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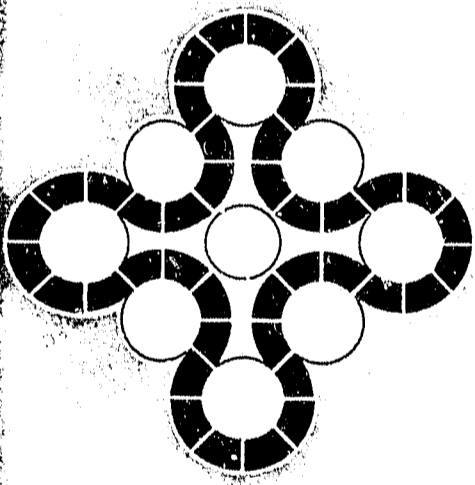
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RALPH—AN ONLINE COMPUTER PROGRAM FOR ACQUISITION AND REDUCTION OF PULSE HEIGHT DATA

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R. C. Davies, R. S. Clark**, J. E. Keith**

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Studies Relative to the Application of Gamma-Ray Spectrometry to Lunar
and Planetary Measurements

R. L. Heath, Principal Investigator

** Employed by NASA, Houston, Texas

ABSTRACT

A background/foreground data acquisition and analysis system incorporating a "high level" control language has been developed for the Radiation Counting Laboratory at the NASA Manned Spacecraft Center in Houston, Texas. The system supports acquisition of gamma-ray spectra in a 256 x 256 coincidence matrix (utilizing disk storage) and simultaneous operation of any of several background support and data analysis functions. In addition to special instruments and interfaces, the hardware consists of a PDP-9 with 24K core memory, 256K words of disk storage, and DEctape and Magtape bulk storage.

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The authors acknowledge all other individuals who have in any way contributed to the development and continual performance of the RALPH system.

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INTRODUCTION

RALPH* is a program for acquiring both singles and dual parameter coincidence data from scintillation detectors. RALPH is written in a psuedo foreground/background environment which allows acquisition to continue while previously acquired data are being reduced or other functions are being performed. A 4K section of core is reserved for overlays which may be called in upon request. The overlays give greater program capability to the system than would otherwise be available in the limited core space.

RALPH is written for the following computer configuration:

PDP-9 computer with three (3) 8192-word memory banks and with the extended arithmetic element (EAE).

A 256K word RF15-RS09 DEC disk .

DEC's high-speed paper tape reader and punch unit.

Calcomp Plotter Model 563 or 565.

DEC tape (2 minimum): TC02 controller with TU55 magnetic tape transports.

Industry compatible magnetic tape transport model TU20 and TC59 controller.

Dual Nuclear Data ND-161 ADC's (modified) and NH04C ADC controller (modified).

Four 18 bit scalers (designed by Digital Equipment Corp.).

One 18 bit timer scaler (designed by Oak Ridge National Laboratory).

A bidirectional serial data interface between the PDP-9 and a PDP-8/L (designed by Aerojet Nuclear Company).

One control panel with function box (designed by Aerojet Nuclear Company).

The control panel and function box are used as a backup for the teletype and to control certain data acquisition and display functions.

The serial data interface is used to transfer data to the PDP-9 from a Nuclear Data 50/50 system through a PDP-8/L.

*RALPH - Reduction and Acquisition of Lunar Pulse Heights

1.0 PROGRAM LAYOUT

RALPH operates in two general modes called HIDE and SEEK. The command SEEK activates the acquisition mode and the command HIDE activates the data reduction mode. Activation of either mode really means that the data buffers being accessed have been changed. There are F, M, Sum, and scalers and counters buffers for both acquisition and data reduction (SEEK and HIDE). See Appendix A for a description of the core layout.

The main operating system of RALPH occupies the first 16600₈ locations of bank 0. It contains all of the handlers for the several devices on the system such as DEC tape, plotter, panel, function box, disk, ADC, teletype real-time clock, live-time clock, etc. The main system also contains a refresh display loop which runs at idle time.

Locations 16600 through 17631 are used for 268 special floating point registers. The commands R1, R2, and RG;X are used to access these registers. The first two (2) registers are in 3 word floating point notation while the other 266 are in 2 word notation. These registers may be thought of as "COMMON" registers since the main system as well as all overlays can access them.

Overlays can be called into core upon request to extend the functions or available commands of the system. All overlays occupy locations 20000-27777 of core memory and reside on absolute DEC tape blocks.

Memory locations 30000 through 37777 are used for the duplicate data buffers for acquisition and data reduction, ADC list buffers, teletype buffer and miscellaneous scratch areas. Locations 40000 through 57777 are used for the 127 x 127 folded matrix in acquisition mode. In HIDE mode, the use is dependent upon the overlay currently in core.

1.1 Main Operating System

The RALPH OS (Operating System) is an interrupt structured system written in macro-9 assembly language. RALPH operates a refresh display as the idle loop. Upon interrupt, all appropriate registers are saved on a stack. Return from the interrupt is made by popping off the stack the last set of registers to be pushed onto the stack. This allows for nesting of interrupts and sets the response time to any interrupt to a minimum.

The RALPH OS contains all of the I/O handlers. This helps prevent illegal interrupts from occurring by having all devices resident.

The teletype handler which is contained within the OS has a buffer which can handle up to 170₁₀ characters. This allows any number of characters to be individually erased or an entire line to be erased. Buffering the input in this manner also gives the

capability to have sequences of commands placed in the buffer before starting execution of them. See the SEQ commands.

While the system is waiting on I/O or simply sitting idle, the OS runs through a display loop. A number of different displays are available upon operator request.

1.2 Acquisition Mode (SEEK)

After an initial loading of RALPH or upon typing SEEK, all acquisition buffers are made available to the user. The user may ask the system to give a live display of F, M, Sum, or coincidence spectra. The acquisition parameters may be changed, buffers erased and the 256 x 256 matrix on disk erased, and/or the data may be saved, etc. In short, most functions within the system may be performed on the acquisition data when in SEEK mode of operation. The data reduction (HIDE) buffers are not available to the acquisition (SEEK) mode.

All overlays except EXTEND force program operation into hide mode when read in from DEC tape. However, once the particular overlay is in core, the SEEK command may be given and the overlay then used in seek. This precaution is provided to prevent the user from destroying acquired data by mistake.

1.3 Data Reduction Mode (HIDE)

The HIDE command makes all data reduction buffers available to the system thus protecting the acquisition data. This allows the user to start acquisition and then proceed with data reduction on previously acquired data. The acquisition of data will continue on as if nothing else were happening. There are two main options which are resident in HIDE. They are STRIP and 50/50 (C5050 and S5050). These commands function as resident overlays in that they add new features to the program.

All overlays may be called into the hide mode. The overlays are always read from DEC tape unit 0 into memory locations 20000 through 27777. Following is a list of the presently available overlays. Section 1.4 describes the overlays.

EXTEND	8.5	
LIB	8.6	
SEARCH	8.7	
SING	8.8	
PLOT	8.9	
FOCAL*	8.10	
INVERT	8.11	
FORMAT	8.12	
STRIP	8.3	Resident in RALPH hide mode
C5050 and S5050	8.4	Resident in RALPH hide mode

*FOCAL is a trademark of DEC.

1.4 Overlays

All overlays occupy core locations 20000 through 27777. The system tape is assumed to be on DEC tape unit 0 and all overlays are read in from the system tape. Each overlay resides in particular absolute blocks on tape. If the desired overlay is already in core, it is not read in again if requested.

1.4.1 EXTEND

EXTEND is found in blocks 20-37 of the system tape. The EXTEND overlay is read in when the command EXTEND is given. This overlay is the only one which can be read directly into the SEEK mode and should only be used in SEEK mode. All other overlays force the system to enter HIDE mode.

EXTEND allows the user to display various parts of the 256 x 256 matrix. This overlay also has the commands to store the 256 x 256 matrix on any one of the output devices (DEC tape, mag tape, or disk) and to retrieve the same again and place it back on the disk. The following commands are in the EXTEND overlay.

GMAG;X	8.5.2
MGSLOT;X	8.5.3
DMAG;X	8.5.1
CON;S,Y,DX,DY	8.5.4

Some future commands will be:

GMAG;±Y*X
GMAG;±Y/Z*X
MGSLOT;±Y*X
MGSLOT;±Y/Z*X

1.4.2 LIB

LIB is found in blocks 100 through 117 on the system tape. The LIB overlay is read into core when the command LIB is given. This overlay creates library tapes from data tapes. Library tapes contain only the ID blocks of individual spectra. This way information about many spectra from any DEC tapes (magnetic tape or disk) may be stored on one tape. The following commands are available.

LAST	8.6.5	LREN;X,Y	8.6.9
LIND	8.6.7	LDEL;X	8.6.8
LGET;X	8.6.11	LNEW	8.6.1
GREEL;X	8.6.10	GET;X	8.6.2
XFER	8.6.6	RDSLOT;X	8.6.3
OUTPUT	8.6.4	ISETUP	8.1.2

1.4.3 SEARCH

SEARCH is found in blocks 120 through 137 on the system tape. The SEARCH overlay is read into core when the command SEARCH is given. This overlay searches library tapes to find those spectra meeting certain criteria. The ID blocks of those spectra meeting the criteria are placed on a scratch tape. Criteria are selected by going through a SETUP command and entering the parameters. Special characters are used for and/or on parameters within a given command. All criteria must be met for a spectrum to be selected. The following commands are used within SEARCH:

CLEAR	8.7.1
GO	8.7.2
FMT	8.7.3

1.4.4 SING

SING is found in blocks 140 through 157 on the system tape. The SING overlay is read into core when the command SING is given. This overlay has the capability of handling singles spectra of up to 4096 channels. These spectra may come from pulse height analyzer systems which have paper tape output. The format must conform to the following:

1. Leader must be either blank tape or eighth level punch only.
2. If channel numbers are specified, they must have 4 (four) digits.
3. Each channel must be terminated by a character other than a number.
4. The first channel on the tape will contain the time either in seconds or in hundredths of a minute.
5. The tape must be terminated by a level 4 punch.

Most all functions within RALPH may be used in the singles mode. Functions which change while in the SING overlay and all functions peculiar to SING are listed below.

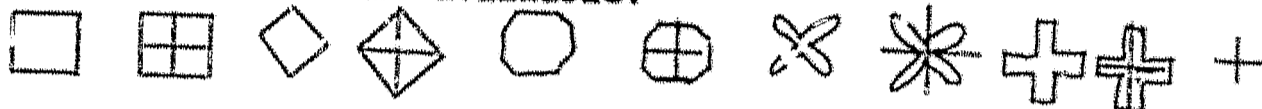
M,SUM,FM, and CONTUR are same as F

W window size may increase to 4096

READPT	8.8.7
RDTMC	8.8.9
READ8	8.8.8
SSING	8.8.4
CSING	8.8.3

1.4.5 PLOT

PLOT is found in absolute blocks 160 through 177 on the system tape. The PLOT overlay is read into core when the command PLOT is given. Whichever singles spectrum is displayed on the scope may be plotted with this overlay. A labeled X-Y axis is drawn first along with any descriptive message which the user may have entered. The X axis may be lengthened or shortened and plots may be overlaid. Plots may also appear in either linear or log form. The following plot characters are available:



The commands that are available are listed below:

PLOT	8.9.4
PLOT;A,B	8.9.1
PLT	8.9.6
PORG	8.9.5
TOPM	8.9.2
BOTM	8.9.3
SEX;N	8.9.7

1.4.6 FOCAL

FOCAL is found in blocks 200 through 217 on the systems tape and is read in when the command FOCAL is given. This overlay was converted directly from DEC's PDP-8 version of FOCAL. It has been modified to operate under the RALPH OS, but it still maintains the same command structure. FOCAL uses the upper 8K (40000 through 57777) for program and data storage.

Four new functions have been added and a number of library commands have been implemented. An automatic start feature has also been added to the FOCAL overlay. See section 8.10 or Appendix C for new FOCAL commands.

1.4.7 INVERT

INVERT is found in blocks 220 through 237 on the systems tape. This overlay is read in when the command INVERT is given. This overlay added two functions to the system. The first function performs non-linear least-squares fitting of up to twelve 256 channel component (known) spectra to a composite (unknown) spectrum. The least-squares method tries to find the best ratios of each known spectra to the unknown which would cause the least amount of residue when each spectrum is multiplied by its corresponding ratio and subtracted from the unknown spectrum. The ratios are the

regression coefficients or the amount of component found in the composite. The residuals are the channel by channel amount left after the subtraction.

The regression coefficients (intensities) of the spectra are stored in the common registers 3-14 and the corresponding standard deviations in registers 15-26. The residuals are stored in the F spectrum data area of HIDE mode and may be displayed. The residuals determine the quality of fit.

The second function does zero and gain shifting of any singles spectra which is presently being displayed. It should be noted that some error is inherent in the method used. Some error is accountable to the integer truncation done when the data are placed back in the display area. Other errors can occur when channels are lost or gained by shifting.

The following commands are available:

MATRIX;X	8.11.1
INVERT;N	8.11.2
GSHIFT;±±	8.11.3

1.4.8 FORMAT

FORMAT is in blocks 240 through 257 on the systems tape. It is read into core when the command FORMAT is given. This program is the same format routine written by Digital Equipment Corporation. It has been modified to run in the overlay area under RALPH OS. Everything should be shut down including acquisition while running the formatter because the DEC tape marking routines are not interruptable. This overlay has one command called FORMAT (8.12).

2.0 ACQUISITION

Although RALPH is primarily a multi-parameter program, it also simultaneously obtains singles spectra from each detector. The multi-parameter data are sorted, as they are acquired, and stored in a folded 127 x 127 matrix in the upper most core bank and on the disk in a 256 x 256 matrix. The unsorted coincidence data may also be stored on industry compatible magnetic tape as unsorted addresses rather than a spectrum. Singles spectra are stored in 256 channel ramp lengths. For purposes of backup and to obtain half-life data, all accumulated spectra including the 127 x 127 matrix may be periodically dumped on DEC tape unit 4. Because of the techniques used for storing the 127 x 127 matrix in upper core, it is essential to have gains and responses of the two detector systems as nearly identical as possible.

2.1 Data Entry from ADC

RALPH utilizes the ADC interface in the list mode. In the list mode, a buffer is set up for each detector. Upon arrival of each event from the ADC, the event and 6 bits of identifying information are stored into a buffer location on a memory cycle-stealing basis. For every event coming from the ADC, an entry is put in both the F and M buffer lists. For example: if an F singles event occurs, the proper channel number and identifying information is put in the F buffer list. In the corresponding location in the M buffer list, channel number 0 is stored with the identifying information specifying the M event to be a reject. In RALPH, these buffer lists are 16 events long. After 16 events have occurred, an interrupt is generated and the sorting of the data is begun. There are actually two sets of buffer lists so that when one set is being sorted, the other set is being filled.

Only three of the six identification bits are used in the present mode of operation. The six bits are in bits 0-5 of an 18 bit number. The bits of interest are 0, 1 and 3. Bit 0 indicates which side the event arose from with the following convention: bit 0 on a 0 is an F event; bit 0 on a 1 is an M event. Bit 1 indicates if the event was accepted or rejected; 0 being the accepted state and 1 the rejected state. Bit 3 indicates whether the event was a single or coincidence event, 0 being the singles event and 1 being the coincidence event.

2.2 Data Sorting

One of the great advantages that the list mode of operation enjoys is the ability to manipulate the data as they come into the machine and store them in any way desired. In RALPH, considerable information is gleaned from each data event. The sorting routine first takes a pair of events from the F and M buffer lists, then categorizes them into one of the following types:

- a) Good coincidence events
- b) Good singles events

- c) Singles rejects
- d) Coincidence rejects
- e) Error rejects

Once the sorting routine has identified which category a pair of events resides in, then several different pieces of information are derived. In the case of a good coincidence event, the coincidence matrix in upper core is incremented, the coincidence matrix on disk is incremented, a coincidence event is prepared to be written on the magnetic tape transport (if option specified), and a sum spectrum is incremented and the number of good coincidence events is incremented. The sum spectrum is created by taking the F and M channels of a coincidence event, converting them to 256-channel ramps, and adding them together to form a 512-channel sum spectrum. All channels above 256 are stored in channel 256 of the sum spectrum. If the event is identified as being a good singles event, it remains to identify which one was the reject and which one was the good event and to increment the appropriate singles spectrum. If the event is a singles reject event, then the sorting routine will increment a 36-bit register, i.e., two consecutive core locations. If the event is categorized as a coincidence reject, then again a 36-bit register is incremented. For every good singles event, one of the F or M singles registers is also incremented. If the event is not in any of the above categories, a 36-bit error reject register is incremented.

Coincidence data are stored in upper core in a special format. If the gains and responses of both detector systems are kept nearly identical, it is possible to reduce by approximately one-eighth, the storage area required for a coincidence matrix. This is because the data can be stored in what might be described as an overlapped form. In the ordinary coincidence matrix, if one were to draw a diagonal from the lower left-hand corner to the upper right-hand corner, events falling at symmetric locations on either side of the diagonal are equivalent (if the gains and responses of the two detector systems are equal). Under these conditions, it then becomes necessary to only store data on one side of the diagonal plus the diagonal itself. This is the type of storage that is being utilized in RALPH. In this case, the coincidence pairs are always arranged such that the M value is greater than or equal to the F value, which results in all data being stored in the upper half of the coincidence matrix. In addition, each coincidence pair is divided by 2 so that each point in the folded matrix actually represents 4 points of the original 256 x 256 matrix.

Each event of the original coincidence matrix is placed into a 64₁₀ word buffer. A disk routine takes the events out of the buffer and writes them on the disk in a 256 x 256 matrix. If the

ADC ever fills the buffer before the disk routine can empty it, the ADC and timers are shut down until the disk catches up.

In order to access unfolded data along the positron ridge ($E = .511$ MeV), a special 127-channel spectrum is created and overlays part of the coincidence matrix where $M = 127$ and/or $F = 127$. The spectrum is created from events where $F < M$ and $10 \leq M \leq 13$. The spectrum can be accessed by the commands CS;127.

Once the events from the buffer lists have been stored, there are data of the following forms: a 127 x 127 coincidence matrix stored in upper core, a 256 x 256 coincidence matrix in locations 0 through 177777 of disk 0, unsorted 256 channel coincidence data stored on magnetic tape (if specified), a 256-channel spectrum for both the F and M singles, a 256-channel sum spectrum, and six 36-bit registers containing the good F singles, the good M singles, the singles rejects, the good coincidence events, the error rejects, and the coincidence rejects. In addition, the four hardwired scalers denoted as A, B, C, and D are used to collect information about the detector system.

2.3 Count Capacities

Up to 262,143 counts may be stored in each channel of spectral data. All counts in excess of this number are lost; i.e., when the 262,144th count arrives in a channel, the contents of the channel will be 0. When one more count arrives, the contents will be 1, etc.

All scaler quantities such as singles events, the four external scalers A, B, C, D, etc., are stored with a 36-bit capacity. This is approximately 6.9×10^9 events.

2.4 Time

RALPH has full provisions for keeping account of live-time and real-time. The user has the option at the beginning of the experiment to enter the length of live-time desired. The times are always entered as integer minutes.

NOTE: If data reduction is taking place concurrently with data acquisition, the coincidence to magnetic tape option and the DEC tape dump to unit 4 option are ignored. The 127 x 127 coincidence matrix is not stored either. The core used by the 127 x 127 matrix will be used by the data reduction routines. The SEEK command restores all the above.

3.0 DATA REDUCTION

The purpose of data reduction in RALPH is to determine the amounts of particular isotopes which are present in the substance from which data have been acquired.

In order to do this, spectra are acquired from radioisotopic standards. These standards represent a known quantity of a particular isotope. After a representative selection of standards have been acquired, the actual data analysis may resume.

There are two methods of reduction which may be used in RALPH. The two methods are stripping and least squares regression analysis. The stripping method strips the coincidence matrix as well as the singles spectra. The least squares method is used on singles spectra only.

3.1 Stripping

Stripping is the subtraction of standard spectra from an unknown spectrum. If the exact amount of each component, which is present in the unknown, were subtracted from the unknown, the residual or amount left would be zero (0). The general idea then is to subtract the correct amount of each standard present in the unknown from the unknown in order to obtain the lowest amount of residual.

The correct amount to subtract is given by the ratio of the area of the unknown peak to the area of the corresponding standard peak.

Stripping standards from an unknown is performed from the high energy peaks toward the low energy peaks because of the influence the Compton scattering of high energy peaks has on the low energy peaks. Note, however, that single peaks are not stripped but that an entire isotope is stripped from the unknown.

The commands GET;±F*X (8.2.2) and RDSLOT;±F*X (8.2.3) are used to strip the spectra. An example is presented here to show how the first isotope might be stripped. In this example, disk is used for scratch, DEC tape unit 3 has the unknown, and DEC tape unit 4 has the standards.

```
HIDE          / Puts RALPH in HIDE mode.
STRIP         / Activates the strip functions.
DISK          / Use DISK for scratch area.
INIT         / Zeroes out scratch area.
D 3          / Specify DEC tape unit 3.
GET +1*14066 / Add unknown 14066 to scratch area.

CS 14,15     / Cuts a slice out of the
W 63,67      / coincidence matrix.

R1 A         / Put the area in common
              / register 1.
```

CS 13
 W 63,66 / Cut another slice.

R1 +A / Add the area to the previous
 / contents of R1.

VER 12
 HOR 65 / Specify a particular point in the
 / matrix.

R1 +B / Add point to R1.

/ R1 now contains the number of counts in the area under
 / the peak for the unknown.

D 4 / Specify DEC tape unit 4.
 RDSLOT 1 / Read in standard from slot 1.

CS 14,15 / Cut a slice.
 W 63,67

R2 A / Put area in common register 2.

CS 13 / Cut another slice.
 W 63,66

R2 +A / Add area of this slice to R2.

CONTUR / Add point to R2.
 R2 +B

RDSLOT -*1 / Strip the amount R1/R2 of the
 / standard in slot 1 from the
 / unknown in the scratch area.

Do next standard.

3.2 Least Squares Analysis

The least squares method performs a regression analysis of standard spectra to an unknown spectrum. The user must supply all of the standards which are present in the unknown in order to get a good fit and to obtain the correct ratios.

Once the ratios have been obtained through the least squares method, RALPH subtracts the appropriate amount of each standard from the unknown to form the residuals. The residuals determine the quality of fit. The closer the residuals approximate zero, the better the fit.

The quality of fit is affected by the similarity (or dissimilarity) of the standards to the unknown and the closeness of the gain and zero shifts of the spectra.

The commands MATRIX;X (8.11.1) and INVERT;N (8.11.2) are used to do a least squares analysis. A regression analysis example of a spectrum to itself is given below.

```
HIDE          / Put RALPH in HIDE mode.
F            / Specify F singles spectrum.
INVERT       / Call in overlay.
RDSLOT      1 / Read data from slot 1.
MATRIX      0 / These data will be used as the
              unknown.
MATRIX      1 / These data are the standard.

INVERT      1 / Perform the least squares fit.

/ Common register 3 will contain the regression coefficient
/ and register 15 will contain the standard deviation of
/ the fit.
```

3.3 Summary

Both techniques have their advantages and disadvantages. The least squares method requires all standards to be present for a fit, whereas the stripping method does not. The stripping method, however, requires the user to determine the ratios by choosing the appropriate areas, whereas the least squares method calculates the ratios.

4.0 PANEL

The panel consists of an array of rotary switches and momentary contact push buttons. The switches are arranged in three rows of four switches and the push buttons in two rows of 12 as shown in Figure 1.

The rotary switches are numbered in octal code left to right starting in the upper left-hand corner with a switch code of 1. Each switch has eight possible positions which are coded in octal. The 24 push buttons are treated in the interface logic as three eight-position switches with switch codes of 15, 16 and 17.

When a change in panel status occurs (i.e., a switch is turned or a button is pushed), an interrupt is generated. The program in turn reads the panel status into the accumulator to determine which knob or button generated the interrupt. Bits 11 through 14 of the AC will contain the switch code and bits 15 through 17, the position code when the panel status is read.

The meaning of each position of a knob and of each push button is completely dependent upon the program which is presently interpreting the panel. The significance given by RALPH to each knob position and push button is discussed in sections 8.13 through 8.16 below.

4.1 Panel Function

RALPH uses the panel as a status indicator, a backup for the teletype, and to control certain display functions not available through the teletype.

4.1.1 Status Indication

Across the top of the Control Panel are six lights that may be turned on or off under program control. The program RALPH utilizes all the lights but the second from the left-hand side of the panel.

RALPH ENABLED. If this light is on, the program RALPH is in the computer and operating.

ERROR INDICATOR. This light is on any time a user has attempted to perform an illegal operation with the panel. The error condition will be removed by performing the desired operation in the proper manner.

The following are the illegal operations that will cause the ERROR INDICATOR to be lit:

1. In the block marked READ OUT CONTROL, the CLEAR button must be depressed before depressing the START button, otherwise an ERROR INDICATOR will be given.

2. If the ADC's are in operation, depression of any of the buttons in the blocks marked IBM MAGNETIC TAPE CONTROL, STORE COINC EVENTS ON TAPE, or ERASE ALL DATA will cause an error condition.

3. In the block marked ERASE ALL DATA, the ERASE ENABLE button must be depressed before depressing the ERASE AND RESET button.

COINC TAPE INDICATOR. When this light is on, the coincidence events are being written on the IBM compatible tape transport.

PERIODIC DUMP INDICATOR. When this light is on, all data are being dumped periodically on a DEC tape transport.

ANALYZE INDICATOR. When this light is on, the ADC's are in operation, i.e., the experiment is in progress and data are being acquired.

4.1.2 Teletype Backup

A number of the teletype commands are duplicated by the panel. If the teletype malfunctions or quits entirely, the user can still set up the equipment, start and stop acquisition, store data, and control the display all by use of the panel.

4.1.3 Display Control

A few display functions can be given with the panel that cannot be given with the teletype. They are data rotation, number of log decades, and log base line decade. See sections 8.15 and 8.16.

5.0 FUNCTION BOX

The function box consists of 12 keys. An interrupt is generated when the first button is depressed and/or when the last button is released. A key register holds the status of the keys and can be read into the accumulator at any time to determine which buttons are down.

The button locations and accumulator bit assignments are shown in the following diagram. When a button is pushed down, the bit is set to a one.

1	2	3
AC1	AC2	AC3
4	5	6
AC4	AC5	AC6
7	8	9
AC7	AC8	AC9
10	11	12
AC16	AC10	AC17

The function box is used to input numeric data and control some display functions. Key 10 initializes the box for numeric input and key 12 initializes the box for display control. See section 8.17 for a description of the functions for each key.

6.0 BIDIRECTIONAL SERIAL DATA INTERFACE

The bidirectional serial data interface was built by Aerojet Nuclear Company. The interface transfers data between the PDP-9 computer and a PDP-8/L computer. With software commands, the interface can be instructed to transfer data between the PDP-9 and a modem.

The data are transferred in 8 bits. When 8 bits have been assembled, an interrupt is generated in the computer receiving the data. The data are then read into the low order 8 bits of the accumulator. Reading the 8-bit register into the accumulator generates an interrupt in the computer sending the data. This interrupt indicates that the interface is ready for more information.

The PDP-9 has control over all data transfers. The PDP-9 can enable or disable the interface from generating interrupts. This makes it possible for RALPH to accept data from the PDP-8/L only when RALPH wants to accept data. This safeguards the PDP-8 activities from the serial data interface.

The transfer rate is 20 KG. Actual transfers of the F and M 64 channel singles spectra and of the 64 x 64 channel coincidence matrix from the 8/L to the 9 take about 35 seconds.

At present, data are only being transferred from the PDP-8L to the PDP-9. The software has not been completed to handle transfers in the other direction or transfers between a modem. Diagnostics have been written and used to check transfer of data in both directions.

7.0 DEVICE FORMATS

There are four major formats used with the data devices. They are called (1) data format, (2) library format, (3) mag tape dump format, and (4) scratch format. There are four slightly different formats within the "data format" classification. They are (1) regular format, (2) DMAG format, (3) 50/50 format, and (4) singles format. Appendix D has diagrams of the several formats.

The DEC tape, disk, and magnetic tape are the devices used for data storage and retrieval. RALPH is device independent which means the devices can be used interchangeably. The commands D (8.1.47), DISK (8.1.56) and TAPE (8.1.57) specify which device(s) will be used for data storage and retrieval.

Each DEC tape unit or magnetic tape unit is considered to be one unit. The disk, however, may be thought of as three units on the one platter. The disk is software divided into three sections. The first section, disk addresses 0 through 177777_8 , is used for the 256×256 coincidence matrix. The second section, disk addresses 200000 through 264377_8 , is used for scratch area (see section 8.1.56). The third area, disk addresses 264400 through 723400_8 , is used for spectrum storage as any DEC tape or magnetic tape is used.

7.1 Data-Format

Data-format is used for the storage of experiment data and associated parameters. The devices are logically divided into 400_8 word blocks. The first block contains an index. Blocks 2 through $N-1$ (where N is defined by 7.1.1, 7.1.2, 7.1.3, or 7.1.4) are used for the first experiment, blocks N through $2N-1$ for the second experiment, etc. Each set of blocks used for an experiment is called a slot. Slots are numbered from 1 to the number of spectra which may be put on a device.

7.1.1 Regular Format

Forty-four (44_8) blocks are used per slot (per experiment) when using this format. The DEC command creates this format when in seek mode and when in hide mode (a different format is used in SING, C5050, or S5050). Fifteen (decimal) spectra maximum can be stored on DEC tape or disk. Mag tape is allowed 88 spectra maximum.

The first block of the slot contains the ID information for the experiment. The TIMES, COUNTS, SCALER, and the SETUP (8.1.3) parameters are in the ID block.

The second, third, and fourth blocks of a particular slot contain the SUM, F, and M spectra respectively.

The next 40 blocks contain the 127×127 folded coincidence matrix. The matrix is dumped directly from core to the device.

7.1.2 DMAG Format

A variable amount of blocks are used per slot in this format. The number of blocks used increases directly with the number of non-zero entries there are in the 256 x 256 coincidence matrix. The index is written after the data are stored so that the number of blocks used can be entered in the index along with the experiment ID. The DMAG command creates this type of format. The number of spectra are dependent on the number of zero entries.

The first block of the slot contains the ID information pertaining to the experiment. The TIMES, COUNTS, SCALER, and the SETUP (8.1.3) parameters are in the ID block.

The second, third, and fourth blocks contain the SUM, F, and M spectra respectively.

The next varying amount of blocks contains the 256 x 256 coincidence matrix. The matrix is read from the disk two blocks (1000₈ words) at a time and packed into an output buffer to be written on the output device. Successive channels which contain zeroes are packed into one 18-bit word. Bit 0 is set to a 1 to indicate that the word contains packed zeroes. Bits 1 through 17 contain the number of successive channels which contained zeroes.

7.1.3 50/50 Format

Twenty-five (25₈) blocks are used per slot in this format. The DEC command creates this format when in C5050 or S5050 mode. The DEC tape and disk can hold up to 26₁₀ spectra. The magnetic tape can hold 88 spectra.

The first block of the slot contains the ID information. The TIMES, COUNTS, SCALER, etc., are in the ID block.

The second, third, and fourth blocks of a slot contain the SUM, F, and M spectra respectively.

The next 21₈ blocks contain the 64 x 64 coincidence matrix. The matrix is dumped directly from core to the device.

7.1.4 Singles Format

Twenty-one (21₈) blocks are used per slot in this format. When in singles mode, the DEC command creates this format. The DEC tape and disk hold 26₁₀ singles spectra. The industry compatible magnetic tape holds 88 spectra maximum.

The first block of the slot contains the ID information. The TIMES, COUNTS, SCALER, etc., are in the ID block.

The next 20_8 blocks contain a 4096 channel singles spectrum.

7.2 Library Format

The library tapes are the only tapes with this format. Library tapes are always created on DEC tape unit 5. The tape is logically divided into 400_8 word blocks.

The first block contains an index of reel numbers. Every data tape has a reel number associated with it. For every data tape from which ID blocks have been taken and placed on a library tape, its reel number is inserted into the index of the library tape. The ID blocks from 35_{10} data tapes can be placed on a library tape.

Blocks 2 through N contain the ID information from the first data reel, blocks N+1 through 2N contain the ID blocks from the second data reel, etc. N is the number of experiments on the data device (see Sections 7.1.1 through 7.1.4). Each set of blocks thus defined is a slot.

The first block within a slot contains the experiment ID's from the data reel corresponding to this slot.

The next N blocks contain the ID blocks of the several experiments from one reel of data.

7.3 Mag Tape Dump Format

One of the options during acquisition is to dump the coincidence events to magnetic tape for input to a large computer.

Since each value is 8 bits in length, two events can be stored in one 18-bit computer word as shown below.

0XXXXXXXXXXXXXXXXXX

8 bits 8 bits
F event M event

18 bits

one computer word

An F event is combined with the corresponding M event in the above format and stored in memory until 256 computer words have been filled. Events are then stored in another area while the 256 words and an end-of-record gap are written on the tape.

When the dump is complete, the MTEOF command should be given to write an end-of-file at the end of the data.

7.4 Scratch Format

The scratch units (disk or DEC tape unit 5) are the only units which use this format. The units are logically divided into 151_8 blocks of 400_8 words apiece.

The scratch units are used for storing the floating point results of a strip or the floating point data for the non-linear least squares fit.

8.0 COMMANDS

The program is designed to allow control of all computer functions and the control of all peripheral devices by commands issued through the teletype keyboard. A command consists of from one to six characters, a terminator and sometimes an argument. The terminators are listed below.

A semicolon or carriage return is used to terminate a command and start execution of that command. If a command has an argument, the semicolon is used between the command and the argument. For example, the command SETUP; requires no argument and can be terminated by either a semicolon or carriage return. However, both a semicolon and a carriage return are required in a command that has an argument as in CS;2 *.

A comma is used to separate arguments when more than one is used. CS;2,5 is an example.

A space is used in place of the semicolon and altmode is used in place of the carriage return when immediate execution is not desired. In this way, several commands can be input and execution started by using a semicolon or carriage return on the last command. Such a list of commands can be saved for repeated use with the SEQ; commands. (See Section 8.1.65.)

There are four special control characters to be used as follows:

Control "C" and control "P" (↑C and ↑P) are used to delete all pending text and to stop all I/O on the teleprinter, the paper tape reader/punch, and the plotter.

Control "C" is also used to terminate single character input as used in FOCAL and DEBUG.

A control "U" (↑U) is used to delete all pending text.

A rubout character is used to delete the last character in the input stream. There is no limit to the number of characters that can be deleted in this manner.

If an erroneous command is typed, the computer will type back to the user a question mark indicating it did not understand and will then await a new command.

In addition to the teletype commands, the experiment may also be controlled by the Control Panel. This device consists of twelve rotary switches, each having eight positions, 24 push button switches, and a 12-key function box. The device is completely under program control. Thus, the functions performed by the switches are entirely determined by the program that is residing in the computer. The Control Panel is normally quiescent, i.e., interaction with the computer only takes place when a knob has been turned or a push button depressed. When such an

*The Symbol) is used to mean carriage return.

**The control "C" is input by depressing the control shift while typing the C.

action does take place, the computer is interrupted. The program at that point reads a register in the panel to determine which knob, button, or key was activated and then performs the appropriate action. Because the panel has such versatility, no permanent labeling of the knobs and switches is provided. Instead a translucent overlay is provided which labels each of the functions the panel can perform under the control of the program corresponding to the overlay.

Experiment control may be exercised from either the teletype or the Control Panel or any combination of these two devices. The functions that the panel performs do not exactly duplicate the functions that the teletype commands perform. However, the design philosophy is that an experiment may be controlled completely from either device. Thus the panel is a true backup device in that experiments can be conducted if the teletype is inoperable. In those cases where the two devices have duplicate functions, the last device activated determines the present state of the function in question. For example, if one were to set the vertical display scale to LOG on the teletype and then push the LOG-LINEAR button on the panel, the vertical scale would be linear.

All of the commands present in RALPH are listed in this section with a detailed description of each. A summary of the commands is given in Appendix C.

The commands which are resident and operate in SEEK are listed first. Those commands resident in HIDE are listed next. Then the commands in the overlays are listed. Last of all, commands which may be given by the panel and the function box are listed. The commands in each section are grouped according to function. Some commands change meaning depending upon the overlay in core at the time. The section numbers giving further information are listed immediately following the command mnemonic.

8.1 SEEK

Activates all of the acquisition buffers and constants for access by all subsequent commands. Reconstructs the in-core 127 x 127 folded matrix from the unfolded matrix on disk.

.Experiment Setup

8.1.1 ERASE - 8.2.1

Erases the F, M, and SUM 256-channel singles data and the coincidence data buffers. Erases the 256 x 256 matrix on disk and clears the counters, timers, scalers, etc.

8.1.2 ISSETUP

Zeroes setup information (start and stop time, spacings, dump flags, etc.).

8.1.3 SETUP

Causes a query list to be initiated to determine the parameters of the experiment. Values that are presently in memory are listed. If the values are not to be changed, a carriage return is typed. If they are to be changed, the new information is typed followed by a carriage return. The inquiries and possible answers are given below.

INQUIRY	TYPE OF INPUT	COMMAND
GAIN:	5 digits	SETUP;
I MANTLE:	1 alphabetic (Y or N)	continued part of SETUP
O MANTLE:	1 alphabetic (Y or N)	continued part of SETUP
PUNCH PAPER:	1 alphabetic (Y or N) The panel function "punch" or the PUNCH command will set it to "Y".	SETU; or continued part of SETUP
DATA TO MAG:	1 alphabetic (Y or N) The panel function "MAG" or the MAG command will set it to "Y".	continued part of SETU or SETUP
START TIME:	5 digits. Can be entered with START command also.	continued part of SETU or SETUP
STOP TIME:	5 digits. Can be entered with STOP command also.	continued part of SETU or SETUP
TOP SPACING:	48 alphanumerics. Can also be entered with the SPACE command.	space or continued part of SETU or SETUP
BOT SPACING:	48 alphanumerics	continued part of SETU or SETUP or SPACE command
WEIGHT:	5 digits	continued part of SETU or SETUP
LUNAR:	48 alphanumerics	continued part of SETU or SETUP
METERORITE:	48 alphanumerics	continued part of SETU or SETUP
ISOTOPE:	48 alphanumerics	continued part of SETU or SETUP

INQUIRY	TYPE OF INPUT	COMMAND
CONCENTRATION:	5 digits	continued part of SETU or SETUP
GENERAL	48 alphanumerics	continued part of SETU or SETUP
COIN TO MAG:	1 alphabetic (Y or N) The panel function to enable coincidence dump will set this to "Y". The disable will set it to "N".	SET; or continued part of SETU or SETUP
DUMP INTERVAL:	5 digits. Also controlled by the periodic data dump function on the panel.	continued part of SET, SETU, or SETUP
PRESET:	5 digits. Also controlled by the preset live-time function on the panel or the LIVERS command.	continued part of SET, SETU, or SETUP
EXPERIMENT:	10 digits. Also controlled by input from function box or by the EXPID command.	continued part of SET, SETU, or SETUP

8.1.4 SETU

Same as SETUP except a shorter query list is given. This command is used when mantle and gain configurations are not changed.

8.1.5 SET

Same as SETU except a shorter query list is given. This command is used when the same sample is to be counted as previously and the sample description is not changed.

8.1.6 EXPID

This command will allow a new 10 digit sample identification number to be entered.

8.1.7 SPACE

This command will allow new values for the top and bottom spacing to be entered.

8.1.8 LIVERS

This command is for live time preset and will allow the live time of the experiment to be changed during data acquisition.

8.1.9 START;X

Enables the ADC's and all scalers. Does not clear any data areas or scalers. A time may be entered at this point.

8.1.10 STOP;X

Disables the ADC's and all scalers. Does not clear any data areas or scalers. A time may be entered at this point.

8.1.11 STAR

Same as START; except time is not entered.

8.1.12 STP

Same as the STOP command except that no time is entered.

8.1.13 UPSET

Prints a listing of all identifying information which was entered with the SETUP command.

Experiment Parameters

8.1.14 COUNTS

Prints the number of events which have occurred in F, M, and coincidence. Prints the number of singles rejects, error rejects, and the number of coincidence rejects which have occurred.

8.1.15 SCALER

Scalers A, B, C, and D are printed.

8.1.16 TIMES

Prints the live-time, the real-time (elapsed clock time), live time left, and present live time of the experiment.

8.1.17 LIST

Prints the parameters of the COUNTS, SCALER, and TIMES commands.

Display Singles

8.1.18 LOG - 8.16.1

Sets the vertical axis to a logarithmic scale.

8.1.19 LINEAR

Sets the vertical axis to a linear scale. Bits 4-17 of the AC switches are used to set the full scale Y-value.

ACTION

SET LINEAR SCALE TO 32 COUNTS	17
64 COUNTS	16
128 COUNTS	15
256 COUNTS	14
512 COUNTS	13
1024 COUNTS	12
2048 COUNTS	11
4096 COUNTS	10
8192 COUNTS	9
16384 COUNTS	8
32768 COUNTS	7
65536 COUNTS	6
131072 COUNTS	5
262144 COUNTS	4

8.1.20 W;X,Y - 8.8.2

Display channels X through Y across the full width of the oscilloscope. Used with singles spectra only. $0 < X < Y < 255$.

8.1.21 SV;X

Display a vertical line across the screen at channel X.

8.1.22 SH,Y

Display a horizontal line across the screen where the Y-axis equals Y counts.

8.1.23 ZZ - 8.15.3

This command works as a flip-flop. One time it will cause channels with zero counts to be unintensified. The next time it will cause them to be intensified. Zero counts in log mode are displayed on the ones decade.

8.1.24 F

Display F singles data.

8.1.25 M - 8.8.1

Display M singles data.

8.1.26 SUM - 8.8.1

Display SUM singles data.

8.1.27 FM - 8.8.1

Overlapping display of F and M singles data.

8.1.28 S

This command is used with the FM mode of display. Each time this command is given, the M spectrum is raised 1/8 of the vertical scale of the oscilloscope. Giving this command 8 times returns the display to its original position.

Display Plane

8.1.29 CS;X

Display the data formed by a plane through the coincidence 127 x 127 matrix in which F=X and M values go from 0 to 126. Because the matrix is folded, interchanging the values of F and M will give the same planar slice. CS;127 gives special data (see Section 2.2, next to last paragraph).

8.1.30 CS;X,Y

Display the data in the planes cut through the coincidence matrix where $F=X+...+Y$ and where $M=0$ through 126.

That is, add all planar slices $F=X$ through $F=Y$ of the coincidence 127 x 127 matrix and display the sum.

Display Coincidence

8.1.31 CONTUR - 8.4.8, 8.8.1

Display coincidence data. The contour mode displays data in the usual X-Y plane. A Z-axis is also present and supposedly comes out from the screen toward the viewer. The 127 x 127 matrix is displayed unless overlays have changed the matrix to something else. See other sections.

8.1.32 CINIT

Display coincidence data and initialize display as follows: set the delta Z (ΔZ) slice to 131K, set the Z-zero value to 0, and remove the vertical and horizontal markers.

8.1.33 ZZERO;X

Establishes a Z plane through the coincidence matrix at $Z=X$. Only values on the Z-axis greater than this plane are displayed.

8.1.34 DELTZ;X

Establishes a delta Z ($\Delta Z=X$) which is used with the Z-ZERO value to determine the thickness of the Z-plane. All values along the Z-axis having Y number of counts such that $Z < Y < Z + \Delta Z$ are displayed.

8.1.35 RINC;X

Sets the amount by which the Z-plane through the coincidence data is to be raised by the R command. The Z-plane is determined by the ZZERO and DELTZ commands. The value X is given in units of counts.

8.1.36 R

Every time this command is given, the Z-plane is raised by one increment as established by the RINC command. If the value of Z exceeds 262,163 counts, Z is reset to the value last specified by the ZZERO command.

8.1.37 HOR;X

Display a horizontal line across the screen that intersects the y-axis of the coincidence data at $y=X$.

8.1.38 VER;X

Display a vertical line across the oscilloscope screen that intersects the X-axis of the coincidence data at channel X.

Display Number Generator

8.1.39 NG;X

Causes a value to be displayed according to the following table.

<u>X</u>	<u>Quantity</u>
0	% live time
1	Contents of location specified by AC switches
2	Same as X=1
3	DEC tape dump slot number
4	Experiment identification #
5	Bright dot contents
6	Bright dot channel
7	Live time left
8	Scaler A
9	Number of error rejects
10	Number of singles rejects
11	Number of coincidence rejects
12	Character display off
13	Scaler D
14	Scaler C
15	Scaler B
16	Character display off

Calculations

8.1.40 AREA

Calculates and prints the centroid, net area, and gross area of the singles data being displayed. The background, B, is calculated by taking three values (one outside and two within the window) on both sides of the window of the singles data being displayed and averaging them.

$$\text{NET AREA} = \sum_{i=L}^u (Y_i - B) \quad \text{GROSS AREA} = \sum_{i=L}^u Y_i$$

$$\text{CENTROID} = \frac{\sum_{i=L}^u \left[(Y_i - B) X_i \right]}{\text{net area}}$$

where L and U are the lower and upper limits of the window and Y_i are the counts in channel X_i .

8.1.41 F40;X

Set the F40 constant to X/100. This constant is used in the P40 calculation.

8.1.41 M40;X

Set the M40 constant to X/100. This constant is used in the P40 calculation.

8.1.43 P40

Using the data within the window being displayed, calculate the gross area, net area, centroid, and standard deviation of the centroid. See 8.1.40 for calculation of areas and centroid. The standard deviation is calculated by: $S.D. = \sqrt{K/\text{NET AREA}}$ where K equals the F40 or the M40 constant depending whether F or M data are being displayed.

8.1.44 BF;X

Set background constant BF to X/100. This constant is used in the F/M command.

8.1.45 BM;X

Set background constant BM to X/100. This constant is used in the F/M command.

8.1.46 F/M

(This command must be preceded by the display command FM.) Using the data within the respective F and M windows, calculate the gross F/M ratio, the net F/M ratio and the standard deviation of the net F/M ratio according to the following formulas:

$$\text{Gross F/M Ratio} = \frac{\text{gross area of F}}{\text{gross area of M}}$$

$$\text{Net F/M Ratio} = \frac{\text{gross area of F} - (\text{FB} * \text{TIME})}{\text{gross area of M} - (\text{BM} * \text{TIME})}$$

$$\text{S.D.} = \sqrt{\frac{(\text{gross area of F}) + (\text{gross area of M}) * (\text{net F/M ratio})^2}{(\text{gross area of M}) - (\text{BM} * \text{TIME})}}$$

See 8.1.40 for gross area calculation. TIME is the elapsed real time for the experiment.

Input/Output

8.1.47 D;X

Specifies the device and/or unit # to be used for data storage and retrieval by most all I/O commands.

<u>X</u>	<u>Unit</u>	<u>Device</u>
0	0	Industry compatible magnetic tape
1	0	DEC disk
2 thru 5	2 thru 5	DEC tape

8.1.48 NEWDIR;X

Create a new directory with reel #X on the device specified by the D command. Any previous index is destroyed.

8.1.49 INDEX

List the directory of the device specified by D (8.1.47).

8.1.50 IND

Rewind the specified unit. Actually does an INDEX command but suppresses the print out.

8.1.51 DELETE;X

Delete the ID,X, from the directory on the unit specified by the D command.

8.1.52 RENAME;X,Y

Change the old ID name, X, to the new ID name, Y, in the directory of the specified unit.

8.1.53 DEC - 8.8.5

Enters the present experiment ID into the index of the device specified by the D command. The experiment ID was entered with the EXPID command (8.1.6) or with SETUP, SETU, or SET. Then the ID block (see SETUP 8.1.3); the F, M, and SUM singles spectra; and the 127 x 127 folded coincidence spectrum are written out.

8.1.54 GET;X - 8.6.2

Searches the index of the specified device (8.1.47) for the experiment ID X. If the ID is not found, a message indicating the error is printed. If found, the ID block, the F, M, and SUM singles spectra and the 127 x 127 folded coincidence spectrum are read into core. If in SEEK mode, the 127 x 127 folded matrix is expanded (but not unfolded) and placed on the disk to represent the 256 x 256 matrix.

8.1.55 RDSLOT;X - 8.6.3

Reads the ID block; the F, M, and SUM singles spectra; and the 127 x 127 folded coincidence spectrum from slot X of the specified unit. See section 7.1 for the definition of a slot. This command is identical to the GET command (8.1.54) except that the index is not searched. This saves a lot of time which would be spent rewinding the unit (particularly DEC tape) in order to read the index.

8.1.56 DISK - 8.3.1

Specifies the direction to be tape-to-disk for the COPY and COPYS commands. DISK also specifies that the disk scratch area will be used by all commands needing scratch area.

8.1.57 TAPE - 8.3.2

Specifies the direction to be disk-to-tape for the COPY and COPYS commands. TAPE also specifies that DEC tape unit 5 will be used for scratch area by all commands needing such.

8.1.58 INIT - 8.3.3

Zeroes the scratch area indicated by the DISK or TAPE command.

8.1.59 COPY

Uses the DEC tape unit specified by the D command and the disk to perform a copy from one to the other. The direction is set by the DISK or TAPE command. The first 1075₈ blocks are copied.

8.1.60 COPYS

Uses the DEC tape unit specified by the D command and the disk scratch area to perform a copy from one to the other. The direction is set by the DISK or TAPE command. The first 151₈ blocks are copied.

8.1.61 MTNOP

Sends a null function to the magnetic tape controller to see if unit is operational. An error is typed if the tape unit is not ready. This allows the user to make sure unit is functional before running the tape unit.

8.1.62 MTEOF

Writes an end-of-file on the magnetic tape. This function should only be used in conjunction with the coincidence to mag tape dump option in seek mode. When acquisition terminates, this command may be given to put an EOF mark on the dump tape. Off-line big computer systems can now read the tape and sense the end of the data (EOF).

8.1.63 PRINT

Prints the data presently being displayed. The data are printed on the teletype 8 channels per line.

8.1.64 PUNCH

Punches the data presently being displayed. The data are punched 6 digits per number with a space between each. Eight numbers are punched then a carriage return line-feed. A four (4) is punched to indicate end of data.

Sequences

8.1.65 SEQ

Opens a buffer area for storage of commands. The SEQ command allows command sequences to be stored in memory for repeated execution. After giving the command SEQ, then commands may be typed using spaces, commas, and alt modes as delimiters. Either a carriage return or a semicolon must be given after the last command to end the sequence.

The sequence remains in core until another SEQ command, RSEQ command, or a GSEQ command is given.

A total of 186 characters may be in one sequence. The number of characters currently in the buffer can be displayed using the function box variable number 12. Overflow of the buffer will cause back slashes to be printed for each character overflowing the buffer.

Example of SEQ command follows. The ↵ means carriage return and the) means an altmode.

SEQ ↵

INDEX RDSLOT 3 W 67,77 AREA)

RSEQ ↵

8.1.66 LSEQ

Lists the command sequence presently in memory.

8.1.67 ESEQ

Executes the command presently in memory.

8.1.68 PSEQ

Punches the command string out in binary format on paper tape.

8.1.69 RSEQ

Reads the next command string from the paper tape reader and starts execution of the sequence. This command can be used to link sequences together by putting a RSEQ command as the last command in a sequence.

8.1.70 GSEQ

Reads the next command string from the paper tape reader and starts listing the sequence.

Common Registers

8.1.71 R1;α

Constant R1 is loaded with the value α where α is equal to one of the following:

A Gross area of data being displayed.

N Net area of data being displayed.

- B Data point in singles or plane mode marked by SV or data point in CONTUR mode marked by VER and HOR.
- T Elapsed live time of hide mode data.
- E Experiment ID of hide mode data.
- W Weight value of experiment in hide buffers.
- C Concentration value of experiment in hide buffers.
- Ixxx Integer number xxx entered immediately following I.
- Rxx Value of common register xx.

8.1.72 R2;α

Loads the constant R2 with the value of α as indicated in 8.1.71.

8.1.73 RG;Y α

Loads the constant Y (Y=1 through 268) with the value α where α is defined as it is in 8.1.71.

Teletype Control

8.1.74 PONOFF

Turns teletype print out on and off in a flip-flop fashion; i.e., first time turns off print out, the next time turns it on, etc.

Miscellaneous

8.1.75 ADC;X

Sets a flag which tells the ADC's whether to shut down or not whenever I/O is in process with DEC tape, disk, or mag tape. X is Y for yes shutdown ADC and X is not for do not shut down the ADC.

Sometimes the DEC tape and the mag tape have thrown noise into the acquisition. For this reason, it is nice to be able to shut down the ADC's when running DEC tape and/or mag tape when noise problems exist.

8.1.76 L

Old data tapes of years past have descriptive information about the experiment stored with the data. This command prints that information.

8.1.77 DEBUG

This is a resident debugging routine. Locations may be examined and modified. Break points may be inserted and deleted and execution can be started at any point. When an address is specified or its contents modified, only the last six digits are used. All digits typed must be octal.

xxxxxxN open location xxxxxx.

U open preceding location.

xxxxxxL change contents of open location to xxxxxx. The next location is then opened for examination.

Space bar hitting the space bar opens the succeeding location.

xxxxxxB insert a breakpoint at location xxxxxx. Breakpoints can only be one deep.

R restore last breakpoint.

xxxxxxG start execution at location xxxxxx.

Carriage leave DEBUG and return to RALPH OS.
Return

8.1.78 EXIT

Types out a message to confirm that the user truly wants to exit from RALPH. The user types Y or N. If N is typed, RALPH continues in execution. If Y is typed, a small bootstrap is read into core from blocks 0 and 1 of the systems tape. See Appendix B on loading procedures.

Extension to Seek

8.1.79 EXTEND - 8.5

Reads in the Extend overlay. This is the only overlay which can be read directly into the seek mode. It should only be used in seek mode.

Hide Mode

8.2 HIDE

Activates all of the data reduction buffers and constants for access by all subsequent commands. The HIDE command deactivates any overlay. Deactivation of an overlay means that the commands within the overlay are not accessible until the overlay is called again. All overlays except EXTEND give an automatic HIDE command when read in from DEC tape if RALPH is presently in seek mode.

8.2.1 ERASE - 8.1.1

Erases the F, M, and SUM singles data and coincidence data buffers of the hide mode. Data on the disk and in the seek buffers are not disturbed.

8.2.2 GET;±F*X - 8.3.5

The F in this command can be Y, Y/Z (Y and Z are integers), or left out. If F is left out, R1/R2 is assumed where R1 and R2 are common registers.

The index is searched for the experiment ID X. Then as the data are read in they are multiplied by F(Y, Y/Z, or R1/R2) and added to or subtracted from the data in core. If F equals 1 and the + sign was indicated, the counts, times, and scalers are also added. Any resultant data point which is negative is set to 0.

8.2.3 RDSLOT;±F*X - 8.3.6

The F can be a value Y, Y/Z (Y and Z are integers), or left out. If F is left out, the value R1/R2 is used where R1 and R2 are common registers.

X is a slot number. The data from the slot X are read in and multiplied by F(Y, Y/Z or R1/R2) and added to or subtracted from the data in core. If F equals 1 and the + sign was indicated, the counts, times, and scalers are also added. Any resultant data point which is negative is set to 0. See 7.1 for definition of a slot.

8.3 STRIP

Strip is a resident overlay within HIDE. The STRIP command puts RALPH into HIDE mode and changes display of singles spectra to display 0 y-value in the middle of the screen allowing both + and - numbers to be displayed. The STRIP mode is used for data analysis. Subsequent DEC tape commands can be given to strip one spectrum from another. Stripping is done in 3-word floating point using a scratch tape or disk. Stripping is used

to find the ratio of one spectrum to another. When stripping more than one standard (known) spectrum from a composite (unknown) spectrum, the user should start at the high energy end and work toward the low energy end of the spectrum.

8.3.1 DISK - 8.1.56

Specifies disk scratch area to be used for the strip.

8.3.2 TAPE - 8.1.57

Specifies DEC tape unit #5 to be used for the strip.

8.3.3 INIT - 8.1.58

Zeroes the scratch area specified by the TAPE or DISK command. The scratch area is 151 four-hundred word blocks long. This command can be given even though the program may not be in the STRIP mode.

8.3.4 LLIM;X

Set the residual channel limit to X. When stripping with the following two commands (8.3.5 and 8.3.6), any channel less than or equal to X will be included in the strip; however, these channels will not be used for the residual calculation. Sometimes overflow occurs in the first few channels during acquisition. These channels can be omitted from the strip with the LLIM command.

8.3.5 GET;±F*X - 8.2.2

This command operates the same as the command in Section 8.2.2 except for the following differences. The data of experiment X are multiplied by F and then added to or subtracted from the data on the scratch unit in floating point. The floating point results are written on the scratch tape. The integer results (positive and negative) are placed in core for display purposes. A flag is set if overflow occurs. The counts, times, and scalers are never summed.

The scratch unit is specified by the DISK or TAPE command.

8.3.6 RDSLOT;±F*X - 8.2.3

Operates similar to the command in Section 8.2.3 except for the following differences. The data from slot X are multiplied by F and added to or subtracted from the data on the scratch unit in floating point. The floating point results are written back out on the scratch tape. The integer results are placed in core for display purposes.

A flag is set if overflow occurs. The counts, times, and scalars are never summed.

8.3.7 RES - 8.8.6

Prints the algebraic sum of the residuals, the sum of the absolute value of the residuals, and the sum of the square of the residuals formed by stripping. These three sums are printed for the F, M, SUM, and CONTUR spectra.

If an overflow was indicated when either the GET or KDSLOT (8.3.5 and 8.3.6) command was given, the message OVERFLOW is also printed.

8.4 C5050

C5050 is a resident overlay within HIDE. It handles 64 x 64 γ - γ data from a nuclear data 50/50 system. The singles data (F, M, and SUM) are only 64 channel spectra. The following commands are either unique to the 50/50 mode or have changed slightly from their meaning in the hide or seek mode.

8.4.1 S5050

This is the strip mode within the 50/50 mode and all commands from the STRIP section are applicable in S5050. See Section 8.3.

8.4.2 READPT - 8.8.7

Erases the hide buffers, zeroes the experiment time parameters, and then reads in the F, M, and coincidence spectra from paper tape. A SUM spectrum is also calculated from the coincidence spectra. The coincidence spectrum is a 64 x 64 square matrix. The paper tape is output from the nuclear data 50/50 system.

8.4.3 READ8 - 8.8.8

Does the same as the READPT command (8.4.2) except that the data are read directly from the 50/50 system through the FDP-8/L to PDP-9 hardware interface.

8.4.4 CF;X - 8.5.5

Display the data formed by a plane through the 64 x 64 coincidence matrix in which $F=X$ and $M=1-64$. CF specifies a vertical plane and means a constant energy of F.

8.4.5 CM;X - 8.5.6

Displays the data formed by a plane through the 64 x 64 coincidence matrix in which M=X and F=1-64. CM specifies a horizontal plane and means a constant energy of M.

8.4.6 CF;X,Y - 8.5.5

Displays the data formed by the sum of the planes through the 64 x 64 coincidence matrix where F=X+...+Y and M=1 through 64. That is, add all the planar slices F=X through F=Y of the coincidence matrix and display the sum.

8.4.7 CM;X,Y - 8.5.6

Add all the planar slices where M=X through M=Y of the coincidence 64 x 64 matrix and display the sum. F runs from 1 to 64.

8.4.8 CONTUR - 8.1.31

Displays the 64 x 64 coincidence matrix. See 8.1.31 for additional information.

Overlays

8.5 EXTEND

Reads in the extend overlay. This overlay is meant to be an extension of the seek mode.

8.5.1 DMAG

Outputs the present experiment ID information and singles spectra from core in the same manner as the DEC command. The 256 x 256 coincidence matrix is then read from disk and output. All output is to the peripheral specified by the D command.

Multiple zeroes in the coincidence 256 x 256 matrix are packed into one word before they are output. Bit 0 of the packed word is set to a 1 to indicate that the word contains packed zeroes. Bits 1 through 17 contain the number of multiple zeroes there were. This method of output conserves considerable space on the I/O device.

8.5.2 GMAG;X

Searches the index of the specified device (8.1.47) for the experiment ID X. A message is printed if the ID is not found. If ID X is found, the ID block and the F,

M, and SUM singles spectra are read into core. This is the same as the GET command. Then the zero-packed 256 x 256 coincidence matrix is read in, unpacked, and written onto the disk. See 8.5.1 for a description of the packing. The 127 x 127 folded matrix is then created from the 256 x 256 matrix and placed in core.

8.5.3 MGSLOT;X

Reads the ID block and the F, M, and SUM singles spectra from slot X of the specified unit in the same way the RDSLOT command does. The 256 x 256 zero-packed coincidence matrix is then read, unpacked, and written on the disk. The 127 x 127 folded matrix is formed and placed in core. This command is identical to the GMAG command except that the index is not searched for an ID.

8.5.4 CON;X,Y,DX,DY

Reads from the disk the portion of the 256 x 256 matrix where the x-values range from X to DX and where the y-values range from Y to DY. DX times DY must be less than 8K. If DX and DY are not specified, they are set to 64. The commands CF and CM (8.5.5 and 8.5.6) are used to cut planes through the data obtained by the CON command.

8.5.5 CF;X or CF;X,W - 8.4.4, 8.4.6

Displays the data formed by the plane (or the sum of the planes in the case of CF;X,W) through the data specified by the CON command. X and W must fall within the limits set by the CON command. With F representing the x-axis and M representing the y-axis, then the plane is defined by F=X (or F=X+...+W) and M=Y to DY. Y and DY are defined by the CON command.

8.5.6 CM;Y or CM;Y,W - 8.4.5, 8.4.7

Displays the data formed by the plane (or sum of the planes in the case of CM;Y,W) through the data specified by the CON command. Y and W must fall within the limits set by the CON command. The plane is defined by M=Y (or M=Y+...+W) and F=X to DX where X and DX are specified by the CON command.

8.6 LIB

Reads in the library overlay.

8.6.1 LNEW;X

Creates a new directory on the library tape mounted on DEC tape unit 5. The tape is given the reel number X.

8.6.2 GET;X - 8.1.54

Searches the index of the device specified by the D command for the experiment ID X. If X is found, the ID block of that experiment is read into core.

8.6.3 RDSLLOT;X - 8.1.55

Reads the ID block from slot X of the specified unit.

8.6.4 OUTPUT

Rewrites the ID block onto the data device specified by the D command. The ID block is written into the same location from which the last GET or RDSLLOT command read from.

The ID block is also saved in another buffer in core for access by LAST.

8.6.5 LAST

Restores the setup information from the last ID block that was written out by the OUTPUT command.

8.6.6 XFER

Moves all ID blocks from the unit specified by the D command to the library tape on DEC tape unit 5.

8.6.7 LIND

Print the index of the library tape on unit 5. Gives a list of the reel numbers.

8.6.8 LDEL;X

Deletes reel X from the library tape index.

8.6.9 LREN;X,Y

Renames reel X to reel Y on the library tape. Library tape is on DEC tape unit 5.

8.6.10 GREEL;X

Searches the library index for reel X. Then a block which contains an index of the ID blocks for reel X is read in and printed.

Each of the individual ID blocks for a particular reel number on a library tape may be read with the LGET command.

8.6.11 LGET;X

Reads ID block X from the library tape. This command must be preceded by a GREEL command.

8.7 SEARCH

Reads in the search overlay:

8.7.1 CLEAR

Clears the parameter list. The parameter list contains the criteria which must be met before a spectrum is selected by the search.

8.7.2 GO

Asks the following two questions then goes into the SETUP command.

- 1) Are hit spectra to be put on DEC tape (Uses unit 5)
- 2) Number of DEC tapes to search?

Loads DEC tape unit 4 onto the disk and searches; then loads DEC tape unit 3 onto the disk and searches; then back to 4, etc.

Multiple parameters may be given in the SETUP portion using the following terminators.

- : No parameters or criteria desired here.
- ! Or of all parameters separated by !.
- ← Anything between and including the parameters separated by the ←.
- & And of all parameters separated by &.

8.7.3 FMT

Writes a new directory on scratch tape unit 5.

8.8 SING

Reads in the singles overlay.

8.8.1 F, M, SUM, FM, and CONTUR

All of these commands display the F singles data.

8.8.2 W;X,Y - 8.1.20

Display channels X through Y across the full width of the screen. $0 < X < Y < 4095$. When the window size is greater than 1024, more than one y-value is displayed per x-value. For example, four points would be displayed per X coordinate if the window size was 4096. This is because the scope only has a maximum of 1024 displayable points across the screen.

8.8.3 CSING

Changes the singles overlay to a normal hide mode of operation in contrast to a strip mode. This means the I/O commands (GET;±F*X and RDSLOT;±F*X) do not use a scratch tape.

8.8.4 SSING

Puts the singles overlay into a strip mode. The display is split with 0 y-value in the middle of the screen. Positive values are displayed in the upper half of the screen and negative values in the lower half.

All commands which are used in STRIP can be used in singles strip (SSING).

8.8.5 DEC, GET, and RDSLOT

These commands and their variations function the same as they do under HIDE and/or STRIP except that there is only one singles spectrum per experiment. The spectrum is 4096 channels long and there is no coincidence data.

8.8.6 RES - 8.3.7

The algebraic sum, the sum of the absolute value, and the sum of the square of the residuals are printed.

8.8.7 READPT - 8.4.2

Reads a singles spectrum from paper tape. The tape comes from a 50/50 system and can be up to 4096 channels long. Channel 0 contains the time in seconds.

8.8.8 READ8 - 8.4.3

Reads a singles spectrum through the serial data interface from the 50/50 system. The spectrum is the same as in the READPT command. (8.8.7)

8.8.9 RDTMC

Reads a singles spectrum from a paper tape punched by a TMC analyzer or anything similar. Channel 0 contains the time in hundredths of minutes.












8.9 PLOT

Reads in the plot overlay. Since reading in overlays causes RALPH to enter hide mode, the SEEK command must be given, then the PLOT command must be given again in order to plot data from the acquisition buffers.

8.9.1 PLOT;A,B

Defines the plot characters to be used. A is for the data and B is for the bright dot. This command takes effect immediately so that the plot characters can be changed during a plot.

A and B are the integers:

1 for	
2 for	
3 for	
4 for	
5 for	
6 for	
7 for	
8 for	
9 for	
10 for	
11 for	

8.9.2 TOPM;MESS

Inputs a 12 character message to be plotted at the top of the plot.

8.9.3 BOTM;MESS

Inputs a 12 character message to be plotted at the bottom of the plot.

8.9.4 PLOT

Advances the paper 12 inches, plots an x and y axis with labeled tick marks, plots the top and bottom messages, and then plots the singles data which is presently being displayed.

8.9.5 PORG

Moves the pen back to the origin of the plot (0,0). This command is useful and necessary when overlaying plots.

8.9.6P PLT

Fixes the origin (0,0) at the present location of the pen. Plots the data presently being displayed.

8.9.7 SEX;N

Stretch and expand x-axis. This command is used to expand a plot by the multiple N.

8.10 FOCAL

Reads in the FOCAL overlay. Most of the commands are the same as described in the DEC literature. The command differences and additions are listed here.

8.10.1 FREG(X)

Fetches one of the 268 common floating point registers which are in location 16600-17630.

8.10.2 FPREG(X)

Is a reversed function. For example, S A=FPREG(4) means that the common register 4 will be replaced by A. The equation operates backwards.

8.10.3 FDIS(X)

Fetches the contents of channel X from the currently displayed data.

8.10.4 FPDIS(X)

Replaces the data in channel X of the currently displayed data in the same way FPREG changes registers. FPDIS is a reversed function.

8.10.5 L O (NAME)

Prepares FOCAL to write a program with the specified name onto an I/O device. The I/O device is specified by the "D" command in RALPH. If no name is given, paper tape output is assumed.

8.10.6 L W (A) (X.XX)

Writes out all or a particular part of a program to the file specified by the L O command.

8.10.7 L C

Closes the output file and enters the name into the index of the particular device.

8.10.8 L K or T

Kills the output.

8.10.9 L L

Lists the index of the I/O device being used.

8.10.10 L D NAME

Deletes program "NAME" from the index.

8.10.11 L I (NAME)

Reads in the program called "NAME" from the I/O device. If no name was specified, the paper tape reader is used.

8.10.12 L S

Reads in a sequence tape from paper tape.

8.10.13 L P

Punches the present program out as a sequence tape.

8.10.14 O O NAME

Opens a data file for output and operates much like the L O NAME command. A name must be specified.

8.10.15 O C

Closes the data output file.

8.10.16 O I NAME

Opens a data file for input.

8.10.17 O K

Kills data output.

8.10.18 * and :

The "*" is still used to flip-flop data input between the TTY and some other device. The ":" has been added to flip-flop data output between the TTY and some other device. The other device is the high speed paper tape reader/punch unless the O O NAME or O I NAME command is given. If one of these commands is given, the device specified by the "D" command is used.

8.10.19 FOCALG

Given in RALPH, this command causes entrance to FOCAL and causes FOCAL to automatically read the program "BOOT" from the I/O device. The user could set up a common register to specify which program he wanted. Then "BOOT" could look at the register and call the appropriate program. "BOOT" must be written and stored by the user before execution of this command.

8.11 INVERT

Reads in the INVERT overlay.

8.11.1 MATRIX;X

The scratch unit (DISK or TAPE) is divided into 13 logical slots numbered 0 through 12. Slot 0 is used for a composite spectrum and slots 1 through 12 for composite spectra.

The MATRIX command changes the data being displayed to floating point and writes it into slot X.

8.11.2 INVERT;N

Performs a non-linear least squares regression analysis of the spectra in slots 1 through N to the composite spectrum in slot 0.

The regression coefficients are stored in "common" registers 3 through 3+(N-1). The corresponding standard deviations are stored in "common" registers 15 through 15+(N-1).

The residuals are stored in the F singles hide buffer for display.

8.11.3 GSHIFT;±±

Gain and then zero shifts the singles spectrum presently being displayed. The gain shift is given by R1/R2 and the zero shift is given by R3/R4. R1, R2, R3, and R4 are "common" registers and must be loaded before giving the GSHIFT command.

The first sign (±) determines the sign of the gain shift ratio. The second sign (±) determines the sign of the zero shift.

8.12 FORMAT

Reads in the DEC tape formatter. Once this overlay is in core and is active, giving the FORMAT command starts the formatter.

The questions and directions which the formatter types are self-explanatory. Setting AC switch register Bit 0 to 1 omits some of the messages for faster operation. Data acquisition must be stopped before issuing the FORMAT command.

Panel Control

8.13 READ OUT

This section includes the first two switches and the first six buttons on the panel. The user may select from a number of items to be output and the device to output to. See Figure 1.

8.13.1 Device Select

This switch selects the output device. If either IBM tape or DEC tape is selected, the item ALL DATA must be selected on the Data Select switch. These two positions correspond to the DEC command (8.1.53).

8.13.2 Data Select

This switch selects the output data. If ALL DATA is selected, IBM tape or DEC tape must be selected under Device Select. The switch positions and their corresponding teletype command are listed below.

<u>Switch Position</u>	<u>Command</u>	
ALL DATA	DEC	8.1.53
EXPERIMENT ID	EXPID	8.1.6
LIST	LIST	8.1.17

<u>Switch Position</u>	<u>Command</u>
COUNTS	COUNTS 8.1.14
SCALERS	SCALERS 8.1.15
TIMES	TIMES 8.1.16
UPSET	UPSET 8.1.13

8.13.3 IBM Mag Tape Control

EOF does a MTEOF command (8.1.62).

8.13.4 Read Out Control

These buttons initiate the output selected by the Device Select and Data Select switch. The CLEAR button must be pushed first then the START button. If the switches are set wrong or the buttons are pressed in the wrong order, the ERROR INDICATOR light comes on.

8.13.5 Store Coinc Events on Tape

These buttons determine whether the coincidence data will be stored on magnetic tape during acquisition or whether it will not be stored. The COINC TAPE STORAGE INDICATOR light will be on when this option is selected.

8.14 EXPERIMENT CONTROL

This section includes the third and fourth switches and buttons eight through twelve.

8.14.1 Interval Between Dumps

This switch corresponds to the parameter DUMP INTERVAL in the SETUP command. If an interval is specified, the SINGLES DUMP INDICATOR light is lit.

8.14.2 Live Time

This switch corresponds to the LIVERS command (8.1.8).

8.14.3 Erase All Data

These buttons correspond to the ERASE command (8.1.1 and 8.2.1). The ERASE ENABLE must be pressed before the ERASE and RESET buttons or the ERROR INDICATOR light will be lit.

8.14.4 Analyze

These buttons correspond to the STAR and STP (8.1.11 and 8.1.12) commands. If RALPH is in seek mode, a message will be printed indicating if acquisition is on or off whenever one of the buttons is pushed. The ANALYZE INDICATOR light is on if acquisition is in process.

8.15 DISPLAY CONTROL

This section includes switches 5 through 8 and buttons 14 through 24.

8.15.1 Motion Select

This switch selects the item to be set in motion by the DISPLAY MOTION buttons.

SPECTRUM position allows the displayed singles spectrum to be moved left or right.

The SV or VER position allows the vertical marker in singles or coincidence respectively to be moved left or right.

The SH or HQR position selects the horizontal marker in singles or coincidence to be moved up or down on the screen.

The Zo position selects the z-plane through the coincidence data to move up or down on the z-axis.

8.15.2 Data Select

This switch selects the data to be displayed and buttons 14 through 18 specify certain functions which can be performed on the displayed data.

Two of the switch selections do not have a corresponding teletype command. They are PLANE/F and OFF.

PLANE/F is an overlapping display of the plane and the F spectra.

The OFF position disables the display so that there is no data displayed.

A list of the switch positions and buttons under Data Select is given below.

<u>PANEL</u>		<u>TELETYPE</u>	
CONTUR		CONTUR	8.1.31
F		F	8.1.24
M		M	8.1.25
F/M		FM	8.1.27
PLANE	CS, CM or CF		8.1.29, 8.4.4, 8.4.5
PLANE/F		NONE	
OFF		NONE	
INITIALIZE Button		S (Given 8 times)	8.1.28
SPREAD Button		S	
INIT Button		CINIT	8.1.32
RESET Zo Button		ZZERO	8.1.33
RAISE Button		R	8.1.36

8.15.3 Display Zeroes

Operates the same as the teletype command ZZ.

8.15.4 Display Motion

This section defines the last five buttons on the panel. These buttons are associated directly with the Motion Select switch.

8.15.4.1 LEFT

Depression of the LEFT button will cause the data or marker on the screen to move from right to left or down in the case of a horizontal marker or Zo.

8.15.4.2 RIGHT

Moves the data or marker on the screen from left to right or up in the case of a horizontal marker or Zo.

8.15.4.3 CONTINUOUS--INCREMENTAL

Flip-flops between a continuous and an incremental movement of the data or markers. Depression of the LEFT or RIGHT button moves the data or particular marker one channel if incremental mode, but movement continues until stopped if in continuous mode.

8.15.4.4 INITIALIZE

Sets channel 0 as the left most displayed channel and removes all markers.

8.15.5 Numeric Display

This section describes the last two switches in the middle row of switches on the panel. The switch position and corresponding teletype command are listed below.

<u>PANEL</u>	<u>TELETYPE</u>
% LIVE TIME	NG;0 or TIMES 8.1.39
LIVE TIME LEFT	NG;7 or TIMES
BRIGHT DOT CHANNEL	NG;6
BRIGHT DOT CONTENTS	NG;5
EXPERIMENT ID	NG;4 or EXPID
DUMP SLOT	NG;3
MEMORY DISPLAY	NG;1 or DEBUG
MEMORY CHANGE	NG;2 or DEBUG
SCALERS { A B C D	NG;8 NG;15 NG;14 NG;13 } or SCALER
OFF	NG;12
# of EVENTS { COINCIDENCE SINGLES F SINGLES M	COUNTS 8.1.14

8.16 HORIZONTAL and VERTICAL CONTROL

This section includes button 13 and the last four switches. These functions control the x and y axis and pertain only to singles data.

8.16.1 LOG-LINEAR

Flip-flops the display between log and linear mode. The teletype counterparts are the commands LOG and LINEAR.

8.16.2 NUMBER OF CHANNELS

Specifies particular windows for display. See the teletype command W (8.1.20).

8.16.3 LINEAR COUNTS FULL SCALE

Changes display to linear and specifies the number of counts full scale. The AC switches also set the counts full scale (8.1.19).

8.16.4 NUMBER OF DECADES

Changes display to log mode and specifies 1 to 6 decades to be displayed. This switch has no teletype counterpart.

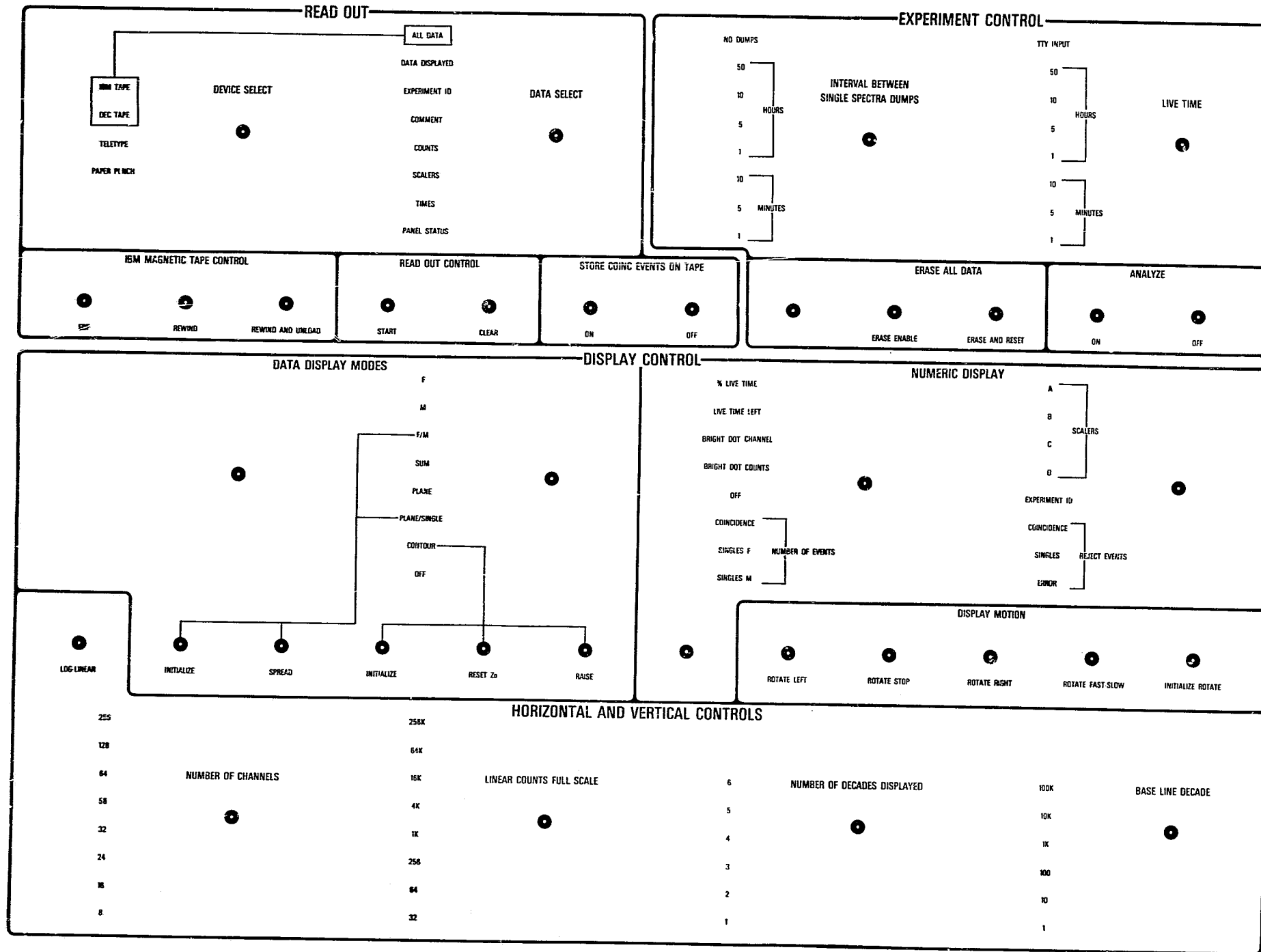


Figure 1 - Panel Overlay

8.16.5 BASE LINE DECADE

Sets the display to log mode and sets the base line of the display to a certain decade. Any data values less than the base line decade are not shown. This switch has no teletype counterpart.

8.17 FUNCTION BOX

The function box consists of 12 keys which interrupt the computer processor when depressed. The numeric input capability of the function box together with the panel functions allow experiments to be conducted without the use of the teletype. The box can also be used to control some of the display functions.

8.17.1 Numeric Input

Figure 2 shows the key labeling on the box. The numeric keys are used to input digits, the "-" key is used to delimit numbers, and the "+" key is used to initialize the box.

FUNCTION BOX

1	2	3
4	5	6
7	8	9
-	0	+

Figure 2

The variables which can be viewed and/or changed are identified by a number according to the following table:

<u>VARIABLE NUMBER</u>	<u>VARIABLE</u>	<u>CORRESPONDING TTY COMMAND</u>
1	Experiment Identification	EXPID
2	First Channel in Window	W,X,Y
3	Number of Channels in Window	W,X,Y
4	Z-Zero Motion Increment	None
5	Horizontal Marker Motion Increment	None
6	Z-Zero Value	ZZERO;X
7	Z-Zero Raise Increment	RINC;X
8	Contour Slice Thickness	DELTZ;X
9	Horizontal Marker Value	SH;X
10	Limit on Number of Records in Coinc Event Dump	None
11	Current Number of Magnetic Records in Coinc Event Dump	None
12	Number of Characters in TTY Buffer One SEQ; command will take a maximum of 186 characters	None

FUNCTION BOX VARIABLES

The "-" key is used to start numeric input as well as delimit the numbers. When the "-" key is first depressed, the current Variable Number is displayed on the scope. The Variable Number may be changed by depressing the desired numeric keys followed by another "-" key, or the Variable Number may be left unchanged by depressing only the "-" key. In either case, the second "-" key will cause the program to display the value of the indicated variable. The value may be changed by depressing the desired numeric keys followed by another "-" key or the value may be left unchanged by depressing only the "-" key. In either case, the third "-" key will terminate the numeric input. The following table illustrates the various possibilities:

<u>Key Sequence</u>	<u>Resulting Variable Number</u>	<u>Resulting Variable Value</u>	<u>Action</u>
-1-33-	1	33	Change experiment ID to 33
--44-	1	44	Change experiment ID to 44
---	1	44	No change
-2--	2	No change	Value of first channel in window will appear on scope.
-2-6-	2	6	Change first channel in window to 6
-2-7+	2	6	+ key clears previous sequence

8.17.2 Function Box Display Control

The numeric keys on the box control various display functions whenever they are used outside of a numeric input sequence. The following box diagrams indicate the key assignments. The first diagram applies if in SINGLE display mode and the second applied if in CONTOUR mode.

1	MOVE LEFT or MOVE DOWN	2	INCREASE SPEED	3	MOVE RIGHT or MOVE UP
4	SET MOTION TO CONTINUOUS	5	SET MOTION TO INCREMENTAL	6	DISPLAY CONTENT OF CHANNEL INDICATED BY VERTICAL MARKER
7	SETUP VERTICAL MARKER FOR MOVEMENT	8	SETUP HORIZONTAL MARKER FOR MOVEMENT	9	SETUP SPECTRUM FOR MOVEMENT
-	None	0	INITIALIZE VERTICAL MARKER, HORIZONTAL MARKER, OR SPECTRUM DEPENDING ON LAST DEPRESSION OF 7, 8, or 9, RESPECTIVELY	+	INITIALIZE BOX

FUNCTION BOX SINGLE MODE DISPLAY CONTROL

Figure 3

<p>1</p> <p>MOVE LEFT or MOVE DOWN</p>	<p>2</p> <p>INCREASE SPEED</p>	<p>3</p> <p>MOVE RIGHT or MOVE UP</p>
<p>4</p> <p>SET MOTION TO CONTINUOUS</p>	<p>5</p> <p>SET MOTION TO INCREMENTAL</p>	<p>6</p> <p>DISPLAY CONTENT OF CHANNEL IN THE COINCIDENCE MATRIX INDICATED BY INTER- SECTION OF VERTICAL AND HORIZONTAL MARKERS</p>
<p>7</p> <p>SETUP VERTICAL (CONTOUR) MARKER FOR MOVEMENT</p>	<p>8</p> <p>SETUP HORIZONTAL (CONTOUR) MARKER FOR MOVEMENT</p>	<p>9</p> <p>SETUP ZZERO FOR MOVEMENT</p>
<p>-</p> <p>NONE</p>	<p>0</p> <p>INITIALIZE VERTICAL MARKER, HORIZONTAL MARKER, OR ZZERO DEPENDING ON LAST DEPRESSION OF 7, 8 or 9, RESPECTIVELY</p>	<p>+</p> <p>INITIALIZE BOX</p>

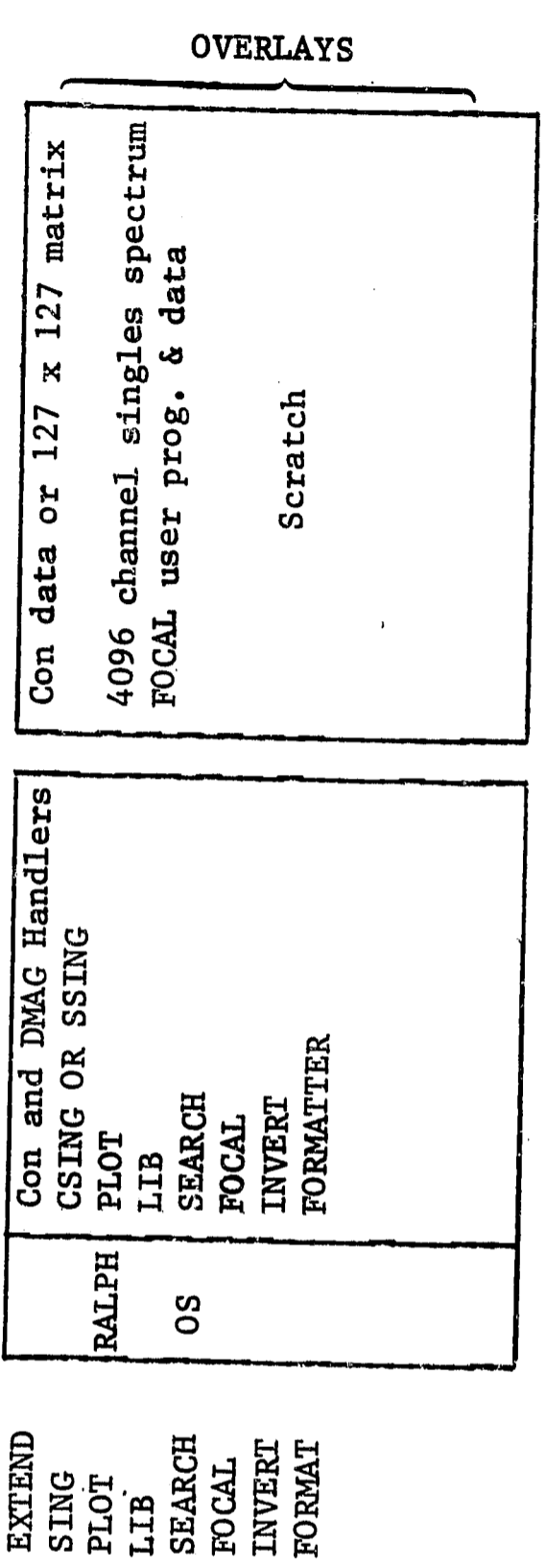
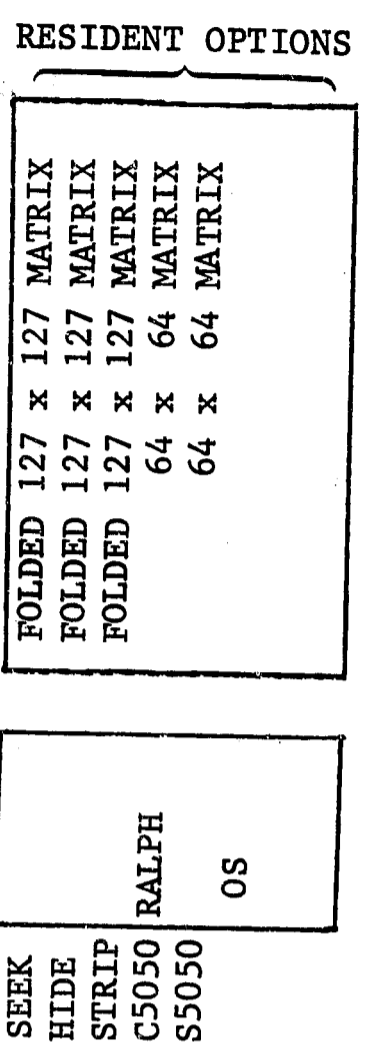
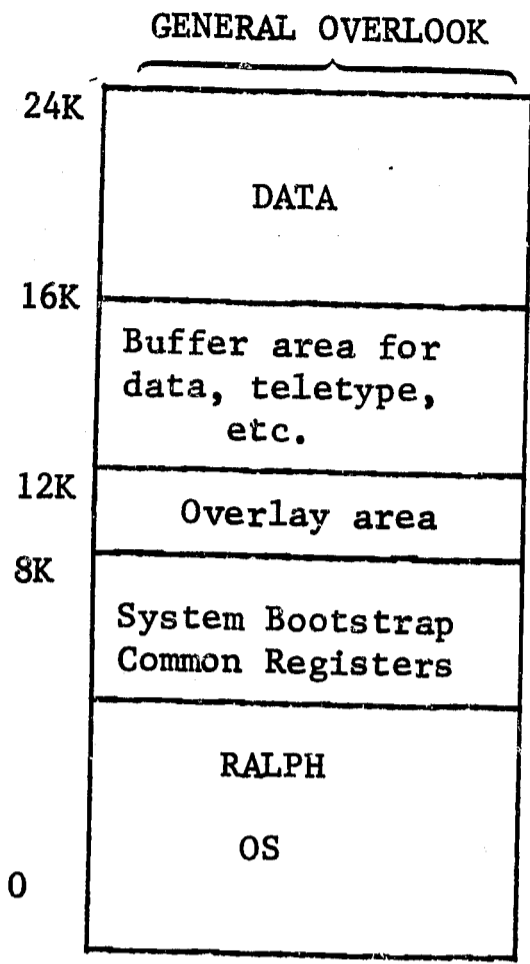
FUNCTION BOX CONTOUR MODE DISPLAY CONTROL

Figure 4

APPENDIX A

256 K Words	Not Used
234K	Data Storage Device
90.25K	Disk Scratch Area
64K	Unfolded 256 x 256 Coincidence Matrix
OK Words	

256K Word Disk Usage Map



MEMORY MAP

STORAGE ALLOCATION

00000-16577	RALPH OS
16600-17630	Common Registers
17637-17777	System Bootstrap
20000-27777	Overlay area
30000-30377	Scalers, counters, timers (ID block)
30400-30777	HIDE Scalers, counters, timers
31000-31077	SEQ butter
31100-31177	COINC events to be written to disk
31200-32577	Scratch area
32600-33177	Directory buffer
33200-33377	128 channel buffer for overlap display
33400-34377	2 IBM tape buffers
34400-34477	Teletype input buffer
34500-34517	F data list #1
34520-34537	M data list #1
34540-34557	F data list #2
34560-34577	M data list #2
34600-34777	Plane display buffer
35000-35377	SUM spectrum
35400-35777	Sum spec. for data reduction (i.e. HIDE, STRIP, etc.)
36000-36377	M singles data
36400-37777	M spec. for data reduction (i.e. HIDE, STRIP, etc.)
37000-37377	F singles data
37400-37777	F spec. for data reduction (i.e., HIDE, STRIP, etc.)
40000-40077	Comment area
40100-57777	Coincidence matrix

Auto Index register usage:

10	teletype
11	display
14,15	SEQ
17	interrupt save and restore

ID BLOCK VARIABLES

The following items are found in the ID block of each experiment. The addresses listed are for the ID block in SEEK mode. Add 400₈ to each address to get the address of the variable for HIDE mode.

EXPIDH=27777	High order experiment ID (dummy)
EXPID =30000	Experiment ID #
LIVEHI=30001	Integer portion of live time
LIVELO=30002	Fractional portion of live time
REALLO=30003	Integer portion of real time
REALLO=30004	Fractional portion of real time
SCALRA=30005	High bits scaler A
LOSCLA=30006	Low bits scaler A
SCALRB=30007	High bits scaler B
LOCSLB=30010	Low bits scaler B
SCALRC=30011	High bits scaler C
LOSCLC=30012	Low bits scaler C
SCALRD=30013	High bits scaler D
LOSCLD=30014	Low bits scaler D
FSINHI=30015	High bits total F counts
FSINLO=30016	Low bits total F counts
MSINHI=30017	High bits total M counts
MSINLO=30020	Low bits total M counts
CSCLHI=30021	High bits total coincidence counts
CSCLLO=30022	Low bits total coincidence counts
SREJHI=30023	High bits singles rejects
SREJLO=30024	Low bits singles rejects
CREJHI=30025	High bits coincidence rejects
CREJLO=30026	Low bits coincidence rejects
EREJHI=30027	High bits error rejects
EREJLO=30030	Low bits error rejects
REALTM=30031	Real time minutes
LIVETM=30032	Live time minutes
LIVECL=30033	Live time counter
LIVEPS=30034	Live time interval
LIVEPT=30035	# minutes to next dump
LIVEPH=30036	Intermediate hold for live time
EXPIDF=30037	High part of experiment D
DECNM =30040	Data reel #
STATIM=30041	Start time history
STOTIM=30042	Stop time history
WEIGHT=30043	Weight
GAIN =30044	Gain
PTFG =30045	Paper tape history
IM =30047	Intermantel history
OM =30051	Outermantel history
CMG =30053	Coincidence to mag flag
MIFG =30055	Mag dump flag

DDPI	=	30057	Data dump interval
SALA	=	30060	Lunar
SAMA	=	30101	Mete
SAIA	=	30122	Isotope
SAGA	=	30143	General
TOPS	=	30164	Top spacing
BOTS	=	30205	Bottom spacing
CONCEN	=	30226	Concentration

APPENDIX B

LOADING PROCEDURE

1. Mount RALPH OS system DEC tape on unit 0 (8) with "REMOTE" enables and "WRITE-LOCK".
2. Set AC switches to 17637. Push "I/O RESET" and "READIN". Read in RALPH Dec tape system bootstrap. The RALPH system bootstrap is a slightly modified version of the KM9 system bootstrap.
3. A small loading program is read from block 0 and types out:

LRL PROGRAMS 19--

TYPE PG NAME:

The user responds by typing the desired program name followed by a semicolon. To load RALPH type RALPH;.

Programs available are:

RALPH	RALPH OS
FOCAL	Stand alone 16K FOCAL - runs under KM9 system.
COPY	DEC tape copy routine - copies from unit 1 to unit 2.
STRIP	16K stand alone version - operates about the same as the STRIP option in RALPH.
PUNCH	Operates under KM9 system. Changes 5050 paper tapes to ASCII to be compatible with card punch. Can also be used for TMC or ND 2200 or for A&M 1600 channel TMC.
COINC	16K acquisition program.
COINCM	16K acquisition program using new ADC interface.
PANTES	Stand alone panel diagnostic. One interrogation cycle of the rotary switches is made. Then each time a switch is turned or a button is pushed, the panel status is printed. To continue automatic interrogation of switches, set bit 0 of AC switches up.
5050	16K program. Operates similar to C5050 option in RALPH.
FORMAT	DEC's DEC tape formatter.

SING 16K singles acquisition program.

LIB 16K library program similar to LIB overlay in RALPH.

4. Program is read in and started. EXIT command returns control to step 3.

APPENDIX C

Mode Control

SEEK	8.1
HIDE	8.2

Acquisition Setup

ERASE	8.1.1, 8.2.1
ISSETUP	8.1.2
SETUP	8.1.3
SETU	8.1.4
SET	8.1.5
EXPID	8.1.6
SPACE	8.1.7
LIVERS	8.1.8
START;X	8.1.9
STOP;X	8.1.10
STAR	8.1.11
STP	8.1.12
UPSET	8.1.13

Experiment Parameters

COUNTS	8.1.14
SCALER	8.1.15
TIMES	8.1.16
LIST	8.1.17

Display Singles Data

LOG	8.1.18, 8.16.1
LINEAR	8.1.19
W;X,Y	8.1.20, 8.8.2
SV;X	8.1.21
SH;X	8.1.22
ZZ	8.1.23, 8.15.3
F	8.1.24
M	8.1.25
SUM	8.1.26
FM	8.1.27
S	8.1.28

Display Plane

CS;X	8.1.29
CS;X,Y	8.1.30
CF;X	8.4.4, 8.5.5
CM;X	8.4.5, 8.5.6
CF;X,Y	8.4.6, 8.5.5
CM;X Y	8.4.7, 8.5.6

Display Coincidence

CONTUR	8.1.31
CINIT	8.1.32
ZZERO;X	8.1.33
DELTZ;X	8.1.34
RINC;X	8.1.35
R	8.1.36
HOR;X	8.1.37
VER;X	8.1.38
CON;X,Y,DX,DY	8.5.4

Number Generator

NG;X	8.1.39
------	--------

Calculations

AREA	8.1.40
F40;X	8.1.41
M40;X	8.1.42
P40	8.1.43
BF;X	8.1.44
BM;X	8.1.45
F/M	8.1.46

Input/Output

D;X	8.1.47
NEWDIR;X	8.1.48
INDEX	8.1.49
IND	8.1.50
DELETE;X	8.1.51
RENAME;X,Y	8.1.52
DEC	8.1.53, 8.8.5
GET;X	8.1.54, 8.6.2
RDSLOT;X	8.1.55, 8.6.3
GET;±F*X	8.2.2, 8.3.5
RDSLOT;±F*X	8.2.3
DISK	8.1.56
TAPE	8.1.57
INIT	8.1.58
COPY	8.1.59
COPYS	8.1.60
MTNOP	8.1.61
MTEOF	8.1.62
PRINT	8.1.63
PUNCH	8.1.64
READPT	8.4.2, 8.8.7
READ8	8.4.3, 8.8.8
RDTMC	8.8.9
DMAG	8.5.1
GMAG;X	8.5.2
MGSLOT;X	8.5.3

Library I/O

LNEW;X	8.6.1
OUTPUT	8.6.4
LAST	8.6.5
XFER	8.6.6
LIND	8.6.7
LDEL;X	8.6.8
LREN;X,Y	8.6.9
GREEL;X	8.6.10
LGET;X	8.6.11

Search I/O

CLEAR	8.7.1
GO	8.7.2
FMT	8.7.3

Plot Output

PLOT;A,B	8.9.1
TOPM;MESS	8.9.2
BOTM;MESS	8.9.3
PLOT	8.9.4
PORG	8.9.5
PLT	8.9.6
SEX;N	8.9.7

Sequences

SEQ	8.1.65
LSEQ	8.1.66
ESEQ	8.1.67
PSEQ	8.1.68
RSEQ	8.1.69
GSEQ	8.1.70

Common Registers

R1; α	8.1.71
R2; α	8.1.72
RG;Y α	8.1.73

Teletype Control

PONOFF	8.1.74
--------	--------

Overlay Calls

EXTEND	8.5
STRIP	8.3
C5050	8.4
S5050	8.4.1
LIB	8.6
SEARCH	8.7
SING	8.8
CSING	8.8.3
SSING	8.8.4
PLOT	8.9
FOCAL	8.10
INVERT	8.11
FORMAT	8.12

Focal

FREG	8.10.1
FPREG	8.10.2
FDIS	8.10.3
FPDIS	8.10.4
L O NAME	8.10.5
L C	8.10.7
L K	8.10.8
L L	8.10.9
L D NAME	8.10.10
L I NAME	8.10.11
L S	8.10.12
L P	8.10.13
O O NAME	8.10.14
O C	8.10.15
O I NAME	8.10.16
O K	8.10.17
FOCALG	8.10.19

Miscellaneous

ADC;X	8.1.75
L	8.1.76
DEBUG	8.1.77
EXIT	8.1.78
LLIM;X	8.3.4
RES;X	8.3.7, 8.8.6
MATRIX;X	8.11.1
INVERT;N	8.11.2
GSHIFT;±±	8.11.3

APPENDIX D

Block #

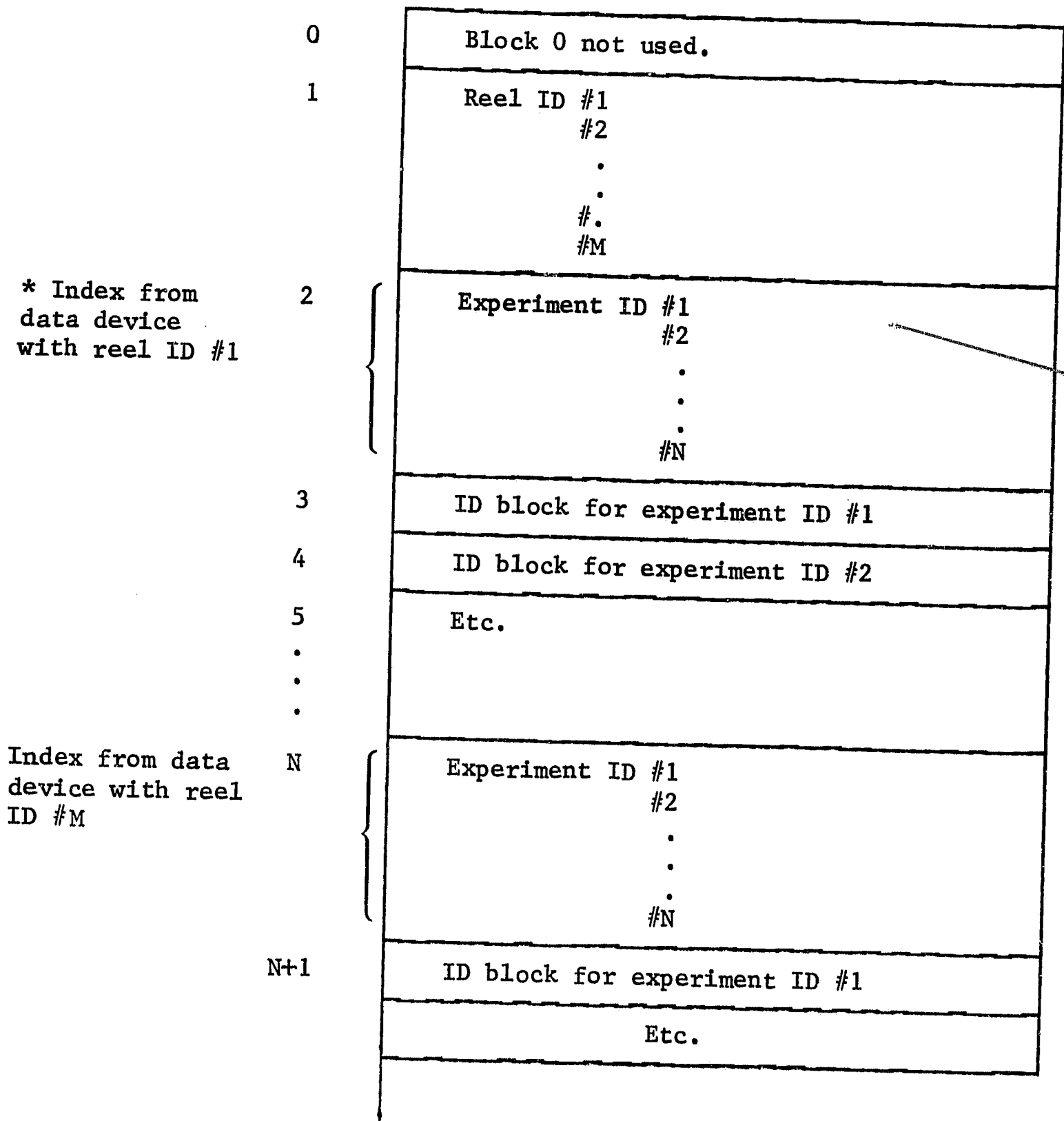
0	Block 0 not used
1	<p>* Reel #X</p> <p style="margin-left: 40px;">Experiment ID #1 #2 . . . #M</p> <p>** Last 17₈ locations contain # of blocks/ experiment.</p>
2	ID block of experiment #1
3	<p>The number of blocks used for the spectrum or spectra depends on the data format used.</p> <p>1) Regulat format - 44₈ blocks 2) DMAG format - variable blocks 3) 50/50 format - 25₈ blocks 4) Singles format - 21₈ blocks</p>
N	ID block of experiment #2
N+1	Etc.

* Entered when NEWDIR command is given. The reel number is used in the index of library tapes.

** Used only for DMAG format.

DATA FORMAT

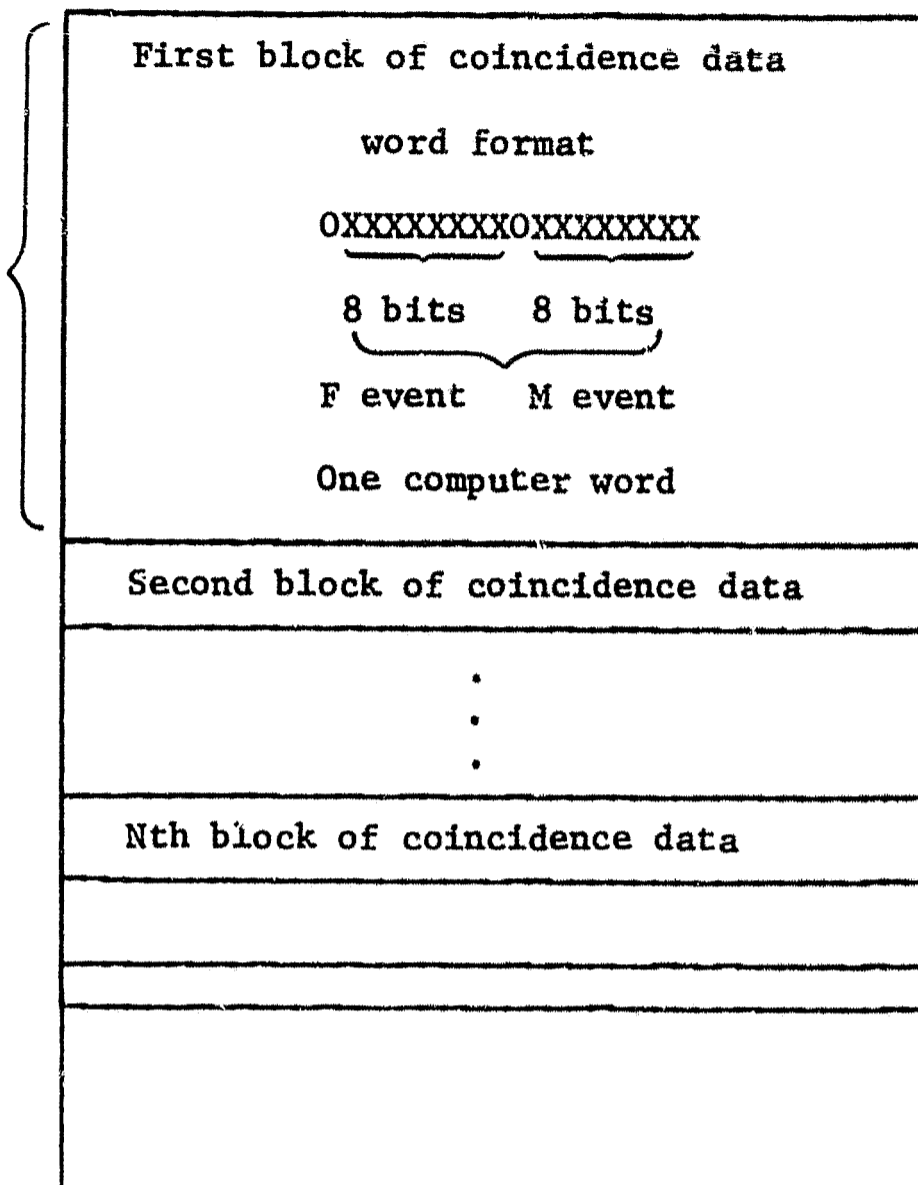
Block #



* See diagram of the DATA FORMAT

LIBRARY FORMAT

Each block
400₈ words



EOF

MAG TAPE DUMP FORMAT

Block #

0	Block 0 not used.
1	Data in three word floating point.
*	
3	
4	Data in three word floating point.
152 ₈	This part of DEC tape not used. Disk doesn't have extra blocks.
N	

* When using scratch for non-linear least squares, blocks 1-3 contain the composite (unknown spectrum), the following 12 sets of 3 blocks/set are used for up to 12 composite spectra.

SCRATCH FORMAT

APPENDIX E

PROGRAM LISTINGS

```

.LIT      LITOUT
/RALPH RIC C. DAVIES PDP-9
/MULTI-PARAMETER PROGRAM FOR THE NASA SYSTEM.
/
/
/ STORAGE ALLOCATION
/ 17600-17777      BOOTSTRAP
/ 30000-30377      SCALERS, COUNTERS, LOG
/ 30400-30777      BKGROUND SCALERS,COUNTERS.LOG
/ 31000-31077      SEQ BUFFER
/ 31100-31177      COINC LIST
/ 31200-32577      STRIP BUFFER
/ 32600-33177      DECTAPE DIRECTORY BUFFER
/ 33200-33377      128 SINGLES FOR OVERLAP
/ 33400-34377      2 18M TAPE BUFFERS
/ 34400-34477      TTY BUFFER
/ 34500-34517      F DATA LIST #1
/ 34520-34537      M DATA LIST #1
/ 34540-34557      F DATA LIST #2
/ 34560-34577      M DATA LIST #2
/ 34600-34777      PLANE DISPLAY
/ 35000-35377      COIN SUM SPECTRUM
/ 35400-35777      SUM SPEC FOR DATA MANIPULATION (E.G. STRIP.ETC)
/ 36000-36377      M SINGLES DATA
/ 36400-36777      M SPEC FOR DATA MANIPULATION (E.G. STRIP.ETC)
/ 37000-37377      F SINGLES DATA
/ 37400-37777      F SPEC FOR DATA MANIPULATION (E.G. STRIP.ETC)
/ 40000-40077      COMMENT AREA
/ 40100-57777      COINCIDENCE ARRAY
/
/AUTO INDEX REGISTRARS USAGE
/      10 - TEL
/      11 - DISPLAY
/      17 - INTERUPT SAVE AND RESTORE
/      14,15 SEQ
/
/DEFINITION OF SOME STANDARD IOT'S FOR THE ADVANCED ASSEMBLER.
/
/ DISK IOT'S...
DSSF=707001
DLAL=707024
DLAH=707084
DSGO=707047
DSRS=707262
DSCD=707242
DLOK=707:02
/ MAG TAPE IOT'S. . .
MTCR=707321
MTAF=707322
MTRS=707352
MTRR=707301
MTLC=707326
MTGO=707304
MTSF=707341
XX=740040
DXL=700506
DYS=700646
DXS=700546
/SKIP ON CONTROL READY
/CLEAR STATUS AND COMMAND REGISTERS
/READ STATUS REGISTER
/SKIP ON TAPE TRANSPORT READ
/LOAD COMMAND REGISTER WITH AC
/GO LIKE HELL
/SKIP ON ERROR FLAG, OR MAG. TAPE FLAG
CDEF0000
CDEF0010
CDEF0020
CDEF0030
CDEF0040
CDEF0050
CDEF0060
CDEF0070
CDEF0080
CDEF0090
CDEF0100
CDEF0110
CDEF0120
CDEF0130
CDEF0140
CDEF0150
CDEF0160
CDEF0170
CDEF0180
CDEF0190
CDEF0200
CDEF0210
CDEF0220
CDEF0230
CDEF0240
CDEF0250
CDEF0260
CDEF0270
CDEF0280
CDEF0290
CDEF0300
CDEF0310
CDEF0320
CDEF0330
CDEF0340
CDEF0350
CDEF0360
CDEF0370
CDEF0380
CDEF0390
CDEF0400
CDEF0410
CDEF0420
CDEF0430
CDEF0440
CDEF0450
CDEF0460
CDEF0470
CDEF0480
CDEF0490
CDEF0500
CDEF0510
CDEF0520
CDEF0530
CDEF0540
CDEF0550
CDEF0560

```

```

DYL=700606
PNRD=705612
PNCL=705604
PNIT=705704
PNSKI=705701
PNID=705702
/
/
/PANEL READ
/PANEL CLEAR
/INTERROGATE PANEL STATUS
/SKIP ON PANEL INTERRUPT
/LOAD PANEL INDICATORS
/
/
/LIVE TIME CLOCK DEFINITIONS FOR IOTS
CSFN=702301
CCSC=702302
CCOF=702304
CSLT=702321
CLAC=702322
CHLT=702324
CFOV=701104
ADCOP=701244
/
/ IOT'S FOR THE FOUR SCALERS
/
CLSA=702004
CLSB=702024
CLSC=702044
CLSD=702064
SKSA=702001
SKSB=702021
SKSC=702041
SKSD=702061
SPSA=702204
SPSB=702224
SPSC=702244
SPSD=702264
ENSA=702201
ENSB=702221
ENSC=702241
ENSD=702261
/
/
/ THE 256 QUANTITIES FOLLOWING THE LINE OF ASTERISKS ARE WHAT
/ ARE WRITTEN AS THE FIRST BLOCK OF DATA ON THE DEC AND
/ IOM TAPE <
/ *****
EXPIDH=27777
EXPID=30000
LIVEHI=30001
LIVELO=30002
REALHI=30003
REALLO=30004
SCALRA=30005
LOSCLA=30006
SCALRB=30007
LOSCLB=30008
SCALRC=30009
LOSCLC=30010
SCALRD=30011
LOSCLD=30012
FSINHI=30013
FSINLO=30014
/ HIGH ORDER EXPERIMENT ID (DUMMY)
/ EXPERIMENT ID #
/ INTEGER PORTION OF LIVE TIME
/ FRACTIONPORTION OF LIVE TIME
/ INTEGER PORTION OF REAL TIME
/ FRACTIONPORTION OF REAL TIME
/ HIGH BITS SCALER A
/ LO BITS SCALER A
/ HIGH BITS SCALER B
/ LO BITS SCALER B
/ HIGH BITS SCALER C
/ LO BITS SCALER C
/ HIGH BITS SCALER D
/ LO BITS SCALER D
/ HIGH BITS F SCALER
/ LO BITS F SCALER
COEF0570
COEF0580
COEF0590
COEF0600
COEF0610
COEF0620
COEF0630
COEF0640
COEF0650
COEF0660
COEF0670
COEF0680
COEF0690
COEF0700
COEF0710
COEF0720
COEF0730
COEF0740
COEF0750
COEF0760
COEF0770
COEF0780
COEF0790
COEF0800
COEF0810
COEF0820
COEF0830
COEF0840
COEF0850
COEF0860
COEF0870
COEF0880
COEF0890
COEF0900
COEF0910
COEF0920
COEF0930
COEF0940
COEF0950
COEF0960
COEF0970
COEF0980
COEF0990
COEF1000
COEF1010
COEF1020
COEF1030
COEF1040
COEF1050
COEF1060
COEF1070
COEF1080
COEF1090
COEF1100
COEF1110
COEF1120
COEF1130
COEF1140

```


000064	000000	CONY	0						CSKP0230
000065	000000	CFCM50	0						CSKP0240
000066	040077		DAC	.+11					CSKP0250
000067	200054		LAC	FG5050					CSKP0260
000070	652000		LMO						CSKP0270
000071	201303		LAC	CFCMFG					CSKP0280
000072	640002		OMO		/ INCLUSIVE OR				CSKP0290
000073	740100		SMA						CSKP0300
000074	440065		ISZ	CFCM50					CSKP0310
000075	200077		LAC	.+2					CSKP0320
000076	620065		JMP	CFCM50					CSKP0330
000077	000000		0						CSKP0340
000100	740000		NOP						CSKP0350
000101	740000		NOP						CSKP0360
000102	740000		NOP						CSKP0370
000103	740000		NOP						CSKP0380
000104	741000		SKP						CSKP0390
000105	600106		JMP	.+1					CSKP0400
000106	740040		HLT						CSKP0410
000107	100130	BEGIN	JMS	RESETA					CSKP0420
000110	705604		PNCI		/ LOOP TO INTERROGATE STATUS OF PANEL				CSKP0430
000111	754002		CLA:STL						CSKP0440
000112	740020	BEG4	RAR						CSKP0450
000113	040020		DAC	20	/ SAVE SW CODE				CSKP0460
000114	356314		TAD	(400000)					CSKP0470
000115	705704		PNIT						CSKP0480
000116	777770		LAW	-10					CSKP0490
000117	356315		TAD	(1)					CSKP0500
000120	744200		SZA:CLL						CSKP0510
000121	600117		JMP	.-2					CSKP0520
000122	200020		LAC	20					CSKP0530
000123	740200		SZA		/ DONE?				CSKP0540
000124	600112		JMP	BEG4	/ NO				CSKP0550
000125	212701		LAC	TELB	/ CLA CLL				CSKP0560
000126	040111		DAC	BEG4-1					CSKP0570
000127	605432		JMP	DLIST	/ YES				CSKP0580
		/RESET ALL POINTERS	ECI						CSKP0590
000130	000000	RESETA	0						CSKP0600
000131	703302		CAF		/ CLEAR ALL FLAGS				CSKP0610
000132	707702		EEM		/ TURN EXTEND MODE ON				CSKP0620
000133	145046		DZH	INDIC	/ CLEAR PANEL INDICATORS				CSKP0630
000134	760040		LAW	40					CSKP0640
000135	105025		JMS	PINDON					CSKP0650
000136	207444		LAC	VECTOR	/ RESET NESTED INTERRUPT				CSKP0660
000137	040017		DAC	17	/ POINTER.				CSKP0670
000140	207445		LAC	VECTOR+1					CSKP0680
000141	047455		DAC	RAS					CSKP0690
000142	200227		LAC	FBI	/ SET F CURRENT ADDRESS				CSKP0700
000143	040041		DAC	4'					CSKP0710
000144	200230		LAC	MBI	/ SET M CURRENT ADDRESS				CSKP0720
000145	040043		JA:	43					CSKP0730
000146	143255		DZH	BFLOP	/ SET LIST FLAG				CSKP0740
000147	106737		JMS	CRLF					CSKP0750
000150	200241		LAC	LS:TOT	/ GET LENGTH OF LISTS				CSKP0760
000151	744010		CLL RAL		/ DOUBLE IT				CSKP0770
000152	040242		DAC	BUFLEN					CSKP0780
000153	740020		RAR		/ RESTORE TO ORIGINAL SIZE				CSKP0790
000154	740001		CMA						CSKP0800

000155	356315	TAD	(1)		
000156	043257	DAC	MLSTEN		CSKP0810
000157	040040	DAC	40		CSKP0820
000160	040042	DAC	42		CSKP0830
000161	152364	DZM	TELMQ	/CLEAR MQ SAVE	CSKP0840
000162	140006	DZM	STPOUT		CSKP0850
000163	152375	DZM	OSIP		CSKP0860
000164	152456	DZM	REAPT		CSKP0870
000165	152712	DZM	TELPT		CSKP0880
000166	146512	DZM	DECPY		CSKP0890
000167	762066	LAW	MESS12		CSKP0900
000170	107031	JMS	MESCOM	/PRINT NAME AND VERSION	CSKP0910
000171	203323	LAC	CNOP	/TURN COIN STORAGE OFF	CSKP0920
000172	043235	DAC	JMSBUF		CSKP0930
000173	140226	DZM	ADCON	/CLEAR ADCON FLAG	CSKP0940
000174	150302	DZM	SPREAD	/SET SPREAD=0	CSKP0950
000175	151370	DZM	TERBUF	/ZERO TERMINATING BUFFER FLAG	CSKP0960
000176	144641	DZM	ADCGO	/ENABLE ADC FLAG	CSKP0970
000177	202753	LAC	COILST		CSKP0980
000200	042751	DAC	LSTAD		CSKP0990
000201	042752	DAC	LSTADR		CSKP1000
000202	141751	DZM	DETADD	/ CLEAR COINC TO DISK FLAG	CSKP1010
000203	204546	LAC	CSNA		CSKP1020
000204	042654	DAC	INTROI		CSKP1030
000205	142750	DZM	ADCDK		CSKP1040
000206	620130	JMP*	RESETA		CSKP1050
					CSKP1060
					CSKP1070
					CSKP1080
					CSKP1090
					CSKP1100
					CSKP1110
					CSKP1120
					CSKP1130
					CSKP1140
					CSKP1150
					CSKP1160
					CSKP1170
					CSKP1180
					CSKP1190
					CSKP1200
					CSKP1210
					CSKP1220
					CSKP1230
					CSKP1240
					CSKP1250
					CSKP1260
					CSKP1270
					CSKP1280
					CSKP1290
					CSKP1300
					CSKP1310
					CSKP1320
					CSKP1330
					CSKP1340
					CSKP1350
					CSKP1360
					CSKP1370
					CSKP1380

/ALL POINTERS, SCALERS, AND CLOCKS ARE RESET
 /MINUTES OF LIVE TIME IS ASK FOR
 /SWITCHES ARE SET FOR DUMPING OR NOT DUMPING COINCIDENCE DATA
 /AND SINGLES DEPENDING ON RESPONSE TO QUESTIONS

000207 000000
 000210 000000
 000211 000000

ADDRSS 0
 XCOORD 0
 YCOORD 0
 /LIST OF TAGS FOR COINC

000212 035400 STRSUM 35400
 000213 037400 FSTRIP 37400
 000214 036400 MSTRIP 36400
 000215 033000 REEL 33000
 000216 034600 FGTPLA 34600
 000217 037000 FSTART 37000
 000220 036000 MSTART 36000
 000221 035000 SUMONE 35000
 000222 000000 FCHANL 0
 000223 000000 MCHANL 0
 000224 000000 COINAD 0
 000225 000013 ADCMOD 13
 000226 000000 ADCON 0
 000227 034477 FB1 34477
 000230 034517 MB1 34517
 000231 034537 FB2 34537
 000232 034557 MB2 34557
 000233 033200 FST128 33200
 000234 040100 FSTCOI 40100
 000235 000001 ZPLANE 1
 000236 777777 DELTA 777777
 000237 777777 DELCNT 777777
 000240 600240 WAIT JMP
 000241 000020 LSTTOT 20

/LOCATION OF REEL # IN INDEX
 /1ST LOC. PLANE DISPLAY LIST
 / 1ST LOC. OF F SINGLES
 / 1ST LOC. OF M SINGLES
 / 1ST LOC. OF COINC SUM SPEC.
 /256 RAMP F CHANNEL
 /256 RAMP M CHANNEL
 /ADDRESS DETERMINED BY DETADD
 /SPECIFIES ADC MODE
 /0 ADC OFF, 1 ADC ON
 /1ST ADDRESS-1 FOR F DATA LIST 1
 /1ST ADDRESS-1 FOR M DATA LIST 1
 /1ST ADDRESS-1 FOR F DATA LIST 2
 /1ST ADDRESS-1 FOR M DATA LIST 2
 / 128 FOR PLANE-SINGLE OVERLAP
 /1ST COINC DATA ADDRESS
 /LOWEST Z PLANE
 /DELTA COUNTS Z PLANE
 /WAIT LOOP
 /LENGTH OF DATA LISTS

000242	000000	BUFLEN	0	/TWICE THE LIST LENGTH	CSKP1390
000243	000000	MESTEM	0		CSKP1400
000244	000000	FDATA	0		CSKP1410
000245	000000	MDATA	0		CSKP1420
000246	000000	LSTEMP	0		CSKP1430
000247	000000	INCLOC	0		CSKP1440
000250	000000	ZTEMP	0		CSKP1450
000251	000000	ZTEMPI	0		CSKP1460
000252	000000	FCOORD	0		CSKP1470
000253	000000	PLALST	0		CSKP1480
000254	000000	MCOORD	0		CSKP1490
000255	000000	ZERTEM	0		CSKP1500
000256	000000	ZRCNTR	0		CSKP1510
000257	000000	FAXIS	0		CSKP1520
000260	000000	MAXIS	0		CSKP1530
000261	000000	ABCT	0	/COUNTER FOR PERIODIC DUMPS	CSKP1540
		/INTRUP	NWB	PDP-9	CSKP1550
		/ROUTINE FOR HANDLING INTERRUPTS IN COINC.			CSKP1560
		/IF NO FLAGS ARE FOUND UP A MESSAGE IS			CSKP1570
		/PRINTED INDICATING AN UNIDENTIFIED INTERRUPT			CSKP1580
		/IS PRESENT.			CSKP1590
000262	060017	INTRUP	DAC*	17 / SAVE AC	CSKP1600
000263	641001		LACS		CSKP1610
000264	060017		DAC*	17 / SAVE STEP COUNTER.	CSKP1620
000265	641002		LACQ		CSKP1630
000266	060017		DAC*	17 / SAVE MQ	CSKP1640
000267	200000		LAC	0	CSKP1650
000270	060017		DAC*	17 / SAVE RETURN ADR.	CSKP1660
000271	701321		10T+1321	/ F OVERFLOW	CSKP1670
000272	602642		JMP	INTRO /YES	CSKP1680
000273	701361		10T+1361	/M OVERFLOW	CSKP1690
000274	602642		JMP	INTRO /YES	CSKP1700
000275	700001		CLSF	/READ TIME CLOCK	CSKP1710
000276	741000		SKP		CSKP1720
000277	605123		JMP	RTSEV	CSKP1730
000300	702301		CSFN	/SKIP IF NOT LIVETIMER	CSKP1740
000301	605220		JMP	LTSEV /LIVE TIME SERVICE	CSKP1750
000302	707001		DSSF	/DISK FLAG	CSKP1760
000303	741000		SKP		CSKP1770
000304	603461		JMP	OSKINT	CSKP1780
000305	707341		MTSF	/MAGNETIC TAPE FLAG	CSKP1790
000306	741000		SKP		CSKP1800
000307	611177		JMP	MTSEV	CSKP1810
000310	702001		SKSA	/SCALER A	CSKP1820
000311	603306		JMP	AENT /YES	CSKP1830
000312	702021		SKSB	/SCALER B	CSKP1840
000313	603313		JMP	BENT /YES	CSKP1850
000314	702041		SKSC	/SCALER C	CSKP1860
000315	603320		JMP	CENT /YES	CSKP1870
000316	702061		SKSD	/SCALER D	CSKP1880
000317	603325		JMP	DENT /YES	CSKP1890
000320	707601		DTDF	/DEC TAPE FLAG	CSKP1900
000321	741000		SKP	/NO	CSKP1910
000322	606441		JMP	DECSEV	CSKP1920
000323	705201		705201	/ INTERFACE IN	CSKP1930
000324	741000		SKP		CSKP1940
000325	616053		JMP	READ50+4	CSKP1950
000326	705301		705301	/ INTERFACE OUT	CSKP1960

000327	741000	SKP				
000330	616062	JMP	OUTB+4			CSKP1970
000331	700101	RSF				CSKP1980
000332	741000	SKP		/ PAPER READER		CSKP1990
000333	611575	JMP	:FAPR			CSKP2000
000334	700201	PSF		/PUNCH		CSKP2010
000335	741000	SKP		/NO		CSKP2020
000336	607354	JMP	PUNSHR	/YES		CSKP2030
000337	700301	KSF		/TELETYPE FLAG		CSKP2040
000340	741000	SKP		/NO		CSKP2050
000341	612564	JMP	:EL			CSKP2060
000342	700401	TSF		/TELEPRINTER FLAG		CSKP2070
000343	741000	SKP				CSKP2080
000344	606757	JMP	PRINTR	/YES		CSKP2090
000345	705001	FBSK		/ FUNCTION BOX		CSKP2100
000346	741000	SKP				CSKP2110
000347	614433	JMP	BOXSEV			CSKP2120
000350	705701	PNSKI		/PANEL		CSKP2130
000351	741000	SKP				CSKP2140
000352	604107	JMP	PANSEV			CSKP2150
000353	702401	702401		/ PLSF PLOTTER FLAG.		CSKP2160
000354	741000	SKP		/NO		CSKP2170
000355	616131	JMP	PLOTTR			CSKP2180
000356	707561	OIEF		/ DEC TAPE ERROR FLAG		CSKP2190
000357	741040	SKPIHLT		/ END OF SKIP CHAIN.		CSKP2200
000360	606441	JMP	DECSEV			CSKP2210
000361	700042	ION				CSKP2220
000362	607436	JMP	RET	/ RETURN		CSKP2230
		/				CSKP2240
		/LIST OF KEYBOARD COMMANDS				CSKP2250
		/				CSKP2260
		ALIST				CSKP2270
000363	000363	.				CSKP2280
000364	553230	553230		/SUM		CSKP2290
000365	601655	JMP	SUMCOM			CSKP2300
000366	560600	560600		/FM		CSKP2310
000367	601653	JMP	FMCOMD			CSKP2320
000370	606000	606000		/F		CSKP2330
000371	601645	JMP	FCOMD			CSKP2340
000372	515000	515000		/M		CSKP2350
000373	601651	JMP	MCOMD			CSKP2360
000374	531250	531250		/ERASE		CSKP2370
000375	101553	JMS	ERASE			CSKP2380
000376	421432	421432		/ START		CSKP2390
000377	601745	JMP	START			CSKP2400
000400	074323	074323		/STOP		CSKP2410
000401	601657	JMP	STOP			CSKP2420
000402	214323	214323		/STAR		CSKP2430
000403	101717	JMS	ADCSTR			CSKP2440
000404	043230	043230		/STP		CSKP2450
000405	101662	JMS	ADCSTP			CSKP2460
000406	254673	254673		/CONTUR		CSKP2470
000407	601126	JMP	CONTUR			CSKP2480
000410	244540	244540		/DELTZ		CSKP2490
000411	601546	JMP	DELTZ			CSKP2500
000412	222000	222000		/R		CSKP2510
000413	601341	JMP	RCOMD			CSKP2520
000414	725223	725223		/ZZERO		CSKP2530
000415	601350	JMP	ZZERO			CSKP2540

000416	330300	330300		/CS	CSKP2550
000417	601076	JMP	CSCOMD		CSKP2560
000420	341010	341010		/ ADC	CSKP2570
000421	604072	JMP	ADCFLG		CSKP2580
000422	361222	361222		/RINC	CSKP2590
000423	601123	JMP	RINC		CSKP2600
000424	416130	416130		/CINIT INIT CONTOUR DISPLAY	CSKP2610
000425	601107	JMP	CONINT		CSKP2620
000426	323000	323000		/S	CSKP2630
000427	605021	JMP	PSPREA	/ SPREAD COMMAND	CSKP2640
000430	036502	036502		/PUNCH	CSKP2650
000431	607205	JMP	PUNOUT		CSKP2660
000432	461202	461202		/PRINT	CSKP2670
000433	607132	JMP	SPECPT		CSKP2680
000434	414000	414000		/ L	CSKP2690
000435	603271	JMP	COMMPS		CSKP2700
000436	076451	076451		/MTNOP	CSKP2710
000437	611312	JMP	MTNOP		CSKP2720
000440	675451	675451		/MTEOF	CSKP2730
000441	611316	JMP	MTEOF		CSKP2740
000442	054532	054532		/SETUP	CSKP2750
000443	612007	JMP	SETUP		CSKP2760
000444	325614	325614		/ RESET LIVETIME	CSKP2770
000445	607517	JMP	LIVERS		CSKP2780
000446	256260	256260		/VER	CSKP2790
000447	601305	JMP	VERMK		CSKP2800
000450	270100	270100		/HOR	CSKP2810
000451	601311	JMP	HORMK		CSKP2820
000452	410050	410050		/EXPID	CSKP2830
000453	612116	JMP	SEND+1		CSKP2840
000454	632300	632300		/SET VERTICAL SV	CSKP2850
000455	611066	JMP	VMARK		CSKP2860
000456	223200	223200		/ZERO SUPPRESSION ZZ	CSKP2870
000457	605373	JMP	SUPZRO		CSKP2880
000460	032300	032300		/SET HORIZONTAL MARKER SH	CSKP2890
000461	611074	JMP	HMARK		CSKP2900
000462	215614	215614		/LINEAR DISPLAY	CSKP2910
000463	611027	JMP	LINEAR		CSKP2920
000464	727000	727000		/W	CSKP2930
000465	611034	JMP	WINDOW		CSKP2940
000466	152101	152101		/AREA	CSKP2950
000467	614027	JMP	CAREA		CSKP2960
000470	620200	620200		/ INPUT BF	CSKP2970
000471	614207	JMP	BFC		CSKP2980
000472	520200	520200		/ INPUT BM	CSKP2990
000473	614211	JMP	BMC		CSKP3000
000474	774140	774140		/LOG DISPLAY	CSKP3010
000475	611024	JMP	LOGS		CSKP3020
000476	354040	354040		/DEC OUTPUT TO DECTAPE	CSKP3030
000477	102017	JMS	DECOUT		CSKP3040
000500	431414	431414		/LIST	CSKP3050
000501	611616	JMP	LIST		CSKP3060
000502	752540	752540		/ DEBUG	CSKP3070
000503	516141	JMP	OIOA		CSKP3080
000504	346573	346573		/COUNTS	CSKP3090
000505	101776	JMS	COUNTO		CSKP3100
000506	355142	355142		/TIMES	CSKP3110
000507	603332	JMP	TIMES		CSKP3120

000510	254133	254133	/SCALER	CSKP3130
000511	605337	JMP	SCALER	CSKP3140
000512	457070	457070	/GET	CSKP3150
000513	601131	JMP	RDSLOT+1	CSKP3160
000514	474342	474342	/RDSLOT	CSKP3170
000515	601130	JMP	RDSLOT	CSKP3180
000516	545454	545454	/DELETE	CSKP3190
000517	606101	JMP	REMOVE	CSKP3200
000520	054611	054611	/INDEX	CSKP3210
000521	606122	JMP	INDEX	CSKP3220
000522	214756	214756	/NEWDIR	CSKP3230
000523	605550	JMP	NEWDIR	CSKP3240
000524	551652	551652	/RENAME	CSKP3250
000525	606201	JMP	RENAME	CSKP3260
000526	410505	410505	/EXIT AND LOAD MONITOR	CSKP3270
000527	607506	JMP	EXIT	CSKP3280
000530	761600	761600	/NG NUMBER GENERATE	CSKP3290
000531	605316	JMP	NGCOM	CSKP3300
000532	040200	040200		CSKP3310
000533	614028	JMP	P40C	CSKP3320
000534	576060	576060	/P40	CSKP3330
000535	614124	JMP	FTOM	CSKP3340
000536	046060	046060	/FTOM	CSKP3350
000537	614203	JMP	F40C	CSKP3360
000540	045150	045150	/F40	CSKP3370
000541	614205	JMP	M40C	CSKP3380
000542	453230	453230	/M40	CSKP3390
000543	612057	JMP	/SET	CSKP3400
000544	545323	545323	SET	CSKP3410
000545	612022	JMP	/SETU	CSKP3420
000546	453052	453052	SETU	CSKP3430
000547	612005	JMP	/UPSET	CSKP3440
000550	531032	531032	UPSET	CSKP3450
000551	612723	JMP	/SPACE	CSKP3460
000552	054531	054531	SPACE	CSKP3470
000553	612715	JMP	/ISETUP	CSKP3480
000554	153020	153020	ISET	CSKP3490
000555	611457	JMP	/PUNCH SEQUENCE	CSKP3500
000556	153222	153222	PSEQ	CSKP3510
000557	611500	JMP	/READ SEQUENCE	CSKP3520
000560	153414	153414	RSEQ	CSKP3530
000561	611517	JMP	/LIST SEQUENCE	CSKP3540
000562	153505	153505	LSEQ	CSKP3550
000563	611535	JMP	/EXECUTE SEQUENCE	CSKP3560
000564	153230	153230	ESEQ	CSKP3570
000565	611523	JMP	/ACCEPT SEQUENCE	CSKP3580
000566	153707	153707	SEQ	CSKP3590
000567	611477	JMP	/GSEQ	CSKP3600
000570	416111	416111	GSEQ	CSKP3610
000571	615664	JMP	/INIT	CSKP3620
000572	514414	514414	INIT	CSKP3630
000573	615415	JMP	/LLIM	CSKP3640
000574	122200	122200	LLIMC	CSKP3650
000575	615005	JMP	/R1	CSKP3660
000576	222200	222200	R1	CSKP3670
000577	615004	JMP	/R2	CSKP3680
000600	722200	722200	R1-1	CSKP3690
000601	615007	JMP	/RG	CSKP3700
		JMP	R1+2	

000602	352220	352220	/RES	CSKP3710
000603	615222	JMP	RESC	CSKP3720
000604	541010	541010	/ HIDE	CSKP3730
000605	601036	JMP	BKG-1	CSKP3740
000606	012432	012432	/STRIP	CSKP3750
000607	600724	JMP	STRIP	CSKP3760
000610	530300	530300	/ CM	CSKP3770
000611	601062	JMP	CM	CSKP3780
000612	630300	630300	/ CF	CSKP3790
000613	601052	JMP	CF	CSKP3800
000614	404152	404152	/ READPT	CSKP3810
000615	615714	JMP	READPT	CSKP3820
000616	750530	050530	/ C5050 (COINC 5050)	CSKP3830
000617	600721	JMP	FIFTYC	CSKP3840
000620	355323	355323	/ SEEK	CSKP3850
000621	601015	JMP	FGR	CSKP3860
000622	050532	050532		CSKP3870
000623	600717	JMP	FIFTYS / 55050 (STRIP 5050)	CSKP3880
000624	404000	404000	/ D	CSKP3890
000625	600732	JMP	D	CSKP3900
000626	331404	331404	/ DISK	CSKP3910
000627	615624	JMP	DISK	CSKP3920
000630	501424	501424	/ TAPE	CSKP3930
000631	615630	JMP	TAPE	CSKP3940
000632	307303	107303	/ COPY	CSKP3950
000633	603512	JMP	COPY	CSKP3960
000634	310730	310730	/ COPYS	CSKP3970
000635	603506	JMP	COPYS	CSKP3980
000636	465405	465405	/ EXTEND	CSKP3990
000637	616073	JMP	PROGRAM-11	CSKP4000
000640	214140	214140	/ LIB	CSKP4010
000641	616107	JMP	PROGRAM+3	CSKP4020
000642	032153	032153	/ SEARCH	CSKP4030
000643	616106	JMP	PROGRAM+2	CSKP4040
000644	761323	761323	/ SING	CSKP4050
000645	616105	JMP	PROGRAM+1	CSKP4060
000646	474020	474020	/ PLOT	CSKP4070
000647	616104	JMP	PROGRAM	CSKP4080
000650	413760	413760	/ FOCAL	CSKP4090
000651	616103	JMP	PROGRAM-1	CSKP4100
000652	461110	461110	/ IND	CSKP4110
000653	106054	JMS	RDDIR	CSKP4120
000654	041522	041522	/ READB	CSKP4130
000655	615712	JMP	READPT-2	CSKP4140
000656	667670	667670	/ FONOFF	CSKP4150
000657	606767	JMP	FONOFF	CSKP4160
000660	415276	415276	/ FORMAT	CSKP4164
000661	616101	JMP	PROGRAM-3	CSKP4165
000662	425661	425661	/ INVERT	CSKP4166
000663	616102	JMP	PROGRAM-2	CSKP4167
000664	000000	0		CSKP4170
		/ PROGRAM CHANGE ROUTINES...		CSKP4180
000665	008000	FIFTY		CSKP4190
000666	141523	0		CSKP4200
000667	216316	DZM	DELIMIT / ZERO DELTA LIMIT	CSKP4210
000670	040063	LAC	(100)	CSKP4220
000671	040064	DAC	CONX	CSKP4230
000672	041303	DAC	CONY	CSKP4240
		DAC	CFMFG	

000673	141307		DZM	VCROSS-1		CSKP4250
000674	141313		DZM	HCROSS-1		CSKP4260
000675	216317		LAC	(1760)		CSKP4270
000676	041522		DAC	XLIMIT	/ XLIMIT FOR CONTUR	CSKP4280
000677	041526		DAC	CMODE	/ NON-ZERO MEANS DISPLAY CHANGE	CSKP4290
000700	041525		DAC	YLIMIT		CSKP4300
000701	216320		LAC	(20)		CSKP4310
000702	044346		JAC	CHOR		CSKP4320
000703	044352		DAC	CVER		CSKP4330
000704	767400		LAW	-10400	/ SET UP MC	CSKP4340
000705	042056		DAC	MESS12-10		CSKP4350
000706	042533		DAC	DTRE2-1		CSKP4360
000707	045213		DAC	CONDMP+5		CSKP4370
000710	777760		LAW	-20		CSKP4380
000711	040054		DAC	FG5050		CSKP4390
000712	216321		LAC	(26)		CSKP4400
000713	044376		DAC	DSL0T+4		CSKP4410
000714	216322		LAC	(32)		CSKP4420
000715	041007		DAC	UNIAMT		CSKP4430
000716	620665		JMP	FIFTY		CSKP4440
000717	100665	FIFTYS	JMS	FIFTY		CSKP4450
000720	600725		JMP	STRIP+1		CSKP4460
000721	100665	FIFTYC	JMS	FIFTY		CSKP4470
000722	140053		DZM	STRPFG		CSKP4480
000723	501037		JMP	BKG		CSKP4490
000724	.01021	STRIP	JMS	FGR+4		CSKP4500
000725	750001		CLC			CSKP4510
000726	040053		DAC	STRPFG		CSKP4520
000727	216315		LAC	(1)		CSKP4530
000730	051077		DAC	MM		CSKP4540
000731	601037		JMP	BKG		CSKP4550
000732	201135	D	LAC	UNIT		CSKP4560
000733	042535		DAC	DTRE1		CSKP4570
000734	200733		LAC	.-1	/ GET ADR OF DTRE1	CSKP4580
000735	112250		JMS	N10		CSKP4590
000736	202535		LAC	DTRE1		CSKP4600
000737	100743		JMS	D2		CSKP4610
000740	201135		LAC	UNIT		CSKP4620
000741	055711		DAC	UNITSV		CSKP4630
000742	606257		JMP	RETC		CSKP4640
000743	000000	D2	O			CSKP4650
000744	652000		LHQ			CSKP4660
000745	741200		SNA			CSKP4670
000746	600773		JMP	DO		CSKP4680
000747	356323		TAD	(-5)	/ VALUE TOO LARGE?	CSKP4690
000750	740300		SMA152A			CSKP4700
000751	606746		JMP	OMARK	/ YES	CSKP4710
000752	541002		LACQ			CSKP4720
000753	041135		DAC	UNIT		CSKP4730
000754	556315		SAD	(1)	/ DISK?	CSKP4740
000755	600767		JMP	D1	/ YES	CSKP4750
000756	203574		LAC	DEC10		CSKP4760
000757	041013		DAC	JMS10		CSKP4770
000760	201010		LAC	JMS10-3		CSKP4780
000761	041014		DAC	JMSBLK		CSKP4790
000762	201007		LAC	UNIAMT		CSKP4800
000763	045716		DAC	FULL		CSKP4810
000764	204376		LAC	DSL0T+4		CSKP4820

000765	046266		DAC	BLKCAL+4		CSKP4830
000766	620743		JMP*	D2		CSKP4840
000767	203533	D1	LAC	COPY1		CSKP4850
000770	041013		DAC	JMS10		CSKP4860
000771	201011		LAC	JMS10-2		CSKP4870
000772	600761		JMP	D1-6		CSKP4880
000773	100775	00	JMS	.+2		CSKP4890
000774	620743		JMP*	D2		CSKP4900
000775	000000		0			CSKP4910
000776	141135		DZM	UNIT		CSKP4920
000777	201012		LAC	JMS10-1		CSKP4930
001000	041013		DAC	JMS10		CSKP4940
001001	203323		LAC	CNOP		CSKP4950
001002	451376		ISZ	RHFG	/ SET REWIND FLAG	CSKP4960
001003	041014		DAC	JMSBLK		CSKP4970
001004	216324		LAC	(130)		CSKP4980
001005	045716		DAC	FULL		CSKP4990
001006	620775		JMP*	D0+2		CSKP5000
001007	000017	UNI AMT	17			CSKP5010
001010	136325		JMS*	(BLKCAL)		CSKP5020
001011	136326		JMS*	(DKBLK)		CSKP5030
001012	136327		JMS*	(MTROWT)		CSKP5040
001013	136330	JMS10	JMS*	(DECTRW)		CSKP5050
001014	136325	JMSBLK	JMS*	(BLKCAL)		CSK 5060
001015	!01021	FGR	JMS	.+4		CSKP5070
001016	103650		JMS	FOLDED		CSKP5080
001017	750000		CLA			CSKP5090
001020	601040		JMP	BKG+1		CSKP5100
001021	000000		0			CSKP5110
001022	140054		DZM	FG5050		CSKP5120
001023	760000		-20000			CSKP5130
001024	042056		DAC	MESS12-10		CSKP5140
001025	042533		DAC	DTRE2-1		CSKP5150
001026	045213		DAC	CONDM+5		CSKP5160
001027	041303		DAC	CFCMFG		CSKP5170
001030	216331		LAC	(45)		CSKP5180
001031	044376		DAC	DSLGT+4		CSKP5190
001032	140053		DZM	STRPFG		CSKP5200
001033	216332		LAC	(17)		CSKP5210
001034	041007		DAC	UNI AMT		CSKP5220
001035	621021		JMP*	FGR+4		CSKP5230
001036	101021		JMS	FGR+4		CSKP5240
001037	216333	BKG	LAC	(400)		CCON0000
001040	157640		DZM	17640		CCON0010
001041	040051		DAC	BKGFLG		CCON0020
001042	740200		SZA			CCON0030
001043	201037		LAC	BKG		CCON0040
001044	741200		SNA		/ BKG OR FGR	CCON0050
001045	212701		LAC	TEL8	/ FG.	CCON0060
001046	040052		DAC	XCTBKG		CCON0070
001047	215711		LAC	UNITSV		CCON0080
001050	100743		JMS	D2		CCON0090
001051	605454		JMP	DSEL+2	/ CHANGE DISPLAY BUFFERS	CCON0100
001052	201307	CF	LAC	VCROSS-1		CCON0110
001053	040057		DAC	CSTART		CCON0120
001054	201313		LAC	MCROSS-1	/ Y START VALUE	CCON0130
001055	040060		DAC	WSTART		CCON0140
001056	200064		LAC	CONY		CCON0150

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001057	041304	DAC	CONDY		CCON0160
001060	75000^	CLA			CCON0170
001081	601070	JMP	CSCOMD-6		CCON0180
001062	201313	CM LAC	HCROSS-1		CCON0190
001063	040057	DAC	CSTART		CCON0200
001064	201307	LAC	VXCROSS-1 / START VALUE		CCON0210
001065	040060	DAC	WSTART		CCON0220
001066	200063	LAC	CONX		CCON0230
001067	041304	DAC	CONDY		CCON0240
001070	652000	LMO		/ SAVE AC	CCON0250
001071	200054	LAC	FG5050		CCON0260
001072	741200	SNA		/ 5050?	CCON0270
001073	440057	ISZ	CSTART	/ NO	CCON0280
001074	641002	LACQ		/ RESTORE AC	CCON0290
001075	601103	JMP	.+6		CCON0300
001076	216334	CSCOMD LAC	(177)		CCON0310
001077	041304	DAC	CONDY		CCON0320
001100	140060	DZM	WSTART	/ START AT 0.	CCON0330
001101	140057	DZM	CSTART		CCON0340
001102	750001	CLC			CCON0350
001103	041303	DAC	CFMFG		CCON0360
001104	101136	JMS	PSETUP	/ READ COORD. & FILL DISPLAY LIST	CCON0370
001105	216335	LAC	(3)		CCON0380
001106	601647	JMP	FCOND+2		CCON0390
			/CONTOUR INITIALIZED FROM PANEL.		CCON0400
001107	150302	CONINT DZM	SPREAD		CCON0410
001110	141314	DZM	HCROSS		CCON0420
001111	141310	DZM	VXCROSS		CCON0430
001112	141337	DZM	ZZMOV		CCON0440
001113	216314	LAC	(400000)		CCON0450
001114	040236	DAC	DELTA		CCON0460
001115	040237	DAC	DELCONT		CCON0470
001116	141527	DZM	MUPPER	/ SET UPPER LEVEL=262K	CCON0480
001117	216315	LAC	(1)		CCON0490
001120	040235	DAC	ZPLANE		CCON0500
001121	040250	DAC	ZTEMP		CCON0510
001122	741000	SKP			CCON0520
001123	112461	RINC JMS	DECIN	/ READ COUNTERS	CCON0530
001124	041340	DAC	DELR	/ SAVE	CCON0540
001125	044342	DAC	ZZER	/ SET MOVING SPEED	CCON0550
			/CODING INITIATED BY THE CONTUR COMMAND.		CCON0560
			/ ALLOWS COINCIDENCE DATA TO BE DISPLAYED IN CONTOUR MAPS.		CCON0570
001126	145477	CONTUR DZM	ONODE		CCON0580
001127	605454	JMP	DSEL+2		CCON0590
001130	751000	RDSLOT SKP:CLA			CCON0600
001131	777777	LAW	-1		CCON0610
001132	151375	DZM	MAGUFL	/ CLEAR FLAG.	CCON0620
001133	042577	DAC	SW		CCON0630
001134	602107	JMP	GTREAD		CCON0640
001135	000004	UNIT 4			CCON0650
			/PSETUP HWB PDP-9		CCON0660
			/ROUTINE TO CALCULATE A DISPLAY LIST FOR A PLANE		CCON0670
			/THROUGH THE COINCIDENCE DATA.		CCON0680
001136	000000	PSETUP. 0			CCON0690
001137	112461	JMS	DECIN	/ GET FIRST PLANE	CCON0700
001140	340057	TAD	CSTART		CCON0710
001141	741300	SNA:SPA			CCON0720
001142	606746	JMP	OMARK		CCON0730

001143	040252		DAC	FCOORD		CCON0740
001144	212714		LAC	TC		CCON0750
001145	556336		SAD	(54)	/ ANOTHER?	CCON0760
001146	601151		JMP	.+3		CCON0770
001147	750000		CLA			CCON0780
001150	601157		JMP	.+7	/ NO	CCON0790
001151	112461		JMS	DECIN		CCON0800
001152	340057		TAD	CSTART		CCON0810
001153	101766		JMS	COMPLM		CCON0620
001154	340252		TAD	FCOORD		CCON0830
001155	740100		SMA			CCON0840
001156	606746		JMP	QMARK	/ LAST IS LESS THAN FIRST	CCON0850
001157	356337		TAD	(-1)		CCON0860
001160	041247		DAC	NUMPLA	/ NUMBER OF PLANES	CCON0870
001161	200216		LAC	FGTPLA	/ZERO DISPLAY LIST	CCON0880
001162	040253		DAC	PLALST		CCON0890
001163	777600		LAW	-200		CCON0900
001164	041250		DAC	PSCNTR		CCON0910
001165	160253		DZM*	PLALST		CCON0920
001166	440253		ISZ	PLALST		CCON0930
001167	441250		:SZ	PSCNTR	/LAST LIST ENTRY	CCON0940
001170	601165		JMP	.-3		CCON0950
001171	150410		DZM	DISTWO	/ONE DISPLAY	CCON0960
001172	200216	PSET21	LAC	FGTPLA	/SET LOCATION OF DISPLAY LIST	CCON0970
001173	050407		DAC	DISONE		CCON0980
001174	040253		DAC	PLALST	/TEMPORARY LOCATION	CCON0990
001175	101274		JMS	CH5050	/ SKIP IF 5050	CCON1000
001176	440253		ISZ	PLALST		CCON1010
001177	140254		DZM	MCOORD	/ZERO M	CCON1020
001200	440254		ISZ	MCOORD	/SET M=1	CCON1030
001201	200252	PSET3	LAC	FCOORD		CCON1040
001202	101274		JMS	CH505C	/ SKIP IF 5050	CCON1050
001203	741000		SKP			CCON1060
001204	201303		LAC	CFCMFG		CCON1070
001205	101766		JMS	COMPLM		CCON1080
001206	340254		TAD	MCOORD		CCON1090
001207	740300		SMA:ISZA		/ * OR # F	CCON1100
001210	601215		JMP	PSET4	/YES	CCON1110
001211	200254		LAC	MCOORD	/NO, INTERCHANGE	CCON1120
001212	041272		DAC	FAXI	/F AND M	CCON1130
001213	200252		LAC	FCOORD		CCON1140
001214	601220		JMP	PSET5-1		CCON1150
001215	200252	PSET4	LAC	FCOORD		CCON1160
001216	041272		DAC	FAXI		CCON1170
001217	200254		LAL	MCOORD		CCON1180
001220	041273		DAC	MAXI		CCON1190
001221	101251	PSET5	JMS	DETPLA		CCON1200
001222	140224		DAC	COINAD	/SAVE ADDRESS	CCON1210
001223	101274		JMS	CH5050	/ SKIP IF 5050	CCON1220
001224	741000		SKP			CCON1230
001225	601231		JMP	..+4		CCON1240
001226	200252		LAC	FCOORD		CCON1250
001227	101766		JMS	COMPLM		CCON1260
001230	340254		TAD	MCOORD		CCON1270
001231	751200		SNA:CLA		/F#M	CCON1280
001232	360224		TAD*	COINAD	/YES DOUBLE COUNTS	CCON1290
001233	360224		TAD*	COINAD	/NO	CCON1300
001234	360253		TAD*	PLALST		CCON1310

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001235	060253	DAC*	PLALST	/STORE IN DISPLAY LIST	CCON1320
001236	440253	ISZ	PLALST		CCON1330
001237	201304	LAC	CONDY		CCON1340
001240	540254	SAD	MCOORD	/ M=100 (IF 5050) OR 177?	CCON1350
001241	601243	JMP	PSETB		CCON1360
001242	601200	JMP	PSET3-1	/ NO	CCON1370
001243	440252	PSETB.	ISZ	/ADVANCE PLANE	CCON1380
001244	441247		ISZ	/LAST PLANS	CCON1390
001245	601172		JMP	/NO	CCON1400
001246	621136		JMP*	/YES	CCON1410
001247	000000	NUMPLA	0		CCON1420
001250	000000	PSCNTR	0		CCON1430
		/ROUTINE TO CALCULATE ADDRESS IN UPPER CORE			CCON1440
		/FOR COMMAND CS.			CCON1450
001251	000000	DETPLA	0		CCON1460
001252	200063		LAC	CONX	CCON1470
001253	041262		DAC	DETP1	CCON1480
001254	201273		LAC	MAXI	CCON1490
001255	101274		JMS	CH5050	CCON1500
001256	041262		DAC	DETP1	CCON1510
001257	356337		TAD	(-1)	CCON1520
001260	744000		CLL		CCON1530
001261	653122		653122		CCON1540
001262	000000	DETP1	0	/MUL	CCON1550
001263	641002		641002	/MULTIPLICAND	CCON1560
001264	101274		JMS	CH5050	CCON1570
001265	744020		CLLIRAR	/DIVIDE BY TWO	CCON1580
001266	341272		TAD	FAXI	CCON1590
001267	356337		TAD	(-1)	CCON1600
001270	340234		TAD	FSTCOI	CCON1610
001271	621251		JMP*	DETP1	CCON1620
001272	000000	FAXI	0		CCON1630
001273	000000	MAXI	0		CCON1640
001274	000000	CH5050	0		CCON1650
001275	652000		LMO	/ SAVE AC	CCON1660
001276	201303		LAC	CFCMFG	CCON1670
001277	744100		SMAICLL		CCON1680
001300	441274		ISZ	CH5050	CCON1690
001301	641002		LACQ	/ YES	CCON1700
001302	621274		JMP*	CH5050	CCON1710
001303	777777	CFCMFG	-1	/ RESTORE AC	CCON1720
001304	000000	CONDY	0		CCON1730
001305	204352	VERMK	LAC	CVER	CCON1740
001306	101315		JMS	HCROSS+1	CCON1750
001307	000000		0		CCON1760
001310	000000	VCROSS	0		CCON1770
001311	204346	HORMK	LAC	CHOR	CCON1780
001312	101315		JMS	HCROSS+1	CCON1790
001313	000000		0		CCON1800
001314	000000	HCROSS	0		CCON1810
001315	000000		0		CCON1820
001316	041331		DAC	.+13	CCON1830
001317	112461		JMS	DECIN	CCON1840
001320	361315		TAD*	HCROSS+1	CCON1850
001321	441315		ISZ	HCROSS+1	CCON1860
001322	741300		SPAISNA		CCON1870
001323	606746		JMP	OMARK	CCON1880
001324	516334		AND	(177)	CCON1890
				/LIMIT TO 128	

001325	100065	JMS	CFCM50	/ SKIP IF NOT 5050 OR SEEK	CCON1900
001326	356337	TAD	(-1)		CCON1910
001327	744009	CLL			CCON1920
001330	653122	MUL			CCON1930
001331	000000	0			CCON1940
001332	641002	LACQ			CCON1950
001333	061315	DAC*	HXCROSS+1	/ SAVE IN HXCROSS OR VCROSS.	CCON1960
001334	601126	JMP	CONTUR		CCON1970
001335	000000	VCMOV	0		CCON1980
001336	000000	HCMOV	0		CCON1990
001337	000000	ZZMOV	0	/ ZZ MOVING CONTROL	CCON2000
001340	000000	DELR	0		CCON2010
				/CODING ACCESSED BY COMMAND R. RAISES Z PLANE BY VALUE OF DELTZ.	CCON2020
				/IF Z PLANE BECOMES GREATER THAN 262K IT IS RESTORED TO ITS	CCON2030
				/ORIGINAL VALUE AS GIVEN BY ZZZERO COMMAND.	CCON2040
001341	200250	RCOND	LAC	ZTEMP	CCON2050
001342	744000		CLL		CCON2060
001343	341340		TAD	DELR	CCON2070
001344	741400		SZL		CCON2080
001345	200235	RCOND	LAC	ZPLANE	CCON2090
001346	101530		JMS	ZZERC	CCON2100
001347	601126		JMP	CONTUR	CCON2110
				/CODING ACCESSED BY COMMAND ZZZERO.X< SETS Z PLANE THROUGH	CCON2120
				/COINCIDENCE DATA TO VALUE OF X.	CCON2130
001350	112461	ZZERO	JMS	DECIN	CCON2140
001351	040235		DAC	ZPLANE	CCON2150
001352	601346		JMP	RCOND+1	CCON2160
				/CODING TO DISPLAY COINCIDENCE DATA	CCON2170
001353	150551	CONDIS	DZM	NY	CCON2180
001354	760002		LAW	2	CCON2190
001355	700704		700704		CCON2200
001356	201337		LAC	ZZMOV	CCON2210
001357	340250		TAD	ZTEMP	CCON2220
001360	040250		DAC	ZTEMP	CCON2230
001361	540251		SAD	ZTEMP)	CCON2240
001362	601377		JMP	COND	CCON2250
001363	040251		DAC	ZTEMP1	CCON2260
001364	744000		CLL		CCON2270
001365	340237		TAD	DELCNT	CCON2280
001366	741400		SZL		CCON2290
001367	750000		CLA		CCON2300
001370	748001		CMA		CCON2310
001371	356315		TAD	(1)	CCON2320
001372	041527		DAC	MUPPER	CCON2330
001373	340250		TAD	ZTEMP	CCON2340
001374	740001		CMA		CCON2350
001375	356315		TAD	(1)	CCON2360
001376	040236		DAC	DELTA	CCON2370
001377	201314	COND	LAC	HXCROSS	CCON2380
001400	341336		TAD	HCMOV	CCON2390
001401	516340		AND	(1777)	CCON2400
001402	041314		DAC	HXCROSS	CCON2410
001403	541525		SAD	YLIMIT	CCON2420
001404	601414		JMP	COND2	CCON2430
001405	700606		700606		CCON2440
001406	750000		CLA		CCON2450
001407	700546	COND1	700546		CCON2460
001410	556317		SAD	(1760)	CCON2470

001411	601414		JMP	COND2	/YES	
001412	35634		TAD	(10)	/NO	CCON2480
001413	601407		JMP	COND1		CCON2490
001414	201310	COND2	LAC	VCROSS	/ DISPLAY VER. MARK	CCON2500
001415	341335		TAD	VCMOV	/ MOVING VARIABLE	CCON2510
001416	516340		AND	(1777)	/ KEEP WITHIN 10 BITS	CCON2520
001417	041310		DAC	VCROSS		CCON2530
001420	541522		SAD	XLIMIT		CCON2540
001421	601431		JMP	COND4		CCON2550
001422	700506			700506	/LOAD X	CCON2560
001423	750000		CLA			CCON2570
001424	700646	COND3		700646	/LOAD Y AND DISPLAY	CCON2580
001425	556317		SAD	(1760)	/ALL POINTS	CCON2590
001426	601431		JMP	COND4	/YES	CCON2600
001427	356341		TAD	(10)	/NO	CCON2610
001430	601424		JMP	COND3		CCON2620
001431	760003	COND4	LAW	3	/ SET BRIGHTNESS	CCON2630
001432	700704			700704		CCON2640
001433	170254		DZM*	MOVADD	/ CONTAINS ADDRESS OF VCMOV IF INC MODE	CCON2650
001434	200234		LAC	FSTCOI	/ GET FIRST ADDRESS TO	CCON2660
001435	040207		DAC	ADDRSS	/BE DISPLAYED	CCON2670
001436	204346		LAC	CHOR		CCON2680
001437	740001		CMA			CCON2690
001440	356315		TAD	(1)		CCON2700
001441	040211		DAC	YCOORD		CCON2710
001442	201522		LAC	XLIMIT	/ INITIALIZE SADLIM.	CCON2720
001443	601446		JMP	.+3		CCON2730
001444	201524	COND5	LAC	SADLIM		CCON2740
001445	341523		TAD	DELIMT	/ UPDATE SADLIM	CCON2750
001446	041524		DAC	SADLIM		CCON2760
001447	140210		DZM	XCOORD	/ SET X=0	CCON2770
001450	200211		LAC	YCOORD	/GET Y	CCON2780
001451	541525		SAD	YLIMIT	/ LAST POINT?	CCON2790
001452	605432		JMP	DLIST	/RETURN	CCON2800
001453	344346		TAD	CHOR	/ ADD OCTAL 10 OR 20	CCON2810
001454	040211		DAC	YCOORD		CCON2820
001455	700606			700606	/LOAD Y BUFFER	CCON2830
001456	220207	COND6	LAC*	ADDRSS	/GET CONTENTS OF ADDRESS	CCON2840
001457	744100		SMAICLL		/ VALUE NEG OR POS?	CCON2850
001460	601470		JMP	.+10	/ POS.	CCON2860
001461	210302		LAC	SPREAD		CCON2870
001462	741200		SNA		/ DISPLAY VALUES > OR < DELTA?	CCON2880
001463	601500		JMP	COND7	/ GREATER THAN DELTA.	CCON2890
001464	220207		LAC*	ADDRSS		CCON2900
001465	740001		CMA		/ NEGATE VALUE.	CCON2910
001466	356315		TAD	(1)		CCON2920
001467	601474		JMP	.+5		CCON2930
001470	210302		LAC	SPREAD		CCON2940
001471	740200		SZA			CCON2950
001472	601500		JMP	COND7	/DISPLAY VALUES > DELTA.	CCON2960
001473	220207		LAC*	ADDRSS		CCON2970
001474	744000		CLL			CCON2980
001475	341527		TAD	MUPPER		CCON2990
001476	744400		SMAICLL		/DISPLAY POINT	CCON3000
001477	340236		TAD	DELTA	/MAYBE	CCON3010
001500	440207	COND7	ISZ	ADDRSS	/INCRFMENT ADDRESS.	CCON3020
001501	200207		LAC	ADDRSS		CCON3030
001502	556342		SAD	(60000)	/ DON'T LET ADR. RUN OVER CORE	CCON3040
						CCON3050

001503	605432	JMP	DLIST			CCON3060
001504	201526	LAC	CMODE			CCON3070
001505	740200	SZA		/ CHANGE IN DISPLAY?		CCON3080
001506	605432	JMP	DLIST	/ YES		CCON3090
001507	200210	LAC	XCOORD	/GET X		CCON3100
001510	741400	SZL		/DISPLAY POINT		CCON3110
001511	601514	JMP	...	/YES		CCON3120
001512	700506	700506		/NO. LOAD X VALUE		CCON3130
001513	741000	SKP				CCON3140
001514	700546	700546		/ LOAD X AND DISPLAY		CCON3150
001515	541524	SAD	SADLIM	/ X=LIMIT		CCON3160
001516	601444	JMP	COND5	/YES, SET NEW X AND Y		CCON3170
001517	344352	TAD	CVER	/ NO. INCREMENT X.		CCON3180
001520	040210	DAC	XCOORD	/SAVE X		CCON3190
001521	601456	JMP	COND6	/RETURN FOR NEW POINT		CCON3200
001522	000000	XLIMIT	0			CCON3210
001523	000010	DELIMT	10			CCON3220
001524	000000	SADLIM	0			CCON3230
001525	001760	YLIMIT	1760			CCON3240
001526	000000	CMODE	0			CCON3250
001527	000000	MUPPER	0	/NEGATIVE OF HIGH SIDE OF DELTA Z		CCON3260
		/ CHR 1970				CCON3270
		/ SUBROUTINE TO CALCULATE DELTA				CCON3280
001530	000000	ZZERC	0			CCON3290
001531	040250	DAC	ZTEMP			CCON3300
001532	744000	CLL				CCON3310
001533	340237	TAD	DELCNT	/ ADD TO FIND UPPER LEVEL		CCON3320
001534	741400	SZL		/ OVERFLOW 262K		CCON3330
001535	750000	CLA				CCON3340
001536	740001	CMA				CCON3350
001537	356315	TAD	(1)			CCON3360
001540	041527	DAC	MUPPER	/ =0 FOR 262K		CCON3370
001541	340250	TAD	ZTEMP	/ DELTA WILL BE DELCNT UNLESS		CCON3380
001542	740001	CMA		/MUPPER=0 THEN WILL BE -ZTEMP		CCON3390
001543	356315	TAD	(1)			CCON3400
001544	040236	DAC	DELTA			CCON3410
001545	621530	JMP*	ZZERC			CCON3420
		/DELTZ	WHB	PDP-9		CCON3430
		/CODING ACCESSED BY DELTZ,X<< COMMAND. SETS THICKNESS OF				CCON3440
		/DELTA Z SLICE THROUGH COINCIDENCE DATA # TO X.				CCON3450
001546	112461	DELTZ	JMS	DECIN		CCON3460
001547	040237		DAC	DELCNT		CCON3470
001550	200250		LAC	ZTEMP		CCON3480
001551	101530		JMS	ZZERC		CCON3490
001552	601126		JMP	CONTUR		CCON3500
		/ ERASE	DATA			CDAT0000
001553	000000	ERASE	0			CDAT0010
001554	105275		JMS	ADCBUS		CDAT0020
001555	200051		LAC	BKGFLG		CDAT0030
001556	741200		SNA		/SKIP ADC ON	CDAT0040
001557	105070		JMS	CCAS	/CLEAR CLOCKS AND SCALERS	CDAT0050
001560	101564		JMS	ERASF		CDAT0060
001561	101573		JMS	ERASH		CDAT0070
001562	101602		JMS	ERASC		CDAT0080
001563	621553		JMP*	ERASE		CDAT0090
001564	000000	ERASF	0			CDAT0100
001565	400052		XCT	XCTBKG		CDAT0110
001566	340217		TAD	FSTART	/ ERASE F SINGLES	CDAT0120

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001567 040255 DAC ZERTEM
001570 777400 LAH -400
001571 101636 JMS ZEROUT
001572 621534 JMS ZEROUT /ERASE 256 CHANNEL SPECTRUM
001573 000000 ERASH JMP* ERASF
001574 400052 0
001575 340220 XCT XCT'KG
001576 040255 TAD MSTART / ERASE M SINGLES
001577 777400 DAC ZERTEM
001600 101636 LAH -400
001601 621573 JMS ZEROUT
001602 000000 ERASC JMP* ERASH /ERASE 256 CHANNEL SPECTRUM
001603 216343 0
001604 040255 LAC (40000) / ERASE 8K DISPLAY BUFFER
001605 760000 DAC ZERTEM
001606 101636 LAH -20000
001607 141621 JMS ZEROUT
001610 777770 DZH ERAS9+4
001611 040256 LAH -10 /ZERO OUT 64K COINC SPEC ON DISK
001612 200051 DAC ZRCNTR
001613 740200 LAC BKGFLG
001614 601630 SZA
001615 103421 ERAS9 JMP ERAS9+13 / ERASE DISK?
001616 000000 JMS DISKIO / NO
001617 760000 0 / DISK #
001620 040000 -20000 /HC
001621 000000 40000 / CA
001622 000005 0 /DISK ADR
001623 760000 5 /WRITE
001624 341621 LAH -20000
001625 041621 TAD -3 / INCREMENT DISK ADR. BY 20000
001626 440256 DAC -4
001627 601615 ISZ ZRCNTR /DONE ZEROING 64K
001630 400052 JMP ERAS9 /NO
001631 340221 XCT XCTBKG
001632 040255 TAD SUMONE / ERASE SUM SPEC
001633 777400 DAC ZERTEM
001634 101636 LAH -400
001635 621602 JMS ZEROUT /ERASE SUM SPECTRUM
JMP* ERASC
HMB PDP-9
/ZEROUT
/ROUTINE TO ZERO CONSECUTIVE CORE LOCATIONS.
/USED IN FOLLOWING WAY
/ ZERTEM = 1ST ADDRESS TO BE ZEROED.
/ AC CONTAINS # OF ADDRESSES TO BE ZEROED.
ZEROUT 0
001636 000003 DAC ZRCNTR
001637 040256 DZH* ZERTEM
001640 160255 ISZ ZERTEM
001641 440255 ISZ ZRCNTR /LAST ADDRESS
001642 440256 JMP ZER01 /NO
001643 601640 JMP* ZEROUT /RETURN
001644 621636 JMP* HMB PDP-9
/FCOMD
/ROUTINE ACCESSED BY F. COMMAND (SINGLE MODE) GO SETUP
/DISPLAY OF F SINGLES.
FCOMD LAC (7)
DZH MSTART
DAC DMODE
JMP DSEL+2

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E-20

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CDAT0130
CDAT0140
CDAT0150
CDAT0160
CDAT0170
CDAT0180
CDAT0190
CDAT0200
CDAT0210
CDAT0220
CDAT0230
CDAT0240
CDAT0250
CDAT0260
CDAT0270
CDAT0280
CDAT0290
CDAT0300
CDAT0310
CDAT0320
CDAT0330
CDAT0340
CDAT0350
CDAT0360
CDAT0370
CDAT0380
CDAT0390
CDAT0400
CDAT0410
CDAT0420
CDAT0430
CDAT0440
CDAT0450
CDAT0460
CDAT0470
CDAT0480
CDAT0490
CDAT0500
CDAT0510
CDAT0520
CDAT0530
CDAT0540
CDAT0550
CDAT0560
CDAT0570
CDAT0580
CDAT0590
CDAT0600
CDAT0610
CDAT0620
CDAT0630
CDAT0640
CDAT0650
CDAT0660
CDAT0670
CDAT0680
CDAT0690
CDAT0700

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/RCOMD   HWB       PDP-9
/ROUTINE ACCESSED BY M. COMMAND (SINGLE MODE) TO SETUP
/DISPLAY OF M SINGLES.
001651   216345   MCOMD   LAC       (6)
001652   601646   JMP      FCOMD+1
/RCOMD   HWB       PDP-9
/ROUTINE ACCESSED BY FM. COMMAND (SINGLE MODE) TO SETUP
/OVERLAPPING DISPLAY OF F AND M SINGLES.
001653   216346   FMCOMD  LAC       (5)
001654   601646   JMP      FCOMD+1
/SUMCOM  HWB       PDP-9       9/14/68
/CODING INITIATED BY COMMAND SUM.
001655   216347   SUMCOM  LAC       (4)
001656   601646   JMP      FCOMD+1
/CODING INITIATED BY COMMAND STOP.
/DISABLES ADC INTERFACE.
/DISABLES REAL TIME CLOCK.
/DISABLES LIVE TIME CLOCK.
001657   101662   STOP    JMS      ADCSTP   /DISABLE ADCS AND CLOCKS
001660   770042   LAW     STOTIM
001661   601747   JMP     START+2
/SUBROUTINE TO DISABLE ADCS AND CLOCKS
ADCSTP   0
001662   000000   IOF
001663   700002   IOF+125, /DISABLE INTERFACE
001664   701254   CHLT    /DISABLE LIVE TIME
001665   702324   CLOF    /DISABLE REAL TIME
001666   700004   SPSA    /STOP SCALER A
001667   702204   SPSB    /B
001670   702224   SPSC    /C
001671   702244   SPSD    /D
001672   702264   ISZ
001673   444641   JMS     ADCGO    / PREVENT ADC ENABLING
001674   102754   LSORT   /SORT PARTIAL LISTS
001675   142750   DZM     ADCDSK
001676   202654   LAC     INTRO1
001677   544546   SAD     CSNA     / DISK SORTING?
001700   141751   DZM     DETAGD   / NO
001701   144641   DZM     ADCGO
001702   105237   JMS     READCS  /READ CLOCKS AND SCALERS
001703   140226   DZM     ADCON   /CLEAR ADC ON FLAG
001704   760001   LAW     I
001705   105037   JMS     PINDOF
001706   200051   LAC     BKGFLG
001707   740200   SZA
001710   621662   JMP*    ADCSTP  / SKIP IF NOT BKG.
001711   107077   JMS     PRIOF
001712   304301   304301   / AD
001713   240303   240303   / C
001714   306317   306317   / OF
001715   540306   640306   / F
001716   621662   JMP*    ADCSTP
/BEGIN   HWB       PDP-9
/ROUTINE INITIATED BY START COMMAND.
/INITIATES TAKING OF DATA IN
/MULTI-PARAMETER MODE. DOES NOT ERASE
/DATA AREA.
001717   000000   ADCSTR  0
001720   105047   JMS     PADCB

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COAT0710
COAT0720
COAT0730
COAT0740
COAT0750
COAT0760
COAT0770
COAT0780
COAT0790
COAT0800
COAT0810
COAT0820
COAT0830
COAT0840
COAT0850
COAT0860
COAT0870
COAT0880
COAT0890
COAT0900
COAT0910
COAT0920
COAT0930
COAT0940
COAT0950
COAT0960
COAT0970
COAT0980
COAT0990
COAT1000
COAT1010
COAT1030
COAT1040
COAT1050
COAT1060
COAT1070
COAT1080
COAT1090
COAT1100
COAT1110
COAT1120
COAT1130
COAT1140
COAT1150
COAT1160
COAT1170
COAT1180
COAT1190
COAT1200
COAT1210
COAT1220
COAT1230
COAT1240
COAT1250
COAT1260
COAT1270
COAT1280
COAT1290

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001721 216315 LAC (1) /SET ADC ON FLAG
001722 040226 DAC ADCON
001723 702201 ENSA /ENABLE SCALER A
001724 702221 ENSB /B
001725 702241 ENSC /C
001726 702261 ENSD /D
001727 702321 CSLT /STAR: LIVE TIME
001730 700044 CLON /START REAL TIME
001731 200225 LAC ADCMOD /GET ADC MODE
001732 701244 ADCOP /SET MODE
001733 701104 CFOV /RESET BOTH ADC'S
001734 760001 LAH 1
001735 105026 JMS PINDON
001736 236350 LAC* (LIVEPT)
001737 076351 DAC* (LIVEPH)
001740 202753 LAC COILST
001741 042752 DAC LSTADR
001742 042751 DAC LSTAD
001743 141751 DZH DETADD / CLEAR COINC TO DISK
001744 621717 JMP* ADCSTR

/COMMAND TO START ADC'S
001745 101717 START JMP* ADCSTR
001746 770041 LAH STATIM
001747 112250 JMS NIO
001750 606257 JMP RETC

/ROUTINE TO CALCULATE STORAGE ADDRESS
/FROM THE COORDINATES OF A COINCIDENCE
/EVENT. RETURNS WITH ADDRESS IN THE AC.
/EXPECTS THE COORDINATES TO BE IN FCHANS
,AND MCHANS.
/USES THE ALGORITHM A=(Y(Y-1))/2+X-1.
/ENTER IN THE FOLLOWING WAY
/LOCATION CONTENTS
/ N JMS DETADD
/ FAXIS CONTAINS F COORDINATE
/ MAXIS CONTAINS M COORDINATE
001751 000000 DETADD 0
001752 200260 LAC MAXIS /GET Y
001753 041757 DAC DETAI
001754 356337 TAD (-1) /Y-1
001755 744000 CLL
001756 653122 653122 /MUL
001757 000000 DETA1 0 /MULTIPLICAND
001760 641002 641002 /LACO. MQ TO AC
001761 744020 CLL RAR /DIVIDE BY TWO
001762 340257 TAD FAXIS /ADD X
001763 356337 TAD (-1)
001764 340234 TAD FSTCOI /ADD 1ST DATA ADDRESS 2ND BANK
001765 621751 JMP* DETADD

/ROUTINE TO FIND THE TWO'S COMPLEMENT
/OF AN 18 BIT NUMBER. ENTER WITH
/NUMBER TO BE COMPLEMENTED IN AC.
/RETURNS WITH COMPLEMENT IN AC
001766 000000 COMPLM 0
001767 740001 CHA
001770 356315 TAD (1)
001771 621766 JMP* COMPLM
001772 000000 CIA 0

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CDAT1300
 CDAT1310
 CDAT1320
 CDAT1330
 CDAT1340
 CDAT1350
 CDAT1360
 CDAT1370
 CDAT1380
 CDAT1390
 CDAT1400
 CDAT1410
 CDAT1420
 CDAT1430
 CDAT1440
 CDAT1450
 CDAT1460
 CDAT1470
 CDAT1480
 CDAT1490
 CDAT1500
 CDAT1510
 CDAT1520
 CDAT1530
 CDAT1540
 CDAT1550
 CDAT1560
 CDAT1570
 CDAT1580
 CDAT1590
 CDAT1600
 CDAT1610
 CDAT1620
 CDAT1630
 CDAT1640
 CDAT1650
 CDAT1660
 CDAT1670
 CDAT1680
 CDAT1690
 CDAT1700
 CDAT1710
 CDAT1720
 CDAT1730
 CDAT1740
 CDAT1750
 CDAT1760
 CDAT1770
 CDAT1780
 CDAT1790
 CDAT1800
 CDAT1810
 CDAT1820
 CDAT1830
 CDAT1840
 CDAT1850
 CDAT1860
 CDAT1870

001773 744001
 001774 356315
 001775 621772

CMAICLL
 TAD (1)
 JMP* CIA
 /CCUNTO HWB PDP9
 /THIS ROUTINE PRINTS OUT THE SCALERS CONTAINING
 /THE F SINGLES, MSINGLES, COINCIDENCE COUNTS.
 /SINGLES REJECTS, AND COINCIDENCE REJECTS.

001776 000000
 001777 200052
 002000 051653
 002001 111625
 002002 011714
 002003 230015
 002004 011717
 002005 230017
 002006 011722
 002007 230023
 002010 011725
 002011 230021
 002012 011730
 002013 230025
 002014 011733
 002015 230027
 002016 621776

COUNT0 0
 LAC XCTBKG
 DAC MIO1
 JMS MIO
 MESS7
 DBLIFSINH1
 MESS8
 DBLIMSINH1
 MESS9
 DBLISREJH1
 MESS10
 DBLICSLH1
 MESS11
 DBLICREJH1
 MESS15
 DBLIEREJH1
 JMP* COUNT0

/CHR PDP9 1969
 /SUBROUTINE TO OUT PUT ENTIRE EXPERIMENT
 /ON DECTAPE WITH UNIT DIALED TO 3.

002017 000000
 002020 104041
 002021 106054
 002022 740200
 002023 622017
 002024 105725
 002025 206303
 002026 740200
 002027 606257
 002030 106072
 002031 740200
 002032 606257
 002033 206305
 002034 046522
 002035 400052
 002036 345546
 002037 105514
 002040 151376
 002041 400052
 002042 340221
 002043 106514
 002044 400052
 002045 340217
 002046 106514
 002047 400052
 002050 340220
 002051 106514
 002052 206522
 002053 042060
 002054 401013
 002055 000000

DECOUT 0
 JMS ADCCHK / ARE ADC'S ON
 JMS RDIR /READ DIRECTORY
 SZA /DECTAPE ERROR
 JMP* DECOUT /YES
 JMS ADDDIR /ADD NEW ID
 LAC DIRFLG /IS TAPE OK
 SZA
 JMP RETC / NO
 JMS WDIR /WRITE THE DIRECTORY
 SZA /DECTAPE ERROR
 JMP RETC
 LAC BLKNO
 DAC DECBLK /SET BLOCK NUMBER
 XCT XCTBKG
 TAD BLKONE /EXPERIMENT ID, ETC.
 JMS WDEC
 DZM RWF
 XCT XCTBKG
 TAD SUMONE /SUM SPECTRUM
 JMS WDEC
 XCT XCTBKG
 TAD FSTART /F SINGLES
 JMS WDEC
 XCT XCTBKG
 TAD MSTART /M SINGLES
 JMS WDEC
 LAC DECBLK
 DAC .+5
 XCT JMS10 / WRITE COINC SPECTRUM
 0 / NULL OR DISK #

CDAT1880
 CDAT1890
 CDAT1900
 CDAT1910
 CDAT1920
 CDAT1930
 CDAT1940
 CDAT1950
 CDAT1960
 CDAT1970
 CDAT1980
 CDAT1990
 CDAT2000
 CDAT2010
 CDAT2020
 CDAT2030
 CDAT2040
 CDAT2050
 CDAT2060
 CDAT2070
 CDAT2080
 CDAT2090
 CDAT2100
 CDAT2110
 CDAT2120
 CDAT2130
 CDAT2140
 CDAT2150
 CDAT2160
 CDAT2170
 CDAT2180
 CDAT2190
 CDAT2200
 CDAT2210
 CDAT2220
 CDAT2230
 CDAT2240
 CDAT2250
 CDAT2260
 CDAT2270
 CDAT2280
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 CDAT2360
 CDAT2370
 CDAT2380
 CDAT2390
 CDAT2400
 CDAT2410
 CDAT2420
 CDAT2430
 CDAT2440
 CDAT2450

E-23

002056	760000		-20000		/ WC	
002057	040000		40000		/ CA	COAT2460
002060	000000		0		/ BLK #	COAT2470
002061	000005		5		/ WRITE	COAT2480
002062	750000		CLA			COAT2490
002063	541135		SAD	UNIT	/ MAG TAPE?	COAT2500
002064	111323		JMS	EOF	/ YES	COAT2510
002065	622017		JMP*	DECOUT		COAT2520
002066	220114	MESS12	220114		/ RAL	COAT2530
002067	201040		201040		/ PH	COAT2540
002070	266061		266061		/ V01	COAT2550
002071	406061		406061		/ JAN	COAT2560
002072	406260		406260		/ 20	COAT2570
002073	406763		406763		/ 1973	COAT2580
002074	000000		0		/END	COAT2590
002075	150107	MESS53	150107		/MAG	COAT2600
002076	240120		240120	/ TAP		COAT2610
002077	054006		054006	/ E F		COAT2620
002100	251414		251414	/ ULL		COAT2630
002101	402205		402205		/ RE	COAT2640
002102	141701		141701		/LOAD	COAT2650
002103	044001		044001		/D A	COAT2660
002104	160440		160440		/NO	COAT2670
002105	232401		232401		/STA	COAT2680
002106	222400		222400		/RT	COAT2690
						COAT2700
						COAT2710
						COAT2720
						COAT2730
						COAT2740
						COAT2750
						COAT2760
						COAT2770
						COAT2780
						COAT2790
						COAT2800
						COAT2810
						COAT2820
						COAT2830
						COAT2840
						COAT2850
						COAT2860
						COAT2870
						COAT2880
						COAT2890
						COAT2900
						COAT2910
						COAT2920
						COAT2930
						COAT2940
						COAT2950
						COAT2960
						COAT2970
						COAT2980
						COAT2990
						COAT3000
						COAT3010
						COAT3020
						COAT3030

/DTREAD HWB PDP 9
 /INITIATED BY COMMAND DTREAD. READS EXPERIMENT ID.
 /ETC.. SINGLES SPECTRA, AND COINCIDENCE SPECTRUM, INTO THEIR NORMAL
 /DATA ACQUISITION ADDRESSES. THE COMMAND MUST BE FOLLOWED BY A
 /SPECTRUM ID OR A SLOT #.

DTREAD JMS ADCCHK / CHECK IF ADC TO BE SHUTDOWN
 JMS DECIN /GET EXPERIMENT ID OR A #&#
 DAC DTRE2 / LOW
 LAC BC+1 / HIGH
 DAC DTRE1
 LAC TC / CHECK TERM CHAR
 SNA / ZERO TERMINATES
 JMP DTRE3 /YES-IT WAS AN ID NUMBER
 SAD (53) / PLUS SIGN
 JMP DTRE4 /YES
 SAD (55) / MINUS SIGN
 JMP DTRE4 /YES
 SAD (40) /SPACE?
 JMP DTRE3
 SAD (76)
 JMP DTRE3
 JMP QMARK
 DAC SIGN /SAVE ASCII CODE FOR ## OR --
 JMS DECIN /GET MULTIPLYING FACTOR
 ISZ AINF / ANY INPUT?
 SKP
 JMP DTRE7A /NO
 DAC INPUTF /SAVE IN INPUT FACTOR
 LAC (1) /SET DIVISOR TO ONE
 DAC INPDIV
 LAC TC
 SAD (52) / IS TERMINATOR AN #
 JMP DTRE7B / YES

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002143	556357		SAD	(57)	/ IS IT A /	CDAT3040
002144	741000		SKP		/YES	CDAT3050
002145	606746		JMP	OMARK	/NO-PRINT QUESTION	CDAT3060
002146	112461		JMS	DECIN		CDAT3070
002147	042406		DAC	INPDIV		CDAT3080
002150	212714		LAC	TC		CDAT3090
002151	556356		SAD	(52)	/ IT MUST BE AN *	CDAT3100
002152	602162		JMP	DTRE7B		CDAT3110
002153	506746		JMP	OMARK	/IT WASN'T	CDAT3120
002154	750001	DTRE7A	CLC			CDAT3130
002155	055424		DAC	RFLG	/ SET RFLG TO PRINT R1 & R2.	CDAT3140
002156	113051		JMS	FINT		CDAT3150
002157	216600		FLAC	DNUM1		CDAT3160
002160	716603		FDIV	DNOM1	/ FORM FACTOR	CDAT3170
002161	602166		JMP	.+5		CDAT3180
002162	155424	DTRE7B	DZM	RFLG	/ CLEAR RFLG	CDAT3190
002163	113051		JMS	FINT		CDAT3200
002164	242405		FLACIS	INPUTF		CDAT3210
002165	742406		FDIVIS	INPDIV	/ FORM MULTIPLING FACTOR.	CDAT3220
002166	015536		FDAC	FFACT		CDAT3230
002167	113666		JMS	FCLA		CDAT3240
002170	015425		FDAC	ALGRES	/ CLEAR RESIDUALS	CDAT3250
002171	015430		FDAC	ABSRES		CDAT3260
002172	015433		FDAC	SGRRES		CDAT3270
002173	113112		JMS	FEXT		CDAT3280
002174	202635		LAC	SIGN		CDAT3290
002175	556352		SAD	(53)		CDAT3300
002176	602202		JMP	.+4		CDAT3310
002177	215537		LAC	FFACT+1	/ NEGATE FACTOR	CDAT3320
002200	356314		TAD	(400000)		CDAT3330
002201	055537		DAC	FFACT+1		CDAT3340
002202	215570		LAC	FBLKSV		CDAT3350
002203	055577		DAC	FBLK		CDAT3360
002204	442577		ISZ	SW		CDAT3370
002205	602556		JMP	RDSL-3		CDAT3380
002206	112461		JMS	DECIN		CDAT3390
002207	042534		DAC	DTRE2		CDAT3400
002210	213414		LAC	BC+1		CDAT3410
002211	042535		DAC	DTRE1		CDAT3420
002212	106054		JMS	RDDIR	/READ DIRECTORY	CDAT3430
002213	740200		SZA		/DECTAPE ERROR	CDAT3440
002214	606257		JMP	RETG		CDAT3450
002215	106141		JMS	SEARCH	/SEARCH FOR ID	CDAT3460
002216	206303		LAC	DIRFLG		CDAT3470
002217	740200		SZA			CDAT3480
002220	606746		JMP	OMARK	/ ID WAS NOT FOUND	CDAT3490
002221	206305		LAC	BLKNO	/PLACE THE EXPERIMENTS	CDAT3500
002222	042606	SWST	DAC	ROBLK	/BLOCK= IN ROBLK	CDAT3510
002223	200053		LAC	STRPFG		CDAT3520
002224	740200		SZA		/COINC OR STRIP?	CDAT3530
002225	502311		JMP	DTREB	/ STRIP	CDAT3540
002226	540051		SAD	BKGFLG		CDAT3550
002227	606746		JMP	OMARK	/ DON'T SUM SPECTRA IN SEEK.	CDAT3560
002230	202635		LAC	SIGN		CDAT3570
002231	556352		SAD	(53)	/IF +, UPDATE CNTS, SCALERS, TIMES	CDAT3580
002232	102407		JMS	SCOMB5		CDAT3590
002233	400052		XCT	XCTBKG		CDAT3600
002234	340221		TAD	SUMONE	/ LOAD SUM SPEC	CDAT3610

002235	102261		JMS	SCOMB		
002236	400052		XCT	XCTBKG		COAT3620
002237	340217		TAD	FSTART	/ LOAD F SINGLES	COAT3630
002240	102261		JMS	SCOMB		COAT3640
002241	400052		XCT	XCTBKG		COAT3650
002242	340220		TAD	MSTART	/ LOAD M SINGLES	COAT3660
002243	102261		JMS	SCOMB		COAT3670
002244	200054		LAC	FG5050		COAT3680
002245	741200		SNA		/ 5050?	COAT3690
002246	777741		LAW	-37	/ NO	COAT3700
002247	356337		TAD	(-1)	/ SET DTCT TO COUNT	COAT3710
002250	042636		DAC	DTCT	/THE 40 BLOCKS OF COINT DATA	COAT3720
002251	216343		LAC	(40000)		COAT3730
002252	042534	DTRES	DAC	DTRE2		COAT3740
002253	102261		JMS	SCOMB		COAT3750
002254	202534		LAC	DTRE2		COAT3760
002255	356333		TAD	(400)		COAT3770
002256	442636		ISZ	DTCT		COAT3780
002257	602252		JMP	DTRES		COAT3790
002260	602540		JMP	DTRE6		COAT3800
002261	000000	SCOMB	0			COAT3810
002262	042640		DAC	DTTS	/ SAVE SPECTRUM LOCATION.	COAT3820
002263	205717		LAC	DIRONE	/ SET FDTPI TO ADR OF BUFFER.	COAT3830
002264	055535		DAC	FDTPI		COAT3840
002265	442606		ISZ	RDBLK		COAT3850
002266	102600		JMS	RTAPE	/LOAD BUFFER	COAT3860
002267	740200		SZA		/DECTAPE ERROR	COAT3870
002270	606257		JMP	RETC		COAT3880
002271	700042		ION			COAT3890
002272	777400		LAW	-400		COAT3900
002273	042637		DAC	DTCTI		COAT3910
002274	113051		JMS	FINT		COAT3920
002275	275535	SCOMI	FLACIS*	FDTPI	/ GET BUFFER WORD	COAT3930
002276	515536		FMUL	FFACT		COAT3940
002277	362640		FADDIS*	DTTS		COAT3950
002300	113657		JMS	SPASNA		COAT3960
002301	113666		JMS	FCLA	/ CLEAR FAC IF NEG.	COAT3970
002302	062640		FDACIS*	DTTS		COAT3980
002303	442640		ISZ	DTTS		COAT3990
002304	455535		ISZ	FDTPI		COAT4000
002305	442637		ISZ	DTCTI	/ DONE	COAT4010
002306	602275		JMP	SCOMI	/ NO	COAT4020
002307	113112		JMS	FEXT		COAT4030
002310	622261		JMP*	SCOMB		COAT4040
002311	455424	DTRE8	ISZ	RFLG	/ PRINT R1 & R2?	COAT4050
002312	602321		JMP	.+7	/ NO	COAT4060
002313	113051		JMS	FINT		COAT4070
002314	216600		FLAC	DNUMI		COAT4080
002315	114324		JMS	FPRIN	/ PRINT R1	COAT4090
002316	216603		FLAC	DNUMI		COAT4100
002317	114324		JMS	FPRIN	/ PRINT R2	COAT4110
002320	113112		JMS	FEXT		COAT4120
002321	777400		LAW	-400		COAT4130
002322	055450		DAC	SCOMBC		COAT4140
002323	215423		LAC	SLIM	/ SET LIMIT COUNTER	COAT4150
002324	055316		DAC	LIMCT		COAT4160
002325	215345		LAC	RESPTS		COAT4170
002326	055346		DAC	RESPT		COAT4180
						COAT4190

002327	203323	LAC	CNOP	/ STORE RESIDUALS	CDAT4200
002330	055507	DAC	SCOMB4+4		CDAT4210
002331	200212	LAC	STRSUM		CDAT4220
002332	115436	JMS	SCOMBS	/ STRIP SUM SPEC.	CDAT4230
002333	215423	LAC	SLIM		CDAT4240
002334	055316	DAC	LIMCT		CDAT4250
002335	200213	LAC	FSTRIP		CDAT4260
002336	115436	JMS	SCOMBS	/ STRIP F	CDAT4270
002337	215423	LAC	SLIM		CDAT4280
002340	055316	DAC	LIMCT		CDAT4290
002341	200214	LAC	MSTRIP		CDAT4300
002342	115436	JMS	SCOMBS	/ STRIP M	CDAT4310
002343	215422	LAC	CLIM		CDAT4320
002344	055316	DAC	LIMCT		CDAT4330
002345	215532	LAC	SCORET		CDAT4340
002346	055507	DAC	SCOMB4+4	/ DON'T STORE RESIDUALS.	CDAT4350
002347	200054	LAC	FG5050	/ SKIP IF 50/50	CDAT4360
002350	741200	SNA			CDAT4370
002351	777741	LAW	-37		CDAT4380
002352	042636	DAC	DTCT	/ GET ALL BUT LAST BLOCK	CDAT4390
002353	777500	LAW	-300		CDAT4400
002354	055450	DAC	SCOMBC	/ SKIP OVER COMMENT	CDAT4410
002355	216316	LAC	(100)		CDAT4420
002356	055534	DAC	FBUFA		CDAT4430
002357	200234	LAC	FSTCO1		CDAT4440
002360	042534	DAC	DTRE2		CDAT4450
002361	115436	JMS	SCOMBS	/ STRIP COINC	CDAT4460
002362	155534	DZM	FBUFA		CDAT4470
002363	777400	LAW	-400		CDAT4480
002364	055450	DAC	SCOMBC		CDAT4490
002365	202534	LAC	DTRE2		CDAT4500
002366	356360	TAD	(300)		CDAT4510
002367	602373	JMP	.+4		CDAT4520
002370	115436	JMS	SCOMBS		CDAT4530
002371	202534	LAC	DTRE2		CDAT4540
002372	356333	TAD	(400)		CDAT4550
002373	042534	DAC	DTRE2		CDAT4560
002374	442636	ISZ	DTCT	/ THROUGH?	CDAT4570
002375	602570	JMP	.-5	/ NO	CDAT4580
002376	777600	LAW	-200	/ -200 WILL GET ALL BUT CS-127	CDAT4590
002377	055450	DAC	SCOMBC		CDAT4600
002400	203323	LAC	CNOP		CDAT4610
002401	055507	DAC	SCOMB4+4		CDAT4620
002402	202534	LAC	DTRE2		CDAT4630
002403	115436	JMS	SCOMBS		CDAT4640
002404	602540	JMP	DTRE6		CDAT4650
002405	000000	INPUTF	0		CDAT4660
002406	000000	INPDIV	0		CDAT4670
002407	000000	SCOMBS	0		CDAT4680
002410	202405	LAC	INPUTF		CDAT4690
002411	542406	SAD	INPDIV	/FACTOR =1?	CDAT4700
002412	741000	SKP		/YES	CDAT4710
002413	622407	JMP	SCOMBS		CDAT4720
002414	205717	LAC	DIRONE		CDAT4730
002415	042640	DAC	DTTS		CDAT4740
002416	102600	JMS	RTAPE	/READ IN COUNTS, SCALERS, ETC.	CDAT4750
002417	740200	SZA		/ERROR?	CDAT4760
002420	606257	JMP	RETC	/YES.	CDAT4770

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002421	400052	XCT	XCTBKG			
002422	345546	TAD	BLKONE	/ADDRESS OF EXPID INFO.		COAT4780
002423	042535	DAC	DTRE1			COAT4790
002424	042534	DAC	DTRE2			COAT4800
002425	777764	LAW	-14			COAT4810
002426	042537	DAC	DTCT1			COAT4820
002427	442640	ISZ	DTTS	/HI-ORDER OF NEW ID.		COAT4830
002430	442535	ISZ	DTRE1	/ OF OLD ID. INPUT		COAT4840
002431	442534	ISZ	DTRE2	/	OUTPUT	COAT4850
002432	222640	LAC*	DTTS	/FORM FLOATING *		COAT4860
002433	054374	DAC	RT+1	/FROM DOUBLE PRECISION *		COAT4870
002434	442640	ISZ	DTTS			COAT4880
002435	222640	LAC*	DTTS			COAT4890
002436	054373	DAC	RT			COAT4900
002437	222535	LAC*	DTRE1			COAT4910
002440	054377	DAC	LT+1			COAT4920
002441	442535	ISZ	DTRE1			COAT4930
002442	222535	LAC*	DTRE1			COAT4940
002443	054376	DAC	LT			COAT4950
002444	216361	LAC	(43)			COAT4960
002445	054375	DAC	RT+2			COAT4970
002446	054400	DAC	LT+2			COAT4980
002447	113051	JMS	FINT			COAT4990
002450	214373	FLAC	RT			COAT5000
002451	113426	JMS	NOR	//NORMALIZE.		COAT5010
002452	014373	FDAC	RT	//SAVE TEMPORARILY.		COAT5020
002453	214376	FLAC	LT			COAT5030
002454	113426	JMS	NOR			COAT5040
002455	314373	FADD	RT			COAT5050
002456	113506	JM*	FFIX			COAT5060
002457	113112	JMS	FEXT			COAT5070
002460	213414	LAC	BC+1			COAT5080
002461	062534	DAC*	DTRE2	/UPDATE HI-ORDER		COAT5090
002462	442534	ISZ	DTRE2			COAT5100
002463	213415	LAC	BC+2			COAT5110
002464	062534	DAC*	DTRE2	/UPDATE LO-ORDER		COAT5120
002465	442637	ISZ	DTCT1	/DONE?		COAT5130
002466	602427	JMP	SCOMB6	/NO		COAT5140
002467	777772	LAW	-6			COAT5150
002470	042637	DAC	DTCT1	/PICK UP REALTM AND LIVETM		COAT5160
002471	113051	JMS	FINT			COAT5170
002472	442640	ISZ	DTTS			COAT5180
002473	442535	ISZ	DTRE1			COAT5190
002474	262640	FLACIS*	DTTS			COAT5200
002475	362535	FADDIS*	DTRE1			COAT5210
002476	062535	FDACIS*	DTRE1			COAT5220
002477	442637	ISZ	DTCT1	/DONE?		COAT5230
002500	602472	JMP	-6	/ NO		COAT5240
002501	113112	JMS	FEXT			COAT5250
002502	622407	JMP*	SCOMB5			COAT5260
002503	442577	ISZ	SW			COAT5270
002504	602561	JMP	ROSL			COAT5280
002505	106054	JMS	RODIR	/READ DIRECTORY INTO CORE.		COAT5290
002506	740200	SZA		/DECTAPE ERROR?		COAT5300
002507	606257	JMP	RETC	/YES		COAT5310
002510	106141	JMS	SEARCH	/FIND ID AND DETERMINE BLOCK NO.		COAT5320
002511	206303	LAC	DIRFLG			COAT5330
002512	740200	SZA		/SEARCH SUCCESSFUL		COAT5340
						COAT5350

SCOMB6

DTRE3

002513	606746		JMP	QMARK	/ NO	CDAT5360
002514	206302		LAC	BLKNO	/YES, SET STARTING BLOCK FOR READ	CDAT5370
002515	042606		DAC	ROBLK		CDAT5380
002516	200051	DTRE0	LAC	BKGFLG	/ BACKGROUND?	CDAT5390
002517	741200		SNA			CDAT5400
002520	101602		JMS	ERASC		CDAT5410
002521	102611		JMS	RDSIN		CDAT5420
002522	740200		SZA		/DECTAPE ERROR	CDAT5430
002523	606257		JMP	RETC	/YES	CDAT5440
002524	216343		LAC	(40000)	/1ST LOC. OF COINC. SPECTRUM	CDAT5450
002525	042534		DAC	DTRE2		CDAT5460
002526	442606		ISZ	ROBLK		CDAT5470
002527	202606		LAC	ROBLK		CDAT5480
002530	042535		DAC	DTRE1		CDAT5490
002531	401013		XCT	JMSIO		CDAT5500
002532	000000		0		/	CDAT5510
002533	760000		-20000		/ WC	CDAT5520
002534	000000	DTRE2	0		/ CA	CDAT5530
002535	000000	DTRE1	0		/ BLK #	CDAT5540
002536	000003		3		/ READ	CDAT5550
002537	451376		ISZ	RWFG	/ SET REWIND.	CDAT5560
002540	740000	DTRE6	NOP			CDAT5570
002541	200051		LAC	BKGFLG		CDAT5580
002542	740200		SZA		/BKG OR FG	CDAT5590
002543	602553		JMP	.+10	/ BKG	CDAT5600
002544	236362		LAC*	(EXPIDF)	/ SETUP HIGH ORDER	CDAT5610
002545	076363		DAC*	(EXPIDH)	/ EXPID.	CDAT5620
002546	211375		LAC	MAGUFL		CDAT5630
002547	151375		DZM	MAGUFL		CDAT5640
002550	741200		SNA			CDAT5650
002551	603775		JMP	UNFOLD	/ UNFOLD MATRIX AND PLACE ON DISK	CDAT5660
002552	612117		JMP	SETI		CDAT5670
002553	236364		LAC*	(EXPIDF+400)		CDAT5680
002554	076365		DAC*	(EXPIDH+400)		CDAT5690
002555	612117		JMP	SETI		CDAT5700
002556	112461		JMS	DECIN		CDAT5710
002557	102564		JMS	OK		CDAT5720
002560	602222		JMP	SWST		CDAT5730
002561	202534	RDSL	LAC	DTRE2		CDAT5740
002562	102564		JMS	OK		CDAT5750
002563	602515		JMP	DTRE0-1		CDAT5760
002564	000000	OK	0			CDAT5770
002565	042577		DAC	SW	/SAVE AC	CDAT5780
002566	741201		SNA/CMA			CDAT5790
002567	606746		JMP	QMARK	/ ILLEGAL VALUE.	CDAT5800
002570	355315		TAD	(1)		CDAT5810
002571	345716		TAD	FULL		CDAT5820
002572	741100		SPA			CDAT5830
002573	606746		JMP	QMARK	/VALUE TOO LARGE.	CDAT5840
002574	202577		LAC	SW	/RESTORE AC.	CDAT5850
002575	401014		XCT	JMSBLK		CDAT5860
002576	622564		JMP*	OK		CDAT5870
002577	000000	SW	0		/USED BY GET3.GET,RSEQ,GSEQ,LSQRT	CDAT5880
			/ROUTINE TO READ ONE BLOCK FROM DEC TAPE.			CDAT5890
002600	000000	RTAPE	0			CDAT5900
002601	042605		DAC	RTAPI	/SAVE 1ST CORE LOCATION	CDAT5910
002602	401013		XCT	JMSIO	/ XCT I/O	CDAT5920
002603	000000		0			CDAT5930

002604 777400
 002605 000000
 002606 000000
 002607 000003
 002610 622600

002611 000000
 002612 400052
 002613 345546
 002614 102600
 002615 151376
 002616 442606
 002617 740200
 002620 622611
 002621 400052
 002622 340221
 002623 102600
 002624 400052
 002625 340217
 002626 442606
 002627 102600
 002630 400052
 002631 340220
 002632 442606
 002633 102600
 002634 622611
 002635 000000
 002636 000000
 002637 000000
 002640 000000
 002641 000000

002642 102754
 002643 211374
 002644 744001
 002645 351373
 002646 740400
 002647 602653

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-400          / HC
RTAPI 0        / CA
RDBLK 0        / BLK #
        3      / READ
        JMP*    FTAPE
/RDSIN  HWB    PDP 9
/Routine TO READ SINGLES SPECTRA FROM DEC TAPE
/INTO THEIR NORMAL DATA ACQUISITION ADDRESSES.
RDSIN  0
        XCT    XCTBKG
        TAD    BLKONE /SCALERS
        JMS    RTAPE
        DZM    RWFG   / CLEAR REWIND-ON-MAG FLAG
        ISZ    RDBLK
        SZA
        JMP*    RDSIN
        XCT    XCTBKG
        TAD    SUMONE /1ST LOCATION OF SUM SPECTRUM
        JMS    RTAPE /READ DEC TAPE
        XCT    XCTBKG
        TAD    FSTART /1ST LOCATION F256
        ISZ    RDBLK /ADVANCE DEC TAPE BLOCK
        JMS    RTAPE
        XCT    XCTBKG
        TAD    MSTART /1ST LOCATION M256
        ISZ    RDBLK
        JMS    RTAPE
        JMP*    RDSIN /RETURN
SIGN  0
DTCT  0
DTCT1 0
DTTS  0
DTTS1 0
/LSORT RCD      8/23/71
/Routine TO SORT TWO DATA LISTS XF AND M.
/ASSUMES ADC RAMPS#1024 CHANNELS. STORES F AND M
/SINGLES IN 128 AND 256 CHANNEL SPECTRA. STORES
/COINCIDENCE DATA IN MEMORY AS 127X127 MATRIX AND
/ON TAPE AS 256X256 MATRIX. 127X127 MATRIX STORED
/IN UPPER CORE BANK.
/THE NUMBER OF EVENTS PER SECOND IN A GIVEN EXPERIMENT THAT MAY BE
/HANDLED CAN BE ESTIMATED FROM THE FOLLOWING DATA.
/ TYPE OF EVENT APPROX. SORTING TIME
/F SINGLE 55 MICRO SECONDS
/M SINGLE 57 MICRO SECONDS
/GOOD COINC 166 MICRO SECONDS
/SINGLE REJECT 42 MICRO SECONDS
/COINC. REJECT 46 MICRO SECONDS
/THIS DOES NOT INCLUDE A CONSTANT TIME OF 54 MICROSECONDS AT THE
/BEGINNING OF THE SORTING OF EACH BUFFER TO INITIALIZE AND RESTART
/THE ADC'S. THIS OF COURSE ADDS 54/16 MICRO SECONDS TO
/THE AVERAGE SORTING TIME FOR EACH EVENT.
INTRO JMS LSORT / SORT LISTS
      LAC MTRCLM /GET LIMIT
      CHAICLL
      TAD MTRCCT /PASSED LIMIT?
      SNL
      JMP .+4 /NO
    
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CDAT5940
 CDAT5950
 CDAT5960
 CDAT5970
 CDAT5980
 CDAT5990
 COAT6000
 COAT6010
 COAT6020
 COAT6030
 COAT6040
 COAT6050
 COAT6060
 COAT6070
 COAT6080
 COAT6090
 COAT6100
 COAT6110
 COAT6120
 COAT6130
 COAT6140
 COAT6150
 COAT6160
 COAT6170
 COAT6180
 COAT6190
 COAT6200
 COAT6210
 COAT6220
 COAT6230
 COAT6240
 COAT6250
 COAT6260
 COAT6270
 SORT0000
 SORT0010
 SORT0020
 SORT0030
 SORT0040
 SORT0050
 SORT0060
 SORT0070
 SORT0080
 SORT0090
 SORT0100
 SORT0110
 SORT0120
 SORT0130
 SORT0140
 SORT0150
 SORT0160
 SORT0170
 SORT0180
 SORT0190
 SORT0200
 SORT0210
 SORT0220
 SORT0230

002650	101662	JMS	ADCSTP	/YES- STOP ADC	
002651	762075	LAW	MESS53		SORT0240
002652	107031	JMS	MESCOM	/PRINT MESSAGE	SORT0250
002653	201751	LAC	DETAAD		SORT0260
002654	741200	INTRO1	SNA	/HAVE COINC EVENT TO PUT DISK?	SORT0270
002655	607436	JMP	RET	/NO	SORT0280
002656	203323	LAC	CNOP	/PREVENT EXECUTION OF THIS CODE	SORT0290
002657	042654	DAC	INTRO1	/UNTIL ALL COINC EVENTS WRITTEN	SORT0300
002660	707212	DLOK+10			SORT0310
002661	751100	SPAICLA		/ DISK BUSY?	SORT0320
002662	602724	JMP	INTRO4	/YES	SORT0330
002663	707272	DSRS+10		/ DISK STATUS	SORT0340
002664	516366	AND	(777770)		SORT0350
002665	740200	SZA		/ DISK INTERRUPT PENDING?	SORT0360
002666	602724	JMP	INTRO4	/YES	SORT0370
002667	202655	LAC	INTRO1+1		SORT0380
002670	042747	DAC	ADCDSK-1		SORT0390
002671	760003	INTRO2	LAW	3 /READ FUNCTION	SORT0400
002672	042710	DAC	DKFUNC		SORT0410
002673	216367	LAC	(JMP INTRO3)		SORT0420
002674	043463	DAC	DKINT1	/ SET INTERRUPT ADR.	SORT0430
002675	707242	OSCD		/ CLEAR STATUS REG.	SORT0440
002676	707074	DLA+10		/ LOAD DISK # 0.	SORT0450
002677	777777	LAW	-1		SORT0460
002700	040036	DAC	36	/ WC	SORT0470
002701	216370	LAC	(INTRO5-1)		SORT0480
002702	040037	DAC	37	/ CA	SORT0490
002703	222752	LAC*	LSTADR	/ GET DISK ADR.	SORT0500
002704	741100	SPA			SORT0510
002705	602732	JMP	INTRO6	/ YES. WE'RE DONE	SORT0520
002706	442752	ISZ	LSTADR		SORT0530
002707	707024	DLAL		/ LCAD DISK ADR	SORT0540
002710	760003	DKFUNC	LAW	3	SORT0550
002711	707047	OSGO			SORT0560
002712	607436	JMP	RET		SORT0570
002713	760005	INTRO3	LAW	5 / WRITE FUNCTION	SORT0580
002714	042710	DAC	DKFUNC		SORT0590
002715	442731	ISZ	INTRO5	/ INCREMENT DISK CONTENTS	SORT0600
002716	740000	NOP			SORT0610
002717	777777	LAW	-1		SORT0620
002720	342752	TAD	LSTADR	/ DECREMENT LIST POINTER	SORT0630
002721	042732	DAC	LSTADR		SORT0640
002722	216371	LAC	(JMP INTRO2)		SORT0650
002723	602674	JMP	INTRO2+3		SORT0660
002724	216371	INTRO4	LAC	(JMP INTRO2)	SORT0670
002725	043463	DAC	DKINT1		SORT0680
002726	216372	LAC	(JMP DKINT1+1)		SORT0690
002727	042747	DAC	ADCDSK-1		SORT0700
002730	607436	JMP	RET		SORT0710
002731	000000	INTRO5	0		SORT0720
002732	141751	INTRO6	DZM	DETAAD	SORT0730
002733	204546	LAC	CSNA		SORT0740
002734	042654	DAC	INTRO1		SORT0750
002735	202753	LAC	COILST		SORT0760
002736	042752	DAC	LSTADR	/ LIST POINTER FOR DISK ROUTINE	SORT0770
002737	042751	DAC	LSTAD	/ LIST POINTER FOR SORT ROUTINE	SORT0780
002740	204641	LAC	ADCGO		SORT0790
002741	740200	SZA		/ ENABLE ADC?	SORT0800
					SORT0810

002742	602746		JMP	.+4		
002743	202750		LAC	ADCDSK		SORT0820
002744	740200		SZA			SORT0830
002745	103406		JMS	ONADC		SORT0840
002746	142750		DZH	ADCDSK		SORT0850
002747	603464		JMP	DKINTI+1	/ OR JMP RET OR JMP DISKIO+10	SORT0860
002750	000000	ADCDSK	0			SORT0870
002751	000000	LSTAD	0			SORT0880
002752	000000	LSTADR	0			SORT0890
002753	031100	COILST	31100			SORT0900
002754	000000	LSORT	0			SORT0910
002755	203255		LAC	BFLOP		SORT0920
002756	740200		SZA		/LISTS ONE	SORT0930
002757	602767		JMP	LSOR1	/NO	SORT0940
002760	200227		LAC	FB1	/YES, SET LIST LOCATIONS FOR	SORT0950
002761	040244		DAC	FDATA	/SORTING FIRST LIST	SORT0960
002762	200230		LAC	MB1		SORT0970
002763	040245		DAC	MDATA		SORT0980
002764	200242		LAC	BUFLEN	/RESET BFLOP	SORT0990
002765	043255		DAC	BFLOP		SORT1000
002766	602774		JMP	LSOR2		SORT1010
002767	200231	LSOR1	LAC	FB2	/SET UP LIST LOCATIONS	SORT1020
002770	040244		DAC	FDATA	/FOR SORTING 2ND LIST	SORT1030
002771	200232		LAC	MB2		SORT1040
002772	040245		DAC	MDATA		SORT1050
002773	143255		DZH	BFLOP	/RESET BFLOP	SORT1060
002774	200227	LSOR2	LAC	FB1	/DETERMINE NEW CURRENT ADDRESS	SORT1070
002775	343255		TAD	BFLOP		SORT1080
002776	040041		DAC	41	/ STARTING ADDRESS	SORT1090
002777	340241		TAD	LSTTOT		SORT1100
003000	040043		DAC	43	/M. STARTING ADDRESS	SORT1110
003001	203257		LAC	MLSTEN	/SET WORD COUNTER	SORT1120
003002	040040		DAC	40		SORT1130
003003	040042		DAC	42		SORT1140
003004	202751		LAC	LSTAD		SORT1150
003005	356373		TAD	(-31160)		SORT1160
003006	740100		SMA			SORT1170
003007	603016		JMP	LSOR21-3	/ RAN OUT OF LIST SPACE	SORT1180
003010	204641		LAC	ADCOO		SORT1190
003011	740200		SZA		/ ENABLE ADC?	SORT1200
003012	603020		JMP	LSOR21-1	/ NO	SORT1210
003013	200225		LAC	ADCMOD	/GET MODE VALUE	SORT1220
003014	701244		ADCOP		/SET ADC MODE	SORT1230
003015	603020		JMP	LSOR21-1		SORT1240
003016	103375		JMS	OFFADC		SORT1250
003017	442750		ISZ	ADCDSK		SORT1260
003020	701124		701124			SORT1270
003021	701104	LSOR21	CFOV		/ CLEAR ADC'S	SORT1280
003022	203257		LAC	MLSTEN		SORT1290
003023	043260		DAC	NOEVNT	/SET LIST COUNTER	SORT1300
003024	440244		ISZ	FDATA		SORT1310
003025	440245		ISZ	MDATA		SORT1320
003026	220244	LSOR3	LAC	FDATA	/GET NEXT FEVENT	SORT1330
003027	741100		SPA		/TAGGED F	SORT1340
003030	603056		JMP	LSOR41	/NO	SORT1350
003031	503256		AND	STMASK	/YES	SORT1360
003032	744010		RCL			SORT1370
003033	040246		DAC	LSTEMP	/SAVE	SORT1380
						SORT1390

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003034	220245		LAC*	MDATA	/GET NEXT MEVENT		
003035	740100		SMA		/TAGGED M		SORT1400
003036	603055		JMP	LSOR4	/NO		SORT1410
003037	503256		AND	STMASK	/YES		SORT1420
003040	340246		TAD	LS2EMP	/SUM 10'S		SORT1430
003041	556374		SAD	(200000)	/F SINGLES		SORT1440
003042	603076		JMP	LSOR7	/YES		SORT1450
003043	556314		SAD	(400000)	/M SINGLES		SORT1460
003044	603110		JMP	LSOR8	/YES		SORT1470
003045	956375		SAD	(140000)	/GOOD COINC		SORT1480
003046	603126		JMP	LSOR9	/YES		SORT1490
003047	556376		SAD	(600000)	/SINGLES REJECT		SORT1500
003050	603243		JMP	LSOR14	/YES		SORT1510
003051	744010		RCL		/NO		SORT1520
003052	744010		RCL				SORT1530
003053	556376		SAD	(600000)	/COINC. REJECT		SORT1540
003054	603250		JMP	LSOR15	/YES		SORT1550
003055	220244	LSOR4	LAC*	FDATA	/NO		SORT1560
003056	360245	LSOR41	TAD*	MDATA			SORT1570
003057	741200		SNA		/END OF PARTIAL BUFFER		SORT1580
003060	622754		JMP*	LSORT	/YES		SORT1590
003061	476377	LSOR5	ISZ*	(EREJLO)	/ NO. ERROR REJECT		SORT1600
003062	603065		JMP	LSOR6			SORT1610
003063	462015		ISZ*	COUNTO*17	/ EREJHI		SORT1620
003064	740000		NOP		/36 BIT OVERFLOW		SORT1630
003065	160244	LSOR6	DZM*	FDATA	/ZERO SORTED ENTRIES		SORT1640
003066	160245		DZM*	MDATA			SORT1650
003067	440244		ISZ	FDATA	/ADVANCE LISTS		SORT1660
003070	740000		NOP				SORT1670
003071	440245		ISZ	MDATA			SORT1680
003072	740000		NOP				SORT1690
003073	443260		ISZ	NOEVNT	/END OF BUFFER		SORT1700
003074	603026		JMP	LSOR3	/NO		SORT1710
003075	622754		JMP*	LSORT	/YES		SORT1720
003076	220244	LSOR7	LAC*	FDATA			SORT1730
003077	103263		JMS	CONVRT	/GET 256 RAMP		SORT1740
003100	340217		TAD	FSTART	/CALCULATE ADDRESS		SORT1750
003101	040247		DAC	INCLOC	/SAVE		SORT1760
003102	460247		ISZ*	INCLOC	/INCREMENT F SPECTRUM		SORT1770
003103	740000		NOP				SORT1780
003104	476400		ISZ*	(FSINLO)	/ INCREMENT F SCALER		SORT1790
003105	603110		JMP	LSOR8			SORT1800
003106	462003		ISZ*	COUNTO*5	/ FSINH!		SORT1810
003107	740000		NOP		/36 BIT OVERFLOW		SORT1820
003110	220245	LSOR8	LAC*	MDATA			SORT1830
003111	740010		RAL		/ IS M GOOD		SORT1840
003112	741120		JPAIRAR		/CHECK AND RESTORE		SORT1850
003113	603065		JMP	LSOR6	/ NO		SORT1860
003114	103263		JMS	CONVRT	/GET 256 RAMP		SORT1870
003115	340220		TAD	MSTART	/CALCULATE ADDRESS!		SORT1880
003116	040247		DAC	INCLOC			SORT1890
003117	460247		ISZ*	INCLOC	/INCREMENT M SPECTRUM		SORT1900
003120	740000		NOP				SORT1910
003121	476401		ISZ*	(MSINLO)	/ INCREMENT M SCALER		SORT1920
003122	603065		JMP	LSOR6			SORT1930
003123	462005		ISZ*	COUNTO*7	/ MSINH!		SORT1940
003124	740000		NOP		/36 BIT OVERFLOW		SORT1950
003.25	603065		JMP	LSOR6			SORT1960
							SORT1970

003126	220245	LSOR9	LAC*	MDATA			
003127	103263		JMS	CONVRT	/GET 256 RAMP		SORT1980
003130	040223		DAC	MCHANL			SORT1990
003131	744020		RCR		/MAKE 128 RAMP		SORT2000
003132	040257		DAC	FAXIS			SORT2010
003133	220244		LAC*	FDATA			SORT2020
003134	103263		JMS	CONVRT	/GET 256 RAMP		SORT2030
003135	040222		DAC	FCHANL			SORT2040
003136	744020		RCR		/MAKE 128 RAMP		SORT2050
003137	040260		DAC	MAXIS			SORT2060
003140	200222		LAC	FCHANL	/COMPUTE SUM SPECTRUM FROM FIRST		SORT2070
003141	340223		TAD	MCHANL	/HALF OF 256 PLUS 256		SORT2080
003142	356402		TAD	(-377)	/BE CERTAIN SUM IS NOT OVER		SORT2090
003143	740100		SMA		/256		SORT2100
003144	750000		CLA				SORT2110
003145	356403		TAD	(377)	/IF IT IS SET TO 255		SORT2120
003146	340221		TAD	SUMONE	/SUM ADDRESS		SORT2130
003147	040247		DAC	INCLC			SORT2140
003150	200051		LAC	BKGLG			SORT2150
003151	740200		SZA				SORT2160
003152	603204		JMP	LSOR13			SORT2170
003153	200260		LAC	MAXIS	/ F CHANS		SORT2180
003154	740001		CMA				SORT2190
003155	356315		TAD	(11)			SORT2200
003156	340257		TAD	FAXIS	/ M CHANS		SORT2210
003157	740100		SMA		/M > OR = TO F		SORT2220
003160	603176		JMP	LSOR12	/YES		SORT2230
003161	200257		LAC	FAX'S	/NO-IF 12<= M<=15 THEN		SORT2240
003162	343261		TAD	LOWL	/STORE IN M=127		SORT2250
003163	741100		SPA		/IS 12<=M?		SORT2260
003164	603204		JMP	LSOR13	/ NO		SORT2270
003165	343262		TAD	HIGHL			SORT2280
003166	740100		SMA		/IS M<=15		SORT2290
003167	603204		JMP	LSOR13	/ NO		SORT2300
003170	216404		LAC	(57600)	/ BEGINNING OF M=127		SORT2310
003171	340260		TAD	MAXIS			SORT2320
003172	040224		DAC	COINAD			SORT2330
003173	460224		ISZ*	COINAD			SORT2340
003174	740000		NOP				SORT2350
003175	603204		JMP	LSOR13			SORT2360
003176	200260	LSOR12	LAC	MAXIS	/REVERSE M & F.		SORT2370
003177	041757		DAC	DETAI			SORT2380
003200	200257		LAC	FAXIS			SORT2390
003201	040260		DAC	MAXIS			SORT2400
003202	201757		LAC	DETAI			SORT2410
003203	040257		DAC	FAXIS			SORT2420
003204	777777	LSOR13	LAW	-1	/ A=256*(Y-1)+X-1.		SORT2430
003205	340223		TAD	MCHANL			SORT2440
003206	744000		CLL				SORT2450
003207	640710		ALS	10	/ MULTIPLY BY 256.		SORT2460
003210	340222		TAD	FCHANL			SORT2470
003211	356337		TAD	(-11)			SORT2480
003212	062751		DAC*	LSTAD			SORT2490
003213	442751		ISZ	LSTAD			SORT2500
003214	101751		JMS	DETADD	/ DETERMINE FOLDED COINC ADR		SORT2510
003215	040224		DAC	COINAD			SORT2520
003216	777777		LAW	-1			SORT2530
003217	062751		DAC*	LSTAD			SORT2540
							SORT2550

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003303	606257	JMP	RETC	/ YES		
003304	603274	JMP	COMM3	/NO		
003305	000000	COMPT	0	/COMMENT POINTER		
		/				
		/SCALER INTERRUPT SERVICE ROUTINE.				
		/				
003306	702204	AENT	SPSA	/STOP SCALER A		
003307	702201		ENSA	/ENABLE SCALER A		
003310	463351		ISZ*	SCAER+5	/ INCREMENT OVERFLOW LOC.	
003311	740000		NOP		/IN CASE OF 18 BIT OVERFLOW	
003312	607436		JMP	RET		
003313	702224	BENT	SPSB	/STOP SCALER B		
003314	702221		ENSB	/ENABLE SCALER B		
003315	463353		ISZ*	SCAER+7		
003316	740000		NOP			
003317	607436		JMP	RET		
003320	702244	CENT	SPSC	/STOP SCALER C		
003321	702241		ENSC	/ENABLE SCALER C		
003322	463355		ISZ*	SCAER+11		
003323	740000	CNOP	NOP	/USED AS A CONSTANT.		
003324	607436		JMP	RET		
003325	702264	DENT	SPSD	/STOP SCALER D		
003326	702261		ENSD	/ENABLE SCALER D		
003327	463357		ISZ*	SCAER+13		
003330	740000		NOP			
003331	607436		JMP	RET		
		/COUNTS	HWB	PDP 9		
		/COMMAND TO LIST NUMBER OF GOOD AND REJECT EVENTS.				
		/COMMAND TO PRINT THE TIMES				
		TIMES	L.C	ADCON	/IS ADC ON	
			SZA			
			JMS	READCS	/YES - READ ON FLY	
			JMS	TIME	/NO	
			JMP	PANRET		
		/COMMAND TO PRINT THE SCALERS				
		SCALER	LAC	ADCON	/IS ADC ON	
		CSZA	SZA		/USED AS A CONSTANT.	
			JMS	READCS	/YES - READ ON FLY	
			JMS	SCAER	/NO	
			JMP	PANRET		
		/SUBROUTINE TO PRINT THE CONTENTS OF SCALER A, B, C, AND D				
		SCAER	0			
			LAC	XCTBKG		
			DAC	MIOI		
			JMS	MIO		
			MESS3			
			DBLISCALRA		/ USED AS A POINTER.	
			MESS4			
			DBLISCALRB		/ USED AS A POINTER.	
			MESS5			
			DBLISCALRC		/ USED AS A POINTER.	
			MESS6			
			DBLISCALRD		/ USED AS A POINTER.	
			JMP*	SCAER		
		MTEOFF	JMS	PADCB		
			JMS	PRIOF		
			305250		/IE	
			306317		/OF	

003365	651207		651207		/)BELL			
003366	700042		ION					
003367	451370		ISZ	TERBUF	/TERMINATE BUFFER			
003370	111100	JMTB	JMS	MTBUF				
003371	216411		LAC	(045500)				
003372	111274		JMS	MTCCY				
003373	151373		DZM	MTRCCT				
003374	605055		JMP	PANRET				
003375	000000	OFFADC	0					
003376	701254		701254		/ DISABLE INTERFACE			
003377	702324		CHLT					
003400	700004		CLOF					
003401	702204		SPSA					
003402	702224		SPSB					
003403	702244		SPSC					
003404	702264		SPSD					
003405	623375		JMP*	OFFADC				
003406	000000	ONADC	0					
003407	200225		LAC	ADCMOD				
003410	701244		ADCOP					
003411	701104		CFOV		/ CLEAR ADC			
003412	702321		CSLT					
003413	700044		CLON					
003414	702201		ENSA					
003415	702221		ENSB					
003416	702241		ENSC					
003417	702261		ENSD					
003420	623406		JMP*	ONADC				
			/DISK IO ROUTINE					
			/CALLING SEQUENCE...					
			/	JMS	DISKIO			
			/	DISK #	/ BITS 15-17			
			/	WC	/2'S COMPLEMENT			
			/	CA	/15 BIT ADR			
			/	DISK ADR	/18 BIT ADR			
			/	FUNCTION	/ BITS 15-17			
003421	000000	DISKIO	0					
003422	700002		IOF					
003423	201751		LAC	DETADD				
003424	741200		SNA		/ BUSY?			
003425	603431		JMP	..4	/ NO			
003426	203425		LAC	..1	/ YES SET UP RETURN ADR.			
003427	042747		DAC	ADCDSK-1				
003430	607436		JMP	RET				
003431	700002		IOF					
003432	223421		..AC*	DISKIO				
003433	707064		DLAH		/DISK #			
003434	443421		ISZ	DISKIO				
003435	223421		LAC*	DISKIO				
003436	040036		DAC	36	/WC			
003437	443421		ISZ	DISKIO				
003440	750001		CLC					
003441	363421		TAD*	DISKIO				
003442	040037		DAC	37	/CA			
003443	443421		ISZ	DISKIO				
003444	223421		LAC*	DISKIO				
003445	741100		SPA					
003446	603451		JMP	..3	/ IF NEG. IT'S 2'S COMP. OF WORD ADR.			

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SORT3740
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 SORT3970
 SORT3980
 SORT3990
 DISK0000
 DISK0010
 DISK0020
 DISK0030
 DISK0040
 DISK0050
 DISK0060
 DISK0070
 DISK0080
 DISK0085
 DISK0090
 DISK0100
 DISK0110
 DISK0120
 DISK0130
 DISK0140
 DISK0150
 DISK0160
 DISK0170
 DISK0180
 DISK0190
 DISK0200
 DISK0210
 DISK0220
 DISK0230
 DISK0240
 DISK0250
 DISK0260
 DISK0270
 DISK0280

003447	860710	ALSS	10	/ IF POS. IT'S A BLK #	
003450	603453	JMP	+3		DISK0290
003451	740001	CHA			DISK0300
003452	356315	TAD	(1)		DISK0310
003453	707024	DLAL		/DISK ADR	DISK0320
003454	443421	ISZ	DISK10		DISK0330
003455	223421	LAC*	DISK10		DISK0340
003456	443421	ISZ	DISK10		DISK0350
003457	707047	DSGO		/ EXECUTE FUNCTION	DISK0360
003460	607436	JMP	RET		DISK0370
003461	201751	LAC	DETADD		DISK0380
003462	740200	SZA		/ STORING COINC ON DISK?	DISK0390
003463	602671	JMP	INTRO2	/ YES (JMP INTRO2 OR INTRC3)	DISK0400
003464	707272	DSRS+10			DISK0410
003465	043505	DAC	DKSTAT	/ SAVE STATUS	DISK0420
003466	707242	DSCD			DISK0430
003467	750100	SMAICLA		/ ERROR FLAG?	DISK0440
003470	603503	JMP	DKSTAT-2	/ NO	DISK0450
003471	107077	JMS	PRI0F		DISK0460
003472	304252	304252	/ *D		DISK0470
003473	323311	323311	/ IS		DISK0480
003474	240313	240313	/ K		DISK0490
003475	322305	322305	/ ER		DISK0500
003476	317322	317322	/ RO		DISK0510
003477	640322	640322	/ R		DISK0520
003500	203505	LAC	DKSTAT	/ PRINT STATUS	DISK0530
003501	108526	JMS	OCTOUT		DISK0540
003502	777777	LAW	-1		DISK0550
003503	700042	ION			DISK0560
003504	623421	JMP*	DISK10		DISK0570
003505	000000	DKSTAT	0		DISK0580
		/ COPY SCRATCH ROUTINE....			DISK0590
003506	777627	COPY5	LAW	-151	DISK0600
003507	043545	DAC	COPY3	/ # OF BLKS.	DISK0610
003510	216333	LAC	(400)	/ STARTING BLK.	DISK0620
003511	603515	JMP	+4		DISK0630
		/ COPY ROUTINE ... STARTS AT DISK BLK 551			DISK0640
003512	776703	COPY	LAW	-1075	DISK0650
003513	043545	DAC	COPY3	/ # OF BLKS.	DISK0660
003514	216412	LAC	(551)	/ STARTING DISK BLK.	DISK0670
003515	043537	DAC	COPY2		DISK0680
003516	205453	LAC	DSEL+1		DISK0690
003517	045452	DAC	DSEL	/ DISABLE DISPLAY	DISK0700
003520	204265	LAC	PINF02+12		DISK0710
003521	047667	DAC	INSEL		DISK0720
003522	215573	LAC	FROISK+2		DISK0730
003523	543533	SAD	COPY1		DISK0740
003524	603545	JMP	COPY3	/ DECTAPE TO DISK....	DISK0750
003525	203537	LAC	COPY2	/ DISK TO DECTAPE	DISK0760
		/ DISK TO DECTAPE COPY ROUTINE			DISK0770
003526	356413	TAD	(2)		DISK0780
003527	043610	DAC	DECDS2		DISK0790
003530	203545	LAC	COPY3		DISK0800
003531	356413	TAD	(2)	/ # OF BLKS LEFT	DISK0810
003532	043406	DAC	ONADC		DISK0820
003533	136414	JMS*	(DISK10)		DISK0830
003534	000000	0		/ DISK #	DISK0840
003535	777000	-1000		/ WC	DISK0850
					DISK0860

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003536	033400	33400	/ CA	DISK0870
003537	000551	COPY2 551	/ BLK #	DISK0880
003540	000003	3	/ READ	DISK0890
003541	203540	LAC -1	/ SETUP TO READ FROM DISK	DISK0900
003542	043611	DAC DECDS2+1		DISK0910
003543	216346	LAC (5)	/ SETUP TO WRITE ON DECTAPE	DISK0920
003544	603554	JMP +10		DISK0930
		/ DECTAPE TO DISK COPY ROUTINE....		DISK0940
003545	776703	COPY3 LAW -1075	/ # OF BLKS.	DISK0950
003546	043406	DAC ONADC		DISK0960
003547	203537	LAC COPY2		DISK0970
003550	043610	DAC DECDS2		DISK0980
003551	216346	LAC (5)	/ SET TO WRITE ON DISK	DISK0990
003552	043611	DAC DECDS2+1		DISK1000
003553	216335	LAC (3)	/ SET TO READ FROM DECTAPE	DISK1010
003554	043601	DAC DECDS1+2		DISK1020
003555	216415	LAC (JMP TAPCON)		DISK1030
003556	046425	DAC DECT3+12	/ CAUSES CONTINUOUS MOTION	DISK1040
003557	200226	LAC ADCON		DISK1050
003560	751200	SNAICLA		DISK1060
003561	603566	JMP +5		DISK1070
003562	700002	IOF		DISK1080
003563	103375	JMS OFFADC		DISK1090
003564	700042	ION		DISK1100
003565	216315	LAC (1)		DISK1110
003566	044060	DAC ADCGN-1	/ SAVE ADC ON OR OFF FLAG	DISK1120
003567	044641	DAC ADCGO		DISK1125
003570	203577	LAC DECDS1		DISK1130
003571	043607	DAC DECDS2-1	/ SET UP BUFFER POINTER AND	DISK1140
003572	356333	TAD (400)	/ CA OF DISK	DISK1150
003573	051367	DAC MAGTPT		DISK1160
003574	136330	DEC10 JMS (DECTRW)		DISK1170
003575	000000	0		DISK1180
003576	777400	-400	/ WC	DISK1190
003577	033400	DECDS1 33400	/ CA	DISK1200
003600	000001	1	/ BLK #	DISK1210
003601	000003	3	/ READ OR WRITE	DISK1220
003602	740200	SZA	/ DECTAPE ERROR?	DISK1230
003603	603627	JMP TAPCON-10	/ YES	DISK1240
003604	103421	JMS DISK10		DISK1250
003605	000000	0		DISK1260
003606	777400	-400	/ WC	DISK1270
003607	033400	33400	/ CA	DISK1280
003610	000551	DECDS2 551	/ BLK #	DISK1290
003611	000005	5	/ WRITE OR READ	DISK1300
003612	740200	SZA	/ DISK ERROR?	DISK1310
003613	603627	JMP TAPCON-10	/ YES	DISK1320
003614	443610	ISZ DECDS2	/ INCREMENT BLK #	DISK1330
003615	211367	LAC MAGTPT		DISK1340
003616	043607	DAC DECDS2-1		DISK1350
003617	543577	SAD DECDS1	/ BUF #1?	DISK1360
003620	603623	JMP +3	/ YES	DISK1370
003621	203577	LAC DECDS1		DISK1380
003622	741000	SKP		DISK1390
003623	356333	TAD (400)		DISK1400
003624	051367	DAC MAGTPT		DISK1410
003625	443406	ISZ ONADC	/ DONE?	DISK1420
003626	607436	JMP RET	/ NO	DISK1430

003627	303626		LAC	-1		
003630	048513		DAC	DECRET		DISK1440
003631	203637		LAC	TAPCON		DISK1450
003632	046425		DAC	DECT3+12		DISK1460
003633	216416		LAC	(DECT3+13)		DISK1470
003634	046436		DAC	DECCMD		DISK1480
003635	144641		DZM	ADCGO		DISK1490
003636	605454		JMP	OSEL+2		DISK1495
003637	106436	TAPCON	JMS	DECCMD		DISK1500
003640	777400		LAW	-400		DISK1510
003641	040030		DAC	30	/ MC	DISK1520
003642	750001		CLC			DISK1530
003643	351367		TAD	MAGTPT	/ CA-1	DISK1540
003644	040031		DAC	31		DISK1550
003645	707554		DTXA+10		/ CONTINUE.	DISK1560
003646	700042		ION			DISK1570
003647	626513		JMP*	DECRET		DISK1580
003650	000000	FOLDED	0			DISK1590
003651	216317		LAC	(1760)		DISK1600
003652	041525		DAC	YLIMIT		DISK1610
003653	141522		DZM	XLIMIT		DISK1620
003654	141307		DZM	VCROSS-1		DISK1630
003655	141313		DZM	MCROSS-1		DISK1640
003656	216341		LAC	(10)		DISK1650
003657	041523		DAC	DELIMT		DISK1660
003660	041526		DAC	CHODE	/ SET DISPLAY CHANGE	DISK1670
003661	044346		DAC	CMOR		DISK1680
003662	044352		DAC	CVER		DISK1690
003663	200234		LAC	FSTCOI		DISK1700
003664	040255		DAC	ZERTEM		DISK1710
003665	760100		LAW	-17700		DISK1720
003666	041303		DAC	CFCMFG		DISK1730
003667	101636		JMS	ZEROUT	/ 0 COINC BUFFER.	DISK1740
003670	143702		DZM	FOLDA		DISK1750
003671	142535		DZM	DTRE1		DISK1760
003672	442535	FOLD1	ISZ	DTRE1		DISK1770
003673	142534		DZM	DTRE2		DISK1780
003674	203701		LAC	+5	/ BEGINNING OF TRANSFER BUF.	DISK1790
003575	044012		DAC	FOLDGT		DISK1800
003676	103421		JMS	DISK10		DISK1810
003677	060000		0		/ DISK #	DISK1820
003700	777400		-400		/ MC	DISK1830
003701	031200		3:200		/ CA IN STRIP BUFFER.	DISK1840
003702	000000	FOLDA	0		/ DISK ADR.	DISK1850
003703	000003		3		/ READ DISK	DISK1860
003704	443702		ISZ	FOLDA		DISK1870
003705	442534		ISZ	DTRE2		DISK1880
003706	202535		LAC	DTRE1		DISK1890
003707	744020		RCR			DISK1900
003710	043774		DAC	MFOLD	/ MAKE 128 RAMP	DISK1910
003711	202534		LAC	DTRE2		DISK1920
003712	744020		RCR			DISK1930
003713	044030		DAC	FFOLD	/ MAKE 128 RAMP	DISK1940
003714	740001		CMA			DISK1950
003715	356315		TAD	(1)		DISK1960
003716	343774		TAD	MFOLD		DISK1970
003717	740100		SMA		/ M> OR = F?	DISK1980
003720	603737		JMP	FOLD2	/ YES	DISK1990
						DISK2000

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003721	203774		LAC	MFOLD	/ IF 12<= M <=15.	DISK2010
003722	343261		TAD	LOWL	/ THEN STORE IN M=127.	DISK2020
003723	741100		SPA		/ 12<=M?	DISK2030
003724	603745		JMP	FOLD3	/ NO	DISK2040
003725	343262		TAD	HIGHL		DISK2050
003726	740100		SMA		/ M<=15?	DISK2060
003727	603745		JMP	FOLD3	/ NO	DISK2070
003730	216404		LAC	(57600)	/ BEGINNING OF M=127.	DISK2080
003731	344030		TAD	FFOLD		DISK2090
003732	043752		DAC	FOLD4		DISK2100
003733	224012		LAC*	FOLDGT		DISK2110
003734	363752		TAD*	FOLD4		DISK2120
003735	063752		DAC*	FOLD4		DISK2130
003736	603745		JMP	FOLD3		DISK2140
003737	204030	FOLD2	LAC	FFOLD	/ REVERSE F AND M.	DISK2150
003740	043752		DAC	FOLD4		DISK2160
003741	203774		LAC	MFOLD		DISK2170
003742	044030		DAC	FFOLD		DISK2180
003743	203752		LAC	FOLD4		DISK2190
003744	043774		DAC	MFOLD		DISK2200
003745	204030	FOLD3	LAC	FFOLD		DISK2210
003746	043752		DAC	FOLD4		DISK2220
003747	356337		TAD	(-1)		DISK2230
003750	744000		CLI		/ A=Y*(Y-1)+X-1	DISK2240
003751	653122		MUL			DISK2250
003752	000000	FOLD4	0			DISK2260
003753	641002		LACQ			DISK2270
003754	744020		RCR			DISK2280
003755	343774		TAD	MFOLD		DISK2290
003756	356337		TAD	(-1)		DISK2300
003757	340234		TAD	FSTCOI	/ BEGINNG OF COINC.	DISK2310
003760	043752		DAC	FOLD4		DISK2320
003761	224012		LAC*	FOLDGT		DISK2330
003762	363752		TAD*	FOLD4		DISK2340
003763	063752		DAC*	FOLD4		DISK2350
003764	444012		ISZ	FOLDGT		DISK2360
003765	216403		LAC	(377)		DISK2370
003766	542534		SAD	DTRE2	/ DONE WITH THIS BUFFER?	DISK2380
003767	741000		SKP			DISK2390
003770	603705		JMP	FOLDA+3	/ NO	DISK2400
003771	542535		SAD	DTRE1	/ FINISHED LOADING?	DISK2410
003772	623650		JMP*	FOLDED	/ YES	DISK2420
003773	603672		JMP	FOLD1		DISK2430
003774	000000	MFOLD	0			DISK2440
003775	777777	UNFOLD	LAH	-1		DISK2450
003776	044012		DAC	FOLDGT		DISK2460
003777	777691		LAH	-177		DISK2470
004000	043774		DAC	MFOLD	/ DETERMINES WHEN FINISHED	DISK2480
004001	144030		OZM	FFOLD	/ INITIATE DISK ADR.	DISK2490
004002	200234		LAC	FSTCOI		DISK2500
004003	043752		DAC	FOLD4	/ ADR OF COINC BUF.	DISK2510
004004	204027		LAC	FFOLD-1		DISK2520
004005	040255		DAC	ZERTEM		DISK2530
004006	777400		LAH	-400		DISK2540
004007	101636		JMS	ZEROUT	/ INITIALIZE OUTPUT BUF.	DISK2550
004010	204027		LAC	FFOLD-1		DISK2560
004011	040255		DAC	ZERTEM		DISK2570
074012	777777	FOLDGT	LAH	-1		DISK2580

004013	043702		DAC	FOLD			
004014	223752		LAC	FOLD	/ GET NEXT COINC VALUE		DISK2590
004015	443752		ISZ	FOLD			DISK2600
004016	440255		ISZ	ZERTEM			DISK2610
004017	060255		DAC	ZERTEM	/ STORE DATA IN EVERY OTHER WORD OF BUF		DISK2620
004020	440255		ISZ	ZERTEM			DISK2630
004021	443702		ISZ	FOLDA	/ DONE WITH THIS BLK?		DISK2640
004022	604014		JMP	-6	/ NO		DISK2650
004023	444030		ISZ	FFOLD			DISK2660
004024	103421		JMS	DISK10			DISK2670
004025	000000		0				DISK2680
004026	777400		-400		/ HC		DISK2690
004027	031200		31200		/ CA		DISK2700
004030	000000	FFOLD	0		/ DISK BLK		DISK2710
004031	000005		5		/ WRITE		DISK2720
004032	444030		ISZ	FFOLD	/ NEXT DISK BLK		DISK2730
004033	777777		LAH	-1			DISK2740
004034	344012		TAD	FOLDGT			DISK2750
004035	044012		DAC	FOLDGT			DISK2760
004036	443774		ISZ	MFOLD	/ DONE?		DISK2770
004037	604010		JMP	FOLDGT-2	/ NO		DISK2780
004040	612117		JMP	SET1			DISK2790
004041	000000	ADCCHK	0				DISK2800
004042	105275		JMS	ADCBUS	/ CHECK FBKG & OR ADC		DISK2810
004043	200226		LAC	ADCON			DISK2820
004044	741200		SNA		/ ADC ON		DISK2830
004045	624041		JMP	ADCCHK	/ NO		DISK2840
004046	204057		LAC	ADCGON-2			DISK2850
004047	556417		SAD	(31000)	/ RUN WITH ADC'S?		DISK2860
004050	741000		SKP				DISK2870
004051	624041		JMP	ADCCHK	/ YES		DISK2880
004052	044060		DAC	ADCGON-1			DISK2890
004053	700002		IOF				DISK2900
004054	103375		JMS	OFFADC			DISK2910
004055	700042		ION				DISK2920
004056	624041		JMP	ADCCHK			DISK2930
004057	160000		160000		/ Y-TURN OFF ADC'S: N-LEAVE ADC'S		DISK2940
004060	000000		0		/ WERE ADC'S ON FLAG		DISK2950
004061	000000	ADCGON	0				DISK2960
004062	204060		LAC	ADCGON-1			DISK2970
004063	741200		SNA		/ WERE ADC'S ON		DISK2980
004064	624061		JMP	ADCGON	/ NO		DISK2990
004065	144060		DZH	ADCGON-1	/ CLEAR FLAG		DISK3000
004066	700002		IOF				DISK3010
004067	103406		JMS	ONADC			DISK3020
004070	700042		ION				DISK3030
004071	624061		JMP	ADCGON			DISK3040
004072	212701	ADCFLG	LAC	TELB			DISK3050
004073	052237		DAC	QAM+5			DISK3060
004074	112144		JMS	QA			DISK3070
004075	777777		LAH	-1			DISK3080
004076	404101		XCT	+3			DISK3090
004077	004057		ADCGON-2				DISK3100
004100	606257		JMP	RETC			DISK3110
004101	231025		231025		/ SHU		DISK3120
004102	240417		240417		/ TDO		DISK3130
004103	271640		271640		/ HN		DISK3140
004104	010403		010403		/ ADC		DISK3150
							DISK3160

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004105	724000	724000	/CHR	PDP9	APRIL 1969		DISK3170
			/PANEL SERVICE ROUTINE				CPAN0000
004106	000000		PANFLG	0			CPAN0010
004107	444106		PANSEV	ISZ	PANFLG		CPAN0020
004110	705612			PNRD		/READ PANEL STATIS	CPAN0030
004111	044147			DAC	PCODE		CPAN0040
004112	760006			LAW	6		CPAN0050
004113	705004			FBCM			CPAN0060
004114	705714			PNIT+10		/DISABLE PANEL INTERRUPT AND CLA	CPAN0070
004115	705604			PNCL		/CLEAR PANEL STATIS	CPAN0080
004116	140006			DZM	STPOUT		CPAN0090
004117	760010			LAW	10	/TURN ERROR LIGHT OFF	CPAN0100
004120	105037			JMS	PINDOF		CPAN0110
004121	700042			ION			CPAN0120
004122	204147			LAC	PCODE		CPAN0130
004123	742020			RTR			CPAN0140
004124	740020			RAR			CPAN0150
004125	516332			AND	(17)		CPAN0160
004126	105305			JMS	PANBR	/BRANCH TO ONE OF 17 SERVICE ROUTINES	CPAN0170
004127	605055			JMP	PANRET	/NO ZERO SWITCH NUMBER	CPAN0180
004130	604150			JMP	PCODE+1	/ DEVICE SELECTION	CPAN0190
004131	044605			DAC	OITEM	/ ITEM FOR OUTPUT	CPAN0200
004132	604642			JMP	POSD	/PERIOD OF PERIODIC DUMP	CPAN0210
004133	604675			JMP	PLIVET	/PANEL LIVE TIME	CPAN0220
004134	604305			JMP	ROTSSEL	/ ROTATION SELECTION	CPAN0230
004135	604724			JMP	PDMODE	/DISPLAY MODE SELECTION	CPAN0240
004136	604216			JMP	PINFO1	/INFORMATION SELECTION NUMBER 1	CPAN0250
004137	604253			JMP	PINFO2	/INFORMATION SELECTION NUMBER 2	CPAN0260
004140	604726			JMP	PNOC0	/NUMBER OF CHANNELS DISPLAYED	CPAN0270
004141	604750			JMP	PLCFS	/LINEAR COUNTS FULL SCALE	CPAN0280
004142	604770			JMP	PNOLD	/NUMBER OF LOG DECADES	CPAN0290
004143	605004			JMP	PBLON	/BASE LINE DECADE NUMBER	CPAN0300
004144	604162			JMP	PB15	/PUSH BUTTON	CPAN0310
004145	604173			JMP	PB16	/PUSH BUTTONS	CPAN0320
004146	604204			JMP	PB17	/PUSH BUTTONS	CPAN0330
004147	000000		PCODE	0			CPAN0340
004150	044604			DAC	ODEV		CPAN0350
004151	356337			TAD	(-1)		CPAN0360
004152	556346			SAD	(5)	/ MAG TAPE?	CPAN0370
004153	751000			SKPICLA		/ YES	CPAN0380
004154	556347			SAD	(4)	/ DECTAPE?	CPAN0390
004155	741000			SKP			CPAN0400
004156	605055			JMP	PANRET		CPAN0410
004157	055711			DAC	UNITSV		CPAN0420
004160	100743			JMS	02		CPAN0430
004161	605055			JMP	PANRET		CPAN0440
			/PUSH BUTTON SERVICE				CPAN0450
004162	105305		PB15	JMS	PANBR		CPAN0460
004163	605055			JMP	PANRET	/NOT USED	CPAN0470
004164	603361			JMP	MTEOFF	/IBM TAPE EOF	CPAN0480
004165	111453			JMS	REWIND	/ IBM TAPE REWIND	CPAN0490
004166	605055			JMP	PANRET	/ IBM TAPE REWIND AND UNLOAD	CPAN0500
004167	604532			JMP	ROGO	/READ OUT GO	CPAN0510
004170	604521			JMP	ROHLT	/READ OUT HALT	CPAN0520
004171	604501			JMP	COINON	/COINC STORAGE ON	CPAN0530
004172	604511			JMP	COINOF	/COINC STORAGE OFF	CPAN0540
004173	105305		PB16	JMS	PANBR		CPAN0550
							CPAN0560

004264 77002.
 004265 107756
 004266 770013
 004267 770011
 004270 770007
 004271 604234
 004272 205535
 004273 105535
 004274 770405
 004275 770417
 004276 770415
 004277 770421
 004300 107756
 004301 770413
 004302 770411
 004303 770407
 004304 604234

 004305 105535
 004306 000000
 004307 004342
 004310 004346
 004311 004352
 004312 004356
 004313 004362
 004314 004366
 004315 000000
 004316 741200
 004317 605055
 004320 044336
 004321 356315
 004322 044337
 004323 356315
 004324 044340
 004325 356315
 004326 044341
 004327 224341
 004330 047667
 004331 224337
 004332 044337
 004333 224340
 004334 044340
 004335 605055
 004336 000000
 004337 005431
 004340 000000
 004341 000000
 004342 000001
 004343 001337
 004344 000250
 004345 104434
 004346 000010
 004347 001336
 004350 001314
 004351 104404
 004352 000010
 004353 001335

OPRISCLHI
 JMS NGNON
 OPRISCALRD
 OPRISCALRC
 OPRISCALRB
 JMP PINRET
 LAC PICK
 JMS PICK
 OPRISCALRA+400
 OPRIMSINH+400
 OPRIFSINH+400
 OPRISCLHI+400
 JMS NGNON
 OPRISCALRD+400
 OPRISCALRC+400
 OPRISCALRB+400
 JMP PINRET
 / ROTATION SELECTION:
 / SPECTRUM, MARKERS, OR ZZERO
 ROTSEL JMS PICK
 0
 ZZER
 CHOR
 CVER
 HOR
 VER
 SPEC
 0
 SNA
 JMP PANRET
 DAC ROTPT / POINTS TO ROTATION CONTROL CONSTANT
 TAD (1)
 DAC ROTPT1 / -TO ROTATION VARIABLE
 TAD (1)
 DAC ROTPT2 / -TO MARK POSITION VARIABLE
 TAD (1)
 DAC ROTPT3 / -TO NG SUBROUTINE
 LAC* ROTPT3
 DAC INSEL / ENABLE
 LAC* ROTPT1
 DAC ROTPT1
 LAC* ROTPT2
 DAC ROTPT2
 JMP PANRET
 ROTPT 0
 ROTPT1 RTMP
 ROTPT2 0
 ROTPT3 0
 ZZER +1 / ZZERO
 ZZMOV
 ZTEMP
 JMS SPEMRK
 CHOR 10 /CONTOUR HOR
 HCHOV
 HCROSS
 JMS CONMRK
 CVER 10 /CONTOUR VER
 VCMOV

CPAN1150
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004354 001310
 004355 104404
 004356 000001
 004357 010255
 004360 011077
 004361 104434
 004362 000001
 004363 010256
 004364 011073
 004365 104434
 004366 000200
 004367 010306
 004370 000000
 004371 110431

 004372 000000
 004373 777776
 004374 340261
 004375 673323
 004376 000045
 004377 641002
 004400 356315
 004401 050556
 004402 750000
 004403 624372

 004404 000000
 004405 777777
 004406 344340
 004407 050556
 004410 230556
 004411 740001
 004412 356315
 004413 050556
 004414 200054
 004415 741200
 004416 201303
 004417 741100
 004420 450556
 004421 224336
 004422 044426
 004423 224340
 004424 744000
 004425 653323
 004426 000000
 004427 641002
 004430 350556
 004431 050556
 004432 750000
 004433 624404

 004434 000000
 004435 224340
 004436 050556
 004437 750000
 004440 624434

VCROSS
 JMS CONMRK
 HOR 1 / SPECTRUM HOR
 MHMOV
 MH
 JMS SPEMRK
 VER +1 / SPECTRUM VER
 MVMOV
 MV
 JMS SPEMRK
 SPEC 200 / THE SPECTRUM
 SPCON
 0
 JMS C8DP
 / SUBROUTINE TO COMPUTE DUMP SLOT NUMBER
 / FOR NUMBER GENERATOR
 D8LOT 0
 LAH -2 / DUMPS START IN BLOCK 2
 TAD ABCY
 673323 / LHQ,CLA,CLL, AND DIV
 45
 LACQ
 TAD (1)
 DAC NGLOW
 CLA
 JMP D8LOT
 / SUBROUTINE TO PICK UP CONTOUR HOR OR VER MARKER
 CONMRK 0
 LAH -1
 TAD ROTPT2
 DAC NGLOW
 LAC* NGLOW
 CMA
 TAD (1)
 DAC NGLOW
 LAC FG5050
 SNA / SKIP IF 5050
 LAC CFCMFG
 SPA
 ISZ NGLOW / SEEK OR 5050
 LAC* ROTPT
 DAC .-4
 LAC* ROTPT2
 CLL
 IDIV
 0
 LACQ
 TAD NGLOW
 DAC NGLOW
 CLA
 JMP CONMRK
 / SUBROUTINE TO PICKUP SPECTRUM HOR OR VER MARKER
 SPEMRK 0
 LAC* ROTPT2
 DAC NGLOW
 CLA
 JMP SPEMRK
 / SUBROUTINE TO CONVERT BIN TO OCT

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 CPAN2300

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004441 000000 / FOR CORE DISPLAY
004442 750004 DCORE 0
004443 044476 LAS
004444 516422 DAC DCTMP / SAVE FOR CHANGING THIS LOCATION
004445 356423 AND (-77777)
004446 740100 TAD (-60000)
004447 144476 SMA / OVER CORE LIMIT?
004450 777772 DZM DCTMP / YES
004451 044475 LAW -6 / COUNT 6
004452 224476 DAC DCCTN
004453 740010 LAC* DCTMP
004454 740010 RAL
004455 742010 RAL
004456 044477 RTL
004457 516344 DAC DCTMP1
004460 350566 AND (7)
004461 044500 TAD NGC0DA / ADD BASE
004462 224500 DAC DCTMP2
004463 060011 LAC* DCTMP2
004464 204477 DAC* 11 / STORE CODE
004465 444475 LAC DCTMP1
004466 604454 ISZ DCCTN
004467 160011 JMP DCORE+13
004470 627662 DZM* 11
JMP* NGBTD / BY PASS BIN TO DEC

/ ROUTINE TO CHANGE CORE-DISABLE WHEN RUNNING
004471 000000 DCCCC 0
004472 750004 LAS
004473 064476 DAC* DCTMP / PUT 740000 HERE TO DISABLE
004474 604450 JMP DCORE+7
004475 000000 DCCTN 0
004476 000000 DCTMP 0
004477 000000 DCTMP1 0
004500 000000 DCTMP2 0

/CHR PDP9 1969
/ENABLE COINC STORAGE
004501 105047 COINON JMS PADCB /ARE ADC'S ON
004502 203370 LAC JMTB /NO
004503 043235 DAC JMSBUF
004504 216417 LAC (310000)
004505 072064 DAC* SET+5 / CMG
004506 760004 LAW 4 /TURN PANEL INDICATOR ON
004507 105026 JMS PINDON
004510 605055 JMP PANRET

/DISABLE COINC STORAGE
004511 105047 COINOF JMS PADCB /ARE ADC'S ON
004512 203323 LAC CNOP
004513 043235 DAC JMSBUF
004514 216424 LAC (160000)
004515 072064 DAC* SET+5 / CMG
004516 760004 LAW 4 /TURN PANEL INDICATOR OFF
004517 105037 JMS PINDOF
004520 605055 JMP PANRET

/COMMAND TO DISCONTINUE TTY AND PUNCH
/OUTPUT AND CLEAR ENABLE READ OUT FLAG
004521 216315 ROHLT LAC (1)
004522 045067 DAC ENABRO /ENABLE READ OUT
004523 040006 DAC STPGUT /STOP OUTPUT

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004524	444531		ISZ	ROH				
004525	604524		JMP	.-1	/WAIT FOR OUTPUT TO STOP		CPAN2850	
004526	140006		OZH	STPOUT			CPAN2860	
004527	106737		JMS	CRLF			CPAN2870	
004530	605055		JMP	PANRET			CPAN2880	
004531	000000	ROH	0				CPAN2890	
			/SUBROUTINE TO START OUTPUT OPERATION					CPAN2900
004532	236363	ROGO	LAC	(EXPIDH)			CPAN2910	
004533	076362		DAC	(EXPIDF)			CPAN2920	
004534	205067		LAC	ENABRO	/CHECK ENABLE READ OUT		CPAN2930	
004535	556315		SAD	(1)			CPAN2940	
004536	741000		SKP				CPAN2950	
004537	605053		JMP	PERROR	/PUSH CLEAR FIRST		CPAN2960	
004540	145067		OZH	ENABRO	/CLEAR ENABLE READ OUT		CPAN2970	
004541	216314		LAC	(400000)	/ENABLE PANEL INTERRUPT		CPAN2980	
004542	705704		PNIT				CPAN2990	
004543	760001		LAW	1			CPAN3000	
004544	705004		FBCM				CPAN3010	
004545	204605		LAC	OITEM			CPAN3020	
004546	741200	CSNA	SNA		/ IS IT ALL DATA?		CPAN3030	
004547	604563		JMP	ROG1	/YES		CPAN3040	
004550	556344		SAD	(7)	/IS IT DISPLAYED DATA		CPAN3050	
004551	604571		JMP	ROG2	/YES		CPAN3060	
004552	105305		JMS	PANBR			CPAN3070	
004553	740040		XX				CPAN3080	
004554	612005		JMP	UPSET			CPAN3090	
004555	603332		JMP	TIMES	/PRINT TIMES		CPAN3100	
004556	603337		JMP	SCALER	/SCALERS		CPAN3110	
004557	101776		JMS	COUNTO	/PRINT COUNTS		CPAN3120	
004560	611616		JMP	LIST			CPAN3130	
004561	607042		JMP	EXPIDP-3	/ PRINT EXPID		CPAN3140	
004562	740040		XX				CPAN3150	
004563	204604	ROG1	LAC	ODEV			CPAN3160	
004564	556345		SAD	(6)			CPAN3170	
004565	604577		JMP	DECOU			CPAN3180	
004566	556346		SAD	(5)			CPAN3190	
004567	604577		JMP	DECOU			CPAN3200	
004570	605053		JMP	PERROR			CPAN3210	
004571	204604	ROG2	LAC	ODEV			CPAN3220	
004572	556347		SAD	(4)			CPAN3230	
004573	607132		JMP	SPECF1			CPAN3240	
004574	556335		SAD	(3)			CPAN3250	
004575	607205		JMP	PUNOUT			CPAN3260	
004576	605053		JMP	PERROR	/DEVICE - DATA ITEM		CPAN3270	
004577	102017	DECOU	JMS	DECOU			CPAN3280	
004600	104061		JMS	ADCGON			CPAN3290	
004601	766334		LAW	MESS45	/OUTPUT COMPLETE		CPAN3300	
004602	107031		JMS	MESCOM			CPAN3310	
004603	605055		JMP	PANRET			CPAN3320	
004604	000000	ODFV	0		/OUTPUT DEVICE		CPAN3330	
004605	000000	OITEM	0		/OUTPUT ITEM		CPAN3340	
			/ERASE ENABLE					CPAN3350
004606	216315	EENAB	LAC	(1)			CPAN3360	
004607	041564		DAC	ERASF	/ENABLE		CPAN3370	
004610	605055		JMP	PANRET			CPAN3380	
			/ERASE DATA					CPAN3390
004611	201564	PERASE	LAC	ERASF			CPAN3400	
004612	556315		SAD	(1)	/IS ERASE ENABLED		CPAN3410	
							CPAN3420	

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004613	741000	SKP				CPAN3430
004614	605053	JMP	PERROR	/NO		CPAN3440
004615	141564	DZM	ERASF	/DISABLE FOR NEXT TIME		CPAN3450
004616	101553	JMS	ERASE	/ ERASE		CPAN3460
004617	107077	JMS	PR:OF			CPAN3470
004620	305250	305250		/IE		CPAN3480
004621	301322	301322		/RA		CPAN3490
004622	305323	305323		/SE		CPAN3500
004623	651207	651207		/BELL		CPAN3510
004624	605055	JMP	PANRET			CPAN3520
		/START ADC'S				CPAN3530
004625	105047	PADCGO	JMS	PADCB		CPAN3540
004626	200051	LAC	BKGFLG			CPAN3550
004627	740200	SZA		/ SKIP IF NOT BKG.		CPAN3560
004630	604637	JMP	.+7			CPAN3570
004631	107077	JMS	PRIOF			CPAN3580
004632	301250	301250		/CA		CPAN3590
004633	303304	303304		/DC		CPAN3600
004634	317240	317240		/O		CPAN3610
004635	251316	251316		/NI		CPAN3620
004636	400207	400207		/BELL		CPAN3630
004637	101717	JMS	ADCSTR			CPAN3640
004640	605055	JMP	PANRET			CPAN3650
004641	000000	ADCGO	0			CPAN3660
		/PERIOD OF PERIODIC	DUMP OF ALL DATA			CPAN3670
004642	200051	POSD	LAC	BKGFLG		CPAN3680
004643	740200	SZA		/ BKG?		CPAN3690
004644	605055	JMP	PANRET	/ YES		CPAN3700
004645	204147	LAC	PCODE			CPAN3710
004646	516344	AND	(7)			CPAN3720
004647	105535	JMS	PICK			CPAN3730
004650	000000	0		/NONE		CPAN3740
004651	777777	-1		/MINUTES 1		CPAN3750
004652	777773	-5		/MINUTES 5		CPAN3760
004653	777766	-12		/MINUTES 10		CPAN3770
004654	777704	-74		/HOURS 1		CPAN3780
004655	777324	-454		/HOURS 5		CPAN3790
004656	776650	-1130		/ HOURS 10		CPAN3800
004657	772110	-5670		/HOURS 50		CPAN3810
004660	040056	DAC	DDFS	/ SAVE FOR RESETTING COUNTER		CPAN3820
004661	040055	DAC	DDFC	/ SET COUNTER		CPAN3830
004662	740001	CMA				CPAN3840
004663	356315	TAD	(1)			CPAN3850
004664	072066	DAC*	SET+7	/ DDPI - DUMP INTERVAL HOLD		CPAN3860
004665	760002	LAW	2	/TURN PANEL LIGHT OFF		CPAN3870
004668	105037	JMS	PINDOF			CPAN3880
004667	232066	LAC*	SET+7	/ DDPI - IS INTERVAL 0?		CPAN3890
004670	741200	SNA				CPAN3900
004671	605055	JMP	PANRET	/YES		CPAN3910
004672	760002	LAW	2	/NO-TURN LIGHT		CPAN3920
004673	105026	JMS	PINDON	/BACK ON		CPAN3930
004674	605055	JMP	PANRET			CPAN3940
		/AMOUNT OF LIVE TIME				CPAN3950
004675	105535	PLIVET	JMS	PICK		CPAN3960
004676	000000	0		/GET FROM ITY		CPAN3970
004677	000001	1		/MINUTES		CPAN3980
004700	000005	5		/MINUTES		CPAN3990
004701	000012	12		/MINUTES		CPAN4000

004702	000074	74		/1 HOUR	CPAN4010	
004703	000454	454		/5 HOUR	CPAN4020	
004704	001130	1130		/10 HOUR	CPAN4030	
004705	005570	5670		/50 HOUR	CPAN4040	
004706	741200	SNA		/IF ZERO READ IN FROM TTY	CPAN4050	
004707	605055	JMP	PANRET		CPAN4060	
004710	044723	DAC	PLIVE		CPAN4070	
004711	236425	LAC	(LIVETM)		CPAN4080	
004712	740001	CHA			CPAN4090	
004713	344723	TAD	PLIVE		CPAN4100	
004714	741100	SPA			CPAN4110	
004715	605053	JMP	PERROR		CPAN4120	
004716	204723	LAC	PLIVE		CPAN4130	
004717	072070	DAC	SET+11	/ LIVEPS-LIVE TIME PRESET.	CPAN4140	
004720	076350	DAC	(LIVEPT)	/ LIVE TIME PRESET HOLD.	CPAN4150	
004721	076351	DAC	(LIVEPH)	/ LIVE TIME HOLD.	CPAN4160	
004722	605055	JMP	PANRET		CPAN4170	
004723	000000	PLIVE	0		CPAN4180	
		/DISPLAY MODE SELECTION			CPAN4190	
004724	045477	PDMODE	DAC	DMODE	/STORE MODE	CPAN4200
004725	605454	JMP	DSEL+2			CPAN4210
004726	044746	PNODC	DAC	NODCSW	/NUMBER OF DISPLAY CHANNELS SWITCH	CPAN4220
004727	105535	JMS	PICK			CPAN4230
004730	000400	400		/256		CPAN4240
004731	000010	10		/8		CPAN4250
004732	000020	20		/16		CPAN4260
004733	000030	30		/24		CPAN4270
004734	000040	40		/32		CPAN4280
004735	000060	60		/58		CPAN4290
004736	000100	100		/64		CPAN4300
004737	000200	200		/128		CPAN4310
004740	050344	DAC	NODC		/STORE IN NUMBER OF CHANNELS DISPLAYED	CPAN4320
004741	3476E0	TAD	DISADD			CPAN4330
004742	356426	TAD	(-400)			CPAN4340
004743	740100	SMA				CPAN4350
004744	147660	DZM	DISADD			CPAN4360
004745	605055	JMP	PANRET			CPAN4370
004746	000000	NODCSW	0		/NUMBER OF DISPLAY CHANNELS SWITCH	CPAN4380
		/PICK COUNTS FULL SCALE FOR LINEAR DISPLAY				CPAN4390
004747	000000	0				CPAN4400
004750	044747	PLCFS	DAC	-1		CPAN4410
004751	204747	LAC	-2			CPAN4420
004752	105535	JMS	PICK			CPAN4430
004753	010300	ROTLST+15		/256K		CPAN4440
004754	010263	ROTLST		/32		CPAN4450
004755	010264	ROTLST+1		/64		CPAN4460
004756	010266	ROTLST+3		/256		CPAN4470
004757	010270	ROTLST+5		/1K		CPAN4480
004760	010272	ROTLST+7		/4K		CPAN4490
004761	010274	ROTLST+11		/16K		CPAN4500
004762	010276	ROTLST+13		/64K		CPAN4510
004763	050261	DAC	LOCATR			CPAN4520
004764	216315	LAC	(1)	/SET SCALE		CPAN4530
004765	047661	DAC	SCALE	/TO LINEAR		CPAN4540
004766	605055	JMP	PANRET			CPAN4550
		/PICK NUMBER OF DECADES				CPAN4560
004767	000000	0				CPAN4570
004770	044767	PNOLD	DAC	-1		CPAN4580

004771	204767	LAC	-2			
004772	556344	SAD	(7)			
004773	216346	LAC	(5)			
004774	741200	SNA				
004775	216346	LAC	(5)			
004776	660714	ALSS	14			
004777	050675	DAC	FACT			
005000	147661	DZM	SCALE	/SET SCALE TO LOG		
005001	211026	LAC	JLOGAR			
005002	050376	DAC	LOGLIN			
005003	605055	JMP	PANRET			
		/PICK BASE LINE DECADE NUMBER				
005004	556344	PBLDN	SAD	(7)		
005005	216346	LAC	(5)			
005006	741200	SNA				
005007	216346	LAC	(5)			
005010	356337	TAD	(-1)			
005011	350620	TAD	ADECM	/CALCULATE BY TABLE LOOK UP		
005012	107072	JMS	LACI			
005013	050617	DAC	LOGSUB			
005014	605055	JMP	PANRET			
		/LOG LINEAR FLIP FLOP				
005015	207661	LOGLN	LAC	SCALE		
005016	740200	SZA				
005017	604771	JMP	PNOLD+1			
005020	604751	JMP	PLCFS+1			
		/ADD ONE INCREMENT TO SPREAD				
005021	210302	PSPREA	LAC	SPREAD		
005022	356427	TAD	(200)			
005023	516340	AND	(1777)			
005024	050302	DAC	SPREAD			
005025	605055	JMP	PANRET			
		/SUBROUTINE TO MAINTAIN PANEL INDICATORS				
		/CALL PINDON TO TURN LIGHT ON				
		/CALL PINDOF TO TURN LIGHT OFF				
		/ENTER WITH PROPER BITS IN AC 12 - 17				
005026	000000	PINDON	0			
005027	700002	IOF				
005030	045037	DAC	PINDCF			
005031	740001	CMA				
005032	505046	AND	INDIC			
005033	245037	XOR	PINDOF			
005034	045046	DAC	INDIC			
005035	705702	PNID				
005036	625026	JMP*	PINDON			
005037	600000	PINDOF	0			
005040	700002	IOF				
005041	740001	CMA				
005042	505046	AND	INDIC			
005043	045046	DAC	INDIC			
005044	705702	PNID				
005045	625037	JMP*	PINDOF			
005046	000000	INDIC	0	/HOLDS PANEL INDICATOR STATIS		
		/GOES TO PERROR IF ADC IS ON				
005047	000000	PADCB	0			
005050	200226	LAC	ADCON	/ARE ADC'S ON		
005051	741200	SNA				
005052	625047	JMP*	PADCB	/NO		

005053	760010	/SET ERROR LIGHT ON PANEL				CPAN5170
005054	105026	PERROR	LAW	10		CPAN5180
			JMS	PINDON		CPAN5190
005055	216314	/RETURN FROM PANEL INTERRUPT				CPAN5200
005056	700002	PANRET	LAC	(400000)		CPAN5210
005057	705704		IOF			CPAN5220
005060	760001		PNIT		/ENABLE PANEL INTERRUPT	CPAN5230
005061	705004		LAW	1	/ENABLE BOX	CPAN5240
005062	204106		FBCM			CPAN5250
005063	144106		LAC	PANFLG		CPAN5260
005064	740200		DZM	PANFLG	/CLEAR FLAG	CPAN5270
005065	607436		SZA		/TTY ENTRY OR PANEL INTERUPT?	CPAN5280
005066	606257		JMP	RET		CPAN5290
005067	000000		JMP	RETC	/TTY	CPAN5300
		ENABRO	0		/ENABLE READ OUT	CPAN5310
		/SUBROUTINE TO CLEAR CLOCKS AND SCALERS				CPAN5320
005070	000000	CCAS	0			CPAN5330
005071	211265		LAC	MTB01	/RESET MAG POINTERS	CPAN5340
005072	051271		DAC	MTB01		CPAN5350
005073	211266		LAC	MTB02		CPAN5360
005074	051272		DAC	MTB02		CPAN5370
005075	232070		LAC*	SET+11	/ LIVEPS-RESET LIVETM PRESET	CPAN5380
005076	076350		DAC*	(LIVEPT)	/ POINTER.	CPAN5390
005077	770760		LAW	-7020		CPAN5400
005100	040007		DAC	7		CPAN5410
005101	777437		LAW	-341		CPAN5420
005102	076430		DAC*	(LIVECL)		CPAN5430
005103	702302		CCSC		/CLEAR SYSTEM LIVE TIME	CPAN5440
005104	702004		CLSA		/CLEAR SCALER A	CPAN5450
005105	702024		CLSB		/B	CPAN5460
005106	702044		CLSC		/C	CPAN5470
005107	702064		CLSD		/D	CPAN5480
005110	105237		JMS	READCS	/READ ZEROED CLOCKS FOR STORAGE	CPAN5490
005111	203351		LAC	SCAER+5	/ SCALRA ADR.	CPAN5500
005112	040255		DAC	ZERTEM		CPAN5510
005113	777752		LAW	-26		CPAN5520
005114	101636		JMS	ZEROUT	/ ZERO SCALERS.	CPAN5530
005115	200056		LAC	DDFS	/ RESET DATA DUMP COUNTER	CPAN5540
005116	040055		DAC	DDFC		CPAN5550
005117	216413		LAC	(2)		CPAN5560
005120	040261		DAC	ABCT	/PERIODIC BLOCK COUNT	CPAN5570
005121	151373		DZM	MTRCCT	/MAG TAPE RECORD COUNTER	CPAN5580
005122	625070		JMP*	CCAS		CPAN5590
		/ROUTINE TO SERVICE REAL TIME CLOCK INTERRUPTS				CPAN5600
005123	700044	RTSEV	CLON			CPAN5610
005124	770760		LAW	-7020	/RESET CLOCK WITH -3600	CPAN5620
005125	040007		DAC	7		CPAN5630
005126	476431		ISZ*	(REALTM)	/ ADD 1 MINUTE TO REALTM.	CPAN5640
005127	440055		ISZ	DDFC	/ DUMP COUNTER	CPAN5650
005130	607436		JMP	RET		CPAN5660
005131	232066		LAC*	SET+7	/ DDPI - IF 0 DON'T DUMP.	CPAN5670
005132	741200		SNA		/PERIODIC DATA IS BEING DUMPED	CPAN5680
005133	607436		JMP	RET	/ NO. RETURN	CPAN5690
005134	200051		LAC	BKGFLG		CPAN5700
005135	740200		SZA		/ DON'T DUMP IF IN BKG.	CPAN5710
005136	607436		JMP	RET		CPAN5720
005137	103375		JMS	OFFADC		CPAN5730
005140	444641		ISZ	ADCGO	/ DON'T ENABLE ADC	CPAN5750

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005141	105237	JMS	READCS		CPAN5760
005142	2002F1	LAC	ABCT		CPAN5770
005143	045202	DAC	ALLCTN		CPAN5780
005144	216347	LAC	(4)		CPAN5790
005145	041135	DAC	UNIT		CPAN5800
005146	205546	LAC	BLKONE	/!D ECT	CPAN5810
005147	105174	JMS	SINDMP		CPAN5820
005150	740200	SZA		/ERROR?	CPAN5830
005151	605166	JMP	RTSEVI	/YES	CPAN5840
005152	200221	LAC	SUMONE	/SUM SPECTRUM	CPAN5850
005153	105174	JMS	SINDMP		CPAN5860
005154	200217	LAC	FSTART	/F SINGLES	CPAN5870
005155	105174	JMS	SINDMP		CPAN5880
005156	200220	LAC	MSTART	/M SINGLES	CPAN5890
005157	105174	JMS	SINDMP		CPAN5900
005160	105206	JMS	CONDMP	/COINCIDENCE	CPAN5910
005161	200261	LAC	ABCT		CPAN5920
005162	356331	TAD	(45)		CPAN5930
005163	556432	SAD	(1055)		CPAN5940
005164	216413	LAC	(2)		CPAN5950
005165	040261	DAC	ABCT		CPAN5960
005166	200056	RTSEVI	LAC	DDFS	/ RESET COUNTER
005167	040055	DAC	DDFC		CPAN5970
005170	700002	IOF			CPAN5980
005171	103406	JMS	ONADC		CPAN5990
005172	144641	OZH	ADCGO		CPAN6000
005173	607436	JMP	RET		CPAN6010
		/SUBROUTINE TO DUMP SINGLES ON DECTAPE			CPAN6020
005174	000000	SINDMP	0		CPAN6030
005175	045201	DAC	.+4		CPAN6040
005176	106344	JMS	DECTRW		CPAN6050
005177	000000	0			CPAN6060
005200	777400	-400		/WC	CPAN6070
005201	000000	0		/CA	CPAN6080
005202	000000	ALLCTN	0	/BLK #	CPAN6090
005203	000005	5		/WRITE	CPAN6100
005204	445202	ISZ	ALLCTN		CPAN6110
005205	625174	JMP*	SINDMP		CPAN6120
		/SUBROUTINE TO DUMP COINCIDENCE ON DECTAPE			CPAN6130
005206	000000	CONDMP	0		CPAN6140
005207	205202	LAC	ALLCTN		CPAN6150
005210	045215	DAC	.+5		CPAN6160
005211	106344	JMS	DECTRW		CPAN6170
005212	000000	0			CPAN6180
005213	760000	-20000		/WC	CPAN6190
005214	040000	40000		/CA	CPAN6200
005215	000000	0		/BLK #	CPAN6210
005216	000005	5		/WRITE	CPAN6220
005217	525206	JMP*	CONDMP		CPAN6230
		/CWR PDP9 SEPTEMBER 1968			CPAN6240
		/ROUTINE TO SERVICE REAL TIME CLOCK INTERRUPTS			CPAN6250
005220	702304	LTSEV	CCOF	/CLEAR COVERFLOW FLAG	CPAN6260
005221	476430	ISZ*	(LIVECL)		CPAN6270
005222	607436	JMP	RET	/ NO OVERFLOW	CPAN6280
005223	476425	ISZ*	(LIVETM)	/ 1 MINUTE IS UP.	CPAN6290
005224	777437	LAW	-341		CPAN6300
005225	076430	DAC*	(LIVECL)	/ RESET CLOCK (-3600)	CPAN6310
005226	236425	LAC*	(LIVETM)		CPAN6320
					CPAN6330

005227	576350	SAD*	(LIVEPT) / IS PRESET TIME UP?	CPAN6340
005230	741000	SKP	/ YES	CPAN6350
005231	607436	JMP	RET	CPAN6360
005232	101662	JMS	ADCSTP	CPAN6370
005233	236350	LAC*	(LIVEPT) / ADD ANOTHER INTERVAL	CPAN6380
005234	372070	TAD*	SE*+11 / TO LIVETIME TESTER.	CPAN6390
005235	076350	DAC*	(LIVEPT)	CPAN6400
005236	607436	JMP	RET	CPAN6410
		/CHR	PDP9 SEPTEMBER 1968	CPAN6420
		/SUBROUTINE TO READ CLOCKS AND SCALERS		CPAN6430
		/AND PLACE RESULTS IN STORAGE		CPAN6440
005237	000000	READCS	0	CPAN6450
005240	236431	LAC*	(REALTM) / COMPUTE FRACTIONAL PART	CPAN6460
005241	076433	DAC*	(REALHI) / OF REALTM.	CPAN6470
005242	200007	LAC	7	CPAN6480
005243	356434	TAD	(7020)	CPAN6490
005244	744000	CLL		CPAN6500
005245	650323	FRDIV		CPAN6510
005246	007020	7020		CPAN6520
005247	641002	LACQ		CPAN6530
005250	076435	DAC*	(REALLO)	CPAN6540
005251	236425	LAC*	(LIVETM) / COMPUTE FRAC. PART	CPAN6550
005252	076436	DAC*	(LIVEHI) / OF LIVE TIME.	CPAN6560
005253	236430	LAC*	(LIVECL) / READ SYSTEM LIVE TIME	CPAN6570
005254	741200	SNA	/IF ZERO JUST PRINT ZERO	CPAN6580
005255	605263	JMP	READCI	CPAN6590
005256	356437	TAD	(341)	CPAN6600
005257	744000	CLL		CPAN6610
005260	650323	FRDIV		CPAN6620
005261	000341	34:		CPAN6630
005262	641002	LACQ		CPAN6640
005263	076440	READCI	DAC* (LIVELO)	CPAN6650
005264	702012	10T+2012	/READ SCALER A	CPAN6660
005265	076441	DAC*	(LOSCLA)	CPAN6670
005266	702032	10T+2032	/B	CPAN6680
005267	076442	DAC*	(LOSCLB)	CPAN6690
005270	702052	10T+2052	/C	CPAN6700
005271	076443	DAC*	(LOSCLC)	CPAN6710
005272	702072	10T+2072	/D	CPAN6720
005273	076444	DAC*	(LOSCLD)	CPAN6730
005274	625237	JMP*	READCS	CPAN6740
		/ADCBUS	HWB PDP-9	CPAN6750
		/ROUTINE TO CHECK IF ADC'S ARE BUSY. IF THEY ARE MESSAGE PRINTED AND		CPAN6760
		/ROUTINE EXITS THROUGH RET IF ADC'S NOT BUSY THEN ROUTINE RETURNS		CPAN6770
		/TO ROUTINE THAT CALLED IT		CPAN6780
005275	000000	ADCBUS	0	CPAN6790
005276	200226	LAC	ADCON /GET ADC BUSY FLAG	CPAN6800
005277	751200	SNAICLA	/ ADC OFF?	CPAN6810
005300	625275	JMP*	ADCBUS /YES	CPAN6820
005301	340051	TAD	BKGFLG	CPAN6830
005302	740200	SZA	/ ADC ON BUT BKG	CPAN6840
005303	625275	JMP*	ADCBUS / YES	CPAN6850
005304	606746	JMP	OMARK	CPAN6860
		/SUBROUTINE TO EXECUTE INSTRUCTION FOLLOWING		CPAN6870
		/CALL. NUMBER IN AC INDICATES WHICH ONE		CPAN6880
005305	000000	PANBR	0	CPAN6890
005306	345305	TAD	PANBR	CPAN6900
005307	045314	DAC	+5	CPAN6910

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005310	225314	LAC*	.+4			CPAN6920	
005311	045314	DAC	.+3			CPAN6930	
005312	204147	LAC	PCODE			CPAN6940	
005313	516344	AND	(7)			CPAN6950	
005314	740040	XX				CPAN6960	
005315	605055	JMP	PAI.RET			CPAN6970	
		/COMMAND TO SELECT NUMBER TO BE GENERATED					CPAN6980
		/ON DISPLAY					CPAN6990
005316	112461	NGCOM	JMS	DECIN	/INPUT NUMBER	CPAN7000	
005317	516344		AND	(7)	/SAVE LOW BITS	CPAN7010	
005320	050616		DAC	NGCTS		CPAN7020	
005321	106737		JMS	CRLF		CPAN7030	
005322	754000		CLAICLL			CPAN7040	
005323	705704		PNIT		/DISABLE PANEL	CPAN7050	
005324	213415		LAC	BC+2		CPAN7060	
005325	640503		LRS	3	/CONVERT INPUT NUMBER	CPAN7070	
005326	741200		SNA		/TO A SWITCH NUMBER	CPAN7080	
005327	605366		JMP	NGCOM1		CPAN7090	
005330	556315		SAD	(1)		CPAN7100	
005331	605370		JMP	NGCOM2		CPAN7110	
005332	556413		SAD	(2)		CPAN7120	
005333	741000		SKP			CPAN7130	
005334	606746		JMP	QMARK		CPAN7140	
005335	200051		LAC	BKGFLG		CPAN7150	
005336	740200		SZA			CPAN7160	
005337	605353		JMP	.+14		CPAN7170	
005340	210616		LAC	NGCTS		CPAN7180	
005341	105535		JMS	PICK	/ SELECTION OF ITEMS	CPAN7190	
005342	107756		JMS	NGNON		CPAN7200	
005343	411373		XCT	MTRCCT	/ NOT ON PANEL	CPAN7210	
005344	406512		XCT	DECPTY		CPAN7220	
005345	770027		OPRIEREJHI			CPAN7230	
005346	770023		OPRISREJHI			CPAN7240	
005347	770025		OPRICREJHI			CPAN7250	
005350	107756		JMS	NGNON		CPAN7260	
005351	107756		JMS	NGNON		CPAN7270	
005352	604234		JMP	PINRET		CPAN7280	
005353	210616		LAC	NGCTS		CPAN7290	
005354	105535		JMS	PICK		CPAN7300	
005355	107756		JMS	NGNON		CPAN7310	
005356	411373		XCT	MTRCCT		CPAN7320	
005357	406512		XCT	DECPTY		CPAN7330	
005360	770427		OPRIEREJHI+400			CPAN7340	
005361	770423		OPRISREJHI+400			CPAN7350	
005362	770425		OPRICREJHI+400			CPAN7360	
005363	107756		JMS	NGNON		CPAN7370	
005364	107756		JMS	NGNON		CPAN7380	
005365	604234		JMP	PINRET		CPAN7390	
005366	216445	NGCOM1	LAC	(70)	/INFO SELECTION 1	CPAN7400	
005367	741000		SKP			CPAN7410	
005370	216316	NGCOM2	LAC	(100)	/ INFO SELECTION 2	CPAN7420	
005371	350616		TAD	NGCTS		CPAN7430	
005372	604111		JMP	PANSEV+2		CPAN7440	
		/ZERO SUPPRESSION FLIP FLOP FOR DISPLAY					CPAN7450
005373	203323	SUPZRO	LAC	CNOP		CPAN7460	
005374	550351		SAD	DD2+1		CPAN7470	
005375	203340		LAC	CSZA		CPAN7480	
005376	050351		DAC	DD2+1		CPAN7490	

005377	605055		JMP	PANRET		CPAN7500
		/ROTATE CONTROL				CPAN7510
005400	777777	RRIGHT	LAW	-1	/ROTATE RIGHT	CPAN7520
005401	050305		DAC	SPCONA		CPAN7530
005402	224336		LAC*	ROTPT		CPAN7540
005403	064337		DAC*	ROTPT1		CPAN7550
005404	605055		JMP	PANRET		CPAN7560
005405	216315	RLEFT	LAC	(1)	/ROTATE LEFT	CPAN7570
005406	050305		DAC	SPCONA		CPAN7580
005407	224336		LAC*	ROTPT		CPAN7590
005410	740001		CMA			CPAN7600
005411	356315		TAD	(1)		CPAN7610
005412	605403		JMP	RLEFT-2		CPAN7620
005413	147660	RINIT	DZM	DISADD	/ROTATE INITIALIZE	CPAN7630
005414	150310		DZM	SX		CPAN7640
005415	164340		DZM*	ROTPT2		CPAN7650
005416	164337		DZM*	ROTPT1		CPAN7660
005417	605055		JMP	PANRET		CPAN7670
005420	216446	RFAST	LAC	(RTMP)		CPAN7680
005421	050254		DAC	MOVADD		CPAN7690
005422	450260		ISZ	ROTINC		CPAN7700
005423	605055		JMP	PANRET		CPAN7710
005424	204337		LAC	ROTPT1		CPAN7720
005425	050254		DAC	MOVADD		CPAN7730
005426	777776		LAW	-2		CPAN7740
005427	050260		DAC	ROTINC		CPAN7750
005430	605055		JMP	PANRET		CPAN7760
005431	000000	RTMP	0			CPAN7770
		/COINCIDENCE DISPLAY CONTROL				CPAN7780
005432	705012	DLIST	FBRD		/ READ FUNCTION BOX	CPAN7790
005433	141526		DZM	CMODE	/ CLEAR DISPLAY CHANGE FLAG	CPAN7800
005434	516447		AND	(100000)		CPAN7810
005435	545500		SAD	BSPEED		CPAN7820
005436	605446		JMP	.+10		CPAN7830
005437	045500		DAC	BSPEED		CPAN7840
005440	741200		SNA			CPAN7850
005441	605446		JMP	.+5		CPAN7860
005442	224337		LAC*	ROTPT1		CPAN7870
005443	744010		CLLIRAL			CPAN7880
005444	744010		CLLIRAL			CPAN7890
005445	064337		DAC*	ROTPT1		CPAN7900
005446	447762		ISZ	NGRF		CPAN7910
005447	741000		SKP			CPAN7920
005450	107662		JMS	NGBTD	/ NUMBER GENERATOR BINARY TO DEC	CPAN7930
005451	107770		JMS	NGDIS	/ DISPLAY NUMBER	CPAN7940
005452	610051	OSEL	JMP	DISPEC		CPAN7950
005453	605432		JMP	DLIST		CPAN7960
005454	205477		LAC	DMODE		CPAN7970
005455	345466		TAD	ADLD		CPAN7980
005456	645457		DAC	.+1	/ FORM INSTRUCTION	CPAN7990
005457	740040		XX			CPAN8000
005460	205453		LAC	OSEL+1		CPAN8010
005461	741000		SKP			CPAN8020
005462	205465		LAC	.+3		CPAN8030
005463	045452		DAC	OSEL		CPAN8040
005464	605055		JMP	PANRET		CPAN8050
005465	601353		JMP	CONDIS		CPAN8060
005466	605467	ADLD	JMP	.+1		CPAN8070

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005467	605462		JMP	.-5		CPAN8080
005470	605460		JMP	.-10		CPAN8090
005471	605527		JMP	PFDIS	/PLANE-F OVERLAP	CPAN8100
005472	605526		JMP	PCIS	/PLANE	CPAN8110
005473	605513		JMP	SUMDIS	/SUM	CPAN8120
005474	605506		JMP	FMDIS	/F - M OVERLAP	CPAN8130
005475	605504		JMP	MDIS	/M SINGLE DISPLAY	CPAN8140
005476	605502		JMP	FDIS	/ F SINGLE DISPLAY	CPAN8150
005477	000007	DMODE	7		/ HOLDS DISPLAY MODE	CPAN8160
005500	000000	BSPEED	0			CPAN8170
005501	610051	JDISP	JMP	DISPEC		CPAN8180
005502	200217	FDIS	LAC	FSTART	/DISPLAY F SINGLE	CPAN8190
005503	605514		JMP	SUMDIS+1		CPAN8200
005504	200220	MDIS	LAC	MSTART	/DISPLAY M SINGLE	CPAN8210
005505	605514		JMP	SUMDIS+1		CPAN8220
005506	200220	FMDIS	LAC	MSTART	/DISPLAY F-M OVERLAP	CPAN8230
005507	340051		TAD	BKGFLG		CPAN8240
005510	050410		DAC	DISTWO		CPAN8250
005511	200217		LAC	FSTART		CPAN8260
005512	605515		JMP	SUMDIS+2		CPAN8270
005513	200221	SUMDIS	LAC	SUMONE	/DISPLAY SUM	CPAN8280
005514	150410		DZM	DISTWO		CPAN8290
005515	340051		TAD	BKGFLO		CPAN8300
005516	050407		DAC	DISONE		CPAN8310
005517	777400	RAMPC	LAW	-400		CPAN8320
005520	050307		DAC	MRAMP		CPAN8330
005521	205501		LAC	JDISP		CPAN8340
005522	045452		DAC	DSEL		CPAN8350
005523	216450		LAC	(7700)	/ MOVE NG UP	CPAN8360
005524	050551		DAC	NY		CPAN8370
005525	605055		JMP	PANRET		CPAN8380
005526	751000	PDIS	SKPICLA		/DISPLAY PLANE	CPAN8390
005527	200233	PFDIS	LAC	FST128	/DISPLAY PLANE-F OVERLAP	CPAN8400
005530	050410		DAC	DISTWO		CPAN8410
005531	200216		LAC	FGTPLA		CPAN8420
005532	050407		DAC	DISONE		CPAN8430
005533	777600		LAW	-200		CPAN8440
005534	605520		JMP	RAMPC+1		CPAN8450
		/END OF COINC CODING				CPAN8460
		/BEGINNING OF COMMON CODING				XDIR0000
005535	000000	PICK	0		XDIR0010	
005536	345535		TAD	PICK	XDIR0020	
005537	045545		DAC	+.6	XDIR0030	
005540	275535		LAC	PICK	XDIR0040	
005541	356341		TAD	(10)	XDIR0050	
005542	045535		DAC	PICK	XDIR0060	
005543	225545		LAC*	+.2	XDIR0070	
005544	625535		JMP*	PICK	XDIR0080	
005545	000000		0		XDIR0090	
005546	030000	BLKONE	EXPID		XDIR0100	
		/NEWDIR	HWB	PDP-9	XDIR0110	
		/ROUTINE TO CREATE A DIRECTORY ON DEC TAPE.				XDIR0120
005547	000000		0		XDIR0130	
005550	104041	NEWDIR	JMS	ADCCHK	XDIR0140	
005551	201135		LAC	UNIT	XDIR0150	
005552	740200		SZA		XDIR0160	
005553	106054		JMS	RDDIR	XDIR0170	
005554	400052		XCT	XCTBKG	XDIR0180	
				/ MAG TAPE MAY NOT HAVE DIRECTORY		

005555	346133		TAD	DECNMA		XDIR0190
005556	045547		DAC	NEWDIR-1		XDIR0200
005557	220215		LAC*	REEL		XDIR0210
005560	065547		DAC*	NEWDIR-1		XDIR0220
005561	146307		DZM	DIRCNT		XDIR0230
005562	777775		LAW	-7		XDIR0240
005563	046300		DAC	DILLOOP		XDIR0250
005564	777777		LAW	-1		XDIR0260
005565	046301		DAC	CKSLOT		XDIR0270
005566	205717		LAC	DIRONE		XDIR0280
005567	046302		DAC	DIRTEM		XDIR0290
005570	206301	NEWDI	LAC	CKSLOT		XDIR0300
005571	066302		DAC*	DIRTEM	/SET CHECK WORD	XDIR0310
005572	446301		ISZ	CKSLOT		XDIR0320
005573	740000		NOP			XDIR0330
005574	446302		ISZ	DIRTEM		XDIR0340
005575	446307		ISZ	DIRCNT		XDIR0350
005576	446300		ISZ	DILLOOP	/LAST CHECK WORD	XDIR0360
005577	605570		JMP	NEWDI	/NO	XDIR0370
005600	166302	NEWDI2	DZM*	DIRTEM	/ZERO REMAINDER OF BLOCK	XDIR0380
005601	446307		ISZ	DIRCNT		XDIR0390
005602	206307		LAC	DIRCNT		XDIR0400
005603	556333		SAD	14001	/DIRECTORY BLOCK ZEROED	XDIR0410
005604	605607		JMP	.+3	/ YES	XDIR0420
005605	446302		ISZ	DIRTEM	/NO	XDIR0430
005606	605600		JMP	NEWDI2		XDIR0440
005607	205547		LAC	NEWDIR-1	/ GET REEL NUMBER.	XDIR0450
005610	112250		JMS	NIO		XDIR0460
005611	225547		LAC*	NEWDIR-1		XDIR0470
005612	060215		DAC*	REEL		XDIR0480
005613	106072		JMS	WTDIR		XDIR0490
005614	201135		LAC	UNIT		XDIR0500
005615	740200		SZA		/ MAG TAPE?	XDIR0510
005616	606257		JMP	RETC	/ NO	XDIR0520
005617	151376		DZM	RWFG		XDIR0530
005620	111377		JMS	MTRDWT	/ MAKE IT LOOK LIKE NORMAL FILE	XDIR0540
005621	000000		0			XDIR0550
005622	756400		-21400		/ HC	XDIR0560
005623	034600		34600		/ CA	XDIR0570
005624	000000		0		/ NO SKIPPING	XDIR0580
005625	000005		5			XDIR0590
005626	111323		JMS	EOF		XDIR0600
005627	606257		JMP	RETC		XDIR0610
		/DIRECT	MWB	PDP-9		XDIR0620
		/ROUTINE TO PRINT DIRECTORY ON DEC TAPE.				XDIR0630
		DIRECT	0			XDIR0640
005630	600000		JMS	CRLF		XDIR0650
005631	106737		JMS	DIRCK	/CHECK DIRECTORY	XDIR0660
005632	105662		JMP*	DIRECT	/NO DIRECTORY	XDIR0670
005633	625630		JMP*	DIRECT	/NO SPECTRA	XDIR0680
005634	625630		NOP		/TAPE FULL	XDIR0690
005635	740000		JMS	SETCNT	/NORMAL DIRECTORY	XDIR0700
005636	106111		DZM	DTREI	/ ZERO SLOT COUNTER	XDIR0710
005637	142535	DIREI	JMS	CRLF		XDIR0720
005640	106737		ISZ	DTREI	/ NEXT SLOT	XDIR0730
005641	442535		LAC	DTREI		XDIR0740
005642	202535		CLL		/ POS. *	XDIR0750
005643	744000		JMS	DECPRT		XDIR0760
005644	106554					

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005645 226306 LAC* DIRTI XDIR0770
005646 046712 DAC HIGHPR / SET HIGH ORDER XDIR0780
005647 226302 LAC* DIRTEM /GET ENTRY XDIR0790
005650 106554 JMS DECPRT /PRINT CONTENTS OF SLOT XDIR0800
005651 226302 LAC* DIRTEM XDIR0810
005652 326308 ADD* DIRTI XDIR0820
005653 446302 ISZ DIRTEM XDIR0830
005654 446306 ISZ DIRTI XDIR0840
005655 740200 SZA /ID IN THIS ENTRY XDIR0850
005656 446307 ISZ DIRCNT /YES XDIR0860
005657 605640 JMP DIREI /NO XDIR0870
005660 106737 JMS CRLF XDIR0880
005661 625630 JMP* DIRECT XDIR0890
/DIRCK HWB PDP-9 XDIR0900
/ROUTINE TO CHECK FOR A DIRECTORY, PRESENCE OF SPECTRA, IF TAPE XDIR0910
/IS FULL. USED IN FOLLOWING WAY. XDIR0920
/ JMS DIRCK XDIR0930
/ X /RETURNS HERE IF NO DIRECTORY XDIR0940
/ X /RETURNS HERE IF NO SPECTRA XDIR0950
/ X /RETURNS HERE IF TAPE FULL XDIR0960
/ Y /RETURNS HERE IF NORMAL DIRECTORY XDIR0970
/ XDIR0980
005662 000000 DIRCK 0 XDIR0990
005663 777775 LAW -3 XDIR1000
005664 046300 DAC DILoop XDIR1010
005665 777777 LAW -1 XDIR1020
005666 046301 DAC CKSLOT XDIR1030
005667 205717 LAC DIRONE /LOCATION 1ST WORD OF DIRECTORY XDIR1040
005670 046302 DAC DIRTEM XDIR1050
005671 226302 DIRC1 LAC* DIRTEM XDIR1060
005672 546301 SAD CKSLOT /CHECK WORD OK XDIR1070
005673 605677 JMP DIRC2 /YES XDIR1080
005674 766324 LAW MESS34 XDIR1090
005675 107031 JMS MESCOM XDIR1100
005676 625662 JMP* DIRCK XDIR1110
005677 446301 DIRC2 ISZ CKSLOT XDIR1120
005700 740000 NOP XDIR1130
005701 446302 ISZ DIRTEM XDIR1140
005702 446300 ISZ DILoop /LAST CHECK WORD XDIR1150
005703 605671 JMP DIRC1 /NO XDIR1160
005704 445662 ISZ DIRCK /YES XDIR1170
005705 225720 LAC* DIRTWO /GET NUMBER OF SPECTRA ON TAPE XDIR1180
005706 740200 SZA /ANY SPECTRA XDIR1190
005707 605711 JMP DIRC3 /YES XDIR1200
005710 625662 JMP* DIRCK XDIR1210
005711 445662 DIRC3 ISZ DIRCK XDIR1220
005712 545716 SAD FULL / TAPE FULL XDIR1230
005713 625662 JMP* DIRCK / YES XDIR1240
005714 445662 ISZ DIRCK /NO XDIR1250
005715 625662 JMP* DIRCK XDIR1260
005716 000017 FULL 17 XDIR1270
005717 032600 DIRONE 32600 /1ST LOC OF DIRECTORY XDIR1280
005720 032603 DIRTWO 32603 /NUMBER OF SPECTRA XDIR1290
005721 032604 DIR3 32604 /1ST ID XDIR1300
005722 032637 DIRHIE 32637 /USED IN RENAME XDIR1310
/ADDDIR HWB PDP-9 XDIR1320
/ROUTINE TO ADD ENTRY TO DEC TAPE DIRECTORY AND CALCULATE BEGINNING XDIR1330
/BLOCK TO WRITE NEW DATA IN. IF NO DIRECTORY IS ON TAPE OR IF XDIR1340

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/ THE TAPE IS FULL ROUTINE RETURNS WITH DIRFLG#1. OTHERWISE
/ DIRFLG#0.
005723 000000
005724 000000
005725 000000
005726 146303
005727 400052
005730 345546
005731 045723
005732 356337
005733 045724
005734 105662
005735 606013
005736 605764
005737 606011
005740 106111
005741 225723
005742 325724
005743 741200
005744 605776
005745 226302
005746 565723
005747 741000
005750 605754
005751 226306
005752 565724
005753 606015
005754 226302
005755 325306
005756 446302
005757 446306
005760 740200
005761 446307
005762 605745
005763 106737
005764 146304
005765 106111
005766 446304
005767 226302
005770 326306
005771 741200
005772 606000
005773 446302
005774 446306
005775 605766
005776 766340
005777 606012
006000 225723
006001 066302
006002 225724
006003 056306
006004 465720
006005 206304
006006 401014
006007 046305
006010 625725
006011 766310
006012 107031
ADDIR 0
DZM DIRFLG
XCT XCTBKG
TAD BLKONE
DAC ADDIR-2
TAD (-1)
DAC ADDIR-1
JMS DIRCK /CHECK DIRECTORY
JMP ADD3+2 / NO DIRECTORY
JMP ADD01 /NO SPECTRA. OK
JMP ADD03 /TAPE FULL
JMS SETCNT / DIRECTORY OK
LAC* ADDIR-2 /EXPID
ADD* ADDIR-1 / EXPIDH
SNA
JMP ADD06 / YES-PROTEST
ADD08 LAC* DIRTEM / COMPARE LOW ORDER
SAD* ADDIR-2 /EXPID
SKP
JMP .+4
LAC* DIRTI / COMPARE HIGH ORDER
SAD* ADDIR-1 /EXPIDH
JMP ADD04 / SAME
LAC* DIRTEM
ADD* DIRTI
ISZ DIRTEM
ISZ DIRTI
SZR
ISZ DIRCNT / LAST
JMP ADD08 / NO
JMS CRLF /YES
ADD01 DZM DIRCT2 /ZERO BLOCK COUNTER
JMS SETCNT /RESET COUNTERS
ADD01 ISZ DIRCT2
LAC* DIRTEM /GET ID
ADD* DIRTI
SNA /SLOT AVAILABLE
JMP ADD02 /YES
ISZ DIRTEM /NO
ISZ DIRTI
JMP ADD01
ADD06 LAH MESS46 / YES
JMP ADD03+1
ADD02 LAC* ADDIR-2 /PUT ID
DAC* DIRTEM / IN DIRECTORY
LAC* ADDIR-1
DAC* DIRTI
ISZ* DIRTWO /INCREMENT NUMBER OF SPECTRA
LAC DIRCT2 /COMPUTE 1ST BLOCK NUMBER
XCT JMSBLK
DAC BLKNO
JMP* ADDIR
ADD03 LAH MESS14 / TAPE FULL
JMS MESCOM
XDIR1350
XDIR1360
XDIR1370
XDIR1380
XDIR1390
XDIR1400
XDIR1410
XDIR1420
XDIR1430
XDIR1440
XDIR1450
XDIR1460
XDIR1470
XDIR1480
XDIR1490
XDIR1500
XDIR1510
XDIR1520
XDIR1530
XDIR1540
XDIR1550
XDIR1560
XDIR1570
XDIR1580
XDIR1590
XDIR1600
XDIR1610
XDIR1620
XDIR1630
XDIR1640
XDIR1650
XDIR1660
XDIR1670
XDIR1680
XDIR1690
XDIR1700
XDIR1710
XDIR1720
XDIR1730
XDIR1740
XDIR1750
XDIR1760
XDIR1770
XDIR1780
XDIR1790
XDIR1800
XDIR1810
XDIR1820
XDIR1830
XDIR1840
XDIR1850
XDIR1860
XDIR1870
XDIR1880
XDIR1890
XDIR1900
XDIR1910
XDIR1920

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006013	446303	ISZ	DIRFLG		XDIR1930
006014	625725	JMP*	ADDIR		XDIR1940
006015	766331	ADD04	LAW	MESS43 / DUPLICATE ID	XDIR1950
006016	606012	JMP	ADD03+1		XDIR1960
		/DELETE	HWB	PDP-9	XDIR1970
				/ROUTINE TO DELETE AN ENTRY FROM DIRECTORY.	XDIR1980
				/ENTER WITH EXPERIMENT ID TO BE DELETED IN AC.	XDIR1990
006017	000000	DELETE	0		XDIR2000
006020	105662	JMS	DIRCK	/CHECK DIRECTORY	XDIR2020
006021	626017	JMP*	DELETE	/NO DIRECTORY	XDIR2030
006022	626017	JMP*	DELETE	/NO SPECTRA ON TAPE	XDIR2040
006023	740000	NOP		/ TAPE FULL	XDIR2050
006024	106111	JMS	SETCNT	/ TAPE OK	XDIR2060
006025	226302	DELE1	LAC*	DIRTEM	XDIR2070
006026	553415	SAD	BC+2	/COMPARE LOW	XDIR2080
006027	741000	SKP			XDIR2090
006030	606034	JMP	.+4		XDIR2100
006031	226306	LAC*	DIRTI		XDIR2110
006032	553414	SAD	BC+1	/COMPARE HIGH	XDIR2120
006033	606046	JMP	DELE3	/ MATCH	XDIR2130
006034	226302	LAC*	DIRTEM		XDIR2140
006035	326306	ADD*	DIRTI		XDIR2150
006036	446306	ISZ	DIRTI		XDIR2160
006037	446302	ISZ	DIRTEM		XDIR2170
006040	740200	SZA			XDIR2180
006041	446307	ISZ	DIRCNT	/SEARCHED AL ID'S	XDIR2190
006042	606025	JMP	DELE1	/NO	XDIR2200
006043	766320	LAW	MESS33	/YES	XDIR2210
006044	107031	JMS	MESCOM	/PRINT MESSAGE	XDIR2220
006045	626017	JMP*	DELETE		XDIR2230
006046	166302	DELE3	DZM*	DIRTEM /ZERC ID	XDIR2240
006047	166306	DZM*	DIRTI		XDIR2250
006050	225720	LAC*	DIRTWO	/GET NUMBER OF SPECTRA	XDIR2260
006051	356337	TAD	(-1)		XDIR2270
006052	065720	DAC*	DIRTWO		XDIR2280
006053	626017	JMP*	DELETE		XDIR2290
		/RDIR	HWB	PDP-9	XDIR2300
				/ROUTINE TO READ DIRECTORY FROM DEC TAPE INTO CORE.	XDIR2310
006054	000000	RDIR	0		XDIR2320
006055	750000	CLA			XDIR2330
006056	401014	XCT	JMSBLK	/ SET BLOCK NUMBER	XDIR2340
006057	042606	DAC	RDBLK		XDIR2350
006060	205717	LAC	DIRONE	/GET 1ST CORE LOCATION	XDIR2360
006061	102600	JMS	RTAPE	/READ DIRECTORY IN	XDIR2370
006062	653000	653000		/ SAVE ERROR FLAG	XDIR2380
006063	400052	XCT	XCTBKG		XDIR2390
006064	346133	TAD	DECNMA		XDIR2400
006065	046072	DAC	WTDIR		XDIR2410
006066	220215	LAC*	REEL		XDIR2420
006067	066072	DAC*	WTDIR		XDIR2430
006070	641002	LACQ			XDIR2440
006071	626054	JMP*	RDIR		XDIR2450
		/WDIR	HWB	PDP-9	XDIR2460
				/ROUTINE TO WRITE DIRECTORY FROM CORE ONTO DEC TAPE.	XDIR2470
006072	000000	WDIR	0		XDIR2480
006073	750000	CLA			XDIR2490
006074	401014	XCT	JMSBLK		XDIR2500
006075	046522	DAC	DECBK	/SET BLOCK NUMBER	XDIR2510

006076	205717	LAC	DIRONE	/1ST CORE LOCATION	XDIR2520
006077	106514	JMS	WTDEC		XDIR2530
006100	626072	JMP*	WTDIR		XDIR2540
		/REMOVE	WWB	PDP-9	XDIR2550
		/ROUTINE TO DELETE AND EXPERIMENT FROM DEC TAPE. ACCESSED BY COMMAND			XDIR2560
		/DELETE.			XDIR2570
006101	112461	REMOVE	JMS	DECIN	/GET EXPERIMENT ID
006102	104041		JMS	ADCCHK	
006103	106054		JMS	RDDIR	/GET DIRECTORY INTO CORE
006104	740200		SZA		/TAPE ERROR
006105	606257		JMP	RETC	
006106	106017		JMS	DELETE	/DELETE ID
006107	106072		JMS	WTDIR	/WRITE NEW DIRECTORY ON TAPE
006110	606257		JMP	RETC	
		/ROUTINE TO SET UP COUNTERS FOR DIRECTORY ROUTINES.			XDIR2650
006111	000000	SETCNT	0		XDIR2660
006112	225720		LAC*	DIRTWO	/GET NUMBER OF SPECTRA
006113	101766		JMS	COMPLM	/DETERMINE TWO'S COMPLEMENT
006114	045307		DAC	DIRCNT	
006115	205721		LAC	DIR3	/GET LOCATION OF FIRST ID
006116	046302		DA	DIRTEM	
006117	356427		TAD	(200)	
006120	046306		DAC	DIRT1	
006121	626111		JMP*	SETCNT	
		/INDEX	WWB	PDP-9	XDIR2750
		/ROUTINE TO LIST DEC TAPE DIRECTORY.			XDIR2760
		/ACCESSED BY COMMAND INDEX.			XDIR2770
006122	104041	INDEX	JMS	ADCCHK	XDIR2780
006123	106054		JMS	RDDIR	/READ DIRECTORY INTO CORE
006124	740200		SZA		/TAPE ERROR
006125	606257		JMP	RETC	
006126	104061		JMS	ADCGON	/TURN ADC BACK ON
006127	440061		ISZ	PFG	/PRINT REEL NUMBER
006130	112001		JMS	SETVAR	
006131	112144		JMS	QA	
006132	253040		XOR	MESS97	
006133	030040	DECNMA	DECNM		XDIR2870
006134	226133		LAC*	DECNMA	XDIR2880
006135	060215		DAC*	REEL	XDIR2890
006136	143061		DZM	PFG	XDIR2900
006137	105630		JMS	DIRECT	/PRINT DIRECTORY
006140	606257		JMP	RETC	XDIR2920
		/SEARCH	WWB	PDP-9	XDIR2930
		/ROUTINE TO SEARCH DIRECTORY FOR AN ID. ENTER WITH			XDIR2940
		/DESIRED ID IN AC. IF NO DIRECTORY OR NO SPECTRA, OR ID NOT			XDIR2950
		/ON TAPE, RETURNS WITH DIRFLG#1, OTHERWISE DIRFLG#0. IF ID			XDIR2960
		/MATCH, CALCULATES 1ST BLOCK NUMBER OF EXPERIMENT.			XDIR2970
006141	000000	SEARCH	0		XDIR2980
006142	146303		DZM	DIRFLG	/ZERO FLAG
006143	105662		JMS	DIRCK	/CHECK DIRECTORY
006144	606173		JMP	SEAR2	/NO DIRECTORY
006145	606173		JMP	SEAR2	/NO SPECTRA
006146	740000		NOP		/TAPE FULL
006147	106111		JMS	SETCNT	/ALL OK
006150	146304		DZM	DIRCT2	/ZERO BLOCK COUNTER
006151	226302	SEAR1	LAC*	DIRTEM	
006152	446304		ISZ	DIRCT2	
006153	542534		SAD	DTRE2	/COMPARE LOW
					XDIR3090

006154	741000	SKP			XDIR3100
006155	606161	JMP	.+4		XDIR3110
006156	226306	LAC*	DIRT1		XDIR3120
006157	542535	SAD	DTRE1	/ COMPARE HIGH	XDIR3130
006160	606175	JMP	SE1R3	/ MATCH	XDIR3140
006161	226302	LAC*	DIRTEM		XDIR3150
006162	326306	ADD*	DIRT1		XDIR3160
006163	446302	ISZ	DIRTEM		XDIR3170
006164	446306	ISZ	DIRT1		XDIR3180
006165	741200	SNA			XDIR3190
006166	606151	JMP	SEAR1		XDIR3200
006167	446307	ISZ	DIRCNT	/NO, LAST ID	XDIR3210
006170	606151	JMP	SEAR1	/NO	XDIR3220
006171	766320	LAW	MESS33	/YES	XDIR3230
006172	107031	JMS	MESCOM	/PRINT MESSAGE	XDIR3240
006173	446303	SEAR2	ISZ	DIRFLG	XDIR3250
006174	626141	JMP*	SEARCH		XDIR3260
006175	206304	SEAR3	LAC	DIRCT2	/COMPUTE 1ST BLOCK NUMBER
006176	401014	XCT	JMSBLK		XDIR3270
006177	046305	DAC	BLKNO		XDIR3280
006200	626141	JMP*	SEARCH		XDIR3290
		RENAME	HWB	PDP-9	XDIR3300
		/ROUTINE TO CHANGE THE ID OF AN EXPERIMENT BOTH IN THE DIRECTORY AND			XDIR3310
		/IN THE DATA.			XDIR3320
		/ACCESSED BY COMMAND RENAME.			XDIR3330
006201	112461	RENAME	JMS	DECIN	XDIR3340
006202	042534	DAC	DTRE2	/READ OLD ID	XDIR3350
006203	213414	LAC	BC+1	/ LOW	XDIR3360
006204	042535	DAC	DTRE1	/ HIGH	XDIR3370
006205	112461	JMS	DECIN	/READ NEW ID	XDIR3380
006206	201135	LAC	UNIT		XDIR3390
006207	741200	SNA			XDIR3400
006210	606746	JMP	QMARK	/ CAN'T RENAME ON MAG	XDIR3410
006211	104041	JMS	ADCCHK		XDIR3420
006212	106054	JMS	RDDIR	/READ DIRECTORY INTO CORE	XDIR3430
006213	740200	SZA		/TAPE ERROR	XDIR3440
006214	606257	JMP	RETC		XDIR3450
006215	106141	JMS	SEARCH	/FIND ID IN DIRECTORY	XDIR3460
006216	206303	LAC	DIRFLG		XDIR3470
006217	740200	SZA		/FIND ID	XDIR3480
006220	606257	JMP	RETC	/NO	XDIR3490
006221	106111	JMS	SETCNT	/YES, SET COUNTERS	XDIR3500
006222	206302	LAC	DIRTEM	/DETERMINE ADDRESS OF ID	XDIR3510
006223	346304	TAD	DIRCT2		XDIR3520
006224	356337	TAD	(-1)		XDIR3530
006225	046302	DAC	DIRTEM		XDIR3540
006226	206306	LAC	DIRT1		XDIR3550
006227	346304	TAD	DIRCT2		XDIR3560
006230	356337	TAD	(-1)		XDIR3570
006231	046306	DAC	DIRT1		XDIR3580
006232	213414	LAC	BC+1		XDIR3590
006233	313415	ADD	BC+2		XDIR3600
006234	741200	SNA			XDIR3610
006235	606746	JMP	QMARK		XDIR3620
006236	213415	LAC	BC+2	/ LOW	XDIR3630
006237	066302	DAC*	DIRTEM	/ CHANGE DIRECTORY	XDIR3640
006240	213414	LAC	BC+1	/ HIGH	XDIR3650
006241	066306	DAC*	DIRT1		XDIR3660
					XDIR3670

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006242 106072 JMS WTDIR /WRITE NEW DIRECTORY XDIR3680
006243 206305 LAC BLKNO XDIR3690
006244 042606 DAC RDBLK XDIR3700
006245 205717 LAC DIRONE XDIR3710
006246 102600 JMS RTAPE /READ DATA WITH ID INTO CORE XDIR3720
006247 213415 LAC BC+2 XDIR3730
006250 065717 DAC* DIRONE XDIR3740
006251 213414 LAC BC+1 XDIR3750
006252 065722 DAC* DIRHIE XDIR3760
006253 206305 LAC BLKNO XDIR3770
006254 046522 DAC DECBLK XDIR3780
006255 205717 LAC DIRONE XDIR3790
006256 106514 JMS WTDEC /WRITE DATA WITH ID ONTO TAPE XDIR3800
/GIVE CRLF THEN GO TO RET XDIR3820
RETC JMS ADCGON XDIR3830
JMS CRLF XDIR3840
JMP CMRET XDIR3850
/BLKCAL HWB PDP-9 XDIR3860
/ROUTINE TO CALCULATE THE STARTING BLOCK NUMBER OF A PIECE OF XDIR3870
/ DATA GIVEN THE SLOT NUMBER OF THE DATA IN THE DIRECTORY. ENTER XDIR3880
/ WITH THE SLOT NUMBER IN THE AC. RETURNS WITH THE BLOCK NUMBER XDIR3890
/ IN THE AC. XDIR3900
BLKCAL 0 XDIR3910
TAD (-1) /ENTRY SLOT MINUS ONE XDIR3920
CLL XDIR3930
MUL /MULTIPLY BY XDIR3940
45 /NUMBER OF BLOCKS PER ENTRY XDIR3950
LACQ /GET ANSWER XDIR3960
TAD (2) /ALLOW FOR DIRECTORY XDIR3970
SPA XDIR3980
LAC (1) XDIR3990
JMP* BLKCAL XDIR4000
/ BLKCAL FOR DISK XDIR4010
OKBLK 0 XDIR4020
JMS BLKCAL XDIR4030
TAD (550) / INDEX IS IN 551. XDIR4040
JMP* OKBLK XDIR4050
DILoop 0 XDIR4060
CKSLot 0 XDIR4070
DIRTEM 0 XDIR4080
DIRFLG 0 XDIR4090
DIRCT2 0 XDIR4100
BLKNO 0 XDIR4110
DIRT1 0 XDIR4130
DIRCNT 0 XDIR4140
/MESSAGES FOR THE DEC TAPE DIRECTORY ROUTINES. XDIR4150
MESS14 240120 /TAP XDIR4160
054006 /E F XDIR4170
251414 /ULL XDIR4180
0 /END XDIR4190
MESS24 053020 /EXP XDIR4200
052211 /ERI XDIR4210
150516 /MEN XDIR4220
06317 247200 / T XDIR4230
MESS33 161724 /NOT XDIR4240
400617 / FO XDIR4250
06322 251604 /UND XDIR4260
06323 000000 0 XDIR4270

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006324	161740	MESS34	161740	/NO		XDIR4280
006325	041122		041122	/DIR		XDIR4290
006326	050324		050324	/ECT		XDIR4300
006327	172231		172231	/ORY		XDIR4310
006330	000000		0	/END		XDIR4320
006331	042501	MESS43	042501	/ DUA		XDIR4330
006332	144011		144011	/L 1		XDIR4340
006333	044100		044100	/DI		XDIR4350
006334	172524	MESS45	172524	/OUT		XDIR4360
006335	202524		202524	/PUT		XDIR4370
006336	400417		400417	/ DO		XDIR4380
006337	160500		160500	/ NE		XDIR4390
006340	111414	MESS46	111414	/ILL		XDIR4400
006341	050701		050701	/EGA		XDIR4410
006342	144011		144011	/L 1		XDIR4420
006343	045600		045600	/D.		XDIR4430
						XDIR4440
						XDIR4450
						XDIR4460
						XDIR4470
						XDIR4480
						XDIR4490
						XDIR4500
						XDIR4510
						XDIR4520
						XDIR4530
						XDIR4540
						XDIR4550
						XDIR4560
						XDIR4570
						XDIR4580
						XDIR4590
						XDIR4600
						XDIR4610
						XDIR4620
						XDIR4630
						XDIR4640
						XDIR4650
						XDIR4660
						XDIR4670
						XDIR4680
						XDIR4690
						XDIR4700
						XDIR4710
						XDIR4720
						XDIR4730
						XDIR4740
						XDIR4750
						XDIR4760
						XDIR4770
						XDIR4780
						XDIR4790
						XDIR4800
						XDIR4810
						XDIR4820
						XDIR4830
						XDIR4840
						XDIR4850

/SUBROUTINE TO PREFORM AUTOMATIC
 /SEARCH AND TRANSFER OF DATA ON
 /DECTAPE. THIS ROUTINE IS CALLED BY EITHER
 /DECTRD FOR READING OR DECTWT FOR WRITING

DECTRW	0		
LAC	DECTRW		
TAD	(3)		
DAC	DECARG	/ ARGUMENT POINTER	
TAD	(2)		
DAC	DECRET	/ RETURN ADDRESS	
LAC	ADECBK		
DAC	31	/LOCATE CURRENT BLOCK	
DLM	30	/INSURE NO WC OVERFLOW	
LAC*	DECTRW		
SNA		/ SKIP IF ARG CONTAINS UNIT.	
LAC	UNIT	/ SEARCH UNIT IN REVERSE DIRECTION	
ALSS	17		
TAD	(041400)		
DTLA		/SET STATUS TO SEARCH. MN. STOP	
LAC	(020000)	/GIVE GO COMMAND	
SKP		/SKIP CONTINUE COMMAND	
DECT1	CLA		
JMS	DECCMD		
LAC*	DECARG	/SUBTRACT DESIRED BLOCK	
CMA		/NUMBER FROM CURRENT BLOCK	
TAD	(2)		
TAD	DECCBK		
SMA			
JMP	DECT1	/CONTINUE TAPE IN REVERSE	
LAC	(040000)	/SEARCH IN FORWARD DIRECTION	
JMS	DECCMD		
DECT2	LAC*	DECARG	/CALCULATE POSITION
CMA			
TAD	(1)		
TAD	DECCBK		
SNA			
JMP	DECT3	/READY TO READ OR WRITE	
SMA			
JMP	DECT1	/GO TO ERROR ROUTINE	
DAC	30	/SET WORD COUNT FOR	
LAC	(010000)	/CONTINUOUS MODE SEARCH	
JMS	DECCMD		

006412	606377		JMP	DECT2			XDIR4860
006413	446344	DECT3	ISZ	DECTRW			XDIR4870
006414	226344		LAC*	DECTRW			XDIR4880
006415	040030		DAC	30	/ WC		XDIR4890
006416	446344		ISZ	DECTRW			XDIR4900
006417	750001		CLC				XDIR4910
006420	366344		TAD*	DECTRW			XDIR4920
006421	040031		DAC	31	/ CA-1		XDIR4930
006422	446310		ISZ	DECARG			XDIR4940
006423	226510		LAC*	DECARG			XDIR4950
006424	660711		ALSS	11	/ READ OR WRITE		XDIR4960
006425	106436		JMS	DECCMD			XDIR4970
006426	200030		LAC	30	/IS WC ZERO		XDIR4980
006427	750200		SZAICLA				XDIR4990
006430	606425		JMP	.-3	/NO - GIVE COMMAND AGAIN		XDIR5000
006431	216453		LAC	(020000)	/YES - STOP UNIT		XDIR5010
006432	707544		DTXA				XDIR5020
006433	700052		ION+10				XDIR5030
006434	626513		JMP*	DECRET	/ RETURN		XDIR5040
006435	006511	ADECBK	DECCBK		/ADDRESS OF BLOCK NUMBER		XDIR5050
006436	000000	DECCMD	0				XDIR5060
006437	707544		DTYA				XDIR5070
006440	607436		JMP	RET			XDIR5080
006441	707561	DECSEV	DTEF		/ ERROR FLAG UP?		XDIR5090
006442	626436		JMP*	DECCMD	/NO		XDIR5100
006443	707572		DTRB		/YES		XDIR5110
006444	556455		SAD	(500000)	/IS ERROR DUE TO END OF TAPE		XDIR5120
006445	606473		JMP	DECR2	/YES		XDIR5130
006446	556456		SAD	(420000)	/NO-IS ERROR PARITY		XDIR5140
006447	445512		ISZ	DECPY	/YES-ADD ONE TO COUNTER		XDIR5150
006450	556456		SAD	(420000)			XDIR5160
006451	626436		JMP*	DECCMD	/AND RETURN		XDIR5170
006452	107077	DECR1	JMS	PRIOF			XDIR5180
006453	304252		304252	/ *D			XDIR5190
006454	303305		303305	/EC			XDIR5200
006455	324240		324240	/T			XDIR5210
006456	305240		305240	/E			XDIR5220
006457	322322		322322	/RR			XDIR5230
006460	322317		322317	/OR			XDIR5240
006461	640252		640252	/ *			XDIR5250
006462	707572		DTRB				XDIR5260
006463	106526		JMS	OCTOUT			XDIR5270
006464	107077		JMS	PRIOF			XDIR5280
006465	640240		640240				XDIR5290
006466	216333		LAC	(400)			XDIR5300
006467	707544		DTXA				XDIR5310
006470	777777		LAW	-1	/-1 IN AC INDICATES ERROR		XDIR5320
006471	700042		ION				XDIR5330
006472	626513		JMP*	DECRET			XDIR5340
006473	707552	DECR2	DTRA		/FRONT END OF TAPE		XDIR5350
006474	516343		AND	(040000)			XDIR5360
006475	751200		SNAICLA				XDIR5370
006476	606452		JMP	DECR1	/NO-STOP TAPE OPERATION		XDIR5380
006477	216453		LAC	(020000)			XDIR5390
006500	446507		ISZ	ENDZCT	/COUNT TO BACK INTO END ZONE TWICE		XDIR5400
006501	106436		JMS	DECCMD			XDIR5410
006502	777776		LAW	-2			XDIR5420
006503	046507		DAC	ENDZCT			XDIR5430

006504	216342	LAC	(060000)	/SEARCH IN FORWARD DIRECTION	XDIR5440
006505	106436	JMS	DECCMD		XDIR5450
006506	606377	JMP	DECT2		XDIR5460
006507	777776	ENDZCT	-2		XDIR5470
006510	000000	DECARG	0	/POINTER FOR ARGUMENT AND RETURN ADDRESS	XDIR5480
006511	000000	DECCBK	0	/HOLDS CURRENT BLOCK NUMBER	XDIR5490
006512	000000	DECPTY	0	/PARITY ERROR FLAG	XDIR5500
006513	000000	DECRET	0	/HOLDS RETURN ADDRESS	XDIR5510
				/CHR PDP9 1969	XDIR5520
				/SUBROUTINE FOR WRITING A 256 WORD BLOCK ON DECTAPE	XDIR5530
				/CALLING SEQUENCE	XDIR5540
		/	JMS	WTDEC	XDIR5550
		/	X	/CORE LOCATION	XDIR5560
		/		/RETURN	XDIR5570
				/TAPE BLOCK NUMBER MUST BE IN DECBLK	XDIR5580
				/DECBLK IS INCREMENTED BY ONE	XDIR5590
006514	000000	WTDEC	0		XDIR5600
006515	046521	DAC	.+4		XDIR5610
006516	401013	XCT	JMS10		XDIR5620
006517	000000		0		XDIR5630
006520	777400		-400	/WC	XDIR5640
006521	000000		0	/CA	XDIR5650
006522	000000	DECBLK	0	/BLK #	XDIR5660
006523	000005		5	/WRITE	XDIR5670
006524	446522	ISZ	DECBLK		XDIR5680
006525	626514	JMP*	WTDEC		XDIR5690
		/CHR	PDP9	SEP 1968	X1010000
				/SUBROUTINE TO PRINT 6 DIGIT OCTAL NUMBER	X1010010
				/ENTER WITH NUMBER IN ACCUMULATOR	X1010020
006526	000000	OCTOUT	0		X1010030
006527	652000	LMO			X1010040
006530	777772	LAW	-6		X1010050
006531	046543	DAC	OCTN	/SET COUNTER	X1010060
006532	641603	OCT1	641603	/CLAILLS 3	X1010070
006533	356457	TAD	(260)		X1010080
006534	700406	TLS			X1010090
006535	700401	TSF			X1010100
006536	606535	JMP	-1		X1010110
006537	700402	TCF			X1010120
006540	446543	ISZ	OCTN	/DONE	X1010130
006541	606532	JMP	OCT1	/NO	X1010140
006542	626526	JMP*	OCTOUT	/YES	X1010150
006543	000000	OCTN	0		X1010160
				/A ROUTINE TO PRINT MULTIPLE SPACES.	X1010170
006544	000000	MULTSP	0		X1010180
006545	046553	DAC	MSPC		X1010190
006546	760240	LAW	240		X1010200
006547	106752	JMS	PRINT		X1010210
006550	446553	ISZ	MSPC		X1010220
006551	606546	JMP	.-3		X1010230
006552	626544	JMP*	MULTSP		X1010240
006553	000000	MSPC	0		X1010250
				/CHR+PDP9+JAN+1968	X1010260
				/SUBROUTINE TO PRINT A DOUBLE PRESSION	X1010270
				/DECIMAL NUMBER. ENTER WITH LOW ORDER	X1010280
				/BITS IN AC AND HIGH ORDER BITS IN HIGHPR	X1010290
				/LINK=1 NEG. NUMBER	X1010300
				/LINK=0 POS. NUMBER	X1010310

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006554	000000	/HIGHPR WILL BE SET TO ZERO AT END.		X1010320
006555	046564	DECPR? 0		X1010330
006556	740400	DAC .+7	/SAVE AC	X1010340
006557	606563	SNL	/NEGATIVE?	X1010350
006560	760255	JMP .+4	/NO	X1010360
006561	106752	LAW 255	/YES. PRINT -	X1010370
006562	236564	JMS PRINT		X1010380
006563	106571	LAC .+2		X1010390
006564	000000	JMS DECCON		X1010400
006565	743200	0		X1010410
006566	626564	SNAICLL	/FINISHED?	X1010420
006567	106752	JMP* DECPRT	/YES	X1010430
006570	626564	JMS PRINT	/NO PRINT ON TELETYPE	X1010440
		JMP* -4		X1010450
		/CHR PDP9 JAN 1968		X1010460
		/SUBROUTINE TO CONVERT A DOUBLE		X1010470
		/PRESSION BINARY NUMBER TO DECIMAL		X1010480
		/ENTER WITH LOW ORDER BITS IN AC		X1010490
		/AND HIGH ORDER BITS IN HIGHPR		X1010500
		/HIGHPR WILL BE SET TO ZERO AT END.		X1010510
		/CALLING SEQUENCE.		X1010520
		/LOW ORDER BITS IN AC		X1010530
		/TAG. JMS DECCON	/HIGH ORDER BITS AN HIGHPR	X1010540
		/	ADDRESS OF RETURN LOCATION FOR NEXT DIGIT	X1010550
		/	RETURNS HERE WITH ASCII	X1010560
		/	DECIMAL DIGIT IN AC	X1010570
		/	TO GET NEXT DIGIT DO A JMP I TAG&I.	X1010580
		/	THE AC IS ZERO ON RETURN AFTER LAST DIGIT	X1010590
006571	000000	DECCON 0		X1010600
006572	046711	DAC LOWPR	/SAVE LOW ORDER BITS	X1010610
006573	750000	CLA		X1010620
006574	546712	SAD HIGHPR	/ARE THERE ANY HIGH ORDER BITS	X1010630
006575	606505	JMP DEC1	/NO	X1010640
006576	206661	LAC APOWL	/YES	X1010650
006577	046721	DAC TENL	/SET POINTERS FOR	X1010660
006600	206662	LAC APOWH	/POWERS OF TEN	X1010670
006601	046720	DAC TENH		X1010680
006602	777765	LAW -13	/COUNT 13 DIGITS	X1010690
006603	046713	DAC DIGCTN		X1010700
006604	606613	JMP DEC2		X1010710
006605	206657	LAC APOWLS		X1010720
006606	046721	DAC TENL	/FOR PRINTING LOW BITS ONLY	X1010730
006607	206660	LAC APOWHS		X1010740
006610	046720	DAC TENH		X1010750
006611	777772	LAW -6		X1010760
006612	046713	DAC DIGCTN		X1010770
006613	266713	LAC DIGCTN		X1010780
006614	556337	SAD (777777)		X1010790
006615	146717	DZM DPZRO		X1010800
006616	146716	DZM DIGIT		X1010810
006617	146714	DZM PROVER		X1010820
006620	744000	CLL		X1010830
006621	206711	LAC LOWPR	/ADD LOWER BITS	X1010840
006622	366721	TAD* TENL		X1010850
006623	745400	SZL CLL	/HAS THERE AN OVER FLOW	X1010860
006624	446714	ISZ PROVER	/YES	X1010870
006625	046715	DAC PRTEM	/STORE TEMPORARLY	X1010880
006626	206712	LAC HIGHPR	/ADD HIGH ORDER BITS	X1010890

006627	366720		TAD*	TENH		X1010900
006630	348714		TAD	PROVER	/ADD OVERFLOW FROM LOW BITS	X1010910
006631	741400		SZL		/IS RESULT NEGITIVE	X1010920
006632	606652		JMP	DECH	/NO	X1010930
006633	206710		LAC	DIGIT	/YES-PRINT OUT DIGIT	X1010940
006634	748200		SZA		/THIS TAKES CARE OF	X1010950
006635	148717		DZM	DPZRO	/SUPPRESSING LEADING ZEROS	X1010960
006636	348717		TAD	DPZRO		X1010970
006637	356457		TAD	(260)	/CONVERT TO ASCII	X1010980
006640	126571		JMS*	DECCON		X1010990
006641	446721		ISZ	TENL	/SET POINTERS TO NEXT	X1011000
006642	446720		ISZ	TENH	/POWER OF TEN	X1011010
006643	446713		ISZ	DIOCTM	/MORE DIGITS	X1011020
006644	606613		JMP	DEC2	/YES	X1011030
006645	777760		LAM	-20	/NO-RESTORE AND RETURN	X1011040
006646	046717		DAC	DPZRO		X1011050
006647	146712		DZM	HIGHPR		X1011060
006650	750000		CLA		/TO INDICATE END	X1011070
006651	126571		JMS*	DECCON		X1011080
006652	046712	DEC4	DAC	HIGHPR	/STORE SUBTRACTED RESULTS	X1011090
006653	206715		LAC	PRTEM	/FOR NEXT SUBTRACTION	X1011100
006654	046711		DAC	LOWPR		X1011110
006655	446716		ISZ	DIGIT	/ADD ONE TO DIGIT	X1011120
006656	606617		JMP	DEC3		X1011130
006657	006670	APOMLS	POMLS			X1011140
006660	006703	APOMYS	POMYS			X1011150
006661	006663	APOML	POML			X1011160
006662	006676	APOMH	POMH			X1011170
006663	016000	POML	-782000		/LOW ORDER BITS OF 10 TO THE 10TH	X1011180
006664	233000		-545000		/10 TO THE 9TH	X1011190
006665	417400		-360400		/8TH	X1011200
006666	654600		-113200		/7TH	X1011210
006667	136700		-641100		/6TH	X1011220
006670	474540	POMLS	-303240		/5TH	X1011230
006671	754360		-23420		/4TH	X1011240
006672	776030		-1750		/3RD	X1011250
006673	777634		-144		/2ND	X1011260
006674	777766		-12		/1ST	X1011270
006675	777777		-1		/ZERO	X1011280
006676	665375	POMH	-1-112402		/HIGH ORDER BITS OF 10 TO THE 10TH	X1011290
006677	770431		-1-7346		/9TH	X1011300
006700	777202		-1-575		/8TH	X1011310
006701	777731		-1-46		/7TH	X1011320
006702	777774		-1-3		/6TH	X1011330
006703	777777	POMYS	777777		/5TH	X1011340
006704	777777		777777		/4TH	X1011350
006705	777777		777777		/3RD	X1011360
006706	777777		777777		/2ND	X1011370
006707	777777		777777		/1ST	X1011380
006710	777777		777777		/ZERO	X1011390
006711	000000	LOWPR	0			X1011400
006712	000000	HIGHPR	0			X1011410
006713	000000	DIOCTM	0			X1011420
006714	000000	PROVER	0			X1011430
006715	000000	PRTEM	0			X1011440
006716	000000	DIGIT	0			X1011450
006717	777760	DPZRO	-20			X1011460
006720	000000	TENH	0			X1011470

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006721 000000 TENL 0
006722 000000 T56 0
006723 000000 T57 0
006724 000000 CTN6 0
006725 000000 ;SI 0
006726 000000 NULLS 0
006727 777771 LAW -7
006730 046736 DAC .*6
006731 750000 CLA / PRINT NULLS FOR CHARS
006732 106752 JMS PRINT / WHICH NEED A DELAY.
006733 446736 ISZ +3
006734 606731 JMP .-3
006735 626726 JMP* NULLS
006736 000000 0
006737 000000 CRLF 0
006740 760215 LAW 215
006741 106752 JMS PRINT
006742 106726 JMS NULLS
006743 760212 LAW 212
006744 106752 JMS PRINT
006745 626737 JMP* CRLF
006746 760277 QMARK LAW 277
006747 106752 JMS PRINT / PRINT *?
006750 104061 JMS ADCGON
006751 605055 JMP PANRET

/Routine to print one character.
/Jump to this routine with the
/ASCII character in the AC.
/Modified by CHR SEP 1967
006752 000000 PRINT 0
006753 700406 T5S
006754 641002 LACQ /SAVE MQ
006755 040005 DAC MQ
006756 607436 JMP RET
006757 700402 PRINTR TCF
006760 200005 LAC MQ /REPLACE MQ
006761 652000 LMQ
006762 216315 LAC 111 /IS THERE AN OUTPUT FLAG
006763 540006 SAD STPOUT
006764 607404 JMP INCON /YES
006765 700042 ION /NO
006766 626752 JMP* PRINT
006767 207126 PONOFF LAC POTTY1+1 / TELETYPE ON-OFF FLIP FLOP
006770 546753 SAD PRINT+1
006771 206766 LAC PRINTR*7
006772 046753 OAC PRINT+1
006773 605055 JMP PANRET

/Routine to print messages for PDP 9
/ENTER WITH ADDRESS OF MESSAGE TO BE PRINTED IN AC.
/TO PACK, STRIP OFF FIRST OCTAL DIGIT OF ASCII CODE.
/76 GIVES CRLF 00 MEANS END OF MESSAGE
006774 000000 MESSAGE 0
006775 51646C AND 177771
006776 107000 JMS MESAG
006777 626774 JMP* MESAG
007000 000000 MESAG 0
007001 516420 AND 137777
007002 047027 DAC FINGER

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007003	777779	MES1	LAW	-3			X1012030
007004	047030		DAC	MESCTN			X1012040
007005	227027		LAC*	FINGER			X1012050
007006	652000		652000		/NO, LOAD HQ, LMO		X1012060
007007	641506	MES2	641606		/CLAILLS 6		X1012070
007010	741200		SNA		/ZERO TERMINATES		X1012080
007011	627000		JMP*	MESAG			X1012090
007012	556355		SAD	(76)			X1012100
007013	607025		JMP	MES4			X1012110
007014	355461		TAD	(-40)	/NO, MAKE ASCII		X1012120
007015	741100		SPA		/ADD 200		X1012130
007016	356316		TAD	(100)	/NO, 300		X1012140
007017	356462		TAD	(240)	/YES		X1012150
007020	106752		JMS	PRINT			X1012160
007021	447030		ISZ	MESCTN			X1012170
007022	607007		JMP	MES2	/NO		X1012180
007023	447027	MES3	ISZ	FINGER	/YES		X1012190
007024	607003		JMP	MES1			X1012200
007025	106737	MES4	JMS	CRLF			X1012210
007026	607021		JMP	MES3-2			X1012220
007027	000000	FINGER	0				X1012230
007030	000000	MESCTN	0				X1012240
		/MESCOM	HWB	PDP-9			X1012250
					/ROUTINE TO PRINT A MESSAGE WITH A CRLF BEFORE AND AFTER THE		X1012260
					/MESSAGE. ENTER WITH THE MESSAGE NUMBER IN THE AC.		X1012270
		MESCOM	0				X1012280
007031	000000		DAC	MESTEM			X1012290
007032	040243		JMS	CRLF			X1012300
007033	106737		LAC	MESTEM			X1012310
007034	200243		JMS	MESSAGE			X1012320
007035	106774		JMS	CRLF			X1012330
007036	106737		JMS	CRLF			X1012340
007037	627031		JMP*	MESCOM			X1012350
007040	000000	MESSW	0				X1012360
007041	000000	MESSW1	0				X1012370
007042	440061		ISZ	PFQ			X1012380
007043	107045		JMS	EXPIDP			X1012390
007044	605055		JMP	PANRET			X1012400
007045	000000	EXPIDP	0				X1012410
007046	112001		JMS	SETVAR			X1012420
007047	400052		XCT	XCTBKG			X1012430
007050	356363		TAD	(EXPIDH)			X1012440
007051	047040		DAC	MESSW	/ EXPIDH		X1012450
007052	356354		TAD	(40)			X1012460
007053	047041		DAC	MESSW1	/ EXPIDF		X1012470
007054	227040		LAC*	MESSW	/ GET HIGH ORDER EXPID		X1012480
007055	046712		DAC	HIGHPR			X1012490
007056	140062		DZM	AINF			X1012500
007057	112144		JMS	QA			X1012510
007060	246314		XOR	MESS24			X1012520
007061	030000		EXPID				X1012530
007062	200062		LAC	AINF			X1012540
007063	741200		SNA		/ ANY INPUT?		X1012550
007064	607070		JMP	+4	/ NO		X1012560
007065	213414		LAC	BC+1			X1012570
007066	067040		DAC*	MESSW			X1012580
007067	067041		DAC*	MESSW1			X1012590
007070	140061		DZM	PFQ			X1012600
007071	627045		JMP*	EXPIDP			X1012610

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007072 000000 /LACI CHR PDP9
007073 047076 /SUBROUTINE TO REPLACE THE AC WITH THE CONTENTS OF THE
007074 227076 /ADDRESS IN THE AC UPON ENTRY.
007075 627072 LACI 0
007076 000000 DAC +3
LAC* +2
JMP* LACI
0 /STORAGE FOR LACI
/SUBROUTINE TO PRINT ON TELETYPE WITH
/INTERRUPT TURNED OFF. USED IN PRINTING
/ CRITICAL PANEL CHANGES AND DETAPE AND MAGTAPE ERRORS
007077 000000 PRIOF 0
007100 700002 IOF
007101 700402 TCF
007102 216463 LAC (212215) /PRINT CRLF
007103 107115 JMS POTTY
007104 227077 LAC* PRIOF
007105 107115 JMS POTTY
007106 447077 ISZ PRIOF
007107 740400 SNL /FINISHED
007110 607104 JMP -4 /NO
007111 216463 LAC (212215)
007112 107115 JMS POTTY
007113 700402 TCF
007114 627077 JMP* PRIOF
007115 000000 POTTY 0
007116 107125 JMS POTTY1 /PRINT LOW ORDER CHARACTER
007117 744000 CLL
007120 640511 LRS+11
007121 107125 JMS POTTY1 /PRINT HIGH ORDER CHARACTER
007122 640510 LRS+10
007123 740020 RAR
007124 627115 JMP* POTTY /PUT LAST BIT IN LINK TO
007125 000000 POTTY1 0 /TEST FOR END
007126 700406 TLS
007127 700401 TSF
007130 607127 JMP -1
007131 627125 JMP* POTTY1
/COMMAND TO PRINT A SPECTRUM
/CORE ADDRESS IS TAKEN FROM DISOME AND
/THE NUMBER OF CHANNELS FROM NOCD
007132 207660 SPECPT LAC DISADD /CALCULATE CHANNEL NUMBER
007133 116064 JMS INCHAN / 50507
007134 356315 TAD (1) / YES
007135 046722 DAC TS6
007136 350407 TAD DISOME
007137 116064 JMS INCHAN / 50507
007140 386337 TAD (-1) / YES
007141 046723 DAC TS7
007142 210344 LAC NOCD /NUMBER OF CHANNELS
007143 740001 CHA /TAKE ONES COMPLEMENT
007144 046724 DAC CTN6 /OF AMOUNT TO BE PRINTED
007145 216464 LAC (111)
007146 047403 DAC NPLINE
007147 107164 JMS PAGES
007150 206722 LAC TS6
007151 107171 JMS LINE /PRINT ONE NUMBER
007152 607155 JMP PAG02 /GET NEXT NUMBER

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X1012610
X1012620
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X1012800
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X1012990
X1013000
X1013010
X1013020
X1013030
X1013040
X1013050
X1013060
X1013070
X1013080
X1013090
X1013100
X1013110
X1013120
X1013130
X1013140
X1013150
X1013160
X1013170
X1013180

007153	206722	LAC	T56	/LINE IS FULL PRINT CHANNEL	X1013190
007154	607151	JMP	PAGO1	/NUMBER AT FIRST OF LINE	X1013200
007155	446722	PAGO2	ISZ		X1013210
007156	226723	LAC*	T57		X1013220
007157	446723	ISZ	T57		X1013230
007160	446724	ISZ	CTN6		X1013240
007161	607151	JMP	PAGO1		X1013250
007162	107164	JMS	PAGES	/FINISH SPACING PAGE	X1013260
007163	606257	JMP	RETC		X1013270
007164	000000	PAGES	0		X1013280
007165	447171	ISZ	LINE		X1013290
007166	147402	DZH	LINPOS	/ZERO LINE POSITION	X1013300
007167	106737	JMS	CRLF		X1013310
007170	627164	JMP*	PAGES		X1013320
		/CWR	PDP-9	AUGUST 1967	X1013330
007171	000000	LINE	0		X1013340
007172	744000	CLL			X1013350
007173	113476	JMS	STRPCH	/SKIP IF NOT IN STRIP.	X1013360
007174	112274	JMS	SCIA		X1013370
007175	106554	JMS	DECPRT	/PRINT INPUT NUMBER	X1013380
007176	777777	LAW	-1		X1013390
007177	106544	JMS	MULTSP		X1013400
007200	447402	ISZ	LINPOS		X1013410
007201	207402	LAC	LINPOS	/IS LINE POSITION EQUAL TO	X1013420
007202	547403	SAD	NPLINE	/NUMBER PER LINE	X1013430
007203	107164	JMS	PAGES	/YES - GET A CRLF	X1013440
007204	627171	JMP*	LINE	/NO	X1013450
		/PUNCH	CWR	PDP9 SEP 1967	X1013460
		/ROUTINE TO PUNCH A		SPECTRUM FOR SINGLE	X1013470
		PUNOUT	LAC	BKDFLG	X1013480
007205	200051	SZA			X1013490
007206	740200	JMP	.+6		X1013500
007207	607215	LAC	(310000)		X1013510
007210	216417	GAC*	SETU*5	/PTFG	X1013520
007211	072027	JMP	.+3		X1013530
007212	607215	LAC	(310000)		X1013540
007213	216417	DAC*	(PTFG*400)		X1013550
007214	076465	JMS	PUNLEA	/PUNCH LEADER	X1013560
007215	107306	LAC	PUNSTA	/PUNCH START OF TAPE CHARACTERS	X1013570
007216	207340	JMS	PUNSS		X1013580
007217	107276	LAC	MNOCD		X1013590
007220	207657	DAC	PUNCT1	/COUNT NUMBER OF CHANNELS	X1013600
007221	047401	LAC	DISADD		X1013610
007222	207660	JMS	INCHAN	/ 50507	X1013620
007223	116064	TAD	(1)	/ YES	X1013630
007224	356315	DAC	PUNTS	/CHANNEL POINTER	X1013640
007225	047377	TAD	DISONE		X1013650
007226	350407	JMS	INCHAN	/ 50507	X1013660
007227	116064	TAD	(-1)	/ YES	X1013670
007230	356337	DAC	PUNTS2	/CHANNEL CONTENT POINTER	X1013680
007231	047400	LAW	-10		X1013690
007232	777770	DAC	PUNCT2	/COUNT NUMBER ON LINE	X1013700
007233	047376	DZH	DPZRO	/CLEAR LEADING ZERO SUPPRESSION	X1013710
007234	146717	LAW	-3		X1013720
007235	777775	DAC	PUNCT3		X1013730
007236	047374	LAC	PUNTS	/PUNCH CHANNEL NUMBER	X1013740
007237	207377	JMS	DECCON		X1013750
007240	106571				X1013760
007241	000000	PUNSH3	0	/CONTAINS RETURN ADDRESS TO DECCON	X1013760

007242	447374		ISZ	PUNCT3	/SKIP FIRST THREE DIGITS	X1013770
007243	627241		JMP*	PUNSH3	/RETURN FOR NEXT DIGIT	X1013780
007244	741200		SNA			X1013790
007245	607252		JMP	PUN2	/ALL DONE	X1013800
007246	107316		JMS	PUNSH2		X1013810
007247	750001		CLC			X1013820
007250	047374		DAC	PUNCT3		X1013830
007251	627241		JMP*	PUNSH3	/RETURN FOR NEXT DIGIT	X1013840
007252	760040	PUN2	LAW	40	/PUNCH SPACE	X1013850
007253	107347		JMS	PUNSH		X1013860
007254	227400		LAC*	PUNTS2		X1013870
007255	107364		JMS	PUNDEC		X1013880
007256	447401		ISZ	PUNCT1	/LAST CHANNEL	X1013890
007257	741000		SKP		/NO	X1013900
007260	607272		JMP	PUN3	/YES	X1013910
007261	447377		ISZ	PUNTS		X1013920
007262	447400		ISZ	PUNTS2		X1013930
007263	447376		ISZ	PUNCT2		X1013940
007264	607252		JMP	PUN2		X1013950
007265	760015		LAW	15	/PUNCH CR	X1013960
007266	107347		JMS	PUNSH		X1013970
007267	760212		LAW	212	/PUNCH LF	X1013980
007270	107347		JMS	PUNSH		X1013990
007271	607232		JMP	PUN1		X1014000
007272	207344	PUN3	LAC	PUNSTO	/PUNCH STOP OF TAPE CHARACTERS	X1014010
007273	107276		JMS	PUNSS		X1014020
007274	107306		JMS	PUNLEA	/PUNCH LEADER	X1014030
007275	606257		JMP	RET		X1014040
007276	000000	PUNSS	0		/SUBROUTINE TO	X1014050
007277	047377		DAC	PUNTS	/PUNCH START CHARACTERS	X1014060
007300	227377		LAC*	PUNYS		X1014070
007301	741100		SPA			X1014080
007302	627276		JMP*	PUNSS		X1014090
007303	107347		JMS	PUNSH		X1014100
007304	447377		ISZ	PUNTS		X1014110
007305	607300		JMP	PUNSS+2		X1014120
007306	000000	PUNLEA	0		/SUBROUTINE TO	X1014130
007307	777700		LAW	-100	/PUNCH LEADER	X1014140
007310	047401		DAC	PUNCT1		X1014150
007311	760200		LAW	200		X1014160
007312	107347		JMS	PUNSH		X1014170
007313	447401		ISZ	PUNCT1		X1014180
007314	607311		JMP	-3		X1014190
007315	627306		JMP*	PUNLEA		X1014200
007316	000000	PUNSH2	0		/SUBROUTINE TO	X1014210
007317	356466		TAD	1-2601		X1014220
007320	347325		TAD	PUNTAB	/LOCATE TABLE CODE	X1014230
007321	047375		DAC	PUNTS3	/FOR CHARACTER	X1014240
007322	227375		LAC*	PUNTS3		X1014250
007323	107347		JMS	PUNSH		X1014260
007324	627316		JMP*	PUNSH2		X1014270
007325	007326	PUNTAB	+1		/DATA CHARACTERS	X1014280
007326	000260		260		/0	X1014290
007327	000061		61		/1	X1014300
007330	000062		62		/2	X1014310
007331	000263		263		/3	X1014320
007332	000064		64		/4	X1014330
007333	000265		265		/5	X1014340

007334	000266		256		/6	X1014350
007335	000067		67		/7	X1014360
007336	000070		70		/8	X1014370
007337	000271		271		/9	X1014380
007340	007341	PUNSTA	.+1			X1014390
007341	000015		15		/CR	X1014400
007342	000212		212		/LF	X1014410
007343	777777		777777		/END OF LIST	X1014420
007344	007345	PUNSTO	.+1		/STOP CODE	X1014430
007345	000004		4			X1014440
007346	777777		777777			X1014450
007347	000000	PUNSH	0		/SUBROUTINE TO PUNCH	X1014460
007350	700204		PSA			X1014470
007351	641002		LACQ		/SAVE MQ FOR DECPRT	X1014480
007352	040005		DAC	MQ		X1014490
007353	607436		JMP	RET	/WAIT FOR PUNCH	X1014500
007354	700202	PUNSHR	PCF		/INTERRUPT RETURNS HERE	X1014510
007355	200005		LAC	MQ	/RESTORE MQ	X1014520
007356	652000		LMQ			X1014530
007357	216315		LAC	(1)	/IS THERE AN OUTPUT STOP FLAG	X1014540
007360	540006		SAD	STPOUT		X1014550
007361	607404		JMP	INCON	/YES	X1014560
007362	700042		IGN		/NO	X1014570
007363	627347		JMP*	PUNSH		X1014580
007364	000000	PUNDEC	0			X1014590
007365	146717		DZM	DPZRO	/CLEAR LEADING ZERO SUPPRESSION	X1014600
007366	106571		JMS	DECCON	/CONVERT TO DECIMAL	X1014610
007367	000000		0		/RETURN FOR NEXT DIGIT	X1014620
007370	741200		SNA		/LAST DIGIT	X1014630
007371	627364		JMP*	PUNDEC	/YES - RETURN	X1014640
007372	107316		JMS	PUNSH2	/NO - PUNCH DIGIT	X1014650
007373	627367		JMP*	.-4		X1014660
007374	000000	PUNCT3	0			X1014670
007375	000000	PUNTS3	0			X1014680
007376	000000	PUNCT2	0			X1014690
007377	000000	PUNTS	0			X1014700
007400	000000	PUNTS2	0			X1014710
007401	000000	PUNCT1	0			X1014720
007402	000000	LINPCS	0			X1014730
007403	000000	NPLINE	0			X1014740
					/ROUTINE TO RESTORE I/O SWITCHES TO INITIAL CONDITIONS UPON	X1014750
					/PREMATURE TERMINATION OF OUTPUT.	X1014760
					/CALLED BY ROUTINES SUCH AS PRINT AND PUNCH WHEN FLAG IS UP	X1014770
007404	140006	INCON	DZM	STPOUT		X1014780
007405	777760		LAW	-20		X1014790
007406	046717		DAC	DPZRO		X1014800
007407	146712		DZM	HIGHPR		X1014810
007410	106737		JMS	CRLF		X1014820
007411	607436		JMP	RET		X1014830
					/ RESTORE RCD PDP9 APR 1972	X1014840
					/ROUTINE TO DECREMENT LISTS HOLDING CONDITION	X1014850
					/OF MACHINE ON INTERRUPTS.	X1014860
007412	000000	RESTOR	0			X1014870
007413	777774		LAW	-4		X1014880
007414	340017		TAD	17	/ BACK UP 17	X1014890
007415	040017		DAC	17		X1014900
007416	220017		LAC*	17		X1014910
007417	040004		DAC	ACC	/ SAVE AC	X1014920

007420	220017	LAC*	17		X1014930
007421	740001	CMA			X1014940
007422	356467	TAD	(660502)	/ RESTORE STEP COUNTER.	X1014950
007423	047424	DAC	.+1		X1014950
007424	740040	XX			X1014970
007425	220017	LAC*	17		X1014980
007426	652000	LMQ		/ RESTORE MQ	X1014990
007427	220017	LAC*	17		X1015000
007430	040000	DAC	0	/ RESTORE 0	X1015010
007431	777774	LAW	-4		X1015020
007432	340017	TAD	17	/ BACK UP 17	X1015030
007433	040017	DAC	17		X1015040
007434	200004	LAC	ACC	/ RESTORE AC	X1015050
007435	627412	JMP*	RESTOR		X1015060
		/ RET RCD PDP9 APR 1972			X1015070
		/ROUTINE THROUGH WHICH INTERRUPTABLE INTERRUPTS			X1015080
		/RETURN.			X1015090
007436	700002	RET	IOF		X1015100
007437	107412		JMS	RESTOR	X1015110
007440	707702		EEM		X1015120
007441	700042		ION		X1015130
007442	703344		OBR		X1015140
007443	620000	VECTOR	JMP*	0	X1015150
007444	007455		RAS		X1015160
007445	000240		WAIT		X1015170
007446	000000		0		X1015180
007447	000000		0		X1015190
007450	000000		0		X1015200
007451	000240		WAIT		X1015210
007452	000000		0		X1015220
007453	000000		0		X1015230
007454	000000		0		X1015240
007455	000240	RAS	WAIT		X1015250
007456			.7LOCK	30	X1015260
007506	105047	/ COMMAND TO EXIT AND LOAD NASA PROGRAM MONITOR			X1015270
007507	767651	EXIT	JMS	PADCB	X1015280
007510	106774		LAW	MESS23	X1015290
007511	112366		JMS	MESSAGE	X1015300
007512	556470		JMS	READ	X1015310
007513	617646		SAD	(31)	X1015320
007514	112366		JMP	17646	X1015330
007515	106737		JMS	READ	X1015340
007516	607436		JMS	CRLF	X1015350
			JMP	RET	X1015360
007517	200051	/ COMMAND TO RESET LIVETIME			X1015370
007520	740200	LIVERS	LAC	BKGFLG	X1015380
007521	607540		SZA		X1015390
007522	236351		JMP	.+17	X1015400
007523	047556		LAC*	(LIVEPH)	X1015410
007524	207523		DAC	LIVER	X1015420
007525	112250		LAC	-1	X1015430
007526	236425		JMS	NIO	X1015440
007527	740001		LAC*	(LIVETM)	X1015450
007530	347556		CMA		X1015460
007531	741100		TAD	LIVER	X1015470
007532	606746		SPA		X1015480
007533	207556		JMP	OMARK	X1015490
			LAC	LIVER	X1015500

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007534	072070	DAC*	SET+11 / LIVEPS	X1015510
007535	078350	DAC*	(LIVEPT)	X1015520
007536	078351	DAC*	(LIVEPH)	X1015530
007537	806257	JMP	RETC	X1015540
007540	236471	LAC*	(LIVEPH+400)	X1015550
007541	047556	DAC	LIVER	X1015560
007542	207541	LAC	.-1 / GET ADR OF LIVER	X1015570
007543	112250	JMS	NIO	X1015580
007544	236472	LAC*	(LIVETM+400)	X1015590
007545	740001	CMA		X1015600
007546	347556	TAD	LIVER	X1015610
007547	741100	SPA		X1015620
007550	606746	JMP	QMARK	X1015630
007551	207556	LAC	LIVER	X1015640
007552	076473	DAC*	(LIVEPS+400)	X1015650
007553	076474	DAC*	(LIVEPT+400)	X1015660
007554	076471	DAC*	(LIVEPH+400)	X1015670
007555	606257	JMP	RETC	X1015680
007556	000000	LIVER	0	X1015690
		/SUBROUTINE TO PRINT: REAL,LIVE, AND PERCENT		X1015700
		/TIME AND LIVE TIME LIFT		X1015710
		TIME	0	X1015720
007557	000000	LAC	BKGFLG	X1015730
007560	200051	SNA		X1015740
007561	741200	JMP	TIME1	X1015750
007562	607573	LAC*	(REALLO+400)	X1015760
007563	236475	DAC	RT	X1015770
007564	054373	LAC*	(REALHI+400)	X1015780
007565	236476	DAC	RT+1	X1015790
007566	054374	LAC*	(LIVELO+400)	X1015800
007567	236477	DAC	LT	X1015810
007570	054376	LAC*	(LIVEHI+400)	X1015820
007571	236500	JMP	.-10	X1015830
007572	607602	LAC*	(REALLO)	X1015840
007573	236435	DAC	RT	X1015850
007574	054373	LAC*	(REALHI)	X1015860
007575	236433	DAC	RT+1	X1015870
007576	054374	LAC*	(LIVELO)	X1015880
007577	236440	DAC	LT	X1015890
007800	054376	LAC*	(LIVEHI)	X1015900
007601	236436	DAC	LT+1	X1015910
007602	054377	LAC	(21)	X1015920
007603	216501	DAC	LT+2	X1015930
007604	054400	DAC	RT+2	X1015940
007605	054375	JMS	FINT	X1015950
007606	113051	FLAC	RT	X1015960
007607	214373	JMS	NOR	X1015970
007610	113426	FDAC	RT	X1015980
007611	214373	FLAC	LT	X1015990
007612	214376	JMS	NOR	X1016000
007613	113426	FDAC	LT	X1016010
007614	014376	FDIV	RT	X1016020
007615	714373	FMULIS	(144)	X1016030
007616	556502	FDAC	LTRT	X1016040
007617	014404	FLAC	LT	X1016050
007620	214376	JMS	FCIA	X1016060
007621	113652	JMS	TIME2	X1016070
007622	107642	FADDIS*	(LIVEPH+400)	X1016080
007623	376471			


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007624 607626 JMP .+2 X1016090
007625 376351 FADDIS* (LIVEPH) X1016100
007626 014401 FDAC LTL X1016110
007627 113112 JMS FEXT X1016120
007630 111625 JMS MIO X1016130
007631 011736 MESS16 X1016140
007632 314373 FLT RT X1016150
007633 011741 MESS17 X1016160
007634 314376 FLT LT X1016170
007635 011744 MESS18 X1016180
007636 314401 FLT LTL X1016190
007637 011747 MESS19 X1016200
007640 314404 FLT LTRT X1016210
007641 627557 JMP* TIME Y1016220
007642 000000 TIME2 0 X1016230
007643 200051 LAC BKGFLG X1016240
007644 740200 SZA / BKG7 X1016250
007645 627642 JMP* TIME2 X1016260
007646 453051 ISZ FINT X1016270
007647 453051 ISZ FINT X1016280
007650 627642 JMP* TIME2 X1016290
007651 031716 MESS23 031716 / CON X1016300
007652 061122 061122 / FIR X1016310
007653 154005 154005 / ME X1016320
007654 301124 301124 / XIT X1016330
007655 403155 403155 / Y- X1016340
007656 164000 164000 / N X1016350
007657 777400 MNOCOD -400 / NEG. OF NOCD XD150000
007660 000000 DISADD 0 /AMMOUNT ADDED TO DISPLAYS 1ST CHANNEL XD150010
007661 000000 SCALE 0 /0 FOR LOG - 1 FOR LINEAR XD150020
/SUBROUTINE TO CONVERT BINARY TO DECIMAL XD150030
/FOR NUMBER GENERATOR XD150040
007662 000000 NGBTD 0 XD150050
007663 777760 LAW -20 / REFRESH ONLY EVERY XD150060
007664 047762 DAC NGRF / 20TH TIME XD150070
007665 210601 LAC NGLIST XD150080
007666 040011 DAC !! XD150090
007667 107756 INSEL JMS NGNON XD150100
007670 741200 SNA XD150110
007671 607702 JMP NG1 XD150120
007672 050557 DAC NGHIGH XD150130
007673 206661 LAC APOWL /PREPARE TO CONVERT DOUBLE PRECISION XD150140
007674 047763 DAC NGTENL XD150150
007675 206662 LAC APOWH XD150160
007676 047764 DAC NGTENH XD150170
007677 777765 LAW -13 /COUNT 13 DIGITS XD150180
007700 047766 DAC NGDCTN XD150190
007701 607710 JMP NG2 XD150200
007702 206657 NG1 LAC APOWLS /PREPARE TO CONVERT SINGLE PRECISION XD150210
007703 047763 DAC NGTENL XD150220
007704 206660 LAC APOWHS XD150230
007705 047764 DAC NGTENH XD150240
007706 777772 LAW -6 /COUNT 6 XD150250
007707 047766 DAC NGDCTN XD150260
007710 207756 NG2 LAC NGDCTN XD150270
007711 556337 SAD (-1) XD150280
007712 147767 DZM NGDZRO XD150290
007713 150560 DZM NGDIG XD150300

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007714	147785	NG3	DZM	NGOVER		XDIS0310
007715	744000		CLL			XDIS0320
007716	210556		LAC	NGLOW	/GET LOW BITS	XDIS0330
007717	367763		TAD*	NGTENL	/ADD LOW POWER OF TEN	XDIS0340
007720	745400		SZLICLL		/WAS THERE AN OVER FLOW	XDIS0350
007721	447765		ISZ	NGOVER	/YES	XDIS0360
007722	050561		DAC	NGTEM	/STORE TEMPORARLY	XDIS0370
007723	210557		LAC	NGHIGH	/ADD HIGH ORDER	XDIS0380
007724	387764		TAD*	NGTENH		XDIS0390
007725	347765		TAD	NGOVER	/ADD OVER FLOW FROM LOW BITS	XDIS0400
007726	741400		SZL		/IS RESULT NEGITIVE	XDIS0410
007727	607751		JMP	NG4	/NO	XDIS0420
007730	210560		LAC	NGDIG	/YES-DIGIT IS READY	XDIS0430
007731	740200		SZA			XDIS0440
007732	147767		DZM	NGDZRO	/SUPPRESS LEADING ZEROS	XDIS0450
007733	347767		TAD	NGDZRO		XDIS0460
007734	741100		SPA			XDIS0470
007735	607742		JMP	.+5		XDIS0480
007736	350566		TAD	NGCODA	/ADD CODE ADDRESS	XDIS0490
007737	050561		DAC	NGTEM		XDIS0500
007740	230561		LAC*	NGTEM		XDIS0510
007741	060011		DAC*	11		XDIS0520
007742	447783		ISZ	NGTENL	/SET POINTERS TO NEXT	XDIS0530
007743	447764		ISZ	NGTENH	/POWER OF TEN	XDIS0540
007744	447756		ISZ	NGDCTN	/MORE DIGITS	XDIS0550
007745	607710		JMP	NG2	/YES	XDIS0560
007746	777777		LAW	-1	/NO-RESTORE AND RETURN	XDIS0570
007747	047767		DAC	NGDZRO		XDIS0580
007750	607757		JMP	NGNON+1		XDIS0590
007751	050537	NG4	DAC	NGHIGH		XDIS0500
007752	210561		LAC	NGTEM		XDIS0610
007753	050556		DAC	NGLOW		XDIS0620
007754	450560		ISZ	NGDIG	/ADD ONE TO DIGIT	XDIS0630
007755	607714		JMP	NG3		XDIS0640
007756	000000	NGNON	0		/ EFFECT BY PASS OF NUMBER GENATOR	XDIS0650
007757	750000		CLA			XDIS0660
007760	080011		DAC*	11		XDIS0670
007761	627662		JMP*	NGBTD		XDIS0680
007762	777780	NGRF	-20		/REFRESH COUNTER	XDIS0690
007763	000000	NGTENL	0		/LOW ORDER POWER OF TEN	XDIS0700
007764	000000	NGTENH	0		/HIGH ORDER POWER OF TEN	XDIS0710
007765	000000	NGOVER	0		/HOLDS OVER FLOW	XDIS0720
007766	000000	NGDCTN	0		/DIGIT COUNTER	XDIS0730
007767	777777	NGDZRO	-1		/ZERO SUPPRESSION	XDIS0740
007770	000000	NGDIS	0			XDIS0750
007771	210601		LAC	NGLIST		XDIS0760
007772	040011		DAC	11		XDIS0770
007773	760001		LAW	1		XDIS0780
007774	700706		700706		/SET INTENSITY	XDIS0790
007775	210546		LAC	OX	/X ORIGIN FOR NUMBER	XDIS0800
007776	050547	NG5	DAC	MX		XDIS0810
007777	050550		DAC	TX		XDIS0820
010000	220011		LAC*	11	/PICK UP CODE FOR NUMBER	XDIS0830
010001	741200		SNA			XDIS0840
010002	627770		JMP*	NGDIS		XDIS0850
010003	050565		DAC	DCODE		XDIS0860
010004	777775		LAW	-3	/SET COUNTER	XDIS0870
010005	050562		DAC	NGC		XDIS0880

010006	210551		LAC	NY	/Y ORIGIN FOR NUMBER	XDIS0890
010007	050552	NG7	DAC	TY		XDIS0900
010010	210565		LAC	DCODE		XDIS0910
010011	744010		CLLIRAL			XDIS0920
010012	050565		DAC	DCODE	/IF BIT IS A ONE	XDIS0930
010013	741400		SZL		/DISPLAY HORIZONTAL LINE	XDIS0940
010014	110520		JMS	NGDHL		XDIS0950
010015	210552		LAC	TY		XDIS0960
010016	350553		TAD	NDY	/RAISE LINE TO NEXT LEVEL	XDIS0970
010017	450562		ISZ	NGC		XDIS0980
010020	610007		JMP	NG7		XDIS0990
010021	777776		LAH	-2	/GO ON TO VERTICAL LINES	XDIS1000
010022	050562		DAC	NGC	/COUNT BOTH GROUPS	XDIS1010
010023	210551		LAC	NY		XDIS1020
010024	050552	NG8	DAC	TY		XDIS1030
010025	777775		LAH	-3	/THREE IN EACH GROUT	XDIS1040
010026	050563		DAC	NGC1		XDIS1050
010027	210547		LAC	NX		XDIS1060
010030	050550	NG9	DAC	TX		XDIS1070
010031	210565		LAC	DCODE		XDIS1080
010032	744010		CLLIRAL			XDIS1090
010033	050565		DAC	DCODE	/IF BIT IS A ONE	XDIS1100
010034	741400		SZL		/DISPLAY VERTICAL LINE	XDIS1110
010035	110533		JMS	NGDVL		XDIS1120
010036	210550		LAC	TX	/MOVE LINE TO RIGHT	XDIS1130
010037	350555		TAD	NDX		XDIS1140
010040	450563		ISZ	NGC1	/FINISHED WITH GROUP	XDIS1150
010041	610030		JMP	NG9	/NO	XDIS1160
010042	210552		LAC	TY	/YES-RAISE FOR NEXT GROUP	XDIS1170
010043	350553		TAD	NDY		XDIS1180
010044	450562		ISZ	NGC	/HAVE WE DONE BOTH GROUPS	XDIS1190
010045	510024		JMP	NG8	/NO	XDIS1200
010046	210547		LAC	NX	/INCREMENT X COOR. FOR	XDIS1210
010047	350554		TAD	NLS	/NEXT LETTER	XDIS1220
010050	607776		JMP	NG5		XDIS1230
010051	210344	DISPEC	LAC	MOCB		XDIS1240
010052	050127		DAC	DX1		XDIS1250
010053	050061		DAC	DX		XDIS1260
010054	740001		CMA			XDIS1270
010055	356315		TAD	(1)		XDIS1280
010056	047657		DAC	MNOCD		XDIS1290
010057	216315		LAC	(1)	/ CALCULATE DELTA X.	XDIS1300
010060	670313		670313			XDIS1310
010061	000000	DX	0			XDIS1320
010062	641002		LACQ			XDIS1330
010063	516340		AND	(1777)	/ MASK OFF UPPER BITS	XDIS1340
010064	741200		SNA			XDIS1350
010065	216315		LAC	(1)	/ IF 0 MAKE =1.	XDIS1360
010066	050061		DAC	DX		XDIS1370
010067	740001		CMA			XDIS1380
010070	356315		TAD	(1)		XDIS1390
010071	050301		DAC	NDX		XDIS1400
010072	750004		LAS			XDIS1410
010073	550257		SAD	LAST	/HAS THERE BEEN A CHANGE	XDIS1420
010074	610107		JMP	OLISTV	/NO	XDIS1430
010075	050257		DAC	LAST		XDIS1440
010076	516420		AND	(037777)		XDIS1450
010077	741300		SPAISNA			XDIS1460

010100	610107	JMP	DLISTV		XDIS1470
010101	650422	650422		/ NORM 22	XDIS1480
010102	777700	LAW	-100		XDIS1490
010103	640001	OSC		/ GET SHIFT COUNT	XDIS1500
010104	744001	CHAICLL			YDIS1510
010105	350262	TAD	ROTLOC		XDIS1520
010106	050261	DAC	LOCATR		XDIS1530
010107	150311	DLISTV	DZM	SPREV	XDIS1540
010110	760001	LAW	I		XDIS1550
010111	700704	700704			XDIS1560
010112	211073	LAC	MV		XDIS1570
010113	350256	TAD	MVMOV		XDIS1580
010114	516403	AND	(377)		XDIS1580
010115	051073	DAC	MV		XDIS1600
010116	741200	SNA		/ IF ZERO DO NOT DISPLAY	XDIS1610
010117	610147	JMP	DLISTH		XDIS1620
010120	207660	LAC	DISADD		XDIS1630
010121	740001	CHA			XDIS1640
010122	356315	TAD	(1)		XDIS1650
010123	351073	TAD	MV	/DISPLAY VERTICAL MARKER	XDIS1660
010124	745100	SPAICLL			XDIS1670
010125	610145	JMP	DLIST7	/ NO	XDIS1680
010126	650313	650313			XDIS1690
010127	000000	DXI	0	/ CALCULATE POSITION	XDIS1700
010130	641002	LACQ			XDIS1710
010131	516340	AND	(1777)		XDIS1720
010132	350310	TAD	SX		XDIS1730
010133	700506	DXL			XDIS1740
010134	516503	AND	(776000)		XDIS1750
010135	740200	SZA		/IS IT WITHIN RANGE	XDIS1760
010136	610145	JMP	DLIST7	/ NO	XDIS1770
010137	216340	LAC	(1777)		XDIS1780
010140	356504	TAD	(-30)		XDIS1790
010141	700646	OYS			XDIS1800
010142	740100	SMA			XDIS1810
010143	610140	JMP	.-3		XDIS1820
010144	610147	JMP	+.3		XDIS1830
010145	207660	DLIST7	LAC	DISADD	XDIS1840
010146	051073	DAC	MV		XDIS1850
010147	211077	DLISTH	LAC	MH	XDIS1860
010150	350255	TAD	MVMOV		XDIS1870
010151	051077	DAC	MH		XDIS1880
010152	741200	SNA		/DO NOT DISPLAY ZERO	XDIS1890
010153	610162	JMP	DLIST3		XDIS1900
010154	110374	JMS	DISPLY	/THIS WILL SET THE Y POSITION	XDIS1910
010155	216340	LAC	(1777)	/DISPLAY A HORIZONTAL LINE	XDIS1920
010156	356504	TAD	(777750)		XDIS1930
010157	700546	OXS			XDIS1940
010160	740100	SMA			XDIS1950
010161	610156	JMP	.-3		XDIS1960
010162	760002	DLIST3	LAW	2	XDIS1970
010163	700706	700706		/RESET INTENSITY	XDIS1980
010164	210254	LAC	MOVADD		XDIS1990
010165	544367	SAD	SPEC+1		XDIS2000
010166	741000	SKP			XDIS2010
010167	170254	DZM	MOVADD		XDIS2020
010170	210407	LAC	DISONE	/ADDRESS OF DATA	XDIS2030
010171	347660	TAD	DISADD	/FIRST CHANNEL TO BE DISPLAYED	XDIS2040

010172	110331		JMS	ODATA	/DISPLAY DATA	
010173	210302		LAC	SPREAD		X01S2050
010174	050311		DAC	SPREV		X01S2060
010175	210410		LAC	DISTW0	/OVER LAP	X01S2070
010176	741200		SNA			X01S2080
010177	610202		JMP	DLIST2	/NO	X01S2090
010200	347660		TAD	DISADD	/YES	X01S2100
010201	110331		JMS	ODATA		X01S2110
010202	207661	DLIST2	LAC	SCALE	/CHECK SCALE	X01S2120
010203	740200		SZA			X01S2130
010204	610216		JMP	DLIST4	/NO LOG	X01S2140
010205	760003		LAW	3		X01S2150
010206	700704		700704		/SET INTENSITY	X01S2160
010207	150311		DZH	SPREV		X01S2170
010210	150303		DZH	X	/DISPLY MADKERS	X01S2180
010211	110313		JMS	DMARK	/LEFT SIDE	X01S2190
010212	216340		LAC	(1777)		X01S2200
010213	050303		DAC	X	/RIGHT SIDE	X01S2210
010214	110313		JMS	DMARK		X01S2220
010215	610220		JMP	DLIST6		X01S2230
010216	230261	DLIST4	LAC*	LOCATR		X01S2240
010217	050376		DAC	LOGLIN		X01S2250
010220	210306	DLIST6	LAC	SPCON	/IS CONTROL ZERO	X01S2260
010221	741200		SNA			X01S2270
010222	605432		JMP	DLIST	/NO ROTATION	X01S2280
010223	350310		TAD	SX	/ROTATION IS UNDER WAY	X01S2290
010224	050310		DAC	SX		X01S2300
010225	741100		SPA		/LEFT OR RIGHT	X01S2310
010226	610233		JMP	ROT1	/LEFT	X01S2320
010227	350301		TAD	MOX	/RIGHT	X01S2330
010230	751100		SPAICLA		/NEED ANOTHER DATA POINT	X01S2340
010231	605432		JMP	DLIST	/NO	X01S2350
010232	610236		JMP	ROT2	/YES	X01S2360
010233	350061	ROT1	TAD	DX		X01S2370
010234	750100		SMAICLA		/NEED ANOTHER DATA POINT	X01S2380
010235	605432		JMP	DLIST	/NO	X01S2390
010236	050310	ROT2	DAC	SX		X01S2400
010237	207660		LAC	DISADD	/AT FRONT OF SPECTRUM	X01S2410
010240	350305		TAD	SPCONA		X01S2420
010241	741100		SPA			X01S2430
010242	610252		JMP	ROT3	/YES STOP ROTATION	X01S2440
010243	350344		TAD	NOCD		X01S2450
010244	350307		TAD	MRAMP		X01S2460
010245	740100		SMA		/AT END OF SPECTRUM	X01S2470
010246	610252		JMP	ROT3	/YES STOP ROTATION	X01S2480
010247	207660		LAC	DISADD		X01S2490
010250	350305		TAD	SPCONA	/GET NEW DATA POINT	X01S2500
010251	047690		DAC	DISADD		X01S2510
010252	170254	ROT3	DZH*	MOVADD		X01S2520
010253	605432		JMP	DLIST		X01S2530
010254	005431	MOVADD	RTMP			X01S2540
010255	000000	MMMOV	0			X01S2550
010256	000000	MVMOV	0			X01S2560
010257	000000	LAST	0			X01S2570
010260	777777	ROTINC	777777			X01S2580
010261	010263	LOCATR	ROTLS1			X01S2590
010262	010262	ROTLOC	.			X01S2600
010263	640605	ROTLS1	LLS*5		/32 COUNTS	X01S2610

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010264 640604 LLS+4 /64 COUNTS XD1S2530
010265 640603 LLS+3 /128 COUNTS XD1S2640
010266 640602 LLS+2 /256 COUNTS XD1S2650
010267 640601 LLS+1 /512 COUNTS XD1S2660
010270 740000 NOP /1024 COUNTS XD1S2670
010271 640501 LRS+1 /2048 COUNTS XD1S2680
010272 640502 LRS+2 /4096 COUNTS XD1S2690
010273 640503 LRS+3 /8192 COUNTS XD1S2700
010274 640504 LRS+4 /16384 COUNTS XD1S2710
010275 640505 LRS+5 /32768 COUNTS XD1S2720
010276 640506 LRS+6 /65536 COUNTS XD1S2730
010277 640507 LRS+7 /131072 COUNTS XD1S2740
010300 640510 LRS+10 /262.144 COUNTS XD1S2750
010301 000000 MDX 0 XD1S2760
010302 000000 SPREAD 0 XD1S2770
010303 000000 X 0 XD1S2780
010304 000000 BDOT 0 XD1S2790
010305 000000 SPCONA 0 XD1S2800
010306 000000 SPCON 0 XD1S2810
010307 777400 MRAMP -400 XD1S2820
010310 000000 SX 0 XD1S2830
010311 000000 SPREV 0 XD1S2840
010312 000000 BDCMN 0 XD1S2850
                                /DISPLAY POINTS AT POWERS OF 10 XD1S2860
010313 000000 OMARK 0 XD1S2870
010314 750000 CLA XD1S2880
010315 110374 JMS DISPLY XD1S2890
010316 216505 LAC (12) /10 XD1S2900
010317 110374 JMS DISPLY XD1S2910
010320 216502 LAC (144) /100 XD1S2920
010321 110374 JMS DISPLY XD1S2930
010322 216506 LAC (1750) /1000 XD1S2940
010323 110374 JMS DISPLY XD1S2950
010324 216507 LAC (23420) /10000 XD1S2960
010325 110374 JMS DISPLY XD1S2970
010326 216510 LAC (303240) /100.000 XD1S2980
010327 110374 JMS DISPLY XD1S2990
010330 630313 JMS OMARK XD1S3000
                                /DISPLAY DATA XD1S3010
010331 000000 ODATA 0 XD1S3020
010332 050373 DAC DPT /STORE ADDRESS OF DATA XD1S3030
010333 207657 LAC MNOCOD XD1S3040
010334 050372 DAC CCNT /FOR COUNTING NUMBER OF CHANNELS XD1S3050
010335 744002 STL XD1S3060
010336 740020 RAR XD1S3070
010337 050304 DAC BDOT XD1S3080
010340 050371 DAC BDOTC /COUNT FOR BRIGHT DOT POSITION XD1S3090
010341 210310 LAC SX /LOAD X WITH STARTING INCREMENT XD1S3100
010342 050127 DAC DXI XD1S3110
010343 670313 / DIVIDE BY 13 BITS XD1S3120
010344 000400 NOCOD 400 / TO GET A DISPLACEMENT. XD1S3130
010345 641002 LACQ XD1S3140
010346 516340 AND (1777) XD1S3150
010347 050303 DAC X XD1S3160
010350 230373 DDZ LAC* DPT /GET Y VALUE XD1S3170
010351 740000 NOP /MAY BE SZA FOR ZERO DEPRESSION XD1S3180
010352 110374 JMS DISPLY /DISPLAY XD1S3190
010353 050371 ISZ BDOTC /IS THIS ONE THE BRIGHT DOT XD1S3200

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010354 610363      JMP      DD1      /NO
010355 777750      LAH      -30
010356 050312      DAC      BDCN     /DRAW A SHORT VERTICAL
010357 210303      LAC      X        /LINE ABOVE BRIGHT DOT
010360 700546      OXS
010361 450312      ISZ      BDCN
010362 610357      JMP      .-3
010363 450373      DD1      ISZ      DPT
010364 210127      LAC      DX1     / ADD DELTA X
010365 356315      TAD      (1)
010366 450372      ISZ      CCNT    /AT END
010367 610342      JMP      NOCD-2  / NO
010370 630331      JMP*     DDATA
010371 000000      BDOTC   0
010372 000000      CCNT    0
010373 000000      DPT     0
          /DISPLY ROUTINE FOR 34H SCOPE
010374 000000      DISPLY  0
010375 744000      CLL
010376 110627      LOGLIN  JMS      LOGAR
010377 110711      JMS     STRP06  / SKIP IF NOT IN STRIP.
010400 356511      TAD     (1000)
010401 350311      TAD     SPREV
010402 700606      OYL
010403 210303      LAC     X
010404 740100      SMA
010405 700546      OXS
010406 630374      JMP*    DISPLY
010407 037000      DISONE  37000
010410 000000      DISTWO  0
          /SUBROUTINE TO CALCULATE LIVE TIME LEFT
010411 000000      CLTL   0
010412 200051      LAC     BKFLG
010413 740200      SZA
010414 610424      JMP     .+10
010415 236425      LAC*   (LIVETH)
010416 740001      CMA
010417 356315      TAD     (1)
010420 376351      TAD*   (LIVEPH)
010421 050556      DAC     NGLW
010422 750000      CLA
010423 630411      JMP*   CLTL
010424 236472      LAC*   (LIVETH+400)
010425 740001      CMA
010426 356315      TAD     (1)
010427 376471      TAD*   (LIVEPH+400)
010430 610421      JMP     .-7
          /SUBROUTINE TO PICK UP BRIGHT DOT POSITION
010431 000000      CBOP   0
010432 210304      LAC     BDOT
010433 740001      CMA
010434 347660      TAD     DISADD
010435 050556      DAC     NGLW
010436 200054      LAC     FG5050
010437 750200      SZAICLA
010440 450556      ISZ     NGLW    / 5050?
010441 630431      JMP*   CBOP    / YES
          /SUBROUTINE TO PICK UP BRIGHT DOT CONTENTS

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010442	000000	CBDC	0			X0153790
010443	110431		JMS	CBOP		X0153800
010444	210556		LAC	NGLOW	/GET BRIGHT DOT POSITION	X0153810
010445	350407		TAD	DISONE		X0153820
010446	050431		DAC	CBOP		X0153830
010447	230431		LAC*	CBOP		X0153840
010450	050556		DAC	NGLJM		X0153850
010451	750000		CLA			X0153860
010452	630442		JMP*	CBDC		X0153870
			/ SUBROUTINE TO PICK UP NUMBER			X0153880
			/WHOSE ADDRESS IS IN CGINH AND CGINL			X0153890
			CGIN	0		X0153900
010453	000000		LAC*	CGINL		X0153910
010454	230464		DAC	NGLOW		X0153920
010455	050556		LAC	CGINH	/ IF ZERO THEN IT IS A SINGLE PRECISION	X0153930
010456	210463		SNA	CLA		X0153940
010457	751200		JMP*	CGIN		X0153950
010460	630453		LAC*	CGINH		X0153960
010461	230463		JMP*	CGIN		X0153970
010462	630453		CGINH	0		X0153980
010463	000000		CGINL	0		X0153990
010464	000000		JMSCG	JMS	CGIN	X0154000
010465	110453		/SUBROUTINE TO PICKUP PERCENT LIVE TIME			X0154010
			CPLT	0		X0154020
010466	000000		CLL			X0154030
010467	744000		OZM	NGLOW		X0154040
010470	150556		LAC	BKGLFG		X0154050
010471	200051		SZA			X0154060
010472	740200		JMP	CPLT1+2		X0154070
010473	610512		LAC*	(REALTM)	/ PREPARE TO DIVIDE	X0154080
010474	236431		SNA		/REAL TIME BY LIVE TIME	X0154090
010475	741200		JMP?	CPLT1	/DENOMINATOR IS ZERO SO RETURN ZERO	X0154100
010476	610510		DAC	.+3		X0154110
010477	050502		LAC*	(LIVETM)		X0154120
010500	236425		FRDIV			X0154130
010501	650323		0			X0154140
010502	000000		LACQ			X0154150
010503	641002		CLL			X0154160
010504	744000		MUL		/MUL BY 100 FOR PERCENT	X0154170
010505	653122		144			X0154180
010506	000144		DAC	NGLOW		X0154190
010507	050556		CLA		/RESULT WILL BE IN MO	X0154200
010510	750000	CPLT1	JMP*	CPLT		X0154210
010511	630466		LAC*	(REALTM+400)		X0154220
010512	236512		SNA			X0154230
010513	741200		JMP	CPLT1		X0154240
010514	610510		DAC	CPLT1-6		X0154250
010515	050502		LAC*	(LIVETM+400)		X0154260
010516	236472		JMP	CPLT1-7		X0154270
010517	5:0501		/DRAW HORIZONTAL LINE			X0154280
			NGDHL	0		X0154290
010520	000000		LAC	TY	/SET Y	X0154300
010521	210552		DYL			X0154310
010522	700606		LAW	-40		X0154320
010523	777740		DAC	NGC2		X0154330
010524	050564		LAC	TX	/MOVE X TO DRAW	X0154340
010525	210550		DXS		/HORIZONTAL LINE	X0154350
010526	700546		TAD	(1)		X0154360
010527	356315					

010530	450564	ISZ	NGC2						
010531	610526	JMP	.-3						XD1S4370
010532	630520	JMP*	NGDHL						XD1S4380
		/DRAW VERTICAL LINE							XD1S4390
010533	000000	NGDVL	0						XD1S4400
010534	210550	LAC	TX		/SET X				XD1S4410
010535	700506	DXL							XD1S4420
010536	777744	LAW	-34						XD1S4430
010537	050584	OAC	NGC2						XD1S4440
010540	210552	LAC	TY		/MOVE Y TO DRAW				XD1S4450
010541	700646	OYS			/VERTICAL LINE				XD1S4460
010542	356315	TAO	(1)						XD1S4470
010543	450564	ISZ	NGC2						XD1S4480
010544	610541	JMP	.-3						XD1S4490
010545	630533	JMP*	NGDVL						XD1S4500
		/NUMBER GENERATOR VARIABLES							XD1S4510
010546	000500	OX	500		/XORIGIN				XD1S4520
010547	000000	NX	0		/SEMITEMP X				XD1S4530
010550	000000	TX	0		/TEMPX				XD1S4540
010551	007700	NY	7700		/Y ORIGIN				XD1S4550
010552	000000	TY	0		/TEMP Y				XD1S4560
010553	000034	NDY	34		/DISTANCE BETWEEN HORIZONTAL LINES				XD1S4570
010554	000100	NLS	100		/DISTANCE BETWEEN LETTERS				XD1S4580
010555	000020	NDX	20		/DISTANCE BETWEEN VERTICAL LINES				XD1S4590
010556	000000	NGLOW	0		/LOW				XD1S4600
010557	000000	NGHIGH	0		/HIGH				XD1S4610
010560	000000	NGDIG	0		/DIGIT				XD1S4620
010561	000000	NGTEM	0		/TEMP				XD1S4630
010562	000000	NGC	0		/COUNTER				XD1S4640
010563	000000	NGC1	0		/COUNTER				XD1S4650
010564	000000	NGC2	0		/COUNTER				XD1S4660
010565	000000	DCODE	0		/GENERATION CODE				XD1S4670
010566	010567	NGCODA	.+1						XD1S4680
010567	555000		555000		/0				XD1S4690
010570	022000		022000		/1				XD1S4700
010571	741000		741000		/2				XD1S4710
010572	711000		711000		/3				XD1S4720
010573	226000		226000		/4				XD1S4730
010574	714000		714000		/5				XD1S4740
010575	754000		754000		/6				XD1S4750
010576	111000		111000		/7				XD1S4760
010577	755000		755000		/8				XD1S4770
010600	315000		315000		/9				XD1S4780
		/NUMBER GENERATOR LIST							XD1S4790
010601	010601	NGLIST	.						XD1S4800
010602	000000		0						XD1S4810
010603	000000		0						XD1S4820
010604	000000		0						XD1S4830
010605	000000		0						XD1S4840
010606	000000		0						XD1S4850
010607	000000		0						XD1S4860
010610	000000		0						XD1S4870
010611	000000		0						XD1S4880
010612	000000		0						XD1S4890
010613	000000		0						XD1S4900
010614	000000		0						XD1S4910
010615	000000		0						XD1S4920
010616	000000	NGCTS	0						XD1S4930
									XD1S4940

010617	000000	LOGSUB	0	/STORAGE FOR -LOG L	XDIS4950
				/THE FOLLOWING ARE Y VALUES FOR SCOPE	XDIS4960
010620	010621	ADECM	.+1		XDIS4970
010621	000000		0	/LOG X1<	XDIS4980
010622	777504		-274	/LOG X10<	XDIS4990
010623	777207		-571	/LOG X100<	XDIS5000
010624	776720		-1060	/LOG X1,000<	XDIS5010
010625	776415		-1363	/LOG X10,000<	XDIS5020
010626	776120		-1660	/LOG X100,000<	XDIS5030
				/	XDIS5040
				/SUBROUTINE TO CONVERT NUMBER TO A	XDIS5050
				/LOGARITHM FOR SEMI-LOG DISPLAY	XDIS5060
				/ENTER WITH NUMBER IN AC. LOG WILL	XDIS5070
				/BE RETURNED IN THE AC.	XDIS5080
				/	XDIS5090
010627	000000	LOGAR	0		XDIS5100
010630	745200		SNAICLL		XDIS5110
010631	630627		JMP*	LOGAR	XDIS5120
010632	740100		SMA	/VALUES OVER 131072 NEED SPECIAL HANDLING	XDIS5130
010633	610645		JMP	LOG1	XDIS5140
010634	110711		JMS	STRP06	XDIS5150
010635	610642		JMP	.+5	XDIS5160
010636	744020		RCR	/ GREATER THAN 131072.	XDIS5170
010637	051022		DAC	MANTIS	XDIS5180
010640	777756		LAW	-22	XDIS5190
010641	610651		JMP	LOG2	XDIS5200
010642	740001		CMA		XDIS5210
010643	356315		TAD	(1)	XDIS5220
010644	455567		ISZ	MFLG	XDIS5230
010645	650421	LOG1	650421	/ SET NEG. FLAG	XDIS5240
010646	051022		DAC	MANTIS	XDIS5250
010647	777700		LAW	-100	XDIS5260
010650	640001		OSC	/ OR SHIFT COUNT	XDIS5270
010651	744001	LOG2	CMAICLL		XDIS5280
010652	653105		653105	/ MUL 5	XDIS5290
010653	707070		707070		XDIS5300
010654	051023		DAC	LOG	XDIS5310
010655	211022		LAC	MANTIS	XDIS5320
010656	742010		RTL	/ USE TABLE LOOK UP TO	XDIS5330
010657	653606		653606	/ DETERMINE MANTISA	XDIS5340
010660	350721		TAD	ACOETA	XDIS5350
010661	051022		DAC	MANTIS	XDIS5360
010662	211023		LAC	LOG	XDIS5370
010663	371022		TAD*	MANTIS	XDIS5380
010664	660507		LRSS	7	XDIS5390
010665	350617		TAD	LOGSUB	XDIS5400
010666	745100		SPAICLL	/LOG 'L' (SEE DECADE)	XDIS5410
010667	750000		CLA	/ SET POINTS BELOW RANGE TO 0.	XDIS5420
010670	110711		JMS	STRP06	XDIS5430
010671	610701		JMP	.+10	XDIS5440
010672	742010		RTL	/ MULT BY 5	XDIS5450
010673	350720		TAD	ACOETA-1	XDIS5460
010674	650313		650313	/ FRDIV 15	XDIS5470
010675	050000	FACT	50000		XDIS5480
010676	641002		LACQ		XDIS5490
010677	516460		AND	(17777)	XDIS5500
010679	741000		SKP		XDIS5510
010701	740020		RAR		XDIS5520

010702	051022	DAC	MANTIS			
010703	356503	TAD	(-2000)	/SET POINTS ABOVE THE RANGE TO 0 (-2000)		XDIS5530
010704	751100	SPAICLA				XDIS5540
010705	211022	LAC	MANTIS			XDIS5550
010706	110711	JMS	STRP06	/ SKIP IF NOT IN STRIP.		XDIS5560
010707	615555	JMP	S3			XDIS5570
010710	630627	JMP*	LOJAR			XDIS5580
010711	000000	STRP06	0			XDIS5590
010712	050720	DAC	+6	/ SAVE AC		XDIS5600
010713	200053	LAC	STRPFG			XDIS5610
010714	745200	SNAICLL		/ STRIP?		XDIS5620
010715	450711	ISZ	STRP06	/ NO		XDIS5630
010716	210720	LAC	+2	/ RESTORE AC.		XDIS5640
010717	630711	JMP*	STRP06			XDIS5650
010720	000000		0			XDIS5660
010721	010722	ACOETA	COETAB	/TABLE FOR LOG COEFICIENTS		XDIS5670
010722	000000	COETAB	0			XDIS5680
010723	000242		242			XDIS5690
010724	000503		503			XDIS5700
010725	000741		741			XDIS5710
010726	001174		1174			XDIS5720
010727	001426		1426			XDIS5730
010730	001655		1655			XDIS5740
010731	002102		2102			XDIS5750
010732	002325		2325			XDIS5760
010733	002546		2546			XDIS5770
010734	002765		2765			XDIS5780
010735	003202		3202			XDIS5790
010736	003415		3415			XDIS5800
010737	003626		3626			XDIS5810
010740	004036		4036			XDIS5820
010741	004244		4244			XDIS5830
010742	004450		4450			XDIS5840
010743	004652		4652			XDIS5850
010744	005053		5053			XDIS5860
010745	005252		5252			XDIS5870
010746	005450		5450			XDIS5880
010747	005645		5645			XDIS5890
010750	006037		6037			XDIS5900
010751	006231		6231			XDIS5910
010752	006421		6421			XDIS5920
010753	006610		6610			XDIS5930
010754	006775		6775			XDIS5940
010755	007161		7161			XDIS5950
010756	007344		7344			XDIS5960
010757	007526		7526			XDIS5970
010760	007706		7706			XDIS5980
010761	010065		10065			XDIS5990
010762	010243		10243			XDIS6000
010763	010420		10420			XDIS6010
010764	010574		10574			XDIS6020
010765	010746		10746			XDIS6030
010766	011120		11120			XDIS6040
010767	011270		11270			XDIS6050
010770	011440		11440			XDIS6060
010771	011606		11606			XDIS6070
010772	011754		11754			XDIS6080
010773	012120		12120			XDIS6090
						XDIS6100

010774	012264		12264				XDIS6110
010775	012427		12427				XDIS6120
010776	012570		12570				XDIS6130
010777	012731		12731				XDIS6140
011000	013071		13071				XDIS6150
011001	013230		13230				XDIS6160
011002	013366		13366				XDIS6170
011003	013524		13524				XDIS6180
011004	013660		13660				XDIS6190
011005	014014		14014				XDIS6200
011006	014147		14147				XDIS6210
011007	014301		14301				XDIS6220
011010	014433		14433				XDIS6230
011011	014563		14563				XDIS6240
011012	014713		14713				XDIS6250
011013	015042		15042				XDIS6260
011014	015171		15171				XDIS6270
011015	015317		15317				XDIS6280
011016	015444		15444				XDIS6290
011017	015570		15570				XDIS6300
011020	015714		15714				XDIS6310
011021	016037		16037				XDIS6320
011022	000000	MANTIS	0				XDIS6330
011023	000000	LOG	0				XDIS6340
011024	150617	LOGS	DZM	LOGSUB	/ INITIALIZE LOG L TO 0.		XDIS6350
011025	604775		JMP	PNOLD+5			XDIS6360
011026	110627	JLOGAR	JMS	LOGAR			XDIS6370
011027	216315	LINEAR	LAC	(1)	/COMMAND TO SET SCALE TO LINEAR		XDIS6380
011030	047661		DAC	SCALE			XDIS6390
011031	203323		LAC	CNOP			XDIS6400
011032	050376		DAC	LOGLIN			XDIS6410
011033	606257		JMP	RETC			XDIS6420
011034	112461	WINDOW	JMS	DECIN			XDIS6430
011035	340060		TAD	WSTART			XDIS6440
011036	741100		SPA				XDIS6450
011037	606746		JMP	OMARK			XDIS6460
011040	116064		JMS	INCHAN	/ 50507		XDIS6470
011041	356337		TAD	(-1)	/ YES		XDIS6480
011042	047660		DAC	DISADD	/STORE ADDING FACTOR		XDIS6490
011043	112461		JMS	DECIN	/ LAST		XDIS6500
011044	340060		TAD	WSTART			XDIS6510
011045	053415		DAC	BC+2			XDIS6520
011046	207660		LAC	DISADD			XDIS6530
011047	740001		CHA		/CALCULATE # OF POINTS TO DISPLAY.		XDIS6540
011050	116064		JMS	INCHAN	/ 50507		XDIS6550
011051	741000		SKP		/ YES		XDIS6560
011052	356315		TAD	(1)			XDIS6570
011053	353415		TAD	BC+2			XDIS6580
011054	741300		SPA ISNA				XDIS6590
011055	606746		JMP	OMARK			XDIS6600
011056	356402		TAD	(-377)			XDIS6610
011057	740300		SMA ISZA				XDIS6620
011060	606746		JMP	OMARK			XDIS6630
011061	356333		TAD	(400)			XDIS6640
011062	050344		DAC	NOC0	/STORE THE NUMBER		XDIS6650
011063	101772		JMS	CIA			XDIS6654
011064	047657		DAC	MNOC0			XDIS6656
011065	606257		JMP	RETC	/RETURN		XDIS6660

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011066      112481  /INPUT X POSITION FOR VERTICAL MARKER
011067      116064  VMARK      JMS      DECIN
011070      396337  JMS      INCHAN  / 5050?
011071      051073  TAD      (-1)   / YES
011072      606257  DAC      MV
011073      000000  JMP      RETC
                    /VERTICAL MARKER
011074      112481  /INPUT COUNTS FOR HORIZONTAL MARKER
011075      051077  HMARK     JMS      DECIN
011076      606257  DAC      MH
011077      000000  JMP      RETC
                    / MARK HORIZONTAL.
                    /MTBUF     CHR      PDP9 1268
                    /ROUTINE TO HANDLE DOUBLE BUFFERED OUTPUT ON MAGNETIC TAPE
                    /TERBUF IS USED TO CONTROL BUFFER TERMINATIONS. IF TERBUF#0
                    /THE AC IS STORED IN A BUFFER. WHEN THE BUFFER IS FULL IT IS
                    /DUMPED AND STORAGE BEGINS IN A SECOND BUFFER. IF TERBUF#1.
                    /THE BUFFER CURRENTLY BEING USED FOR STORAGE IS ZERO FILLED AND
                    /DUMPED. ALL POINTERS ARE THEN INITIALIZED AND
                    /TERBUF IS SET EQUAL TO ZERO.
011100      000000  MTBUF     0
011101      051366  DAC      MTBTS  /STORE DATA IN TEMPORARY LOCATION
011102      211370  LAC      TERBUF /TERMINATE BUFFER
011103      741200  SNA
011104      811136  JMP      MTBUF3 /NO
011105      151370  DZH      TERBUF /CLEAR TERMINATOR
011106      211271  LAC      MTBP1  /YES, DUMP PARTIALLY FILLED BUFFER
011107      551267  SAD      MTBEN1 /BUFFER 1 OR BUFFER 2
011110      611124  JMP      MTBUF1
011111      551265  SAD      MTB01
011112      631100  JMP     MTBUF
011113      451271  ISZ      MTBP1  /ZERO FILL BUFFER 1
011114      171271  DZH     MTBP1
011115      211271  LAC      MTBP1
011116      551267  SAD      MTBEN1
011117      741000  SKP
011120      611113  JMP     -5
011121      211265  LAC      MTB01  /DUMP BUFFER 1
011122      111165  JMS      MTWT
011123      631100  JMP     MTBUF
011124      211272  MTBUF1  LAC      MTBP2
011125      551266  SAD      MTB02
011126      631100  JMP     MTBUF
011127      451272  ISZ      MTBP2  /ZERO FILL BUFFER 2
011130      171272  DZH     MTBP2
011131      211272  LAC      MTBP2
011132      551270  SAD      MTBEN2
011133      741000  SKP
011134      611127  JMP     -5
011135      611157  JMP      MTBUF3
011136      211271  MTBUF3  LAC      MTBP1
011137      551267  SAD      MTBEN1
011140      611150  JMP      MTBUF4 /YES-GO TO BUFFER TWO
011141      451271  ISZ      MTBP1  /NO-STORE
011142      211366  LAC      MTBTS
011143      071271  DAC     MTBP1
011144      211271  LAC      MTBP1  /IS BUFFER FULL NOW
011145      551267  SAD      MTBEN1

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XD156670
XD156680
XD156690
XD156700
XD156710
XD156720
XD156730
XD156740
XD156750
XD156760
XD156770
XD156780
XMAG0000
XMAG0010
XMAG0020
XMAG0030
XMAG0040
XMAG0050
XMAG0060
XMAG0070
XMAG0080
XMAG0090
XMAG0100
XMAG0110
XMAG0120
XMAG0130
XMAG0140
XMAG0150
XMAG0160
XMAG0170
XMAG0180
XMAG0190
XMAG0200
XMAG0210
XMAG0220
XMAG0230
XMAG0240
XMAG0250
XMAG0260
XMAG0270
XMAG0280
XMAG0290
XMAG0300
XMAG0310
XMAG0320
XMAG0330
XMAG0340
XMAG0350
XMAG0360
XMAG0370
XMAG0380
XMAG0390
XMAG0400
XMAG0410
XMAG0420
XMAG0430
XMAG0440
XMAG0450

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011146	611121	JMP	MTBUF1-3	/ YES		XMAG0460
011147	631100	JMP*	MTBUF	/NO RETURN		XMAG0470
011150	451272	MTBUF4	ISZ	MTBP2	/STORE IN BUFFER	XMAG0480
011151	211366	LAC	MTBTS			XMAG0490
011152	071272	DAC*	MTB72			XMAG0500
011153	211272	LAC	MTBP2	/IS BUFFER TWO		XMAG0510
011154	551270	SAD	MTREN2	/FULL NOW		XMAG0520
011155	741000	SKP		/YES		XMAG0530
011156	631100	JMP*	MTBUF	/NO-RETURN		XMAG0540
011157	211266	MTBUF5	LAC	MTB02	/INITIATE WRITING BUFFER	XMAG0550
011160	051272	DAC	MTBP2			XMAG0560
011161	111165	JMS	MTWT	/TWO ON TAPE		XMAG0570
011162	211265	LAC	MTB01	/RESET BUFFER ONE		XMAG0580
011163	051271	DAC	MTBP1	/POINTER		XMAG0590
011164	631100	JMP*	MTBUF			XMAG0600
						XMAG0610
						XMAG0620
						XMAG0630
						XMAG0640
						XMAG0650
						XMAG0660
						XMAG0670
						XMAG0680
						XMAG0690
						XMAG0700
						XMAG0710
						XMAG0720
						XMAG0730
						XMAG0740
						XMAG0750
						XMAG0760
						XMAG0770
						XMAG0780
						XMAG0790
						XMAG0800
						XMAG0810
						XMAG0820
						XMAG0830
						XMAG0840
						XMAG0850
						XMAG0860
						XMAG0870
						XMAG0880
						XMAG0890
						XMAG0900
						XMAG0910
						XMAG0920
						XMAG0930
						XMAG0940
						XMAG0950
						XMAG0960
						XMAG0970
						XMAG0980
						XMAG0990
						XMAG1000
						XMAG1010
						XMAG1020
						XMAG1030

/CHR PDP-9 JANUARY 1968
 /ROUTINE TO WRITE ONE RECORD ON
 /MAGNETIC TAPE IN PRESENT POSITION
 /OF TAPE.
 /ENTER WITH ORIGIN OF RECORD MINUS
 /ONE IN THE AC.
 / USES MCRT TO ASSURE UNIT READY.
 MTWT 0
 MTCR /IS CONTROL READY
 JMS MCRT
 DAC 33 /SET CURRENT ADDRESS
 LAM -400
 DAC 32
 LAC (044500) /COMMAND TO WRITE NORMAL MODE 556 BPI
 JMS MTRCOM
 ISZ MTRCCT /ADD ONE TO RECORD COUNTER
 JMP* MTWT
 /ROUTINE TO SERVICE INTERRUPT FROM
 /MAGTAPE UNIT
 MTSEV MTRC
 DAC MTSTAT
 SMA /ERROR?
 JMP MTSEV /NO
 AND (377600) /MAKE OUT ALL BUT ERROR BITS
 SAD (100000) /BOT IS OK AFTER REWIND
 JMP MTSEV
 SAD (010000) /EOF IS OK WHEN WRITTING
 JMP MTSEV
 SAD (140000)
 JMP MTSEV / ALREADY AT BOT
 SAD (120000)
 JMP MTSEV
 SAD (011000) / EOF AND BAD REC. LENGTH
 JMP MTSEV
 SAD (010200)
 SKP
 JMP .+4
 707312 / MTRC
 SAD (446500) / BAD TAPE ALRIGHT IF SPACING
 JMP MTSEV
 JMS PRIOR
 315252 /M
 307301 /AG

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011227 305240 305240 /E XMAG1040
011230 322322 322322 /RR XMAG1050
011231 322317 322317 /OR XMAG1060
011232 640252 640252 /P XMAG1070
011233 211273 LAC MTSTAT XMAG1080
011234 051376 DAC RWIG XMAG1090
011235 106526 JMS OCTOUT XMAG1100
011236 107077 JMS PRIOF XMAG1110
011237 640240 640240 /CRLF XMAG1120
011240 707322 MTAF XMAG1130
011241 607436 JMP RET XMAG1140
011242 707322 MTSEVI MTAF XMAG1150
011243 151264 DZM MF XMAG1160
011244 211261 LAC MWAIT XMAG1170
011245 151261 DZM MWAIT XMAG1180
011246 741200 SNA /IF WE WERE NOT WAITING THEN XMAG1190
011247 607436 JMP RET /RETURN XMAG1200
011250 151311 DZM MTC2 XMAG1210
011251 707321 MTCR /WAIT FOR CONTROL READY XMAG1220
011252 611256 JMP .+4 XMAG1230
011253 151263 DZM MTC3 XMAG1240
011254 211262 LAC CC XMAG1250
011255 631351 JMP MCRT XMAG1260
011256 451263 ISZ MTC3 XMAG1270
011257 611251 JMP .-6 XMAG1280
011260 611331 JMP MTERR1 XMAG1290
011261 000000 MWAIT 0 XMAG1300
011262 000000 CC 0 XMAG1310
011263 000000 MTC3 0 XMAG1320
011264 000000 MF 0 XMAG1330
011265 033377 MTB01 33400-1 / ORIGIN OF MAG BUFFER #1 -1 XMAG1340
011266 033777 MTB02 34000-1 / ORIGIN OF MAG BUFFER #2 -1 XMAG1350
011267 033777 MTBEN1 33777 / END OF MAG BUFFER #1 XMAG1360
011270 034377 MTBEN2 34377 / END OF MAG BUFFER #2 XMAG1370
011271 033377 MTBP1 33400-1 /POINTER OF MAG BUFFER #1 XMAG1380
011272 033777 MTBP2 34000-1 /POINTER OF MAG BUFFER #2 XMAG1390
011273 000000 MTSTAT 0 XMAG1400
/CHR POP9 JANUARY 1968 XMAG1410
/SET OF COMMANDS TO OPERATE MAGNETIC XMAG1420
/TAPE DECK XMAG1430
/ XMAG1440
/SUBROUTINE TO GIVE TAPE COMMANDS XMAG1450
MTCOM 0 XMAG1460
011274 000000 MTCR /IS CONTROL READY XMAG1470
011275 707321 JMS MCRT XMAG1480
011276 111351 MTLC XMAG1490
011277 707326 MTRR /IS UNIT READY XMAG1500
011300 707301 SKP /NO XMAG1510
011301 741000 JMP MTC1 /YES XMAG1520
011302 611306 ISZ MTC2 /TRY 262144 TIMES XMAG1530
011303 451311 JMP .-4 XMAG1540
011304 611300 JMP MTERR1 / GIVE UP AND SHUT DOWN TAPE XMAG1550
011305 611331 MTC1 MTGO XMAG1560
011306 707304 ISZ MF XMAG1570
011307 451264 JMP MTCOM XMAG1580
011310 631274 MTC2 0 XMAG1590
011311 000000 /COMMAND NOP TO MAKE SURE MAGTAPE IS READY XMAG1600
MTNOP JMS ADCCHK XMAG1610

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011313	216521	LAC	(040500)	/THIS COMMAND		XMAG1630	
011314	111274	JMS	MTCOM			XMAG1640	
011315	606257	JMP	RETC			XMAG1650	
011316	104041	MTEOF	JMS	ADCCHK		XMAG1660	
011317	451370	ISZ	TERBUF	/TERMINATE BUFFER		XMAG1670	
011320	111100	JMS	MTJUF			XMAG1680	
011321	111323	JMS	EOF			XMAG1690	
011322	606257	JMP	RETC			XMAG1700	
011323	000000	EOF	0			XMAG1710	
011324	216411	LAC	(045500)			XMAG1720	
011325	111274	JMS	MTCOM			XMAG1730	
011326	151373	DZM	MTRCCT			XMAG1740	
011327	451376	ISZ	RWFG			XMAG1750	
011330	631323	JMP*	EOF			XMAG1760	
		/MAGTAPE SHUT DOWN DUE TO BEING NOT READY					XMAG1770
011331	700002	MTERRI	IOF			XMAG1780	
011332	203323	LAC	CNOP			XMAG1790	
011333	043235	DAC	JMSBUF			XMAG1800	
011334	216424	LAC	(160000)			XMAG1810	
011335	072064	DAC*	SET+5	/ CMG		XMAG1820	
011336	051376	DAC	RWFG			XMAG1830	
011337	760073	LAW	73			XMAG1840	
011340	505046	AND	INDIC			XMAG1850	
011341	045046	DAC	INDIC			XMAG1860	
011342	705702	PNID				XMAG1870	
011343	107077	JMS	PRIOF			XMAG1880	
011344	301315		301315	/MA		XMAG1890	
011345	240307		240307	/G		XMAG1900	
011346	306317		306317	/OF		XMAG1910	
011347	640306		640306	/F		XMAG1920	
011350	605055	JMP	PANRET			XMAG1930	
		/MAGTAPE CONTROL READY TEST					XMAG1940
011351	000000	MCRT	0			XMAG1950	
011352	700002		IOF			XMAG1960	
011353	707321		MTCR			XMAG1970	
011354	741000		SKP			XMAG1980	
011355	631351	JMP*	MCRT	/OK RETURN		XMAG1990	
011356	051262	DAC	CC			XMAG2000	
011357	151261	DZM	MWAIT			XMAG2010	
011360	211264	LAC	MF			XMAG2020	
011361	741200	SNA				XMAG2030	
011362	611331	JMP	MTERRI			XMAG2040	
011363	451261	ISZ	MWAIT			XMAG2050	
011364	444106	ISZ	PANFLG			XMAG2060	
011365	605055	JMP	PANRET			XMAG2070	
011366	000000	MTBTS	0			XMAG2080	
011367	000000	MAGTPT	0			XMAG2090	
011370	000000	TERBUF	0			XMAG2100	
011371	000000	MAGRET	0	/ RETURN ADDRESS		XMAG2110	
011372	000000	MAGARG	0			XMAG2112	
011373	000000	MTRCCT	0	/ RECORD COUNTER		XMAG2120	
011374	034554	MTRCLM	34554	/ TOTAL # OF RECORDS		XMAG2130	
		/ MTRDWT	RCD	OCT. 1971		XMAG2140	
		/	JMS	MTRDWT		XMAG2150	
		/	0	/NULL		XMAG2160	
		/	HC			XMAG2170	
		/	CA			XMAG2180	
		/	#	FILES TO SKIP		XMAG2190	

011375	000000	/	FUNCTION: 3 FOR READ; 5 FOR WRITE. -1 ADDED TO FUNC.						
011376	000000	MAGUFL	0						XMAG2200
011377	000000	RWFG	0					/ 0-9K DUMP; 1-256 X 256 COINC DUMP.	XMAG2210
011400	211377	MTRDWT	0					/ REWIND FLAG	XMAG2220
011401	356335	LAC		MTRDWT					XMAG2230
011402	051372	TAD		(3)					XMAG2240
011403	356413	DAC		MAGARG					XMAG2250
011404	051371	TAD		(2)					XMAG2260
011405	451377	DAC		MAGRET					XMAG2262
011406	211376	ISZ		MTRDWT					XMAG2264
011407	741200	LAC		RWFG					XMAG2270
011410	611415	SNA						/ REWIND?	XMAG2280
011411	111453	JMP		..+5					XMAG2290
011412	231372	JMS		REWIND				/ YES	XMAG2300
011413	740200	LAC*		MAGARG					XMAG2310
011414	111436	SZA							XMAG2320
011415	451372	JMS		MSPACE				/ SPACE TO CORRECT FILE.	XMAG2330
011416	707321	ISZ		MAGARG					XMAG2340
011417	111351	MTCR						/ CONTROL READY?	XMAG2350
011420	231377	JMS		MCRT				/ NO	XMAG2360
011421	040032	LAC*		MTRDWT					XMAG2370
011422	451377	DAC		32				/ WC	XMAG2380
011423	750001	ISZ		MTRDWT					XMAG2390
011424	371377	CLC							XMAG2400
011425	040033	TAD*		MTRDWT					XMAG2410
011426	750001	DAC		33				/ CA-1	XMAG2420
011427	371372	CLC							XMAG2430
011430	660711	TAD*		MAGARG				/ FUNCTION-1	XMAG2440
011431	356521	ALSS		11					XMAG2450
011432	111274	TAD		(040500)				/ FORM READ OR WRITE	XMAG2460
011433	111351	JMS		MTCOM					XMAG2470
011434	750000	JMS		MCRT				/ WAIT 'TIL DONE	XMAG2480
011435	631371	CLA						/ NO ERROR	XMAG2500
011436	000000	MP*		MAGRET					XMAG2510
011437	101766	MSPACE		0					XMAG2520
011440	046304	JMS		COMPLM					XMAG2530
011441	707321	DAC		DIRCT2					XMAG2540
011442	111351	MTCR						/ MAG READY?	XMAG2550
011443	777000	JMS		MCRT				/ NO	XMAG2560
011444	040032	LAW		-1900				/ SET TO SPACE TO AN EQF	XMAG2570
011445	216522	DAC		32					XMAG2580
011446	111274	LAC		(046500)				/ SPACE FORWARD.	XMAG2590
011447	111351	JMS		MTCOM					XMAG2600
011450	446304	JMS		MCRT				/ WAIT UNTILL DONE	XMAG2610
011451	611443	ISZ		DIRCT2				/ DONE?	XMAG2620
011452	631436	JMP		..-6				/ NO	XMAG2630
011453	000000	JMP*		MSPACE					XMAG2640
011454	216523	REWIND		0					XMAG2650
011455	111274	LAC		(41500)					XMAG2660
011456	631453	JMS		MTCOM					XMAG2670
		JMP*		REWIND					XMAG2680
									XMAG2690
									X1020000
									X1020010
									X1020020
									X1020030
									X1020040
011457	216524	/SEQUENCE COMMANDS							X1020050
011460	051564	/FOR STORING A SEQUENCE							X1020060
		/OF PROGRAM INSTRUCTIONS							
		/							
		/PUNCH SEQUENCE ON PAPER TAPE							
		PSEQ		LAC					
				(31000)					
				DAC				/SET POINTER	

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011461	231564	LAC*	SEQPT		X1020070	
011462	741200	SNA		/ZERO TERMINATES	X1020080	
011463	611467	JMP	PSEQ1		X1020090	
011464	111600	JMS	PUNBIN		X1020100	
011465	451564	ISZ	SEQPT		X1020110	
011466	611481	JMP	.-5		X1020120	
011467	111600	PSEQ1	JMS	PUNBIN	X1020130	
011470	777740	LAW	-40	/PUNCH LEADER	X1020140	
011471	051564	DAC	SEQPT		X1020150	
011472	750000	CLA			X1020160	
011473	107347	JMS	PUNSH		X1020170	
011474	451564	ISZ	SEQPT		X1020180	
011475	611472	JMP	.-3		X1020190	
011476	606257	JMP	RETC		X1020200	
		/READ SEQ	FROM PAPER TAPE		X1020210	
011477	751001	GSEQ	SKPICLC		X1020220	
011500	750000	RSEQ	CLA		X1020230	
011501	042577	DAC	SH		X1020240	
011502	216524	LAC	(31000)	/ SET POINTER	X1020250	
011503	051564	DAC	SEQPT		X1020260	
011504	111565	JMS	RPAPER	/READ BINARY	X1020270	
011505	071564	DAC*	SEQPT		X1020280	
011506	451564	ISZ	SEQPT		X1020290	
011507	741200	SNA		/ZERO TERMINATES	X1020300	
011510	611515	JMP	CHECK		X1020310	
011511	211564	LAC	SEQPT	/PROTECT FROM BAD	X1020320	
011512	556525	SAD	(31076)	/ PAPER TAPE.	X1020330	
011513	606746	JMP	QMARK		X1020340	
011514	611504	JMP	.-10		X1020350	
011515	442577	CHECK	ISZ	SH	X1020360	
011516	611535	JMP	ESEQ		X1020370	
		/LIST DATA FOR SEQUENCE INSTRUCTIONS			X1020380	
011517	106737	LSEQ	JMS	CRLF	X1020390	
011520	216524	LAC	(31000)		X1020400	
011521	107000	JMS	MESAG		X1020410	
011522	606257	JMP	RETC		X1020420	
		/ACCEPT DATA FOR SEQUENCE			X1020430	
011523	211534	SEQ	LAC	SEQR	/SETUP TO INPUT DAT	X1020440
011524	052144	DAC	QA		X1020450	
011525	216524	LAC	(31000)	/ STARTING ADR. OF SEQ INFO.	X1020460	
011526	052244	DAC	ALBS		X1020470	
011527	052245	DAC	ALBSI		X1020480	
011530	152456	DZH	REAPT		X1020490	
011531	152712	DZH	TELPT		X1020500	
011532	777701	LAW	-77		X1020510	
011533	612175	JMP	QAAL		X1020520	
011534	606257	SEQR	JMP	RETC	X1020530	
		/EXECUTE SEQUENCE INSTRUCTIONS			X1020540	
011535	451563	ESEQ	ISZ	SEQPS	/SET THE SEQUENCE PRINT SWITCH	X1020550
011536	216526	LAC	(34377)		X1020560	
011537	040014	DAC	14	/MOVE INSTRUCTIONS TO TTY BUFFER	X1020570	
011540	216527	LAC	(30777)		X1020580	
011541	040015	DAC	15		X1020590	
011542	777700	LAW	-100		X1020600	
011543	051564	DAC	SEQPT		X1020610	
011544	220015	LAC*	15		X1020620	
011545	060014	DAC*	14		X1020630	
011546	741200	SNA			X1020640	

011547	611552	JMP	+3			X1020650	
011550	451564	ISZ	SEQPT			X1020660	
011551	611544	JMP	-5			X1020670	
011552	152456	DZM	REAPT	/SET TO START OF INSTRUCTIONS		X1020680	
011553	200014	LAC	14			X1020690	
011554	516530	AND	(77)			X1020700	
011555	040014	DAC	14			X1020710	
011556	744010	CLLIRAL				X1020720	
011557	340014	TAD	14			X1020730	
011560	356315	TAD	(1)			X1020740	
011561	052712	DAC	TELPT	/SET TO END OF INSTRUCTIONS		X1020750	
011562	606257	JMP	RETC			X1020760	
011563	000000	SEQPS	0	/PRINT SWITCH		X1020770	
011564	000000	SEQPT	0	/TEMP		X1020780	
		/READ PAPER TAPE					X1020790
011565	000000	RPAPER	0			X1020800	
011566	700314					X1020810	
011567	516511	1ORS		/PAPER READER OUT?		X1020820	
011570	556511	AND	(1000)			X1020830	
011571	606746	SAD	(1000)			X1020840	
011572	700002	JMP	QMARK	/YES		X1020850	
011573	700144	IC				X1020860	
011574	607436	RSB				X1020870	
011575	700112	JMP	RET			X1020880	
011576	700942	RPAPR	RRB			X1020890	
011577	631565	ION				X1020900	
		JMP*	RPAPER			X1020910	
		/PUNCH PAPER IN BINARY					X1020920
011600	000000	PUNBIN	0			X1020930	
011601	652000	LMQ				X1020940	
011602	777777	LAH	-3	/COUNT 3 FRAMES		X1020950	
011603	051615	DAC	PBCT			X1020960	
011604	211614	LAC	PBINR	/SET UP RETURN		X1020970	
011605	047347	DAC	PUNSH			X1020980	
011606	640606	LLS	6			X1020990	
011607	700244	PSB		/PUNCH BINARY		X1021000	
011610	607351	JMP	PUNSH+2			X1021010	
011611	451615	ISZ	PBCT			X1021020	
011612	611606	JMP	-4			X1021030	
011613	631600	JMP*	PUNBIN			X1021040	
011614	011611	PBINR	-3			X1021050	
011615	000000	PBCT	0			X1021090	
		/LISTING COMMAND					X1021100
011616	200226	LIST	LAC	ADCON		X1021110	
011617	740200		SZA			X1021120	
011620	105237	JMS	READCS			X1021130	
011621	107557	JMS	TIME			X1021140	
011622	101776	JMS	COUNT0			X1021150	
011623	103344	JMS	SCAER			X1021160	
011624	605055	JMP	PANRET			X1021170	
		/PRINT MESSAGE AND SINGLE					X1021180
		/DOUBLE. OR FLOATING NUMBER					X1021190
		/SNG	NUM	/FOR SINGLE		X1021200	
		/DBL	NUM	/FOR DOUBLE		X1021210	
		/FLT	NUM	/FOR FLOATING		X1021220	
		/EXAMPLE					X1021230
/		JMS	MIO			X1021240	
/		MESSI				X1021250	
/		SNG	NUM				

Address	Value	Instruction	Comments	Label	Hex Address
					X1021260
					X1021270
					X1021280
					X1021290
					X1021300
					X1021310
					X1021320
					X1021330
					X1021340
					X1021350
					X1021360
					X1021370
					X1021380
					X1021390
					X1021400
					X1021410
					X1021420
					X1021430
					X1021440
					X1021450
					X1021460
					X1021470
					X1021480
					X1021490
					X1021500
					X1021510
					X1021520
					X1021530
					X1021540
					X1021550
					X1021560
					X1021570
					X1021580
					X1021590
					X1021600
					X1021610
					X1021620
					X1021630
					X1021640
					X1021650
					X1021660
					X1021670
					X1021680
					X1021690
					X1021700
					X1021710
					X1021720
					X1021730
					X1021740
					X1021750
					X1021760
					X1021770
					X1021780
					X1021790
					X1021800
					X1021810
					X1021820
					X1021830

/ MESS2
 / FLT FNUM
 / JMP ECT /ANY INSTRUCTION TERMINATES EXCEPT CAL

FLT=300000
 DBL=200000
 SNG=100000
 MIO 0

MIO1

MIOF

MIO5
MESS3

MESS4

MESS5

(700000)
 (300000) /FLOATING
 MIOF /YES
 (100000) /SINGLE
 .+7 /YES
 /LAW -400 OR CLA

/POS. NUMBER

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011711	044040	MESS6	044040	/D	X1021840
011712	404040		404040		X1021850
011713	000000		0		X1021860
011714	064023	MESS7	064023	/F SING	X1021870
011715	111607		111607		X1021880
011716	000000		0		X1021890
011717	154023	MESS8	154023	/M SING	X1021900
011720	111607		111607		X1021910
011721	000000		0		X1021920
011722	235640	MESS9	235640	/S. REJ	X1021930
011723	220512		220512		X1021940
011724	000000		0		X1021950
011725	031711	MESS10	031711	/COIN	X1021960
011726	164040		164040		X1021970
011727	000000		0		X1021980
011730	035640	MESS11	035640	/C. REJ	X1021990
011731	220512		220512		X1022000
011732	000000		0		X1022010
011733	055640	MESS13	055640	/E. REJ	X1022020
011734	220512		220512		X1022030
011735	000000		0		X1022040
011736	220501	MESS16	220501	/REA	X1022050
011737	144024		144024	/T	X1022060
011740	000000		0		X1022070
011741	141126	MESS17	141126	/LIV	X1022080
011742	054024		054024	/ET	X1022090
011743	000000		0		X1022100
011744	404014	MESS18	404014	/L	X1022110
011745	050624		050624	/EFT	X1022120
011746	000000		0		X1022130
011747	454014	MESS19	454014	/L	X1022140
011750	112605		112605	/IVE	X1022150
011751	000000		0		X1022160
011752	164001	MESS22	164001	/N AREA	X1022170
011753	220501		220501		X1022180
011754	000000		0		X1022190
011755	074001	MESS25	074001	/O AREA	X1022200
011756	220501		220501		X1022210
011757	000000		0		X1022220
011760	030516	MESS26	030516	/CENT	X1022230
011761	245640		245640		X1022240
011762	000000		0		X1022250
011763	404023	MESS27	404023	/S.D.	X1022260
011764	560456		560456		X1022270
011765	000000		0		X1022280
011766	074040	MESS28	074040	/O F/M	X1022290
011767	065715		065715		X1022300
011770	000000		0		X1022310
011771	164040	MESS29	164040	/N F/M	X1022320
011772	065715		065715		X1022330
011773	000000		0		X1022340
011774	031716	MESS98	031716	/CON	X1022350
011775	030516		030516	/CEN	X1022360
011776	242201		242201	/TRA	X1022370
011777	241117		241117	/TIO	X1022380
012000	164000		164000	/N	X1022390
012001	000000	/ IF PFC NOT SET. SET QAM+5 TO SELECT APPR. VALUES SETVAR	0		X1022400
					X1022410

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012002	200092		LAC	XCTBKG		X1022420
012003	052237		DAC	QAM*5		X1022430
012004	632001		JMP*	SETVAR		X1022440
012005	440061	UPSET	ISZ	PFG		X1022450
012006	741000		SKP			X1022460
012007	140061	SETUP	DZM	PFG		X1022470
012010	112001		JMS	SETVAR		X1022480
012011	106737		JMS	CRLF		X1022490
012012	112144		JMS	QA		X1022500
012013	777777		LAW	-1		X1022510
012014	253045		XOR	MESS80	/ GAIN	X1022520
012015	030044		GAIN			X1022530
012016	413016		XCT	MESS81	/ INNER MANTEL	X1022540
012017	030047		IM			X1022550
012020	413022		XCT	MESS82	/ OUTER MANTEL	X1022560
012021	030051		OM			X1022570
012022	106737	SETU	JMS	CRLF		X1022580
012023	112001		JMS	SETVAR		X1022590
012024	112144		JMS	QA		X1022600
012025	777777		LAW	-1		X1022610
012026	412772		XCT	MESS83	/ PAPER PUNCH FLAG	X1022620
012027	030045		PTFG			X1022630
012030	412740		XCT	MESS84	/ DATA TO MAG FLAG	X1022640
012031	030055		HTFG			X1022650
012032	777760		LAW	-20		X1022660
012033	252745		XOR	MESS85	/ START TIME	X1022670
012034	030041		STATIM			X1022680
012035	252752		XOR	MESS86	/ STOP TIME	X1022690
012036	030042		STOTIM			X1022700
012037	413026		XCT	MESS87	/ TOP SPACING	X1022710
012040	030164		TOPS			X1022720
012041	413033		XCT	MESS88	/ BOTTOM SPACING	X1022730
012042	030205		BOTS			X1022740
012043	253043		XOR	MESS89	/ WEIGHT	X1022750
012044	030043		HEIGHT			X1022760
012045	412777		XCT	MESS90	/ LUNAR	X1022770
012046	030060		SALA			X1022780
012047	413002		XCT	MESS91	/ METEORITE	X1022790
012050	030101		SAMA			X1022800
012051	413006		XCT	MESS92	/ ISOTOPE	X1022810
012052	030122		SAIA			X1022820
012053	251774		XOR	MESS98	/ CONCENTRATION	X1022830
012054	030226		CONCEN			X1022840
012055	413012		XCT	MESS93	/ GENERAL	X1022850
012056	030143		SAGA			X1022860
012057	106737	SET	JMS	CRLF		X1022870
012060	112001		JMS	SETVAR		X1022880
012061	112144		JMS	QA		X1022890
012062	777777		LAW	-1		X1022900
012063	412733		XCT	MESS94	/ COIN MAG	X1022910
012064	030053		CHG			X1022920
012065	252756		XOR	MESS95	/ DUMP INTERVAL	X1022930
012066	030057		DDPI			X1022940
012067	252764		XOR	MESS96	/ LIVE TIME	X1022950
012070	030034		LIVEPS			X1022960
012071	200061		LAC	PFG		X1022970
012072	740200		SZA			X1022980
012073	612115		JMP	SEND		X1022990

012074	151373	DZN	MTRCCT		
012075	540051	SAD	BKOFLO	/ BKGF	X1023000
012076	612103	JMP	.+5	/ NO	X1023010
012077	238473	LAC*	(LIVEPS+400)		X1023020
012100	076474	DAC*	(LIVEPT+400)		X1023030
012101	076471	DAC*	(LIVEPH+400)		X1023040
012102	612115	JMP	SEND		X1023050
012103	232070	LAC*	SET+11	/ LIVEPS	X10230FU
012104	076350	DAC*	(LIVEPT)		X1023070
012105	076351	DAC*	(LIVEPH)		X1023080
012106	232066	LAC*	SET+7	/ DDPI	X1023090
012107	740001	CMA			X1023100
012110	356315	TAD	(1)		X1023110
012111	040056	DAC	DDFS		X1023120
012112	040055	DAC	DDFC		X1023130
012113	216413	LAC	(2)		X1023140
012114	040261	DAC	ABCT	/ BLOCK COUNT	X1023150
012115	106737	JMS	CRLF		X1023160
012116	107045	JMS	EXPIOP		X1023170
012117	760006	LAW	6	/TURN INDICATORS OFF.	X1023180
012120	105037	JMS	PINDOF		X1023190
012121	200051	LAC	BKOFLO		X1023200
012122	740200	SZA		/BKG OR FG?	X1023210
012123	605055	JMP	PANRET	/ BKG	X1023220
012124	203323	LAC	CNOP		X1023230
012125	043235	DAC	JMSBUF		X1023240
012126	232064	LAC*	SET+5	/ CMG	X1023250
012127	556417	SAD	(310000)	/ IS COIN EVENT DUMP A 'Y'	X1023260
012130	741000	SKP			X1023270
012131	612136	JMP	.+5	/ NO	X1023280
012132	760004	LAW	4	/ YES	X1023290
012133	105026	JMS	PINDON		X1023300
012134	203370	LAC	JMTB	/ SET JMS TO BUFFERING ROUTINE.	X1023310
012135	043235	DAC	JMSBUF		X1023320
012136	232066	LAC*	SET+7	/ DDPI	X1023330
012137	741200	SNA		/ IS DUMP INTERVAL NON-ZERO	X1023340
012140	612143	JMP	.+3		X1023350
012141	760002	LAW	2		X1023360
012142	105026	JMS	PINDON	/ YES TURN ON INDICATOR.	X1023370
012143	605055	JMP	PANRET		X1023380
		OCT	1970		X1023390
		/ CHR			X1023400
		/ HANDLE QUESTIONS AND ANSWERS OF NUMERIC AND			X1023410
		/ ALPHA DATA			X1023420
		/ ARGUMENT LIST IS TERMINATED BY ANY OTHER THAN LAW, XOR, XCT			X1023430
		/ LAW X SETS ALPHA INPUT LIMIT TO X CHARACTERS			X1023440
		/ XOR MESSX PRINTS MESSAGE X AND INDICATES NUMERIC DATA			X1023450
		/ XCT MESSX PRINTS MESSAGE X AND INDICATES ALPHA DATA			X1023460
		/ XCT AND XOR MUST BE FOLLOWED BY ADDRESS OF DATA			X1023470
012144	000000	QA	0		X1023480
012145	232144	LAC*	QA		X1023490
012146	516532	AND	(760000)	/ ALPHA?	X1023500
012147	556314	SAD	(400000)	/ YES	X1023510
012150	512165	JMP	QAA		X1023520
012151	556533	SAD	(240000)	/ NUMERIC?	X1023530
012152	612162	JMP	QAN	/ YES	X1023540
012153	556532	SAD	(760000)		X1023550
012154	741000	SKP			X1023560
012155	632144	JMP*	QA		X1023570

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012156	232144	LAC*	QA		X1023580	
012157	052247	DAC	ALSIZ	/ SET NUMBER OF WORDS TO BE ALLOWED	X1023590	
012160	452144	ISZ	QA	/ SHOULD BE ONE LESS THAN NUMBER IN	X1023600	
012161	612145	JMP	QA+1	/ STORAGE AREA	X1023610	
		/ INPUT NUMERIC			X1023620	
012162	112232	QAN	JMS	QAI	/ PRINT MESSAGE ASSOCIATED WITH VARIABLE	X1023630
012163	112250	JMS	N10	/ NUMBER 1/0	X1023640	
012164	612145	JMP	QA+1		X1023650	
		/ INPUT ALPHA			X1023660	
012165	112232	QAA	JMS	QAM	X1023670	
012166	052244	DAC	ALBS		X1023680	
012167	052245	DAC	ALBS1		X1023690	
012170	107000	JMS	MESAG		X1023700	
012171	200061	LAC	PFG	/ PRINT ONLY	X1023710	
012172	740200	SZA			X1023720	
012173	612145	JMP	QA+1	/ YES	X1023730	
012174	212247	LAC	ALSIZ	/ SIZE OF AREA -1	X1023740	
012175	052246	GAAI	DAC	ALSIZC	X1023750	
012176	106737	JMS	CRLF		X1023760	
012177	750000	CLA			X1023770	
012200	112222	JMS	QAR	/ GET FIRST CHARACTER	X1023780	
012201	452245	ISZ	ALBS1		X1023790	
012202	172244	DZM*	ALBS	/ INITIALIZE TO ZERO	X1023800	
012203	172245	DZM*	ALBS1	/ ZERO LAST WORD	X1023810	
012204	640614	LLS	14	/ MOVE TO HIGH	X1023820	
012205	112222	JMS	QAR		X1023830	
012206	640606	LLS	6	/ MOVE TO CENTER	X1023840	
012207	112222	JMS	QAR		X1023850	
012210	112222	JMS	QAR	/ LEAVE IN LOW AND GET NEXT ONE	X1023860	
012211	452244	ISZ	ALBS		X1023870	
012212	452246	ISZ	ALSIZC	/ FULL	X1023880	
012213	612201	JMP	-12	/ NO	X1023890	
012214	760334	LAW	334	/ PRINT BACKSLASH FOR OVERFLOW	X1023900	
012215	106752	JMS	PRINT		X1023910	
012216	112366	JMS	READ	/ FINISH READING INPUT	X1023920	
012217	741200	SNA			X1023930	
012220	612145	JMP	QA+1		X1023940	
012221	612214	JMP	-5		X1023950	
012222	000000	QAR	0		X1023960	
012223	372244	TAD*	ALBS	/ COMBINE NEW CHARACTER WITH OLD	X1023970	
012224	072244	DAC*	ALBS		X1023980	
012225	112366	JMS	READ	/ GET NEXT CHARACTER FROM READF SO AS	X1023990	
012226	745200	SNAICLL			X1024000	
012227	612145	JMP	QA+1	/ ZERO TERMINATES	X1024010	
012230	650000	CLO			X1024020	
012231	632222	JMP*	QAR		X1024030	
		/ MESSAGE PRINTER FOR QA			X1024040	
012232	000000	QAM	0		X1024050	
012233	106737	JMS	CRLF		X1024060	
012234	232144	LAC*	QA	/ GET MESSAGE ADDRESS	X1024070	
012235	452144	ISZ	QA		X1024080	
012236	107000	JMS	MESAG		X1024090	
012237	750000	CLA		/LAW -400 OR CLA	X1024100	
012240	372144	TAD*	QA	/RETURN WITH VARIABLE ADDRESS	X1024110	
012241	516420	AND	(37777)		X1024120	
012242	452144	ISZ	QA	/ IN AC	X1024130	
012243	632232	JMP*	QAM		X1024140	
012244	000000	ALBS	0		X1024150	

012245	000000	ALBSI	0					
012246	000000	ALSiZC	0				X1024160	
012247	000000	ALSiZ	0				X1024170	
		/ OUTPUT NUMBER AND CHANGE IF INPUT :S PRESENT						X1024180
012250	000000	NIC	0				X:024190	
012251	516420	AND	(37,77)				X1024200	
012252	052273	DAC	NIOA		/ ADDRESS OF NUMBER		X1024210	
012253	777774	LAW	-4				X1024220	
012254	106544	JMS	MULTSP				X1024230	
012255	232273	LAC*	NIOA				X1024240	
012256	744000	CLL					X1024250	
012257	113476	JMS	STRPCH		/ SKIP IF NOT IN STRIP.		X1024260	
012260	112274	JMS	SCIA				X1024270	
012261	106554	JMS	DECPRT		/ PRINT NUMBER		X1024280	
012262	200061	LAC	PFG		/ WAIT FOR INPUT		X1024290	
012263	740200	SZA					X1024300	
012264	632250	JMP*	NIO		/ NO		X1024310	
012265	777774	LAW	-4				X1024320	
012266	106544	JMS	MULTSP				X1024330	
012267	112461	JMS	DECIN				X1024340	
012270	440062	IS*	AINF		/ WAS ANY INPUT		X1024350	
012271	072273	DAC*	NIOA		/ YES		X1024360	
012272	632250	JMP*	NIO				X1024370	
012273	000000	NIOA	0				X1024380	
012274	000000	SCIA	0				X1024390	
012275	664000	GSM					X1024400	
012276	741400	SZL					X1024410	
012277	356315	TAD	(1)				X1024420	
012300	632274	JMP*	SCIA				X1024430	
		/ COMMAND DECODER						X1024440
012301	212374	CDDC	LAC	READF	/ HAS READ BEEN CALLED?		X1024450	
012302	740200		SZA				X1024460	
012303	612370		JMP	READ*2	/ YES RETURN THROUGH READ		X1024470	
012304	152364	CMRET	DZM	TELMQ			X1024480	
012305	140061		DZM	PFG			X1024490	
012306	112405		JMS	REAUNP	/ GET ONE 6 BIT CHARACTER		X1024495	
012307	052365		DAC	READT			X1024500	
012310	556354		SAD	(40)			X1024510	
012311	750000		CLA				X1024520	
012312	556355		SAD	(76)			X1024530	
012313	750000		CLA				X1024540	
012314	741200		SNA				X1024550	
012315	612331		JMP	CDDC1			X1024560	
012316	212364		LAC	TELMQ			X1024570	
012317	652000		LMQ				X1024580	
012320	744200		SZAI CLL				X1024590	
012321	612324		JMP	.+3			X1024600	
012322	212365		LAC	READT	/ PACK FOR COMMAND		X1024610	
012323	640506		LRS*5				X1024620	
012324	212365		LAC	READT			X1024630	
012325	640503		LRS*3				X1024640	
012326	641002		LACQ				X1024650	
012327	052364		DAC	TELMQ	/ SAVE FOR FOR NEXT TIME		X1024660	
012330	612305		JMP	CMRET*1	/ GO GET ANOTHER		X1024670	
012331	212364	CDDC1	LAC	TELMQ	/ CHECK FOR ZERO		X1024680	
012332	741200		SNA				X1024690	
012333	612304		JMP	CMRET			X1024700	
012334	215711		LAC	UNITSV			X1024710	
							X1024720	

012335	100743		JMS	D2		X1024730
012336	217640		LAC	17640	/ CA=0 FOR NO OVRLAY-17777 FOR OVRLAY	X1024740
012337	740200		SZA			X1024750
012340	112344		JMS	CDDC3		X1024760
012341	200363		LAC	ALIST	/ LIST OF COMMANDS	X1024770
012342	112344		JMS	CDDC3		X1024780
012343	606746		JMP	QMARK		X1024790
012344	000000	CDDC3	0			X1024800
012345	040010		DAC	10		X1024810
012346	220010		LAC*	10		X1024820
012347	552364		SAD	TELMQ	/ MATCH?	X1024830
012350	612355		JMP	CDDC2		X1024840
012351	741200		SNA		/ END OF LIST?	X1024850
012352	632344		JMP*	CDDC3	/ YES	X1024860
012353	440010		ISZ	10		X1024870
012354	612346		JMP	.-6		X1024880
012355	220010	CDDC2	LAC*	10		X1024890
012356	052362		DAC	.*4		X1024900
012357	503323		AND	CNOP	/ ADDRESSES FIRST 16K	X1024910
012360	755200		SNAICLAICLL			X1024920
012361	632362		JMP*	.*1	/ GO TO UPPER CORE.	X1024930
012362	740040		XX			X1024940
012363	606257		JMP	RETL		X1024950
012364	000000	TELMQ	0			X1024960
012365	000000	READT	0			X1024970
		/ GET ONE	6 BIT CHARACTER FROM INPUT BUFFER			X1024980
012366	000000	READ	0			X1024990
012367	452374		ISZ	READF		X1025000
012370	112405		JMS	REAUNP		X1025010
012371	052714		DAC	TC		X1025020
012372	152374		DZM	READF		X1025030
012373	632366		JMP*	READ		X1025040
012374	000000	READF	0			X1025050
012375	000000	OSIP	0			X1025060
012376	000000	READ1	0			X1025070
012377	750001		CLC		/ DEMAND 1 CHAR FROM KEYBOARD.	X1025080
012400	052375		DAC	OSIP		X1025090
012401	607436		JMP	RET		X1025100
012402	152456		DZM	REAPT		X1025104
012403	152712		DZM	TELPT		X1025105
012404	607436		JMP	RET		X1025106
012405	000000	REAUNP	0			X1025110
012406	212456		LAC	REAPT	/ IS BUFFER EMPTY	X1025120
012407	552712		SAD	TELPT		X1025130
012410	612402		JMP	REAUNP-3	/ YES	X1025140
012411	673323		673327		/ 3 PER WORD	X1025150
012412	000003		3			X1025160
012413	052460		LAC	REATT		X1025170
012414	641002		LACQ			X1025180
012415	352710		TAD	TELBS	/ ADD BASE	X1025190
012416	052457		DAC	REAPT1		X1025200
012417	212460		LAC	REATT		X1025210
012420	653122		MUL			X1025220
012421	000006		6		/ COMPUTE NUMBER OF SHIFTS	X1025230
012422	641002		LACQ			X1025240
012423	356534		TAD	(640500	/ LRS	X1025250
012424	052430		DAC	.*4		X1025260
012425	356316		TAD	(100)	/ CHANGE TO LLS	X1025270

012426	052432	DAC	.+4		X1025280
012427	216535	LAC	(770000)	/ WILL BECOME	X1025290
012430	740040	XX		/ 770000. 007700. OR 000077	X1025300
012431	532457	AND ^o	REAPT1		X1025310
012432	740040	XX		/ MOVE TO XX00C0 FROM 00XX00 OR 0000XX	X1025320
012433	640514	LRS	14	/ MOVE TO 0000XX	X1025330
012434	652000	LMQ			X1025340
012435	452456	ISZ	REAPT	/ MOVE POINTER AHEAD	X1025350
012436	212456	LAC	REAPT	/ AT END OF BUFFER	X1025360
012437	552711	SAD	TELZ2		X1025370
012440	152456	DZM	REAPT	/ YES	X1025380
012441	211563	LAC	SEQPS	/SEQUENCE PRINT SWITCH	X1025390
012442	741200	SNA			X1025400
012443	612454	JMP	.+11		X1025410
012444	641002	LACQ			X1025420
012445	741200	SNA			X1025430
012446	632405	JMP ^o	REAUNP		X1025440
012447	356461	TAD	(-40)	/CONVERT TO ASCII	X1025450
012450	741100	SPA			X1025460
012451	356316	TAD	(100)		X1025470
012452	356462	TAC	(240)		X1025480
012453	106752	JMS	PRINT		X1025490
012454	641002	LACQ			X1025500
012455	632405	JMP ^o	REAUNP		X1025510
012456	000090	REAPT	0		X1025520
012457	000000	REAPT1	0		X1025530
012460	000000	REATT	0		X1025540
				/ DECIMAL INPUT ROUTINE	X1025550
				/ JMS DECIN	X1025560
				/ AINF WILL BE SET TO -1 IF NO NUMBER HAS INPUT	X1025570
012461	000000	DECIN	0		X1025580
012462	750001	CLC			X1025590
012463	040062	DAC	AINF	/ ANY IN FLAG	X1025600
012464	113666	JMS	FCLA		X1025610
012465	113506	JMS	FFIX		X1025620
012466	112366	DE1	JMS	READ	X1025630
012467	356536	TAD	(-60)		X1025640
012470	052531	DAC	TC1		X1025650
012471	741100	SPA			X1025660
012472	612506	JMP	DE2		X1025670
012473	356537	TAD	(-12)		X1025680
012474	740100	SMA			X1025690
012475	612506	JMP	DE2	/ NON NUMERIC TERMINATES	X1025700
012476	440062	ISZ	AINF		X1025710
012477	740000	NOP			X1025720
012500	113051	JMS	FINT		X1025730
012501	556505	F MULIS	(12)	/ MUL BY 10	X1025740
012502	352531	FADDIS	TC1		X1025750
012503	113506	JMS	FFIX	/ FIX INTO BC,BC+1,BC+2,BC+3	X1025760
012504	113112	JMS	FEXT		X1025770
012505	612466	JMP	DE1		X1025780
012506	212714	DE2	LAC	TC	X1025790
012507	556355	SAD	(76)	/ALTMODE	X1025800
012510	612527	JMP	DE3		X1025810
012511	556336	SAD	(54)	/COMMA	X1025820
012512	612527	JMP	DE3		X1025830
012513	556354	SAD	(40)	/ SPACE	X1025840
012514	612527	JMP	DE3		X1025850

012515	556357	SAC	(57)	/ SLASH	X1025860
012516	612527	JMP	DE3		X1025870
012517	556352	SAD	(53)	/ PLUS	X1025880
012520	612527	JMP	DE3		X1025890
012521	556353	SAD	(55)	/ MINUS	X1025900
012522	612527	JMP	DE3		X1025910
012523	556356	SAD	(57)	/ ASTRIX	X1025920
012524	612527	JMP	DE3		X1025930
012525	740200	SZA			X1025940
012526	606746	JMP	OMARK		X1025950
012527	113545	DE3	JMS	FSIGN	X1025960
012530	632461		JMP*	DECIN	X1025970
012531	000000	TC1	0		X1025980
		/ TELETYPE INPUT BUFFER PACKING ROUTINE			X1025990
012532	000000	TELPK	0		X1026000
012533	673000		673000	/ PSL, LMQ, CLA.	X1026010
012534	640323	DIV			X1026020
012535	000903		3		X1026030
012536	052552	DAC	TELST	/ 0.1.2 INDICATING POSITION IN WORD	X1026040
012537	641002	LACQ			X1026050
012540	352710	TAD	TELBS	/ BASE ADDRESS	X1026060
012541	052713	DAC	TELPT1	/ WORD ADDRESS	X1026070
012542	212552	LAC	TELST		X1026080
012543	653122	MUL		/ COMPUTE SHIFTS	X1026090
012544	000006		5		X1026100
012545	641002	LACQ			X1026110
012546	356534	TAD	(640500)	/ LONG RIGHT SHIFT	X1026120
012547	052554	DAC	TELST1		X1026130
012550	052557	DAC	TELST2		X1026140
012551	632532	JMP*	TELPK		X1026150
012552	000000	TELST	0		X1026160
012553	670614		670614	/CLO,LLSS 14-ISOLATE 6 BITS AND SHIFT	X1026170
012554	000000	TELST1	0	/ TO XX0000, 00XX00, OR 0000XX	X1026180
012555	052554	DAC	TELST1		X1026190
012556	754002	CLAISTL		/ DEVELOPE MASK TO BE	X1026200
012557	000000	TELST2	0	/ 000000, 770000, OR 777700	X1026210
012560	532713	AND*	TELPT1		X1026220
012561	352554	TAD	TELST1	/ COMBINE	X1026230
012562	072713	DAC*	TELPT1		X1026240
012563	632552	JMP*	TELST		X1026250
		/ TELETYPE BUFFER FILLING ROUTINE			X1026260
012564	740000	TEL	NOP		X1026270
012565	212712	LAC	TELPT		X1026280
012566	112532	JMS	TELPK	/ INIT PACK	X1026290
012567	700312	KRB			X1026300
012570	700042	ION			X1026310
012571	046725	DAC	TS1		X1026320
012572	556540	SAD	(203)	/ C.C	X1026330
012573	612646	JMP	TEL3		X1026340
012574	452375	ISZ	OSIP		X1026350
012575	741000	SKP			X1026360
012576	632376	JMP*	READ1		X1026370
012577	152375	DZM	OSIP		X1026380
012600	151563	DZM	SEQPS		X1026390
012601	556403	SAD	(377)	/ RUBOUT	X1026400
012602	612630	JMP	TEL1		X1026410
012603	556410	SAD	(215)	/ C.R.	X1026420
012604	612700	JMP	TEL2		X1026430

012605	556541		SAD	(225)	/ C.U	
012606	612657		JMP	TEL4		X1026440
012607	556542		SAD	(220)	/ C P	X1026450
012610	612646		JMP	TEL3		X1026460
012611	556543		SAD	(212)	/ L.F	X1026470
012612	612672		JMP	TEL5		X1026480
012613	556544		SAD	(273)	/ SEMICOLON	X1026490
012614	612701		JMP	TEL8		X1026500
012615	556545		SAD	(376)	/ ALTMODE	X1026510
012616	612675		JMP	TEL6		X1026520
012617	112552	TEL7	JMS	TELST	/ PACK CHARACTER	X1026530
012620	452712		ISZ	TELPT		X1026540
012621	212712		LAC	TELPT		X1026550
012622	552711		SAD	TELZZ		X1026560
012623	612630		JMP	TELI	/ DON'T INPUT TOO MANY CHARS.	X1026570
012624	112532		JMS	TELPK		X1026580
012625	452713		ISZ	TELPT1		X1026590
012626	172713		DZM*	TELPT1		X1026600
012627	607436		JMP	RET		X1026610
012630	212712	TELI	LAC	TELPT		X1026620
012631	552456		SAC	REAPT	/ DON'T ALLOW TOO MANY RUBOUTS	X1026630
012632	607436		JMP	RET		X1026640
012633	356337		TAD	(-1)		X1026650
012634	741100		SPA			X1026660
012635	216546		LAC	(274)		X1026670
012636	052712		DAC	TELPT		X1026680
012637	112532		JMS	TELPK	/ INIT PACK	X1026690
012640	750000		CLA		/ STORE 00	X1026700
012641	112552		JMS	TELST		X1026710
012642	760334		LAW	334		X1026720
012643	106752		JMS	PRINT		X1026730
012644	607436		JMP	RET		X1026740
012645	000000		O			X1026750
012646	212645	TEL3	LAC	TEL3-1	/CHECK IN CASE WE ARE ALREADY COUNTING	X1026760
012647	740200		SZA			X1026770
012650	607436		JMP	RET		X1026780
012651	440006		ISZ	STPOUT	/CONTROL C OR P	X1026790
012652	452645		ISZ	TEL3-1		X1026800
012653	612652		JMP	-1		X1026810
012654	140006		DZM	STPOUT		X1026820
012655	152375		DZM	OSIP		X1026830
012656	700112		RRB		/ CLEAR PAPER READER	X1026840
012657	760336	TEL4	LAW	336	/ CONTROL U OR P	X1026845
012660	106752		JMS	PRINT		X1026850
012661	750100		LAW	100		X1026860
012662	346725		TAD	TSI		X1026870
012663	106752		JMS	PRINT		X1026880
012664	740061		DZM	PFG		X1026890
012665	152712		DZM	TELPT		X1026900
012666	152456		DZM	REAPT		X1026910
012667	152364		DZM	TELMO		X1026920
012670	152374		DZM	READF		X1026930
012671	106737		JMS	CRLF		X1026940
012672	760212	TELS	LAW	212	/ LINE FEED	X1026950
012673	106752		JMS	PRINT		X1026960
012674	607436		JMP	RET		X1026970
012675	106737	TELG	JMS	CRLF	/ ALT MODE	X1026980
012676	216355		LAC	(76)		X1026990
						X1027000

012677	612617		JMP	TEL7	X1027010
012700	106737	TEL2	JMS	CRLF	X1027020
012701	754000	TELB	CLAICLL		X1027030
012702	112552		JMS	TELST	X1027040
012703	452712		ISZ	TELPT	X1027050
012704	212712		LAC	TELPT	X1027060
012705	552711		SAO	TELZZ	X1027070
012706	152712		DZM	TELPT	X1027080
012707	512301		JMP	CDDC	X1027090
012710	034400	TELB5	34400		X1027100
012711	000275	TELZZ	275		X1027110
012712	000000	TELPT	0		X1027120
012713	000000	TELPT1	0		X1027130
012714	000000	TC	0	/ TERMINATING CHARACTER ON DECIN	X1027160
		/ ZERO OUT SETUP VARIABLES			X1027170
012715	400052	ISET	XCT	XCTBKG	X1027180
012716	346133		TAD	DECNMA	X1027200
012717	040255		DAC	ZERTEM	X1027210
012720	777440		LAW	-340	X1027220
012721	101636		JMS	ZEROUT	X1027230
012722	606257		JMP	RETC	X1027240
012723	112001	SPACE	J.S	SETVAR	X1027250
012724	112144		JMS	QA	X1027260
012725	760021		LAW	21	X1027270
012726	413026		XCT	MESS87	X1027280
012727	030164		TCPS		X1027290
012730	413033		XCT	MESS88	X1027300
012731	030205		BOTS		X1027310
012732	606257		JMP	RETC	X1027320
012733	031711	MESS94	071711	/ COI	X1027330
012734	164024		164024	/ N T	X1027340
012735	174015		174015	/ O M	X1027350
012736	010772		010772	/ AG:	X1027360
012737	400000		400000		X1027370
012740	040124	MESS84	040124	/ DAT	X1027380
012741	014024		014024	/ A T	X1027390
012742	174015		174015	/ O M	X1027400
012743	010772		010772	/ AG:	X1027410
012744	400000		400000	/ SPACE	X1027420
012745	232401	MESS85	232401	/ STA	X1027430
012746	222440		222440	/ RT	X1027440
012747	241115		241115	/ TIM	X1027450
012750	057240		057240	/ E:	X1027460
012751	000000		0		X1027470
012752	232417	MESS86	232417	/ STO	X1027480
012753	204024		204024	/ PT	X1027490
012754	111505		111505	/ IME	X1027500
012755	724000		724000	/ :	X1027510
012756	042515	MESS95	042515	/ DUM	X1027520
012757	204011		204011	/ P I	X1027530
012760	162405		162405	/ NTE	X1027540
012761	222601		222601	/ RVA	X1027550
012762	147240		147240	/ L	X1027560
012763	000000		0		X1027570
012764	202205	MESS96	202205	/ PRE	X1027580
012765	230524		230524	/ SET	X1027590
012766	401411		401411	/ LI	X1027600
012767	260540		260540	/ VE	X1027610

012770	241115		241115	/ TIM	
012771	057200		057200	/ E:	X!027620
012772	202516	MESS83	202516	/ PUN	X1027630
012773	031040		031040	/ CH	X1027640
012774	200120		200120	/ PAP	X1027650
012775	052272		052272	/ ER	X1027660
012776	400000		400000		X1027670
012777	142516	MESS90	142516	/ LUN	X1027680
013000	012272		012272	/ AR	X1027690
013001	400000		400000		X1027700
013002	150524	MESS91	150524	/ MET	X1027710
013003	051722		051722	/ EOR	X1027720
013004	112405		112405	/ ITE	X1027730
013005	724000		724000	/	X1027740
013006	112317	MESS92	112317	/ ISO	X1027750
013007	241720		241720	/ TOP	X1027760
013010	057240		057240	/ E	X1027770
013011	000000		0		X1027780
013012	070516	MESS93	070516	/ GEN	X1027790
013013	052201		052201	/ ERA	X1027800
013014	147240		147240	/ L	X1027810
013015	000000		0		X1027820
013016	114015	MESS81	114015	/ I M	X1027830
013017	011624		011624	/ ANT	X1027840
013020	140572		140572	/ EL	X1027850
013021	400000		400000		X1027860
013022	174015	MESS82	174015	/ O M	X1027870
013023	011624		011624	/ ANT	X1027880
013024	140572		140572	/ EL	X1027890
013025	400000		400000		X1027900
013026	241720	MESS87	241720	/ TOP	X1027910
013027	402320		402320	/ SP	X1027920
013030	010311		010311	/ ACI	X1027930
013031	160772		160772	/ NG	X1027940
013032	400000		400000		X1027950
013033	021724	MESS88	021724	/ BOT	X1027960
013034	402320		402320	/ SP	X1027970
013035	010311		010311	/ ACI	X!027980
013036	160772		160772	/ NG	X1027990
013037	400000		400000		X1028000
013040	220505	MESS97	220505	/ REE	X1028010
013041	147240		147240	/ L	X1028020
013042	000000		0		X1028030
013043	270511	MESS89	270511	/ HEI	X1028040
013044	071024		071024	/ GHT	X1028050
013045	724000		724000		X1028060
013046	070111	MESS80	070111	/ GAI	X1028070
013047	167240		167240	/ N	X1028080
013050	000000		0		X1028090
					X1028100
					XMFP0000
					XMFP0010
					XMFP0020
					XMFP0030
					XMFP0040
					XMFP0050
					XMFP0060
					XMFP0070
					XMFP0080
					XMFP0090

/ MINI FP
/ CHR AUG 1970
/ FLOATING POINT PACKAGE WITH LIMITED FUNCTIONS
/ FMUL, FDIV, FADD, & SOR TAKEN FROM PACKAGE BY HRM
/ ENTER BY JMS DINT
/ INDIRECT WILL AUTOMATICALLY INCREMENT POINTER
/ BY ONE IF SINGLE AND BY THREE IF FLOATING
/ 'JMS FEXT' WILL EXIT
/ 'JMS', 'ISZ' AND 'JMP' ARE LEGAL INTERPRETIVE INSTRUCTIONS

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/ HOWEVER THE SUBROUTINE ENTERED BY 'JMS' MUST BE NORMAL MODE
/ FXXXIS MEANS ARGUMENT IS POSITIVE 18 BIT INTEGER
/ FLOATING POINT INSTRUCTIONS
FLAC=200000      / (LAC)      LOAD FAC
FOAC=000000     / (CAL)      DEPOSITE FAC
FAAD=300000     / (AOD)      ADD TO FAC
FMUL=500000     / (AND)      MUL FAC
FDIV=700000     / (IOT)     DIV FAC
S=40000         / INDICATES INTEGER ARGUMENT
/ FLOATING POINT INTERPRETOR
FINT 0
          DZM      DM      / SET DATA MCDE TO 3 WORD
          LAC      FINT
          AND      (60000) / GET EXTENDED MEMORY BITS
          LMQ
          LAC*     FINT    / PICKUP INSTRUCTION
          AND      (17777)
          OMQ
          DAC      ADR     / ADDRESS
          LAC*     FINT    / SAVE
          AND      (40000) / PRECISION
          DAC      FPRE    / INDICATOR
          LAC*     FINT
          AND      (20000) / INDIRECT?
          SNA/CLL
          JMP      FINT1   / NO
          LAC*     ADR
          DAC      ADR
          LAC*     FINT
FINT1 LRS      17      / GET OP CODE
          TAD      .+4
          DAC      .+2
          LAC      ACS    / PICKUP AC ARGUMENT INCASE OF JMS
          0
          JMP      .+1
          JMP      JDAC   / 0 - FOAC
          JMP      JJMS   / 1 - JMS
          JMP      JLAC   / 2 - FLAC
          JMP      JAOD   / 3 - FTAD
          JMP      JISZ   / 4 - ISZ
          JMP      JMUL   / 5 - FMUL
          JMP      JJMP   / 6 - JMP
          JMP      JOIV   / 7 - FDIV
          0          / EXIT FROM INTERPRETOR
          ISZ      FINT
          JMP*     FINT
          JJMS     ADR    / EFFECT A REGULAR JMS
          FNEXT   FINT   / GET NEXT INSTRUCTION
          NOP
          JMP      FINT+2
          JJMP    LAC    / EFFECT A REGULAR JMP
          DAC     FINT
          JMP     FINT+2
          JISZ   ISZ*   / EFFECT A REGULAR ISZ
          SKP
          ISZ    FINT
          JMP    FNEXT
          JDAC   LAC    / FLOATING?
          FPRE
    
```

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XMFP0090
XMFP0100
XMFP0110
XMFP0120
XMFP0130
XMFP0140
XMFP0150
XMFP0160
XMFP0170
XMFP0180
XMFP0190
XMFP0200
XMFP0210
XMFP0220
XMFP0230
XMFP0240
XMFP0250
XMFP0260
XMFP0270
XMFP0280
XMFP0290
XMFP0300
XMFP0310
XMFP0320
XMFP0330
XMFP0340
XMFP0350
XMFP0360
XMFP0370
XMFP0380
XMFP0390
XMFP0400
XMFP0410
XMFP0420
XMFP0430
XMFP0440
XMFP0450
XMFP0460
XMFP0470
XMFP0480
XMFP0490
XMFP0500
XMFP0510
XMFP0520
XMFP0530
XMFP0540
XMFP0550
XMFP0560
XMFP0570
XMFP0580
XMFP0590
XMFP0600
XMFP0610
XMFP0620
XMFP0630
XMFP0640
XMFP0650
XMFP0660
    
```

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013051 000000
013052 155220
013053 213051
013054 516342
013055 652000
013056 233051
013057 516460
013060 640002
013061 053423
013062 233051
013063 516343
013064 053424
013065 233051
013066 516453
013067 745200
013070 613073
013071 233423
013072 053423
013073 233051
013074 640517
013075 353101
013076 053100
013077 213425
013100 000000
013101 613102
013102 613130
013103 613115
013104 613166
013105 613171
013106 613124
013107 613247
013110 613121
013111 613335
013112 000000
013113 453051
013114 633051
013115 133423
013116 453051
013117 740000
013120 613053
013121 213423
013122 053051
013123 613053
013124 473423
013125 741000
013126 453051
013127 613116
013130 213424
    
```

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FINT1
FEXT
JJMS
FNEXT
JJMP
JISZ
JDAC
    
```

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013131	741200	SNA				
013132	613137	JMP	.+5	/ YES		XMFP0670
013133	113506	JMS	FFIX	/ NO-INTEGER		XMFP0680
013134	113545	JMS	FSIGN			XMFP0690
013135	073423	DAC*	ADR			XMFP0700
013136	613116	JMP	FNEXT			XMFP0710
013137	213417	LAC	AC			XMFP0720
013140	746020	CLLIRTR				XMFP0730
013141	253421	XOR	AC+2			XMFP0740
013142	652000	LMQ				XMFP0750
013143	215220	LAC	DM			XMFP0760
013144	745200	SNAICLL		/ MODE?		XMFP0770
013145	744002	STL		/ 3		XMFP0780
013146	213422	LAC	AC+3			XMFP0790
013147	741400	SZL		/ DATA MODE 2?		XMFP0800
013150	613156	JMP	.+6	/ NO		XMFP0810
013151	516547	AND	(777000)	/ YES, PACK LOW MANTISSA		XMFP0820
013152	053416	DAC	BC+3	/ AND EXP INTO ONE WORD.		XMFP0830
013153	213420	LAC	AC+1			XMFP0840
013154	516550	AND	(777)			XMFP0850
013155	253416	XOR	BC+3			XMFP0860
013156	073423	DAC*	ADR	/ DEPOSIT 1ST WORD.		XMFP0870
013157	641002	LACQ				XMFP0880
013160	453423	ISZ	ADR			XMFP0890
013161	073423	DAC*	ADR	/ DEPOSIT 2ND WORD.		XMFP0900
013162	744400	SNLICLL		/ DATA MODE 3?		XMFP0910
013163	613116	JMP	FNEXT			XMFP0920
013164	213420	LAC	AC+1	/ YES		XMFP0930
013165	613160	JMP	.-5	/ STORE EXP		XMFP0940
013166	113554	JMS	ASET			XMFP0950
013167	113620	JMS	XAB			XMFP0960
013170	613116	JMP	FNEXT			XMFP0970
013171	113554	JMS	ASET			XMFP0980
013172	113714	JMS	BCZ	/ IS ADDEND ZERO?		XMFP0990
013173	613116	JMP	FNEXT	/ YES, DONE		XMFP1000
013174	113702	JMS	ACZ	/ IS AUGEND ZERO?		XMFP1010
013175	613167	JMP	JLAC+1	/ YES MOVE ADDEND TO FAC		XMFP1020
013176	113731	JMS	CASO	/ COMPARE MAGNITUDES		XMFP1030
013177	741100	CPA		/ IS ADDEND GREATER		XMFP1040
013200	113620	JMS	XAB	/ YES, EXCHANGE		XMFP1050
013201	213414	LAC	BC+1	/ CAL EXPONENT		XMFP1060
013202	101772	JMS	CIA	/ DIFFERENCE FOR		XMFP1070
013203	353420	TAD	AC+1	/ DENORMALIZATION		XMFP1080
013204	741201	SNAICMA		/ IS DIFFERENCE ZERO		XMFP1090
013205	613224	JMP	.+17			XMFP1100
013206	652004	LMQICHO		/ NO, SHIFT 'M' TO RIGHT		XMFP1110
013207	356361	TAD	(43)	/ UNTIL EXPONENTS		XMFP1120
013210	741100	SPA		/ ARE EQUAL		XMFP1130
013211	613116	JMP	FNEXT			XMFP1140
013212	641002	LACQ				XMFP1150
013213	256551	XOR	(660500)			XMFP1160
013214	053220	DAC	.+4			XMFP1170
013215	213416	LAC	BC+3			XMFP1180
013216	652000	LMQ				XMFP1190
013217	213415	LAC	BC+2			XMFP1200
013220	740040	XX				XMFP1210
013221	053415	DAC	BC+2			XMFP1220
013222	641002	LACQ				XMFP1230
						XMFP1240

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013223	053416	DAC	BC+3			XMFP1250
013224	113722	JMS	SGN	/ COMPARE SIGNS.		XMFP1260
013225	745200	CLL ISNA		/ DIFFERENT?		XMFP1270
013226	613237	JMP	.+11	/ NO		XMFP1280
013227	213416	LAC	BC+3	/ YES. COMPLEMENT 'MO'		XMFP1290
013230	101772	JMS	CIA			XMFP1300
013231	053416	DAC	BC+3			XMFP1310
013232	213415	LAC	BC+2			XMFP1320
013233	741401	SZL ICMA				XMFP1330
013234	356315	TAD	(1)			XMFP1340
013235	053415	DAC	BC+2			XMFP1350
013236	744000	CLL				XMFP1360
013237	213422	LAC	AC+3	/ PERFORM DOUBLE		XMFP1370
013240	353416	TAD	BC+3	/ PRECISION ADD		XMFP1380
013241	053422	DAC	AC+3			XMFP1390
013242	750010	GLK				XMFP1400
013243	353421	TAD	AC+2			XMFP1410
013244	353415	TAD	BC+2			XMFP1420
013245	053421	DAC	AC+2			XMFP1430
013246	613676	JMP	AOT	/ NORM AND LEAVE		XMFP1440
013247	113554	JMS	ASET			XMFP1450
013250	113722	JMS	SGN			XMFP1460
013251	053417	DAC	AC			XMFP1470
013252	213420	LAC	AC+1			XMFP1480
013253	353414	TAD	BC+1			XMFP1490
013254	053420	DAC	AC+1			XMFP1500
013255	213416	LAC	BC+3			XMFP1510
013256	744010	RCL				XMFP1520
013257	053270	DAC	.+11			XMFP1530
013260	053307	DAC	.+27			XMFP1540
013261	213415	LAC	BC+2			XMFP1550
013262	740010	RAL				XMFP1560
013263	053274	DAC	.+11			XMFP1570
013264	053324	DAC	.+40			XMFP1580
013265	153415	DZM	BC+2			XMFP1590
013266	213422	LAC	AC+3			XMFP1600
013267	653122	MUL				XMFP1610
013270	740040	HLT				XMFP1620
013271	053413	DAC	BC			XMFP1630
013272	213422	LAC	AC+3			XMFP1640
013273	653122	MUL				XMFP1650
013274	740040	HLT				XMFP1660
013275	053414	DAC	BC+1			XMFP1670
013276	641002	LACQ				XMFP1680
013277	353413	TAD	BC			XMFP1690
013300	053413	DAC	BC			XMFP1700
013301	745400	SZL ICLL				XMFP1710
013302	153414	ISZ	BC+1			XMFP1720
013303	745000	SKPICLL				XMFP1730
013304	453415	ISZ	BC+2			XMFP1740
013305	213421	LAC	AC+2			XMFP1750
013306	653122	MUL				XMFP1760
013307	740040	HLT				XMFP1770
013310	353414	TAD	BC+1			XMFP1780
013311	053414	DAC	BC+1			XMFP1790
013312	745400	SZL ICLL				XMFP1800
013313	453415	ISZ	BC+2			XMFP1810
013314	641002	LACQ				XMFP1820

013315	353413	TAD	BC		
013316	745400	SZLICLL			
013317	453414	ISZ	BC+1		
013320	745000	SKPICLL			
013321	453415	ISZ	BC+2		
013322	213421	LAC	AC+2		
013323	653122	MUL			
013324	740040	HLT			
013325	353415	TAD	BC+2		
013326	053421	DAC	AC+2		
013327	641002	LAC0			
013330	353414	TAD	BC+1		
013331	053422	DAC	AC+3		
013332	745400	SZLICLL			
013333	453421	ISZ	AC+2		
013334	613676	JMP	AOT		
013335	113554	JMS	ASET		
013336	213700	LAC	SIDIV		
013337	153700	DZM	SIDIV		
013340	744200	SZAIICLL			
013341	113620	JMS	XAB		
013342	113702	JMS	ACZ		
013343	613116	JMP	FNEXT		
013344	113714	JMS	BCZ		
013345	613674	JMP	FZAC		
013346	113722	JMS	SGN		
013347	053417	DAC	AC		
013350	213414	LAC	BC+1		
013351	101772	JMS	CIA		
013352	353420	TAD	AC+1		
013353	053420	DAC	AC+1		
013354	213416	LAC	BC+3		
013355	744010	RCL			
013356	053366	DAC	.+10		
013357	213415	LAC	BC+2		
013360	740010	RAL			
013361	053370	LAC	.+7		
013362	053401	DAC	.+17		
013363	053407	DAC	.+24		
013364	213421	LAC	AC+2		
013365	653122	MUL			
013366	740040	HLT			
013367	640323	DIV			
013370	740040	HLT			
013371	641002	LAC0			
013372	101772	JMS	CIA		
013373	353422	TAD	AC+3		
013374	652000	LMO			
013375	754400	SNLICLAICLL			
013376	740001	CMA			
013377	353421	TAD	AC+2		
013400	660323	660323		/PSLIDIV	
013401	740040	HLT			
013402	053416	DAC	BC+3		
013403	641002	LAC0			
013404	053421	DAC	AC+2		
013405	213416	LAC	BC+3		
013406	650323	FRDIV			
					XMFP1830
					XMFP1840
					XMFP1850
					XMFP1860
					XMFP1870
					XMFP1880
					XMFP1890
					XMFP1900
					XMFP1910
					XMFP1920
					XMFP1930
					XMFP1940
					XMFP1950
					XMFP1960
					XMFP1970
					XMFP1980
					XMFP1990
					XMFP2000
					XMFP2010
					XMFP2020
					XMFP2030
					XMFP2040
					XMFP2050
					XMFP2060
					XMFP2070
					XMFP2080
					XMFP2090
					XMFP2100
					XMFP2110
					XMFP2120
					XMFP2130
					XMFP2140
					XMFP2150
					XMFP2160
					XMFP2170
					XMFP2180
					XMFP2190
					XMFP2200
					XMFP2210
					XMFP2220
					XMFP2230
					XMFP2240
					XMFP2250
					XMFP2260
					XMFP2270
					XMFP2280
					XMFP2290
					XMFP2300
					XMFP2310
					XMFP2320
					XMFP2330
					XMFP2340
					XMFP2350
					XMFP2360
					XMFP2370
					XMFP2380
					XMFP2390
					XMFP2400

013500	200053	LAC	STRPFG		XMFP2990
013501	741200	SNA		/ IN STRIP?	XMFP3000
013502	453476	ISZ	STRPCH	/ NO.	XMFP3010
013503	213505	LAC	.+2	/ GET AC.	XMFP3020
013504	633476	JMP*	STRPCH		XMFP3030
013505	000000	0			XMFP3040
013506	000000	FFIX	0		XMFP3050
013507	213420	LAC	AC+1	/ CHECK EXPONENT-IF NEGATIVE	XMFP3060
013510	744101	SMAICLLICMA		/ COMPUT FRACTION-IF NOT ADD	XMFP3070
013511	356552	TAD	(44)	/ 44 AND COMPUTE INTEGER	XMFP3080
013512	516530	AND	(77)		XMFP3090
013513	256551	XOR	(660500)		XMFP3100
013514	053520	DAC	.+4		YMFP3110
013515	213422	LAC	AC+3		XMFP3120
013516	652000	LMQ			XMFP3130
013517	213421	LAC	AC+2		XMFP3140
013520	000000	0		/ DENORMALIZE	XMFP3150
013521	053414	DAC	BC+1	/ HIGH PART OF INTEGER OR	XMFP3160
013522	053416	DAC	BC+3	/ FRACTION IF EXPONENT IS NEGATIVE	XMFP3170
013523	641002	LACO			XMFP3180
013524	053415	DAC	BC+2	/ LOW PART OF INTEGER	XMFP3190
013525	213420	LAL	AC+1	/ CHECK EXPONENT AGAIN	XMFP3200
013526	740100	SMA			XMFP3210
013527	613533	JMP	.+4		XMFP3220
013530	153414	DZM	BC+1	/ RETURN ZERO + FRACTION	XMFP3230
013531	153415	DZM	BC+2		XMFP3240
013532	633506	JMP*	FFIX		XMFP3250
013533	356315	TAD	(1)	/ COMPUTE FRACTION	XMFP3260
013534	516530	AND	(77)		XMFP3270
013535	256553	XOR	(660600)		XMFP3280
013536	053542	DAC	.+4		XMFP3290
013537	213422	LAC	AC+3		XMFP3300
013540	652000	LMQ			XMFP3310
013541	213421	LAC	AC+2		XMFP3320
013542	000000	0		/ LEFT JUSTIFY FRACTION	XMFP3330
013543	053416	DAC	BC+3		XMFP3340
013544	633506	JMP*	FFIX		XMFP3350
013545	000000	FSIGN	0		XMFP3360
013546	213417	LAC	AC		XMFP3370
013547	740020	RAR			YMFP3380
013550	213415	LAC	BC+2	/LOW ORDER PART	XMFP3390
013551	741400	SZL		/NEG?	XMFP3400
013552	101772	JMS	CIA	/YES. COMPLEMENT	XMFP3410
013553	633545	JMP*	FSIGN		XMFP3420
013554	000000	ASET	0	/ GET ARGUMENT AND PLACE IN BC	XMFP3430
013555	213424	LAC	FPRE	/ NON ZERO MEANS INTEGER	XMFP3440
013556	741200	SNA			XMFP3450
013557	633567	JMP	.+10		XMFP3460
013560	113620	JMS	XAB		XMFP3470
013561	233423	LAC*	ADR		XMFP3480
013562	053425	DAC	ACS	/SAVE FOR JMS ARGUMENT PASSING	XMFP3490
013563	744000	CLL			XMFP3500
013564	113471	JMS	FM		XMFP3510
013565	113620	JMS	XAB		XMFP3520
013566	633554	JMP*	ASET		XMFP3530
013567	233423	LAC*	ADR		XMFP3540
013570	652000	LMQ			XMFP3550
013571	453423	ISZ	ADR		XMFP3560

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013572	233423		LAC*	ADR			
013573	660000		660000		/ MOVE ACD TO LINK		XMFP3570
013574	516422		AND	(377777)			XMFP3580
013575	053415		DAC	BC+2			XMFP3590
013576	750010		GLK				XMFP3600
013577	053413		DAC	BC	/ SIGN		XMFP3610
013600	215220		LAC	DM			XMFP3620
013601	745200		SNAICLL		/ MODE?		XMFP3630
013602	744002		STL		/ 3		XMFP3640
013603	641002		LACQ				XMFP3650
013604	740400		SNL				XMFP3660
013605	516547		AND	(777000)			XMFP3670
013606	053416		DAC	BC+3			XMFP3680
013607	740400		SNL				XMFP3690
013610	613615		JMP	.+5			XMFP3700
013611	453423		ISZ	ADR	/ MODE 3		XMFP3710
013612	233423		LAC*	ADR			XMFP3720
013613	053414		DAC	BC+1			XMFP3730
013614	633554		JMP*	ASET			XMFP3740
013615	640633		LLS	33	/ MODE 2		XMFP3750
013616	660511		LRS*	11			XMFP3760
013617	613613		JMP	.-4			XMFP3770
013620	000000	XAB	0				XMFP3780
013621	213417		LAC	AC			XMFP3790
013622	740020		RAR				XMFP3800
013623	213413		LAC	BC			XMFP3810
013624	053417		DAC	AC			XMFP3820
013625	750010		GLK				XMFP3830
013626	053413		DAC	BC			XMFP3840
013627	213420		LAC	AC+1			XMFP3850
013630	652000		LMQ				XMFP3860
013631	213414		LAC	BC+1			XMFP3870
013632	053420		DAC	AC+1			XMFP3880
013633	641002		LACQ				XMFP3890
013634	053414		DAC	BC+1			XMFP3900
013635	213421		LAC	AC+2			XMFP3910
013636	652000		LMQ				XMFP3920
013637	213415		LAC	BC+2			XMFP3930
013640	053421		DAC	AC+2			XMFP3940
013641	641002		LACQ				XMFP3950
013642	053415		DAC	BC+2			XMFP3960
013643	213422		LAC	AC+3			XMFP3970
013644	652000		LMQ				XMFP3980
013645	213416		LAC	BC+3			XMFP3990
013646	053422		DAC	AC+3			XMFP4000
013647	641002		LACQ				XMFP4010
013650	053416		DAC	BC+3			XMFP4020
013651	633620		JMP*	XAB			XMFP4030
013652	000000	FCIA	0		/ TWO S COMP OF AC		XMFP4040
013653	213417		LAC	AC			XMFP4050
013654	256315		XOR	(1)			XMFP4060
013655	053417		DAC	AC			XMFP4070
013656	633652		JMP*	FCIA			XMFP4080
013657	00000J	SPASNA	0				XMFP4090
013660	113702		JMS	ACZ	/ IS FAC ZERO		XMFP4100
013661	633657		JMP*	SPASNA	/ YES		XMFP4110
013662	213417		LAC	AC	/ IS FAC MINUS		XMFP4120
013663	741200		SNA				XMFP4130
							XMFP4140

Address	Label	Instruction	Comments	Target
013664		ISZ		/NO
013665		JMP*	SPASNA	
013666	FCLA	0		
013667		DZM	AC+3	
013670		DZM	AC+2	
013671		DZM	AC+1	
013672		DZM	AC	
013673		JMP*	FCLA	
013674	FZAC	JMS	FCLA	
013675		JMP	FNEXT	
013676	AOT	JMS	NOR	
013677		JMP	FNEXT	
013700	SIDIV	0		
013701		JMP*	SIDIV	/ THIS IS USED FOR FLAG FOR
013702	ACZ	0		/ INVERSE DIVIDE
013703		LAC	AC+2	/ IS FAC ZERO
013704		ADD	AC+3	
013705		SZAI	CLL	
013706		JMP	.+4	
013707		DZM	AC+1	/ YES
013710		DZM	AC	
013711		JMP*	ACZ	
013712		ISZ	ACZ	/ NO-INC RETURN
013713		JMP*	ACZ	
013714	BCZ	0		
013715		LAC	BC+2	
013716		ADD	BC+3	
013717		SZAI	CLL	
013720		ISZ	BCZ	
013721		JMP*	BCZ	
013722	SGN	0		
013723		LAC	AC	
013724		XOR	BC	
013725		JMP*	SGN	
013726	ABS	0		
013727		DZM	AC	/MAKE FAC POSITIVE
013730		JMP*	ABS	
013731	CASQ	0		/ COMPARE MAGNITUDES
013732		LAC	BC+1	/ RETURN - CONDITION
013733		JMS	CIA	/- FAC LESS
				/ 0 EQUAL
				/ + NOT 0 FAC GREATER
013734		TAD	AC+1	
013735		SZA		
013736		JMP*	CASQ	
013737		LAC	BC+2	
013740		JMS	CIA	
013741		TAD	AC+2	
013742		SZA		
013743		JMP*	CASQ	
013744		LAC	BC+3	
013745		JMS	CIA	
013746		TAD	AC+3	
013747		SZAI	CML	
013750		RAR		
013751		JMP*	CASQ	
013752	SQR	0		
013753		JMS	ACZ	
013754		JMP*	SQR	

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013755	777775	-3			XMFP4730
013756	053417	DAC	AC		XMFP4740
013757	213420	LAC	AC+1		XMFP4750
013760	660000	660000			XMFP4760
013761	740020	RAR			XMFP4770
013762	053420	DAC	AC+1		XMFP4780
013763	741400	SZL			XMFP4790
013764	613773	JMP	.+7		XMFP4800
013765	213421	LAC	AC+2		XMFP4810
013766	744020	RCR			XMFP4820
013767	053421	DAC	AC+2		XMFP4830
013770	213422	LAC	AC+3		XMFP4840
013771	740020	RAR			XMFP4850
013772	053422	DAC	AC+3		XMFP4860
013773	213421	LAC	AC+2		XMFP4870
013774	356554	TAD	1166712		XMFP4880
013775	054003	DAC	+6		XMFP4890
013776	054017	DAC	+21		XMFP4900
013777	213422	LAC	AC+3		XMFP4910
014000	652000	LMO			XMFP4920
014001	213421	LAC	AC-2		XMFP4930
014002	660323	660323			XMFP4940
014003	740040	HLT			XMFP4950
014004	053413	DAC	BC		XMFP4960
014005	641002	LACQ			XMFP4970
014006	354003	TAD	-3		XMFP4980
014007	740020	RAR			XMFP4990
014010	453417	ISZ	AC		XMFP5000
014011	613775	JMP	.-14		XMFP5010
014012	053421	DAC	AC+2		XMFP5020
014013	750020	CLAIRAR			XMFP5030
014014	053414	DAC	BC+1		XMFP5040
014015	213413	LAC	BC		XMFP5050
014016	640323	DIV			XMFP5060
014017	740040	HLT			XMFP5070
014020	641002	LACQ			XMFP5080
014021	744020	RCR			XMFP5090
014022	353414	TAD	BC+1		XMFP5100
014023	053422	DAC	AC+3		XMFP5110
014024	113426	JMS	NOR		XMFP5120
014025	633752	JMP*	SQR	/ RESULT	XMFP5130
		/ COMMAND TO PRINT S.D. OF P40 CENTROID			XCMP0000
		/ USING INPUT CONSTANTS F40 OR M40 WHICH EVER			XCMP0010
		/ SIDE IS BEING DISPLAYED			XCMP0020
014026	454122	P40C	ISZ	FHF / SET FLAG FOR P40 CALCULATION	XCMP0030
014027	210407	CAREA	LAC	DISONA	XCMP0040
014030	114215		JMS	AREA	XCMP0050
014031	205477		LAC	DNODE	XCMP0060
014032	556346		SAD	15 /FM MODE?	XCMP0070
014033	741000		SKP	/YES	XCMP0080
014034	614065		JMP	CAREA1	XCMP0090
014035	113051		JMS	FINT	XCMP0100
014036	214376		FLAC	ARSUM /SAVE AREAS OF F SPECTRUM	XCMP0110
014037	014420		FDAC	TF1	XCMP0120
014040	214373		FLAC	NETA	XCMP0130
014041	014423		FDAC	TF2	XCMP0140
014042	214404		FLAC	CENDEN	XCMP0150
014043	014426		FDAC	TF3	XCMP0160

014044	:13112	JMS	FEXT			
014045	210410	LAC	DISTWO	/GET AREA ON M SIDE.		XCMP0170
014046	114215	JMS	AREA			XCMP0180
014047	113051	JMS	FINT			XCMP0190
014050	214376	FLAC	ARSUM	/CALCULATE AVERAGE OF F AND M.		XCMP0200
014051	314420	FADD	TF1			XCMP0210
014052	756413	FDIVIS	(2			XCMP0220
014053	014376	FDAC	ARSUM			XCMP0230
014054	214373	FLAC	NETA			XCMP0240
014055	314427	FADD	TF2			XCMP0250
014056	756413	FDIVIS	(2			XCMP0260
014057	014373	FDAC	NETA			XCMP0270
014060	214404	FLAC	CENDEN			XCMP0280
014061	314426	FADD	TF3			XCMP0290
014062	756413	FDIVIS	(2			XCMP0300
014063	014404	FDAC	CENDEN			XCMP0310
014064	113112	JMS	FEXT			XCMP0320
014065	111625	JMS	M10			XCMP0330
014066	011755	MESS25				XCMP0340
014067	314376	FLT	ARSUM			XCMP0350
014070	011752	MFSS22				XCMP0360
014071	314373	FLT	NETA			XCMP0370
014072	011760	MESS26				XCMP0380
014073	314404	FLT	CENDEN			XCMP0390
014074	214122	LAC	FMF			XCMP0400
014075	741200	SNA				XCMP0410
014076	606257	JMP	RETC			XCMP0420
014077	154122	OZM	FMF			XCMP0430
014100	210407	LAC	DISONE			XCMP0440
014101	540217	SAD	FSTART			XCMP0450
014102	214370	LAC	F40			XCMP0460
014103	554370	SAD	F40			XCMP0470
014104	741000	SKP				XCMP0480
014105	214371	LAC	M40			XCMP0490
014106	054372	DAC	P40			XCMP0500
014107	113051	JMS	FINT			XCMP0510
014110	254372	FLACIS	P40			XCMP0520
014111	756502	FDIVIS	(144)			XCMP0530
014112	714373	FDIV	NETA			XCMP0540
014113	113752	JMS	SQR			XCMP0550
014114	014373	FDAC	NETA			XCMP0560
014115	113112	JMS	FEXT			XCMP0570
014116	111625	JMS	M10			XCMP0580
014117	011763	MESS27				XCMP0590
014120	314373	FLT	NETA			XCMP0600
014121	606257	JMP	RETC			XCMP0610
014122	000000	0				XCMP0620
014123	230032	LIVETM				XCMP0630
014124	205477	LAC	DMOJE			XCMP0640
014125	556346	SAD	(5)	/ FM DISPLAY ?		XCMP0650
014126	741000	SKP				XCMP0652
014127	606746	JMP	OMARK	/ NO		XCMP0654
014130	210410	LAC	DISTWO			XCMP0656
014131	114215	JMS	AREA			XCMP0658
014132	113051	JMS	FINT	/ ENTER INTERPRETER		XCMP0660
014133	214376	FLAC	ARSUM			XCMP0670
014134	014415	FDAC	AOFM	/ SAVE AREA OF M		XCMP0680
014135	113112	JMS	FEXT			XCMP0690
						XCMP0700

014136	400052	XCT	XCTBKG			XCMP0710
014137	356425	TAD	(LIVETM)	/	FORM ADR.	XCMP0720
014140	054123	DAC	FTOM-1			XCMP0730
014141	210407	LAC	DISONE			XCMP0740
014142	114215	JMS	AREA			XCMP0750
014143	113051	JMS	FIN			XCMP0760
014144	214376	FLAC	AOFF	/	AREA OF F	XCMP0770
014145	714415	FDIV	AOFM			XCMP0780
014146	014273	FDAC	FMR	/	F/M RATIO	XCMP0790
014147	254432	FLACIS	BM			XCMP0800
014150	756502	FDIVIS	(144)			XCMP0810
014151	574123	FMULIS*	FTOM-1	/	CONVERT COUNT RATE TO COUNTS	XCMP0820
014152	113652	JMS	FCIA			XCMP0830
014153	314415	FADD	AOFM			XCMP0840
014154	014401	FDAC	NM	/	NET AREA OF M	XCMP0850
014155	254431	FLACIS	BF			XCMP0860
014156	756502	FDIVIS	(144)			XCMP0870
014157	574123	FMULIS*	FTOM-1	/	CONVERT COUNT RATE TO COUNTS	XCMP0880
014160	113652	JMS	FCIA			XCMP0890
014161	314376	FADD	AOFF	/	NET AREA OF F	XCMP0900
014162	714401	FDIV	NM			XCMP0910
014163	014404	FDAC	NFNMR	/	NET F/NET M RATIO	XCMP0920
014164	514404	FMUL	NFNMR			XCMP0930
014165	514415	FMUL	AOFM	/	$SQR((AOFF+AOFM*(NFNMR**2))/(NM**2))$	XCMP0940
014166	314376	FADD	AOFF			XCMP0950
014167	113752	JMS	SQR	/	SQUARE ROOT OF NUMERATOR.	XCMP0960
014170	714401	FDIV	NM			XCMP0970
014171	014401	FDAC	NM			XCMP0980
014172	113112	JMS	FEXT			XCMP0990
014173	111625	JMSMIO	JMS	MIO	/USED AS A CONSTANT	XCMP1000
014174	011766		MESS28			XCMP1010
014175	314373		FLT	FMR		XCMP1020
014176	011771		MESS29			XCMP1030
014177	314404		FLT	NFNMR		XCMP1040
014200	011763		MESS27			XCMP1050
014201	314401		FLT	NM		XCMP1060
014202	606257		JMP	RETC		XCMP1070
			/ INPUT P40 CONSTANTS			XCMP1080
014203	774370	F40C	LAW	F40		XCMP1090
014204	614212		JMP	NIOR		XCMP1100
014205	774371	M40C	LAW	M40		XCMP1110
014206	614212		JMP	NIOR		XCMP1120
			/ INPUT BACKGROUND CONSTANTS			XCMP1130
014207	774431	BFC	LAW	BF		XCMP1140
014210	614212		JMP	NIOR		XCMP1150
014211	774432	BMC	LAW	BM		XCMP1160
			/ CALL NIO AND RETURN			XCMP1170
014212	516460	NIOR	AND	(17777)		XCMP1180
014213	112250		JMS	NIO		XCMP1190
014214	606257		JMP	RETC		XCMP1200
014215	000000	AREA	0			XCMP1210
014216	347650		TAD	DISADD		XCMP1220
014217	054367		DAC	SPPT	/ SET POINTER	XCMP1230
014220	356555		TAD	(-2)	/ LOW SIDE BGKROUND	XCMP1240
014221	054365		DAC	BKLSP		XCMP1250
014222	200054		LAC	FG5050		XCMP1260
014223	750200		SZAICLA		/ 5050?	XCMP1270
014224	614227		JMP	.+3	/ YES	XCMP1280

014225	454365		ISZ	BKLSP				XCMP1290
014226	777776		LAW	-2				XCMP1300
014227	350344		TAD	NOCD				XCMP1310
014230	354367		TAD	SPPT				XCMP1320
014231	054366		DAC	BKHSP	/	HIGH-SIDE BK POINTER		XCMP1330
014232	207660		LAC	DISADD				XCMP1340
014233	054364		DAC	CHPT	/	SET CHANNEL POINTER		XCMP1350
014234	207657		LAC	MNOCD				XCMP1360
014235	054363		DAC	AREACT	/	SET CHANNEL COUNTER		XCMP1370
014236	113051		JMS	FINT	/	ENTER FLOATING INTERPRETER		XCMP1380
014237	113666		JMS	FCLA				XCMP1390
014240	014373		FDAC	NETA				XCMP1400
014241	014376		FDAC	ARSUM				XCMP1410
014242	014401		FDAC	CENNUM				XCMP1420
014243	014404		FDAC	CENDEN				XCMP1430
014244	274365		FLACIS*	BKLSP	/	COMPUTE BACK GROUND		XCMP1440
014245	454365		ISZ	BKLSP				XCMP1450
014246	374365		FADDIS*	BKLSP				XCMP1460
014247	454365		ISZ	BKLSP				XCMP1470
014250	114315		JMS	ARE50	/	SKIP TWO IF 5050.		XCMP1480
014251	374365		FADDIS*	BKLSP				XCMP1490
014252	374366		FADDIS*	BKHSP				XCMP1500
014253	454366		ISZ	BKHSP				XCMP1510
014254	374366		FADDIS*	BKHSP				XCMP1520
014255	454366		ISZ	BKHSP				XCMP1530
014256	374366		FADDIS*	BKHSP				XCMP1540
014257	114315		JMS	ARE50	/	SKIP TWO IF 5050.		XCMP1550
014260	756345		FDIVIS	(6)	/	AVERAGE		XCMP1560
014261	614263		JMP	.+2				XCMP1570
014262	756347		FDIVIS	(4)				XCMP1580
014263	113652		JMS	FC!A				XCMP1590
014264	014412		FDAC	BACKG				XCMP1600
014265	214376	ARE1	FLAC	ARSUM	/	ADD TO AREA		XCMP1610
014266	374367		FADDIS*	SPPT				XCMP1620
014267	014376		FDAC	ARSUM				XCMP1630
014270	274367		FLACIS*	SPPT				XCMP1640
014271	314412		FADD	BACKG	/	SUB BACK GROUND		XCMP1650
014272	014407		FDAC	ARTS				XCMP1660
014273	314373		FADD	NETA	/	ADD TO NET AREA		XCMP1670
014274	014373		FDAC	NETA				XCMP1680
014275	214407		FLAC	ARTS				XCMP1690
014276	314404		FADD	CENDEN	/	ADD TO DENOMINATOR		XCMP1700
014277	014404		FDAC	CENDEN				XCMP1710
014300	214407		FLAC	ARTS	/	GET CHANNEL-BACKGROUND		XCMP1720
014301	554364		FMULIS	CHPT				XCMP1730
014302	314401		FADD	CENNUM				XCMP1740
014303	014401		FDAC	CENNUM				XCMP1750
014304	454367		ISZ	SPPT				XCMP1760
014305	454364		ISZ	CHPT	/	ADD ONE TO CHANNEL POINTER.		XCMP1770
014306	454363		ISZ	AREACT	/	MORE		XCMP1780
014307	614265		JMP	ARE1	/	YES		XCMP1790
014310	214401		FLAC	CENNUM				XCMP1800
014311	714404		FDIV	CENDEN				XCMP1810
014312	014404		FDAC	CENDEN				XCMP1820
014313	113112		JMS	FEXT				XCMP1830
014314	634215		JMP*	:REA				XCMP1840
014315	000000	ARE50	G					XCMP1850
014316	200054		LAC	FG5050				XCMP1860

014472	214762		LAC	BOXL	/ MUL LOW BY 10	XBOX0320
014473	653122		MUL			XBOX0330
014474	000012		12			XBOX0340
014475	354761		TAD	BOXH	/ COMBINE	XBOX0350
014476	054761		DAC	BOXH		XBOX0360
014477	641002		LACQ			XBOX0370
014500	744000		CLL			XBOX0380
014501	354755		TAD	BOXT		XBOX0390
014502	054762		DAC	BOXL		XBOX0400
014503	741400		SZL			XBOX0410
014504	454761		ISZ	BOXH		XBOX0420
014505	777777		LAW	-1		XBOX0430
014506	054757		DAC	BOXS		XBOX0440
014507	214760		LAC	BOXH-1		XBOX0450
014510	604234		JMP	PINRET		XBOX0460
014511	454756	BOXA	ISZ	BOXAS	/ COUNT THE ASTRIXS	XBOX0470
014512	214756		LAC	BOXAS		XBOX0480
014513	556413		SAD	(2)	/ SECOND	XBOX0490
014514	614523		JMP	BOXA2	/ YES	XBOX0500
014515	556335		SAD	(3)	/ THIRD	XBOX0510
014516	614537		JMP	BOXA3	/ YES	XBOX0520
014517	214521		LAC	BOXAA-1	/ FIRST	XBOX0530
014520	614562		JMP	BOXR+2		XBOX0540
014521	414522		XCT	.+1	/ DESIGNATES SINGLE PRECISION * TO NG	XBOX0550
014522	000000	BOXAA	0			XBOX0560
014523	454757	BOXA2	ISZ	BOXS		XBOX0570
014524	614535		JMP	.+11		XBOX0580
014525	777763		LAW	-15		XBOX0590
014526	354762		TAD	BOXL	/- NUMBER IN LIST.	XBOX0600
014527	741400		SZL		/ LEGAL???	XBOX0610
014530	614535		JMP	.+5	/ NO	XBOX0620
014531	214762		LAC	BOXL	/ YES	XBOX0630
014532	054522		DAC	BOXAA		XBOX0640
014533	354764		TAD	BOXAL	/ ADDRESS LIST	XBOX0650
014534	054763		DAC	BOXPT		XBOX0660
014535	234763		LAC*	BOXPT		XBOX0670
014536	614562		JMP	BOXR+2		XBOX0680
014537	454757	BOXA3	ISZ	BOXS		XBOX0690
014540	614560		JMP	BOXR		XBOX0700
014541	234763		LAC*	BOXPT		XBOX0710
014542	516420		AND	(37777)		XBOX0720
014543	054757		DAC	BOXS	/ SAVE TEMPORALLY	XBOX0730
014544	234763		LAC*	BOXPT		XBOX0740
014545	503323		AND	CNOP	/ SINGLE OR DOUBLE?	XBOX0750
014546	556557		SAD	(440000)		XBOX0760
014547	614556		JMP	.+7	/ SINGLE	XBOX0770
014550	543323		SAD	CNOP		XBOX0780
014551	741000		SKP			XBOX0790
014552	614560		JMP	BOXR		XBOX0800
014553	214761		LAC	BOXH	/ LOAD HIGH	XBOX0810
014554	074757		DAC*	BOXS		XBOX0820
014555	454757		ISZ	BOXS		XBOX0830
014556	214762		LAC	BOXL	/ LOAD LOW	XBOX0840
014557	074757		DAC*	BOXS		XBOX0850
014560	214765	BOXR	LAC	BOXAL+1	/ TURN NUMBER GENERATOR OFF	XBOX0860
014561	154756		DZM	BOXAS		XBOX0870
014562	154761		DZM	BOXH		XBOX0880
014563	154762		DZM	BOXL		XBOX0890

014564	154757		DZM	BOXS		XBOX0900
014565	604237		JMP	PINRET		XBOX0910
014566	214754	BOXROT	LAC	BROT	/ CONTROL ROTATION FROM BOX	XBOX0920
014567	556453		SAD	(20000)	/ SET CONTINUOUS ROTATE	XBOX0930
014570	614622		JMP	BOXR1		XBOX0940
014571	556454		SAD	(10000)	/ SET INCREMENT ROTATE	XBOX0950
014572	614624		JMP	BOXR2		XBOX0960
014573	556560		SAD	(4000)		XBOX0970
014574	614627		JMP	RBANG	/ GET SPECTRUM CONTENTS	XBOX0980
014575	556561		SAD	(2000)		XBOX0990
014576	614734		JMP	BVER	/ VERTICAL MARKER	XBOX1000
014577	556511		SAD	(1000)		XBOX1010
014600	614741		JMP	BHOR	/HORIZONTAL MARKER	XBOX1020
014601	556333		SAD	(400)		XBOX1070
014602	614746		JMP	BSPC	/ SPECTRUM OR ZZERO	XBOX1040
014603	556427		SAD	(200)		XBOX1050
014604	605413		JMP	RINIT	/ INITIALIZE	XBOX1060
014605	516533		AND	(240000)	/ LEFT OR RIGHT?	XBOX1070
014606	054754		DAC	BROT		XBOX1080
014607	741200		SNA			XBOX1090
014610	605055		JMP	PANRET	/ NO	XBOX1100
014611	214753		LAC	BROTC		XBOX1110
014612	050254		DAC	MOVADD		XBOX1120
014613	214754		LAC	BROT		XBOX1130
014614	556374		SAD	(200000)		XBOX1140
014615	605405		JMP	RLEFT	/ LEFT	XBOX1150
014616	605400		JMP	RRIGHT	/ RIGHT	XBOX1160
014617	204337	BRST	LAC	ROTPT1		XBOX1170
014620	050254		DAC	MOVADD		XBOX1180
014621	605055		JMP	PANRET		XBOX1190
014622	216446	BOXR1	LAC	(RTMP)		XBOX1200
014623	741000		SKP			XBOX1210
014624	204337	BOXR2	LAC	ROTPT1		XBOX1220
014625	054753		DAC	BROTC	/ SET ROTATE CONTROL	XBOX1230
014626	605055		JMP	PANRET		XBOX1240
014627	205477	RBANG	LAC	DMODE	/CONT,OUR?	XBOX1250
014630	741200		SNA			XBOX1260
014631	614724		JMP	CRBR	/YES	XBOX1270
014632	204336		LAC	ROTPT	/IS IT MARKER ROTATION	XBOX1280
014633	544313		SAD	ROTSEL+6		XBOX1290
014634	614641		JMP	.+5	/YES	XBOX1300
014635	210304		LAC	BOOT	/NO-SPECTRUM ROTATION	XBOX1310
014636	740001		CMA			XBOX1320
014637	347660		TAD	DISADD		XBOX1330
014640	741000		SKP			XBOX1340
014641	211073		LAC	MV		XBOX1350
014642	350407		TAD	DISONE		XBOX1360
014643	354673		DAC	CRB	/COMPUTE CONTENT	XBOX1370
014644	234673		LAC	CRB		XBOX1380
014645	113476		JMS	STRPCH	/ SKIP IF NOT IN STRIP.	XBOX1390
014646	112274		JMS	SCIA		XBOX1400
014647	054673		DAC	CRB		XBOX1410
014650	614731		JMP	CRB1		XBOX1420
014651	000000	CRBANG	0			XBOX1430
014652	700002		IOF		/IOF BECAUSE TTY AND FUNC BOX USE THIS.	XBOX1440
014653	200063		LAC	CONX		XBOX1450
014654	054673		DAC	CRB		XBOX1460
014655	204346		LAC	CHOR		XBOX1470

014656	054662		DAC	.+4			XBOX1480
014657	201314		LAC	HCROSS			XBOX1490
014660	744000		CLL				XBOX1500
014661	653323		IDIV				XBOX1510
014662	000000		0				XBOX1520
014663	641002		LACQ				XBOX1530
014664	114715		JMS	CH50			XBOX1540
014665	614671		JMP	.+4			XBOX1550
014666	356315		TAD	(1)			XBOX1560
014667	054673		DAC	CRB	/COMPUTE CONTOUR ADDRESS AT CROSS OF HORIZ		XBOX1570
014670	356337		TAD	(-1)	/MARKER AND VERTICAL MARKER		XBOX1580
014671	744000		CLL				XBOX1590
014672	653122		MUL				XBOX1600
014673	000000	CRB	0				XBOX1610
014674	641002		LACQ		/A=(Y(Y-1))/2+X-1		XBOX1620
014675	114715		JMS	CH50			XBOX1630
014676	741000		SKP				XBOX1640
014677	744020		CLL IRAR				XBOX1650
014700	054673		DAC	CRB			XBOX1660
014701	204352		LAC	CVER			XBOX1670
014702	054706		DAC	.+4			XBOX1680
014703	201310		LAC	VCROSS			XBOX1690
014704	744000		CLL				XBOX1700
014705	653323		IDIV				XBOX1710
014706	000000		0				XBOX1720
014707	641002		LACQ				XBOX1730
014710	354673		TAD	CRB			XBOX1740
014711	340234		TAD	FSTCOI			XBOX1750
014712	054673		DAC	CRB	/ADDRESS		XBOX1760
014713	700042		ION				XBOX1770
014714	634651		JMP*	CRBANG			XBOX1780
014715	000000	CH50	0				XBOX1790
014716	652000		LMQ				XBOX1800
014717	201303		LAC	CFCHFG			XBOX1810
014720	741100		SPA		/ 5050?		XBOX1820
014721	454715		ISZ	CH50	/ NO		XBOX1830
014722	641002		LACQ				XBOX1840
014723	634715		JMP*	CH50			XBOX1850
014724	114651	CRBR	JMS	CRBANG			XBOX1860
014725	234673		LAC*	CRB	/CONTENT		XBOX1870
014726	113476		JMS	STRPCH	/ SKIP IF NOT IN STRIP.		XBOX1880
014727	112274		JMS	SCIA			XBOX1890
014730	054673		DAC	CRB			XBOX1900
014731	214733	CRB1	LAC	CRB2			XBOX1910
014732	604234		JMP	PINRET			XBOX1920
014733	414673	CRB2	XCT	CRB	/40 MEANS SINGLE PRECISION		XBOX1930
					/NON CHANGEABLE		XBOX1940
014734	205477	BVER	LAC	DMODE	/EITHER CONTOUR OR SPECTRUM VERTICAL		XBOX1950
014735	740200		SZA				XBOX1960
014736	216413		LAC	(2)	/ SPECTRUM		XBOX1970
014737	356335		TAD	(3)	/ CONTUR		XBOX1980
014740	604305		JMP	ROTSEL			XBOX2010
014741	205477	BHOR	LAC	DMODE	/HORIZONTAL		XBOX2020
014742	740200		SZA				XBOX2030
014743	216413		LAC	(2)	/ SPECTRUM		XBOX2040
014744	356413		TAD	(2)	/ CONTUR		XBOX2050
014745	604305		JMP	ROTSEL			XBOX2080
014746	205477	BSPC	LAC	DMODE			XBOX2090

014747	740200	SZA							
014750	216346	LAC	(5)	/ SPECTRUM					XBOX2100
014751	356315	TAD	(1)	/ ZZERO					XBOX2110
014752	604305	JMP		ROTSSEL					XBOX2120
014753	005431	BROTC		RTMP					XBOX2150
		FBSK=705001							XBOX2160
		FBCM=705004							XBOX2170
		FBRD=705012							XBOX2180
014754	000000	BROT	0						XBOX2190
014755	000000	BOXT	0						XBOX2200
014756	000000	BOXAS	0						XBOX2210
014757	000000	BOXS	0						XBOX2220
014760	754761			OPRIBOXH					XBOX2230
014761	000000	BOXH	0						XBOX2240
014762	000000	BOXL	0						XBOX2250
				/ 40 SINGLE NOT CHANGEABLE					XBOX2260
				/ 44 SINGLE CHANGEABLE					XBOX2270
				/ 70 DOUBLE NOT CHANGEABLE					XBOX2280
				/ 74 DOUBLE CHANGEABLE					XBOX2290
014763	014765	BOXPT	.+2						XBOX2300
014764	014765	BOXAL	.+1						XBOX2310
014765	107756	JMS		NGNON					XBOX2320
014766	767777			OPRIEXPIDH					XBOX2330
014767	447660	ISZ		DISADD	/ 44-SING-CHANGE				XBOX2340
014770	450344	ISZ		NOCD					XBOX2350
014771	444342	ISZ		ZZER	/ 44 ZZER SPEED				XBOX2360
014772	444356	ISZ		HOR	/ 44 HORIZONTAL MARKER SPEED				XBOX2370
014773	440250	ISZ		ZTEMP	/ 44 ZZERO				XBOX2380
014774	441340	ISZ		DELR	/ 44 RAISING				XBOX2390
014775	440237	ISZ		DELCNT	/ 44 THICKNESS				XBOX2400
014776	451077	ISZ		MH					XBOX2410
014777	451374	ISZ		MTRCLM					XBOX2420
015000	411373	XCT		MTRCCT					XBOX2430
015001	412712	XCT		TELPT					XBOX2440
015002	000000		0						XBOX2450
015003	000000	STRP11	0		/STRP11 MUST BE ON LAST INSTR.				XBOX2460
				/REGISTAR COMMANDS					XBOX2470
				/ R1 AND R2 COMMANDS +					STRP0000
				/ RG COMMAND					STRP0010
015004	216315	LAC	(1)	/ R2					STRP0020
015005	356315	R1 TAC	(1)	/ R1					STRP0030
015006	741000	SKP							STRP0040
015007	112461	JMS		DECIN	/ RG READ REGISTER #.				STRP0050
015010	115145	JMS		RGNUM					STRP0060
015011	035413	DAC		RRR	/ ADR OF REGISTER.				STRP0070
015012	112366	JMS		READ					STRP0080
015013	556352	SAD	(53)						STRP0090
015014	615024	JMP	.+10						STRP0100
015015	113051	JMS		FINT					STRP0110
015016	113666	JMS		FCLA					STRP0120
015017	115202	JMS		FMODE	/ SET DATA MODE 2 OR 3.				STRP0130
015020	035413	FDAC		RRR	/ ZERO CURRENT VALUE IF NOT +.				STRP0140
015021	113112	JMS		FEXT					STRP0150
015022	212714	LAC		TC					STRP0160
015023	741000	SKP							STRP0170
015024	112366	JMS		READ					STRP0180
015025	556346	SAD	(5)	/ E EXPID					STRP0190
015026	615206	JMP		XPIDC					STRP0200
									STRP0210

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015027	556413		SAD	(2)	/B BANG	STRP0220
015030	615100		JMP	RBANGR		STRP0230
015031	556464		SAD	(11)	/I INPUT	STRP0240
015032	615062		JMP	RNAREA-3		STRP0250
015033	556562		SAD	(22)	/R REGISTER	STRP0260
015034	615132		JMP	REG		STRP0270
015035	556335		SAD	(03)	/C CONCENTRATION	STRP0280
015036	615174		JMP	PESO-3		STRP0290
015037	556563		SAD	(27)	/W WEIGHT	STRP0300
015040	615177		JMP	PESO		STRP0310
015041	556564		SAD	(24)	/T LIVE TIME	STRP0320
015042	615057		JMP	T		STRP0330
015043	215046		LAC	JMP4		STRP0340
015044	054085		DAC	CAREA1	/ SET TO RETURN AT JMP4+1	STRP0350
015045	614027		JMP	CAREA		STRP0360
015046	615047	JMP4	JMP	.+1		STRP0370
015047	214173		LAC	JMSH10	/ RESTORE CAREA1	STRP0380
015050	054065		DAC	CAREA1		STRP0390
015051	212714		LAC	TC		STRP0400
015052	556315		SAD	(1)	/A AREA	STRP0410
015053	615070		JMP	RAREA		STRP0420
015054	556565		SAD	(16)	/N NET AREA	STRP0430
015055	615065		JMP	RNAREA		STRP0440
015056	606746		JMP	QMARK		STRP0450
015057	113051	T	JMS	FINT		STRP0460
015060	276472		FLACIS*	(LIVETH+400)		STRP0470
015061	615072		JMP	RAREA+2		STRP0480
015062	112461		JMS	DECIN		STRP0490
015063	113051		JMS	FINT		STRP0500
015064	615072		JMP	RAREA+2		STRP0510
015065	113051	RNAREA	JMS	FINT		STRP0520
015066	214373		FLAC	NETA		STRP0530
015067	615072		JMP	RAREA+2		STRP0540
015070	113051	RAREA	JMS	FINT		STRP0550
015071	214376		FLAC	ARSUM		STRP0560
015072	115202		JMS	FMODE		STRP0570
015073	335413		FADD*	RRR		STRP0580
015074	035413		FDAC*	RRR		STRP0590
015075	114324		JMS	FPRIN		STRP0600
015076	113112		JMS	FEXT		STRP0610
015077	606257		JMP	RETC		STRP0620
015100	205477	RBANGR	LAC	DMODE	/SPECTRUM OR CONTOUR	STRP0630
015101	741200		SNA			STRP0640
015102	615125		JMP	RBANG1	/CONTUR	STRP0650
015103	211073		LAC	MV		STRP0660
015104	350407		TAD	DISONE	/COMPUTE ADDRESS	STRP0670
015105	054673		DAC	CRB		STRP0680
015106	205477		LAC	DMODE		STRP0690
015107	556346		SAD	(5)	/FM MODE?	STRP0700
015110	741000		SKP		/YES	STRP0710
015111	615126		JMP	RBANG!+1		STRP0720
015112	211073		LAC	MV		STRP0730
015113	350410		TAD	DISTHO		STRP0740
015114	107072		JMS	LAC1	/ GET CONTENTS OF ADR IN AC.	STRP0750
015115	055436		DAC	SCOMBS	/ M SIDE	STRP0760
015116	234673		LAC*	CRB		STRP0770
015117	054673		DAC	CRB	/ F SIDE	STRP0780
015120	113051		JMS	FINT		STRP0790

015121	254673		FLACIS	CRB		
015122	355436		FADDIS	SCOMBS		STRP0800
015123	756413		FOIVIS	(2)	/ AVERAGE	STRP0810
015124	615072		JMP	RAREA+2		STRP0820
015125	114651	RBANG1	JMS	CRBANG		STRP0830
015126	234673		LAC*	CRB	/ GET CONTENT	STRP0840
015127	113471		JMS	FM	/ FLOAT	STRP0850
015130	113051		JMS	FINT		STRP0860
015131	615072		JMP	RAREA+2		STRP0870
015132	215221	REG	LAC	MOD23		STRP0880
015133	055436		DAC	SCOMBS	/ SAVE DATA MODE.	STRP0890
015134	112461		JMS	DECIN	/ READ REG. #.	STRP0900
015135	115145		JMS	RGNUM		STRP0910
015136	055145		DAC	RGNUM	/ ADR OF REGISTER.	STRP0920
015137	113051		JMS	FINT		STRP0930
015140	115202		JMS	FMODE		STRP0940
015141	255436		FLACIS	SCOMBS	/ PESTORE DATA MODE	STRP0950
015142	055221		FOACIS	MOD23		STRP0960
015143	235145		FLAC*	RGNUM		STRP0970
015144	615072		JMP	RAREA+2		STRP0980
015145	000000	RGNUM	0			STRP0990
015146	741300		SNAISPA			STRP1000
015147	606746		JMP	QMARK	/ # TOO SMALL.	STRP1010
015150	652000		LMQ		/ SAVE AC	STRP1020
015151	356566		TAD	(-414)		STRP1030
015152	740300		SMAISZA			STRP1040
015153	606746		JMP	QMARK	/ # TOO LARGE	STRP1050
015154	641002		LACO			STRP1060
015155	356337		TAD	(-1)		STRP1070
015156	745200		SNAICLL			STRP1080
015157	744002		STL		/ R1	STRP1090
015160	556315		SAD	(1)		STRP1100
015161	744002		STL		/ R2	STRP1110
015162	055221		DAC	MOD23	/ SET TO DATA MODE 2.	STRP1120
015163	740400		SNL			STRP1130
015164	615167		JMP	.+3		STRP1140
015165	155221		DZM	MOD23	/ MODE 3 IF R1 OR R2.	STRP1150
015166	741000		SKP			STRP1160
015167	356315		TAD	(1)		STRP1170
015170	740200		SZA			STRP1180
015171	740010		RAL			STRP1190
015172	355414		TAD			STRP1200
015173	635145		JMP*	RIA	/ FORM ADR.	STRP1210
015174	113051		JMS	RGNUM		STRP1220
015175	276567		JMS	FINT		STRP1230
015176	615072		FLACIS*	(CONCEN+400)	/ CONCENTRATION	STRP1240
015177	113051	PESO	JMP	RAREA+2		STRP1250
015200	276570		JMS	FINT		STRP1260
015201	615072		FLACIS*	(HEIGHT+400)	/ WEIGHT	STRP1270
015202	030000	FMODE	JMP	RAREA+2		STRP1280
015203	215221		0			STRP1290
015204	055220		LAC	MOD23		STRP1300
015205	635202		DAC	DM		STRP1310
015206	236571		JMP*	FMODE		STRP1320
015207	054373	XPIDC	LAC*	(XPID+400)		STRP1330
015210	236365		DAC	RT		STRP1340
015211	054374		LAC*	(XPIDH+400)		STRP1350
015212	216361		DAC	R1+1		STRP1360
			LAC	(43)		STRP1370

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015213	054375		DAC	RT*2		
015214	113051		JMS	FINT		STRP1380
015215	214373		FLAC	RT		STRP1390
015216	113426		JMS	NOR		STRP1400
015217	615073		JMP	RAREA*3		STRP1410
015220	000000	DM	0			STRP1420
015221	000000	MOD23	0			STRP1430
		/PRINT	RESIDUALS			STRP1440
015222	111625	RESC	JMS	M10		STRP1450
015223	015265		MESSAL			STRP1460
015224	315347		FLT	ALGS		STRP1470
015225	015276		MESSF			STRP1480
015226	315360		FLT	ALGF		STRP1490
015227	015301		MESSM			STRP1500
015230	315371		FLT	ALGM		STRP1510
015231	015304		MESSC			STRP1520
015232	315402		FLT	ALGC		STRP1530
015233	015270		MESSAB			STRP1540
015234	315352		FLT	ABSS		STRP1550
015235	015276		MESSF			STRP1560
015236	315363		FLT	ABSF		STRP1570
015237	015301		MESSM			STRP1580
015240	315374		FLT	ABSM		STRP1590
015241	015304		MESSC			STRP1600
015242	315405		FLT	ABSC		STRP1610
015243	015273		MESSSO			STRP1620
015244	315355		FLT	SOS		STRP1630
015245	015276		MESSF			STRP1640
015246	315366		FLT	SOF		STRP1650
015247	015301		MESSM			STRP1660
015250	315377		FLT	SQM		STRP1670
015251	015304		MESSC			STRP1680
015252	315410		FLT	SOC		STRP1690
015253	215261		LAC	OVERFL		STRP1700
015254	740200		SZA		/RESIDUAL OVERFLOW?	STRP1710
015255	606257		JMP	RETC	/NO	STRP1720
015256	775262		LAW	MESOVF	/YES	STRP1730
015257	106774		JMS	MESSAGE		STRP1740
015260	606257		JMP	RETC		STRP1750
015261	777777	OVERFL	-1			STRP1760
015262	172622	MESOVF	172622		/OVR	STRP1770
015263	061417		061417		/FLO	STRP1780
015264	000000		0			STRP1790
015265	011407	MESSAL	011407	/ALG		STRP1800
015266	024023		024023	/B S		STRP1810
015267	000000		0			STRP1820
015270	010223	MESSAB	010223	/ABS		STRP1830
015271	264023		264023	/V S		STRP1840
015272	000000		0			STRP1850
015273	232125	MESSSO	232125	/SQU		STRP1860
015274	224023		224023	/R S		STRP1870
015275	000000		0			STRP1880
015276	404040	MESSF	404040	/SPACE		STRP1890
015277	404006		404006	/F		STRP1900
015300	000000		0			STRP1910
015301	404040	MESSM	404040			STRP1920
015302	404015		404015	/M		STRP1930
015303	000000		0			STRP1940
						STRP1950

015304	404040	MESJC	404040		STRP1960
015305	404003		404003	/ C	STRP1970
015306	000000		0		STRP1980
015307	00000C	BLIM	0		STRP1990
015310	215316		LAC	LIMCT	STRP2000
015311	741200		SNA		STRP2010
015312	635307		JMP*	BLIM	STRP2020
015313	455316		ISZ	LIMCT	STRP2030
015314	615504		JMP	SCOMB4+1	STRP2040
015315	615504		JMP	SCOMB4+1	STRP2050
015316	000000	LIMCT	0		STRP2060
015317	000000	CLIMC	0		STRP2070
015320	215421		LAC	LLIM	STRP2080
015321	740001		CMA		STRP2090
015322	356315		TAD	(1)	STRP2100
015323	055423		DAC	SLIM	STRP2110
015324	215421		LAC	LLIM	STRP2120
015325	744020		CLLIRAR		STRP2130
015326	055422		DAC	CLIM	STRP2140
015327	055333		DAC	CL	STRP2150
015330	356337		TAD	(-1)	STRP2160
015331	744000		CLL		STRP2170
015332	653122		TUL		STRP2180
015333	000000	CL	0		STRP2190
015334	641002		LACQ		STRP2200
015335	744020		CLLIRAR		STRP2210
015336	055333		DAC	CL	STRP2220
015337	215422		LAC	CLIM	STRP2230
015340	355333		TAD	CL	STRP2240
015341	356337		TAD	(-1)	STRP2250
015342	740001		CMA		STRP2260
015343	055422		DAC	CLIM	STRP2270
015344	635317		JMP*	CLIMC	STRP2280
015345	015347	RESPTS	ALGS		STRP2290
015346	000000	RESPT	0		STRP2300
015347	000000	ALGS	0		STRP2310
015350	000000		0		STRP2320
015351	000000		0		STRP2330
015352	000000	ABSS	0		STRP2340
015353	000000		0		STRP2350
015354	000000		0		STRP2360
015355	000000	SQS	0		STRP2370
015356	000000		0		STRP2380
015357	000000		0		STRP2390
015360	000000	ALGF	0		STRP2400
015361	000000		0		STRP2410
015362	000000		0		STRP2420
015363	000000	ABSF	0		STRP2430
015364	000000		0		STRP2440
015365	000000		0		STRP2450
015366	000000	SQF	0		STRP2460
015367	000000		0		STRP2470
015370	000000		0		STRP2480
015371	000000	ALGM	0		STRP2490
015372	000000		0		STRP2500
015373	000000		0		STRP2510
015374	000000	ABSM	0		STRP2520
015375	000000		0		STRP2530

015376	000000		0						STRP2540
015377	000000	SQM	0						STRP2550
015400	000000		0						STRP2560
015401	000000		0						STRP2570
015402	000000	ALGC	0						STRP2580
015403	000000		0						STRP2590
015404	000000		0						STRP2600
015405	000000	ABSC	0						STRP2610
015406	000000		0						STRP2620
015407	000000		0						STRP2630
015410	000000	SQC	0						STRP2640
015411	000000		0						STRP2650
015412	000000		0						STRP2660
015413	000000	RRR	0						STRP2670
		DNUM1=16600							STRP2680
		DNUM1=16603							STRP2690
015414	016600	RIA	DNUM1						STRP2700
		/LOWER LIMIT ON RESIDUALS							STRP2710
015415	215320	LLIMC	LAC	CLIMC+1	/ GET ADR OF LLIM				STRP2720
015416	112250		JMS	N10					STRP2730
015417	115317		JMS	CLIMC					STRP2740
015420	606257		JMP	RETC					STRP2750
015421	000000	LLIM	0						STRP2760
015422	000000	CLIM	0						STRP2770
015423	000000	SLIM	0						STRP2780
015424	000000	RFLG	0		/USED TO PRINT R1 & R2 WHEN READING TAPE				STRP2790
015425	000000	ALGRES	0						STRP2800
015426	000000		0						STRP2810
015427	000000		0						STRP2820
015430	000000	ABSRES	0						STRP2830
015431	000000		0						STRP2840
015432	000000		0						STRP2850
015433	000000	SQRRES	0						STRP2860
015434	000000		0						STRP2870
015435	000000		0						STRP2880
015436	000000	SCOMBS	0						STRP2890
015437	042640		DAC	DTTS	/SPECTRUM ADDRESS				STRP2900
015440	205717		LAC	DIRONE					STRP2910
015441	355534		TAD	FBUFA					STRP2920
015442	042641		DAC	DTTS1	/SPECTRUM INPUT BUFFER				STRP2930
015443	442606		ISZ	RDBLK					STRP2940
015444	205717		LAC	DIRONE					STRP2950
015445	102600		JMS	RTAPE	/LOAD BUFFER				STRP2960
015446	740200		SZA						STRP2970
015447	606257		JMP	RETC	/ERROR				STRP2980
015450	777400	SCOMBC	LAW	-400					STRP2990
015451	042637		DAC	DTCT1					STRP3000
015452	215533		LAC	FBUF					STRP3010
015453	055535		DAC	FDTPI					STRP3020
015454	115571		JMS	FRDISK					STRP3030
015455	113051	SCOMB1	JMS	FINT					STRP3040
015456	262641		FLACIS	DTTS1					STRP3050
015457	442641		ISZ	DTTS1					STRP3060
015460	515536		FMUL	FFACT					STRP3070
015461	335535		FADD	FDTPI					STRP3080
015462	035535		FOAC	FDTPI					STRP3090
015463	115544		JMS	ISZ3					STRP3100
015464	015535		FDTPI						STRP3110

015465	015541		FDAC	FTEMP		
015466	115635		JMS	RFS		
015467	115307		JMS	BLIM		STRP3120
015470	215541		FLAC	FTEMP		STRP3130
015471	315425		FADD	AI GRES		STRP3140
015472	015425		FDAC	ALGRES		STRP3150
015473	215541		FLAC	FTEMP		STRP3160
015474	113726		JMS	ABS		STRP3170
015475	315430		FADD	ABSRES		STRP3180
015476	015430		FDAC	ABSRES		STRP3190
015477	215541		FLAC	FTEMP		STRP3200
015500	515541		FMUL	FTEMP		STRP3210
015501	315433		FADD	SORRES		STRP3220
015502	015433		FDAC	SORRES		STRP3230
015503	113112	SCOMB4	JMS	FEXT		STRP3240
015504	442637		ISZ	DTCTI		STRP3250
015505	615455		JMP	SCOMB1		STRP3260
015506	115603		JMS	FWDISK		STRP3270
015507	635436		JMP*	SCOMBS	/NO	STRP3280
015510	113051		JMS	FINT	/ YES	STRP3290
015511	215425		LAC	ALGRES		STRP3300
015512	035346		FDAC*	RESPT		STRP3310
015513	115544		JMS	ISZ3		STRP3320
015514	015346		RESPT			STRP3330
015515	215430		FLAC	ABSRES		STRP3340
015516	035346		FDAC*	RESPT		STRP3350
015517	115544		JMS	ISZ3		STRP3360
015520	015346		RESPT			STRP3370
015521	215433		FLAC	SORRES		STRP3380
015522	035346		FDAC*	RESPT		STRP3390
015523	115544		JMS	ISZ3		STRP3400
015524	015346		RESPT			STRP3410
015525	113666		JMS	FCLA		STRP3420
015526	015425		FDAC	ALGRES	/ZERO RESIDUALS	STRP3430
015527	015430		FDAC	ABSRES		STRP3440
015530	015433		FOAC	SORRES		STRP3450
015531	113112		JMS	FEXT		STRP3460
015532	635436	SCORET	JMP*	SCOMBS		STRP3470
015533	031200	FBUF	31200			STRP3480
015534	000000	FBUFA	0			STRP3490
015535	000000	FDTPI	0			STRP3500
015536	000000	FFACT	0			STRP3510
015537	000000		0			STRP3520
015540	000000		0			STRP3530
015541	000000	FTEMP	0			STRP3540
015542	000000		0			STRP3550
015543	000000		0			STRP3560
015544	000000	ISZ3	0		/ INCR ADR BY 2	STRP3570
015545	453051		ISZ	FINT		STRP3580
015546	233051		LAC*	FINT		STRP3590
015547	055554		DAC	.+5		STRP3600
015550	235554		LAC*	.+4		STRP3610
015551	356335		TAD	(3)		STRP3620
015552	075554		DAC*	.+2		STRP3630
015553	635544		JMP*	ISZ3		STRP3640
015554	000000		0			STRP3650
015555	215567	/LOG MOD S3	LAC	MFLG		STRP3660
						STRP3670
						STRP3680
						STRP3700

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015556	741200		SNA			STRP3710
015557	615564		JMP	.+5		STRP3720
015560	211022		LAC	MANTIS		STRP3730
015561	740001		CMA			STRP3740
015562	356315		TAD	(1)		STRP3750
015563	741000		SKF			STRP3760
015564	211022		LAC	MANTIS		STRP3770
015565	155567		DZM	NFLG		STRP3780
015566	630627		JMP*	LOGAR		STRP3790
015567	000000	MFLG	0			STRP3800
015570	000400	FBLKSV	400			STRP3820
015571	000000	FRDISK	0			STRP3830
015572	115703		JMS	UNITS / CHANGE TO UNIT 5.		STRP3840
015573	136414		JMS*	(DISK10)		STRP3850
015574	000000		0			STRP3860
015575	776400		-1400		/ WC	STRP3870
015576	031200		31200		/ CA	STRP3880
015577	000000	FBLK	0			STRP3890
015600	000003		3		/ READ	STRP3900
015601	700042		ION			STRP3910
015602	635571		JMP*	FRDISK		STRP3920
015603	000000	FWDISK	0			STRP3930
015604	215577		LAC	FBLK		STRP3940
015605	055612		DAC	.+5		STRP3950
015606	415573		XCT	FRDISK+2		STRP3960
015607	000000		0			STRP3970
015610	776400		-1400		/ WC	STRP3980
015611	031200		31200		/ CA	STRP3990
015612	000000		0			STRP4000
015613	000005		5		/ WRITE	STRP4010
015614	455577		ISZ	FBLK		STRP4020
015615	455577		ISZ	FBLK		STRP4030
015616	455577		ISZ	FBLK		STRP4040
015617	740200		SZA			STRP4050
015620	606257		JMP	RETC	/ ERROR.	STRP4060
015621	215711		LAC	UNITSV	/ RESTORE UNIT	STRP4070
015622	041135		DAC	UNIT		STRP4080
015623	635603		JMP*	FWDISK		STRP4090
015624	203533	DISK	LAC	COPY1		STRP4100
015625	055573		DAC	FRDISK+2		STRP4110
015626	216333		LAC	(400)		STRP4120
015627	615633		JMP	.+4		STRP4130
015630	203574	TAPE	LAC	DEC10		STRP4140
015631	055573		DAC	FRDISK+2		STRP4150
015632	216315		LAC	(1)		STRP4160
015633	055570		DAC	FBLKSV		STRP4170
015634	606257		JMP	RETC		STRP4180
015635	000000	RFS	0			STRP4190
015636	113506		JMS	FFIX		STRP4200
015637	213416		LAC	BC+3		STRP4210
015640	745100		SPACLL	/ROUND OFF		STRP4220
015641	453415		ISZ	BC+2		STRP4230
015642	213417		LAC	AC		STRP4240
015643	741200		SNA		/MINUS?	STRP4250
015644	615655		JMP	RFSR	/NO	STRP4260
015645	213415		LAC	BC+2		STRP4270
015646	741100		SPA		/# TOO LARGE?	STRP4280
015647	615655		JMP	RFSR	/YES	STRP4290

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015650	740001		CMA				STRP4300
015651	356315		TAD	(1)			STRP4310
015652	062640		DAC*	DTTS	/STORE #.		STRP4320
015653	442640		ISZ	DTTS			STRP4330
015654	635635		JMP*	RFS			STRP4340
015655	213415	RFSR	LAC	BC+?			STRP4350
015656	740500		SMAISNL		/SKIP IF OVERFLOW.		STRP4360
015657	615652		JMP	RFSR-3			STRP4370
015660	750000		CLA				STRP4380
015661	555316		SAD	LIMCT			STRP4390
015662	055281		DAC	OVERFL	/SET OVERFLOW FLAG.		STRP4400
015663	615652		JMP	RFSR-3			STRP4410
015664	215570	INIT	LAC	FBLKSV			STRP4420
015665	055577		DAC	FBLK			STRP4430
015666	215533		LAC	FBUF			STRP4440
015667	040255		DAC	ZERTEM			STRP4450
015670	776400		LAW	-1400	/ ZERO OUT BUFFER		STRP4460
015671	101636		JMS	ZEROUT			STRP4470
015672	777735		LAW	-43			STRP4480
015673	055702		DAC	ICNT			STRP4490
015674	115703		JMS	UNITS			STRP4500
015675	055261		DAC	OVERFL	/SET TO NO OVERFLOW.		STRP4510
015676	115603		JMS	FWDISK			STRP4520
015677	455702		ISZ	ICNT			STRP4530
015700	615674		JMP	-4			STRP4540
015701	606257		JMP	RETC			STRP4550
015702	000000	ICNT	0				STRP4560
015703	000000	UNITS	0				STRP4570
015704	201135		LAC	UNIT			STRP4580
015705	055711		DAC	UNITSV	/SAVE FOR RESTORE		STRP4590
015706	216346		LAC	(5)			STRP4600
015707	041135		DAC	UNIT			STRP4610
015710	635703		JMP*	UNITS			STRP4620
015711	000000	UNITSV	0				STRP4630
015712	216572		LAC	(705161)			FIFT0000
015713	741000		SKP				FIFT0010
015714	216573	READPT	LAC	(700104)	/ RSA		FIFT0020
015715	056051		DAC	READ50+2			FIFT0030
015716	200054		LAC	FG5050			FIFT0034
015717	741200		SNA		/ IN 50/50 MODE?		FIFT0035
015720	606746		JMP	OMARK	/ NO		FIFT0036
015721	216574		LAC	(PTRD+4)			FIFT0040
015722	051565		DAC	RPAPER			FIFT0050
015723	101564		JMS	ERASF			FIFT0060
015724	101573		JMS	ERASM			FIFT0070
015725	101602		JMS	ERASC			FIFT0080
015726	777701		LAW	-77			FIFT0090
015727	042637		DAC	DTCT1			FIFT0100
015730	200213		LAC	FSTRIP	/ F SINGLES		FIFT0110
015731	042640		DAC	DTTS			FIFT0120
015732	116006		JMS	PTRD			FIFT0130
015733	062640		DAC*	DTTS			FIFT0140
015734	653323		IDIV		/ MAKE TIME MINUTES		FIFT0150
015735	000074		74				FIFT0160
015736	641002		LACO		/ SETUP TIME VARIABLES.		FIFT0170
015737	076472		DAC*	(LIVETM+400)			FIFT0180
015740	076471		DAC*	(LIVEPH+400)			FIFT0190
015741	076500		DAC*	(LIVEHI+400)			FIFT0200

015742	176477		DZM*	(LIVELO+400)	FIFT0210
015743	176512		DZM*	(REALTM+400)	FIFT0220
015744	176475		DZM*	(REALLO+400)	FIFT0230
015745	176476		DZM*	(REALHI+400)	FIFT0240
015746	116006		JMS	PTRO / READ A #.	FIFT0250
015747	442640		ISZ	DTTJ	FIFT0260
015750	062640		DAC*	DTTS / STORE F.	FIFT0270
015751	442637		ISZ	DTCTI	FIFT0280
015752	615746		JMP	.-4	FIFT0290
015753	200214		LAC	MSTRIP / M SINGLES	FIFT0300
015754	042640		DAC	DTTS	FIFT0310
015755	200234		LAC	FSTCOI / COINCIDENCE	FIFT0320
015756	356316		TAD	(100)	FIFT0330
015757	042641		DAC	DTTSI	FIFT0340
015760	155702		DZM	ICNT	FIFT0350
015761	116006		JMS	PTRO	FIFT0360
015762	442640	LOOP	ISZ	DTTS / INCREMENT BEFORE STORING	FIFT0370
015763	062640		DAC*	DTTS / STORE M	FIFT0380
015764	200212		LAC	STRSUM	FIFT0390
015765	455702		ISZ	ICNT	FIFT0400
015766	355702		TAD	ICNT	FIFT0410
015767	042535		DAC	DTREI	FIFT0420
015770	777700		LAW	-100	FIFT0430
015771	042637		DAC	DTCTI	FIFT0440
015772	750000		CLA		FIFT0450
015773	062641		DAC*	DTTSI / STORE COINC	FIFT0460
015774	442641		ISZ	DTTSI	FIFT0470
015775	362535		TAD*	DTREI	FIFT0480
015776	062535		DAC*	DTREI / STORE SUM	FIFT0490
015777	442535		ISZ	DTREI	FIFT0500
016000	116006		JMS	PTRO	FIFT0510
016001	442637		ISZ	DTCTI / DONE 64?	FIFT0520
016002	615773		JMP	.-7 / NO	FIFT0530
016003	615762		JMP	LOOP / YES	FIFT0540
016004	000000	TEMP	0		FIFT0550
016005	000000	TMP1	0		FIFT0560
016006	000000	PTRO	0		FIFT0570
016007	142636		DZM	DTCT	FIFT0580
016010	156004		DZM	TEMP	FIFT0590
016011	116047		JMS	READ50	FIFT0600
016012	516530		AND	(77) / GET 6 BITS.	FIFT0610
016013	741200		SNA		FIFT0620
016014	616010		JMP	.-4 / LEADER-IF 0 OR 200.	FIFT0630
016015	556347		SAD	(4) / 4?	FIFT0640
016016	616042		JMP	PTEND / YES-EOT	FIFT0650
016017	356536		TAD	(-60)	FIFT0660
016020	745100		SPA:CLL		FIFT0670
016021	616033		JMP	TERM / TERMINATOR	FIFT0680
016022	056005		DAC	TMP1	FIFT0690
016023	216004		LAC	TEMP	FIFT0700
016024	653122		MUL		FIFT0710
016025	000012		12		FIFT0720
016026	641002		LACQ		FIFT0730
016027	356005		TAD	TMP1	FIFT0740
016030	056004		DAC	TEMP	FIFT0750
016031	442636		ISZ	DTCT / COUNT # OF CHARS.	FIFT0760
016032	616011		JMP	PTRO+3	FIFT0770
016033	202636	TERM	LAC	DTCT	FIFT0780

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016034	745200		SNAICLL		/ READ ANY CHAR?	FIFT0790
016035	616007		JMP	PTRD+1	/ NO	FIFT0800
016036	556347		SAD	(4)	/ 4 DIGIT #?	FIFT0810
016037	616007		JMP	PTRD+1	/ YES	FIFT0820
016040	216004		LAC	TEMP		FIFT0830
016041	636006		JMP*	PTRD		FIFT0840
016042	216004	PTEND	LAC	TEMP		FIFT0850
016043	062641		DAC*	DTTS1		FIFT0860
016044	705202		705202		/ CLEAR INTERFACE FLAG	FIFT0870
016045	705164		705164		/ DISABLE INTERFACE	FIFT0880
016046	606257		JMP	RETC	/ DONE	FIFT0890
016047	000000	READ50	0			FIFT0900
016050	705202		705202		/ CLEAR FLAG	FIFT0910
016051	705161		705161		/ ENABLE INTERFACE	FIFT0920
016052	607436		JMP	RET		FIFT0930
016053	705204		705204		/ SET BUFFER	FIFT0940
016054	705172		705172		/ READ BUFFER	FIFT0950
016055	636047		JMP*	READ50		FIFT0960
016056	000000	OUT8	0			FIFT0970
016057	705161		705161			FIFT0980
016059	705306		705306		/ SEND	FIFT0990
016061	607436		JMP	RET		FIFT1000
016062	705302		705302		/ CLEAR	FIFT1010
016063	636056		JMP*	OUT8		FIFT1020
016064	000000	INCHAN	0			FIFT1030
016065	652000		LMQ		/SAVE AC	FIFT1040
016066	200054		LAC	FG5050		FIFT1050
016067	741200		SNA		/ 5050 SYSTEM?	FIFT1060
016070	456064		ISZ	INCHAN	/ NO	FIFT1070
016071	641002		LACQ		/RESTORE AC	FIFT1080
016072	636064		JMP*	INCHAN		FIFT1090
016073	216320		LAC	(20)	/ EXTEND 20	OVL0000
016074	056064		DAC	INCHAN		OVL0010
016075	216046		LAC	READ50-1		OVL0020
016076	616112		JMP	PROGRAM+6		OVL0030
016077	356320		TAD	(20)		OVL0034
016100	356320		TAD	(20)		OVL0035
016101	356320		TAD	(20)	/ FORMAT 240	OVL0036
016102	356320		TAD	(20)	/ INVERT 220	OVL0037
016103	356320		TAD	(20)	/ FOCAL 200	OVL0040
016104	356320	PRCGRM	TAD	(20)	/ PLOT 160	OVL0050
016105	356320		TAD	(20)	/ SING 140	OVL0060
016106	356320		TAD	(20)	/ SEARCH 120	OVL0070
016107	356316		TAD	(100)	/ LIB 100	OVL0080
016110	056064		DAC	INCHAN	/ STARTING BLOCK #	OVL0090
016111	216126		LAC	PLOTGO-1		OVL0100
016112	040105		DAC	105		OVL0110
016113	216460		LAC	(17777)		OVL0120
016114	057640		DAC	17640	/ CA-1 OF OVERLAYS	OVL0130
016115	216064		LAC	INCHAN		OVL0140
016116	557637		SAD	17637	/ ALREADY IN CORE ?	OVL0150
016117	606257		JMP	RETC		OVL0160
016120	057637		DAC	17637		OVL0170
016121	770002		LAW	-7776		OVL0180
016122	057641		DAC	17641	/ WC = -4K	OVL0190
016123	617663		JMP	17663		OVL0200
016124	216333		LAC	(400)		OVL0210
016125	601041		JMP	BKG+2		OVL0220

016126	616124		JMP	.-2		OVLY0230
016127	00000^	PLOTGO	0			OVLY0240
016130	607436		JMP	RET		OVLY0250
016131	702402	PLOTTR	702402		/ PLCF	OVLY0280
016132	200006		LAC	STPOUT		OVLY0290
016133	740200		SZA			OVLY0300
016134	607404		JMP	INCON		OVLY0310
016135	700042		ION			OVLY0320
016136	636127		JMP^	PLOTGO		OVLY0330
016137	750001		CLC			OVLY0340
016140	356265		TAD	OIPT		OVLY0350
016141	056265	OIOA	DAC	OIPT		OVLY0360
016142	156266		OZM	OIOAC		OVLY0370
016143	106737		JMS	CRLF		OVLY0380
016144	216265		LAC	OIPT		OVLY0390
016145	116267		JMS	OOUT		OVLY0400
016146	236265		LAC^	OIPT		OVLY0410
016147	116267		JMS	OOUT		OVLY0420
016150	112376	OIO	JMS	READI		OVLY0430
016151	116303		JMS	MATCH		OVLY0440
016152	000240		240			OVLY0450
016153	616224		JMP	OILF		OVLY0460
016154	000314		314			OVLY0470
016155	616222		JMP	OILO		OVLY0480
016156	000316		316			OVLY0490
016157	616220		JMP	OINX		OVLY0500
016160	000307		307			OVLY0510
016161	616237		JMP	OIGO		OVLY0520
016162	000323		323			OVLY0530
016163	616226		JMP	OIJMS		OVLY0540
016164	000302		302			OVLY0550
016165	616244		JMP	OIOB		OVLY0560
016166	000322		322			OVLY0570
016167	616252		JMP	OIOBRS		OVLY0580
016170	000325		325			OVLY0590
016171	616137		JMP	OIOA-2		OVLY0600
016172	000320		320			OVLY0610
016173	616207		JMP	OIPRO		OVLY0620
016174	000215		215			OVLY0630
016175	608257		JMP	RETC		OVLY0640
016176	000000		0			OVLY0650
016177	206725		LAC	TSI		OVLY0660
016200	516344		AND	(7)		OVLY0670
016201	056217		DAC	TSSI		OVLY0680
016202	216266		LAC	OIOAC		OVLY0690
016203	640703		ALS	3		OVLY0700
016204	356217		TAD	TSSI		OVLY0710
016205	056266		DAC	OIOAC		OVLY0720
016206	616150		JMP	OIO		OVLY0730
016207	216263	OIPRO	LAC	LINSV		OVLY0740
016210	740020		RAR			OVLY0750
016211	216264		LAC	HQSV		OVLY0760
016212	652000		LMQ			OVLY0770
016213	216262		LAC	ACSV		OVLY0780
016214	700042		ION			OVLY0790
016215	416257		XCT	OIOBSV		OVLY0800
016216	620020		JMP^	20		OVLY0810
016217	000000	TSSI	0			OVLY0820

016220	216266	CL4X	LAC	O1OAC	
016221	616141		JMP	O1OA	OVLY0830
016222	218266	O1LO	LAC	O1OAC	OVLY0840
016223	076265		DAC*	O1PT	OVLY0850
016224	456265	O1LF	ISZ	O1PT	OVLY0860
016225	616142		JMP	O1OA+1	OVLY0870
016226	136266	O1JMS	JMS*	O1OAC	OVLY0880
016227	056262	DBRT	DAC	ACSV	OVLY0890
016230	750010		GLK		OVLY0900
016231	056263		DAC	LINSV	OVLY0910
016232	641002		LACO		OVLY0920
016233	056264		DAC	MOSV	OVLY0930
016234	216261		LAC	ACPT	OVLY0940
016235	056265		DAC	O1PT	OVLY0950
016236	616224		JMP	O1LF	OVLY0960
016237	216255	O1GO	LAC	LINK	OVLY0970
016240	740020		RAR		OVLY0980
016241	216256		LAC	ACSET	OVLY0990
016242	700042		ION		OVLY1000
016243	636266		JMP*	O1OAC	OVLY1010
016244	236266	O1DB	LAC*	O1OAC	OVLY1020
016245	056257		DAC	O1DBSV	OVLY1030
016246	216266		L..C	O1OAC	OVLY1040
016247	056260		DAC	O1DBAD	OVLY1050
016250	176266		OZH*	O1OAC	OVLY1060
016251	616224		JHP	O1LF	OVLY1070
016252	216257	O1DBRS	LAC	O1DBSV	OVLY1080
016253	076260		DAC*	O1DBAD	OVLY1090
016254	616224		JMP	O1LF	OVLY1100
016255	000000	LINK	0		OVLY1110
016256	000000	ACSET	0		OVLY1120
016257	000000	O1DBSV	0		OVLY1130
016260	000000	O1DBAD	0		OVLY1140
016261	016261	ACPT	ACPT		OVLY1150
016262	000000	ACSV	0		OVLY1160
016263	000000	LINSV	0		OVLY1170
016264	000000	MOSV	0		OVLY1180
016265	000000	O1PT	0		OVLY1190
016266	000000	O1OAC	0		OVLY1200
016267	000000	O0'JT	0		OVLY1210
016270	652000		LMQ		OVLY1220
016271	777772		LAW	-6	OVLY1230
016272	046737		DAC	CRLF	OVLY1240
016273	760026		LAW	26	OVLY1250
016274	640603		LLS	3	OVLY1260
016275	106752		JMS	PRINT	OVLY1270
016276	446737		ISZ	CRLF	OVLY1280
016277	616273		JMP	..-4	OVLY1290
016300	760240		LAW	240	OVLY1300
016301	106752		JMS	PRINT	OVLY1310
016302	636267		JMP*	O0UT	OVLY1320
016303	000000	MATCH	0		OVLY1330
016304	236303		LAC*	MATCH	OVLY1340
016305	456303		ISZ	MATCH	OVLY1350
016306	745200		SNAICLL		OVLY1360
016307	636303		JMP*	MATCH	OVLY1370
016310	546725		SAD	ISI	OVLY1380
016311	636303		JMP*	MATCH	OVLY1390
					OVLY1400

016312 456303
 016313 616304
 016314 000000

 016314 400000
 016315 000001
 016316 000100
 016317 001760
 016320 000020
 016321 000026
 016322 000032
 016323 777773
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 016325 006262
 016326 006274
 016327 011377
 016330 006344
 016331 000045
 016332 000017
 016333 000400
 016334 000177
 016335 000003
 016336 000054
 016337 777777
 016340 001777
 016341 000010
 016342 060000
 016343 040000
 016344 000007
 016345 000006
 016346 000005
 016347 000004
 016350 030035
 016351 030036
 016352 000053
 016353 000055
 016354 000040
 016355 000076
 016356 000052
 016357 000057
 016360 000300
 016361 000043
 016362 030037
 016363 027777
 016364 030437
 016365 030377
 016366 777770
 016367 602713
 016370 002730
 016371 602671
 016372 603464
 016373 746620
 016374 200000
 016375 140000
 016376 600000
 016377 030030
 016400 030016
 016401 030020

L11OUT

ISZ
 JMP
 0
 .END
 MATCH
 MATCH+1

OVL1410
 OVL1420

016402	777401
016403	000377
016404	057600
016405	030022
016406	030024
016407	030026
016410	000215
016411	045500
016412	000551
016413	000002
016414	003421
016415	603637
016416	006426
016417	310000
016420	037777
016421	700000
016422	377777
016423	720000
016424	160000
016425	030032
016426	777400
016427	000200
016430	030033
016431	030031
016432	001055
016433	030003
016434	007020
016435	030004
016436	030001
016437	000341
016440	030002
016441	030006
016442	030010
016443	030012
016444	030014
016445	000070
016446	005431
016447	100000
016450	007700
016451	000550
016452	041400
016453	020000
016454	010000
016455	500000
016456	420000
016457	000260
016460	017777
016461	777740
016462	000240
016463	212215
016464	000011
016465	030445
016466	777520
016467	660502
016470	000031
016471	030436
016472	030432
016473	030434

016474	030435
016475	030404
016476	030403
016477	030402
016500	030401
016501	000021
016502	000144
016503	776000
016504	777750
016505	000012
016506	001750
016507	023420
016510	303240
016511	001000
016512	030431
016513	044500
016514	377600
016515	120000
016516	011000
016517	010200
016520	446500
016521	040500
016522	046500
016523	041500
016524	031000
016525	031076
016526	034377
016527	030777
016530	000077
016531	300000
016532	760000
016533	240000
016534	640500
016535	770000
016536	777720
016537	777766
016540	000203
016541	000225
016542	000220
016543	000212
016544	000273
016545	000376
016546	000274
016547	777000
016550	000777
016551	660500
016552	000044
016553	669600
016554	166712
016555	777776
016556	777744
016557	440000
016560	004000
016561	002000
016562	000022
016563	000027
016564	000024
016565	000016

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*** PDP9/15 ASSEMBLY LISTING ***

PAGE NO. 141

016566	777364
016567	030626
016570	030443
016571	030400
016572	705161
016573	700104
016574	016012

		.TITLE	SINGLES ROUTINE...
		.LOC	20000
		.LIT	F+1
020000	515000	515000	/ M
020001	020456	F	
020002	553230	553230	/ SUM
020003	020456	F	
020004	254673	254673	/ CONTUR
020005	020456	F	
020006	560600	560600	/ FM
020007	020456	F	
020010	727000	727000	/ WINDOW
020011	020337	GETWIN	
020012	354040	354040	/ DEC
020013	020306	DECPUT	
020014	457070	457070	/ GET
020015	020044	GET	
020016	474342	474342	/ RDSLOT
020017	020043	GET-1	
020020	354422	354422	/ RDTMC
020021	020406	GETPT	
020022	041522	041522	/ READB
020023	020400	GETPT-6	
020024	404152	404152	/ READPT
020025	020404	GETPT-2	
020026	761332	761332	/ SSING
020027	020375	SSING	
020030	761330	761330	/ CSING
020031	020374	SSING-1	
020032	352220	352220	/RES
020033	020446	RES	
020034	000000	0	
020035	000000	0	
020036	000000	GETNUM	
020037	000000	GETDIV	
020040	000000	I	
020041	000000	0	/ TEMP LOCATION
020042	000000	0	/ TEMP LOCATION
020043	751000	0	/ TEMP LOCATION
020044	777777	SKPICLA	/ RDSLOT COMMAND
020045	040303	LAW	/ GET COMMAND
020046	100364	DAC	
020047	120457	JMS	
020050	120450	JMS*	
020051	060461	JMS*	
020052	220462	DAC*	/ LOW
020053	060463	LAC*	/ HIGH ORDER
020054	220464	DAC*	
020055	741200	LAC*	/ CHECK TERM CHAR
020056	600246	SNA	
020057	540465	JMP	
020060	600070	SAD	/ ID #
020061	540466	JMP	/ + SIGN?
020062	600070	SAD	/ YES
020063	540467	JMP	/ - SIGN?
020064	600246	SAD	/ YES
020065	540470	JMP	/ SPACE?
020066	600246	SAD	/ YES
		JMP	/ ALTMODE?

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020067	620471		JMP*	(QMARK)	
020070	040305	GET4	DAC	GETS	
020071	120460		JMS*	(DECIN)	/ SAVE ASCII CODE FOR - OR +.
020072	460472		ISZ*	(AINF)	/ GET MULTIPLYING FACTOR
020073	741000		SKP		/ ANY INPUT?
020074	600117		JMP	GET7A	
020075	060473		DAC*	(INPUTF)	
020076	040036		DAC	GETNUM	
020077	200474		LAC	(I)	
020100	060475		DAC*	(INPDIV)	
020101	040037		DAC	GETDIV	/ SET DIVISOR TO 1.
020102	220464		LAC*	(TC)	
020103	540476		SAD	(52)	/ *?
020104	600125		JMP	GET7B	
020105	540477		SAD	(57)	/ IS IT A ??
020106	741000		SKP		
020107	620471		JMP*	(QMARK)	/ PRINT QUESTION
020110	120460		JMS*	(DECIN)	
020111	060475		DAC*	(INPDIV)	
020112	040037		DAC	GETDIV	
020113	220464		LAC*	(TC)	
020114	540476		SAD	(52)	/ MUST BE *
020115	600125		JMP	GET7B	
020116	620471		JMP*	(QMARK)	
020117	750001	GET7A	CLC		
020120	040304		DAC	GFLG	/ SET FLAG TO PRINT R1 & R2
020121	120500		JMS*	(FINT)	/ ENTER FLT PNT PACK.
020122	220501		FLAC*	(DNUM)	
020123	720502		FDIV*	(DNOM)	
020124	600131		JMP	.+5	
020125	140304	GET7B	OZM	GFLG	/ CLEAR PRINT FLAG.
020126	120500		JMS*	(FINT)	
020127	240036		FLAC:5	GETNUM	
020130	740037		FDIV:5	GETDIV	/ FORM FACTOR
020131	020503		FDAC*	(FFACT)	
020132	120504		JMS*	(FCLA)	
020133	020505		FDAC*	(ALGRES)	
020134	020506		FDAC*	(ABSRES)	
020135	020507		FDAC*	(SORRES)	
020136	120510		JMS*	(FEXT)	
020137	200305		LAC	GETS	
020140	540465		SAD	(53)	/ +?
020141	600145		JMP	.+4	
020142	220511		LAC*	(FFACT+1)	
020143	340512		TAD	(40000)	/ NEGATE
020144	060511		DAC*	(FFACT+1)	
020145	220513		LAC*	(FBLKSV)	
020146	060514		DAC*	(FBLK)	
020147	440303		ISZ	GETSW	
020150	600275		JMP	GETSL-3	
020151	120460		JMS*	(DECIN)	
020152	060461		DAC*	(DTRE2)	
020153	220462		LAC*	(BC+1)	
020154	060463		DAC*	(DTRE1)	
020155	120515		JMS*	(RDDIR)	/ READ DIRECTORY
020156	740200		SZA		
020157	620516		JMP*	(RETC)	/ ERROR
020160	120517		JMS*	(SEARCH)	

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020161 220520 LAC* (DIRFLG)
020162 740200 SZA
020163 620471 JMP* (QMARK) / ID NOT FOUND.
020164 220521 LAC* (BLKNO) / PUT EXP BLOCK#
020165 060522 GET9 DAC* (RDBLK) / IN RDBLK.
020166 220465 LAC* (STRPFG)
020167 740200 SZA / SINGLES OR SINGLES STRIP?
020170 600206 JMP GET8 / STRIP.
020171 200305 LAC GETS
020172 540465 SAD (53) / IF +, UPDATE TIMES.
020173 120523 JMS* (SCOMB5)
020174 777760 LAW -20
020175 040040 DAC I
020176 200271 LAC GETI
020177 040041 DAC I+1
020200 120524 JMS* (SCOMB)
020201 200041 LAC I+1
020202 340525 TAD (400)
020203 440040 ISZ I / DONE 4096 CHANNELS?
020204 600177 JMP -5 / NO
020205 620526 GET8 JMP* (RDSL-6)
020206 440304 ISZ GFLG / PRINT R1 & R2?
020207 600216 JMP -7 / NO
020210 120500 JMS* (FINT)
020211 220501 FLAC* (ONUMI)
020212 120527 JMS* (FPRIN) / PRINT R1
020213 220502 FLAC* (DNOMI)
020214 120527 JMS* (FPRIN) / PRINT R2
020215 120510 JMS* (FEXT)
020216 220530 LAC* (SCORET)
020217 060531 DAC* (SCOMB4+4)
020220 220532 LAC* (RESPTS)
020221 060533 DAC* (RESPT)
020222 777400 LAW -400
020223 060534 DAC* (SCOMBC)
020224 777761 LAW -17
020225 040040 DAC I
020226 200271 LAC GETI / FSTRIP
020227 040041 DAC I+1
020230 220535 LAC* (SLIM) / SET LIMIT COUNTER
020231 060536 DAC* (LIMCT)
020232 200041 LAC I+1
020233 120537 JMS* (SCOMBS) / STRIP DATA.
020234 200041 LAC I+1
020235 340525 TAD (400)
020236 440040 ISZ I / DONE 4096 CHANNELS?
020237 600227 JMP -10 / NO
020240 040041 DAC I+1
020241 200540 LAC (740000) / STORE RESIDUALS.
020242 060531 DAC* (SCOMB4+4)
020243 200041 LAC I+1
020244 120537 JMS* (SCOMBS)
020245 620526 GET3 JMP* (RDSL-6)
020246 440303 ISZ GETSW
020247 600300 JMP GETSL
020250 120515 JMS* (RDIR) / READ DIRECTORY
020251 740200 SZA / DECTAPE ERROR?
020252 620516 JMP* (RETC) / YES
    
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020253	120517		JMS*	(SEARCH)	/ FIND ID & DETERMINE BLK #.
020254	220520		LAC*	(DIRFLG)	
020255	740200		SZA		/ FIND ID?
020256	620471		JMP*	(QMARK)	/ NO
020257	220521		LAC*	(BLKNO)	
020260	060522		DAC*	(RDBLK)	
020261	200541		LAC	(30400)	/ ID BLOCK ADR
020262	120542		JMS*	(RTAPE)	
020263	220522		LAC*	(RDBLK)	
020264	340474		TAD	(I)	
020265	040272		DAC	.+5	
020266	420543		XCT*	(JMS10)	
020267	000000		0		
020270	770000		-10000		/ WC
020271	037400	GETI	37400		/ CA
020272	000000		0		/ BLK #
020273	000003		3		/ READ
020274	620526		JMP*	(RDSL-6)	
020275	120460		JMS*	(DECLIN)	
020276	120544		JMS*	(OK)	
020277	600165		JMP	GET9	
020300	220461	GETSL	LAC	(DTRE2)	
020301	120544		JMS*	(OK)	
020302	600260		JMP	GET1-11	
020303	000000	GETSW	0		
020304	000000	GFLG	0		
020305	000000	GETS	0		
020306	120457	DECPUT	JMS*	(ADCHK)	
020307	100384		JMS	GET10	
020310	120515		JMS*	(RDIR)	
020311	740200		SZA		
020312	620516		JMP*	(RETC)	
020313	120545		JMS*	(ADDIR)	/ ADD NEW ID.
020314	220520		LAC*	(DIRFLG)	
020315	740200		SZA		/ TAPE OK?
020316	620516		JMP*	(RETC)	/ NO
020317	120546		JMS*	(WDIR)	
020320	740200		SZA		/ WRITE DIRECTORY OK?
020321	620516		JMP*	(RETC)	/ NO
020322	220521		LAC*	(BLKNO)	
020323	060547		DAC*	(DECBLK)	
020324	040334		DAC	.+10	
020325	200541		LAC	(30400)	/ ID BLOCK ADR
020326	120550		JMS*	(WTDEC)	
020327	440334		ISZ	.+5	
020330	420543		XCT*	(JMS10)	
020331	000000		0		
020332	770000		-10000		/ WC
020333	037400		37400		/ CA
020334	000000		0		/ BLK #
020335	000005		5		/ WRITE.
020336	620516		JMP*	(RETC)	
020337	120460	GETWIN	JMS*	(DECIN)	/ 1ST CHANNEL
020340	060551		DAC*	(DISADD)	/ STORE ADDING FACTOR
020341	120460		JMS*	(DECIN)	/ LAST CHANNEL
020342	040040		DAC	I	
020343	220551		LAC*	(DISADD)	
020344	740001		CMA		

020345	340474		TAD	(1)	
020346	340040		TAD	1	
020347	741300		SPAISNA		/ IST < LAST?
020350	620471		JMP*	(QMARK)	
020351	740552		TAD	(-7777)	
020352	740300		SMAISZA		/ GREATER THAN 4K?
020353	620471		JMP*	(QMARK)	/ YES
020354	340553		TAD	(1000)	
020355	060554		DAC*	(NOCD)	
020356	740001		CMA		
020357	340474		TAD	(1)	
020360	060555		DAC*	(MNOCD)	
020361	770000		LAW	-10000	
020362	060556		DAC*	(MRAMP)	
020363	620516		JMP*	(RETC)	
020364	000000	GET10	0		
020365	200557		LAC	(25)	
020366	060560		DAC*	(DSLOT+4)	
020367	060561		DAC*	(BLKCAL+4)	
020370	200562		LAC	(32)	
020371	060563		DAC*	(UNIAMT)	
020372	060564		DAC*	(FULL)	
020373	620364		JMP*	GET10	
020374	751000		CLAISKP		
020375	750001	SSING	CLC		
020376	060465		DAC*	(STRPFG)	
020377	620516		JMP*	(RETC)	
020400	200565		LAC	(74)	/ READ8
020401	040425		DAC	GETPT1	
020402	200566		LAC	(705161)	
020403	600411		JMP	GETPT+3	
020404	200565		LAC	(74)	/ READPT
020405	741000		SKP		
020406	200567	GETPT	LAC	(144)	/ TMC
020407	040425		DAC	GETPT1	
020410	200570		LAC	(700104)	
020411	060571		DAC*	(READ50+2)	
020412	200572		LAC	(PTRD+4)	
020413	060573		DAC*	(RPAPER)	
020414	120574		JMS*	(ERASF)	
020415	120575		JMS*	(ERASC)	
020416	200271		LAC	GET1	
020417	060576		DAC*	(DTTS1)	
020420	040040		DAC	1	
020421	770000		LAW	-10000	
020422	040041		DAC	1+1	
020423	120577		JMS*	(PTRD)	
020424	653323		IDIV		/ DIVIDE BY 100
020425	000144	GETPT1	144		/ OR BY 60.
020426	050402		DAC	LIVELO+400	
020427	641002		LACQ		/ INTEGER PART
020430	050436		DAC	LIVEPH+400	
020431	050401		DAC	LIVEHI+400	
020432	050432		DAC	LIVETM+400	
020433	150403		OZH	REALHI+400	
020434	150404		OZH	REALLO+400	
020435	150431		OZH	REALTH+400	
020436	751000		SKPICLA		

020437	120577		JMS*	(PTRD)	
020440	060040		DAC*	:	/ STORE SINGLES DATA
020441	440040		ISZ	I	
020442	460576		ISZ*	(DITS!)	
020443	440041		ISZ	I+1	/ DONE
020444	600437		JMP	.-5	/ NO
020445	620516		JMP*	(RETC)	
020446	120600	RES	JMS*	(MIO)	
020447	015265		MESSAL		
020450	315347		FLT	ALGS	
020451	015270		MESSAB		
020452	315352		FLT	ABSS	
020453	015273		MESSSQ		
020454	315355		FLT	SQS	
020455	620601		JMP*	(OVERFL-6)	
020456	620602	F	JMP*	(FCOMD)	
			.END		
020457	004041				
020460	012461				
020461	002534				
020462	013414				
020463	002535				
020464	012714				
020465	000053				
020466	000055				
020467	000040				
020470	000076				
020471	006746				
020472	000062				
020473	002405				
020474	000001				
020475	002406				
020476	000052				
020477	000057				
020500	013051				
020501	016600				
020502	016603				
020503	015536				
020504	013666				
020505	015425				
020506	015430				
020507	015433				
020510	013112				
020511	015537				
020512	400000				
020513	015570				
020514	015577				
020515	006054				
020516	006257				
020517	006141				
020520	006303				
020521	006305				
020522	002606				
020523	002407				
020524	002261				
020525	000400				
020526	002553				
020527	014324				

020530	015532
020531	015507
020532	015345
020533	015346
020534	015450
020535	015423
020536	015316
020537	015436
020540	740000
020541	030400
020542	002600
020543	001013
020544	002564
020545	005725
020546	006072
020547	006522
020550	006514
020551	007660
020552	770001
020553	010000
020554	010344
020555	007657
020556	010307
020557	000026
020560	004376
020561	006266
020562	000032
020563	001007
020564	005716
020565	000074
020566	705161
020567	000144
020570	700104
020571	016051
020572	016012
020573	011565
020574	001564
020575	001602
020576	002641
020577	016006
020600	011625
020601	015253
020602	001645

		TITLE	LIBRARY CREATE ROUTINE...
	LOC	20000	
	LIT	L15*1	
020000	414314	414314	
020001	020165	LINDEX*2	/ LASTID
020002	481414	481414	/ LINDEX
020003	020183	LINDEX	
020004	457414	457414	/ LGET
020005	020075	LGET	
020006	455270	455270	/ GREEL
020007	020254	GREEL	
020010	256030	256030	/ XFER
020011	020341	XFER	
020012	450457	450457	/ OUTPUT
020013	020201	OUTPUT	
020014	652414	652414	/ LREN
020015	020030	LREN	
020016	454414	454414	/ LOEL
020017	020071	LOEL	
020020	756414	756414	/ LNEW
020021	020073	LNEW	
020022	457070	457070	/ GET
020023	020125	GET	
020024	474342	474342	/ RDSLOT
020025	020142	GETIN-2	
020026	000000	0	
020027	000000	0	
020030	120415	JMS*	(DECIN) / READ OLD ID
020031	060416	DAC*	(DTRE2)
020032	220417	LAC*	(BC*1)
020033	060420	DAC*	(DTRE1)
020034	120415	JMS*	(DECIN) / READ NEW ID
020035	120421	JMS*	(ADCCHK)
020036	100302	JMS	U5
020037	120422	JMS*	(RDDIR) / READ DIRECTORY
020040	740200	SZA	
020041	620423	JMP*	(RETC)
020042	120424	JMS*	(SEARCH) / FIND ID?
020043	220425	LAC*	(DIRFLG)
020044	740200	SZA	
020045	620423	JMP*	(RETC) / NOT FOUND.
020046	120426	JMS*	(SETCNT)
020047	220427	LAC*	(DIRTEM) / DETERMINE ADR OF ID.
020050	360430	TAD*	(DIRCT2)
020051	340431	TAD	(-1)
020052	040200	DAC	LASTC
020053	220432	LAC*	(DIRT1)
020054	360430	TAD*	(DIRCT2)
020055	340431	TAD	(-1)
020056	040412	DAC	CTN
020057	220417	LAC*	(BC*1)
020060	320433	ADD*	(BC*2)
020061	741200	SNA	
020062	620434	JMP*	(OMARK)
020063	220433	LAC*	(BC*2) / CHANGE ID.
020064	060200	DAC*	LASTC
020065	220417	LAC*	(BC*1)
020066	060412	DAC*	CTN

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020067	120435		JMS*	(WTDIR)	/ WRITE NEW DIRECTORY
020070	620423		JMP*	(RETC)	
020071	100302	LDEL	JMS	U5	
020072	620436		JMP*	(REMOVE)	
020073	100302	LNEW	JMS	U5	
020074	620437		JMP*	(NEWDIR)	
020075	120415	LGET	JMS*	(DECIN)	/ GET ID
020076	060416		DAC*	(DTRE2)	
020077	220417		LAC*	(BC+1)	
020100	060420		DAC*	(DTRE1)	
020101	120424		JMS*	(SEARCH)	/ SEARCH FOR ID
020102	220425		LAC*	(DIRFLG)	
020103	740200		SZA		/ FIND ID?
020104	620423		JMP*	(RETC)	/ NO
020105	200276		LAC	RBAS	
020106	360430		TAD*	(DIRCT2)	
020107	040115		DAC	.+6	
020110	100302		JMS	U5	
020111	120440		JMS*	(DECTRW)	/ READ ID BLK.
020112	000000		0		
020113	777400		-400		
020114	030400		30400		
020115	000000		0		
020116	000003		3		
020117	210437		LAC	EXPIDF+400	
020120	050377		DAC	EXPIDH+400	
020121	040251		DAC	ETH	
020122	210400		LAC	EXPID+400	
020123	040252		DAC	ETL	
020124	620423		JMP*	(RETC)	/ RETURN
020125	120415	GETT	JMS*	(DECIN)	/ READ ID #
020126	060416		DAC*	(DTRE2)	/ SAVE LOW
020127	220417		LAC*	(BC+1)	
020130	060420		DAC*	(DTRE1)	/ SAVE HIGH
020131	120422		JMS*	(RDDIR)	/ READ DIRECTORY
020132	740200		SZA		
020133	620423		JMP*	(RETC)	
020134	120424		JMS*	(SEARCH)	/ SEARCH FOR ID.
020135	220425		LAC*	(DIRFLG)	
020136	740200		SZA		/ FIND ID?
020137	620423		JMP*	(RETC)	/ NO
020140	220441		LAC*	(BLKNO)	
020141	600144		JMP	.+3	
020142	120415		JMS*	(DECIN)	/ GET SLOT #
020143	420442		XCT*	(JMSBLK)	
020144	040151	GETIN	DAC	.+5	
020145	420443		XCT*	(JMS10)	
020146	000000		0		
020147	777400		-400		
020150	030400		30400		
020151	000000		0		
020152	000003		3		
020153	150437		DZH	EXPIDF+400	
020154	150377		DZH	EXPIDH+400	
020155	140251		DZH	ETH	
020156	210400		LAC	EXPID+400	
020157	040252		DAC	ETL	
020160	213000		LAC	13000	

020161	050440		DAC	DECNM+400	
020162	620423		JMP*	(RETC)	/ RETURN
020163	100302	LINDEX	JMS	U5	
020164	620444		JMP*	(INDEX)	
020165	200445		LAC	(30437)	
020166	060413		DAC*	L14	
020167	200446		LAC	(31237)	
020170	360414		DAC*	L15	
020171	777440		LAW	-340	
020172	040200		DAC	LASTC	
020173	220015		LAC*	15	/ RESTORE ID INFO.
020174	060014		DAC*	14	
020175	440200		ISZ	LASTC	
020176	600173		JMP	.-3	
020177	620423		JMP*	(RETC)	/ RETURN
020200	000000	LASTC	0		
020201	220447	OUTPUT	LAC*	(UNITSV)	
020202	741200		SNA		/ MAG TAPE?
020203	620423		JMP*	(RETC)	/ YES
020204	210440		LAC	DECNM+400	
020205	040253		D C	REELS	
020206	120422		JMS*	(RDDIR)	/ READ DIRECTORY
020207	740200		SZA		
020210	620423		JMP*	(RETC)	
020211	200251		LAC	ETH	
020212	060420		DAC*	(DTRE1)	
020213	200252		LAC	ETL	
020214	060416		DAC*	(DTRE2)	
020215	120424		JMS*	(SEARCH)	/ SEARCH FOR DUPLICATE ID.
020216	220425		LAC*	(DIRFLG)	
020217	740200		SZA		
020220	620423		JMP*	(RETC)	
020221	220432		LAC*	(DIRT1)	/ GET ADDRESS
020222	040200		DAC	LASTC	
020223	210377		LAC	EXPIDH+400	
020224	060200		DAC*	LASTC	
020225	220427		LAC*	(DIRTEM)	/ GET ADDRESS
020226	040200		DAC	LASTC	
020227	210400		LAC	EXPID+400	
020230	060200		DAC*	LASTC	
020231	200253		LAC	REELS	
020232	050440		DAC	DECNM+400	
020233	053000		CAC	13000	/ REEL
020234	120435		JMS*	(WTDIR)	
020235	220441		LAC*	(BLKNO)	
020236	040243		DAC	.*5	
020237	420443		XCT*	(JMS10)	
020240	000000		0		
020241	777400		-400		
020242	030400		30400		
020243	000000		0		
020244	000005		5		
020245	200446		LAC	(31237)	
020246	060413		DAC*	L14	
020247	200445		LAC	(30437)	
020250	600170		JMP	LINDEX+5	
020251	000000	ETH	0		
020252	000000	ETL	0		

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02023	000000	REELS	0		
02025	100302	GREEL	JMS	US	
020255	120415		JMS*	(DECIN)	
020256	060416		DAC*	(DTRE2)	
020257	220417		LAC*	(BC+1)	
020260	060420		DAC*	(DTRE1)	
020261	120422		JMS*	(RODIR)	/ READ DIRECTORY
020262	740200		SZA		
020263	520423		JMP*	(RETC)	
020264	120424		JMS*	(SEARCH)	/ SEARCH
020265	220425		LAC*	(DIRFLG)	
020266	740200		SZA		/ SUCCESSFUL?
020267	620423		JMP*	(RETC)	/ NO
020270	220441		LAC*	(BLKNO)	
020271	040276		DAC	RBAS	
020272	120440		JMS*	(DECTRW)	
020273	000000		0		
020274	777400		-400		
020275	032500		32600		
020276	000000	RBAS	0		
020277	000003		3		
020300	120450		JMS*	(DIRECT)	/ PRINT DIRECTORY
020301	620423		JMP*	(RETC)	
020302	000000	US	0		
020303	200451		LAC	(S)	
020304	120452		JMS*	(D2)	/ D2
020305	200453		LAC	(20)	
020306	060454		DAC*	(BLKCAL+4)	
020307	200455		LAC	(43)	
020310	060456		DAC*	(FULL)	
020311	620302		JMP*	US	
020312	000000	R5	0		
020313	040320		DAC	BK5	
020314	420443		XCT*	(JMS10)	
020315	000000		0		
020316	777400		-400		
020317	031600		31600		
020320	000000	BK5	0		
020321	000003		3		
020322	740200		SZA		
020323	620423		JMP*	(RETC)	
020324	620312		JMP*	R5	
020325	000000	H6	0		
020326	100302		JMS	US	
020327	120440		JMS*	(DECTRW)	
020330	000000		0		
020331	777400		-400		
020332	031600		31600		
020333	000000	BK6	0		
020334	000005		5		
020335	740200		SZA		
020336	620423		JMP*	(RETC)	
020337	440333		ISZ	BK6	
020340	620325		JMP*	H6	
020341	120422	XFER	JMS*	(RODIR)	/ READ DIRECTORY
020342	740200		SZA		
020343	620423		JMP*	(RETC)	
020344	213000		LAC	13000	/ REEL

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020345 050400
020346 150437
020347 150377
020350 100302
020351 120422
020352 740200
020353 620423
020354 120457
020355 220425
020356 740200
020357 620423
020360 120435
020361 740200
020362 620423
020363 220441
020364 040333
020365 220447
020366 120452
020367 750001
020370 420442
020371 100312
020372 100325
020373 220460
020374 740001
020375 340461
020376 040412
020377 140200
020400 440200
020401 220447
020402 120452
020403 200200
020404 420442
020405 100312
020406 100325
020407 440412
020410 600400
020411 620423
020412 000000
020413 000014
020414 000015

000415 012461
000416 002534
000417 013414
000420 002535
000421 004041
000422 006054
000423 006257
000424 006141
000425 006303
000426 006111
000427 006302
000430 006304
000431 777777
000432 006306
000433 013415
000434 006746
000435 006072
    
```

```

OOF
CTN
L14
L15
    
```

```

DAC EXPID+400
DZM EXPIDF+400
DZM EXPIDH+400
JMS US
JMS* (RDIR) / READ LIB DIRECTORY
SZA
JMP* (RETC)
JMS* (ADDIR)
LAC* (DIRFLG)
SZA
JMP* (RETC)
JMS* (WDIR) / WRITE LIB DIRECTORY
SZA
JMP* (RETC)
LAC* (BLKNO)
DAC BK6
LAC* (UNITSV) / UNITSV
JMS* (D2) / D2
CLA
XCT* (JMSBLK)
JMS R5
JMS W6
LAC* (UNIAMT) / # OF 10 BLKS ON TAPE
CMA
TAD (1)
DAC CTN
DZM LASTC
ISZ LASTC
LAC* (UNITSV) / UNITSV
JMS* (D2) / D2
LAC LASTC
XCT* (JMSBLK) / BLKCAL
JMS R5
JMS W6
ISZ CTN
JMP OOF
JMP* (RETC) / RETURN
0
14
15
.END
    
```

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000436	006101
000437	005550
000440	006344
000441	006305
000442	001014
000443	001013
000444	006122
000445	030437
000446	031237
000447	015711
000450	005630
000451	000005
000452	000743
000453	000020
000454	006266
000455	000043
000456	005716
000457	005725
000460	001007
000461	000001

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020000 715707
020001 020203
020002 474375
020003 020202
020004 715404
020005 020015
020006 673030
020007 020371
020010 272151
020011 020555
020012 276151
020013 020554
020014 000000

020015 120717
020016 220720
020017 740200
020020 620721
020021 120722
020022 740200
020023 620723
020024 120724
020025 220725
020026 750201
020027 620723
020030 352603
020031 340726
020032 040145
020033 220727
020034 741200
020035 600042
020036 220145
020037 741200
020040 600043
020041 600044
020042 120730
020043 220731
020044 060732
020045 420733
020046 340734
020047 120735
020050 160736
020051 420733
020052 340737
020053 120735
020054 420733
020055 340740
020056 120735
020057 420733
020060 340741
020061 120735
020062 777600
020063 040145
020064 140101
    
```

```

.TITLE EXTEND OVERLAY RCD
.LOC 20000
.LIT CADRI+1
715707 / GMAG
MGSLOT+1
474375 / MGSLOT
MGSLOT
715404 / DMAG
MAGDEC
673030 / CON;X.Y.DX.DY
CON
272151 / MAJOR
MINHAF+1
276151 / MINOR
MINHAF
0
/ ROUTINE TO READ OR WRITE UNFOLDED MATRIX
/ RIC C. DAVIES MARCH 1972
MAGDEC JMS* (ADCCHK) / ADC'S ON?
LAC* (BKGFLG)
SZA
JMP* (QMARK)
JMS* (RDDR)
SZA
JMP* (RETC) / RETURN ON ERROR.
JMS* (ADD:R) / ADD NEW ID.
LAC* (DIRFLG)
SZAICLC / DIRECTORY OK?
JMP* (RETC) / NO
TAD 12603 / 32603-# OF SPECTRA
TAD (33160)
DAC MDECS
LAC* (UNIT)
SNA / MAGTAPE?
JMP .+5 / YES
LAC* MDECS / GET BLK# TO WRITE IN
SNA
JMP .+3 / WRONG KIND OF TAPE.
JMP .+3
JMS* (HTDIR)
LAC* (BLKNO)
DAC* (DECBK)
XCT* (XCTBKG) / WRITE ID BLOCK
TAD (EXPID)
JMS* (HTDEC)
DZH* (RWFG)
XCT* (XCTBKG)
TAD (35000) / SUM SPECTRUM
JMS* (HTDEC)
XCT* (XCTBKG)
TAD (37000) / F SPECTRUM
JMS* (HTDEC)
XCT* (XCTBKG)
TAD (36000) / H SPECTRUM
JMS* (HTDEC)
LAW -200
DAC MDCNT
DZH MDEC1
    
```

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020065	140154		DZM	MDEC2	
020066	140144		DZM	MOTER	
020067	200742		LAC	(33400)	
020070	040201		DAC	MDBPT	
020071	777000		LAW	-1000	
020072	040150		DAC	MDECWC	
020073	200100		LAC	.+5	
020074	040147		DAC	MDECPT	
020075	120743		JMS*	(DISK10)	
020076	000000		0		/ DISK #
020077	777000		-1000		/ WC
020100	031200		31200		/ CA
020101	000000	MDEC1	0		/ DISK ADR
020102	000003		3		/ READ
020103	777000		LAW	-1000	
020104	340101		TAD	MDEC1	/ UPDATE DISK ADR
020105	040101		DAC	MDEC1	
020106	220147		LAC*	MDECPT	/ GET POINT
020107	741200		SNA		
020110	600152		JMP	MDEC2-2	/ SQUEEZE ZEROES
020111	200154		LAC	MDEC2	
020112	740200		S7A		/ NEED TO WRITE OUT PACKED ZEROES?
020113	100154		JMS	MDEC2	/ YES
020114	140154		DZM	MDEC2	
020115	220147		LAC*	MDECPT	
020116	100160		JMS	MDBUF	
020117	440147	MDEC3	ISZ	MDECPT	
020120	440150		ISZ	MDECWC	
020121	600106		JMP	MDEC1+5	/ GET NEXT POINT.
020122	440146		ISZ	MDCNT	
020123	600071		JMP	MDEC1-10	/ READ IN NEW BUFFER.
020124	200154		LAC	MDEC2	
020125	740200		SZA		
020126	100154		JMS	MDEC2	
020127	440144		ISZ	MOTER	
020130	100160		JMS	MDBUF	
020131	560727		SAD*	(UNIT)	
020132	600142		JMP	MAGDC2	
020133	100362		JMS	MDEC8	
020134	777230		LAW	-550	
020135	360732		TAD*	(DECBLK)	
020136	440145		ISZ	MDECS	
020137	060145		DAC*	MDECS	
020140	120730		JMS*	(WDIR)	/ WRITE DIRECTORY
020141	620723		JMP*	(RETC)	
020142	120744	MAGDC2	JMS*	(EOF)	
020143	620723		JMP*	(RETC)	
020144	000000	MOTER	0		
020145	000000	MDECS	0		
020146	000000	MDCNT	0		
020147	000000	MDECPT	0		
020150	000000	MDECWC	0		
020151	000000	SGSW	0		
020152	440154		ISZ	MDEC2	
020153	600117		JMP	MDEC3	
020154	000000	MDEC2	0		
020155	340745		TAD	(400000)	/ BIT 0 INDICATES 0 PACK WORD.
020156	100160		JMS	MDBUF	

020157	620154		JMP*	MDEC2	
020160	000900	MDBUF	0		
020161	060201		DAC*	MDBPT	
020162	440201		ISZ	MDBPT	
020163	200201		LAC	MDBPT	
020164	540746		SAD	(34000)	/ FILLED BUFFER?
020165	600172		JMP	.+5	/ YES
020166	200144		LAC	MTER	
020167	751200		SNAICLA		
020170	620160		JMP*	MDBUF	
020171	600161		JMP	MDBUF+1	
020172	140144		OZH	MTER	
020173	200742		LAC	(33400)	
020174	040201		DAC	MDBPT	/ RESET POINTER.
020175	120735		JMS*	(MTEC)	/ WRITE BUFFER.
020176	740200		SZA		
020177	620723		JMP*	(RETC)	/ BAD-MAY BE END OF TAPE.
020200	620160		JMP*	MDBUF	
020201	033400	MDBPT	33400		
020202	751000	MGSLOT	SKPICLA		
020203	750001		CLC		
020204	040151		D.C	SGSW	
020205	460747		ISZ*	(MAGUFL)	
020206	120717	DECMAG	JMS*	(ADCHK)	/ ADC'S ON
020207	220720		LAC*	(BKGFLG)	
020210	740200		SZA		
020211	620721		JMP*	(QMARK)	
020212	120750		JMS*	(DECIN)	/ GET EXPID
020213	060751		DAC*	(DTRE2)	/ LOW
020214	220752		LAC*	(BC+1)	
020215	060753		DAC*	(DTRE1)	/ HIGH
020216	220754		LAC*	(TC)	
020217	540755		SAD	(40)	
020220	750000		CLA		
020221	540756		SAD	(76)	
020222	750000		CLA		
020223	740200		SZA		
020224	620721		JMP*	(QMARK)	
020225	120722		JMS*	(RDIR)	/ READ DIRECTORY
020226	740200		SZA		
020227	620723		JMP*	(RETC)	
020230	440151		ISZ	SGSW	
020231	600355		JMP	MDEC7	/ READ SLOT
020232	120757		JMS*	(SEARCH)	/ FIND ID
020233	220725		LAC*	(DIRFLG)	
020234	740200		SZA		/ SEARCH SUCCESSFUL?
020235	620721		JMP*	(QMARK)	/ NO
020236	220760		LAC*	(DIRT2)	
020237	340761	MDEC4	TAD	(33157)	
020240	040145		DAC	MDECS	
020241	100362		JMS	MDEC8	
020242	200762		LAC	(550)	
020243	040151		DAC	SGSW	
020244	220145		LAC*	MDECS	/ GET STARTING BLOCK
020245	740200		SZA		
020246	340151		TAD	SGSW	
020247	741200		SNA		
020250	220731		LAC*	(BLKNO)	/ IF 0, USE BLKNO

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020251	060763		DAC*	(RDBLK)	
020252	120764		JMS*	(ERASC)	
020253	120765		JMS*	(RDSIN)	
020254	740200		SZA		/ ERROR?
020255	620723		JMP*	(RETC)	
020256	777600		LAW	-2C)	/ # OF 1000 WORD BLKS.
020257	040146		OAC	MDCNT	
020260	140341		OZM	MAGRAD	
020261	777000		LAW	-1000	
020262	040150		DAC	MDECWC	
020263	200100		LAC	MDEC1-1	
020264	040147		DAC	MDECPT	/ SET TO START OF BUFFER
020265	200766		LAC	(MDEC5)	
020266	040312		DAC	MAGET	
020267	600320		JMP	MAGET+6	
020270	100330		JMS	MAGPUT	
020271	100312	MDEC5	JMS	MAGET	
020272	740100		SMA		/ SKIP IF WORD CONTAINS PACKED 0'S.
020273	600305		JMP	MDEC6	
020274	340745		TAD	(400000)	/ TAKE OFF BIT 0.
020275	740001		CMA		
020276	340767		TAD	(1)	
020277	040154		DAC	MDEC2	/ COMP OF # OF ZEROES.
020300	750000		CLA		
020301	100330		JMS	MAGPUT	
020302	440154		ISZ	MDEC2	
020303	600300		JMP	.-3	
020304	600271		JMP	MDEC5	
020305	740200	MDEC6	SZA		/ IF ZERO - THEN END OF BUFFER.
020306	600270		JMP	MDEC5-1	
020307	750000		CLA		
020310	100330		JMS	MAGPUT	
020311	600307		JMP	-2	
020312	000000	MAGET	0		
020313	220370		LAC*	MDECBP	
020314	440370		ISZ	MDECBP	
020315	440145		ISZ	MDECS	/ DONE WITH THIS BUFFER?
020316	620312		JMP*	MAGET	/ NO
020317	040154		DAC	MDEC2	
020320	777400		LAW	-400	
020321	040145		DAC	MDECS	
020322	220770		LAC*	(DIRONE)	
020323	040370		DAC	MDECBP	
020324	460763		ISZ*	(RDBLK)	
020325	120771		JMS*	(RTAPE)	/ READ BLK OF DATA.
020326	200154		LAC	MDEC2	
020327	620312		JMP*	MAGET	
020330	090000	MAGPUT	0		
020331	060147		DAC*	MDECPT	
020332	440147		ISZ	MDECPT	
020333	440150		ISZ	MDECWC	/ FILLED BUFFER?
020334	620330		JMP*	MAGPUT	/ NO
020335	120743		JMS*	(DISKIO)	
020336	000000		0		
020337	777000		-1000		/ WC
020340	031200		31200		/ CA
020341	000000	MAGRAD	0		/ DISK ADR.
020342	000005		5		/ WRITE

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020343 777000 LAM -1000
020344 040190 DAC MDEC7C
020345 340341 TAD MAGRAD
020346 040341 DAC MAGRAD
020347 200340 LAC MAGRAD-1
020350 040147 DAC MDECPT / RESET POINTER,ETC.
020351 440146 ISZ MDCIT / WRITTEN ALL BUFFERS?
020352 620330 JMP* MAGPUT / NO
020353 120772 JMS* (FOLDED)
020354 620773 JMP* (DTRE6-1)
020355 220751 MDEC7 LAC* (DTRE2)
020356 120774 JMS* (OK)
020357 060731 DAC* (BLKNO)
020360 220751 LAC* (DTRE2)
020361 600237 JMP MDEC4
020362 000000 MDEC8 0
020363 777777 LAM -1
020364 360727 TAD* (UNIT)
020365 750200 SZAICLA
020366 440362 ISZ MDEC8
020367 620362 JMP* MDEC8
020370 000000 MDEC8P 0
/ ROUTINE CON RCD OCT 1971
/ ARGUMENTS: CON;X,Y,DX,DY
/ CALLS A RECTANGLE OF CONTOUR POINTS
/ OFF OF DISK AND PLACES IT IN CONTOUR
/ DISPLAY BUFFER.
020371 120775 CON JMS* (ADCBUS)
020372 220720 LAC* (BKFLG)
020373 740200 SZA / IN BK?
020374 620721 JMP* (OMARK)
020375 160776 DZH* (CFMFG)
020376 100532 JMS CON3
020377 060777 DAC* (VCROSS-1) / X VALUE
020400 100532 JMS CON3
020401 061000 DAC* (HCROSS-1) / Y VALUE
020402 220754 LAC* (TC)
020403 541001 SAD (54) / DX AND DY FOLLOW?
020404 600410 JMP .+4 / YES
020405 777700 LAM -100 / NO, SET BOTH TO 64.
020406 040421 DAC CON1
020407 600417 JMP CON1-2
020410 100532 JMS CON3
020411 741200 SNA / IF ZERO,
020412 750001 CLC / MAKE -1
020413 040421 DAC CON1 / DELTA X
020414 100532 JMS CON3
020415 745200 SNA CLL
020416 750001 CLC / MAKE -1 IF 0.
020417 040532 DAC CON3 / DELTA Y
020420 553122 MUL
020421 000000 CON1 0
020422 641006 B41006 / CMQ LACQ
020423 341002 TAD (17701)
020424 745100 SPA CLL / LESS THAN BK?
020425 620721 JMP* (OMARK) / NO
020426 220777 LAC* (VCROSS-1)
020427 100520 JMS CON4 / CHECK DX

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020430	340421	TAD	CON1
020431	040421	DAC	CON1
020432	221000	LAC*	(HCROSS-1)
020433	100520	JMS	CON4 / CHECK DY
020434	340532	TAD	CON3
020435	040532	DAC	CON3
020436	200532	LAC	CON3
020437	100550	JMS	CONCIA
020440	061003	DAC*	(CONY) / DY POSITIVE
020441	200421	LAC	CON1
020442	040504	DAC	CADR-1 / WC
020443	100550	JMS	CONCIA
020444	061004	DAC*	(CONX)
020445	340532	TAD	CON3
020446	744100	SMA CLL	/ SKIP IF DY>DX.
020447	600492	JMP	.+3
020450	221003	LAC*	(CONY)
020451	741000	SKP	
020452	221004	LAC*	(CONX)
020453	040456	DAC	.+3
020454	201005	LAC	(2000) / CALCULATE POINT SPACING.
020455	653323	ICIV	
020456	000000	0	
020457	641002	LAC0	
020460	061006	DAC*	(CHOR)
020461	061007	DAC*	(CVER)
020462	040545	DAC	CON2+4
020463	221003	LAC*	(CONY)
020464	100541	JMS	CON2 / CALCULATE Y-LIMIT
020465	061010	DAC*	(YLIMIT)
020466	221004	LAC*	(CONX)
020467	100541	JMS	CON2 / CALCULATE X-LIMIT
020470	061011	DAC*	(XLIMIT)
020471	061012	DAC*	(CMODE)
020472	161013	DZM*	(DELIMIT)
020473	221000	LAC*	(HCROSS-1) /GET Y
020474	744000	CLL	
020475	840710	ALS	10
020476	360777	TAD*	(VCROSS-1) /ADD X
020477	040506	DAC	CADR+1 / DISK ADR
020500	221014	LAC*	(FST01)
020501	040505	DAC	CADR
020502	120743	JMS*	(DISK10)
020503	000000	0	/ DISK UNIT
020504	000000	0	/ WC
020505	000000	CADR	0 / CA
020506	000000	0	/ DISK ADR
020507	000003	3	/ READ
020510	717400	LAW	-400
020511	340506	TAD	CADR+1
020512	040506	DAC	CADR+1 / UPDATE DISK ADR
020513	221004	LAC*	(CONX)
020514	340505	TAD	CADR / UPDATE CA.
020515	440532	ISZ	CON3 / DONE?
020516	600501	JMP	CADR-4 / NO
020517	621015	JMP*	(CONTR)
020520	000000	0	
020521	341016	TAD	(377)

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020522 652000 LMO
020523 420520 XCT* CON4 / WILL BE DELTA IF DX OR DY TOO LARGE.
020524 440520 ISZ CON4
020525 740100 SMA
020526 440520 ISZ CON4
020527 641006 64100F / CMQ LACQ
020530 340767 TAD (1)
020531 620520 JMP* CON4
020532 000000 CON3 0
020533 120750 JMS* (DEC IN)
020534 501016 AND (377)
020535 100550 JMS CONCIA
020536 461017 ISZ* (AINF) / INPUT A POINT?
020537 620532 JMP* CON3 / YES
020540 620721 JMP* (OMARK) / NO
020541 000000 CON2 0
020542 341020 TAD (-1)
020543 744000 CLL
020544 653122 MUL
020545 000000 0
020546 641002 LACQ
020547 620541 JMP* CON2
020550 000000 CONCIA 0
020551 744001 CHAICLL
020552 340767 TAD (1)
020553 620550 JMP* CONCIA

/ RCD FEB 1972
/ ROUTINE TO GET MAJOR AND MINOR HALVES OF UNFOLDED MATRIX.
MINHAF SKPICLC
020554 751001 CLA
020555 750000 DAC CON2
020556 040541 DAC WC+2
020557 040655 DZM WC
020560 140653 LAC (40100) / FSTCOI
020561 201021 DAC* (ZERTEM)
020562 061022 DAC CADR1
020563 040716 LAH -17700
020564 760100 JMS* (ZEROUT) / ZERO OUT COINC AREA
020565 121023 ISZ CON2
020566 440541 JMP MAJHAF
020567 600622 LAH -400 / SET WC FOR MINOR HALF.
020570 777400 DAC WC
020571 040653 LAH -2
020572 777776 DAC CON3
020573 040532 LAC CADR1
020574 200716 DAC CADR
020575 040505 DAC CADR1
020576 040716 ISZ WC / DONE?
020577 440653 SKP / NO
020600 741000 JMP .+5
020601 600606 LAC WC
020602 200653 JMS MAJ10 / READ IN DATA
020603 100645 JMP MINI+4 / RESET BUF POINTER AND CONT.
020604 600576 JMP MINI / SET BUF POINTER AND CONT.
020605 600572 LAH -10
020606 777770 DAC* (DELIMT)
020607 061013 LAC (1760) / SETUP DISPLAY VARIABLES.
020610 201024 DAC* (XLIMIT)
020611 061011

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020612	061010	MIN2	DAC*	(YLIMIT)	
020613	161000		DZM*	(HCROSS-1)	
020614	160777		DZM*	(VCROSS-1)	
020615	201025		LAC	(10)	
020616	061012		DAC*	(CMODE)	
020617	061006		DAC*	(CHOR)	
020620	061007		DAC*	(CVER)	
020621	621015		JMP*	(CONTUR)	
020622	777377	MAJHAF	LAW	-401	
020623	040655		DAC	WC+2	
020624	200716		LAC	CADR1	
020625	040505		DAC	CADR	
020626	777776		LAW	-2	
020627	040532		DAC	CON3	
020630	200716		LAC	CADR1	
020631	040716		DAC	CADR1	
020632	777777		LAW	-1	
020633	340653		TAD	WC	/ SET WC
020634	040653		DAC	WC	
020635	100645		JMS	MAJ10	/ READ IN DATA
020636	600631		JMP	MAJHAF+7	/ RESET BUF POINTER AND CONT.
020637	600624		JMP	MAJHAF+2	/ CONT.
020640	161011		DZM*	(XLIMIT)	
020641	201025		LAC	(10)	
020642	061013		DAC*	(DELIMIT)	
020643	201024		LAC	(1760)	
020644	600612		JMP	MIN2	
020645	000000	MAJ10	0		
020646	040541		DAC	CON2	
020647	200654		LAC	WC+1	
020650	040715		DAC	BADR	
020651	120743		JMS*	(DISK10)	
020652	000000		0		
020653	000000	WC	0		/ WC
020654	031200		31200		/ CA
020655	000000		0		/ DISK BLK
020656	000003		3		/ READ
020657	777400		LAW	-400	
020660	340655		TAD	WC+2	
020661	040655		DAC	WC+2	
020662	777776		LAW	-2	
020663	040520		DAC	CON4	
020664	200716	MAJ1	LAC	CADR1	
020665	541026		SAD	(60000)	
020666	600712		JMP	BADR-3	
020667	220715		LAC*	BADR	
020670	440715		ISZ	BADR	
020671	360716		TAD*	CADR1	
020672	060716		DAC*	CADR1	
020673	040541		ISZ	CON2	
020674	600703		JMP	.+7	
020675	200505		LAC	CADR	
020676	440532		ISZ	CON3	
020677	620645		JMP*	MAJ10	
020700	440716		ISZ	CADR1	
020701	440645		ISZ	MAJ10	
020702	620645		JMP*	MAJ10	
020703	440520		ISZ	CON4	

020704	600664		JMP	MAJI
020705	440716		ISZ	CADRI
020706	777777		LAW	-1
020707	540532		SAD	CON3
020710	440505		ISZ	C/DR
020711	600662		JMP	MAJI-2
020712	440645		ISZ	MAJIO
020713	440645		ISZ	MAJIO
020714	620645		JMP*	MAJIO
020715	000000	BADR	0	
020716	000000	CADRI	0	
			.END	
020717	004041			
020720	000051			
020721	006746			
020722	006054			
020723	006257			
020724	005725			
020725	006303			
020726	033160			
020727	001135			
020730	006072			
020731	006305			
020732	006522			
020733	000052			
020734	030000			
020735	006514			
020736	011376			
020737	035000			
020740	037000			
020741	036000			
020742	033400			
020743	003421			
020744	011323			
020745	400000			
020746	034000			
020747	011375			
020750	012461			
020751	002534			
020752	013414			
020753	002535			
020754	012714			
020755	000040			
020756	000076			
020757	076141			
020760	006304			
020761	033157			
020762	000550			
020763	002606			
020764	001602			
020765	002611			
020766	020271			
020767	000001			
020770	005717			
020771	002600			
020772	003650			
020773	002537			
020774	002564			

020775	005275
020776	001303
020777	001307
021000	001313
021001	000054
021002	017701
021003	000064
021004	000063
021005	002000
021006	004346
021007	004352
021010	001525
021011	001522
021012	001526
021013	001523
021014	000234
021015	001126
021016	000377
021017	000062
021020	777777
021021	040100
021022	000255
021023	001636
021024	001760
021025	000010
021026	060000

ABCT	000261	APOWLS	006657	CADR	020505	CONCEN	030226	DCTMP1	004477
ABS	013726	AREA	014215	CADRI	020716	CONCIA	020550	DCTMP2	004500
ABSC	015405	AREACT	014363	CAREA	014027	COND	001377	DDATA	010331
ABSF	015363	ARE1	014265	CAREA1	014065	COND15	001353	DDFC	000055
ABSM	015374	ARE50	014315	CASQ	013731	CONDMP	005206	DDFS	000056
ABSRES	015430	ARSUM	014376	CBDC	010442	CONDY	001304	DDPI	030057
ABSS	015352	ARTS	014407	CBOP	010431	CONDI	001407	DD1	010363
AC	013417	ASET	013554	CC	011262	COND2	001414	DD2	010350
ACC	000004	BACKG	014412	CCAS	005070	COND3	001424	DECARG	006510
ACOETA	010721	BADR	020715	CCNT	010372	COND4	001431	DECBLK	006522
ACPT	016261	BC	013413	CCOF	702304	COND5	001444	DECCBK	006511
ACS	013425	9CZ	013714	CCSC	702302	COND6	001456	DECCMD	006436
ACSET	016256	BDCTN	010312	CDDC	012301	COND7	001500	DECCON	006571
ACSV	016262	BOOT	010304	CDDC1	012331	CONINT	001107	DECDS1	003577
ACZ	013702	BDOTC	010371	CDDC2	012355	CONMRK	004404	DECDS2	003610
ADCBUS	005275	BEGIN	000107	CDDC3	012344	CONTRK	001126	DECIN	012461
ADCCHK	004041	BEG4	000112	CENDEN	014404	CONVRT	003263	DECIO	003574
ADCDSK	002750	BENT	003313	CENNUM	014401	CONX	000063	DECMAG	020206
ADCFLG	004072	BF	014431	CENT	003320	CONY	000064	DECNM	030040
ADCGO	004641	BFC	014207	CF	001052	CON1	020421	DECNMA	006133
ADCGON	004061	BFLOP	003255	CFCMFG	001303	CON2	020541	DECOU	004577
ADCMOD	000225	BHOR	014741	CFCM50	000065	CON3	020532	DECOUT	002017
ADCON	000226	BKG	001037	CFOV	701104	CON4	020520	DECPRT	006554
ADCOP	701244	BKGF LG	000051	CGIN	010453	COPY	003512	DECPTY	006512
ADCSTP	001662	BK4SP	014366	CGINH	010463	COPYS	003506	DECPUT	020306
ADCSTR	001717	BKLS P	014365	CGINL	010464	COPY1	003533	DECRET	006513
ADDIR	005725	BKS	020320	CHECK	011515	COPY2	003537	DECR1	006452
ADDD01	005764	BK6	020333	CHLT	702324	COPY3	003545	DECR2	006473
ADDD1	005766	BLIM	015307	CHOR	004346	COUNTO	001776	DECSEV	006441
ADDD2	006000	BLKCAL	006262	CHPT	014364	CPLT	010466	DECTRW	006344
ADDD3	006011	BLKNO	006305	CH50	014715	CPLT1	010510	DECT1	006365
ADDD4	006015	BLKONE	005546	CH5050	001274	CRB	014673	DECT2	006377
ADDD6	005776	BM	014432	CIA	001772	CRBANG	014651	DECT3	006413
ADDD8	005745	BMC	014211	CKSLOT	006301	CRBR	014724	DECI	006605
ADDRSS	000207	BOIS	030205	CL	015333	CRB1	014731	DEC2	006613
ADECBK	006435	BOXA	014511	CLAC	702322	CRB2	014733	DEC3	006617
ADECM	010620	BOXAA	014522	CLIM	015422	CREJHI	030025	DEC4	006652
ADLD	005466	BOXAL	014764	CLIMC	015317	CREJLO	030026	DELCNT	000237
ADR	013423	BOXAS	014756	CLSA	702004	CRLF	006737	DELETE	006017
AENT	003306	BOXA2	014523	CLSB	702024	CSC LHI	030021	DELE1	006025
AINF	000062	BOXA3	014537	CLSC	702044	CSC LLO	030022	DELE3	006046
ALBS	012244	BOXH	014761	CLSD	702064	CSCOMD	001076	DELIMT	001523
ALBS1	012245	BOXL	014762	CLTL	010411	CSFN	702301	DELR	001340
ALGC	015402	BOXPT	014763	CM	001062	CSLT	702321	DELTA	000236
ALGF	015360	BOXR	014560	CMG	030053	CSNA	004346	DELTZ	001546
ALGM	015371	BOXROT	014566	CMD	001526	CSTART	000057	DENT	003325
ALGRES	015425	BOXR1	014622	CMODE	001526	CSZA	003340	DETA00	001751
ALGS	015347	BOXR2	014624	CMRET	012304	CTN	020412	DETA1	001757
ALIST	000363	BOXS	014757	CNOP	003323	CTN6	006724	DETPLA	001251
ALLCTN	005202	BOXSEV	014433	COETAB	010722	CVER	004352	DETP1	001262
ALSIZ	012247	BOXT	014755	COILST	002753	O	000732	DE1	012466
ALSIZC	012246	BR0T	014754	COINAD	000224	DBL	200000	DE2	012506
AOFF	014376	BR0TC	014753	COINOF	004511	DBRT	016227	DE3	012527
AOFM	014415	BRST	014617	COINON	004501	DCCCC	004471	DIGCTN	005713
AOT	013676	BSPC	014746	COMMPS	003271	DCCTN	004475	DIGIT	006716
APOWH	006662	BSPEED	005500	COMM3	003274	DCODE	010565	D!LOOF	006300
APOWHS	006660	BUFLEN	000242	COMPLM	001766	DCORE	004441	DIRCK	005662
APOWL	006661	BVER	014734	COMPT	003305	DCTMP	004476	DIRCNT	006307
				CON	020371				

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DIRCT2	006304	DTRE6	002540	FDATA	000244	GETPT	020406	JMSBUF	003235
DIRC1	005671	DTRE7A	002154	FDIS	005502	GETPT1	020425	JMSCG	010465
DIRC2	005677	DTRE7B	002162	FDIV	700000	GETS	020305	JMSIO	001013
DIRC3	005711	DTRE8	002311	FDTPI	015535	GETSL	020300	JMSHIO	014173
DIRECT	005630	DTTS	002640	FEXT	013112	GETSW	020303	JMTB	003370
DIRE1	005640	DTTS1	002641	FFACT	015536	GETT	020125	JMUL	013247
DIRFLG	006303	DX	010061	FFIX	013506	GETWIN	020337	LACI	007072
DIRHIE	005722	DXL	700506	FFOLD	004030	GET1	020271	LAST	010257
DIRONE	005717	DXS	700546	FGR	001015	GET10	020364	LASTC	020200
DIRTEM	006302	DX1	010127	FGTPLA	000216	GET3	020246	LDEL	020071
DIRTHO	005720	DYL	700606	FG5050	000054	GET4	020070	LGET	020075
DIRT1	006306	DYS	700646	FIFTY	000665	GET7A	020117	LIMCT	015316
DIR3	005721	DO	000775	FIFTYC	000721	GET7B	020125	LINDEX	020163
DISADD	007660	D1	000767	FIFTYS	000717	GET8	020206	LINE	007171
DISK	015624	D2	000743	FINGER	007027	GET9	020165	LINEAR	011027
DISK10	003421	EENAB	004606	FINT	013051	GFLG	020304	LINK	016255
DISONE	010407	ENABRO	005067	FINT1	013073	GREEL	020254	LINPOS	007402
DISPEC	010051	ENDZCT	006507	FLAC	200000	GSEQ	011477	LINSV	016263
DISPLY	010374	ENSA	702201	FLOAT	013460	HCMOV	001336	LIST	011616
DISTW0	010410	ENSB	702221	FLT	300000	HCROSS	001314	LITOUT	016314
DKBLK	006274	ENSC	702241	FM	013471	HIGHL	003262	LIVECL	030033
DKFUNC	002710	ENSD	702261	FMCOMD	001653	HIGHPR	006712	LIVEHI	030001
DKINT1	003463	EOF	011323	FMDIS	005506	HMARK	011074	LIVELQ	030002
DKSTAT	003505	ERASC	001602	FMF	014122	HOR	004356	LIVEPH	030036
DLAH	707064	ERASE	001553	FMODE	015202	HORMK	001311	LIVEPS	030034
DLAL	707024	ERASF	001564	FMR	014373	I	020040	LIVEPT	030035
DLIST	005432	ERASM	001573	FMUL	500000	ICNT	015702	LIVER	007556
DLISTH	010147	ERAS9	001615	FNEXT	013116	IM	030047	LIVERS	007517
DLISTV	010107	EREJHI	030027	FOLDA	003702	INCHAN	016064	LIVETM	030032
DLIST2	010202	EREJLO	030030	FOLDED	003650	INCLC	000247	LLIM	015421
DLIST3	010162	ESEQ	011535	FOLDGT	004012	INCON	007404	LLIMC	015415
DLIST4	010216	ETH	020251	FOLD1	003672	INDEX	006122	LNEW	020073
DLIST6	010220	ETL	020252	FOLD2	003737	INDIC	005046	LOCALR	010261
DLIST7	010145	EXIT	007506	FOLD3	003745	INIT	015664	LOG	011023
DLOK	707002	EXPID	030000	FOLD4	003752	INPDIV	002406	LOGAR	010627
DM	015220	EXPIDF	030037	FPCT	014362	INPUTF	002405	LOGLIN	010376
DMARK	010313	EXPIDH	027777	FPRE	013424	INSEL	007667	LOGLN	005015
DMODE	005477	EXPIDP	007045	FPRIN	014324	INTRO	002642	LOGS	011024
DNOM1	016603	F	020456	FRDISK	015571	INTRO1	002654	LOGSUB	010617
DNUM1	016600	FACT	010675	FSIGN	013545	INTRO2	002671	LOG1	010645
DPT	010373	FADD	300000	FSINH1	030015	INTRO3	002713	LOG2	010651
DPZRO	006717	FAXI	001272	FSINLO	030016	INTR04	002724	LOOP	015762
DSCD	707242	FAXIS	000257	FSTART	000217	INTR05	002731	LOSCLA	030005
DSEL	005452	FBCM	705004	FSTC01	000234	INTR06	002732	LOSCLB	030010
DSGO	707047	FBLK	015577	FSTRIP	000213	INTRUP	000262	LOSCLC	030012
DSKINT	003461	FBLKSV	015570	FST128	000233	ISET	012715	LOSCLD	030014
DSL0T	004372	FBRD	705012	FTEMP	015541	ISZ3	015544	LOWL	003261
DSRS	707262	FBSK	705001	FTOM	014124	JADD	013171	LOWPR	006711
DSSF	707001	FBUF	015533	FULL	005716	JDAC	013130	LREN	020030
DTCT	002636	FBUFA	015534	FWDISK	015603	JDISP	005501	LSEQ	011517
DTCT1	002637	FBI	000227	FZAC	013674	JDIV	013335	LSORT	002754
DTREAD	002107	FB2	000231	F40	014370	JISZ	013124	LSOR1	002767
DTRE0	002516	FCHANL	000222	F40C	014203	JJMP	013121	LSOR12	003176
DTRE1	002535	FCIA	013652	GAIN	030044	JJMS	013115	LSOR13	003204
DTRE2	002534	FCLA	013666	GET	020044	JLAC	013166	LSOR14	003243
DTRE3	002503	FCOMD	001645	GETDIV	020037	JLOGAR	011026	LSOR15	003250
DTRE4	002130	FCOORD	000252	GETIN	020144	JMP4	015046	LSOR2	002774
DTRE5	002252	FDAC	000000	GETNUM	020036	JMSBLK	001014	LSOR21	003021

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LSOR3	003026	MDX	010301	MESS94	012733	MTGO	707304	NG9	010030
LSOR4	003055	MESAG	007000	MESS95	012756	MTLC	707326	NIO	012250
LSOR41	003056	MESSAGE	006774	MESS96	012764	MTNQP	011312	NIOA	012273
LSOR5	003061	MESCOM	007031	MESS97	013040	MTRCCT	011373	NIOR	014212
LSOR6	003065	MESCTN	007030	MESS98	011774	MTRCLM	011374	NLS	010554
LSOR7	003076	MESOVF	015262	MESTEM	000242	MTRDWT	011377	NM	014401
LSOR8	003110	MESSAB	015270	MESI	007003	MTRS	707352	NOCD	010344
LSOR9	003126	MESSAL	015265	MES2	007007	MTSEV	011177	NODCSW	004746
LSTAD	002751	MESSC	015304	MES3	007023	MTSEVI	011242	NCEVNT	003260
LSTADR	002752	MESSF	015276	MES4	007025	MTSF	707341	NOR	013426
LSTEMP	000246	MESSM	015301	MFLG	011264	MTSTAT	011273	NPLINE	007403
LSTTOT	000241	MESSSQ	015273	MFOLD	003774	MTTR	707301	NULLS	006726
LT	014376	MESSW	007040	MGSLOT	020202	MTWT	011165	NUMPLA	001247
LTL	014401	MESSWI	007041	MH	011077	MULTSP	006544	NX	010547
LTRT	014404	MESS10	011725	MHMOV	010255	MUPPER	701527	NY	010551
LTSEV	005220	MESS11	011730	MINHAF	020554	HV	011073	OCTN	006543
L14	020413	MESS12	002066	MINI	020572	MVMOV	010256	OCTOUT	006526
L15	020414	MESS14	006310	MIN2	020612	MWAIT	011261	OCT1	006532
MAGARG	011372	MESS15	011733	MIO	011625	M40	014371	ODEV	004604
MAGDC2	020142	MESS16	011736	MIOF	011666	M40C	014205	OFFADC	003375
MAGDEC	020015	MESS17	011741	MIOS	011677	NDX	010555	OIDB	016244
MAGET	020312	MESS18	011744	MIO5	011677	NDY	010553	OIDBAD	016260
MAGPUT	020330	MESS19	011747	MIO1	011653	NETA	014373	OIDBRS	016252
MAGRAD	020341	MESS22	011752	MLSTEN	003257	NEWOIR	005550	OIDBSV	016257
MAGRET	011371	MESS23	007651	MNOCD	007657	NEWD1	005570	OIGO	016237
MAGTPT	011367	MESS24	006314	MOD23	015221	NEWD2	005600	OIJMS	016226
MAGUFL	011375	MESS25	011755	MOVADD	010254	NFNMR	014404	OILF	016224
MAJHAF	020622	MESS26	011760	MO	000005	NGBDT	007662	OILO	016222
MAJ10	020645	MESS27	011763	MOSV	016264	NGC	010562	OINX	016220
MAJ1	020664	MESS28	011766	MRAMP	010307	NGCODA	010566	OIO	016150
MANTIS	011022	MESS29	011771	MSINH1	030017	NGCOM	005316	OIOA	016141
MATCH	016303	MESS3	011700	MSINLO	030020	NGCOM1	005366	OIOAC	016266
MAX1	001273	MESS33	006320	MSPACE	011436	NGCOM2	005370	OIPRO	016207
MAXIS	000260	MESS34	006324	MSPC	006553	NGCTS	010616	OIPT	016265
MB1	000230	MESS4	011703	MSTART	000220	NGC1	010563	ITEM	004605
MB2	000232	MESS43	006331	MSTRIP	000214	NGC2	010564	JK	002564
MCHANL	000223	MESS45	006334	MTAF	707322	NGDCTN	007766	OM	030051
MCOMD	001651	MESS46	006340	MTBEN1	011267	NGDHL	010520	ONADC	003406
MCOORD	000254	MESS5	011706	MTBEN2	011270	NGDIG	010560	OOP	020400
MCRT	011351	MESS53	002075	MTB01	011265	NGDIS	007770	OOUT	016267
MDATA	000245	MESS6	011711	MTB02	011266	NGDVL	010533	OSIP	012375
MDBPT	020201	MESS7	011714	MTBPI	011271	NGOZRO	007767	OUTPUT	020201
MDBUF	020160	MESS8	011717	MTBP2	011272	NGHIGH	010557	OUT8	016056
MDCNT	020146	MESS80	013045	MTBTS	011366	NGLIST	010601	OVERFL	015261
MDECBP	020370	MESS81	013016	MTBUF	011100	NGLOW	010556	OX	010546
MDECPT	020147	MESS82	013022	MTBUF1	011124	NGNON	007756	PADCB	005047
MDECS	020145	MESS83	012772	MTBUF3	011136	NGOVER	007765	PADCGO	004625
MDECHC	020150	MESS84	012740	MTBUF4	011150	NGRF	007762	PAGES	007164
MDEC1	020101	MESS85	012745	MTBUF5	011157	NGTEM	010561	PAGO1	007151
MDEC2	020154	MESS86	012752	MTCOM	011274	NGTENH	007764	PAGO2	007155
MDEC3	020117	MESS87	013026	MTCR	707321	NGTENL	007763	PANBR	005305
MDEC4	020237	MESS88	013033	MTC1	011306	NG1	007702	PANFLG	004106
MDEC5	020271	MESS89	013043	MTC2	011311	NG2	007710	PANRET	005055
MDEC6	020305	MESS9	011722	MTC3	011263	NG3	007714	PANSEV	004107
MDEC7	020355	MESS90	012777	MTEOF	011316	NG4	007751	PBCT	011615
MDEC8	020362	MESS91	013002	MTEOFP	003361	NG5	007776	PB!NR	011614
MDIS	005504	MESS92	013006	MTERR1	011331	NG7	010007	PBLDN	005004
MDTER	020144	MESS93	013012	MTFG	030055	NG8	010024	PB!S	004162

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PB16	004173	PUNCT2	007376	REELS	020253	SAMA	030101	SQC	015410
PB17	004204	PUNCT3	007374	REG	015132	SCAER	003344	SQF	015366
PCODE	004147	PUNDEC	007364	REMOVE	006101	SCALE	007661	SQM	015377
PDIS	005526	PUNLEA	007306	RENAME	006201	SCALER	003337	SQR	013752
PDMODE	004724	PUNOUT	007205	RES	020446	SCAI RA	030005	SORRES	015433
PERASE	004611	PUNSH	007347	RESC	0.5222	SCALRB	030007	SQS	015355
PERROR	005053	PUNSHR	007354	RESETA	000130	SCALRC	030011	SREJHI	030023
PESO	015177	PUNSH2	007316	RESPT	015346	SCALRD	030013	SREJLO	030024
PFDIS	005527	PUNSH3	007241	RESPTS	015345	SCAIA	012274	SSING	020375
PFG	000061	PUNSS	007275	RESTOR	007412	SCOMB	002261	START	001745
PICK	005535	PUNSTA	007340	RET	007436	SCOMBC	015450	STATIM	030041
PINDOF	005037	PUNSTO	007344	RETC	006257	SCOMBS	015436	STMASK	003256
PINDOM	005026	PUNTAB	007325	REWIND	011453	SCOMBI	015455	STOP	001657
PINFO1	004216	PUNTS	007377	RFAST	005420	SCOMB4	015503	STOTIM	030042
PINFO2	004253	PUNTS2	007400	RFLG	015424	SCOMB5	002407	STPOUT	000006
PINRET	004234	PUNTS3	007375	RFS	015635	SCOMB6	002427	STRIP	000724
PLAIST	000253	PUNI	007232	RFSR	015655	SCOMI	002275	STRPCH	013476
PLCFS	004750	PUN2	007252	RGNUM	015145	SCORET	015532	STRPFG	000053
PLIVE	004723	PUN3	007272	RINC	001123	SEARCH	006141	STRP06	010711
PLIVET	004675	P40	014372	RINIT	005413	SEAR1	006151	STRP11	015003
PLOTGO	016127	P40C	014026	RLEFT	005405	SEAR2	006173	STRSUM	000212
PLOTTR	016131	QA	012144	RNAREA	015065	SEAR3	006175	SUMCOM	001655
PNCL	705604	QAA	012165	ROGO	004532	SEND	012115	SUMDIS	005513
PNID	705702	QAA1	012175	ROGI	004563	SEQ	011523	SUMONE	000221
PNIT	705704	QAM	012232	ROG2	004571	SEQPS	011563	SUPZRO	005373
PNOC	004726	QAN	012162	ROH	004531	SEQPT	011564	SW	002577
PNOLD	004770	QAR	012222	ROHLT	004521	SEOR	011534	SWST	002222
PNRD	705612	QMARK	006746	ROTINC	010260	SET	012057	SX	010310
PNSKI	705701	RAMPC	005517	ROTLOC	010262	SETCNT	006111	S3	015555
PONOFF	006767	RAREA	015070	ROTLCST	010263	SETUP	012022	T	015057
POSD	004642	RAS	007455	ROTPT	004336	SETUP	012007	TAPCON	003637
POTTY	007115	RBANG	014627	ROTPT1	004337	SETVAR	012001	TAPE	015630
POTTY1	007125	RBANGR	015100	ROTPT2	004340	SETI	012117	TC	012714
POWH	006676	RBANGI	015125	ROTPT3	004341	SGN	013722	TC1	012531
POWHS	006703	RBAS	020276	POTSEL	004305	SGSW	020151	TEL	012564
POWL	006663	RCOMD	001341	ROT1	010233	SIDIV	013700	TELBS	012710
POWLS	006670	RCOMDR	001345	ROT2	010236	SIGN	002635	TELMQ	012364
PRINT	006752	RDBLK	002606	ROT3	010252	SINDMP	005174	TELPK	012532
PRINTR	006757	RDIR	006054	RPAPER	011565	SKSA	702001	TELPT	012712
PRIOF	007077	RDSIN	002611	RPAPR	011575	SKSB	702021	TELPT1	012713
PROGRM	016104	RDSL	002561	RRIGHT	005400	SKSC	702041	TELST	012552
PROVER	006714	RDSL0T	001130	RRR	015413	SKSD	702061	TELST1	012554
PRTEM	006715	READ	012366	RSEQ	011500	SLIM	015423	TELST2	012557
PSCNTR	001250	READCS	005237	RT	014373	SNG	100000	TELZ2	012711
PSEQ	011457	READC1	005263	RTAPE	002600	SPACE	012723	TEL1	012630
PSEQ1	011457	READF	012374	RTAPI	002605	SPASNA	013657	TEL2	012700
PSETUP	001136	READPT	015714	RTMP	005431	SPCON	010306	TEL3	012646
PSET21	001172	READT	012365	RTSEV	005123	SPCONA	010305	TEL4	012657
PSET3	001201	READ1	012376	RTSEV1	005166	SPEC	004366	TEL5	012672
PSET4	001215	READ50	016047	RWFG	011376	SPECPT	007132	TEL6	012675
PSET5	001221	REALH1	030003	RI	015005	SPEMRK	004434	TEL7	012617
PSET8	001243	REALLO	030004	RIA	015414	SPPT	014367	TEL8	012701
PSPREA	005021	REALTM	030031	R5	020312	SPREAD	010302	TEMP	016004
PTEND	016042	REAPT	012456	S	040000	SPREV	010311	TENH	006720
PTFG	030045	REAPT1	012457	SADLIM	001524	SPSA	702204	TENL	006721
PTRC	016006	REATT	012460	SAGA	030143	SPSB	702224	TERBUF	011370
PUNBIN	011600	REAUMP	012405	SALA	030122	SPSC	702244	TERM	016033
PUNCT1	007401	REEL	000215	SALA	030060	SPSD	702264	TF1	014420

TF2	014423
TF3	014426
TIME	007557
TIMES	003332
TIME1	007573
TIME2	007642
TMP1	016005
TOPS	030164
TSSI	016217
TS1	006725
TS6	006722
TS7	006723
TX	010550
TY	010552
UNFOLD	003775
UNIAMT	00100
UNIT	001135
UNITSV	015711
UNIT5	015703
UPSET	012005
U5	020302
VCMOV	001335
VCROSS	001310
VECTOR	007444
VER	004362
VERMK	001305
VMARK	011066
WAIT	000240
WC	020653
WEIGHT	030043
WINDOW	011034
WSTART	000060
WTDEC	006514
WTDIR	006072
W6	020325
X	010303
XAB	013620
XCOORD	000210
XCTBKG	000052
XFER	020341
XLIMIT	001522
XPIDC	015206
XX	740040
YCOORD	000211
YLIMIT	001525
ZEROUT	001636
ZERO	001640
ZERTC	000255
ZPLANE	000235
ZRCNTR	000256
ZTEMP	000250
ZTEMP1	000251
ZZER	004342
ZZERC	001530
ZZERO	001350
ZZMOV	001337

** ERROR COUNT IS 0

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/ LIBRARY SEARCH
XX=HLT
FLAC=200000
FDAC=0
FADD=300000
FMUL=500000
FDIV=700000
S=40000
FCIA=13652
MESAG=7000
TAPCON=3637
DMODE=5477
PINFO2=4253
INSEL=7667
MAGTP1=11367
DECTRM=6344
DECT3=6413
DISK10=3421
RET=7436
DECRET=6513
DECCMD=6436
FCLA=13666
FF'X=13506
READ=12366
DSEL=5452
FINT=13051
FEXT=13112
FSIGN=13545
CRLF=6737
CIA=1772
PRINT=6752
TC=12714
AINF=62
REALH1=30003
EXP10=30000
HIGHPR=6712
DECPRT=6554
RETC=6257
DECCON=6571
GAIN=30044
STATIM=30041
STOTIM=30042
WEIGHT=30043
ODPI=30057
LIVEPS=30034
DECNM=30040
IM=30047
OM=30051
PTFG=30045
CMG=30053
MTFG=30055
SALA=30060
SAMA=30101
SAIA=30122
SAGA=30143
EXP10F=30037
AC=13417

NOR=13426
 ACZ=13702
 FLOAT=13460
 BC=13413
 TOPS=30164
 BOTS=30205
 UPSET=12005
 MESS24=6314
 MESS80=13046
 MESS81=13016
 MESS82=13022
 MESS83=12772
 MESS84=12740
 MESS85=12745
 MESS8E=12752
 MESS87=13026
 MESS88=13033
 MESS89=13043
 MESS90=12777
 MESS91=13002
 MESS92=13006
 MESS93=13012
 MESS94=12733
 MESS95=12756
 MESS96=12764

		.LIT	LIBLIT	
		.LOC	20000	
020000	770700	770700		
020001	020276	LRGO		/ GO-BEGIN SEARCH
020002	215430	215430		/ CLEAR PARAMETER TABLE-CLEAR
020003	023427	CLEAR		
020004	456060	456060		
020005	023447	FMT		
020006	457070	457070		
020007	023753	LGE ?		
020010	404000	404000		/ D-ENTER DEBUG
020011	024021	010A		
020012	000000	0		
020013	000000	0		
020014	230501	MESS01 230501		/ SEA
020015	220310	220310		/ RCH
020016	724000	724000		/ :
020017	040503	MESS02 040503		/ DEC
020020	240120	240120		/ TAP
020021	054016	054016		/ E N
020022	251502	251502		/ UMB
020023	052272	052272		/ ER
020024	400000	400000		
020025	760310	MESS07 760310		/ CH
020026	050313	050313		/ ECK
020027	400405	400405		/ DE
020030	032401	032401		/ CTA
020031	200540	200540		/ PE
020032	251611	251611		/ UNI
020033	244000	244000		/ T
020034	761011	MESS06 761011		/ HI
020035	244003	244003		/ T C
020036	224027	224027		/ R W

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020037	100516		100516	/ MEN
020040	402205		402205	/ RE
020041	010431		010431	/ ADY
020042	000000		0	
020043	766664	MESS03	766664	/ 64
020044	401011		401011	/ HITS
020045	242376		242376	
020046	000000		0	
020047	762305	MESS04	762305	/ SE
020050	012203		012203	/ ARC
020051	104003		104003	/ H C
020052	171520		171520	/ OMP
020053	140524		140524	/ LET
020054	054024		054024	/ E T
020055	100522		100522	/ MER
020056	054027		054027	/ E H
020057	052205		052205	/ ERE
020060	400000		400000	
020061	401011	MESS05	401011	/ HI
020062	242376		242376	/ TS
020063	241005		241005	/ THE
020064	314001		314001	/ Y A
020065	220572		220572	/ RE:
020066	760000		760000	
020067	241724	MESS30	241724	/ TOT
020070	011440		011440	/ AL
020071	232001		232001	/ SPA
020072	031116		031116	/ CIN
020073	077240		077240	/ G:
020074	000000		0	
020075	142516	MESS31	142516	/ LUN
020076	012240		012240	/ AR
020077	230115		230115	/ SAM
020100	201405		201405	/ PLE
020101	724000		724000	/ :
020102	042440	MS100	042440	/ DT
020103	171640		171640	/ GN
020104	654006		654006	/ S F
020105	251414		251414	/ ULL
020106	402431		402431	/ TY
020107	200540		200540	/ PE
020110	032240		032240	/ CR
020111	271005		271005	/ WHE
020112	164022		164022	/ N R
020113	050104		050104	/ EAD
020114	310000		310000	/ Y
020115	042515	MS101	042515	/ OUM
020116	204017		204017	/ P O
020117	164024		164024	/ N T
020120	012005		012005	/ APE
020121	774000		774000	/ ?
020122	161724	MS102	161724	/ NOT
020123	401716		401716	/ ON
020124	402410		402410	/ TH
020125	112340		112340	/ IS
020126	240120		240120	/ TAPE
020127	057600		057600	/ E
020130	142516	MS104	142516	/LUN

020131 012240
 020132 230115
 020133 201405
 020134 724000

012240 /AR
 230115 /SAM
 201405 /PLE
 724000 /:

/DECTAPE TO DISK COPY
 /CALL WITH AC=DECTAPE UNIT NUMBER
 /USES 1000(8) LOCATIONS STARTING AT IOBUF
 CPY

020135 000000
 020136 204247
 020137 064250
 020140 224251
 020141 064252
 020142 204253
 020143 064254
 020144 204255
 020145 040170
 020146 200157
 020147 040167
 020150 344256
 020151 064257
 020152 776703
 020153 040216
 020154 124260
 020155 000004
 020156 777400
 020157 031200
 020160 000001
 020161 000003
 020162 740200
 020163 600207
 020164 124261
 020165 000000
 020166 777400
 020167 031200
 020170 000551
 020171 000005
 020172 740200
 020173 600207
 020174 440170
 020175 224257
 020176 040167
 020177 540157
 020200 600203
 020201 200157
 020202 741000
 020203 344256
 020204 064257
 020205 440216
 020206 624262
 020207 204262
 020210 064263
 020211 224264
 020212 064254
 020213 204265
 020214 064266
 020215 620135
 020216 000000

LAC (DSEL+1) / TURN OFF DISPLAY.
 DAC* (DSEL)
 LAC* (PINFO2+12)
 DAC* (INSEL)
 LAC (JMP TAPCON)
 DAC* (DECT3+12)
 LAC (551) / SET UP STARTING DISK ADDRESS
 DAC DCDS2
 LAC DCDS1 / SET UP DOUBLE BUFFER ADDRESS
 DAC DCDS2-1
 TAD (400)
 DAC* (MAGTPT)
 LAM -1075 / BLOCK COUNTER
 DAC BLKCNT
 JMS* (DECTRW)
 DUNIT 4 / UNIT
 -400 / WC
 DCDS1 31200
 1 / BLOCKS
 3 / FUNCTION READ
 SZA / ERROR?
 JMP RNC1 / YES
 JMS* (DISKIO)
 0 / UNIT
 -400 / WC
 31200 / CA
 DCDS2 55: / BLOCKS
 5 / FUNCTION WRITE
 SZA
 JMP RNC1 / GO LIKE CRAZY
 ISZ DCDS2
 LAC* (MAGTPT)
 DAC DCDS2-1
 S-D DCDS1
 JIF .+3
 LAC DCDS1
 SKP
 TAD (400)
 DAC* (MAGTPT)
 ISZ BLKCNT
 JMP* (RET)
 RNC1 LAC (RET)
 DAC* (DECRET)
 LAC* (TAPCON)
 DAC* (DECT3+12)
 LAC (DECT3+13)
 DAC* (DECCMD)
 JMP* CPY
 BLKCNT 0
 /DISK READ 256 WORDS

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/CRDCA CONTAINS CURRENT DISK ADDRESS
/CA=EXPION
020217 000000 DKRD 0
020220 200232 LAC CRDCA
020221 040226 DAC .+5 / SAVE DRUM ADDRESS
020222 124261 JMS* (DISKIO)
020223 000000 0 / DISK #
020224 777400 -400
020225 030400 30400
020226 740040 XX / DRUM ADDRESS
020227 000003 3 / FUNCTION
020230 440232 ISZ CRDCA / GET READY FOR NEXT BLOCK
020231 620217 JMP* DKRD
020232 000000 CRDCA 0
/DECIMAL INPUT ROUTINE
/CALLING SEQUENCE
/ JMS DECINN
/ ADDRESS RETURN FOR NEXT NUMBER
/ AC=0 FOR LAST CHARACTER IN BUFFER
/ NOINP=-1 NO INPUT
/ NON-NUMER TERMINATES EACH NUMBER
/ CR TERMINATES BUFFER
/ DCOG=NUMBER INPUT
020233 000000 DECINN 0
020234 750001 CLC
020235 040273 DAC NOINP
020236 124267 JMS* (FCLA)
020237 124270 JMS* (FFIX)
020240 124271 DINI JMS* (READ)
020241 741200 SNA
020242 600262 JMP ENDECI / END OF BUFFER RETURN
020243 344272 TAD (-60)
020244 040275 DAC TC3
020245 741100 SPA
020246 600266 JMP ENDEC
020247 344273 TAD (-12)
020250 740100 SMA
020251 600266 JMP ENDEC
020252 440273 ISZ NOINP
020253 740000 NOP
020254 124274 JMS* (FINT)
020255 544275 FMUL'S (12)
020256 340275 FAJUS TC3
020257 124270 JMS* (FFIX)
020260 124276 JMS* (FEXT)
020261 600240 JMP DINI
020262 124277 ENDECI JMS* (FSIGN)
020263 040274 DAC DCOG
020264 750000 CLA
020265 120233 JMS* DECINN
020266 124277 ENDEC JMS* (FSIGN)
020267 040274 DAC DCOG
020270 750001 CLC
020271 120233 JMS* DECINN
020272 600236 JMP DINI-2
020273 000000 NOINP 0
020274 000000 DCOG 0
020275 000000 TC3 0

```

```

/START OF SEARCH ROUTINES
/
020276 124300
020277 760115
020300 104210
020301 124271
020302 544301
020303 600307
020304 750001
020305 040741
020306 741000
020307 140741
020310 100742
020311 200423
020312 040240
020313 201567
020314 041576
020315 204302
020316 041573
020317 204303
020320 040155
020321 141574
020322 777775
020323 041575
020324 124300
020325 760014
020326 104210
020327 100233
020330 000000
020331 740100
020332 600342
020333 200274
020334 061576
020335 441576
020336 441574
020337 441575
020340 620330
020341 600276
020342 441574
020343 200274
020344 061576
020345 200273
020346 741100
020347 600276
020350 201574
020351 124304
020352 041575
020353 041574
020354 221573
020355 344305
020356 064275
020357 220012
020360 041577
020361 220012
020362 041602
020363 220012
020364 041601
020365 220012

LRGO  ENK 7 OCT 1971
      JMS* (CRLF)
      LAW MS101 / DUMP ON TAPE
      JMS MSPT
      JMS* (READ)
      SAD (16)
      JMP .+4
      CLC
      DAC DFLAG
      SKP
      DZM DFLAG
      JMS ZREAD / CLEAR INPUT BUFFER
      LAC EQM
      DAC DINI
      LAC NDYSA / SET UP POINTER TO NUMBER
      DAC NDTBF / OF DECTAPE TO SEARCH FOR EACH LINK
      LAC (SCHPA)
      DAC SCHB / STORAGE AREAS
      LAC (4) / INITIALIZE TAPE UNIT NUMBER
      DAC DUNIT
      DZM NUMS / CLEAR NUMBER OF LINKS COUNTER
      LAW -3 / ALLOW UP TO 3 LINKS
      DAC SCNT
      JMS* (CRLF)
      LAW MESS01
      JMS MSPT
SMORE JMS DECINN / READ FIRST NUMBER
      0
      SMA / DONE ALL?
      JMP BSRCH / YES
      LAC DCDG / NO PICK UP NUMBER
      DAC* NDTBF / STORE IN LIST
      ISZ NDTBF
      ISZ NUMS
      ISZ SCNT / DONE 3?
      JMP* SMORE+1 / NO
      JMP LRGO / YES TO MANY START OVER
BSRCH ISZ NUMS
      LAC DCDG
      DAC* NDTBF
      LAC NOINP / ANY INPUT?
      JMP LRGO / NO-ERROR START OVER
      LAC NUMS
      JMS* (CIA)
      DAC SCNT
      DAC NUMS
NXB LAC* SCHB / GET ADDRESS OF PARAMETER STORAGE
      TAD (-1)
      DAC* (12)
      LAC* 12 / GET ADDRESS OF NUMERIC BUFFER
      DAC NUMERIC
      LAC* 12
      DAC YN / YES NO BUFFER
      LAC* 12
      DAC ALPHA / ALPHA BUFFER
      LAC* 12 / ADDRESS OF 10 BUFFER

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020366	040217		DAC	DKRD	/ SAVE IT FOR LATER USE
020367	220012		LAC*	12	
020370	041340		DAC	SPN	
020371	220012		LAC*	12	
020372	041037		DAC	TSP	
020373	220012		LAC*	12	
020374	041046		DAC	LSP	
020375	200217	ESTRT	LAC	DKRD	/ SAVE ADDRESS OF TOP OF
020376	042453		OAL	EXPER	/ INPUT BUFFER
020377	204306		LAC	(MESS24)	
020400	104210		JMS	MSPT	
020401	222453		LAC*	EXPER	/ ANY VALUES TO PRINT
020402	740200		SZA		
020403	600456		JMP	ES1	/ YES-GO PRINT EM
020404	760272		LAW	272	
020405	124307		JMS*	(PRINT)	
020406	760273	ES5	LAW	273	/ BEGIN INPUT
020407	124307		JMS*	(PRINT)	
020410	103361		JMS	FREAD	/ READ 1ST FLOATING VALUE
020411	741200		SNA		/ ANY GOOD
020412	600441		JMP	ES2	/ YES
020413	224310		LAC*	(TC)	/ ANY SPECIFICATION
020414	544311		SAD	(72)	
020415	600451		JMP	ENOSP	/ NO
020416	224310	ES4	LAC*	(TC)	/ WHAT WAS TERMINATING VALUE
020417	544312		SAD	(37)	/ BK ARROW
020420	600431		JMP	EINC	
020421	544313		SAD	(41)	/ EX PT
020422	600431		JMP	EINC	
020423	124271	EQM	JMS*	(READ)	/ NONE OF ABOVE BAD INPUT
020424	740200		SZA		
020425	600423		JMP	--2	
020426	760277		LAW	277	
020427	124307		JMS*	(PRINT)	
020430	600375		JMP	ESTRT	
020431	224310	EINL	LAC*	(TC)	/ STORE TERMINATING VALUE
020432	062453		DAC*	EXPER	
020433	442453		ISZ	EXPER	
020434	102454		JMS	CMDYX	/ CHANGE AND STORE FLOATING VALUE
020435	103361		JMS	FREAD	/ READ NEXT
020436	741200		SNA		
020437	600444		JMP	ES3	/ DONE
020440	600416		JMI	ES4	
020441	224314	ES2	LAC*	(AINF)	
020442	741100		SPA		
020443	600500		JMP	ELEAV	
020444	204315	ES3	LAC	(15)	/ PUT 15 IN BUFFER
020445	062453		DAC*	EXPER	
020446	442453		ISZ	EXPER	
020447	102454		JMS	CMDYX	/ STORE LAST VALUE AND RETURN
020450	600500		JMP	ELEAV	
020451	124271	ENOSP	JMS*	(READ)	/ CLEAR OUT ANY THING
020452	740200		SZA		/ REMAINING IN BUFFER
020453	600451		JMP	--2	
020454	162453		OZM*	EXPER	/ ZERO VALUE FOR NO-SPEC
020455	600500		JMP	ELEAV	
020456	222453	ES1	LAC*	EXPER	/ PRINT CONTENTS OF BUFFER LOOP
020457	442453		ISZ	EXPER	

020460	544315		SAD	(15)	
020461	600474		JMP	ES6	
020462	042013		DAC	CKIT	
020463	103411		JMS	EPRNT	
020464	202013		LAC	CKIT	
020465	544312		SAC	(37)	
020466	600472		JMP	.+4	
020467	344316		TAD	(200)	
020470	124307		JMS*	(PRINT)	
020471	600456		JMP	ES1	
020472	344317		TAD	(300)	
020473	600470		JMP	.-3	
020474	103411	ES6	JMS	EPRNT	
020475	200217		LAC	DKRD	/ RESET POINTER TO TOP OF INPUT BUFFER
020476	042453		DAC	EXPER	
020477	600406		JMP	FSS	
020500	204320	ELEAV	LAC	(MESS80)	
020501	101653		JMS	GN	
020502	204321		LAC	(MESS81)	
020503	100751		JMS	GYN	
020504	204322		LAC	(MESS82)	
020505	100751		JMS	GYN	
020506	204323		LAC	(MESS83)	
020507	100751		JMS	GYN	
020510	204324		LAC	(MESS84)	
020511	100751		JMS	GYN	
020512	204325		LAC	(MESS85)	
020513	101653		JMS	GN	
020514	204326		LAC	(MESS86)	
020515	101653		JMS	GN	
020516	204327		LAC	(MESS87)	
020517	101047		JMS	GSN	
020520	204330		LAC	(MESS88)	
020521	101047		JMS	GSN	
020522	101031		JMS	GTS	/ TOTAL SPACING
020523	204331		LAC	(MESS89)	
020524	101653		JMS	GN	
020525	204332		LAC	(MESS90)	
020526	101341		JMS	GALP	
020527	204333		LAC	(MESS91)	
020530	101341		JMS	GALP	
020531	204334		LAC	(MESS92)	
020532	101341		JMS	GALP	
020533	204335		LAC	(MESS93)	
020534	101341		JMS	GALP	
020535	204336		LAC	(MESS94)	
020536	100751		JMS	GYN	
020537	204337		LAC	(MESS95)	
020540	101653		JMS	GN	
020541	204340		LAC	(MESS96)	
020542	101653		JMS	GN	
020543	760017		LAW	MESS02	/ DECTAPE NUMBER
020544	101653		JMS	GN	
020545	101040		JMS	GLS	
020546	124300		JMS*	(CRLF)	
020547	124300		JMS*	(CRLF)	
020550	441573		ISZ	SCHB	
020551	441575		ISZ	SCNT	

020552	600354	JHP	NXB	
020553	201567	LAC	NDTSA	
020554	041576	DAC	NDTBF	
020555	204341	LAC	(3)	
020556	040155	DAC	DUNIT	
020557	101603	JMS	UNITCH	
020560	204302	LAC	(SCHPA)	
020561	041573	DAC	SCHB	
020562	221576	NEXTSM	!AC*	NDTBF / GET # OF TAPES TO SEARCH
020563	124304	JMS*	(CIA)	
020564	041575	DAC	SCNT	
020565	777700	LAW	-100	/ ALLOW 64(10) HITS
020566	040736	DAC	HITCNT	
020567	204246	LAC	HITBA	/ SET UP BUFFER FOR HIT EXPERID
020570	064342	DAC*	(13)	
020571	140737	DZM	HITS	
020572	100135	COPYGO	JMS	CPY
020573	204255	LAC	(551)	/ SET UP DRUM ADDRESS COUNTER
020574	040232	DAC	CRDKA	
020575	100217	JMS	DKRD	/ READ DIRECTORY
020576	224343	LAC*	(REALH+400)	
020577	124304	JMS*	(CIA)	
020600	040734	DAC	NREELS	
020601	100217	GREEL	JMS	DKRD
020602	224343	LAC*	(REALH+400)	
020603	124304	JMS*	(CIA)	
020604	040740	DAC	NID	/ SAVE FOR COUNTER
020605	040735	DAC	MOD	/ SAVE FOR POINTER BUMPER
020606	100217	NEXTID	JMS	DKRD / READ ID BLOCK
020607	221573	LAC*	SCHB	/ PICK UP CURRENT SEARCH BUFFER
020610	040751	DAC	GYN	/ GET ADDRESS OF CURRENT
020611	220751	LAC*	GYN	/ NUMERIC PARAMETER LIST
020612	440751	ISZ	GYN	
020613	101777	JMS	NUMSH	/ SEARCH NUMERIC
020614	600661	JMP	CKNEXT	/ NO GOOD-GET ID
020615	220751	LAC*	GYN	/ GET ADDRESS OF CURRENT
020616	440751	ISZ	GYN	/ YES-NO PARAMETER LIST
020617	102107	JMS	YNSH	
020620	600661	JMP	CKNEXT	
020621	220751	LAC*	GYN	
020622	440751	ISZ	GYN	
020623	102140	JMS	ASH	
020624	600661	JMP	CKNEXT	
020625	220751	LAC*	GYN	
020626	440751	ISZ	GYN	
020627	102332	JMS	IDSH	/ ID SEARCH
020630	600661	JMP	CKNEXT	
020631	220751	LAC*	GYN	
020632	440751	ISZ	GYN	
020633	102710	JMS	SSH	/ SPACING SEARCH
020634	600661	JMP	CKNEXT	
020635	220751	LAC*	GYN	
020636	440751	ISZ	GYN	
020637	103157	JMS	TSSH	/ SEARCH TOTAL SPACING
020640	600661	JMP	CKNEXT	
020641	220751	LAC*	GYN	
020642	103300	JMS	LSH	/ LUNAR SAMPLE SEARCH
020643	600661	JMP	CKNEXT	

020644	440737		ISZ	HITS	/ HIT
020645	224344		LAC*	(EXPIDF+400)	
020646	060013		DAC*	13	
020647	224345		LAC*	(EXPID+400)	
020650	060013		DAC*	13	/ PUT ID IN BUFFER
020651	750001		CLC		
020652	340232		TAD	CRDKA	/ SAVE HIT DISK BLOCK #
020653	060013		DAC*	13	
020654	440736		ISZ	HITCNT	/ 64 HITS?
020655	600661		JMP	CKNEXT	/ NO
020656	760043		LAW	MESS03	/ YES PRINT MESSAGE
020657	104210		JMS	MSPT	
020660	600702		JMP	PTHITS	
020661	440740	CKNEXT	ISZ	NID	/ DONE ALL ID'S THIS TAPE
020662	600606		JMP	NEXTID	/ NO-GET NEXT ONE
020663	200735		LAC	MOD	/ NO BUMP DISK BLICK COUNTER
020664	344346		TAD	(17)	/ BY AMOUNT NECESSARY TO PICK
020665	340232		TAD	CRDKA	/ UP NEXT REEL ID BLOCK
020666	040232		DAC	CRDKA	
020667	440734		ISZ	NREELS	/ DO E ALL REELS THIS TAPE?
020670	600601		JMP	GREEL	/ NO
020671	441575		ISZ	SCNT	/ DONE ALL SEARCHES
020672	600731		JMP	NXTAPE	/ NO
020673	103610		JMS	DTAPE	
020674	760047		LAW	MESS04	/ YES PRINT INFO FOR THIS SEARCH
020675	104210		JMS	MSPT	
020676	200737		LAC	HITS	
020677	101761		JMS	DECSING	
020700	760061		LAW	MESS05	
020701	104210		JMS	MSPT	
020702	200737	PTHITS	LAC	HITS	
020703	741200		SNA		
020704	600721		JMP	.+15	
020705	124304		JMS*	(CIA)	
020706	040737		DAC	HITS	
020707	204246		LAC	HITBA	
020710	064342		DAC*	(13)	
020711	124300		JMS*	(CRLF)	
020712	220013		LAC*	13	
020713	064347		DAC*	(HIGHPR)	
020714	220013		LAC*	13	
020715	744000		CLL		
020716	124350		JMS*	(DECPRT)	
020717	464342		ISZ*	(13)	
020720	440737		ISZ	HITS	
020721	600712		JMP	.-7	
020722	441574		ISZ	NUMS	/ DONE ALL SEARCHES
020723	741000		SKP		
020724	624351		JMP*	(RETC)	/ YES DONE RETURN
020725	441576		ISZ	NDTBF	/ NO-MOVE POINTERS FOR NEXT SEARCH
020726	441573		ISZ	SCHB	
020727	101603		JMS	UNITCH	/ SWITCH UNITS
020730	600562		JMP	NEXTSH	/ BEGIN NEW COPY-AND SEARCH
020731	101603	NXTAPE	JMS	UNITCH	/ SWITCH UNITS
020732	103610		JMS	DTAPE	
020733	600572		JMP	COPYGO	/ CONTINUE SEARCH
020734	000000	NREELS	0		
020735	000000	MOD	0		

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020736	000000	HITCNT	0			
020737	000000	HITS	0			
020740	000000	NID	0			
020741	000000	DFLAG	0			
020742	000000	ZREAD	0			
020743	124271		JMS*	(READ)		
020744	740200		SZA			
020745	600743		JMP	--2		
020746	620742		JMP*	ZREAD		
020747	000000	CONIN	0			
020750	620747		JMP*	CONIN		
		/YES-NO PRINT AND INPUT				
020751	000000	GYN	0			
020752	041776		DAC	MESSNO	/ SAVE MESSAGE NO	
020753	104210		JMS	MSPT		
020754	221602		LAC*	YN	/ CURRENT PARAMETER VALUE	
020755	740200		SZA		/ UNSPECIFIED?	
020756	601010		JHP	SOMSP	/ NO	
020757	760272	GYNOS	LAW	272	/ PRINT:	
020760	124307		JMS*	(PRINT)		
020761	760273		LAW	273	/ PRINT:	
020762	124307		JMS*	(PRINT)		
020763	124271		JMS*	(READ)	/ READ ONE CHAR	
020764	745200		SNA	CLL		
020765	601006		JMP	INOK+5	/ CR-LEAVE AS IS	
020766	544311		SAD	(72)	/ NO SEARCH	
020767	601023		JMP	GNOSP	/ YES	
020770	544352		SAD	(31)	/ Y?	
020771	601001		JMP	INOK		
020772	544301		SAD	(16)	/ N?	
020773	601001		JMP	INOK		
020774	601025		JMP	BADIN		
020775	760277	GQM	LAW	277	/ NONE OF ABOVE ERROR	
020776	124307		JMS*	(PRINT)		
020777	201776		LAC	MESSNO	/ START OVER	
021000	600753		JMP	GYN+2		
021001	540614	INOK	LLS	14	/ MOVE Y; N TO UPPER PART OF WORD	
021002	061602		DAC	YN	/ PUT IN PARAMETER AREA	
021003	124271		JMS*	(READ)	/ READ NEXT CHARACTER SHOULD	
021004	740200		SZA		/ BE A TERMINATOR	
021005	601025		JMP	BADIN	/ IT WASNT INPUT ERROR	
021006	440751		ISZ	GYN		
021007	620751		JMP*	GYN		
021010	221602	SOMSP	LAC*	YN	/ SOME THING SPECIFIED	
021011	544353		SAD	(310000)	/ IS IT A Y?	
021012	760331		LAW	331	/ YES	
021013	544354		SAD	(160000)	/ IS IT A N?	
021014	760316		LAW	316	/ YES	
021015	741100		SPA			
021016	600760		JMP	GYNOS+1		
021017	600757		JMP	GYNOS	/ NO SET IT EQUAL ZERO AND CONTINUE	
021020	201602		LAC	YN	/ PRINT CURRENT VALUE	
021021	104210		JMS	MSPT		
021022	600761		JMP	GYNOS+2		
021023	161602	GNOSP	DZM*	YN	/ SET PARAMETER WORD = 0	
021024	601003		JMP	INOK+2		
021025	124271	BADIN	JMS*	(READ)		
021026	740200		SZA			

021027	601025		JMP	.-2	
021030	600775		JMP	GQM	
021031	000000	GTS	0		
021032	201037		LAC	TSP	
021033	041340		DAC	SPN	
021034	760067		LAW	MESS30	
021035	101047		JMS	GSN	
021036	621031		JMP*	GTS	
021037	000000	TSP	0		
		/MOD GLS			
021040	000000	GLS	0		
021041	201046		LAC	LSP	
021042	041517		DAC	NUMERIC	
021043	760130		LAW	MS104	
021044	101653		JMS	GN	
021045	621040		JMP*	GLS	
021046	000000	LSP	0		
		/ROUTINE FOR SPACING INPUT			
021047	000000	GSN	0		
021050	041776		DAC	MESSNO	/ FOR COMMENTS SEE FLOW
021051	104210		JMS	MSPT	/ CHART SPACING INPUT
021052	777777		LAW	-1	/ 12/21/71
021053	341340		TAD	SPN	
021054	054275		DAC*	(12)	
021055	221340		LAC*	SPN	
021056	740200		SZA		
021057	601304		JMP	GSPRT	
021060	760272		LAI	272	
021061	124307		JMS*	(PRINT)	
021062	760273	GSIN	LAW	273	
021063	124307		JMS*	(PRINT)	
021064	151501		DZM	11	
021065	144241		DZM	NI	
021066	144242		OZM	DNMI	
021067	101330		JMS	RVALS	
021070	741200		SNA		
021071	601222		JMP	GANY	
021072	224310		LAC*	(TC)	
021073	544311		SAD	(72)	
021074	601236		JMP	GNSP	
021075	544313		SAD	(41)	
021076	601124		JMP	GEX	
021077	544312		SAD	(37)	
021100	601131		JMP	GBA	
021101	544355		SAD	(57)	
021102	601164		JMP	GSLS	
021103	544356		SAD	(55)	
021104	601114		JMP	GDSH	
021105	124271		JMS*	(READ)	
021106	740200		SZA		
021107	601105		JMP	.-2	
021110	760277	GSQM	LAW	277	
021111	124307		JMS*	(PRINT)	
021112	201776		LAC	MESSNO	
021113	601051		JMP	GSN+2	
021114	200274	GDSH	LAC	DCDG	
021115	051501		DAC	11	
021116	101334		JMS	RVALC	

021117	741200		SNA	
021120	601110		JMP	GSQM
021121	224310		LAC*	(TC)
021122	544355		SAD	(57)
021123	601164		JMP	GSLS
021124	200274	GEX	LAC	DCDG
021125	051501		DAC	11
021126	204313		LAC	(41)
021127	060012		DAC*	12
021130	501135		JMP	GB
021131	200274	GBA	LAC	DCDG
021132	051501		DAC	11
021133	224310		LAC*	(TC)
021134	060012		DAC*	12
021135	101243	GB	JMS	MG
021136	101334		JMS	RVALC
021137	740200		SZA	
021140	601152		JMP	+12
021141	200273		LAC	NOINP
021142	741100		SPA	
021143	601110		JMP	GSQM
021144	200274		LAC	DCDG
021145	051501		DAC	11
021146	204315		LAC	(15)
021147	060012		DAC*	12
021150	101243		JMS	MG
021151	601232		JMP	GA
021152	224310		LAC*	(TC)
021153	544313		SAD	(41)
021154	601124		JMP	GEX
021155	544312		SAD	(37)
021156	601131		JMP	GBA
021157	544356		SAD	(55)
021160	601114		JMP	GDSH
021161	544355		SAD	(57)
021162	601164		JMP	GSLS
021163	601105		JMP	GSQM-3
021164	200274	GSLS	LAC	DCDG
021165	044241		DAC	NI
021166	101334		JMS	RVALC
021167	740200		SZA	
021170	601202		JMP	+12
021171	200273		LAC	NOINP
021172	741100		SPA	
021173	601110		JMP	GSQM
021174	200274		LAC	DCDG
021175	044242		DAC	DNMI
021176	204315		LAC	(15)
021177	060012		DAC*	12
021200	101243		JMS	MG
021201	601232		JMP	GA
021202	200273		LAC	NOINP
021203	741100		SPA	
021204	601110		JMP	GSQM
021205	200274		LAC	DCDG
021206	044242		DAC	DNMI
021207	224310		LAC*	(TC)
021210	544313		SAD	(41)

021211	741000		SKP		
021212	601215		JMP	.+3	
021213	060012		DAC*	12	
021214	601135		JMP	GB	
021215	544312		SAD	(37)	
021216	741000		SKP		
021217	601105		JMP	GSQM-3	
021220	060012		DAC*	12	
021221	601135		JMP	GB	
021222	200273	GANY	LAC	NOINP	
021223	741100		SPA		
021224	601232		JMP	GA	
021225	200274		LAC	DCDG	
021226	051501		DAC	11	
021227	204315		LAC	(15)	
021230	060012		DAC*	12	
021231	101243		JMS	MG	
021232	204357	GA	LAC	(120)	
021233	341340		TAD	SPN	
021234	041340		DAC	SPN	
021235	621047		JMP*	GSN	
021236	124271	GNSP	JMS*	(READ)	
021237	740200		SZA		
021240	601236		JMP	.-2	
021241	161340		DZM*	SPN	
021242	601232		JMP	GA	
021243	000000	MG	G		/ MOVE CONTENTS OF 11.NI.GI
021244	211501		LAC	11	/ INTO PARAMETER STORAGE AREA
021245	060012		DAC*	12	
021246	204241		LAC	NI	
021247	060012		DAC*	12	
021250	204242		LAC	DNMI	
021251	060012		DAC*	12	
021252	151501		DZM	11	
021253	144241		DZM	NI	
021254	144242		DZM	DNMI	
021255	621243		JMP*	MG	
021256	000000	FPRT	0		/ PRINT FRACTIONAL VALUES
021257	220012		LAC*	12	
021260	741200		SNA		
021261	601302		JMF	Z1	
021262	101761		JMS	DECSING	/ PRINT INTEGER
021263	220012		LAC*	12	/ DENOM=0
021264	741200		SNA		
021265	601300		JMP	FRET	/ YES
021266	040233		DAC	DECINN	/ SAVE IT
021267	760255		LAW	255	/ PRINT -
021270	124307		JMS*	(PRINT)	
021271	200233		LAC	DECINN	/ PRINT DENOM
021272	101761	F11	JMS	DECSING	
021273	760257		LAW	257	/ PRINT /
021274	124307		JMS*	(PRINT)	
021275	220012		LAC*	12	/ GET NUMER
021276	101761		JMS	DECSING	
021277	621256		JMP*	FPRT	/ PRINT
021300	464275	FRET	ISZ*	(12)	
021301	621255		JMP*	FPRT	
021302	220012	Z1	LAC*	12	

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021303	601272		JMP	F11	
021304	220012	GSPR1	LAC*	12	
021305	042102		DAC	TCN	
021306	101256		JMS	FPRT	
021307	202102		LAC	TCN	
021310	544315		SAD	(15)	
021311	601314		JMP	.+3	
021312	101320		JMS	TCPR1	
021313	601304		JMP	GSPRT	
021314	777777		LAW	-1	/ RESTORE AUTO INDEX
021315	341340		TAD	SPN	
021316	064275		DAC*	(12)	
021317	601062		JMP	GSIN	
021320	000000	TCPR1	0		
021321	544312		SAD	(37)	
021322	601326		JMP	.+4	
021323	344316		TAD	(200)	
021324	124307		JMS*	(PRINT)	
021325	621320		JMP*	TCPR1	
021326	344317		TAD	(300)	
021327	601324		JMP	--3	
021330	000000	RVALS	0		
021331	100233		JMS	DECINN	/ READ DECIMAL VALUE
021332	070000	RV	0		
021333	621330		JMP*	RVALS	
021334	000000	RVALC	0		/ READ DECIMAL VALUE FROM
021335	201334		LAC	RVALC	/ WHERE WE LEFT OFF IN INPUT BUFFER
021336	041330		DAC	RVALS	
021337	621332		JMP*	RV	
021340	000000	SPN	0		
			/ ALPHA PRINT AND INPUT		
021341	000000	GALP	0		
021342	041776		DAC	MESSNO	/ SAVE MESSAGE NUMBER
021343	040273		DAC	NOINP	/ SET NO INPUT FLAG
021344	104210		JMS	MSPT	
021345	777771		LAW	-7	
021346	041773		DAC	FTC	/ COUNTER TO ALLOW INPUT OF 6CHAR
021347	140274		DZM	DCDG	/ CLEAR CHARACTER INPUT COUNTER
021350	201601		LAC	ALPHA	
021351	041772		DAC	NUMTMP	/ SAVE ADDRESS OF TOP OF BUFFER
021352	344360		TAD	(6)	
021353	041775		DAC	CHRI	/ SAVE ADDRESS OF BOTTOM HALF OF BUFFER
021354	344360		TAD	(6)	
021355	040751		DAC	GYN	/ SAVE ADDRESS OF BOTTOM OF BUFFER
021356	221601		LAC*	ALPHA	
021357	740200		SZA		/ CURRENT VALUE UNSPECIFIED?
021360	601477		JMP	SOPAL	/ NO-PRINT CURRENT VALUES
021361	760272	A3	LAW	272	
021362	124307		JMS*	(PRINT)	
021363	760273		LAW	273	
021364	124307		JMS*	(PRINT)	
021365	124271	AREAD	JMS*	(READ)	
021366	745200		SNA CLL		
021367	601433		JMP	ASIS	/ YES
021370	544311		SAD	(72)	
021371	601420		JMP	ANOSP	/ NO SPECIFICATION
021372	544361		SAD	(46)	
021373	601460		JMP	ANDSP	/ AND

021374	544313		SAD	(41)	
021375	601473		JMP	ORSP	/ OR
021376	441773	A1	ISZ	FTC	/ 7TH CHARACTER
021377	741000		SKP		/ NO
021400	601406		JMP	AGM	/ YES DON'T ALLOW IT
021401	140273		DZM	NOINP	
021402	061601		DAC*	ALPHA	/ SAVE CHARACTER
021403	441601		ISZ	ALPHA	
021404	440274		ISZ	DCDG	/ INCREMENT CHARACTER CNTR
021405	601365		JMP	AREAD	/ READ MORE
021406	124271	AGM	JMS*	(READ)	/ ERROR-CLEAR READ BUFFER
021407	740200		SZA		
021410	601406		JIP	.-2	
021411	760277		LAW	277	/ PRINT?
021412	124307		JMS*	(PRINT)	
021413	124300		JMS*	(CRLF)	
021414	201772		LAC	NUMTMP	/ RESET ALPHA TO TOP OF BUFFER
021415	011601		DAC	ALPHA	
021416	201776		LAC	MESSNO	/ GET MESSAGE AGAIN
021417	601343		JMP	GALP+2	
021420	041526	ANOSP	DAC	PRTAL	/ SAVE CHAR
021421	200273		LAC	NOINP	/ HAS THERE BEEN INPUT
021422	741200		SNA		
021423	601431		JMP	.*6	/ YES SAVE AS NORMAL
021424	124271		JMS*	(READ)	/ NO IS: THE ONLY INPUT
021425	740200		SZA		
021426	601431		JMP	.*3	/ NO-SAVE AS NORMAL
021427	161601		DZM*	ALPHA	
021430	601436		JMP	ADONE	
021431	201523		LAC	PRTAL	
021432	601376		JMP	A1	
021433	200273	ASIS	LAC	NOINP	/ INPUT FINISHED
021434	741200		SNA		
021435	601441		JMP	SMIN	/ YES
021436	200751	ADONE	LAC	GYN	
021437	041601		DAC	ALPHA	
021440	621341		JMP*	GALP	
021441	221772	SMIN	LAC*	NUMTMP	/ ANY SPECIAL DELIMITORS?
021442	304362		AND	(770000)	
021443	744200		SZA CLL		
021444	601453		JMP	SET2	/ YES
021445	200274		L/C	DCDG	/ NO HAVE SINGLE VALUE
021446	640706		ALS	6	
021447	344363		TAD	(010000)	/ SET SINGLE VALUE FUNCTION
021450	361772		TAD*	NUMTMP	
021451	061772		DAC*	NUMTMP	
021452	601436		JMP	ADONE	
021453	200274	SET2	LAC	DCDG	/ PUT NUMBER OF CHAR IN BUFFER
021454	640706		ALS	6	
021455	361775		TAD*	CHRI	
021456	061775		DAC*	CHRI	
021457	601436		JMP	ADONE	
021460	200274	ANDSP	LAC	DCDG	/ AND SPECIFICATION ON INPUT
021461	640706		ALS	6	
021462	344364		TAD	(020000)	/ SET AND FUNCTION
021463	361772	A2	TAD*	NUMTMP	
021464	061772		DAC*	NUMTMP	
021465	777771		LAW	-7	/ GET SECOND SET OF NUMBERS

021466	041773		DAC	FTC	
021467	201775		LAC	CHRI	
021470	041601		DAC	ALPHA	
021471	140274		OZM	DCDG	
021472	601365		JMP	AREAD	
021473	200274	ORSP	LAC	DCDG	/ OR SPECIFICATION ON INPUT
021474	640706		ALS	6	
021475	344365		TAD	(030000)	/ SET OR FUNCTION
021476	601463		JMP	A2	
021477	504362	SOPAL	AND	(770000)	/ PRINT CURRENT VALUES OF PARAMETERS
021500	544363		SAD	(010000)	
021501	601510		JMP	SPRT	/ SINGLE VALUED
021502	544364		SAD	(020000)	
021503	601513		JMP	APRT	/ AND VALUE
021504	544365		SAD	(030000)	
021505	601521		JMP	OPRT	/ OR VALUE
021506	161601		OZM*	ALPHA	/ NONE OF ABOVE SET TO UNSPEC
021507	601361		JMP	A3	/ AND CONTINUE
021510	201772	SFRT	LAC	NUMTMP	/ PRINT VALUES IN TOP OF LIST
021511	:01526		JMS	PRTAL	
021512	601363		JMP	AREAD-2	/ PROCEED WITH INPUT
021513	201772	APRT	LAC	NUMTMP	/ PRINT VALUES IN TOP HALF
021514	101526		JMS	PRTAL	
021515	750246		LAW	246	/ PRINT &
021516	124307		JMS*	(PRINT)	
021517	201775		LAC	CHRI	/ PRINT VALUES IN BOTTOM HALF
021520	601511		JMP	-7	
021521	201772	OPRT	LAC	NUMTMP	/ FOR OR PRINT TOP HALF
021522	101526		JMS	PRTAL	
021523	760241		LAW	241	/ PRINT EXCL
021524	124307		JMS*	(PRINT)	
021525	601516		JMP	OPRT-3	/ AND PROCEED AS OR
				/PRINT VALUES IN ALPHA LIST	
021526	000000		PRTAL	0	
021527	041653		DAC	GN	
021530	221653		LAC*	GN	
021531	504366		AND	(007700)	/ COMPUTE NUMBER OF CHARACTERS TO PRINT
021532	746020		CLL	RTR	
021533	742020		RTR		
021534	742020		RTR		
021535	124304		JMS*	(CIA)	
021536	041603		DAC	UNITCH	
021537	760240		L/W	240	
021540	124307		JMS*	(PRINT)	
021541	221653	PRI	LAC*	GN	
021542	504367		AND	(77)	
021543	344370		TAD	(-40)	/ NUMERIC?
021544	740100		SMA		
021545	601560		JMP	OPRT	/ YES
021546	221653		LAC*	GN	/ NO-PRINT ALPHA
021547	504367		AND	(77)	
021550	344317		TAD	(300)	
021551	124307	FR2	JMS*	(PRINT)	
021552	441653		ISZ	GN	
021553	441603		ISZ	UNITCH	/ DONE?
021554	601541		JMP	PRI	/ NO
021555	760240		LAW	240	
021556	124307		JMS*	(PRINT)	

021557	621526		JMP*	PRIAL	
021560	221653	DPRIT	LAC*	GN	
021561	504367		AND	(77)	
021562	344316		TAD	(200)	
021563	601551		JMP	PR2	
021564	024214	SCHPA	SCHP1		
021565	024223		SCHP2		
021566	024232		SCHP3		
021567	021570	NDTSA	- +)		
021570	000000		0		
021571	000000		0		
021572	000000		0		
021573	000000	SCHB	0		
021574	000000	NUMS	0		
021575	000000	SCNT	0		
021576	000000	NDTBF	0		
021577	000000	NUMERIC	0		
021600	000000	SPNUMBER	0		
021601	000000	ALPHA	0		
021602	000000	YN	0		
021603	000000	UNITCH	0		
021604	204371		LAC	(BN)	/ PUT BLOCK COUNTER ADDRESS IN CA
021605	064352		DAC*	(31)	
021606	204341		LAC	(3)	
021607	540155		SAD	DUNIT	/ SWITCH UNIT TO 3 OR 4
021610	204303		LAC	(4)	
021611	040155		DAC	DUNIT	
021612	744000		CLL		
021613	640717		ALS	17	
021614	041650		DAC	SUNIT	
021615	341652	OKGO	TAD	FROSH	
021616	707545		DTLA		
021617	707561		DTEF		/ ERROR FLAG?
021620	741000		SKP		
021621	601630		JMP	CKERR	/ YES
021622	707601		DTDF		/ NO
021623	601617		JMP	-4	/ NO FLAG WAIT
021624	777400		LAW	-400	
021625	341651		TAD	BN	
021626	741100		SPA		
021627	601646		JMP	OKSTP	/ NO-EVERY THING OK STOP
021630	101642	CKERR	JMS	DSTOP	
021631	760025		LAL	MESS07	
021632	104210		JMS	MSPT	
021633	200155		LAC	DUNIT	
021634	101761		JMS	DECSING	
021635	760034		LAW	MESS06	
021636	104210		JMS	MSP?	
021637	124271		JMS*	(READ)	
021640	201650		LAC	SUNIT	
021641	601615		JMP	OKGO	
021642	000000	DSTOP	0		
021643	201650		LAC	SUNIT	
021644	707545		DTLA		
021645	621642		JMP*	DSTOP	
021646	101642	OKSTP	JMS	DSTOP	
021647	521603		JMP*	UNITCH	
021650	000000	SUNIT	0		

021651	000000	BN	0		
021652	021000	FRD5H	021000		
		/ NUMERIC PRINT AND INPUT			
021653	000000	GN	0		
021654	041776		DAC	MESSNO	/ PRINT PARAMETER NAME
021655	104210		JMS	MSPY	
021656	777777		LAW	-1	/ SET UP INPUT AUTO INDEX
021657	341577		TAD	NUMERIC	
021660	064275		DAC*	(12)	
021661	221577		LAC*	NUMERIC	/ ANY SPECIFICATION
021662	740200		SZA		
021663	501742		JMP	GN1	/ YES-PRINT WHATS THERE
021664	760272		LAW	272	/ :
021665	124307		JMS*	(PRINT)	
021666	760273	GN5	LAW	273	/ : BEGIN INPUT
021667	124307		JMS*	(PRINT)	
021670	101330		JMS	RVALS	/ READ FIRST DECIMAL NUMBER
021671	741200		SNA		
021672	601722		JMP	GN2	/ BUFFER EMPTY?-YES
021673	224310		LAC*	(TC)	
021674	544311		SAD	(72)	/ NO SPECIFICATION
021675	601735		JMP	GNOS	
021676	224310	GN4	LAC*	(TC)	/ TERMINATED BY:
021677	544312		SAD	(37)	/ BK ARROW
021700	601712		JMP	GINC	
021701	544313		SAD	(41)	/ EX. PT.
021702	601712		JMP	GINC	
021703	124271	GNQM	JMS*	(READ)	
021704	740200		SZA		
021705	601703		JMP	.-2	
021706	760277		LAW	277	
021707	124307		JMS*	(PRINT)	/ PRINT:
021710	201776		LAC	MESSNO	/ AND START OVER
021711	601654		JMP	GN+1	
021712	224310	GINC	LAC*	(TC)	/ STORE TERMINATING CHARACTER
021713	080012		DAC*	12	
021714	200274		LAC	DCDG	/ THEN ITS VALUE
021715	060012		DAC*	12	
021716	101334		JMS	RVALC	/ CONTINUE TO READ
021717	741200		SNA		
021720	601725		JMP	GN3	/ BUFFER EMPTY?
021721	601676		JMP	GN4	/ NO
021722	200273	GN2	LAC	NOINP	
021723	741100		SPA		
021724	601731		JMP	GN7	
021725	204315	GN3	LAC	(15)	/ CLOSE OUT BUFFER WITH CR
021726	060012		DAC*	12	
021727	200274		LAC	DCDG	
021730	060012		DAC*	12	
021731	204372	GN7	LAC	(50)	
021732	341577		TAD	NUMERIC	
021733	041577		DAC	NUMERIC	
021734	621653		JMP*	GN	
021735	124271	GNOS	JMS*	(READ)	/ ON NO SPECIFICATION
021736	740200		SZA		/ EMPTY BUFFER
021737	601735		JMP	.-2	
021740	61577		DZM*	NUMERIC	/ AND PLACE A ZERO AT IS TOP
021741	601731		JMP	GN7	

021742 220012
 021743 544315
 021744 601753
 021745 042013
 021746 220012
 021747 101761
 021750 202013
 021751 101320
 021752 601742
 021753 220012
 021754 101761
 021755 777777
 021756 341577
 021757 064275
 021760 601665
 021761 000000
 021762 124373
 021763 000000
 021764 745200
 021765 621761
 021766 544374
 021767 621763
 021770 124307
 021771 621763
 021772 000000
 021773 000000
 021774 000000
 021775 000000
 021776 000000

GNI LAC* 12 / TERMINATING VALUE?
 SAD (15)
 JMP GNS / YES PRINT NUMERIC AND GO GET INPUT
 DAC CKIT
 LAC* 12
 JMS DECSING
 LAC CKIT / HAS TERMINATING VALUE A BK ARROW
 JMS TCPRT
 JMP GNI
 GNS LAC* 12
 JMS DECSING
 LAW -1
 TAD NUMERIC
 DAC* (12)
 JMP GNS
 DECSING 0 / PRINT DECIMAL NUMBER
 JMS* (DECCON)
 0
 SNA CLL
 JMP* DECSING
 SAD (240)
 JMP* -4
 JMS* (PRINT)
 JMP* -6
 NUMTMP 0
 FTC 0
 INCNT 0
 CHRI 0
 MESSNO 0

/NUMERIC SEARCH ROUTINE
 /ENTER WITH ADDRESS OF NUMERIC
 /SEARCH PARAMETER BUFFER IN AC
 /RETURNS +1 IF IO DOESN'T MEET CRITERIA
 /RETURNS +2 IF IO MEETS CRITERIA

/SEARCH ORDER:
 / GAIN
 / STAR
 / STOP
 / WEIGHT
 / DUMP INTERVAL
 / LIVE TIME
 / DECTAPE NUMBER

021777 000000
 0220J0 042105
 022001 777771
 022002 042106
 022003 102013
 022004 030444
 J22005 030441
 022006 030442
 022007 030443
 022010 030457
 022011 030434
 022012 030440
 022013 000000
 022014 222013
 022015 042104
 022016 202105

NUMSH 0
 DAC NUMBA
 LAW -7
 DAC NMCTR
 JMS CKIT
 GAIN+400
 STATIM+400
 STOTIM+400
 WEIGHT+400
 ODPI+400
 LIVEPS+400
 DECNM+400
 CKIT 0
 LAC* CKIT
 DAC CKADR
 LAC NUMBA

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022017 042103
 022020 344375
 022021 042102
 022022 222103
 022023 740200
 022024 602036
 022025 442106
 022026 602031
 022027 441777
 022030 621777
 022031 204372
 022032 342105
 022033 042105
 022034 442013
 022035 602014
 022036 222103
 022037 544315
 022040 602061
 022041 544313
 022042 602065
 022043 222102
 022044 040274
 022045 102072
 022046 200274
 022047 124304
 022050 362104
 022051 741100
 022052 602036
 022053 222102
 022054 124304
 022055 362104
 022056 740300
 022057 602036
 022060 602025
 022061 222104
 022062 562102
 022063 602025
 022064 621777
 022065 222104
 022066 562102
 022067 602025
 022070 102072
 022071 602036
 022072 000000
 022073 204376
 022074 342103
 022075 042103
 022076 204376
 022077 342102
 022100 042102
 022101 622072
 022102 000000
 022103 000000
 022104 000000
 022105 000000
 022106 000000

DAC TCV
 TAD (1)
 DAC TCN
 LAC* TCV
 SZA
 JMP .+12
 CKRT ISZ NMCTR / DONE ALL
 JMP .+3
 ISZ NUMSH
 JMP* NUMSH
 LAC (50)
 TAD NUMBA
 DAC NUMBA
 ISZ CKIT
 JMP CKIT+1
 B LAC* TCV
 SAD (15)
 JMP NEND
 SAD (41)
 JMP ORN
 LAC* TCN
 DAC DCDG
 JMS BYTWO
 LAC DCDO
 JMS* (CIA)
 TAD* CKADR
 SPA
 JMP B
 LAC* TCN
 JMS* (CIA)
 TAD* CKADR
 SMA SZA
 JMP B
 JMP CKRT
 NEND LAC* CKADR
 SAD* TCN
 JMP CKRT
 ORN JMP* NUMSH
 LAC* CKADR
 SAD* TCN
 JMP CKRT
 JMS BYTWO
 JMP B
 BYTWO 0
 LAC (2)
 TAD TCV
 DAC TCV
 LAC (2)
 TAD TCN
 DAC TCN
 JMP* BYTWO
 TCN 0
 TCV 0
 CKADR 0
 NUMBA 0
 NMCTR 0

/SEARCH ID FOR YES-NO PARAMETERS
 /ENTER WITH ADDRESS OF YN BUFFER IN AC

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/RETURNS+1 IF ID DOESN'T MEET CRITERIA
/RETURNS+2 IF ID MEETS CRITERIA
SEARCH ORDER:
/      I MANTLE
/      O MANTLE
/      PUNCH PAPER
/      DATA TO MAG
/      COIN TO MAG
022107 000000 YNSH 0
022110 042105 DAC NUMBA / SAVE PARAMETER ADDRESS
022111 777773 LAW -5 / DO FIVE VALUES
022112 042106 DAC NMCTR
022113 102121 JMS CKYN / IN THIS ORDER
022114 030447 IM+400
022115 030451 OM+400
022116 030445 PTFG+400
022117 030453 CMG+400
022120 030455 MIFG+400
022121 000000 CKYN 0
022122 222121 LAC* CKYN
022123 042104 DAC CKADR
022124 222105 LAC* NUMBA / GET PARAMETER VALUE
022125 741200 SNA
022126 602132 JMP +4 / UNSPECIFIED
022127 562104 SAD* CKADR
022130 741000 SKP
022131 622107 JMP* YNSH / NO-ID NO GOOD RETURN+1
022132 442121 ISZ CKYN / GET NEXT VALUE
022133 442105 ISZ NUMBA / GET NEXT PARAMETER VALUE
022134 442106 ISZ NMCTR / DONE ALL FIVE?
022135 602122 JMP CKYN+1 / NO
022136 442107 ISZ YNSH / YES-ID OK RETURN+2
022137 622107 JMP* YNSH

/ALPHA SEARCH ROUTINE
/ENTER WITH ADDRESS OF ALPHA BUFFER IN AC
/RETURN+1 IF ID DOESN'T MEET CRITERIA
/RETURN+2 IF ID MEETS CRITERIA
SEARCH ORDER:
/      LUNAR
/      METEORITE
/      ISOTOPE
/      GENERAL
022140 000000 ASH 0
022141 042105 DAC NUMBA
022142 777774 LAW -4
022143 042106 DAC NMCTR / DO 4 ALPHA SEARCHS
022144 102151 JMS ACKIT
022145 030460 SALA+400
022146 030501 SAMA+400
022147 030522 SAIA+400
022150 030543 SAGA+400
022151 000000 ACKIT 0
022152 222105 LAC* NUMBA / UNSPECIFIED
022153 740200 SZA
022154 602165 JMP SSS / NO
022155 204377 LAC (14) / YES MOVE TO NEXT PARAMETER
022156 342105 TAD NUMBA
022157 042105 DAC NUMBA
    
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022160 442151 ISZ ACKIT
022161 442106 ISZ NMCTR / DONE ALL?
022162 602152 JMP ACKIT+1
022163 442140 ISZ ASH / YES RETURN+2
022164 622140 JMP* ASH
022165 504362 SSS AND (770000)
022166 544363 SAD (010000)
022167 602204 JMP SSR
022170 544364 SAD (020000)
022171 602207 JMP ASR
022172 102212 JMS ASRC / OR SEARCH
022173 741000 SKP / FIRST SET NO GOOD TRY NEXT
022174 602155 JMP NXNBA
022175 204360 SI LAC (6)
022176 342105 TAD NUMBA
022177 042105 DAC NUMBA
022200 102212 JMS ASRC
022201 622140 JMP* ASH / NO GOOD
022202 204360 LAC (6)
022203 602156 JMP NXNBA+1
022204 102212 SSR JMS ASRC / SINGLE SEARCH
022205 622140 JMP* ASH
022206 602155 JMP NXNBA
022207 102212 ASR JMS ASRC / AND SEARCH
022210 622140 JMP* ASH
022211 602175 JMP SI
/Routine TO SEARCH ID BUFFER
/FOR 6 ALPHA CHARACTERS
/RETURNS +1 IF NO GOOD
/RETURNS +2 IF GOOD
/NUM A POINTS TO PARAMETER BUFFER
ASRC 0
022212 000000 LAC (1)
022213 204375 DAC 1 / INITIALIZE COUNTERS
022214 042324 DAC J
022215 042325 DAC J
022216 202105 LAC NUMBA
022217 042326 DAC ADT*P / SAVE TOP OF 6 WORD BUFFER
022220 222105 LAC* NUMBA
022221 640506 LRS 8
022222 504367 AND (77)
022223 042327 DAC JEND
022224 102270 INEXT JM GETI / GET CHARACTER POINTED TO BY I
022225 741200 SNA / END OF BUFFER?
022226 602265 JMP GOOD+1 / END OF BUFFER NO GOOD
022227 042270 DAC GETI / SAVE
022230 222105 LAC* NUMBA / ISOLATE 6 BIT CODE
022231 504367 AND (77)
022232 542270 SAD GETI
022233 602241 JMP NLOOP / CHECKS
022234 202324 LAC 1
022235 544400 SAD (63) / DONE ALL IN ID
022236 602265 JMP GOOD+1 / YES-NO GOOD
022237 442324 ISZ 1
022240 602224 JMP INEXT
022241 202327 NLOOP LAC JEND / FINISHED WITH PARAMETER
022242 542325 SAD J
022243 602264 JMP GOOD / YES ID OK
022244 202324 LAC 1

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022245	544400	SAD	(63)	
022246	602265	JMP	GOOD+1	
022247	442324	ISZ	I	
022250	442325	ISZ	J	
022251	442105	ISZ	NUMBA	
022252	102270	JMS	GETI	
022253	741200	SNA		/ END OF BUFFER?
022254	602257	JMP	.+3	
022255	562105	SAD*	NUMBA	
022256	602241	JMP	NLOOP	
022257	204375	LAC	(1)	
022260	042325	DAC	J	
022261	202326	LAC	ADTMP	
022262	042105	DAC	NUMBA	
022263	602224	JMP	INEXT	
022264	442212	GOOD ISZ	ASRC	
022265	202326	LAC	ADTMP	
022266	042105	DAC	NUMBA	
022267	622212	JMP*	ASRC	
		/ROUTINE TO UNPACK 8 BITS AS		
		/POINTED TO BY I		
		GETI	0	
022270	000000			
022271	741000	CLL		/ TAKE 1 FORM I+2
022272	204376	LAC	(2)	/ THEN DIVIDE BY 3
022273	342324	TAD	I	/ QUOTIENT POINTS TO WORD
022274	653323	IDIV		/ IN ID BUFFER
022275	000003		3	
022276	042331	DAC	R	/ IN WORD:
022277	641002	LACQ		/ R=0 LEFT MOST POSITION
022300	362151	TAD*	ACKIT	/ R=1 MIDDLE POSITION
022301	344305	TAD	(-1)	/ R=2 RIGHT MOST POSITION
022302	042330	DAC	WORD	
022303	202331	LAC	R	
022304	741200	SNA		
022305	602320	JMP	FTSH	
022306	544375	SAD	(1)	
022307	602322	JMP	SXSHF	
022310	750000	CLA		
022311	344401	TAD	(640500)	
022312	042315	OAC	.+3	
022313	222330	LAC*	WORD	
022314	744000	CLL		
022315	740040	XX		
022316	504367	AND	(77)	
022317	622270	JMP*	GETI	
022320	204377	FTSH LAC	(14)	
022321	602311	JMP	.-10	
022322	204360	SXSHF LAC	(6)	
022323	602311	JMP	.-12	
022324	000000	I	0	
022325	000000	J	0	
022325	000000	ADTMP	0	
022327	000000	JEND	0	
022330	000000	WORD	0	
022331	000000	R	0	

/EXPERIMENT ID SEARCH ROUTINE
 /EXTER WITH ADDRESS OF ID BUFFER IN AC
 /RETURN +1 IF ID DOESN'T MEET CRITERIA

/RETURN +2 IF 10 MEETS CRITERIA

022332	000000	0			
022333	042105	DAC	NUMBA	/ ADDRESS OF PARAMETER BUFFER	
022334	224345	LAC*	(EXP10+400)		
022335	064402	DAC*	(AC+3)		
022336	224344	LAC*	(EXP10F+400)		
022337	064403	DAC*	(AC+2)		
022340	204404	LAC	(43)		
022341	064405	DAC*	(AC+1)		
022342	164406	DZM*	(AC)		
022343	124407	JMS*	(NOR)		
022344	202452	LAC	IDFLTA		
022345	042453	DAC	EXPER		
022346	102454	JMS	CMDYX	/ STORES CURRENT VALUE IN FTMP	
022347	202105	LAC	NUMBA		
022350	042103	DAC	TCV	/ SET UP POINTERS	
022351	344375	TAD	(1)		
022352	042102	DAC	TCN		
022353	222103	LAC*	TCV	/ UNSPECIFIED?	
022354	740200	SZA			
022355	602380	JMP	.+3	/ NO	
022356	442332	IDRT	ISZ	ISDH	/ RETURN 10 OK
022357	622332	JMP*	ISDH		
022360	222103	LAC*	TCV	/ LAST VALUE IN BUFFER?	
022361	544315	SAD	(15)		
022362	602411	JMP	IEND	/ YES	
022363	544313	SAD	(4)		
022364	602414	JMP	IORN	/ OR TERMINATOR?	
022365	102420	JMS	FGET	/ NO MUST BE INCLUSIVE	
022366	102430	JMS	BYFOUR	/ INCREMENT POINTERS BY 4	
022367	124274	JMS*	(FINT)	/ CURRENT-PARAMETER >= 0	
022370	124410	JMS*	(FCIA)		
022371	302674	FADD	FTMP		
022372	124276	JMS*	(FEXT)		
022373	224406	LAC*	(AC)		
022374	740200	SZA			
022375	602360	JMP	BB	/ NO LOOK NEXT	
022376	102420	JMS	FGET		
022377	124274	JMS*	(FINT)		
022400	124410	JMS*	(FCIA)	/ CURRENT-PARAMETER <= 0	
022401	302674	FADD	FTMP		
022402	124276	JMS*	(FEXT)		
022403	124411	JMS*	(ACZ)		
022404	602356	JMP	IDRT		
022405	224406	LAC*	(AC)		
022406	741200	SNA			
022407	602380	JMP	BB	/ NO	
022410	602356	JMP	IDRT	/ YES 10 OK	
022411	102440	JMS	FEQL	/ CURRENT-PARAMETER?	
022412	602356	JMP	IDRT	/ YES	
022413	622332	JMP*	IDSH	/ NO	
022414	102440	JMS	FEQL		
022415	602356	JMP	IDRT		
022416	102430	JMS	BYFOUR		
022417	602360	JMP	BB		
022420	000000	FGET	0	/ LOAD FLOATING AC AS PRINTED	
022421	777775	LAW	-3	/ TO BY TCN	
022422	342102	TAD	TCN		

022423 042102
 022424 124274
 022425 222102
 022426 124276
 022427 622420
 022430 000000
 022431 204303
 022432 342103
 022433 042103
 022434 204303
 022435 342102
 022436 042102
 022437 622430
 022440 000000
 022441 102420
 022442 124274
 022443 124410
 022444 302674
 022445 124276
 022446 124411
 022447 622440
 022450 442440
 022451 622440
 022452 022674
 022453 000000

DAC TCN
 JMS* (FINT)
 FLAC* TCN
 JMS* (FEXT)
 JMP* FGET
 BYFOUR 0 / INCREMENT POINTERS BY 4
 LAC (4)
 TAD TCV
 DAC TCV
 LAC (4)
 TAD TCN
 DAC TCN
 JMP* BYFOUR
 FEQL 0 / RETURN+1 IF EQUAL
 / RETURN +2 IF NOT EQUAL
 JMS FGET
 JMS* (FINT)
 JMS* (FCIA)
 FADD FTMP / ADD CURRENT VALUE
 JMS* (FEXT)
 JMS* (ACZ)
 JMP* FEQL
 ISZ FEQL
 JMP* FEQL
 IDFLTA FTMP
 EXPER 0

/SUBROUTINE TO CHANGE
 /EXPERIMENT ID FROM MONTH, DAY, YEAR, EX
 /TO YEAR, MONTH, DAY, EX
 /STORES CONVERTED NUMBER IN ADDRESS
 /POINTED TO BY EXPER

022454 000000
 022455 777775
 022456 342453
 022457 042453
 022460 124274
 022461 002674
 022462 702677
 022463 124276
 022464 102560
 022465 042671
 022466 124412
 022467 124274
 022470 502677
 022471 124410
 022472 302674
 022473 002674
 022474 702702
 022475 124276
 022476 102560
 022477 042672
 022500 124412
 022501 124274
 022502 502702
 022503 124410
 022504 302674
 022505 002674
 022506 702705
 022507 124276

CMDYX 0
 LAW -3 / MOVE POINTER BACK 3
 TAD EXPER / SO WE CAN DO INDIRECT
 DAC EXPER
 JMS* (FINT)
 FDAC FTMP
 FDIV FMIL
 JMS* (FEXT)
 JMS FSING
 DAC MONTH
 JMS* (FLOAT)
 JMS (FINT)
 FMUL FMIL
 JMS* (FCIA)
 FADD FTMP
 FDAC FTMP
 FDIV FTH
 JMS* (FEXT)
 JMS FSING
 DAC DAY
 JMS* (FLOAT)
 JMS* (FINT)
 FMUL FTH
 JMS* (FCIA)
 FADD FTMP
 FDAC FTMP
 FDIV FHR
 JMS* (FEXT)

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022510 102560
 022511 042670
 022512 124412
 022513 124274
 022514 502705
 022515 124410
 022516 302674
 022517 124276
 022520 102560
 022521 042673
 022522 202670
 022523 124412
 022524 124274
 022525 502677
 022526 002674
 022527 124276
 022530 202671
 022531 124412
 022532 124274
 022533 502702
 022534 302674
 022535 002674
 022536 124276
 022537 202672
 022540 124412
 022541 124274
 022542 502705
 022543 302674
 022544 002674
 022545 124276
 022546 202673
 022547 124412
 022550 124274
 022551 302674
 022552 022453
 022553 124276
 022554 204341
 022555 342453
 022556 042453
 022557 622454
 022560 000000
 022561 124270
 022562 224413
 022563 622550

JMS FSING
 DAC YEAR
 JMS* (FLOAT)
 JMS* (FINT)
 FMUL FHR
 JMS* (FCIA)
 FADD FTMP
 JMS* (FEXT)
 JMS FSING
 DAC EX
 LAC YEAR
 JMS* (FLOAT)
 JMS* (FINT)
 FMUL FMIL
 FDAC FTMP
 JMS* (FEXT)
 LAC MONTH
 JMS* (FLOAT)
 JMS* (FINT)
 FMUL FTH
 FADD FTMP
 FDAC FTMP
 JMS* (FEXT)
 LAC DAY
 JMS* (FLOAT)
 JMS* (FINT)
 FMUL FHR
 FADD FTMP
 FDAC FTMP
 JMS* (FEXT)
 LAC EX
 JMS* (FLOAT)
 JMS* (FINT)
 FADD FTMP
 FDAC* EXPER
 JMS* (FEXT)
 LAC (3)
 TAD EXPER
 DAC EXPER
 JMP* CMDYX
 FSING 0 / FIX FLAC) PICK
 JMS* (FFIX) / UP INTEGER PART
 LAC* (BC+2)
 JMP* FSING

/SURROUTINE TO CHANGE
 /EXPERIMENT ID FROM YEAR,MONTH,DAY, EX
 /TO MONTH,DAY,YEAR, EX
 /ENTER WITH ADDRESS OF FLOATING # EXPER
 /EXIT WITH NEW FORMAT IN FAC

022564 000000
 022565 777775
 022566 342453
 022567 042453
 022570 124274
 022571 222453
 022572 002674
 022573 702677
 022574 124276

CYMOE 0
 LAW -3 / MOVE POINTER BACK 3
 TAD EXPER / SO WE CAN DO INDIRECT
 DAC EXPER
 JMS* (FINT)
 FLAC* EXPER / PICK UP CUFRENT FLOATING ID
 FDAC FTMP
 FDIV FMIL
 JMS* (FEXT)

022575	10256C	JMS	FSING	
022576	042670	DAC	YEAR	/ YEAR=10/10**6
022577	124412	JMS*	(FLOAT)	
022600	124274	JMS*	(FINT)	
022601	502677	FMUL	FMIL	
022602	124410	JMS*	(FCIA)	
022603	302674	FADD	FTMP	
022604	002674	FDAC	FTMP	/ 10=10-YEAR*10**6
022605	702702	FDIV	FTH	
022606	124276	JMS*	(FEXT)	
022607	102560	JMS	FSING	
022610	042671	DAC	MONTH	/ MONTH=10/10**4
022611	124412	JMS*	(FLOAT)	
022612	124274	JMS*	(FINT)	
022613	502702	FMUL	FTH	
022614	124410	JMS*	(FCIA)	
022615	302674	FADD	FTMP	
022616	002674	FDAC	FTMP	/ 10=10-MONTH*10**4
022617	702705	FDIV	FHR	
022620	124276	JMS*	(FEXT)	
022621	102560	JMS	FSING	
022622	042672	DAC	DAY	/ DAY=10/11**2
022623	124412	JMS*	(FLOAT)	
022624	124274	JMS*	(FINT)	
022625	502705	FMUL	FHR	
022626	124410	JMS*	(FCIA)	
022627	302674	FADD	FTMP	/ 10=10-DAY*10**2
022630	124276	JMS*	(FEXT)	
022631	102560	JMS	FSING	
022632	042673	DAC	EX	/ EX=10
022633	202671	LAC	MONTH	/ COMPUT 10 OF FORM
022634	124412	JMS*	(FLOAT)	/ MONTH, DAY, YEAR, EXPERIMENT *
022635	124274	JMS*	(FINT)	
022636	502677	FMUL	FMIL	
022637	002674	FDAC	FTMP	/ 10=MONTH*10**6
022640	124276	JMS*	(FEXT)	
022641	202672	LAC	DAY	
022642	124412	JMS*	(FLOAT)	
022643	124274	JMS*	(FINT)	
022644	502702	FMUL	FTH	
022645	302674	FADD	FTMP	
022646	002674	FDAC	FTMP	/ 10=10*DAY*10**4
022647	124276	JMS*	(FEXT)	
022650	202670	LAC	YEAR	
022651	124412	JMS*	(FLOAT)	
022652	124274	JMS*	(FINT)	
022653	502705	FMUL	FHR	
022654	302674	FADD	FTMP	
022655	002674	FDAC	FTMP	/ 10=10-YEAR*10**4
022656	124276	JMS*	(FEXT)	
022657	202673	LAC	EX	
022660	124412	JMS*	(FLOAT)	
022661	124274	JMS*	(FINT)	
022662	302674	FADD	FTMP	10=10* EX
022663	124276	JMS*	(FEXT)	
022664	204341	LAC	(3)	
022665	342453	TAD	EXPER	
022666	042453	DAC	EXPER	

022667 622564
 022670 000000
 022671 000000
 022672 000000
 022673 000000
 022674 000000
 022675 000000
 022676 000000
 022677 000000
 022700 364110
 022701 000024
 022702 000000
 022703 234200
 022704 000016
 022705 000000
 022706 310000
 022707 000007

JMP* CYMDE
 YEAR 0
 MONTH 0
 DAY 0
 EX 0
 FTMP 0
 0
 0
 FMIL C
 364110
 24
 FTH 0
 234200
 16
 FHR 0
 310000
 7

/SPACEING SEARCH ROUTINE
 /ENTER WITH ADDRESS OF SPACE BUFFER IN AC
 /RETURN +1 IF IO DOESN'T MEET CRITERIA
 /RETURN +2 IF IO MEETS CRITERIA

022710 000000
 022711 042105
 022712 777776
 022713 042106
 022714 102717
 022715 030564
 022716 030805
 022717 000000
 022720 202105
 022721 042103
 022722 222103
 022723 740200
 022724 602740
 022725 442106
 022726 602733
 022727 442710
 022730 200423
 022731 040240
 022732 622710
 022733 204357
 022734 342105
 022735 042105
 022736 442717
 022737 602720
 022740 222103
 022741 544315
 022742 602761
 022743 544313
 022744 602765
 022745 102777
 022746 102772
 022747 224406
 022750 740200
 022751 602740
 022752 102777
 022753 124411
 022754 602725

SSH 0
 DAC NUMBA / NUMBER OF SEARCH'S
 LAN -2
 DAC NMCTR
 JMS SRCH
 TOPS+400
 ROTS+400
 SRCH 0
 LAC NUMBA
 DAC TCV
 LAC* TCV / LOOK AT TERMINATING VALUE
 SZA / IF ZERO UNSPECIFIED
 JMP SB
 SRNXT ISZ NMCTR
 JMP .+5
 ISZ SSH
 SSEXT LAC EQM / RESET READ TTY UPON EXIT
 DAC DINI
 JMP* SSH
 LAC (120) / BUMP POINTER UP BY 120
 TAD NUMBA / FOR NEXT IO
 DAI NUMBA
 ISZ SRCH
 JMP SRCH+1
 SB LAC* TCV
 SAD (15)
 JMP S2
 SAD (41)
 JMP SOR
 JMS GFRA
 JMS TCVPH
 LAC* (AC)
 SZA
 JMP SB
 JMS GFRA
 JMS* (AC2)
 JMP SRNX1

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022755	224406		LAC*	(AC)	
022756	741200		SNA		
022757	602740		JMP	SB	
022760	602725		JMP	SRNXT	
022761	102777	S2	JMS	GFRA	
022762	124411		JMS*	(ACZ)	
022763	602725		JMP	SRNXT	
022764	602730		JMP	SSEX7	
022765	102777	SOP	JMS	GFRA	
022766	124411		JMS*	(ACZ)	
022767	602725		JMP	SRNXT	
022770	102772		JMS	TCVP4	
022771	602740		JMP	SB	
022772	000000	TCVP4	0		
022773	204303		LAC	(4)	
022774	342103		TAD	TCV	
022775	042103		DAC	TCV	
022776	622772		JMP*	TCVP4	
022777	000000	GFRA	0		
023000	222717		LAC*	SRCH	
023001	042104		DAC	CKADR	
023002	103060		JMS	GFRAC	
023003	622777		JMP*	GFRA	
023004	000000	ROBFF	0		
023005	203034		LAC	ROBCNT	/ ROUTINE TO UNPACK SPACE BUFFERS
023006	741200		SNA		/ 6 BITS AT A TIME
023007	603020		JMP	F1	/ FIRST TIME THIS WORD?
023010	544375		SAD	(1)	/ YES
023011	603026		JMP	F2	/ SECOND TIME THIS WORD?
023012	222104		LAC*	CKADR	/ YES
023013	504367		AND	(77)	/ THIRD TIME BUMP POINTERS
023014	143034		DZH	ROBCNT	/ RESET TIMES/WORD
023015	442104		ISZ	CKADR	
023016	084310		DAC*	(TC)	
023017	623004		JMP*	ROBFF	
023020	443034	F1	ISZ	ROBCNT	
023021	222104		LAC*	CKADR	
023022	504362		AND	(770000)	
023023	744000		CLL		
023024	640514		LRS	14	
023025	603016		JMP	F1-2	
023026	443034	F2	ISZ	ROBCNT	
023027	222104		LAC*	CKADR	
023030	504366		AND	(7700)	
023031	744000		CLL		
023032	640506		LRS	6	
023033	603016		JMP	F1-2	
023034	000000	ROBCNT	0		
					/ROUTINE TO RETRIEVE AND FLOAT
					/VALUES OUT OF PARAMETER BUFFER AS POINTED TO
					/BY INDEX REGISTER 14. EXIT IN FLOATING MODE
					^L1^
023035	000000		0		
023036	220012		LAC*	12	/ GET INTEGER VALUE
023037	044243		DAC	12	
023040	220012		LAC*	12	/ GET NUMERATOR
023041	741200		SNA		/ IF IT IS ZERO WE
023042	603054		JMP	+12	/ HAVE NO FRACTIONAL PART
023043	044244		DAC	N2	/ SAVE NUMERATOR

023044 220012
 023045 044245
 023046 124274
 023047 244243
 023050 544245
 023051 344244
 023052 744245
 023053 603056
 023054 124274
 023055 244243
 023056 124276
 023057 623035

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LAC*      12
DAC       DNM2
JMS*     (FINT)
FLACIS   12
FMUL'S   DNM2
FADD'S   N2
FDIV'S   DNM2
JMP      FLEXT
JMS*     (FINT)
FLACIS   12
FLEXT    JMS* (FEXT.
JMP*     FL14
/SUBROUTINE TO PICK UP CURRENT VALUES
/OFF SPACE PARAMETER'S POINTED TO BY CKADR
/PUT THIS VALUE IN FTMP
/THEN GETS PARAMETER VALUE AS POINTED TO BY TCV
/AND PERFORMS THE FOLLOWING:
/JMS FCIA FADD FTMP AND RETURNS NORMAL MODE
GFRAC     0
OZM      11          / REINITIALIZE INPUT FRACTION
OZM      NI
OZM      DNM1
LAC      JMSRD
DAC      DINI
OZM      RDBCNT
JMS      RVALS
SNA
JMP      GF1
LAC*     (TC)
SAD      (55)
JMP      GF2
SAD      (57)          / FRACTION ONLY
SKP
JMP      ZFRAC        / ZERO VALUE
LAC      DCDG
DAC      NI
JMS      RVALC
LAC      DCCG
DAC      DNM1
GF3      JMS* (FINT)
          FLACIS   11
          FMUL'S   DNM1
          FADD'S   NI
          FDIV'S   DNM1
          JMP      GFRXT
GF1      LAC      NOINP
          SPA
          JMP      ZFRAC        / ZERO VALUE
          JMS* (FINT)
          FLACIS   DCDG
          JMP      GFRXT
GF2      LAC      DCDG
          DAC      11
          JMS      RVALC
          SNA
          JMP      ZFRAC        / ZERO VALUE
          LAC      DCDG
          DAC      NI
    
```

023060 000000
 023061 151501
 023062 144241
 023063 144242
 023064 207156
 023065 040240
 023066 143034
 023067 101330
 023070 741200
 023071 603113
 023072 224310
 023073 544356
 023074 603121
 023075 544355
 023076 741000
 023077 603153
 023100 200274
 023101 044241
 023102 101334
 023103 200274
 023104 044242
 023105 124274
 023106 251501
 023107 544242
 023110 344241
 023111 744242
 023112 603141
 023113 200273
 023114 741100
 023115 603153
 023116 124274
 023117 240274
 023120 603141
 023121 200274
 023122 051501
 023123 101334
 023124 741200
 023125 603153
 023126 200274
 023127 044241

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023130	101334		JMS	RVALC	
023131	740200		SZA		/ GOOD DENOMINATOR?
023132	603136		JMP	.+4	/ YES
023133	200273		LAC	NOINP	/ ANY INPUT AT ALL?
023134	741100		SPA		
023135	603153		JMP	ZFRAC	/ NO ZERO FRACTION
023136	200274		LAC	DCDG	
023137	044242		DAC	DNMI	
023140	603105		JMP	GF3	
023141	002674	GFRXT	FDAC	FTMP	
023142	124276		JMS*	(FEXT)	
023143	202103		LAC	TCV	/ GET PARAMETER VALUE
023144	064275		DAC*	(12)	
023145	103035		JMS	FL14	
023146	124274		JMS*	(FINT)	
023147	124410		JMS*	(FCIA)	
023150	302674		FADD	FTMP	
023151	124276		JMS*	(FEXT)	
023152	623060		JMP*	GFRAC	
023153	124274	ZFRAC	JMS*	(FINT)	
023154	124267		JMS*	(FCIA)	
023155	603141		JMP	GFRXT	
023156	103004	JMSRD	JMS	RDBFF	
		/TOTAL SPACING		SEARCH ROUTINE	
023157	000000	TSSH	0		
023160	042105		DAC	NUMBA	/ SAVE PARAMETER STORAGE POINTER
023161	222105		LAC*	NUMBA	/ ANY SPECIFICATION?
023162	740200		SZA		
023163	603170		JMP	.+5	/ YES
023164	443157		ISZ	TSSH	/ NO RETURN IO OK
023165	2004	TEXT	LAC	EOM	/ RESCT DECINN IN CASE
023166	040240		DAC	DINI	/ IT WAS USED BY GFRAC
023167	623157		JMP*	TSSH	
023170	202105		LAC	NUMBA	
023171	042103		DAC	TCV	
023172	222103	TB	LAC*	TCV	
023173	544315		SAD	(15)	/ LAST VALUE?
023174	603230		JMP	TEND	/ YES
023175	544313		SAD	(4)	/ OR?
023176	603233		JMP	TOR	
023177	103254		JMS	FSUM	/ FORM TOPS+BOTS
023200	202103		LAC	TCV	
023201	064275		DAC*	(12)	
023202	103035		JMS	FL14	/ GET PARAMETER VALUE
023203	102772		JMS	TCVP4	/ BUMP TCV BY 4
023204	124274		JMS*	(FINT)	
023205	124410		JMS*	(FCIA)	
023206	303275		FADD	FSM	
023207	124276		JMS*	(FEXT)	
023210	224406		LAC*	(AC)	/ SUM-PARAMETER=0
023211	740200		SZA		
023212	603172		JMP	TB	/ NO
023213	202103		LAC	TCV	
023214	064275		DAC*	(12)	
023215	103035		JMS	FL14	/ GET NEXT PARAMETER VALUE
023216	124274		JMS*	(FINT)	
023217	124410		JMS*	(FCIA)	
023220	303275		FADD	FSM	

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023221 124276 JMS* (FEXT)
023222 124411 JMS* (ACZ) / SUM-PARAMETER:=0
023223 603164 JMP TEXT-1
023224 224406 LAC* (AC)
023225 741200 SNA
023226 603172 JMP TB
023227 603164 JMP TEXT-1
023230 103237 TEND JMS FSAME / SUM=PARAMETER
023231 603164 JMP TEXT-1 / YES IS GOOD
023232 603165 JMP TEXT
023233 103237 TOR JMS FSAME
023234 603164 JMP TEXT-1
023235 102772 JMS TCVP4
023236 603172 JMP TB
023237 000000 FSAME 0
023240 103254 JMS FSUM
023241 202103 LAC TCV
023242 064275 DAC* (I2)
023243 103035 JMS FL14
023244 124274 JMS* (FINT)
023245 124410 JMS* (FCIA)
023246 303275 FADD FSM
023247 124276 JMS* (FEXT)
023250 124411 JMS* (ACZ)
023251 623237 JMP* FSAME
023252 443237 ISZ FSAME
023253 623237 JMP* FSAME
023254 000000 FSUM 0
023255 204414 LAC (TOPS+400)
023256 042104 DAC CKADR / SPACING BUFFER
023257 103060 JMS GFRAC
023260 124274 JMS* (FINT)
023261 202674 FLAC FTMP
023262 003275 FDAC FSM
023263 124276 JMS* (FEXT)
023264 204415 LAC (BOTS+400)
023265 042104 DAC CKADR / SPACING BUFFER
023266 103060 JMS GFRAC
023267 124274 JMS* (FINT)
023270 203275 FLAC FSM / FORM SUM OF THE TWO
023271 302674 FADD FTMP
023272 003275 FDAC FSM
023273 124276 JMS* (FEXT)
023274 623254 JMP* FSUM
023275 000000 FSM 0 / CONTAINS SUM OF
023276 000000 0 / BOTTOM AND TOP SPACING
023277 000000 0

/LUNAR SAMPLE SEARCH
/USES ROFF TO READ OUT OF
/LUNAR ALPHA BUFFER FOR SAMPLE NUMBER
/ASSUMES L.S. IS FIRST NUMERIC VALUE IN
/LUNAR ALPHA. USES SAME TYPE SEARCH AS FOR
/NUMERIC VALUES
LSH 0
023300 000000 DAC NUMBA
023301 042105 LAC* NUMBA
023302 222105 SZA
023303 740200 JMP +5
023304 603311

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023305	443300	LEXT	ISZ	LSH
023306	200423		LAC	EQM
023307	040240		DAC	DINI
023310	623300		JMP*	LSH
023311	203156		LAC	JMSRD
023312	040240		DAC	DINI
023313	143034		DZM	RDBCNT
023314	204416		LAC	(SALA+400)
023315	042104		DAC	CKADR
023316	101330		JMS	RVALS
023317	200274		LAC	DCDG
023320	041653		DAC	GN
023321	202105		LAC	NUM3A
023322	042103		DAC	TCV
023323	344375		TAD	(1)
023324	042102		DAC	TCN
023325	222103	LB	LAC*	TCV
023326	544315		SAD	(15)
023327	603350		JMP	LEND
023330	544313		SAD	(4)
023331	603354		JMP	LOR
023332	222102		LAC*	TCN
023333	040274		DAC	DCDG
023334	102072		JMS	BYTWO
023335	200274		LAC	DCDG
023336	124304		JMS*	(CIA)
023337	341653		TAD	GN
023340	741100		SPA	
023341	603325		JMP	LB
023342	222102		LAC*	TCN
023343	124304		JMS*	(CIA)
023344	341653		TAD	GN
023345	740300		SMA SZA	
023346	603325		JMP	LB
023347	603305		JMP	LEXT
023350	201653	LEND	LAC	GN
023351	562102		SAD*	TCN
023352	603305		JMP	LEXT
023353	603306		JMP	LEXT+1
023354	201653	LOR	LAC	GN
023355	562102		SAD*	TCN
023356	603305		JMP	LEXT
023357	102072		JMS	BYTWO
023360	603325		JMP	LB
/ROUTINE TO READ A NUMBER INTO				
/FLOATING AC AINF=-1 IF NO INPUT				
023361	000000	FREAD	0	
023362	750001		CLC	
023363	064314		DAC*	(AINF)
023364	124267		JMS*	(FCLA)
023365	124271	FRI	JMS*	(READ)
023366	741200		SNA	
023367	623361		JMP*	FREAD
023370	344272		TAD	(-60)
023371	043410		DAC	TC2
023372	741100		SPA	
023373	603406		JMP	FXT
023374	344273		TAD	(-12)

023375 740100
 023376 603406
 023377 464314
 023400 740000
 023401 124274
 023402 544275
 023403 343410
 023404 124276
 023405 603365
 023406 750001
 023407 623361
 023410 000000

023411 000000
 023412 102564
 023413 124270
 023414 224417
 023415 064347
 023416 224413
 023417 124373
 023420 000000
 023421 745200
 023422 623411
 023423 544374
 023424 623420
 023425 124307
 023426 623420

023427 204214
 023430 103436
 023431 204223
 023432 103436
 023433 204232
 023434 103436
 023435 624351
 023436 000000
 023437 344305
 023440 064275
 023441 776507
 023442 041653
 023443 160012
 023444 441653
 023445 603443
 023446 623436
 023447 103522
 023450 103560
 023451 624351

023452 000000
 023453 204246
 023454 342324
 023455 042270
 023456 222270

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SMA
JMP      FXT
ISZ*    (AINF)
NOP
JMS*    (FINT)
FMULIS  (I2)
FADDIS  TC2
JMS*    (FEXT)
JMP      FRI
FXT      CLC
         JMP*   FREAD
TC2      0
/Routine TO PRINT ID
/AS POINTED TO BY EXPER
EPRNT    0
         JMS    CYMDE / CHANGE ID TO M.D.Y.X FORMAT
         JMS*   (FFIX)
         LAC*   (BC+1)
         DAC*   (HIGHPR)
         LAC*   (BC+2)
         JMS*   (DECCON)
         0
SNA CLL / DONE?
JMP*    EPRNT
SAD     (240) / DON'T PRINT LEADING SPACES
JMP*    -4
JMS*    (PRINT)
JMP*    -6
/RESETA ALL PARAMETER WORDS TO ZERO
CLEAR   LAC    SCHP1 / ADDRESS NUMERIC BUFFER 1
         JMS    ZERON / CLEAR IT
         LAC    SCHP2
         JMS    ZERON
         LAC    SCHP3
         JMS    ZERON
         JMP*   (RETC)
ZERON   0
         TAD    (-1)
         DAC*   (I2)
         LAW    -1271
         DAC    GN
         DZM    12
         ISZ    GN
         JMP    -2
FMT     JMS*   ZERON
         JMS    CLB
         JMS    RXW
         JMP*   (RETC)
/SUBROUTINE TO CHECK HIT ID
/WITH TAPE ID. X IS INDEX OF TAPE ID'S
/L IS INDEX OF HIT ID'S
'RETURNS +1 IF ID'S NOT SAME
'RETURNS +2 IF ID'S ARE THE SAME
LOOK.   0
         LAC    HITBA / COMPUTE ADDRESS OF HIGH ORDER
         TAD    1 / HIT ID GET IT AND SAVE
         DAC    GETI
         LAC*   GETI
    
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023457 042674 DAC FTMP
023460 442270 ISZ GETI / GET LOW ORDER AND SAVE
023461 222270 LAC* GETI
023462 042675 DAC FTMP+1
023463 204020 LAC IOBUF / COMPUTE ADDRESS OF TAPE ID
023464 342325 TAD J
023465 042270 DAC GETI
023466 222270 LAC* GETI / HIGH ORDER'S EQUAL?
023467 542674 SAO FTMP
023470 741000 SKP / YES
023471 623452 JMP* LOOK / NO
023472 442270 ISZ GETI
023473 222270 LAC* GETI
023474 542675 SAO FTMP+1 / LOW ORDERS EQUAL
023475 741000 SKP
023476 623452 JMP* LOOK
023477 443452 ISZ LOOK
023500 623452 JMP* LOOK
023501 000000 RDKID 0 / READ'S 41T DISK BLOCK #
023502 204246 LAC HITBA / IF ZERO RETURN +2
023503 342324 TAD I / IF NON-ZERO RETURN +1
023504 344376 TAD (2)
023505 042270 DAC GETI
023506 222270 LAC* GETI
023507 740200 SZA
023510 623501 JMP* RDKID
023511 443501 ISZ RDKID
023512 623501 JMP* RDKID
023513 760102 DTFL LAM MS100 / TELL EM TAPE FULL AND TO
023514 104210 JMS MSPT / MOUNT NEW ONE
023515 124271 JMS* (READ)
023516 740200 SZA
023517 603513 JMP -4
023520 103522 JMS CLB / ZERO INDEX
023521 603617 JMP 03+1
023522 000000 CLB 0 / ZERO IO BUFFER
023523 777400 LAM -400
023524 041047 DAC GSN
023525 777777 LAM -1
023526 344020 TAD IOBUF
023527 064275 DAC* (12)
023530 160012 DZM* 12
023531 441047 ISZ GSN
023532 603530 JMP -2
023533 623522 JMP* CLB
/READ TAPE SEARCH INDEX
023534 000000 RXR J
023535 124260 JMS* (DECTRW) / DECTAPE IO
023536 000005 RUNT 5 / UNIT 5
023537 777400 -400 / 400 VALUES
023540 030400 30400
023541 000001 1 / 1 BLOCK
023542 000003 3 / READ
023543 741200 SNA / ERROR?
023544 623524 JMP* RXR / NO RETURN
023545 103547 JMS DTERR / YES
023546 603535 JMP RXR+1 / TELL 'F.1 AND WAIT
023547 000000 DTERR 0

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023550 760025
 023551 104210
 023552 203536
 023553 101761
 023554 760034
 023555 104210
 023556 124271
 023557 623347

LAW MESS07 / PRINT ERROR MESSAGE
 JMS MSPT / WAIT FOR CR INDICATING
 LAC RUNT / ALL OK
 JMS DECSING
 LAW MESS06
 JMS MSPT
 JMS (READ)
 JMP DTERR

023560 000000
 023561 124260
 023562 000005
 023563 777400
 023564 030400
 023565 000001
 023566 000005
 023567 741200
 023570 623560
 023571 103547
 023572 603561

/WRITE TAPE SEARCH INDEX
 / UNIT 5
 / BLOCK 1
 RXW 0
 JMS (DECTRW)
 5
 -400
 30400
 1
 5
 SNA
 JMP RXW
 JMS DTERR
 JMP RXW+1

023573 000000
 023574 124260
 023575 000005
 023576 777400
 023577 030400
 023600 000000
 023601 000005
 023602 741200
 023603 623573
 023604 103547
 023605 603574
 023606 142325
 023607 603661
 023610 000000
 023611 200737
 023612 751200
 023613 523610
 023614 540741
 023615 623610
 023616 103534
 023617 200737
 023620 124304
 023621 040751
 023622 143361
 023623 224345
 023624 124304
 023625 041047
 023626 741200
 023627 603606
 023630 777600
 023631 364345
 023632 340737
 023633 740100
 023634 603513
 023635 204375

/WRITE ON DECTAPE UNIT 5
 ORT 0
 JMS (DECTRW)
 5
 -400
 30400
 ORUT 0
 5
 SNA
 JMP ORT
 JMS DTERR
 JMP ORT+1
 OZM J
 JMP LNX-6
 DTAPE 0
 LAC HITS
 SNA CLA
 JMP DTAPE
 SAD DFLAG
 JMP DTAPE
 JMS RXR / READ INDEX
 LAC HITS / GET 2'S COMP.
 JMS (CIA) / OF NUMBER OF HITS
 DAC GYN
 OZM FREAD / CLEAR DIFFERENT COUNTER
 LAC (EXP10+400)
 JMS (CIA)
 DAC GSN / NUMBER OF ID'S THIS TAPE
 SNA
 JMP DTAPE-2
 LAW -200
 TAD (EXP10+400)
 TAD HITS / IF WE ADD ALL HITS
 SNA
 JMP DTFL
 LAC (1)

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023636	042324		DAC	I	/ INDEX FOR HIT ID'S
023637	042325		DAC	J	/ INDEX FOR ID'S ON TAPE
023640	103452	LMRE	JMS	LOOK	/ HIT ID=TAPE ID
023641	603647		JMP	LC	
023642	204376		LAC	(2)	/ YES-ZERO DRUM BLOCK NUMBER
023643	342324		TAD	I	/ FOR THIS HIT ID
023644	344246		TAD	HITBA	
023645	042270		DAC	GETI	
023646	162270		OZM*	GETI	
023647	202324	LC	LAC	I	/ DO NEXT HIT ENTRY
023650	344341		TAD	(3)	
023651	042324		DAC	I	
023652	440751		ISZ	GYN	/ DONE ALL HITS?
023653	603640		JMP	LMRE	/ NO
023654	200737		LAC	HITS	
023655	124304		JMS*	(CIA)	
023656	040751		DAC	GYN	
023657	441047		ISZ	GSN	/ DONE ALL TAPE ID'S?
023660	603745		JMP	DC	
023661	224345		LAC*	(EXPID+40)	
023662	744010		CLL RAL		/ FOR THE ADDING OF NEW IDS
023663	344020		TAD	IDBUF	
023664	064275		GAC*	(12)	
023665	204375		LAC	(1)	
023666	042324		DAC	I	
023667	103501	LNx	JMS	RDKID	/ READ DISK BLOCK # FROM
023670	603735		JMP	PUTIN	/ HITS BUFFER IN NOT ZERO GO TO PUTIN
023671	440751		ISZ	GYN	/ DONE ALL HITS?
023672	741000		SKP		
023673	603700		JMP	.+5	
023674	204341		LAC	(3)	
023675	342324		TAD	I	
023676	042324		DAC	I	
023677	603667		JMP	LNx	
023700	203361		LAC	FREAD	/ UPDATE NUMBER OF ENTRIES
023701	364345		TAD*	(EXPID+400)	
023702	064345		DAC*	(EXPID+400)	
023703	103560		JMS	RYW	/ YES REWRITE UPDATED INDEX
023704	203361		LAC	FREAD	
023705	741200		SNA		
023706	623610		JMP*	DTAPE	
023707	124304		JMS*	(CIA)	/ NUMBER FOR DUMPING ON TAPE
023710	364345		TAD*	(EXPID+400)	
023711	344376		TAD	(2)	
023712	043600		DAC	DRUT	
023713	200737		LAC	HITS	/ RESET NUMBER OF ID'S TO CHECK
023714	124304		JMS*	(CIA)	
023715	040751		DAC	GYN	
023716	204375		LAC	(1)	
023717	042324		DAC	I	
023720	103501	D5	JMS	RDKID	/ READ HIT ID AGAIN IF ZERO IGNOR
023721	603730		JMP	.+7	
023722	204341		LAC	(3)	
023723	342324		TAD	I	
023724	042324		DAC	I	
023725	440751		ISZ	GYN	/ DONE ALL?
023726	603720		JMP	D5	/ NO
023727	623610		JMP*	DTAPE	/ DONE

023730	040232		DAC	CROKA	/ NO SET UP DISK ADDRESS
023731	100217		JMS	DKRD	/ READ DISK
023732	103573		JMS	DR1	/ WRITE ON DECTAPE
023733	443600		ISZ	DRUT	/ INCREMENT BLOCK COUNTER FOR DECTAPE
023734	603722		JMP	D5+2	
023735	103452	PUTIN	JMS	LOOK	
023736	740000		NOP		
023737	202674		LAC	FTMP	
023740	060012		DAC*	12	
023741	202675		LAC	FTMP+1	
023742	060012		DAC*	12	
023743	443361		ISZ	FREAD	/ INCREMENT ADD TOO COUNTER
023744	603E71		JMP	LN*2	
023745	204375	DC	LAC	(1)	
023746	042324		DAC	1	
023747	204376		LAC	(2)	
023750	342325		TAD	J	
023751	042325		DAC	J	
023752	603640		JMP	LN*RE	
023753	103361	LGET	JMS	FREAD	/ READ ID
023754	124270		JMS*	(FFIX)	/ FIX IT
023755	124300		JMS*	(CRLF)	
023756	103534		JMS	RXR	/ READ TAPE INDEX
023757	224345		LAC*	(EXPID+400)	
023760	124304		JMS*	(CIA)	
023761	041047		DAC	GSN	
023762	20437E		LAC	(2)	/ INITIALIZE DECTAPE BLOCK COUNTER
023763	044006		DAC	DTBLK	
023764	204020		LAC	IOBUF	
023765	054342		DAC*	(13)	
023766	220013		LAC*	13	
023767	564417		SAD*	(BC+1)	/ HIGH ORDERS MATCH?
023770	603776		JMP	.+6	/ YES
023771	464342		ISZ*	(13)	
023772	444006		ISZ	DTBLK	
023773	441047		ISZ	GSN	/ DONE ALL?
023774	603766		JMP	.-6	
023775	604015		JMP	NONE	/ YES NOT ON THIS TAPE
023776	220013		LAC*	13	
023777	564413		SAD*	(BC+2)	/ HIGH ORDERS CHECK-DO LOW ORDERS
024000	741000		SKP		
024001	603772		JMP	.-7	
024002	124260		JMS*	(DETRH)	/ YES-READ IN THAT BLOCK
024003	000005		5		
024004	777400		-400		
024005	030400		30400		
024006	000000	DTBLK	0		
024007	000003		3		
024010	740200		SZA		
024011	624351		JMP*	(RETC)	
024012	224344		LAC*	(EXPID+400)	
024013	064420		DAC*	(17177)	
024014	624421		JMP*	(UPSET)	/ PRINT THE DATA
024015	760122	NONE	LAW	MS102	
024016	104210		JMS	MSPT	
024017	624351		JMP*	(RETC)	
024020	030400	IOBUF	30400		/ ADDRESS OF DEC TAPE IO BUFFER.
024021	044150	OIOA	DAC	OIPT	/ CLEAR POINTER

024022	750000		CLA		
024023	044151		DAC	OIOAC	/ AC=0 TO START
024024	124500		JMS*	(CRLF)	
024025	204150		LAC	OIPT	/ GET POINTER
024026	104152		JMS	OOUT	
024027	224150		LAC*	OIPT	/ GET CONTENTS
024030	104152		JMS	OOUT	
024031	104177	OIO	JMS	REDIOF	
024032	104186		JMS	MATCH	/ SPECIAL INSTRUCTION?
024033	000240		ZNO		
024034	604105		JMP	OILF	/ SPACE*LOOK AT NEXT
024035	000314		314		
024036	604103		JMP	OILO	/ L*LOAD
024037	000316		316		
024040	604107		JMP	OINX	/ N*NEXT
024041	000307		307		
024042	604113		JMP	OIGO	/ G*GO
024043	000323		323		
024044	604111		JMP	OIJMS	/ S*JMS
024045	000302		302		
024046	604117		JMP	OIOB	/ B*BREAK POINT
024047	000322		322		
024050	604126		JMP	OIOBRS	/ R*RESTORE BREAK POINT
024051	000325		325		
024052	604100		JMP	OIBK	/ U*LOOK AT PREVIOUS
024053	000320		320		
024054	604087		JMP	OIPRO	/ P*PROCEED FROM BREAK POINT
024055	000000		0		/ TERMINATOR FOR MATCH
024056	204207		LAC	TSS1	
024057	04422		AND	171	
024060	044207		DAC	TSS1	
024061	204151		LAC	OIOAC	
024062	744000		CLL		
024063	640703		ALS	3	
024064	344207		TAD	TSS1	
024065	044151		DAC	OIOAC	
024066	604031		JMP	OIO	/ GET NEXT
024067	204136	OIPRC	LAC	LINSV	
024070	740020		RAR		/ RESTORE LINK
024071	204133		LAC	OIOBAU	/ BREAK POINT ADDRESS
024072	044077		DAC	ADPT	
024073	444077		ISZ	ADPT	
024074	204135		LAC	ACSV	/ AND AC
024075	404132		XCT	OIOBSV	
024076	624077		JMP*	ADPT	
024077	000000	ADPT	0		
024100	204150	OIBK	L C	OIPT	
024101	344305		TAD	1-11	/ MOVE POINTER BACK ONE
024102	604021		JMP	OIOA	
024103	204151	OILO	LAC	OIOAC	/ LOAD
024104	064150		DAC*	OIPT	
024105	444150	OILF	ISZ	OIPT	/ MOVE DOWN ONE
024106	604022		JMP	OIOA+1	
024107	204151	OINX	LAC	OIOAC	/ NEW ADDRESS
024110	604021		JMP	OIOA	
024111	124151	OIJMS	JMS*	OIOAC	
024112	104141		JMS	DBRT	
024113	204137	OIGO	LAC	LINK	/ FIX LINK

024114	740020		RAR		
024115	204140		LAC	ACSET	/ AND AC
024116	624151		JMP*	OIOAC	
024117	224151	OIOB	LAC*	OIOAC	
024120	044132		DAC	OIOBSV	/ SAVE INSTRUCTION
024121	204151		LAC	OIOAC	
024122	044133		DAL	OIOBAD	/ SAVE ADDRESS
024123	204131		LAC*	JMSOB	
024124	064151		DAC*	OIOAC	/ INSERT BREAK POINT
024125	604105		JMP	OILF	
024126	204132	OIOBRS	LAC	OIOBSV	/ GET INSTRUCTION
024127	064133		DAC*	OIOBAD	/ RESTORE IT
024130	604105		JMP	OILF	/ GO LOOK AT NEXT
024131	104141	JMSOB	JMS	DBRT	
024132	000000	OIOBSV	0		
024133	000000	OIOBAD	0		
024134	024134	ACPT	ACPT		
024135	000000	ACSV	0		
024136	000000	LINSV	0		
024137	000000	LINK	0		
024140	000000	ACSET	0		
024141	000000	DBRT	0		
024142	044135		DAC	ACSV	/ SAVE AC
024143	750010		GLX		
024144	044136		DAC	LINSV	
024145	204134		LAC	ACPT	
024146	044150		DAC	OIPT	
024147	604105		JMP	OILF	
024150	000000	OIPT	0		
024151	000000	OIOAC	0		
024152	000000	OOUT	0		
024153	652000		LMO		/ SAVE AC
024154	777772		LAM	-6	
024155	064300		DAC*	(CRLF)	/ USED FOR COUNTER
024156	661603		661603		/ CLA LLSS 3
024157	344423		TAD	(260)	
024160	124307		JMS*	(PRINT)	
024161	464300		ISZ*	(CRLF)	
024162	604156		JMP	-4	
024163	780240		LAM	240	
024164	124307		JMS*	(PRINT)	
024165	624152		JMP*	OOUT	
024166	000000	MATCH	0		
024167	224166		LAC*	MATCH	/ GET CHARACTER
024170	444166		ISZ	MATCH	/ MOVE POINTER
024171	741200		SNA		/ END OF LIST?
024172	624166		JMP*	MATCH	/ YES
024173	544207		SAD	TSSI	/ NO-MATCH
024174	624166		JMP*	MATCH	/ YES
024175	444166		ISZ	MATCH	/ NO MOVE POINTER
024176	604167		JMP	MATCH+1	
024177	000000	REDIOF	0		
024200	700002		IOF		
024201	700301		KSF		
024202	604201		JMP	-1	
024203	700312		KRB		
024204	044207		DAC	TSSI	
024205	700002		IOF		

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024206 624177      JMP*      RED:OF
024207 000000      TSS1     0
024210 000000      MSPT     0
024211 504424      AND      (37777)
024212 124425      JMS*     (MESAG)
024213 624210      JMP*     MSPT
/PARAMETER STORAGE 1
/STORAGE ORGANIZATION IS AS FOLLOWS
024214 031502      SCHP1    NUM1      / ADDRESS OF NUMERIC BUFFER
024215 032133      YN1      / ADDRESS OF YES-NO BUFFER
024216 032140      ALP1     / ADDRESS OF ALPHA BUFFER
024217 032220      EXP1     / ADDRESS OF EXPERIMENT ID BUFFER
024220 032341      SPN1     / ADDRESS OF SPACING BUFFER
024221 032602      TSP1     / ADDRESS OF TOTAL SPACING BUFFER
024222 032723      LS1      / ADDRESS OF LUNAR SAMPLE BUFFER
/PARAMETER STORAGE 2
/STORAGE ORGANIZED SAME AS 1
024223 032774      SCHP2    NUM2
024224 033425      YN2
024225 033432      ALP2
024226 033512      EXP2
024227 033633      SPN2
024230 034074      TSP2
024231 034215      LS2
/PARAMETER STORAGE 3
/STORAGE ORGANIZED SAME AS 1
024232 034266      SCHP3    NUM3
024233 034717      YN3
024234 034724      ALP3
024235 035004      EXP3
024236 035125      SPN3
024237 035366      TSP3
024240 035507      LS3
024241 000000      N1       0
024242 000000      DNMI     0
024243 000000      I2       0
024244 000000      N2       0
024245 000000      DNMI     0
024246 031200      HITBA    HBFF
024247 000000      LIBLIT   0
031200 000000      HBFF     0
031501 000000      I1       0
          .LOC      31200
          .LOC      +300 / BUFFER TO KEEP ID'S FROM HITS
/NUMERIC BUFFER 50(8) WORDS
/PER ENTRY IN FOLLOWING ORDER
/      GAIN
/      START
/      STOP
/      WEIGHT
/      DUMP INTERVAL
/      LIVE TIME
/      DECTAPE NUMBER
031502 000000      NUM1     0
          .LOC      +430
/YES-NO BUFFER ONE WORD
/PER ENTRY IN FOLLOWING ORDER
/      INTER MANTLE

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/      OUTER MANTLE
/      MAG TAPE
/      COIN TO MAG
/      PUNCH
032133  000000  YN1      0
              .LOC      .+4
/ALPHA BUFFER 14 WORDS
/PER ENTRY IN FOLLOWING ORDER
/      LUNAR
/      METEORITE
/      ISOTOPE
/      GENERAL
032140  000000  ALP1      0
              .LOC      .+57
/EXPERIMENT 10 BUFFER 120 WORDS
032220  000000  EXP1      0
              .LOC      .+120
/SPACING BUFFER 7 WORDS
/PER ENTRY IN FOLLOWING ORDER
/      TOP
/      BOT
032341  000000  SPN1      0
              .LOC      .+240
/TOTAL SPACING BUFFER 7 WORDS
032602  000000  TSP1      0
              .LOC      .+120
/LUNAR SAMPLE BUFFER 50 WORDS
032723  000000  LSI      0
              .LOC      .+50
032774  000000  NUM2      0
              .LOC      .+430
033425  000000  YN2      0
              .LOC      .+4
033432  000000  ALP2      0
              .LOC      .+57
033512  000000  EXP2      0
              .LOC      .+120
033633  000000  SPN2      0
              .LOC      .+240
034074  000000  TSP2      0
              .LOC      .+120
034215  000000  LS2      0
              .LOC      .+50
034266  000000  NUM1      0
              .LOC      .+430
034717  000000  YN3      0
              .LOC      .+4
034724  000000  ALP3      0
              .LOC      .+57
035004  000000  EXP3      0
              .LOC      .+120
035125  000000  SPN3      0
              .LOC      .+240
035366  000000  TSP3      0
              .LOC      .+120
035507  000000  LS3      0
              .END
024247  005453

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03/05/73 LIBRARY SEARCH

*** PDP9/15 ASSEMBLY LISTING ***

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024250	005452
024251	004265
024252	007667
024253	603637
024254	008425
024255	000551
024256	000400
024257	011367
024260	006344
024261	003421
024262	007436
024263	006513
024264	003637
024265	006426
024266	006436
024267	013666
024270	013506
024271	012366
024272	777720
024273	777766
024274	013051
024275	000012
024276	013112
024277	013545
024300	006737
024301	000016
024302	021564
024303	000004
024304	001772
024305	777777
024306	006314
024307	006752
024310	012714
024311	000072
024312	000037
024313	000041
024314	000062
024315	000015
024316	000200
024317	000300
024320	013046
024321	013016
024322	013022
024323	012772
024324	012740
024325	012745
024326	012752
024327	013026
024330	013033
024331	013043
024332	012777
024333	013002
024334	013006
024335	013012
024336	012733
024337	012756
024340	012764
024341	000003

024342	000013.
024343	030403
024344	030437
024345	030400
024346	000017
024347	006712
024350	006554
024351	006257
024352	000041
024353	310000
024354	150000
024355	000057
024356	000055
024357	000120
024360	000006
024361	000048
024362	770000
024363	010000
024364	020000
024365	030000
024366	007700
024367	000077
024370	777740
024371	021651
024372	000050
024373	006571
024374	000240
024375	000001
024376	000002
024377	000014
024400	000063
024401	640500
024402	013422
024403	013421
024404	000043
024405	013420
024406	013417
024407	013426
024410	013652
024411	013702
024412	013460
024413	013415
024414	030564
024415	030605
024416	030460
024417	013414
024420	017177
024421	012005
024422	000007
024423	000260
024424	037777
024425	007000

*** SYMBOL TABLE ***

AC	013417	DCOS1	020157	FEXT	013112	GN7	021131	MESS01	020014
ACKIT	022151	DCOS2	020170	FFIX	013506	GOOD	022264	MESS02	020017
ACPT	024134	DDPI	030057	FGET	022420	GOM	020775	MESS03	020043
ACSET	024140	DECCMD	006436	FHF	022705	GREEL	020601	MESS04	020047
ACSV	024135	DECCON	006571	FINT	013051	GSIN	021062	MESS05	020061
ACZ	013702	DEC1MN	020233	FLAC	200000	GSL5	021164	MESS06	020034
ADONE	021436	DECNM	030040	FLEXT	023056	GSN	021047	MESS07	020025
ADPT	024077	DECPRT	006554	FLOAT	013460	GSPRT	021304	MESS24	006314
ADTMP	022326	DECRET	006513	FL14	023035	GSOM	021110	MESS30	020067
AINF	000062	DECSING	021761	FMIL	022677	GTS	021031	MESS31	020075
ALPHA	021601	DECTRW	006344	FMT	023447	GYN	020751	MESS80	013046
ALP1	032140	DECT3	006413	FMUL	500000	GYNOS	020757	MESS81	013016
ALP2	033432	OFLAG	020741	FPRT	021256	HBBF	031200	MESS82	013022
ALP3	034724	DINI	020240	FRDSH	021652	HIGHPR	006712	MESS83	012772
ANDSP	021460	DISK10	003421	FREAD	023361	HITBA	024246	MESS84	012740
ANOSP	021420	OKRD	020217	FRET	021300	HITCNT	020736	MESS85	012745
APRT	021513	DMODE	005477	FRI	023365	HITS	020737	MESS86	012752
AQM	021406	DNM1	024242	FSAME	023237	I	022324	MESS87	013026
AREAD	021365	DNM2	024245	FSIGN	013545	IDBUF	024020	MESS88	013033
ASH	022140	DPRIT	021560	FSING	022560	IDFLTA	022452	MESS89	013043
ASIS	021433	DRT	023573	FSM	023275	IDRT	022356	MESS90	012777
ASR	022207	DRUT	023600	FSUM	023254	IDSH	022332	MESS91	013002
ASRC	022212	DSEL	005452	FTC	021773	IEND	022411	MESS92	013006
A1	021376	DSTOP	021642	FTH	022702	IM	030047	MESS93	013012
A2	021463	DTAPE	023610	FTMP	022674	INCNT	021774	MESS94	012733
A3	021361	DTBLK	024006	FTSH	022320	INEXT	022224	MESS95	012756
B	022036	DTERR	023547	FXT	023406	INOK	021001	MESS96	012764
BADIN	021025	DTFL	023513	F1	023020	INSEL	007667	MG	021243
BB	022360	DUNIT	020155	F11	021272	IORN	022414	MOD	020735
BC	013413	D3	023616	F2	023026	I1	031501	MONTH	022671
BLKCNT	020216	D5	023720	GA	021232	I2	024243	MSPT	024210
BN	021651	EINC	020431	GAIN	030044	J	022325	MS100	020102
BOTS	030205	ELEAV	020500	GALP	021341	JEND	022327	MS101	020115
BSRCH	020342	ENDEC	020266	GANY	021222	JMSOB	024131	MS102	020122
BYFOUR	022130	ENDECI	020262	GB	021135	JMSRD	023156	MS104	020130
BYTWO	022072	ENOSP	020451	GBA	021131	LB	023325	MTFG	030055
CHRI	021775	EPRNT	023411	GDSH	021114	LC	023647	NOTBF	021576
CIA	001772	EQM	020423	GETI	022270	LEND	023353	NOTSA	021567
CKADR	022104	ESTRT	020375	GEX	021124	LEXT	023305	NEND	023061
CKERR	021630	ES1	020456	GFRA	022777	LGET	023753	NEXT10	020606
CKIT	022013	ES2	020441	GFRAC	023060	LIBLIT	024247	NEXTSH	020562
CKNEXT	020661	ES3	020444	GFRXT	023141	LINK	024137	NID	020740
CKRT	022025	ES4	020416	GF1	023113	LINSV	024136	NLOOP	022241
CKYN	022121	ES5	020406	GF2	023121	LIVEPS	030034	NMCTR	022106
CLB	023522	ES6	020474	GF3	023105	LMRE	023640	NOINP	020273
CLEAR	023427	EX	022673	GINC	021712	LNK	023667	NONE	024015
CMOYX	022454	EXPER	022453	GLS	021040	LOOK	023452	NOR	013426
CMG	030053	EXPID	030000	GN	021653	LOR	023354	NREELS	020734
CONIN	020747	EXPIDF	030037	GNOS	021735	LRGO	020276	NUMBA	022105
COPYGO	020572	EXP1	032220	GNOSP	021023	LSH	023300	NUMERIC	021577
CPY	020135	EXP2	033512	GNQM	021703	LSP	021046	NUMS	021574
CROKA	020232	EXP3	035004	GNSP	021236	LSI	032723	NUMSH	021777
CRLF	006737	FADD	300000	GN1	021742	LS2	034215	NUMTMP	021772
CYMODE	022564	FCIA	013652	GN2	021722	LS3	035507	NUM1	031502
DAY	022672	FCLA	013655	GN3	021725	MAGTPT	011367	NUM2	032774
DBRT	024141	FDAC	000000	GN4	021676	MATCH	024166	NUM3	034255
DC	023745	FDIV	700000	GN5	021666	MESAG	007000	NXB	020354
DCOG	020274	FEQL	022440	GN6	021753	MESSNO	021776	NXNBA	022155

*** SYMBOL TABLE ***

NXTAPE	020731	SCHP2	024223	ZFRAC	023153
N1	024241	SCHP3	024232	ZI	021302
N2	024244	SCNT	021575	ZREAD	020742
OIBK	024100	SET2	021453		
OIOB	024117	SMIN	021441		
OIOBAD	024133	SMORE	020327		
OIOBRS	024126	SOMSP	021010		
OIOBSV	024132	SOPAL	021477		
OIGO	024113	SOR	022765		
OIJMS	024111	SPN	021340		
OILF	024105	SPNUMER	021600		
OILO	024103	SPN1	032341		
OINX	024107	SPN2	033633		
OIO	024031	SPN3	035125		
OIOA	024021	SPRT	021510		
OIOAC	024151	SRCH	022717		
OIPRO	024067	SRNXT	022725		
OIPT	024150	SSEXT	022730		
OKGO	021615	SSH	022710		
OKSTP	021846	SSR	022204		
OM	030051	SSS	022165		
OOOUT	024152	STATIM	030041		
OPRT	021521	STOTIM	030042		
ORN	022065	SUNIT	021650		
ORSP	021473	SXSHF	022322		
PINFO2	004253	S1	022175		
PRINT	006752	S2	022761		
PRTAL	021526	TAPCON	003637		
PRI	021541	TB	023172		
PR2	021551	TC	012714		
PTFG	030045	TCN	022102		
PTHITS	020702	TCPRT	021320		
PUTIN	023735	TCV	022103		
R	022331	TCVP4	022772		
ROBCNT	023034	TC2	023410		
RCBFF	023004	TC3	020275		
RDKID	023501	TEND	023230		
READ	012366	TEXT	023165		
REALHI	030003	TOPS	030164		
REDIOF	024177	TOR	023233		
RET	007436	TSP	021037		
RETC	006257	TSP1	032602		
RNC1	020207	TSP2	034074		
RUNT	023536	TSP3	035366		
RV	021332	TSSH	023157		
RVALC	021334	TSSI	024207		
RVALS	021330	UNITCH	021603		
RXR	023534	UPSET	012005		
RXH	023560	HEIGHT	030043		
S	040000	WORD	022330		
SAGA	030143	XX	740040		
SAIA	030122	YEAR	022670		
SALA	030060	YN	021602		
SAMA	030101	YNSH	022107		
SB	022740	YN1	032133		
SCHB	021573	YN2	033425		
SCHPA	021564	YN3	034717		
SCHPI	024214	ZERON	023436		

ADDIR=5725
 BCR=13413
 BLKNO=8305
 CRLF=8737
 DECBLK=8522
 DELETR=8017
 DIRFLO=8303
 DISOME=10407
 DTRE1=2535
 DTRE2=2534
 MESAQ=7000
 OOUT=18267
 PRINT=8752
 PUNBIN=11800
 PUNSH=7347
 RDBLK=2808
 RDIR=8054
 READ1=12378
 RET=7438
 RETC=8257
 RPAPER=11585
 RTAPE=2800
 SEARCH=8141
 WTDEC=8514
 WDIR=8072
 XX=740040

/ FOCAL-RCD RUN WITH RALPH - NASA MANNED SPACECRAFT CENTER.
 / USES INDEX REGISTERS:
 / 11, 12, 13, 14, AND 18.

020000	413780	.LOC	20000	
020001	020078	413780		/ FOCAL
020002	741378	START+1		
020003	022745	741378		/ FOCALG
020004	341378	FOCALG		
020005	022742	341378		/ FOCALS
020006	000000	FOCALG		
		0		
		.LOC	20020	
020020	000000	TEXTP	0	
020021	000000	XCT	0	/ UNPACK SWITCH
020022	000000	STEM	0	/ UNPACK STORAGE
020023	022332	PC	FLTZER	/ PROGRAM COUNTER
020024	000000	THISLN	0	/ LINE PNTR FROM FINDLN
020025	000000	THISOP	0	/ CURRENT EVAL OPER.
020026	000000	LASTLN	0	/ BACK PNTR FROM FINDLN
020027	000000	DEBOSH	0	/ DEBUG SW; NONZERO FOR LITERAL
020030	000000	PACKST	0	/ RUB-OUT PROTECTION.
020031	000000	PTI	0	/ VAR. PNTR
020032	040000	LASTV	BUFBEQ	/ ADR OF LAST VAR.
020033	000000	T1	0	
020034	000000	T3	0	
020035	057700	BOTTOM	57700	
020036	000000	INSUB	0	/ 0=GETC - #0=READC
020037	000000	SORTCH	0	/ # IN TABLE FROM SORTC.
020040	000000	LASTOP	0	/ LAST OPER FOR EVAL.
		EFOP=.		/ FUNCTION CODE.
020041	000000	ATSH	0	/ ASK - TYPE SWITCH.

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020042	777760	CNTR	-20	
		STARTV=.		
020043	040000	BUFR	BUFBEG	/ NEXT LOC IN BUFFER.
020044	002405	FISW	2405	
020045	000000	ADD	0	
020046	000000	XCTIN	0	/ PACK SWITCH
020047	000001	NAGSW	1	
020050	000215	CHAR	215	
020051	000000	LINENO	0	/ LINE # - READ BY GETLN
020052	000004	GINC	4	
020053	000000	T2	0	
		LIST6=.		
020054	000214		214	
020055	000207		207	
		LIST7=.		
020056	000337		337	
020057	000212		212	
		LIST3=.		/ EXCRETION LIST
020060	000215		215	
020061	000001	DMP SW	1	
020062	777777		-1	/ TERMINATES A LIST.
		INLIST=.		
020063	020113		IBAR	/ B.A.=RESTART
020064	020120		IGNOR	
020065	020126		IRETN	/ C.R.=TERMINATE STRING.
020066	777777		-1	/ TERMINATES A LIST.
020067	026471	COMBUF	COMBIN	/ COMMAND BUFFER START
020070	026567	CFRS	FRST	/ ADDRESS OF DUMMY LINE.
020071	022332	CFRSX	FLTZER	/ POINTER TO ZERO DATA
020072	026601	COMBOT	COMOUT+12	/ END OF COMMAND BUF
020073	026471	END	COMBIN	/ FIRST LOC.
020074	040000	ENDT	BUFBEG	/ START OF STORAGE AREA.
020075	751000	START	SKPICLA	/ PROGRAM START FROM SELF
020076	602735		JMP	BEGIN
020077	200071		LAC	CFRSX
020100	040023		DAC	PC
020101	206603		LAC	(1)
020102	040061		DAC	DMP SW
020103	140027		DZM	DEBGSW
020104	200072		LAC	COMBOT
020105	063054		DAC*	PDLXR
020106	202443		LAC	TELSW
020107	740300		SMAISZA	
020110	600113		JMP	IBAR
020111	760252		LAW	252
020112	126604		JMS*	(PRINT)
020113	777775	IBAR	LAW	-3
020114	040046		DAC	XCTIN
020115	200067		LAC	COMBUF
020116	040030		DAC	PACKST
020117	043055		DAC	AXIN
020120	102100	IGNOR	JMS	READC
020121	101214		JMS	SORTJ
020122	020055		LIST7-1	
020123	000005		INLIST-LIST7	
020124	102757		JMS	PACBUF
020125	600120		JMP	-J
020126	102757	IRETN	JMS	PACBUF

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020127	102757	JMS	PACBUF	
020130	200067	LAC	COMBUF	
020131	063056	GONE	DAC*	AXOUT / SETUP CURRENT LINE
020132	777777	LAW	-1	
020133	040021	DAC	XCT	
020134	200035	LAC	BOTTOM	
020135	063054	DAC*	PDLXR	
020136	102216	JMS	OETC	
020137	103045	JMS	SPNOR	/ IGNORE LEADING SPACES
020140	101421	JMS	TESTN	/ DOES LINE BEGIN WITH 1-9?
020141	600257	JMP	OZERR	/ PERIOD-ILLEGAL GROUP ZERO USAGE
020142	600172	JMP	INPUTX	/ NO
020143	440027	ISZ	DEBOSH	
020144	100202	JMS	OETLN	
020145	200047	LAC	NAOSH	
020146	744010	RCL		
020147	750200	SZAICLA		
020150	102454	JMS	ERROR3	
020151	200043	LAC	BUFR	
020152	043055	DAC	AXIN	
020153	777775	LAW	-3	
020154	040046	DAC	XCTIN	
020155	200051	LAC	LINENO	
020156	103057	JMS	STAXIN	/ DAC* 10
020157	103045	JMS	SPNOR	
020160	741000	SKP		
020161	102216	JMS	OETC	
020162	102757	SRETN	JMS	PACBUF
020163	777563	LAW	-215	/ CHECK FOR C.R.
020164	340050	TAD	CHAR	
020165	740200	SZA		
020166	600161	JMP	.-5	
020167	102007	JMS	DELETE	
020170	102275	JMS	ENDLN	
020171	600075	JMP	START	
020172	100402	INPUTX	JMS	PUSHJ / PROCESS IMMEDIATE COMMAND.
020173	020502	PROC		
020174	220023	LAC*	PC	
020175	741200	SNA		/ END OF PROGRAM?
020176	600075	JMP	START	/ YES
020177	040023	DAC	PC	
020200	346603	TAD	(1)	
020201	600131	JMP	GONE	
		/ TEST LINE BUFFER FORMAT ***		
		/ #1 POINTER OR -1 IN LAST		
		/ #2 LINENO		
		/ #3 - #N+1 IS TEST		
		/ #N CR=0		
020202	000000	OETLN	0	
020203	103045	JMS	SPNOR	/ IGNORE LEADING 0'S OR SPACES.
020204	346605	TAD	(-301)	/ 'ALL' IS A SPECIAL ARG.
020205	751200	SNAICLA		
020206	600220	JMP	TESTA	
020207	140036	DZH	INSUB	/ CALL OETC FROM INPUT VIA DECON
020210	103026	JMS	DECONV	
020211	104517	JMS	FXQ	
020212	740020	RAR		
020213	652000	LHQ		

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020214 346606 TAD (-32)
020215 754300 SMAISZAICLAICLL
020216 102454 JMS ERROR2 / TOO LARGE.
020217 640631 LLS 31
020220 040051 TESTA DAC LINENO
020221 101421 JMS TESTN
020222 102216 JMS GETC / READ STEP #
020223 101421 JMS TESTN
020224 600236 JMP GERR / DOUBLE PERIODS
020225 600250 JMP GEXIT / OTHER
020226 200037 LAC SORTCN / NUMBER
020227 742010 RTL
020230 340037 TAD SORTCN
020231 740010 RAL
020232 340051 TAD LINENO
020233 040051 DAC LINENO
020234 102216 JMS GETC / READ 2ND STEP #.
020235 101421 JMS TESTN
020236 102454 GERR JMS ERROR4 / DOUBLE PERIODS
020237 600250 JMP GEXIT / OTHER
020240 200037 LAC SORTCN
020241 340051 TAD LINENO
020242 040051 DAC LINENO
020243 102216 JMS GETC / CHECK FOR CORRECT TERM.
020244 101421 JMS TESTN
020245 600236 JMP GERR / .
020246 741000 SKP
020247 102454 JMS ERROR2 / # TOO LARGE
020250 200051 GEXIT LAC LINENO
020251 506607 AND (777600)
020252 744200 SZAI CLL
020253 740002 CML
020254 200051 LAC LINENO
020255 506610 AND (177)
020256 740600 SNLISZA
020257 102454 GZERR JMS ERROR2 / 0.X ILLEGAL
020260 740200 SZA
020261 206611 LAC (200000)
020262 740002 CML
020263 740010 RAL
020264 040047 DAC NAGSW
020265 620202 JMP GETLN

/ RANGE OF ACCEPTABLE LINE #'S = 1.01 TO 3.99
/ NAGSW:
/ GROUP=000000
/ LINE =400000
/ ALL = 1
/ LIST OF FUNCTION ADDRESSES (NAMES ARE IN FNTABL)
FNTABF=.

020266 021744 XABS
020267 021741 XSGN
020270 021037 XINT
020271 022637 FREG
020272 021437 XРАН
020273 022715 FDIS
020274 022623 ARTN
020275 022621 FEXP
020276 022625 FLOG
    
```

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020277	022627	FSIN	
020300	022631	FCOS	
020301	022633	XSQRT	
020302	022675	PUTDIS	
020303	022700	PUTREG	
020304	022451	ERROR5	
/ RECURSIVE OPERATE, XCT, OR CALL			
020305	100202	DO	JMS GETLN / EXECUTE 1 LINE, A GROUP, OR ALL
020306	200023		LAC PC
020307	100361		JMS PUSHA / SAVE CURRENT LINE ADR.
020310	100415		JMS PUSH17 / SAVE REST OF LINE.
020311	100431	DGRP	JMS PUSHF
020312	020047		NAGSW / SAVE NAGSW: CHAR; AND LINENO
020313	200047		LAC NAGSW
020314	751100		SPAICLA / SKIP IF GROUP OR ALL.
020315	600347		JMP DOONE / DO 1 LINE
020316	102165		JMS FINDLN / INIT FOR GROUP AND SET THISLN
020317	749000		NOP
020320	200024		LAC THISLN / TEST FOR GOOD GROUP #.
020321	063067		DAC* XRT
020322	220014		LAC* 14
020323	100637		JMS TSTGRP
020324	102454		JMS ERROR2 / NO SUCH #.
020325	100402	DGRP1	JMS PUSHJ / XCT OBJECT LINE AND SET PC.
020326	020477		PROCESS-2
020327	100451		JMS POPF / RESTORE DATA.
020330	020047		NAGSW
020331	220023		LAC* PC
020332	741200		SNA / END OF TEXT?
020333	600355		JMP DCONT / YES
020334	346603		TAD (1)
020335	040031		DAC PT1 / SAVE PNT TO LINENO.
020336	200047		LAC NAGSW
020337	740300		SMAISZA
020340	600344		JMP .+4 / DO ALL
020341	220031		LAC* PT1
020342	100637		JMS TSTGRP
020343	600355		JMP DCONT / NOT IN GROUP.
020344	220031		LAC* PT1 / READ NEXT LINE
020345	040051		DAC LINENO
020346	600311		JMP DGRP / CONTINUE SUBR.
020347	102165	DOONE	JMS FINDLN / FIND THE LINE.
020350	102454		JMS ERROR2 / NO SUCH LINE #.
020351	100402		JMS PUSHJ / XCT IT.
020352	020501		PROCESS
020353	100451		JMS POPF / RESTORE CHAR
020354	020047		NAGSW
020355	100423	DCONT	JMS POP17
020356	220013		LAC* 13 / PDLXR
020357	040023		DAC PC / RESTORE ADR OF CURRENT LINE.
020360	600502		JMP PROC / CONTINUE PROCESSING THIS LINE.
/ PUSH DOWN LIST CONTROLS			
020361	000000	PUSHA	0 / PUSH AC.
020362	040053		DAC T2 / BACK UP POINTER
020363	777777		LAW -1 / THEN CHECK CORE USAGE.
020364	100372		JMS PCHK
020365	200053		LAC T2
020366	060013		DAC* 13 / PDLXR

020367	777777		LAW	-1	
020370	100372		JMS	PCHK	
020371	620361		JMP*	PUSHA	
020372	000000	PCHK	0		
020373	363054		TAD*	POLXR	
020374	063054		DAC*	POLXR	
020375	104210		JMS	CIA	
020376	340032		TAD	LASTV	
020377	751400		SZLICLA		
020400	102454		JMS	ERROR3	/ STORAGE FILLED
020401	620372		JMP*	PCHK	
020402	000000	PUSHJ	0		/ RECURSIVE SUBROUTINE CALL.
020403	220402		LAC*	PUSHJ	
020404	040053		DAC	T2	/ SAVE SUBR ADR.
020405	777777		LAW	-1	
020406	100372		JMS	PCHK	
020407	200402		LAC	PUSHJ	
020410	346603		TAD	(1)	
020411	060013		DAC*	13	/ POLXR - SAVE RETURN
020412	777777		LAW	-1	
020413	100372		JMS	PCHK	
020414	620053		JMP*	T2	/ TRANSFER CONTROL.
020415	000000	PUSH17	0		
020416	223056		LAC*	AXOUT	
020417	040020		DAC	TEXTP	
020420	100431		JMS	PUSHF	
020421	020020		TEXTP		
020422	620415		JMP*	PUSH17	
020423	000000	POP17	0		
020424	100451		JMS	POPF	
020425	020020		TEXTP		
020426	200020		LAC	TEXTP	
020427	063056		DAC*	AXOUT	
020430	620423		JMP*	POP17	
020431	000000	PUSHF	0		/ SAVE FLOATING PNT #.
020432	777777		LAW	-1	
020433	360431		TAD*	PUSHF	/ COMPUTE VAR. ADR.
020434	440431		ISZ	PUSHF	
020435	063067		DAC*	XRT	
020436	777775		LAW	-3	
020437	100372		JMS	PCHK	
020440	777775		LAW	-3	
020441	040053		DAC	T2	
020442	220014		LAC*	14	
020443	060013		DAC*	13	/ POLXR
020444	440053		ISZ	T2	
020445	600442		JMP	.-3	
020446	777775		LAW	-3	
020447	100372		JMS	PCHK	/ RESET POINTER
020450	620431		JMP*	PUSHF	
020451	000000	POPF	0		/ RESTORE FLT PNT #.
020452	777777		LAW	-1	
020453	360451		TAD*	POPF	
020454	440451		ISZ	POPF	
020455	063067		DAC*	XRT	
020456	777775		LAW	-3	
020457	040053		DAC	T2	
020460	220013		LAC*	13	

020461	060014		DAC*	14	
020462	440053		ISZ	T2	
020463	600460		JMP	.-3	
020464	620451		JMP*	POPF	
020465	020774	FLIST2	FLIMIT		/.=STADARD
020466	021034		FINFIN		/;=SHORT
020467	022451		ERROR5		/CR=DUMB
020470	020762	FLIST1	FINCR		/.=STANDARD FORMAT
020471	020501		PROCESS		/;=SET;PLUS...
020472	020504		PC1		/CR=SET COMMAND
020473	100202	GOTO	JMS	GETLN	/ READ LINE *
020474	102444		JMS	DZMTEL	
020475	102165		JMS	FINDLN	/ LOCATE !T AND RESET TEXTP.
020476	102454		JMS	ERROR2	/ NOT THERE
020477	200024		LAC	THISLN	
020500	040023		DAC	PC	/ SET PC
020501	102216	PROCESS	JMS	GETC	
020502	200050	PROC	LAC	CHAR	
020503	546612		SAD	(215)	/ CR?
020504	601451	PC1	JMP	POPJ	/ EXIT 'PROCESS'
020505	100614		JMS	SORTC	/ IGNORE 'SPACE', '.', 'AND', ':'
020506	021256		GLIST-1		
020507	600501		JMP	PROCESS	
020510	200050		LAC	CHAR	/ SAVE COMMAND CHAR.
020511	506613		AND	(377)	
020512	100361		JMS	PUSHA	
020513	102216		JMS	GETC	/ GO TO TERMINATOR
020514	100614		JMS	SORTC	
020515	021256		GLIST-1		
020516	741000		SKP		
020517	600513		JMP	.-4	
020520	220013		LAC*	13	
020521	101214		JMS	SORTJ	/ XCT COMMAND
020522	020666		COMLST-1		
020523	000153		CCMGO-COMLST		
020524	102454		JMS	ERROR2	/ ILLEGAL COMMAND
		/ OUTPUT COMMAND TEXT			
020525	100202	WRITE	JMS	GETLN	/ SET LINENO.
020526	200050		LAC	CHAR	
020527	546614		SAD	(242)	/ "
020530	601126		JMP	TQUOT	
020531	440027		ISZ	DEBOSH	/ DISABLE TRACE
020532	102165		JMS	FINDLN	
020533	600562		JMP	WTESTG	/ * NOT THERE
020534	200051		LAC	LINENO	
020535	750200		SZAICLA		
020536	102337		JMS	PRNTLN	/ PRINT LINE * AND A SPACE.
020537	102216		JMS	GETC	
020540	102420		JMS	PRNTC	/ PRINT TEXT OF LINE.
020541	200050		LAC	CHAR	
020542	546612		SAD	(215)	/ C.R?
020543	741000		SKP		/ SKIP IF END OF LINE.
020544	600537		JMP	.-5	
020545	220024		LAC*	THISLN	
020546	741200	WTEST2	SNA		/ END OF TEXT?
020547	600564		JMP	WX-2	/ EXIT: DO NEXT INDIRECT LINE.
020550	346603		TAD	(1)	
020551	040031		DAC	PTI	/ SAVE PNT TO LINENO OF NEXT.

020552	200047	LAC	NAOSH	
020553	740100	SMA		
020554	220031	LAC*	PTI	
020555	100837	JMS	TSTORP	/ TRY NEXT LINENO FOR GROUP.
020556	800588	JMP	HX	
020557	220031	WALL	LAC*	PTI / SET LINENO.
020560	040051	DAC	LINENO	
020561	800532	JMP	WRITE+S	
020562	200024	WTESTO	LAC	THISLN / INIT GROUP PRINTOUT.
020563	800548	JMP	WTEST2	
020564	040027	DAC	DEBOSH	
020565	801451	JMP	POPJ	
020566	200047	HX	LAC	NAOSH
020567	751300		SPAISNAICLA	/ SKIP IF ALL.
020570	800584	JMP	HX-2	
020571	102420	JMS	PRINTC	/ PRINT CR AGAIN
020572	800557	JMP	HALL	
020573	000000	TESTC	0	/ TEST NATURE OF NEXT ALPHANUMERIC
020574	103045	JMS	SPNOR	
020575	100814	JMS	SORTC	
020576	021717		TERMS-1	
020577	820573	JMP*	TESTC	/ YES SORT/CN IS SET.
020600	200050	LAC	CHAR	/ NO
020601	440573	ISZ	TESTC	
020602	548815	SAD	(306)	/ F?
020603	800811	JMP	XT3	
020604	101421	JMS	TESTN	
020605	820573	JMP*	TESTC	/ .
020606	741000	SKP		/ OTHER
020607	820573	JMP*	TESTC	/ NUMBER
020610	440573	ISZ	TESTC	
020611	440573	XT3	ISZ	TESTC / RETURNS T,N,F,A
020612	750000		CLA	
020613	820573	JMP*	TESTC	
020614	030000	SORTC	0	/ SORT CHAR AGAINST TABLE.
020615	220814	LAC*	SORTC	
020616	063070	DAC*	XRT2	
020617	220012	LAC*	IZ	
020620	741100	SPA		/ LIST ENDED BY NEG. #.
020621	800833	JMP	SEXC	
020622	104210	JMS	CIA	
020623	340050	TAD	CHAR	
020624	740200	SZA		
020625	800817	JMP	.-8	
020626	220814	LAC*	SORTC	/ COMPUTE INCREMENT 0-N
020627	740001	CMA		
020630	363070	TAD*	XRT2	
020631	040037	DAC	SORTCN	
020632	741000	SKP		
020633	440814	SEXC	ISZ	SORTC
020634	440814	ISZ	ISZ	SORTC
020635	754000		CLAICLL	
020636	820814	JMP*	SORTC	
020637	000000	TSTORP	0	/ AC VS LINENO
020640	908807	AND	(777800)	
020641	104210	JMS	CIA	
020642	040053	DAC	T2	
020643	200051	LAC	LINENO	

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020644 506607 AND (777600)
020645 340053 TAD T2
020646 751200 SNAICLA
020647 440637 ISZ TSTGRP
020650 620637 JMP* TSTGRP
/ INPUT FROM TEXT OR KEYBOARD;
/ BACKARROW RESTARTS INPUT
020651 000000 INPUT 0
020652 200036 LAC INSUB
020653 740200 SZA / KEYBOARD?
020654 600657 JMP .+3 / YES
020655 102216 JMS GETC
020656 620651 JMP* INPUT
020657 123571 JMS* INFLT
020660 101214 JMS SORTJ
020661 022326 SPECIAL-1
020662 777775 INFIX-SPECIAL
020663 620651 JMP* INPUT
ILIST IF1 / ;
020665 020501 PROCESS / ;
020666 020504 PC1 / CR
COMLST=.
020667 000323 323 / SET
020670 000306 306 / FOR
020671 000311 311 / IF
020672 000304 304 / DO
020673 000307 307 / GOTO
020674 000303 303 / COMMENT
020675 000301 301 / ASK
020676 000324 324 / TYPE
020677 000314 314 / LIBRARY
020700 000317 317 / OUT PUT DATA
020701 000305 305 / ERASE
020702 000327 327 / WRITE
020703 000315 315 / MODIFY
020704 000321 321 / OUIT
020705 000322 322 / RETURN
020706 000252 252 / * -EXPANDABLE COMMAND
020707 000272 272 / : HS FLT OUT
020710 000332 332 / 2 FOR RETURN TO RALPH...
020711 777777 -1 / END OF LIST
/ THIS COMMAND IS SPEED OPTIMIZED.
/ CONDITIONAL TRANSFER PROCESS
IF JMS TESTC
020712 100573 JMS ECALL / T
020713 101466 JMS POLXR / N-DUMP THE (EFOP)
020714 463054 ISZ* PARTEST / F-CHECK FOR PAREN MATCH
020715 101774 JMS -2 / A
020716 777776 LAW T1
020717 040033 DAC AC / TEST F(AC) -.0.+
020720 204175 SZA
020721 740200 JMP* COMGO+4 / NEG
020722 621046 JMS ACZ
020723 104214 JMS T1
020724 440033 IF3 ISZ
020725 751000 SKPICLA
020726 621046 JMP* COMGO+4 / TRANSFER
020727 101214 JMS SORTJ / SEARCH TEST TIL .:CR
020730 021257 TLIST-1

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020731	777404	ILIST-TLIST		
020732	102216	JMS	GETC	
020733	600727	JMP	.-4	
020734	102216	IF1	JMS	GETC / MOVE PAST COMMA.
020735	600724		JMP	IF3
			/ LOOP CONTROL STATEMENT	
		SET=.		/ SUBSET OF 'FOR'..
020736	100402	FOR	JMS	PUSHJ / LOOPS, ETC.
020737	021267		GETARG	/ LOOK FOR =
020740	103048		JMS	SPNOR
020741	546616		SAD	(275)
020742	741000		SKP	
020743	102454		JMS	ERROR4 / LEFT OF = IN ERROR
020744	200031		LAC	PTI
020745	100361		JMS	PUSHA / SAVE POINTER TO VAR.
020746	100402		JMS	PUSHJ
020747	021477		EVAL-1	/ GET INITIAL VALUE EXPRESSION.
020750	220013		LAC*	13
020751	040031		DAC	PTI
020752	104071		JMS	EIM
020753	060031		FPUT*	PTI
020754	740000		NOP	/ LIM
020755	750000		CLA	
020756	101214		JMS	SORTJ
020757	021257		TLIST-1	
020760	777210		FLIST1-TLIST	
020761	102454		JMS	ERROR4
020762	200031	FINCR	LAC	PTI / SAVE VAR. ADR.
020763	100361		JMS	PUSHA
020764	100402		JMS	PUSHJ
020765	021477		EVAL-1	
020766	100431		JMS	PUSHF / SAVE LIMIT
020767	021757		FLARG	
020770	101214		JMS	SORTJ / TEST TERMINATORS
020771	021257		TLIST-1	
020772	777205		FLIST2-TLIST	
020773	102454		JMS	ERROR4 / ILLEGAL TERM IN FOR
020774	100402	FLIMIT	JMS	PUSHJ
020775	021477		EVAL-1	/GET THE INCR.
020776	100431		JMS	PUSHF / SAVE INCR.
020777	021757		FLARG	
021000	100415	FCONT	JMS	PUSH17 / SAVE TEXT OF OBJECT.
021001	100402		JMS	PUSHJ
021002	020501		PROCESS	/ DO OBJECT STATEMENTS
021003	100423		JMS	POP17 / RESTORE T T
021004	100451		JMS	POPF
021005	021656		ITER1	/ POP INCR.
021006	100451		JMS	POPF
021007	021757		FLARG	/ POP LIMIT.
021010	220013		LAC*	13 / GET VAR. ADR
021011	040031		DAC	PTI
021012	104071		JMS	EIM
021013	220031		FGET*	PTI
021014	301656		FSUM	ITER1
021015	060031		FPUT*	PTI
021016	341757		FMIN	FLARG
021017	740000		NOP	/ LIM
021020	204175		LAC	AC

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021021	741200	SNA			
021022	104214	JMS	ACZ		/ SKIP IF NEG.
021023	741000	SKP			/ NEG OR 0.
021024	601451	JMP	POPJ		
021025	200031	LAC	FTI		
021026	100361	JMS	PUSHA		/ SAVE ADR.
021027	100431	JMS	PUSHF		
021030	021757	FLARG			
021031	100431	JMS	PUSHF		
021032	021656	ITER1			
021033	601000	JMP	FCONT		
021034	100431	JMS	PUSHF		/ SET INCR TO 1.
021035	022334	FINFIN	FLTONE		
021036	601000	JMP	FCONT		
		/TAKE INTEGER PART			
021037	104540	XINT	JMS	FIXL	
021040	104332	JMS	FLOQ		/ FLOAT INTEGER PART
021041	601747	JMP	EFUN3		
		COMGO=.			
021042	020736	SET			
021043	020736	FOR			
021044	020712	IF			
021045	020305	DO			
021046	020473	GOTO			
021047	020504	PCI		/ COMMENT	
021050	021064	ASK			
021051	021065	TYPE			
021052	023101	LIBRARY			
021053	023573	DATA			
021054	022127	ERASE			
021055	020525	WRITE			
021056	021154	MODIFY			
021057	020075	START			/ RETURN TO COMMAND MODE VIA QUIT.
021060	021447	RETRN			
021061	023516	HSPX			
021062	023541	HSOUT			
021063	006257	RETC			
		/ INPUT-OUTPUT			
021064	750001	ASK	CLC		
021065	040041	TYPE	DAC	ATSW	
021066	140027	TASK	DZM	DEBGSW	
021067	750000		CLA		
021070	101214		JMS	SORTJ	/ SPECIAL CHAR?
021071	021251		ALIST-1		
021072	000203		ATLIST-ALIST		
021073	440041		ISZ	ATSW	/ TYPE OR ASK?
021074	601117		JMP	TYPE2	/ TYPE
021075	100402		JMS	PUSHJ	
021076	021267		GETARG		
021077	200050		LAC	CHAR	/ SAVE IN-LINE CHAR
021100	100361		JMS	PUSHA	
021101	203537		LAC	HSPXSW	
021102	740200		SZA		/ PRINT : IF TTY.
021103	601106		JMP	.+3	
021104	760272		LAW	272	/ TYPE :
021105	102420		JMS	PRINTC	
021106	440036		ISZ	INSUB	/ INDICATE READ
021107	104071		JMS	EIM	

021110	140651		DZM	INPUT	/ GET FLOATING #.
021111	060031		FPUT*	PTI	
021112	740000		NOP		
021113	140036		DZM	INSUB	
021114	220013		LAC*	13	
021115	040050		DAC	CHAR	/ RE-TEST LAST TERMINATOR.
021116	601064		JMP	ASK	/ CONTINUE
021117	100402	TYPE2	JMS	PUSHJ	
021120	021500		EVAL		
021121	104071		JMS	EIM	
021122	523074		AND*	OUTFLT	/ PRINT FLOATING #.
021123	740000		NOP		
021124	750000		CLA		
021125	601065		JMP	TYPE	
021126	440027	TQUOT	ISZ	DEBOSH	/ DISABLE TRACE
021127	102216		JMS	GETC	
021130	101214		JMS	SORTJ	
021131	021263		TLIST2-1		
021132	001036		TLIST3-TLIST2		
021133	102420		JMS	PRINTC	
021134	601127		JMP	TQUOT+1	
021135	102216	TINTR	JMS	GETC	/ PASS PERCENT
021136	100202		JMS	GETLN	/ READ FORMAT CONTROL: 'X7.03'
021137	200051		LAC	LINENO	
021140	040044		DAC	FISH	/ SAVE FORMAT CODE
021141	104071		JMS	EIM	
021142	660044		EAE*	FISH	
021143	740000		NOP		
021144	601066		JMP	TASK	
021145	206612	TCRLF2	LAC	(215)	/ CR ONLY
021146	123075		JMS*	OUTIO	
021147	601152		JMP	TASK4	
021150	206612	TCRLF	LAC	(215)	/ CR LF
021151	102420		JMS	PRINTC	
021152	102216	TASK4	JMS	GETC	
021153	601066		JMP	TASK	
			/ IF DEBOSH=0	: ENABLE FLIP-FLOP DMP5W	
			/	#0	: DISABLE AND RETURN ALL ?'S
			/ IF DMP5W =0	: TRACE ON	
			/	#0	: TRACE OFF
			/ IF BOTH =0	: PRINT TRACE.	
021154	100202	MODIFY	JMS	GETLN	/ LINE #.
021155	102165		JMS	FINDLN	/ LOOK IT UP NOW.
021156	102454		JMS	ERROR2	/ NOT THERE
021157	200043		LAC	BUFR	
021160	043055		DAC	AXIN	
021161	777775		-3		
021162	040046		DAC	XCTIN	
021163	200051		LAC	LINENO	
021164	103057		JMS	STAXIN	/ COPY SAME LINE #. (SAME AS DAC* 10)
021165	203055		LAC	AXIN	
021166	040030		DAC	PACKST	
021167	102401	SCONT	JMS	INDEV	
021170	040061		DAC	LIST3+1	/ SAVE SEARCH CHAR.
021171	440027		ISZ	DEBOSH	/ NO BREAKS.
021172	102216	SCHAR	JMS	GETC	/ TYPE+TEST-F.F.
021173	102420		JMS	PRINTC	/ PLAYBACK TEST.
021174	101214		JMS	SORTJ	/ LOOK FOR MATCH

021175	020057		LIST3-1		
021176	001170		LIST00-LIST3		
021177	102757		JMS	PACBUF	/ SAVE NEW LINE
021200	601172		JMP	SCHAR	
021201	200043	SBAR	LAC	BUFR	
021202	346603		TAD	(1)	
021203	043055		DAC	AXIN	
021204	777775		-3		
021205	040046		DAC	XCTIN	
021206	102100	SFOUND	JMS	READC	/ READ FROM TTY
021207	101214		JMS	SORTJ	/ TEST
021210	020053		LIST6-1		
021211	001170		SRNLST-LIST6		
021212	102757	SGOT	JMS	PACBUF	/ PACK CHAR.
021213	601206		JMP	SFOUND	/ MORE
021214	000000	SORTJ	0		/ SORT AND BRANCH ROUTINE
021215	741200		SNA		
021216	200050		LAC	CHAR	/ ASSUME CHAR IF AC=0.
021217	104210		JMS	CIA	
021220	040053		DAC	T2	/ SAVE SORT ITEM.
021221	221214		LAC*	SORTJ	
021222	441214		ISZ	SORTJ	
021223	063070		DAC*	XRT2	
021224	220012		LAC*	12	
021225	741100		SPA		
021226	601241		JMP	SEX	/ READ EX:IT
021227	340053		TAD	T2	
021230	740200		SZA		/ FIND MATCH?
021231	601224		JMP	.-5	/ NO
021232	223070		LAC*	XRT2	
021233	361214		TAD*	SORTJ	
021234	040053		DAC	T2	
021235	220053		LAC*	T2	
021236	040053		DAC	T2	
021237	750000		CLA		
021240	620053		JMP*	T2	
021241	441214	SEX	ISZ	SORTJ	/ MATCH NOT FOUND.
021242	754000		CLAICLL		
021243	621214		JMP*	SORTJ	/ RETURN TO CALLING SEQ.
		SRNLST=.			/ MODIFY CONTROL TABLE
021244	021172		SCHAR	/ F.F. = CONTINUE	
021245	021167		SCONT	/ BELL = CHANGE SEARCH CHAR.	
021246	021201		SBAR	/ B.A. = RESTART	
021247	021170		SCONT+1	/ L.F. = FINISH LINE AS BEFORE	
		LIST00=.			
021250	020162		SRETN	/ C.R. = END LINE HERE S IS	
021251	021212		SGOT	/ CHAR = SEARCH CHAR	
		ALIST=.		/ ASK-TYPE LIST OF CONTROLS.	
021252	000245		245	/ &	
021253	000242		242	/ "	
021254	000241		241	/ EXCLAM	
021255	000243		243	/ #	
021256	000244		244	/ \$	
		GLIST=.			
021257	000240		240	/ SPACE	
		TLIST=.			
021260	000254		254	/ .	
021261	000273		273	/ ;	

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021262	000215		215	/ CR
021263	777777		-1	/ END OF LIST
021264	000242	TLIST2	242	/ "
021265	000215		215	/ CR
021266	777777		-1	
021267	100573	OETARO	JMS	TESTC / 1ST LETTER OF ARG.
021270	740000		NOP	
021271	740000		NOP	
021272	102454		JMS	ERROR4 / BAD ARG IN FOR, SET, OR ASK.
021273	777775	OETVAR	-3	
021274	040046		DAC	XCTIN / PACK INTO ADD
021275	102757		JMS	PACBUF
021276	200045		LAC	ADD
021277	744000		CLL	
021300	640714		ALS	14
021301	040045		DAC	ADD
021302	102216		JMS	OETC / 2ND LETTER.
021303	100614		JMS	SORTC / TERMINATOR?
021304	021717		TERMS-1	
021305	601330		JMP	OSERCH / YES
021306	200050		LAC	CHAR / NO
021307	506617		AND	(77)
021310	660706		ALSS	6
021311	340045		TAD	ADD
021312	040045		DAC	ADD
021313	102216		JMS	OETC
021314	100614		JMS	SORTC
021315	021717		TERMS-1	
021316	601330		JMP	OSERCH
021317	200050		LAC	CHAR / GET 3RD CHAR
021320	306617		AND	(77)
021321	340045		TAD	ADD
021322	040045		DAC	ADD
021323	102216		JMS	OETC / IGNORE THE REST
021324	100614		JMS	SORTC
021325	021717		TERMS-1	
021326	601330		JMP	OSERCH
021327	601323		JMP	-4
021330	101762	OSERCH	JMS	TSTLPR / LOOK FOR SUBSCRIPT VIA SORTCN
021331	601341		JMP	OSI / NOT SUBSCRIPTED BY L-PAR.
021332	200045		LAC	ADD / SAVE NAME
021333	040041		DAC	EFOP / FOR RECURSIVE & ERROR CHECK.
021334	101466		JMS	ECALL
021335	220013		LAC*	13
021336	040045		DAC	ADD / RESTORE NAME
021337	101774		JMS	PARTEST / TEST PAREN MATCH, ETC.
021340	104540		JMS	FIXL
021341	043045	OSI	DAC	SUBS / SAVE SUBSCRIPT
021342	200043		LAC	STARTV / SEARCH FOR VAR.
021343	040031	OS3	DAC	PT1
021344	104210		JMS	CIA
021345	340032		TAD	LASTV / TEST FOR END OF LIST.
021346	741300		SPAISNA	
021347	601360		JMP	OS2 / END
021350	220031		LAC*	PT1 / GET TABLE ENTRY
021351	104210		JMS	CIA
021352	340045		TAD	ADD
021353	751300		SNAICLA	

021354	601404		JMP	GFND1	/ FOUND XX.
021355	200031	GS4	LAC	PT1	/ TRY NEXT.
021356	340052		TAD	GINC	
021357	601343		JMP	GS3	
021360	200032	GS2	LAC	LASTV	/ ADD THE VAR.
021361	346620		TAD	(13)	
021362	104210		JMS	CIA	
021363	363054		TAD*	PDLXR	
021364	750400		SNLICLA		/ TEST STORAGE LIMITS.
021365	102454		JMS	ERROR3	
021366	200032		LAC	LASTV	
021367	340052		TAD	GINC	/ UPDATE LIST.
021370	040032		DAC	LASTV	
021371	200045		LAC	ADD	/ SAVE NAME
021372	060031		DAC*	PT1	
021373	440031		ISZ	PT1	
021374	203045		LAC	SUBS	/ SAVE SUBSCRIPT.
021375	060031		DAC*	PT1	
021376	440031		ISZ	PT1	
021377	104071		JMS	EIM	
021400	750000		CLA		/ FCLA
021401	060031		FPUT*	PT1	
021402	740000		NOP		
021403	601451		JMP	POPJ	
021404	200031	GFND1	LAC	PT1	
021405	063067		DAC*	XRT	/ TEST SUBSCRIPTS
021406	220014		LAC*	14	
021407	104210		JMS	CIA	
021410	343045		TAD	SUBS	
021411	750200		SZAICLA		
021412	601355		JMP	GS4	/ WRONG SUBSCRIPT
021413	440031		ISZ	PT1	
021414	440031		ISZ	PT1	
021415	601451		JMP	POPJ	
021416	000000	RANO	0		/ RANDOM # STORAGE
021417	200000		200000		
021420	000000		0		
021421	000000	TESTN	0		/ RETURNS: ,- OTHER- OR #
021422	200050		LAC	CHAR	
021423	546621		SAD	(256)	/ PERIOD?
021424	741000		SKP		
021425	441421		ISZ	TESTN	/ NO
021426	346622		TAD	(-260)	
021427	040037		DAC	SORTCN	/ SAVE VALUE OF #.
021430	755100		SPAICLAICLL		/ TEST FOR DIGIT.
021431	621421		JMP*	TESTN	/ OTHER
021432	777507		LAW	-271	
021433	340050		TAD	CHAR	
021434	755300		SPAISNAICLAICLL		
021435	441421		ISZ	TESTN	/ #
021436	621421		JMP*	TESTN	
021437	104071	XRAN	JMS	EIM	/ PSUEDO-RANDOM # GENERATOR.
021440	301416		FSUM	RANO	/ ADD RUNNING RESULT TO ARG.
021441	401444		FHUL	.+3	
021442	041416		FPUT	RANO	/ HOW
021443	740000		NOP		
021444	141420		DZH	RANO+2	/ CONVERT TO .5 THRU .999
021445	144176		DZH	AC+1	/ SAME TO F(AC).

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021446 601747      JMP      EFUN3
/ EXIT FROM A DO SUBROUTINE
021447 200071      RETRN   LAC      CFRSX   / (PC) => 0
021450 040023      DAC      PC
021451 220013      POPJ   LAC*    13      / RECURSIVE EXIT
021452 040053      DAC      T2
021453 750000      CLA
021454 620053      JMP*    T2
ATLIST=.          / ASK-TYPE CONTROL CHAR TABLE
021455 021135      TINTR  / X  FORMAT DELIMITER
021456 021126      TQUOT  / "  LITERAL DELIMITER
021457 021150      TCRLF  / \  CR AND LF
021460 021145      TCRLF2 / @  CR ONLY
021461 022554      TDUMP  / $/ DUMP SYMBOL TABLE
021462 021152      TASK4 / SP TERM FOR NAMES
021463 021152      TASK4 / .  TERM FOR EXPRESSIONS
021464 020501      PROCESS / ;  TERM FOR COMMANDS
021465 020504      PCI   / CR TERM FOR STRINGS
/ $ FOR TDUMP TERMINATES COMMAND.
/ EVALUATE EXPRESSION WHICH
/ TERMINATES WITH AN R-PAREN ; OR CR AND
/ LEAVE RESULT IN F(AC) AND FLARG.
021466 000000      ECALL  0          / RECURSIVE CALL TO EVAL
021467 200037      LAC      SORTCN
021470 100361      JMS     PUSHA   / SAVE SORTCN, LASTOP, AND EFOP
021471 200040      LAC      LASTOP
021472 100361      JMS     PUSHA
021473 200041      LAC      EFOP
021474 100361      JMS     PUSHA
021475 201466      LAC      ECALL   / SAVE RETURN ADR FOR
021476 100361      JMS     PUSHA   / NEXT POPJ.
021477 102216      JMS     GETC    / MOVE PAST EXTRA CHAR
021500 040040      EVAL   DAC      LASTOP
021501 100573      JMS     TESTC
021502 601517      JMP     ETERM1  / TERM
021503 601661      JMP     ENUM    / @
021504 601673      JMP     EFUN    / FUNCTION
021505 100402      JMS     PUSHJ   / LETTER OR VAR
021506 021273      GETVAR / FIND OR CREATE VAR AND SET PT1.
021507 100573      OPNEXT JMS     TESTC
021510 601534      JMP     ETERMN  / T
021511 740000      NOP     / N- ERROR IN FORMAT
021512 740000      NOP     / F
021513 102454      JMS     ERROR4 / L- MISSING OPERATOR.
021514 000212      ECHOLST 212    / N-ERROR IN FORMAT
021515 000377      377    / F
021516 777777      -1
021517 200071      ETERM1 LAC      CFRSX
021520 040031      DAC      PT1
021521 777776      LAH     -2
021522 340037      TAD     SORTCN  / TEST FOR UNARY OPR
021523 741200      SNA
021524 601537      JMP     ETERM  / CREATE DUMMY FOR UNARY MINUS.
021525 346603      TAD     (1)
021526 741200      SNA
021527 601644      JMP     ARGXNT / IGNORE UNARY +.
021530 777767      LAH     -11
021531 340037      TAD     SORTCN / TEST FOR NULL PAREN.

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021532	741100		SPA		
021533	601713		JMP	ELPAR	/ MIGHT BE LEFT PAREN.
021534	101762	ETERMN	JMS	TSTLPR	
021535	741000		SKP		
021536	102454		JMS	ERROR4	/ OPR MISSING BEFORE PAREN.
021537	200037	ETERM	LAC	SORTCN	/ SET FROM TESTC TO SORTC.
021540	040025		DAC	THISOP	
021541	346623		TAD	(-11)	
021542	740100		SMA		/ END?
021543	140025		DZM	THISOP	/ THISOP = END OF EXP.
021544	200025	ETERM2	LAC	THISOP	
021545	104210		JMS	CIA	/ COMPARE PRIORITIES.
021546	340040		TAD	LASTOP	
021547	745100		SPAICLL		
021550	601631		JMP	EPAR	/ CONTINUE
021551	200040		LAC	LASTOP	
021552	506624		AND	(7)	
021553	741200		SNA		
021554	206611		LAC	(200000)	
021555	546602		SAD	(1)	
021556	206625		LAC	(300000)	
021557	546626		SAD	(2)	
021560	206627		LAC	(340000)	
021561	546630		SAD	(3)	
021562	206631		LAC	(440000)	
021563	546632		SAD	(4)	
021564	206633		LAC	(400000)	
021565	546634		SAD	(5)	
021566	601617		JMP	UPAR	
021567	341652		TAD	OPTABL	
021570	041602		DAC	FLOP	
021571	200040		LAC	LASTOP	
021572	751200		SNAICLA		/ END OF DATA INTO F(AC)?
021573	601601		JMP	.+6	
021574	100451		JMS	POPF	/ GET LAST DATA.
021575	021653		FTEMP		
021576	104071		JMS	EIM	
021577	201653		FGET	FTEMP	
021600	740000		NOP		
021601	104071		JMS	EIM	
021602	000000	FLOP	0		/ FLOPR = PT1
021603	041757		FPUT	FLARG	
021604	740000		NOP		
021605	206635		LAC	(FLARG)	
021606	040031		DAC	PT1	
021607	200025		LAC	THISOP	
021610	340040		TAD	LASTOP	
021611	741200		SNA		
021612	601451		JMP	POPJ	/ EXIT EVAL
021613	220013		LAC	13	/ GET PRIOR OPR.
021614	040040		DAC	LASTOP	
021615	601544		JMP	ETERM2	
021616	101622		JMS	FUPAR	
021617	201615	UPAR	LAC	.-1	
021620	041602		DAC	FLOP	
021621	601571		JMP	FLOP-11	
021622	000000	FUPA?	0		
021623	105570		JMS	LOG	

021624	104071	JMS	EIM	
021625	420031	FMUL*	PTI	
021626	105667	JMS	EXP	
021627	104071	JMS	EIM	
021630	621622	JMP*	FUPAR	
021631	101762	JMS	TSTLPR	/ TEST FOR SUB-EXPRESSION.
021632	741000	SKP		
021633	601715	JMP	EPAR2	/ EVALUATE EXPRESSION.
021634	200040	LAC	LASTOP	/ CONT READING EXPRESSION.
021635	100361	JMS	PUSHA	/ SAVE LASTOP.
021636	200031	LAC	PTI	
021637	041641	DAC	.+2	
021640	100431	JMS	PUSHF	/ SAVE LAST ARG.
021641	000000	0		
021642	200025	LAC	THISOP	
021643	040040	DAC	LASTOP	
021644	102216	JMS	GETC	/ READ 1ST CHAR OF ARG.
021645	100573	JMS	TESTC	
021646	601713	JMP	ELPAR	/ MAY BE L PAREN.
021647	601661	JMP	ENUM	/ N
021650	601673	JMP	EFUN	/ F
021651	601505	JMP	OPNEXT-2	/ L
021652	020031	OPTABL	CAL*	PTI
021653	000000	FTEMP	0	/ TEMP FLOATING AC.
021654	000000		0	
021655	000000		0	
021656	000000	ITER1	0	
021657	000000		0	
021660	000000		0	
021661	206635	ENUM	LAC	(FLARG)
021662	040031		DAC	PTI
021663	146463		DZM	INFLG / PICK UP CHAR.
021664	104071		JMS	EIM
021665	041653		FPUT	FTEMP / SAVE F(AC)
021666	146651		DZM	INPUT / GET FLOATING #.
021667	060031		FPUT*	PTI
021670	201653		FGET	FTEMP
021671	740000		NOP	
021672	601507		JMP	OPNEXT
021673	040041	EFUN	DAC	EFOP
021674	102216		JMS	GETC / READ FUNCTION NAME (1,2, OPR 3 LETTERS)
021675	100614		JMS	SORTC / TERM CHAR?
021676	021717		TERMS-1	
021677	601704		JMP	EFUN2 / YES
021700	200041		LAC	EFOP
021701	744010		RCL	/ MISH-MASH HASH CODE.
021702	340050		TAD	CHAR
021703	601673		JMP	EFUN
021704	101762	EFUN2	JMS	TSTLPR
021705	102454		JMS	ERROR4 / FOLLOW WITH PARENS TO SET ARG.
021706	101465		JMS	ECALL
021707	220013		LAC*	13 / BRNACH ON FUNC CODE;RETURN VIA EFUN3I
021710	101214		JMS	SORTJ
021711	022106		FNTABL-1	
021712	776157		FNTABF-FNTABL	
021713	101762	ELPAR	JMS	TSTLPR
021714	102454		JMS	ERROR4 / DOUBLE OPR OR ILLEGAL FUNC NAME.
021715	101466	EPAR2	JMS	ECALL / EVAL NESTED EXPR.

021716	463054	ISZ*	PDLXR	/ DUMP EXTRA ARG.
021717	601747	JMP	EFUN3	
021720	000240	TERMS=.		/ TERM TABLE FOR EVAL AND GETVAR
021721	000253	240	/ SPACE	0
021722	000255	253	/ +	1
021723	000257	255	/ -	2
021724	000252	257	/ /	3
021725	000336	252	/ *	4
021726	000250	336	/ UPARR	5
021727	000333	250		/ (LEFT PAREN 6
021730	000274	333	/LBRACKT	7
021731	000251	274	/ <	10
021732	000335	251	/)	11
021733	000276	335	/RBRACKT	12
021734	000254	276	/ >	13
021735	000273	254	/ .	14
021736	000215	273	/ ;	15
021737	000275	215	/ CR	16
021740	777777	275	/ =	
		-1		/ END OF LIST
		/ TWO MINOR FUNCTIONS		
021741	204175	XSGN	LAC	AC
021742	104332		JMS	FLOQ
021743	601747		JMP	EFUN3
021744	201760	XABS	LAC	FLARG+1
021745	751100		SPAICLA	
021746	144175		DZM	AC
021747	104731	EFUN3	JMS	NOR
021750	104071		JMS	EIM
021751	041757		FPUT	FLARG
021752	740000		NOP	
021753	206635		LAC	(FLARG)
021754	040031		DAC	PT1
021755	101774		JMS	PARTEST
021756	601507		JMP	OPNEXT
021757	000000	FLARG	0	
021760	000000		0	
021761	000000		0	
021762	000000	TSTLPR	0	/ SKIP IF LEFT PAREN.
021763	777767		LAW	-11
021764	340037		TAD	SORTCN
021765	750100		SMAICLA	
021766	621762		JMP*	TSTLPR
021767	777773		LAW	-5
021770	340037		TAD	SORTCN
021771	750300		SMAISZAICLA	
021772	441762		ISZ	TSTLPR
021773	621762		JMP*	TSTLPR
021774	000000	PARTEST	0	/ TEST PAREN MATCHES
021775	220013		LAC*	13
021776	040040		DAC	LASTOP
021777	206630		LAC	(3)
022000	360013		TAD*	13
022001	104210		JMS	CIA
022002	340037		TAD	SORTCN
022003	740200		SZA	
022004	102454		JMS	ERROR4
022005	102216		JMS	GETC
				/ MOVE PAST R-PAREN.

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022006	621774		JMP*	PARTEST	
		/ DELETE A LINE			
		DELETE	0		
022007	000000		JMS	FINDLN	/ SETS THISIN AND LASTIN.
022010	102165		JMP*	DELETE	/ ALREADY DONE
022011	622007		ISZ	DEBGSW	/ DISABLE TRACE
022012	440027		JMS	GETC	/ MEASURE LENGTH
022013	102216		LAC	CHAR	
022014	200050		SAD	(215)	/ CR?
022015	546612		SKP		/ YES
022016	741000		JMP	.-4	
022017	602013		LAC*	AXOUT	
022020	223056		CMA		
022021	740001		TAD	THISLN	
022022	340024		DAC	CNTR	/ LENGTH
022023	040042		LAC	CFRS	/ ILLEGAL TO DELETE 1ST LINE.
022024	200070		JMS	CIA	
022025	104210		TAD	THISLN	
022026	340024		SNAICLA		
022027	751200		JMP	START	
022030	600075		LAC*	THISLN	/ DISCONNECT.
022031	220024		DAC*	LASTLN	
022032	060026		LAC	CFRS	/ START LIST AT TOP.
022033	200070		DAC	T2	
022034	040053	DOK	LAC*	T2	
022035	220053		SNA		/ TEST FOR END.
022036	741200		JMP	DONE	
022037	602052		DAC	T1	
022040	040033		LAC	THISLN	
022041	200024		JMS	CIA	
022042	104210		TAD	T1	
022043	340033		SZLICLA		
022044	751400		LAC	CNTR	/ CHANGE (X) TO ACCOUNT FOR
022045	200042		TAD	T1	/ GARBAGE.
022046	340033		DAC*	T2	
022047	060053		LAC	T1	
022050	200033		JMP	DOK	
022051	602034		CLC		
022052	750001	DONE	TAD	THISLN	/ BACK UP LINE FOR XR.
022053	340024		DAC*	XRT	
022054	063067		LAC	CNTR	
022055	200042		CMA		
022056	740001		TAD	THISLN	
022057	340024		DAC*	XRT2	
022060	063070		LAC	CNTR	
022061	200042		TAD	BUFR	
022062	340043		DAC	BUFR	
022063	040043		LAC	AXIN	
022064	203055		CMA		
022065	740001		TAD*	XRT2	
022066	363070		DAC	T1	
022067	040033		LAC	AXIN	
022070	203055		TAD	CNTR	
022071	340042		DAC	AXIN	
022072	043055		LAC*	12	/ SIPHON LOWER PART.
022073	220012		DAC*	14	
022074	060014		ISZ	T1	
022075	440033		JMP	.-3	
022076	602073				


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022077 602010
022100 000000
022101 102401
022102 741200
022103 602101
022104 040050
022105 750000
022106 622100

022107 002533
022110 002650
022111 002636
022112 002631
022113 002630
022114 002565
022115 002572
022116 002624
022117 002625
022120 002654
022121 002575
022122 002702
022123 005765
022124 006031
022125 000330
022126 777777

022127 100573
022130 602162
022131 602145
022132 602136
022133 200050
022134 546636
022135 741000
022136 102454
022137 200074
022140 040043
022141 160070
022142 200043
022143 040032
022144 600075
022145 100202
022146 200043
022147 043055
022150 102007
022151 440024
022152 200047
022153 750100
022154 220024
022155 100637
022156 602142
022157 220024
022160 040051
022161 602150
022162 200043
022163 040032
022164 601451

READC  JMP      DELETE+1 / RESET LASTN, THISLN
        0          / READ IN A CHAR.
        JMS      INDEV
        SNA
        JMP      .-2      / IF 0, TRY AGAIN.
        DAC      CHAR
        CLA
        JMP*     READC

FNTABL=. 2533          / ABS
         2650          / SGN
         2636          / ITR
         2631          / REG
         2630          / RAN
         2565          / DIS
         2572          / ATN
         2624          / EXP
         2625          / LOG
         2654          / SIN
         2575          / COS
         2702          / SQT
         5765          / PDIS
         6031          / PREG
         0330          / X
         -1
/ ERASE SINGLE LINES, GROUPS, OR VARIABLES.
ERASE   JMS      TESTC  / TEST 2ND WORD IF ANY.
        JMP      ERVX   / ERASE VAR.
        JMP      ERL    / LINES OR GROUPS
        JMP      .+4    / ERROR
        LAC      CHAR   / ALL TEXT
        SAD      (301)
        SKP
        JMS      ERROR3 / BAD ARG FOR ERASE.
        LAC      ENDT   / ERASE ALL TEXT**
        DAC      BUFR
        DZM*     CFRS
        LAC      STARTV / ERASE VAR.
        DAC      LASTV
        JMP      START  / POINTERS MAY BE DIFFERENT NOW.
        JMS      GETLN  / ERASE LINES.
        LAC      BUFR   / PROTECT REST OF TEXT.
        DAC      AXIN
        JMS      DELETE / EXTRAC VE LINE.
        ISZ     THISLN
        LAC      NAGSW
        SMAICLA
        LAC*    THISLN
        JMS     TSTGRP  / SKIP IF G(AC) = G(LINENO)
        JMP     ERV
        LAC*    THISLN
        DAC     LINENO
        JMP     ERG
        LAC     STARTV / INIT VAR.
        DAC     LASTV
        JMP     POPJ

/ ROUTINE FINDLN...
/ SEARCH FOR GIVEN LINE I.D.=(LINENO)

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/ 1ST RETURN IF NOT FOUND.
 / 2ND RETURN IF FOUND.
 / THISLN = FOUND LINE OR LARGER.
 / LASTLN = LESSER AND/OR LAST.
 / TEXTP IS SET

022165	000000	FINDLN	0		
022166	200070		LAC	CFRS	/ INIT POINTERS TO 1ST LINE.
022167	040026		DAC	LASTLN	
022170	040024	FINDN	DAC	THISLN	
022171	063067		DAC*	XRT	
022172	200051		LAC	LINENO	
022173	104210		JMS	CIA	
022174	360014		TAD*	14	/ LINENO=0 WILL ALSO BF FOUND.
022175	741200		SNA		
022176	602207		JMP	FEND3-1	/ FOUND IT.
022177	751400		SZLICLA		
022200	602210		JMP	FEND3	/ PAST IT.
022201	200024		LAC	THISLN	
022202	040026		DAC	LASTLN	/ MOVE POINTERS.
022203	220024		LAC*	THISLN	
022204	741200		SNA		/ END OF TEXT?
022205	602210		JMP	FEND3	/ YES
022206	602170		JMP	FINDN	
022207	442165		ISZ	FINDLN	/ 2ND EXIT=FOUND.
022210	200024	FEND3	LAC	THISLN	/ 1ST EXIT=NOT FOUND.
022211	346603		TAD	(1)	
022212	063056		DAC*	AXOUT	/ SET TEXTP
022213	750001		CLC		
022214	040021		DAC	XCT	
022215	622165		JMP*	FINDLN	
022216	000000	GETC	0		
022217	102252		JMS	GETI	
022220	751100	UTE	SPAICLA		
022221	206637		LAC	(100)	/ 300-337 & 340-376
022222	346640		TAD	(-137)	/ 240-275 & 200-236
022223	340050		TAD	CHAR	
022224	741200		SNA		
022225	602240		JMP	UTX	/ ? FOUND
022226	346641		TAD	(337)	
022227	040050	UTQ	DAC	CHAR	
022230	200027		LAC	DEBGSH	
022231	340061		TAD	DMPSH	
022232	751200		SNAICLA		/ PRINT ONL. :F BOTH 0.
022233	102420		JMS	PRINTC	
022234	622216		JMP*	GETC	
022235	102252	EXTR	JMS	GETI	
022236	740001		CHA		
022237	602220		JMP	UTE	
022240	200027	UTX	LAC	DEBGSH	/ TEST FOR TRACE ENABLE
022241	750200		SZAICLA		
022242	602250		JMP	.+6	
022243	200061		LAC	DMPSH	/ FLIP TRACE
022244	751200		SNAICLA		
022245	206603		LAC	(1)	
022246	040061		DAC	DMPSH	
022247	602217		JMP	GETC+1	/ GET NEXT CHAR INSTEAD.
022250	346642		TAD	(277)	/ TRACE DISABLE =RETURN ?
022251	602227		JMP	UTQ	

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022252 000000 GET1 0 / UNPACK 6 BITS.
022253 440021 ISZ XCT
022254 741000 SKP
022255 602271 JMP GET3
022256 200022 LAC GTEM
022257 640514 GEND LRS 14
022260 506617 AND (77)
022261 040050 DAC CHAR
022262 641002 LACQ
022263 040022 DAC GTEM
022264 200050 LAC CHAR
022265 546617 SAD (77)
022266 602235 JMP EXTR
022267 346643 TAD (-40)
022270 622252 JMP* GET1
022271 777775 GET3 LAW -3
022272 040021 DAC XCT
022273 220016 LAC* 16
022274 602257 JMP GEND
022275 000000 ENDLN 0 / TERM BUFFERED LINE...
022276 220026 LAC* LASTLN / SAVE OLD POINTER.
022277 060043 DAC* BUFR
022300 200043 LAC BUFR / POINT TO NEW LAST LINE
022301 060026 DAC* LASTLN
022302 200045 LAC ADD
022303 745200 SNAICLL
022304 602314 JMP .+10
022305 652000 LMQ
022306 777776 -2
022307 540046 SAD XCTIN
022310 640606 LLS 6
022311 640606 LLS 6
022312 641002 LACQ
022313 103057 JMS STAXIN
022314 203055 LAC AXIN / COMPUTE NEW END OF BUFFER.
022315 346603 TAD (1)
022316 040043 DAC BUFR
022317 200043 LAC STARTV / RESET VAR LIST.
022320 040032 DAC LASTV
022321 622275 JMP* ENDLN
TLIST3=. / LITERAL TERMINATORS.
022322 021152 TASK4 / -
022323 023654 LT / CR = AUTO QUOTE MATCH.
INFX=. / DATA CONTP
022324 026256 FINPUT+1 / LEFT ARROW = KILL
022325 020652 INPUT+1 / L.F. = IGNORE
022326 777777 -1
SPECIAL=.
022327 000337 337 / LEFT ARROW
022330 000212 212 / LINE FEED
022331 777777 -1
022332 000000 FLTZER 0 / ML
022333 000000 0 / S+MH
022334 000001 FLTONE 1 / EXP #'S ARE OVERLAPPED IF 3 WORD.
022335 200000 200000
022336 000001 1
022337 000000 PRNTLN 0 / PRINT LINE #
022340 200051 LAC LINENO

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022341	652000		LMQ		
022342	640613		LLS	13	
022343	506617		AND	(77)	
022344	102355		JMS	PRNT	
022345	760256		LAW	256	/ PRINT . FOR SEPARATION
022346	102420		JMS	PRINTC	
022347	200051		LAC	LINENO	
022350	102355		JMS	PRNT	/ TWO DIGIT STEP *
022351	777640		LAW	-140	
022352	040050		DAC	CHAR	
022353	102420		JMS	PRINTC	/ PRINT TRAILING SPACE
022354	622337		JMP*	PRNTLN	
022355	000000	PRNT	0		/ PRINT 2 DEC. DIGITS.
022356	506610		AND	(177)	
022357	040033		DAC	T1	
022360	206644		LAC	(260)	
022361	040034		DAC	T3	
022362	602365		JMP	.+3	
022363	440034		ISZ	T3	
022364	040033	XYZ	DAC	T1	
022365	200033		LAC	T1	
022366	346645		TAD	(-12)	
022367	740100		SMA		
022370	602363		JMP	XYZ-1	
022371	200034		LAC	T3	
022372	102420		JMS	PRINTC	
022373	200033		LAC	T1	
022374	346644		TAD	(260)	
022375	102420		JMS	PRINTC	
022376	622355		JMP*	PRNT	
022377	123100		JMS*	INIO	
022400	622401		JMP*	INDEV	
022401	000000	INDEV	0		
022402	202443		LAC	TELSW	
022403	740300		SZAISMA		
022404	602377		JMP	INDEV-2	
022405	126646		JMS*	(READ1)	/ DEMAND A CHAR FROM TTY.
022406	546647		SAD	(220)	
022407	600111		JMP	IBAR-2	
022410	546612		SAD	(215)	
022411	741000		SKP		
022412	622401		JMP*	INDEV	
022413	126650		JMS*	(CRLF)	
022414	206612		LAC	(215)	
022415	622401		JMP*	INDEV	
022416	123075		JMS*	OUTIO	
022417	622420		JMP*	PRINTC	
022420	000000	PRINTC	0		/ OUTPUT A CHAR
022421	506613		AND	(377)	
022422	741200		SNA		
022423	200050		LAC	CHAR	
022424	042401		DAC	INDEV	/ SAVE CHAR.
022425	202443		LAC	TELSW	
022426	751100		SPAICLA		/ TEL OR PAPER?
022427	602416		JMP	PRINTC-2	
022430	202401		LAC	INDEV	
022431	543651		SAD	(376)	/ ALTMODE?
022432	602441		JMP	TELSW-2	/ YES

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022433 548612 SAD (215)
022434 602441 JMP TELSW-2
022435 740209 SZA / DON'T PRINT NULLS.
022436 126604 JMS* (PRINT)
022437 750000 CLA
022440 622420 JMP* PRINTC
022441 126650 JMS* (CRLF)
022442 802437 JMP* .-3
022443 000000 TELSW 0
022444 000000 DZMTEL 0
022445 142443 DZM TELSW
022446 206604 LAC (PRINT)
022447 043075 DAC OUTIO
022450 622444 JMP* DZMTEL
/ ERROR RECOVERY PROCEDURE
022451 200053 ERRORS LAC T2
022452 042454 DAC .+2 / ERROR CALLED FROM TABLE.
022453 741000 SKP
ERROR2=.
ERROR3=.
ERROR4 0 / LIMIT EXCEEDED
022454 000000 CLC / COMPUTE CALLING ADR
022455 750001 TAD / AND USE AS ERROR CODE.
022456 342454 DAC LINENO / SAVE CODE.
022457 040051 DAC -20
022460 777760 LAW CNTR
022461 040042 DAC (IOBUF-1)
022462 206652 LAC AXIN
022463 043055 DAC
022464 750000 CLA
022465 103057 JMS STAXIN
022466 440042 ISZ CNTR / DONE?
022467 602464 JMP .-3 / NO
022470 102444 RECOVX JMS DZMTEL
022471 760277 LAW 277
022472 102420 JMS PRINTC / PRINT A ?
022473 290051 LAC LINENO
022474 126653 JMS* (OOUT) / PRINT ERROR #
022475 440023 ISZ PC
022476 220023 LAC* PC
022477 741200 SNA
022500 602507 JMP .+7
022501 040051 DAC LINENO
022502 760300 LAW 300 / ATSIGN
022503 102420 JMS PRINTC
022504 760240 LAW 240
022505 102420 JMS PRINTC / PRINT SPACE.
022506 102337 JMS PRNTLN / PRINT LINE OF ERROR.
022507 760215 LAW 215
022510 102420 JMS PRINTC
022511 103560 JMS HSRSET
022512 206626 LAC (2) / SET DATA MODE
022513 044206 DAC DM
022514 600075 JMP START
022515 777775 RUB1 LAW -3
022516 540046 SAD XCTIN
022517 602532 JMP RUB2
022520 200045 LAC ADD
022521 744000 CLL

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022522	640506	LRS	6	
022523	040045	DAC	ADD	
022524	777777	-1		
022525	340046	TAD	XCTIN	
022526	040046	RUB4 DAC	XCTIN	
022527	760334	LAW	334	
022530	126604	JMS*	(PRINT)	
022531	622757	JMP*	PACBUF	
022532	203055	RUB2 LAC	AXIN	
022533	104210	JMS	CIA	
022534	340030	TAD	PACKST	
022535	750100	SNAICLA		
022536	602527	JMP	RUB4+1	
022537	102547	JMS	RUB3	
022540	103063	JMS	LACKIN	
022541	744000	CLL		
022542	640506	LRS	6	
022543	040045	DAC	ADD	
022544	102547	JMS	RUB3	
022545	777777	-1		
022546	602526	JMP	RUB4	
022547	000000	RUB3 0		
022550	777777	-1		
022551	343055	TAD	AXIN	
022552	043055	DAC	AXIN	
022553	622547	JMP*	RUB3	
		/ SYMBOL TABLE TYPEOUT		
022554	200043	TDUMP LAC	STARTV	
022555	040031	DAC	PTI	
022556	200032	LAC	LASTV	
022557	104210	JMS	CIA	
022560	340031	TAD	PTI	
022561	751200	SNAICLA		
022562	601451	JMP	POPJ	/ END OF LIST
022563	220031	LAC*	PTI	
022564	045465	DAC	OP+1	
022565	206464	LAC	OP	/ SETUP UNPACK PNTRS.
022566	063056	DAC*	AXOUT	
022567	777777	LAW	-1	
022570	040021	DAC	XCT	
022571	102216	JMS	GETC	/ READ AND PRINT
022572	102420	JMS	PRINTC	
022573	102216	JMS	GETC	
022574	102420	JMS	PRINTC	
022575	102216	JMS	GETC	
022576	102420	JMS	PRINTC	
022577	102216	JMS	GETC	
022600	102420	JMS	PRINTC	
022601	440031	ISZ	PTI	
022602	220031	LAC*	PTI	
022603	102355	JMS	PRNT	
022604	102216	JMS	GETC	/ PRINT 1
022605	102420	JMS	PRINTC	
022606	440031	ISZ	PTI	
022607	104071	JMS	EIN	
022610	220031	FOET*	PTI	
022611	502420	AND	PRINTC	
022612	740000	NOP		

022613	760215		LAW	215	
022614	102420		JMS	PRINTC	
022615	777776		LAW	-2	
022616	340052		TAD	QINC	
022617	340031		TAD	PTI	
022620	602555		JMP	TDUMP+1	
022621	105667	FEXP	JMS	EXP	
022622	601747		JMP	EFUN3	
022623	105347	ARTN	JMS	ATN	
022624	601747		JMP	EFUN3	
022625	105570	FLOG	JMS	LOG	
022626	601747		JMP	EFUN3	
022627	105476	FSIN	JMS	SIN	
022630	601747		JMP	EFUN3	
022631	105465	FCOS	JMS	COS	
022632	601747		JMP	EFUN3	
022633	104071	XSQRT	JMS	EIM	
022634	746000		NOP+6000		
022635	740000		NOP		
022636	601747		JMP	EFUN3	
022637	102647	FREG	JMS	FREGR	
022640	042642		DAC	.+2	
022641	104071		JMS	EIM	
022642	747002		747002		
022643	222757		FGET*	PACBUF	
022644	747002		747002		/ MODE 2
022645	740000		NOP		
022646	601747		JMP	EFUN3	
022647	000000	FREGR	0		
022650	104540		JMS	FIXL	
022651	741300		SNAISPA		
022652	102454		JMS	ERROR2	/ # TOO SMALL.
022653	652000		LMO		/ SAVE AC
022654	346654		TAD	(-414)	
022655	740300		SMAISZA		
022656	102454		JMS	ERROR2	/ # TOO LARGE.
022657	641002		LACQ		
022660	546603		SAD	(1)	
022661	751001		SKPICLC		
022662	546626		SAD	(2)	
022663	602671		JMP	FREG1	/ REG 1&2 ARE DATA MODE 3.
022664	744010		RCL		
022665	346655		TAD	(16600)	/ ADR OF DATA REGISTERS.
022666	042757		DAC	PACBUF	
022667	202644		LAC	FREG+5	/ MODE 2
022670	622647		JMP*	FREGR	
022671	346656	FREG1	TAD	(16601)	
022672	042757		DAC	PACBUF	
022673	206657		LAC	(747003)	/ MODE 3
022674	622647		JMP*	FREGR	
022675	102721	PUTDIS	JMS	FDISR	
022676	202717		LAC	FDIS+2	
022677	741000		SKP		
022700	102647	PUTREG	JMS	FREGR	
022701	042710		DAC	.+7	
022702	101774		JMS	PARTST	
022703	220013		LAC*	13	
022704	220013		LAC*	13	

022705	040031		DAC	PTI	
022706	104071		JMS	EIM	
022707	220031		FGET*	PTI	
022710	747002		747002		
022711	062757		FPUT*	PACBUF	
022712	747002		747002		
022713	740000		NOP		
022714	601451		JMP	POPJ	
022715	102721	FDIS	JMS	FDISR	
022716	104071		JMS	EIM	
022717	747001		747001		/ MODE 1
022720	602643		JMP	FREGR-4	
022721	000000	FDISR	0		
022722	104540		JMS	FIXL	
022723	741100		SPA		
022724	102454		JMS	ERROR2	/ # CAN'T BE -.
022725	652000		LMQ		
022726	346660		TAD	(-400)	
022727	740100		SMA		
022730	102454		JMS	ERROR2	/ # TOO LARGE.
022731	641002		LACQ		
022732	366661		TAD*	(DISONE)	/ DISPLAY ADDRESS
022733	042757		DAC	PACBUF	
022734	622721		JMP*	FDISR	
022735	206662	BEGIN	LAC	(MESFOC)	
022736	126663		JMS*	(MESAG)	
022737	203300		LAC	KILL+3	
022740	040076		DAC	START+1	
022741	602137		JMP	ERT	
022742	206664	FOCAL5	LAC	(.+)	/ GIVE DO COMMAND
022743	600131		JMP	GONE	
022744	047715		047715		
022745	206665	FOCALG	LAC	(.+)	
022746	600131		JMP	GONE	
022747	144011		144011		
022750	400217		400217		/ L 1 BOOT
022751	172477		172477		
022752	157715		157715		
022753	061703	MESFOC	061703		/ FOC
022754	011455		011455		/ AL-
022755	220304		220304		/ RCD
022756	000000		G		
022757	000000	PACBUF	0		
022760	200050		LAC	CHAR	
022761	546613		SAD	(377)	
022762	602515		JMP	RUB1	
022763	546642		SAD	(277)	
022764	206666		LAC	(37)	
022765	546651		SAD	(376)	
022766	602777		JMP	PCK1-4	
022767	546612		SAD	(215)	
022770	602773		JMP	.+3	
022771	103003		JMS	PCK1	
022772	622757		JMP*	PACBUF	
022773	760077		LAW	77	
022774	103003		JMS	PCK1	
022775	760015		LAW	15	
022776	602771		JMP	.-5	

022777	760077		LAW	77	
023000	103003		JMS	PCK1	
023001	760076		LAW	76	
023002	602771		JMP	.-11	
023003	000000	PCK1	0		
023004	660506		LRSS	6	
023005	200045		LAC	ADD	
023006	640606		LLS	6	
023007	040045		DAC	ADD	
023010	440046		ISZ	XCTIN	
023011	623003		JMP*	PCK1	
023012	103057		JMS	STAXIN	
023013	140045		DZM	ADD	
023014	777775		LAW	-3	
023015	040046		DAC	XCTIN	
023016	223054		LAC*	PDLXR	/ CHECK FOR OVERFLOW
023017	104210		JMS	CIA	
023020	346620		TAD	(13)	
023021	343055		TAD	AXIN	
023022	754400		SNLICLLICLA		
023023	623003		JMP*	PCK1	
023024	102454		JMS	ERROR2	
023025	606340		JMP	INAN	
023026	000000	DECONV	0		
023027	146463		DZM	INFLG	
023030	203025		LAC	DECONV-1	
023031	046442		DAC	ECHK	/ CAUSE FLT PNT PACKAGE TO EXIT
023032	046445		DAC	PERCHK	/ ON E OR .
023033	104071		JMS	EIM	
023034	140651		DZM	INPUT	/ INPUT #.
023035	740000		NOP		
023036	203043		LAC	+.5	
023037	046442		DAC	ECHK	/ RESTORE FLOATING INPUT.
023040	203044		LAC	+.4	
023041	046445		DAC	PERCHK	
023042	623026		JMP*	DECONV	
023043	606322		JMP	EXPN-1	
023044	606374		JMP	DECI	
023045	000000	SPNOR	0		
023046	200050		LAC	CHAR	
023047	546667		SAD	(240)	
023050	741000		SKP		
023051	623045		JMP*	SPNOR	
023052	102216		JMS	GETC	
023053	603046		JMP	SPNOR+1	
		SUBS=SPNOR			
023054	000013	PDLXR	13		
023055	000000	AXIN	0		/ PSEUDO INDEX REG 10.
023056	000016	AXOUT	16		
023057	000000	STAXIN	0		/ TREAT AXIN AS AN INDEX REG 10.
023060	443055		ISZ	AXIN	
023061	063055		DAC*	AXIN	/ AS IF DAC* 10
023062	623057		JMP*	STAXIN	
023063	000000	LACXIN	0		
023064	443055		ISZ	AXIN	
023065	223055		LAC*	AXIN	/ AS IF LAC* 10
023066	623063		JMP*	LACXIN	
023067	000014	XRT	14		

023070	000012	XRT2	12		
023071	000001	IOSH	1		
023072	020651	IO	INPUT	/	INPUT ROUTINE SW.
023073	000000	TERBUF	0	/	TERM BUFFER INDICATOR
023074	022420	OUTFLT	PRINTC	/	OUT ROUTINE FOR FLOATING POINT.
023075	006752	OUTIO	PRINT	/	OUTPUT ROUTINE SW.
023076	031177	BUFOUT	31177	/	ADR OF OUTBUF FOR DECTAPE
023077	777775	BUFCNT	-3		
023100	023623	INIG	PREAD		
023101	103045	LIBRARY	JMS	SPNOR	
023102	143572		DZM	DECPAP	
023103	101214		JMS	SORTJ	
023104	023106		LIBLST-1		
023105	000013		LIBGO-LIBLST		
023106	102454		JMS	ERROR2	/ INAPROPRIATE COMMAND.
023107	000317	LIBLST	317	/	O
023110	000327		327	/	M
023111	000303		303	/	C
023112	000311		311	/	I
023113	000324		324	/	T
023114	000313		313	/	K
023115	000304		304	/	D
023116	000314		314	/	L
023117	000323		323	/	S
023120	000320		320	/	P
023121	777777		-1		
023122	023134	LIBGO	DECOPN	/	OPEN FILE
023123	023243		DECHT	/	WRITE
023124	023264		DECLOS	/	CLOSE FILE
023125	023423		DECIN	/	INPUT FILE
023126	023275		KILL	/	KILL FILE
023127	023275		KILL		
023130	023347		DECDL	/	DELETE FILE
023131	023360		DECLIB	/	PRINT INDEX
023132	023753		RSEQ	/	READ SEQ.
023133	023771		PSEQ	/	PUNCH SEQ.
023134	143071	DECOPN	DZM	IOSH	/ INDICATE FILE OPEN
023135	103161		JMS	DECGET	
023136	777775		LAW	-3	
023137	043077		DAC	BUFCNT	
023140	603300		JMP	KILL+3	
023141	000000	DECGT1	0		
023142	140045		DZM	ADD	
023143	777775		LAW	-3	/ GET 3 CHAR
023144	043242		DAC	DECNT	
023145	102216		JMS	GETC	
023146	103045		JMS	SPNOR	
023147	744002		STL		/ SET LINK TO INDICATE END
023150	546612		SAD	(215)	
023151	623141		JMP*	DECGT1	
023152	660506		LRSS	6	
023153	200045		LAC	ADD	
023154	640606		LLS	6	
023155	040045		DAC	ADD	
023156	443242		ISZ	DECNT	
023157	603145		JMP	DECGT1+4	
023160	623141		JMP*	DECGT1	
023161	000000	DECGET	0		

023162	103141	JMS	DECGT1	/ READ 3 CHAR
023163	200045	LAC	ADD	
023164	066670	DAC*	(DTRE2)	
023165	050400	DAC	10400	/ 30400
023166	140045	DZM	ADD	
023167	741200	SNA		/ DONE?
023170	623161	JMP*	DECGT	/ YES
023171	740400	SNL		/ C.R?
023172	103141	JMS	DECGT1	/ NO
023173	200045	LAC	ADD	
023174	066671	DAC*	(DTRE1)	/ LOW ORDER
023175	050377	DAC	10377	/ 30377
023176	126672	JMS*	(RDDIR)	/ READ DIRECTORY
023177	740200	SZA		/ BAD READ?
023200	102454	JMS	ERROR4	/ YES
023201	103210	JMS	CHECK	/ RETURN IF ALL OK IN DIR.
023202	226673	LAC*	(BLKNO)	
023203	066674	DAC*	(DECBLK)	/ SETUP BLOCK.
023204	066675	DAC*	(RDBLK)	
023205	206676	LAC	(31177)	
023206	043076	DAC	BUFOUT	
023207	623161	JMP*	DECGT	
023210	000000	CHECK	0	
023211	203071	LAC	IOSH	
023212	740200	SZA		/ OUT OR IN?
023213	603216	JMP	.*3	
023214	126677	JMS*	(ADDDIR)	/ OUT.
023215	741000	SKP		
023216	126700	JMS*	(SEARCH)	/ IN.
023217	226701	LAC*	(DIRFLG)	
023220	740200	SZA		
023221	102454	JMS	ERROR4	
023222	623210	JMP*	CHECK	
023223	000000	DECPRT	0	
023224	652000	LHQ		
023225	777775	LAW	-3	
023226	043161	DAC	DECGT	/ SET TO PRINT 3 CHAR
023227	641606	641606		/ CLA LLS 6
023230	741200	SNA		
023231	603237	JMP	.*6	
023232	346643	TAD	(-40)	
023233	741100	SPA		/ FORM ALPHA: ALPHABETIC CODE.
023234	346637	TAD	(100)	
023235	346667	TAD	(240)	
023236	126604	JMS*	(PRINT)	
023237	443161	ISZ	DECGT	
023240	603227	JMP	.-11	
023241	623223	JMP*	DECPRT	
023242	000000	DECNT	0	
023243	203071	DECHT	LAC	IOSH
023244	740200	SZA		
023245	102454	JMS	ERROR4	/ MUST OPEN FILE FIRST.
023246	102216	JMS	GETC	
023247	777777	LAW	-1	
023250	042443	DAC	TELSW	/ SET TO DECTAPE OUTPUT.
023251	126670	LAC*	(DTRE2)	
023252	740200	SZA		/ PAPER PUNCH?
023253	603256	JMP	.*3	

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023254	206702	LAC	(PUNCH)	/ YES
023255	741000	SKP		
023256	206703	LAC	(DECPUT)	/ OUT ROUTINE.
023257	043075	DAC	OUTIO	
023260	100402	JMS	PUSHJ	
023261	020525	WRITE		
023262	102444	JMS	DZMTEL	
023263	601451	JMP	POPJ	
023264	203071	DECLOS	LAC	IOSH
023265	740200	SZA		
023266	102454	JMS	ERROR4	/ CAN'T CLOSE FILE IF NOT OPEN.
023267	226670	LAC*	(DTRE2)	
023270	751200	SNAICLA		/ PAPER PUNCH?
023271	603275	JMP	KILL	/ YES
023272	443073	ISZ	TERBUF	/ SET CLOSE FLAG
023273	103311	JMS	DECO	
023274	126704	JMS*	(HTDIR)	
023275	143572	KILL	DZM	DECPAP
023276	206603	LAC	(1)	
023277	043071	DAC	IOSH	
023300	102444	JMS	DZMTEL	/ SET TO CLOSED FILE.
023301	103560	JMS	HSRSET	
023302	601451	JMP	POPJ	
023303	000000	DECPUT	0	
023304	741200	SNA		
023305	202401	LAC	INDEV	
023306	740200	SZA		/ DON'T OUTPUT 0.
023307	103311	JMS	DECO	
023310	623303	JMP*	DECPUT	
023311	000000	DECO	0	
023312	506613	AND	(377)	
023313	546705	SAD	(212)	
023314	623311	JMP*	DECO	
023315	552000	LMO		/ SAVE AC
023316	200050	LAC	CHAR	/ SAVE CHAR
023317	043210	DAC	CHECK	
023320	641002	LACQ		
023321	040050	DAC	CHAR	
023322	203645	LAC	PUNCH	
023323	040045	DAC	ADD	
023324	203077	LAC	BUFCNT	
023325	040046	DAC	XCTIN	/ SET UP REG. FOR PCK1.
023326	203076	LAC	BUFOUT	
023327	043055	DAC	AXIN	
023330	102757	JMS	PACBUF	
023331	203210	LAC	CHECK	/ RESTORE CHAR.
023332	040050	DAC	CHAR	
023333	200045	LAC	ADD	
023334	043645	DAC	PUNCH	
023335	200046	LAC	XCTIN	/ SAVE PCK1 REGS.
023336	043077	DAC	BUFCNT	
023337	203055	LAC	AXIN	
023340	043076	DAC	BUFOUT	
023341	546706	SAD	(31577)	/ BUFFER FULL?
023342	603406	JMP	DECO!	/ YES
023343	203073	LAC	TERBUF	
023344	750200	SZAICLA		
023345	603315	JMP	DECO+4	/ ZERO REST OF BUF.

023346	623311		JMP*	DECO	
023347	750001	DECDEL	CLC		
023350	043071		DAC	IOSH	
023351	103161		JMS	DECGET	
023352	226670		LAC*	(DTRE2)	
023353	066707		DAC*	(BCR+2)	
023354	226671		LAC*	(DTRE1)	
023355	066710		DAC*	(BCR+1)	
023356	126711		JMS*	(DELETR)	
023357	603274		JMP	KILL-1	
023360	126672	DECLIB	JMS*	(RDDR)	
023361	212603		LAC	12603	/ # OF ID'S
023362	741200		SNA		
023363	601451		JMP	POPJ	/ INDEX IS CLEAR.
023364	104210		JMS	CIA	
023365	043242		DAC	DECNT	
023366	206712		LAC	(32603)	
023367	043141		DAC	DECGT1	/ LOW ORDER ID
023370	346713		TAD	(200)	
023371	043434		DAC	DECINI	/ HIGH ORDER ID
023372	443141	DECLII	ISZ	DECNT1	
023373	443434		ISZ	DECINI	
023374	223141		LAC*	DECGT1	
023375	741200		SNA		/ SLOT OCCUPIED?
023376	603372		JMP	DECLII	/ NO
023377	103223		JMS	DECPRT	
023400	223434		LAC*	DECINI	
023401	103223		JMS	DECPRT	
023402	126650		JMS*	(CRLF)	
023403	443242		ISZ	DECNT	/ DONE
023404	603372		JMP	DECLII	
023405	601451		JMP	POPJ	/ YES
023406	206714	DECOI	LAC	(31200)	
023407	126715		JMS*	(HTDEC)	/ OUTPUT BUFFER
023410	206676		LAC	(31177)	
023411	043076		DAC	BUFOUT	
023412	203073		LAC	TERBUF	
023413	751200		SNAICLA		/ TERM BUF?
023414	623311		JMP*	DECO	/ NO
023415	143073		DZM	TERBUF	
023416	211577		LAC	11577	/ 31577
023417	751200		SNAICLA		
023420	623311		JMP*	DECO	/ ALREADY TERMINATED.
023421	151200		DZM	11200	
023422	603406		JMP	DECOI	
023423	750001	DECIN	CLC		
023424	043071		DAC	IOSH	/ INDICATE INPUT
023425	103161		JMS	DECGET	
023426	200074		LAC	ENDT	/ ERASE PREVIOUS PROG.
023427	040043		DAC	BUFR	
023430	160070		DZM*	CFRS	
023431	040032		DAC	LASTV	
023432	103434		JMS	DECINI	
023433	600075		JMP	START	
023434	000000	DECINI	0		
023435	226670		LAC*	(DTRE2)	
023436	740200		SZA		
023437	603442		JMP	.+3	

023440	206716		LAC	(PREAD)	
023441	603450		JMP	.+7	
023442	206676		LAC	(31177)	
023443	043161		DAC	DECGET	/ BUF ADR.
023444	346603		TAD	(1)	
023445	126717		JMS*	(RTAPE)	
023446	466675		ISZ*	(ROBLK)	
023447	206720		LAC	(DECIN2)	
023450	043100		DAC	INIO	/ SETUP INPUT ROUTINE.
023451	206603		LAC	(1)	
023452	042443		DAC	TELSW	
023453	623434		JMP*	DECINI	
023454	000000	DECIN2	0		
023455	203071		LAC	IOSW	/ SET UP TO USE GETC
023456	040021		DAC	XCT	
023457	203161		LAC	DECGET	
023460	063056		DAC*	AXOUT	
023461	203210		LAC	CHECK	
023462	040022		DAC	GTEM	
023463	440027		ISZ	DEBGSW	
023464	102216		JMS	GETC	
023465	140027		DZM	DEBGSW	
023466	200022		LAC	GTEM	
023467	043210		DAC	CHECK	
023470	200021		LAC	XCT	
023471	043071		DAC	IOSW	
023472	223056		LAC*	AXOUT	
023473	043161		DAC	DECGET	
023474	546706		SAD	(31577)	/ END OF BUFFER?
023475	741000		SKP		
023476	603504		JMP	DECIN3	
023477	202443		LAC	TELSW	
023500	043560		DAC	HSRSET	/ SAVE TELS
023501	103434		JMS	DECINI	
023502	203560		LAC	HSRSET	
023503	042443		DAC	TELSW	/ RESET TELS
023504	200050	DECIN3	LAC	CHAR	
023505	546721		SAD	(300)	/ END OF CHARS?
023506	741000		SKP		
023507	623454		JMP*	DECIN2	
023510	140050		DZM	CHAR	
023511	102444		JMS	DZMTEL	/ YES
023512	206603		LAC	(1)	
023513	043071		DAC	IOSW	
023514	103560		JMS	HSRSET	
023515	600075		JMP	START	
023516	203537	HSPX	LAC	HSPXSW	/ MULTI-USES OF * FLIP-FLOP THE SW.
023517	740001		CHA		
023520	043537		DAC	HSPXSW	
023521	741200		SNA		
023522	603532		JMP	.+10	
023523	203572		LAC	DECPAP	
023524	741200		SNA		
023525	603530		JMP	.+3	
023526	206720		LAC	(DECIN2)	
023527	741000		SKP		
023530	206716		LAC	(PREAD)	
023531	741000		SKP		

023532	206722		LAC	(READC)
023533	043571		DAC	INFLT
023534	143540		DZM	LDRFG
023535	600502		JMP	PROC
023536	000000	HSOSH	0	
023537	000000	HSPXSW	0	/ 0 TEL; -1 PAPER OR DEC.
023540	000000	LDRFG	0	
023541	203536	HSOUT	LAC	HSOSH / MULTI-USES OF : FLIP-FLOP THE SW.
023542	740001		CMA	
023543	043536		DAC	HSOSH
023544	741200		SNA	
023545	603555		JMP	.+10
023546	203572		LAC	DECPAP
023547	741200		SNA	
023550	603553		JMP	.+3
023551	206703		LAC	(DECPUT)
023552	741000		SKP	
023553	206702		LAC	(PUNCH)
023554	741000		SKP	
023555	206723		LAC	(PRINTC)
023556	043074		DAC	OUTFLT
023557	600502		JMP	PROC
023560	000000	HSRSET	0	
023561	206723		LAC	(PRINTC)
023562	043074		DAC	OUTFLT
023563	206722		LAC	(READC)
023564	043571		DAC	INFLT
023565	143536		DZM	HSOSH
023566	143537		DZM	HSPXSW
023567	143540		DZM	LDRFG
023570	623560		JMP*	HSRSET
023571	022100	INFLT	READC	
023572	000000	DECPAP	0	
023573	750001	DATA	CLC	
023574	043572		DAC	DECPAP / SET TO INDICATE
023575	103045		JMS	SPNOR
023576	101214		JMS	SORTJ
023577	023106		LIBLST-1	
023600	000473		LIBDAT-LIBLST	
023601	102454		JMS	ERROR2
023602	023615	LIBDAT	DATAOP	/ OPEN FILE
023603	022451		ERROR5	/ ILLEGAL
023604	023264		DECLOS	/ CLOSE FILE
023605	023610		DATAIN	/ INPUT DATA
023606	023275		KILL	/ STOP DATA FLOW
023607	023275		KILL	/ STOP
023610	750001	DATAIN	CLC	
023611	043071		DAC	IOSW
023612	103161		JMS	DECGET / GET NAME
023613	103434		JMS	DECINI / READ FIRST BLOCK.
023614	603300		JMP	KILL+3
023615	143071	DATAOP	DZM	IOSW
023616	103161		JMS	DECGET
023617	226670		LAC*	(DTRE2)
023620	741200		SNA	
023621	102454		JMS	ERROR4 / NO NAME
023622	603136		JMP	DECOPN+2
023623	000000	PREAD	0	

023624	206724	LAC	(PREAD+5)	
023625	066725	DAC*	(RPAPER)	
023626	700104	RSA		
023627	626726	JMP*	(RET)	
023630	741200	SNA		/ BLANK TAPE?
023631	603636	JMP	PREAD1	/ YES
023632	043540	DAC	LDRFG	
023633	040050	DAC	CHAR	
023634	200050	LAC	CHAR	
023635	623623	JMP*	PREAD	
023636	203540	LAC	LDRFG	
023637	741200	SNA		/ LEADER OR TRAILER?
023640	603624	JMP	PREAD+1	/ LEADER.
023641	102444	JMS	DZMTEL	
023642	!03560	JMS	HSRSET	
023643	140050	DZM	CHAR	
023644	603634	JMP	PREAD1-2	
023645	000000	PUNCH	0	
023646	741200	SNA		
023647	202401	LAC	INDEV	
023650	546705	SAD	(212)	/ DON'T PUNCH LINE FEED.
023651	741000	SKP		
023652	126727	JMS*	(PUNSH)	
023653	623645	JMP*	PUNCH	
023654	202443	LT	LAC	TELSH
023655	140027		DZM	DEBGSW
023656	740100	SNA		/ PUNCH?
023657	601451	JMP	POPJ	/ NO
023660	760215	LAW	215	/ CR
023661	102420	JMS	PRINTC	
023662	601451	JMP	POPJ	
023663	000000	BINARY	0	
023664	204060	LAC	BINI	
023665	741100	SPA		/ NEED NEW LINE?
023666	603715	JMP	BINL1	/ NO
023667	444060	ISZ	BINI	
023670	346730	TAD	(BIN2+1)	
023671	044061	DAC	BIN2	
023672	224061	LAC*	BIN2	
023673	040050	DAC	CHAR	
023674	740100	SNA		
023675	623663	JMP*	BINARY	
023676	044060	DAC	BINI	
023677	204065	LAC	BIN2+4	
023700	546731	SAD	(271)	
023701	206732	LAC	(255)	
023702	346632	TAD	(4)	
023703	044065	DAC	BIN2+4	
023704	546733	SAD	(261)	
023705	444064	ISZ	BIN2+3	
023706	204064	LAC	BIN2+3	
023707	546734	SAD	(272)	
023710	741000	SKP		
023711	603715	JMP	BINL1	
023712	206733	LAC	(261)	
023713	044064	DAC	BIN2+3	
023714	444062	ISZ	BIN2+1	
023715	204061	BINL1	LAC	BIN2

023716	444060		ISZ	BIN1	/ MORE INPUT?
023717	603723		JMP	.+4	
023720	777775	BINY	LAW	-3	/ YES
023721	044060		DAC	BIN1	
023722	126725		JMS*	(RPAPER)	
023723	741200		SNA		/ END?
023724	603744		JMP	BINY2	/ YES
023725	044070		DAC	BIN3	
023726	633606		653606		/ LMQ LLS+6
023727	346643		TAD	(-40)	
023730	741100		SPA		
023731	346637		TAD	(100)	
023732	346667		TAD	(240)	
023733	546721		SAD	(300)	/ CR?
023734	603747		JMP	BINY1	
023735	546735		SAD	(276)	/ ALTMODE?
023736	346637		TAD	(100)	
023737	040050		DAC	CHAR	
023740	641002		LACQ		
023741	044061		DAC	BIN2	
023742	200050		LAC	CHAR	
023743	623663		JMP*	BINARY	
023744	204070	BINY2	LAC	BIN3	
023745	741200		SNA		/ ALREADY HAVE CR?
023746	603720		JMP	BINY	/ YES
023747	144070	BINY1	DZM	BIN3	
023750	144060		DZM	BIN1	
023751	206612		LAC	(215)	
023752	603737		JMP	BINY2-5	
023753	200074	RSEQ	LAC	ENDT	
023754	040043		DAC	BUFR	
023755	160070		DZM*	CFRS	
023756	040032		DAC	LASTV	
023757	206736		LAC	(BINARY)	
023760	043100		DAC	INIO	
023761	206603		LAC	(1)	
023762	042443		DAC	TELSW	
023763	144060		DZM	BIN1	
023764	206733		LAC	(261)	
023765	044064		DAC	BIN2+3	
023766	044065		DAC	BIN2+4	
023767	044062		DAC	BIN2+1	
023770	600075		JMP	START	
023771	142337	PSEQ	DZM	PRNTLN	
023772	777775		LAW	-3	
023773	043663		DAC	BINARY	
023774	102216		JMS	GETC	
023775	777777		LAW	-1	
023776	042443		DAC	TELSW	
023777	206737		LAC	(BINOUT)	
024000	603257		JMP	DECLOS-5	
024001	000000	BINOUT	0		
024002	044060		DAC	BIN1	
024003	202337		LAC	PRNTLN	
024004	044061		DAC	BIN2	
024005	142337		DZM	PRNTLN	
024006	750200		SZAICLA		
024007	624061		JMP*	BIN2	/ DON'T OUTPUT LINE #.

024010	200051		LAC	LINENO	
024011	741200		SNA		/ DON'T PUNCH LINE 0.
024012	624001		JMP*	BINOUT	
024013	204060		LAC	BIN1	
024014	741200		SNA		
024015	202401		LAC	INDEV	
024016	546705		SAD	(212)	/ DON'T OUTPUT LINEFEED.
024017	624001		JMP*	BINOUT	
024020	546612		SAD	(215)	
024021	604034		JMP	BIN01	
024022	640506		LRS	6	
024023	204070		LAC	BIN3	
024024	640606		LLS	6	
024025	044070		DAC	BIN3	
024026	443663		ISZ	BINARY	
024027	624001		JMP*	BINOUT	
024030	126740		JMS*	(PUNBIN)	
024031	777775		LAW	-3	
024032	043663		DAC	BINARY	
024033	624001		JMP*	BINOUT	
024034	777775	BIN01	LAW	-3	
024035	543663		SAD	BINARY	
024036	604044		JMP	.+6	
024037	204070		LAC	BIN3	
024040	650606		650606		/ CLQ LLS+6
024041	443663		ISZ	BINARY	
024042	604040		JMP	.-2	
024043	126740		JMS*	(PUNBIN)	
024044	204070		LAC	BIN3	
024045	751200		SNAICLA		
024046	604031		JMP	BIN01-3	/ DON'T GIVE TWO CR IN A ROW.
024047	144070		DZM	BIN3	
024050	126740		JMS*	(PUNBIN)	
024051	777740		LAW	-40	
024052	043663		DAC	BINARY	
024053	750000		CLA		
024054	126727		JMS*	(PUNSH)	/ PUNCH LEADE
024055	443663		ISZ	BINARY	
024056	604053		JMP	.-3	
024057	604031		JMP	BIN01-3	
024060	000000	BIN1	0		
024061	000000	BIN2	0		
024062	000261		261		
024063	000256		256		
024064	000261		261		
024065	000261		261		
024066	000240		240		
024067	777777		-1		
024070	000000	BIN3	0		
		FGET=	200000		
		FPUT=	040000		
		FSUM=	300000		
		FMIN=	340000		
		FMAX=	400000		
		FQVD=	440000		

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          .TITLE   FPP9E
          /
          / INTERPRETER FOR PDP-9 OR
          / FOR PDP-15 IN BANK MODE
024071    740040    EIM    HLT
024072    224071    LAC*    EIM    / START INTERPRETIVE MODE.
024073    544541    SAD      FIXL+1 / GET NEXT INSTRUCTION.
024074    624071    JMP*    EIM    / LEAVE INTERPRETER IF NOP.
024075    653605
024076    744020    RCR      / OP-CODE TO AC AND
024077    546741    SAD      (17) / INDIRECT BIT TO LINK.
024100    604134    JMP      FOPR  / OPERATE CLASS
024101    344114    TAD      +13  / TESTED SEPARATELY.
024102    044111    DAC      +7   / SET UP BRANCH
024103    641505    LAC      EIM  / TO FUNCTION.
024104    204071    AND      (60000) / 13 BIT ADDRESS TO HQ.
024105    506742    640002   / COMBINE WITH BANK BITS.
024106    640002
024107    044205    DAC      ADR
024110    744400    HLT
024111    740040    LAC*    ADR    / INDIRECT ADDRESS IF REQUIRED
024112    224205    JMP      -4    / AND GO TO EXECUTE FUNCTION.
024113    604107

          / FLOATING POINT ARITHMETIC
          / DATA FORMATS:
          /   3 THREE WORD FLOATING
          /   2 TWO WORD FLOATING
          /   1 ONE WORD SIGNED INTEGER
          /   0 ONE WORD DATA
          / INTERPRETIVE INSTRUCTIONS:
          / JMS      EIM    / ENTER INTERPRETER
          / NOP
          / DAC      X      / LEAVE INTERPRETER
          / LAC      X      / STORE FAC IN X
          / LAW      N      / LOAD FAC FROM X
          / OZH      R      / IMMEDIATE LOAD N TO FAC
          / AND      R      / INPUT TO FAC USING R
          / EAE      XXYY   / OUTPUT FROM FAC USING R
          / IOT      N      / SET OUTPUT FORMAT
          / CAL      L      / START N-FOLD LOOP
          / IOT      0      / INCREMENT L BY DATA MODE
          / ADD      X      / LOOP END INDICATOR
          / TAD      X      / ADD X TO FAC
          / XCT      X      / SUBTRACT . FROM FAC
          / ISZ      X      / MULTIPLY FAC BY X
          / XOR      X      / DIVIDE FAC BY X
          / JMS      L      / DIVIDE X BY FAC TO FAC
          / JMP      L      / JMS TO L, FLOATING MODE
          / SAD      X      / TRANSFER CONTROL TO L
          / OPR      0      / COMPARE AND BRANCH
          / OPR      1000   / LEAVE INTERPRETER
          / OPR      2000   / SQUARE OF FAC
          / OPR      3000   / SET FAC SIGN POSITIVE
          / OPR      4000   / CHANGE SIGN OF FAC
          / OPR      5000   / SET MAGNITUDE TO ONE
          / OPR      6000   / COMPARE IMMEDIATE, BRANCH
          / OPR      700N  / SQUARE ROOT OF FAC
          / OPR      10000 / SET DATA MODE TO N
          / OPR      10000 / SET FAC TO ZERO

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/          OPR      11NNN      / IMMEDIATE MULTIPLY      83
/          OPR      12NNN      / IMMEDIATE ADD          84
/          OPR      13NNN      / IMMEDIATE DIVIDE      85
/  INDIRECT ADDRESSING MAY BE USED WITH      86
/  LAC, DAC, ADD, TAD, XCT, ISZ.              87
/  XOR, JMS, JMP, SAD, CAL, IOT.             88
/                                              89
024114      604115      JMP          .+1          90
024115      604514      JMP          FINQ        / CAL = INCREMENT.      91
024116      604450      JMP          FDAC        / DAC = DEPOSIT FAC.   92
024117      604311      JMP          FJMS        / JMS = JMS.           93
024120      606293      JMP          FINP        / LAC = LOAD FAC.      94
024121      604353      JMP          FLAC        / XOR = INVERT DIVIDE. 95
024122      605205      JMP          RDIV        / ADD = FLOATING ADD.  96
024123      604774      JMP          FADD        / TAD = SUBTRACT.      97
024124      604767      JMP          FSUB        / XCT = MULTIPLY.      98
024125      605117      JMP          FMPY        / ISZ = DIVIDE.        99
024126      605212      JMP          FDIV        100
024127      605756      JMP          FOUT        101
024130      604403      JMP          FCAS        / SAD = THREE-WAY COMPARE. 102
024131      604330      JMP          SRTN        / JMP = JMP.           103
024132      605736      JMP          FMT         104
024133      604555      JMP          FINX        / IOT = LOOP CONTROL.  105
024134      745400      FOPR        745400      / OPERATE CLASS DECODE. 106
024135      604321      JMP          FLOD        / LAW IS IMMEDIATE LOAD. 107
024136      641604      JMP          641604      108
024137      344142      TAD          .+3        109
024140      044141      DAC          .+1        110
024141      740040      HLT         111
024142      624142      JMP*        112
024143      025266      SQAX        / 1000 SQUARE FAC.     113
024144      024161      FZAC+3      / 2000 ABSOLUTE VALUE. 114
024145      024163      FZAC+5      / 3000 CHANGE SIGN.    115
024146      024365      FSGN        / 4000 UNIT MAGNITUDE. 116
024147      024373      FCZ         / 5000 BRANCH ON ZERO. 117
024150      025276      SQRX        / 6000 SQUARE ROOT.   118
024151      024167      FSDM        / 7000 DATA MODE.     119
024152      024156      FZAC        / 10000 CLEAR FAC.     120
024153      024727      MPIR        / 11000 IMMEDIATE MULTIPLY. 121
024154      024723      ADIR        / 12000 IMMEDIATE ADD.  122
024155      024725      DVIR        / 13000 IMMEDIATE DIVIDE. 123
024156      144200      FZAC        / ZERO TO FAC.         124
024157      144177      DZM         AC+3        125
024160      144176      DZM         AC+2        126
024161      144175      DZM         AC+1        127
024162      605264      JMP          AC          / SET SIGN PLUS.       128
024163      206603      LAC         BAK         / CHANGE SIGN.         129
024164      244175      XOR         AC          130
024165      044175      DAC         AC          131
024166      605264      JMP          BAK        132
024167      641611      FSDM        641611      / SET DATA MODE.     133
024170      044206      DAC         DM          134
024171      745202      GLK        745202      135
024172      750010      DAC         DM+1       136
024173      044207      JMP          BAK        137
024174      605264      JMP          BAK        138
/
024175      AC          .@LOCK 4          / FLOATING ACCUMULATOR. 139

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024201		BC	.BLOCK	4	/ OPERAND OR 'MO'.	
024205	000000	ADR	0		/ OPERAND ADDRESS.	141
024206	000002	DM	2		/ DATA MODE INDICATOR.	142
024207	000002		2			
024210	740040	CIA	HLT		/ TWO'S COMPLEMENT AC.	
024211	744001		744001			145
024212	346603		TAD	(1)		146
024213	624210		JMP*	CIA		147
024214	740040	ACZ	HLT		/ TEST FAC FOR ZERO.	148
024215	204177		LAC	AC+2		149
024216	304200		ADD	AC+3		150
024217	744200		744200		/ RETURN TO LOC+1 IF	151
024220	604224		JMP	.+4	/ ZERO, TO LOC+2 IF	152
024221	144176		DZM	AC+1	/ NOT ZERO.	153
024222	144175		DZM	AC		154
024223	624214		JMP*	ACZ		155
024224	444214		ISZ	ACZ		156
024225	624214		JMP*	ACZ		157
024226	740040	BCZ	HLT		/ TEST OPERAND ZERO.	158
024227	204203		LAC	BC+2		159
024230	304204		ADD	BC+3		160
024231	744200		744200			161
024232	444226		ISZ	BCZ		162
024233	624226		JMP*	BCZ		163
024234	740040	SGN	HLT		/ COMPARE SIGNS OF	164
024235	204175		LAC	AC	/ FAC AND OPERAND.	165
024236	244201		XOR	BC		166
024237	624234		JMP*	SGN		167
024240	740040	XAB	HLT		/ EXCHANGE OPERAND AND	168
024241	204175		LAC	AC	/ FLOATING ACCUMULATOR.	169
024242	740020		RAR			170
024243	204201		LAC	BC		171
024244	044175		DAC	AC		172
024245	750010		GLK			173
024246	044201		DAC	BC		174
024247	204176		LAC	AC+1		175
024250	652000		652000			176
024251	204202		LAC	BC+1		177
024252	044176		DAC	AC+1		178
024253	641002		641002			179
024254	044202		DAC	BC+1		180
024255	204177		LAC	AC+2		181
024256	652000		652000			182
024257	204203		LAC	BC+2		183
024260	044177		DAC	AC+2		184
024261	641002		641002			185
024262	044203		DAC	BC+2		186
024263	204200		LAC	AC+3		187
024264	652000		652000			188
024265	204204		LAC	BC+3		189
024266	044200		DAC	AC+3		190
024267	641002		641002			191
024270	044204		DAC	BC+3		192
024271	624240		JMP*	XAB		193
024272	740040	SVMD	HLT		/ SAVE DATA MODE.	194
024273	740000		NOP		/ THEN SET TO THREE.	195
024274	204206		LAC	DM		196
024275	044302		DAC	.+5		197
						198

024276	206630		LAC	(3)		199
024277	044206		DAC	DM		200
024300	204272		LAC	SVMD		201
024301	604330		JMP	SRTN	/ LEAVE IN INTERPRETIVE MODE.	202
024302	740040		HLT			203
024303	740040	RSMD	HLT		/ RESTORE USER DATA	204
024304	740000		NOP		/ MODE AND LEAVE	205
024305	204302		LAC	.-3	/ INTERPRETER.	206
024306	044206		DAC	DM		207
024307	624303		JMP*	RSMD		208
024310	024071		EIM			209
024311	544310	FJMS	SAD	.-1	/ FLOATING MODE JMS.	210
024312	605264		JMP	BAK		211
024313	204071		LAC	EIM	/ JMS EIM AND JMS* (EIM) ARE	212
024314	346603		TAD	(1)	/ NO-OPS IN FLOATING MODE.	213
024315	064205		DAC*	ADR		214
024316	204205		LAC	ADR		215
024317	346603		TAD	(1)		216
024320	604330		JMP	SRTN		217
024321	641002	FLOD	641002		/ IMMEDIATE LOAD 13-BIT	218
024322	660505		660505		/ SIGNED INTEGER TO FAC.	219
024323	104332		JMS	FLOQ		220
024324	605264		JMP	BAK		221
024325	740040	FLOAT	HLT		/ FLOAT AN 18-BIT SIGNED	222
024326	104332		JMS	FLOQ	/ TWO'S COMPLEMENT INTEGER	223
024327	204325		LAC	FLOAT	/ TO FAC AND ENTER	224
024330	044071	SRTN	DAC	EIM	/ INTERPRETIVE MODE.	225
024331	604072		JMP	EIM+1		226
024332	740040	FLOQ	HLT		/ UTILITY ROUTINE FOR	227
024333	664000		664000		/ FLOATING A SIGNED	228
024334	652000		652000		/ INTEGER TO FAC.	229
024335	750010		GLK			230
024336	044175		DAC	AC		231
024337	641002		641002			232
024340	344175		TAD	AC		233
024341	650422		650422			234
024342	044177		DAC	AC+2		235
024343	741200		SNA			236
024344	604350		JMP	+.4		237
024345	777700		-100			238
024346	640001		640001			239
024347	740001		CMA			240
024350	044176		DAC	AC+1		241
024351	144200		DZH	AC+3		242
024352	624332		JMP*	FLOQ		243
024353	104572	FLAC	JMS	GET	/ FLOATING LOAD FAC	244
024354	204201		LAC	BC	/ FROM MEMORY, ...	245
024355	044175		DAC	AC	/ OPERAND THEN MOVE	246
024356	204202		LAC	BC+1	/ TO FAC.	247
024357	044176		DAC	AC+1		248
024360	204203		LAC	BC+2		249
024361	044177		DAC	AC+2		250
024362	204204		LAC	BC+3		251
024363	044200		DAC	AC+3		252
024364	605264		JMP	BAK		253
024365	206603	FSGN	LAC	(1)	/ SET FAC MAGNITUDE	254
024366	044176		DAC	AC+1	/ TO ONE, LEAVE	255
024367	660720		660720		/ SIGN UNCHANGED.	256

024370	044177		DAC	AC+2		
024371	144200		DZM	AC+3		257
024372	605264		JMP	BAK		258
024373	104716	FCZ	JMS	IMOP	/ THREE-WAY COMPARE	259
024374	604404		JMP	FCAS+1	/ IMMEDIATE OPERAND.	260
024375	204175		LAC	AC		261
024376	740200		SZA			262
024377	605264		JMP	BAK		263
024400	444071		ISZ	EIM		264
024401	444071		ISZ	EIM		265
024402	605264		JMP	BAK		266
024403	104572	FCAS	JMS	GET	/ THREE-WAY COMPARE FAC	267
024404	104214		JMS	ACZ	/ TO OPERAND, GO TO	268
024405	604424		JMP	.+17	/ LOC+1 IF FAC LESS.	269
024406	104226		JMS	BCZ	/ LOC+2 IF EQUAL.	270
024407	604375		JMP	FCZ+2	/ LOC+3 IF GREATER.	271
024410	104234		JMS	SGN		272
024411	740200		SZA			273
024412	604375		JMP	FCZ+2		274
024413	104427		JMS	CASQ		275
024414	741200		SNA			276
024415	604401		JMP	FCAS-2		277
024416	740100		SMA			278
024417	604375		JMP	FCZ+2		279
024420	204201		LAC	BC		280
024421	740200		SZA			281
024422	604400		JMP	FCAS-3		282
024423	605264		JMP	BAK		283
024424	104226		JMS	BCZ		284
024425	604401		JMP	FCAS-2		285
024426	604420		JMP	.-6		286
024427	740040	CASQ	HLT			287
024430	204202		LAC	BC+1	/ COMPARE MAGNITUDES OF	288
024431	104210		JMS	CIA	/ FAC AND OPERAND.	289
024432	344176		TAD	AC+1	/ RETURN NEGATIVE IF	290
024433	740200		SZA		/ FAC LESS, ZERO IF	291
024434	624427		JMP*	CASQ	/ EQUAL, POSITIVE NON-ZERO	292
024435	204203		LAC	BC+2	/ IF FAC GREATER.	293
024436	104210		JMS	CIA		294
024437	344177		TAD	AC+2		295
024440	740200		SZA			296
024441	624427		JMP*	CASQ		297
024442	204204		LAC	BC+3		298
024443	104210		JMS	CIA		299
024444	344200		TAD	AC+3		300
024445	740202		740202			301
024446	740020		RAR			302
024447	624427		JMP*	CASQ		303
024450	204175	FDAC	LAC	AC	/ DEPOSIT FLOATING	304
024451	744020		RCR		/ ACCUMULATOR TO MEMORY.	305
024452	750020		750020			306
024453	244177		XOR	AC+2	/ MOVE HIGH MANTISSA	307
024454	652000		652000		/ AND SIGN TO MQ, THEN	308
024455	204206		LAC	DM	/ TEST DATA MODE.	309
024456	744020		RCR			310
024457	741200		SNA		/ DATA MODE 2 OR 3 ?	311
024450	604501		JMP	.-21	/ NO, MUST BE 1 OR 0.	312
024461	204200		LAC	AC+3	/ YES.	313
						314

024462	741400		SZL		/ DATA MODE 2 ?	315
024463	604471		JMP	.+6	/ NO.	316
024464	506743		AND	(777000)	/ YES, PACK LOW MANTISSA	317
024465	044204		DAC	BC+3	/ AND EXPONENT INTO	318
024466	204176		LAC	AC+1	/ ONE WORD.	319
024467	506744		AND	(777)		320
024470	244204		XOR	BC+3		321
024471	064205		DAC*	ADR	/ DEPOSIT FIRST WORD.	322
024472	641002		641002		/ SECOND WORD IN MQ.	323
024473	444205		ISZ	ADR		324
024474	064205		DAC*	ADR	/ DEPOSIT SECOND WORD.	325
024475	744400		744400		/ DATA MODE 3 ?	326
024476	605264		JMP	BAK	/ NO, RETURN.	327
024477	204176		LAC	AC+1	/ YES, SET-UP TO	328
024500	604473		JMP	.-5	/ STORE EXPONENT.	329
024501	741400		SZL		/ MODE ZERO OR ONE.	330
024502	604511		JMP	.+7		331
024503	204175		LAC	AC	/ MODE ZERO, IF FAC	332
024504	750200		750200		/ NEGATIVE, STORE ZERO.	333
024505	604512		JMP	.+5		334
024506	104517		JMS	FXQ	/ CONVERT TO ROUNDED	335
024507	346603		TAD	(1)	/ 18-BIT INTEGER.	336
024510	741020		741020			337
024511	104540		JMS	FIXL	/ MODE ONE, CONVERT	338
024512	064205		DAC*	ADR	/ TO SIGNED INTEGER.	339
024513	605264		JMP	BAK		340
024514	224205	FINQ	LAC*	ADR	/ ADD CURRENT DATA MODE	341
024515	344207		TAD	DM+1	/ TO SPECIFIED LOCATION.	342
024516	604512		JMP	.-4		343
024517	740040	FXQ	HLT		/ ROUTINE TO CONVERT	344
024520	204176		LAC	AC+1	/ FAC TO AN INTEGER.	345
024521	744101		744101			346
024522	604525		JMP	.+3	/ LEAVES 18 BIT	347
024523	651000		651000		/ UNSIGNED INTEGER	348
024524	624517		JMP*	FXQ	/ IN L, AC-0 TO AC-16.	349
024525	346745		TAD	(43)	/ AC-17 CONTAINS THE	350
024526	506617		AND	(77)	/ MOST SIGNIFICANT	351
024527	246746		XOR	(660500)	/ FRACTION BIT.	352
024530	044534		DAC	.+4		353
024531	204200		LAC	AC+3		354
024532	652000		652000			355
024533	204177		LAC	AC+2		356
024534	740040		HLT			357
024535	740020		RAR			358
024536	641002		641002			359
024537	624517		JMP*	FXQ		360
024540	740040	FIXL	HLT		/ FLOATING MODE	361
024541	740000		NOP		/ FUNCTION TO	362
024542	104517		JMS	FXQ	/ TRANSLATE FAC TO	363
024543	346603		TAD	(1)	/ SIGNED INTEGER AND	364
024544	744020		RCL		/ RETURN IN NORMAL MODE.	365
024545	744010		RCL			366
024546	244175		XOR	AC	/ MAY BE CALLED FROM	367
024547	740020		RAR		/ NORMAL MODE.	368
024550	741400		SZL			369
024551	104210		JMS	CIA		370
024552	624540		JMP*	FIXL		371
024553			.BLOCK	2		372

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024555	740201	FINX	740201	/ LOOP CONTROL.	373
024556	604564		JMP	.+6 / IF ZERO OPERAND.	374
024557	444553		ISZ	FINX-2 / INCREMENT LOOP COUNTER.	375
024560	741000		SKP	/ CONTINUE LOOP OR LEAVE.	376
024561	605264		JMP	BAK	377
024562	204554		LAC	FINX-1 / SAVE LOOP START LOCATION	378
024563	604330		JMP	SRTN / AND SET LOOP COUNTER.	379
024564	346603		TAD	(1)	380
024565	044553		DAC	FINX-2	381
024566	444071		ISZ	EIM	382
024567	204071		LAC	EIM	383
024570	044554		DAC	FINX-1	384
024571	604072		JMP	EIM+1	385
024572	740040	GET	HLT	/ OPERAND FETCH.	386
024573	204206		LAC	DM / TEST DATA MODE FOR	387
024574	744020		RCR	/ FLOATING OR INTEGER.	388
024575	740200		SZA		389
024576	604616		JMP	.+20 / FLOATING.	390
024577	224205		LAC*	ADR / INTEGER, GET ONE WORD.	391
024600	740600		740600	/ TEST MODE FOR 0 OR 1.	392
024601	604604		JMP	.+3	393
024602	104675		JMS	BL50 / MODE 1, USE SIGNED INTEGER	394
024603	624572		JMP*	GET / LOAD ROUTINE.	395
024604	740100		SMA	/ IF MODE 0 AND POSITIVE.	396
024605	604602		JMP	.-3 / USE SIGNED LOAD ROUTINE.	397
024606	744020		RCR	/ IF 'NEGATIVE', THEN	398
024607	044203		DAC	BC+2 / NORMALIZED DATA LOAD	399
024610	750020		750020	/ IS DEFINED EXACTLY.	400
024611	044204		DAC	BC+3	401
024612	206747		LAC	(22)	402
024613	044202		DAC	BC+1	403
024614	144201		DZM	BC	404
024615	624572		JMP*	GET	405
024616	224205		LAC*	ADR / FLOATING FORMAT, 2 OR 3.	406
024617	652000		652000	/ PUT FIRST WORD IN MQ.	407
024620	444205		ISZ	ADR	408
024621	224205		LAC*	ADR / GET SECOND WORD.	409
024622	660000		660000	/ SAVE SIGN IN LINK.	410
024623	506750		AND	(377777) / MASK OFF SIGN AND	411
024624	044203		DAC	BC+2 / PUT IN HIGH MANTISSA.	412
024625	750010		GLK		413
024626	044201		DAC	BC	414
024627	204206		LAC	DM	415
024630	744020		RCR		416
024631	641002		641002		417
024632	740400		SNL		418
024633	506743		AND	(777000)	419
024634	044204		DAC	BC+3 / IF MODE 2, DECOMPOSE	420
024635	740400		SNL	/ FIRST WORD TO LOW	421
024636	604642		JMP	.+4 / MANTISSA AND EXPONENT.	422
024637	444205		ISZ	ADR / IF MODE 3, GET THIRD	423
024640	224205		LAC*	ADR / WORD FOR EXPONENT.	424
024641	604644		JMP	.+3	425
024642	640633		640633		426
024643	660511		660511		427
024644	044202		DAC	BC+1 / NORMALIZE FLOATING	428
024645	204203		LAC	BC+2 / OPERAND REGISTER.	429
024646	744010		RCL	/ IF BIT ONE IS SET.	430

024647	741100		SPA		/ THEN ALREADY NORMAL.	431
024650	624572		JMP*	GET		432
024651	304204		ADD	BC+3	/ IF MANTISSA IS ZERO.	433
024652	740200		SZA		/ THEN CLEAR EXPONENT	434
024653	604657		JMP	.+4	/ AND SIGN FOR	435
024654	144201		DZM	BC	/ NORMAL ZERO.	436
024655	144202		DZM	BC+1		437
024656	624572		JMP*	GET		438
024657	204204		LAC	BC+3	/ OTHERWISE, SHIFT LEFT	439
024660	652000		852000		/ UNTIL NORMALIZED	440
024661	204203		LAC	BC+2	/ AND ADJUST EXPONENT.	441
024662	660444		660444			442
024663	044203		DAC	BC+2		443
024664	641002		641002			444
024665	044204		DAC	BC+3		445
024666	777700		-100			446
024667	640001		640001			447
024670	346745		TAD	(43)		448
024671	740001		CMA			449
024672	344202		TAD	BC+1		450
024673	044202		DAC	BC+1		451
024674	624572		JMP*	GET		452
024675	740040	BLSO	HLT		/ LOAD SIGNED INTEGER	453
024676	664000		664000		/ OPERAND TO FLOATING	454
024677	652000		652000		/ OPERAND REGISTER.	455
024700	750010		GLK			456
024701	044201		DAC	BC		457
024702	641002		641002			458
024703	344201		TAD	BC		459
024704	650422		650422			460
024705	044203		DAC	BC+2		461
024706	741200		SNA			462
024707	604713		JMP	.+4		463
024710	777700		-100			464
024711	640001		640001			465
024712	740001		CMA			466
024713	044202		DAC	BC+1		467
024714	144204		DZM	BC+3		468
024715	624675		JMP*	BLSO		469
024716	740040	IMOP	HLT		/ MOVE IMMEDIATE OPERAND	470
024717	641002		641002		/ TO FLOATING OPERAND	471
024720	660511		660511		/ REGISTER.	472
024721	104675		JMS	BLSO		473
024722	624716		JMP*	IMOP		474
024723	104716	ADIR	JMS	IMOP	/ ADD IMMEDIATE.	475
024724	604777		JMP	FADD+3		476
024725	104716	DVIR	JMS	IMOP	/ DIVIDE IMMEDIATE.	477
024726	605217		JMP	FDIV+5		478
024727	104716	MPIR	JMS	IMOP	/ MULTIPLY IMMEDIATE.	479
024730	605120		JMP	FMPY+1		480
024731	740040	NOR	HLT		/ NORMALIZE FAC.	481
024732	204177		LAC	AC+2		482
024733	745110		745110		/ 'OVERFLOW' ?	483
024734	604757		JMP	.+23	/ YES.	484
024735	741100		SPA		/ NO, NORMALIZED ?	485
024736	624731		JMP*	NOR	/ YES, DONE.	486
024737	104214		JMS	ACZ	/ NO, ZERO ?	487
024740	624731		JMP*	NOR	/ YES, DONE.	488

024741	204200	LAC	AC+3	/ NO. NORMALIZE	489
024742	652000	652000		/ MANTISSA AND	490
024743	204177	LAC	AC+2	/ ADJUST EXPONENT.	491
024744	660444	660444			492
024745	044177	DAC	AC+2		493
024746	641002	641002			494
024747	044200	DAC	AC+3		495
024750	777700	-100			496
024751	640001	640001			497
024752	346745	TAD	(43)		498
024753	740001	CMA			499
024754	344176	TAD	AC+1		500
024755	044176	DAC	AC+1		501
024756	624731	JMP*	NOR		502
024757	742020	RTR		/ OVERFLOW, MOVE DOUBLE	503
024760	044177	DAC	AC+2	/ WORD MANTISSA ONE	504
024761	204200	LAC	AC+3	/ BIT TO RIGHT AND	505
024762	740020	RAR		/ INCREMENT EXPONENT.	506
024763	044200	DAC	AC+3		507
024764	444176	ISZ	AC+1		508
024765	624731	JMP*	NOR		509
024766	624731	JMP*	NOR		510
024767	104572	JMS	GET	/ SUBTRACT, GET OPERAND.	511
024770	204201	LAC	BC	/ COMPLEMENT, AND	512
024771	246603	XOR	(1)	/ GO TO ADD.	513
024772	044201	DAC	BC		514
024773	741000	SKP			515
024774	104572	JMS	GET	/ ADD, GET OPERAND.	516
024775	104226	JMS	BCZ	/ IS ADDEND ZERO ?	517
024776	605264	JMP	BAK	/ YES, DONE.	518
024777	104214	JMS	ACZ	/ NO, IS AUGEND ZERO ?	519
025000	604354	JMP	FLAC+1	/ YES, MOVE ADDEND TO FAC.	520
025001	104427	JMS	CASQ	/ NO, COMPARE MAGNITUDES.	521
025002	741100	SPA		/ IS ADDEND GREATER ?	522
025003	104240	JMS	XAB	/ YES, EXCHANGE.	523
025004	204202	LAC	BC+1	/ CALCULATE EXPONENT	524
025005	104210	JMS	CIA	/ DIFFERENCE FOR	525
025006	344176	TAD	AC+1	/ DENORMALIZATION OF 'MQ'.	526
025007	741201	741201		/ IS DIFFERENCE ZERO ?	527
025010	605027	JMP	+.17	/ YES.	528
025011	652004	652004		/ NO, SHIFT 'MQ' TO	529
025012	346745	TAD	(43)	/ RIGHT UNTIL EXPONENTS	530
025013	741100	SPA		/ ARE EQUALIZED.	531
025014	605264	JMP	BAK		532
025015	641002	641002			533
025016	246746	XOR	(660500)		534
025017	045023	DAC	+.4		535
025020	204204	LAC	BC+3		536
025021	652000	652000			537
025022	204203	LAC	BC+2		538
025023	740040	HLT			539
025024	044203	DAC	BC+2		540
025025	641002	641002			541
025026	044204	DAC	BC+3		542
025027	104234	JMS	SGN	/ COMPARE SIGNS.	543
025030	745200	745200		/ DIFFERENT ?	544
025031	605042	JMP	+.11	/ NO.	545
025032	204204	LAC	BC+3	/ YES, COMPLEMENT 'MQ'.	546

025033	104210	JMS	CIA		547
025034	044204	DAC	BC+3		548
025035	204203	LAC	BC+2		549
025036	741401	741401			550
025037	346603	TAD	(1)		551
025040	044203	DAC	BC+2		552
025041	744000	CLL			553
025042	204200	LAC	AC+3	/ PERFORM DOUBLE	554
025043	344204	TAD	BC+3	/ PRECISION ADD.	555
025044	044200	DAC	AC+3		556
025045	750010	GLK			557
025046	344177	TAD	AC+2		558
025047	344203	TAD	BC+2		559
025050	044177	DAC	AC+2	/ GO TO NORMALIZE	560
025051	605263	JMP	ADT	/ AND OUT.	561
025052	740040	HLT		/ MULTIPLY FAC BY 10.	562
025053	204176	LAC	AC+1		563
025054	346630	TAD	(3)	/ ADD 3 TO EXPONENT.	564
025055	044176	DAC	AC+1		565
025056	204200	LAC	AC+3	/ PUT TWO-WORD MANTISSA	566
025057	652000	652000		/ IN AC AND MQ.	567
025060	204177	LAC	AC+2		568
025061	660502	660502		/ DIVIDE BY FOUR.	569
025062	045074	DAC	DVTN	/ SAVE HIGH MANTISSA.	570
025063	641002	641002		/ GET ADJUSTED LOW	571
025064	344200	TAD	AC+3	/ MANTISSA AND ADD TO	572
025065	044200	DAC	AC+3	/ ORIGINAL.	573
025066	750010	GLK		/ GET OVERFLOW.	574
025067	345074	TAD	DVTN	/ ADD ADJUSTED HIGH	575
025070	344177	TAD	AC+2	/ MANTISSA AND ORIGINAL.	576
025071	044177	DAC	AC+2	/ PUT IN HIGH MANTISSA.	577
025072	104731	JMS	NOR	/ NORMALIZE:	578
025073	625052	JMP*	MPTN		579
025074	740040	HLT		/ DIVIDE FAC BY 10.	580
025075	777774	-4		/ REDUCE EXPONENT	581
025076	344176	TAD	AC+1	/ BY FOUR.	582
025077	044176	DAC	AC+1		583
025100	204200	LAC	AC+3	/ DIVIDE TWO-WORD	584
025101	652000	652000		/ MANTISSA BY 10.	585
025102	204177	LAC	AC+2		586
025103	660323	660323			587
025104	500000	500000			588
025105	045052	DAC	MPTN	/ SAVE REMAINDER.	589
025106	641002	641002			590
025107	044177	DAC	AC+2	/ STORE QUOTIENT HIGH.	591
025110	205052	LAC	MPTN		592
025111	650323	650323		/ DIVIDE REMAINDER BY 10.	593
025112	500000	500000			594
025113	641002	641002		/ STORE SECOND QUOTIENT	595
025114	044200	DAC	AC+3	/ IN LOW MANTISSA.	596
025115	104731	JMS	NOR	/ NORMALIZE.	597
025116	625074	JMP*	DVTN		598
025117	104572	JMS	GET	/ MULTIPLY.	599
025120	104234	JMS	SGN	/ GET SIGN OF RESULT.	600
025121	044175	DAC	AC		601
025122	204176	LAC	AC+1	/ ADD EXPONENTS.	602
025123	344202	TAD	BC+1		603
025124	044175	DAC	AC+1		604

025125	204204	LAC	BC+3	/ DISTRIBUTE LOW ORDER	605
025126	744010	RCL		/ MULTIPLIER, SHIFTED	606
025127	045140	DAC	.+11	/ TO IMPROVE PRECISION.	607
025130	045157	DAC	.+27		608
025131	204203	LAC	BC+2	/ DISTRIBUTE HIGH	609
025132	740010	RAL		/ MULTIPLIER, SHIFTED.	610
025133	045144	DAC	.+11		611
025134	045174	DAC	.+40		612
025135	144203	DZM	BC+2	/ ZERO HIGH PRODUCT.	613
025136	204200	LAC	AC+3		614
025137	553122	653122			615
025140	740040	HLT		/ HIGH PART OF LOW * LOW,	616
025141	044201	DAC	BC	/ THIRD WORD OF PRODUCT.	617
025142	204200	LAC	AC+3		618
025143	553122	653122			619
025144	740040	HLT		/ HIGH PART OF LOW * HIGH,	620
025145	044202	DAC	BC+1	/ MIDDLE WORD OF PRODUCT.	621
025146	641002	641002			622
025147	344201	TAD	BC	/ ADD LOW OF LOW * HIGH	623
025150	044201	DAC	BC	/ TO THIRD WORD AND	624
025151	745400	745400		/ CARRY OVERFLOWS.	625
025152	444202	ISZ	BC+1		626
025153	745000	745000			627
025154	444203	ISZ	BC+2		628
025155	204177	LAC	AC+2		629
025156	653122	653122			630
025157	740040	HLT		/ ADD HIGH OF HIGH * LOW	631
025160	344202	TAD	BC+1	/ TO MIDDLE WORD AND	632
025161	044202	DAC	BC+1	/ CARRY OVERFLOW.	633
025162	745400	745400			634
025163	444203	ISZ	BC+2		635
025164	641002	641002			636
025165	344201	TAD	BC	/ ADD LOW OF HIGH * LOW	637
025166	745400	745400		/ AND CARRY OVERFLOWS.	638
025167	444202	ISZ	BC+1		639
025170	745000	745000			640
025171	444203	ISZ	BC+2		641
025172	204177	LAC	AC+2		642
025173	653122	653122		/ HIGH PART OF HIGH * HIGH	643
025174	740040	HLT		/ ADDED TO PREVIOUS HIGH	644
025175	344203	TAD	BC+2	/ PRODUCT GOES TO	645
025176	044177	DAC	AC+2	/ HIGH MANTISSA.	646
025177	641002	641002			647
025200	344202	TAD	BC+1	/ ADD LOW PART OF HIGH * HIGH	648
025201	044200	DAC	AC+3	/ AND CARRY OVERFLOW.	649
025202	745400	745400			650
025203	444177	ISZ	AC+2	/ RETURN.	651
025204	605263	JMP	AOT		652
025205	104572	JMS	GET		653
025206	104226	JMS	BCZ	/ INVERSE DIVIDE, GET	654
025207	604156	JMP	FZAC	/ OPERAND, THEN EXCHANGE.	655
025210	104240	JMS	XAB		656
025211	605215	JMP	.+4		657
025212	104214	JMS	ACZ	/ DIVIDE, IS FAC ZERO ?	658
025213	605264	JMP	BAK	/ YES, DONE.	659
025214	104572	JMS	GET	/ NO, GET OPERAND.	660
025215	104226	JMS	BCZ	/ IS OPERAND ZERO ?	661
025216	604156	JMP	FZAC	/ YES, CLEAR FAC AND OUT.	662

RDIV

FDIV

025217	104234		JMS	SGN	/ NO, GET SIGN OF	
025220	044175		DAC	AC	/ QUOTIENT.	663
025221	204202		LAC	BC+1		664
025222	104210		JMS	CIA	/ SUBTRACT EXPONENTS FOR	665
025223	344176		TAD	AC+1	/ EXPONENT OF RESULT.	666
025224	044176		DAC	AC+1		667
025225	204204		LAC	BC+3	/ LOW ORDER DIVISOR,	668
025226	744010		RCL		/ SHIFTED LEFT TO	669
025227	045237		DAC	.+10	/ AVOID OVERFLOW.	670
025230	204203		LAC	BC+2		671
025231	740010		RAL		/ HIGH ORDER DIVISOR	672
025232	045241		DAC	.+7	/ SHIFTED AND DISTRIBUTED	673
025233	045252		DAC	.+17	/ FOR USE BY DIVIDES.	674
025234	045260		DAC	.+24		675
025235	204177		LAC	AC+2	/ USE (A+BK)/(C+DK) =	676
025236	653122		653122		/ (A+(B-AD/C)K)/C,	677
025237	740040		HLT		/ ALGORITHM BY D D METCALF.	678
025240	640323		640323			679
025241	740040		HLT			680
025242	641002		641002		/ AD/C.	681
025243	104210		JMS	CIA		682
025244	344200		TAD	AC+3		683
025245	652000		652000		/ (B-AD/C)K.	684
025246	754400		754400			685
025247	777777	NEG1	-1			686
025250	344177		TAD	AC+2	/ FINISH WITH DOUBLE	687
025251	660323		660323		/ PRECISION DIVIDE	688
025252	740040		HLT		/ BY HIGH DIVISOR.	689
025253	044204		DAC	BC+3		690
025254	641002		641002			691
025255	044177		DAC	AC+2		692
025256	204204		LAC	BC+3		693
025257	650323		650323			694
025260	740040		HLT			695
025261	641002		641002			696
025262	044200	SQO	DAC	AC+3		697
025263	104731	AOT	JMS	NOR	/ ARITHMETIC RETURN.	698
025264	444071	BAK	ISZ	EIM	/ INCREMENT FPC AND	699
025265	604072		JMP	EIM+1	/ CONTINUE INTERPRETER.	700
025266	144175	SQAX	OZH	AC	/ SQUARE OF FAC.	701
025267	204176		LAC	AC+1		702
025270	744010		RCL			703
025271	044176		DAC	AC+1		704
025272	204177		LAC	AC+2		705
025273	044203		DAC	BC+2		706
025274	204200		LAC	AC+3		707
025275	605126		JMP	FMPY+7		708
025276	104214	SQRX	JMS	ACZ	/ SQUARE ROOT OF FAC.	709
025277	605264		JMP	BAK		710
025300	777775		-3			711
025301	044175		DAC	AC		712
025302	204176		LAC	AC+1	/ DIVIDE EXPONENT BY TWO.	713
025303	660000		660000			714
025304	740020		RAR			715
025305	044176		DAC	AC+1		716
025306	741400		SZL		/ ADJUST MANTISSA FOR EVEN	717
025307	605316		JMP	.+7	/ EXPONENT, THEN PERFORM	718
025310	204177		LAC	AC+2	/ NEWTON ITERATION ON	719
						720

025311	744020		RCR					
025312	044177		DAC	AC+2	/ HIGH ORDER PART OF A			721
025313	204200		LAC	AC+3	/ NUMBER BETWEEN			722
025314	740020		RAR		/ ONE-HALF AND TWO.			723
025315	044200		DAC	AC+3	/ ALGORITHM BY D D METCALF.			724
025316	204177		LAC	AC+2				725
025317	346751		TAD	(166712)				726
025320	045326		DAC	.+6				727
025321	045342		DAC	.+21				728
025322	204200		LAC	AC+3	/ ITERATE THREE TIMES			729
025323	652000		652000		/ ON HIGH ORDER:			730
025324	204177		LAC	AC+2	/ G(I+1)=(G(I)+X/G(I))/2.			731
025325	660323		660323					732
025326	740040		HLT					733
025327	044201		DAC	BC				734
025330	641002		641002					735
025331	345326		TAD	.-3				736
025332	740020		RAR					737
025333	444175		ISZ	AC				738
025334	605320		JMP	.-14				739
025335	044177		DAC	AC+2	/ HIGH ORDER ROOT.			740
025336	750020		750020					741
025337	044202		DAC	BC+1	/ EXTEND PRECISION			742
025340	204201		LAC	BC	/ TO LOW ORDER			743
025341	640323		640323		/ WITH ROUNDING.			744
025342	740040		HLT					745
025343	641002		641002					746
025344	744020		RCR					747
025345	344202		TAD	BC+1				748
025346	605262		JMP	S00				749
025347	740040	ATN	HLT		/ ARCTANGENT.			750
025350	740000		NOP					756
025351	204175		LAC	AC				757
025352	045465		DAC	COS				758
025353	144175		OZM	AC				759
025354	204176		LAC	AC+1				760
025355	754302		754302					761
025356	740010		RAL					762
025357	045476		DAC	SIN				763
025360	741200		SNA					764
025361	605367		JMP	.+6				765
025362	104071		JMS	EIM				766
025363	045462		DAC	COS-3				767
025364	760001		LAW	I				768
025365	445462		ISZ	COS-3				769
025366	740000		NOP					770
025367	104272		JMS	SVMO				771
025370	545446		SAD	PIOT-6				772
025371	605402		JMP	.+11				773
025372	742000		OPR	2000				774
025373	045462		DAC	COS-3				775
025374	405446		XCT	PIOT-6				776
025375	752001		OPR	12001				777
025376	045457		DAC	COS-6				778
025377	205446		LAC	PIOT-6				779
025400	345462		TAD	COS-3				780
025401	445437		ISZ	COS-6				781
025402	045462		DAC	COS-3				782
								783

025403	741000		OPR	1000		784
025404	045457		DAC	COS-6		785
025405	753015		OPR	13015		786
025406	751044		OPR	11044		787
025407	752013		OPR	12013		788
025410	245457		XOR	COS-6		789
025411	751031		OPR	11031		790
025412	752011		OPR	12011		791
025413	245457		XOR	COS-6		792
025414	751020		OPR	11020		793
025415	752007		OPR	12007		794
025416	245457		XOR	COS-6		795
025417	751011		OPR	11011		796
025420	752005		OPR	12005		797
025421	245457		XOR	COS-6		798
025422	751004		OPR	11004		799
025423	752003		OPR	12003		800
025424	245457		XOR	COS-6		801
025425	752001		OPR	12001		802
025426	245462		XOR	COS-3		803
025427	745000		OPR	5000		804
025430	305451		ADD	PIOT-3		805
025431	740000		NOP			806
025432	740000		NOP			807
025433	205476		LAC	SIN		808
025434	044175		DAC	AC		809
025435	741200		SNA			810
025436	605442		JMP	.+4		811
025437	104071		JMS	EIN		812
025440	305454		ADD	PIOT		813
025441	740000		NOP			814
025442	104303		JMS	RSMD		815
025443	205465		LAC	COS		816
025444	044175		DAC	AC		817
025445	625347		JMP*	ATN		
025445	463201			463201		820
025447	324047			324047		821
025450	777777			-1		822
025451	552421			552421		823
025452	711037			711037		824
025453	777777			-1		825
025454	552421	PIOT		552421		826
025455	311037			311037		827
025456	000001			1		828
025457			.BLOCK	6		829
025465	740040	COS	HLT		/ COSINE.	830
025466	740000		NOP			831
025467	144175		D3H	AC		832
025470	145457		D3H	COS-6		833
025471	205465		LAC	COS		834
025472	045476		DAC	SIN		835
025473	104272		JMS	SVMD		836
025474	305454		ADD	PIOT		837
025475	605504		JMP	.+7		838
025476	740040	SIN	HLT		/ SINE.	839
025477	740000		NOP			840
025500	204175		LAC	AC		841
025501	045457		DAC	COS-6		842

025502	144175	DZM	AC	
025503	104272	JMS	SVMD	843
025504	445454	ISZ	PIOT	844
025505	045462	DAC	COS-3	845
025505	740000	NOP		846
025507	104517	JMS	FXQ	847
025510	744020	RCR		848
025511	045465	DAC	COS	849
025512	104210	JMS	CIA	850
025513	104325	JMS	FLOAT	851
025514	305462	ADD	COS-3	852
025515	740000	NOP		853
025516	205465	LAC	COS	854
025517	740020	RAR		855
025520	740400	SNL		856
025521	605525	JMP	.+4	857
025522	104071	JMS	EIM	858
025523	752777	OPR	12777	859
025524	740000	NOP		PS0
025525	205465	LAC	COS	861
025526	742020	RTR		862
025527	750010	GLK		863
025530	245457	XOR	COS-6	864
025531	044175	DAC	AC	865
025532	104071	JMS	EIM	866
025533	405454	XCT	PIOT	867
025534	045462	DAC	COS-3	868
025535	741000	OPR	1000	869
025536	045457	DAC	COS-6	870
025537	760001	LAW	1	871
025540	740000	NOP		872
025541	206752	LAC	(16)	873
025542	045545	DAC	.+3	874
025543	744001	744001		875
025544	653122	653122		876
025545	740040	HLT		877
025546	640611	640611		878
025547	760753	LAW	753	879
025550	640611	640611		880
025551	045554	DAC	.+3	881
025552	104071	JMS	EIM	882
025553	405457	XCT	COS-6	883
025554	740040	HLT		884
025555	752001	OPR	12001	885
025556	740000	NOP		886
025557	777776	-2		887
025560	345545	TAD	.-13	888
025561	740200	SZA		889
025562	605542	JMP	.-20	890
025563	104071	JMS	EIM	891
025564	405462	XCT	COS-3	892
025565	740000	NOP		893
025566	104303	JMS	RSMD	894
025567	625476	JMP	SIN	895
025570	740040	HLT		
025571	740000	NOP		/ NATURAL LOGARITHM.
025572	104214	JMS	ACZ	904
025573	605651	JMP	LOG	/ LOG OF ZERO IS ZERO.
				905
				906
				907

LOG

/ NATURAL LOGARITHM.
/ LOG OF ZERO IS ZERO.

025574	144175	DZH	AC	/ LOG OF ABSOLUTE VALUE.	908
025575	204176	LAC	AC+1		909
025576	744010	RCL			910
025577	345247	TAD	NEG1		911
025600	045074	DAC	DVTN		912
025601	206603	LAC	(1)		913
025602	044176	DAC	AC+1		914
025603	104272	JMS	SVMD		915
025604	405653	XCT	EXP-14		916
025605	752002	OPR	12002		917
025606	045664	DAC	EXP-3		918
025607	752774	OPR	12774		919
025610	445664	ISZ	EXP-3		920
025611	045664	DAC	EXP-3		921
025612	741000	OPR	1000		922
025613	045661	DAC	EXP-6		923
025614	751011	OPR	11011		924
025615	753013	OPR	13013		925
025616	752001	OPR	12001		926
025617	405661	XCT	EXP-6		927
025620	751007	OPR	11007		928
025621	753011	OPR	13011		929
025622	752001	OPR	12001		930
025623	405661	XCT	EXP-6		931
025624	751005	OPR	11005		932
025625	753007	OPR	13007		933
025626	752001	OPR	12001		934
025627	405661	XCT	EXP-6		935
025630	751003	OPR	11003		936
025631	753005	OPR	13005		937
025632	752001	OPR	12001		938
025633	405661	XCT	EXP-6		939
025634	753003	OPR	13003		940
025635	752001	OPR	12001		941
025636	751002	OPR	11002		942
025637	405664	XCT	EXP-3		943
025640	045664	DAC	EXP-3		944
025641	740000	NOP			945
025642	205074	LAC	DVTN		946
025643	104325	JMS	FLOAT		947
025644	753002	OPR	13002		948
025645	445656	ISZ	EXP-11		949
025646	305664	ADD	EXP-3		950
025647	740000	NOP			951
025650	104303	JMS	RSMD		952
025651	205570	LAC	LOG		953
025652	625570	JMP*	LOG		955
025653	714640				956
025654	265011				957
025655	000001				958
025656	354513				959
025657	270524				960
025660	000001				961
025661	000002				962
025662	000033				963
025663	000444				964
025664	005555				965
025665	066666				965

LOO

025666	777777		777777			
025667	740040	EXP	HLT		/ NATURAL EXPONENT.	966
025670	740000		NOP			967
025671	104272		JMS	SVMD		968
025672	405656		XCT	EXP-11		969
025673	045664		DAC	EXP-3		970
025674	104540		JMS	FIXL		971
025675	045052		DAC	MPTN		972
025676	104210		JMS	CIA		973
025677	104325		JMS	FLOAT		974
025700	305664		ADD	EXP-3		975
025701	445656		ISZ	EXP-11		976
025702	045664		DAC	EXP-3		977
025703	753011		OPR	13011		978
025704	752001		OPR	12001		979
025705	740000		NOP			980
025706	777770		-10			981
025707	045074		DAC	DVTN		982
025710	205703		LAC	.-5		983
025711	045715		DAC	+.4		984
025712	605720		JMP	+.6		985
025713	104071		JMS	EIM		986
025714	405664		XCT	EXP-3		987
025715	740040		HLT			988
025716	752001		OPR	12001		989
025717	740000		NOP			990
025720	750001		CLC			991
025721	345715		TAD	.-4		992
025722	045715		DAC	.-5		993
025723	445074		ISZ	DVTN		994
025724	605713		JMP	.-11		995
025725	104071		JMS	EIM		996
025726	405664		XCT	EXP-3		997
025727	752001		OPR	12001		998
025730	740000		NOP			999
025731	205052		LAC	MPTN		1000
025732	344176		TAD	AC+1		1001
025733	044176		DAC	AC+1		1002
025734	104303		JMS	RSMD		1003
025735	625667		JMP*	EXP		1004
025736	653613	FMT	653613		/ SET OUTPUT FORMAT LMQ,CLA, LLS 13	
025737	104210		JMS	CIA	/ BY EAE AAB8,	
025740	045751		DAC	INWD	/ WHERE:	1011
025741	641607		641607		/ AA = 'INTEGER' WIDTH,	1012
025742	104210		JMS	CIA	/ BB = 'FRACTION' WIDTH.	
025743	045752		DAC	FRWD		1014
025744	605264		JMP	BAK		1015
025745	000000	EFMD	0		/ E OR F MODE	1016
025746	000000	EXPAD	0			
025747	240000		240000			
025750	000004		4			
025751	777766	INWD	-12			
025752	777773	FRWD	-5			1017
025753	740040		HLT			1018
025754	021065	FODEV	TYPE			1019
025755	740040		HLT			1020
025756	045754	FOUT	DAC	FODEV	/ OUTPUT ONE DECIMAL	1021
025757	145745		DZM	EFMD		1022

025760	204071	LAC	EIM	/ NUMBER FROM FAC	1023
025761	045755	DAC	FOUT-1	/ BY AND ADRS.	1024
025762	200044	LAC	FISW	/ WHERE ADRS IS ADR OF CHAR OUT ROUTINE	
025763	745200	SNAICLL		/ E OR F OUTPUT?	
025764	740002	CML		/ E	
025765	205752	LAC	FRWD		
025766	740100	SMA			
025767	750001	CLC			1028
025770	741400	SZL			
025771	777772	LAW	-6		
025772	046224	DAC	DGO		1029
025773	045753	DAC	FRWD+1		
025774	750010	GLK			
025775	045745	DAC	EFMD	/ SET MODE SW	
025776	104272	JMS	SVMD		1030
025777	046214	DAC	SVFAC	/ SAVE FAC FOR RETURN.	1031
026000	760005	LAW	5	/ CALCULATE ROUNDING TERM.	1032
026001	740000	NOP			1033
026002	105074	JMS	DVTN		1034
026003	446224	ISZ	DGO		1035
026004	606002	JMP	.-2		1036
026005	104071	JMS	EIM		1037
026006	046221	DAC	DGO-3		1038
026007	206214	LAC	SVFAC		1039
026010	745000	OPR	5000		1040
026011	346221	TAD	DGO-3	/ SUBTRACT OR ADD	1041
026012	740000	NOP		/ ROUNDING TERM.	1042
026013	306221	ADD	DGO-3		1043
026014	740000	NOP			1044
026015	146221	DZH	DGO-3		
026016	104214	JMS	ACZ		1045
026017	741000	SKP			1046
026020	606024	JMP	+.4		1047
026021	206753	LAC	(40)	/ SET 'SIGN' TO SPACE	
026022	046217	DAC	DGO-5	/ IF NUMBER IS ZERO.	1049
026023	606036	JMP	FRO-6		1050
026024	204175	LAC	AC		1051
026025	740020	RAR			1052
026026	206753	LAC	(40)	/ SAVE SIGN AND SET	1053
026027	741400	SZL		/ FAC POSITIVE.	1054
026030	206754	LAC	(55)		1055
026031	046217	DAC	DGO-5		1056
026032	144175	DZH	AC		1057
026033	204176	LAC	AC+1	/ IF NOT LESS TH; 1.0.	1058
026034	740300	SMAISZA		/ GO TO 'INTEGER' PRINT.	1059
026035	606071	JMP	FRO+2		
026036	206603	LAC	(1)		1061
026037	345751	TAD	INWD		1062
026040	741100	SPA		/ IF FRACTION ONLY, PRINT	1063
026041	106244	JMS	SPAC	/ LEADING SPACES, SIGN,	1064
026042	206217	LAC	DGO-5	/ AND DECIMAL POINT.	1065
026043	125754	JMS*	FODEV		1066
026044	205753	LAC	FRWD+1	/ PRINT FRACTIONAL	
026045	740100	SMA		/ PART OF NUMBER.	1068
026046	606143	JMP	ODN		1069
026047	205745	LAC	EFMD		
026050	741200	SNA			
026051	606062	JMP	+.11		

026052	206630		LAC	(3)		
026053	344176		TAD	AC+1		
026054	740100		SMA		/ EXP POS?	
026055	606062		JMP	+.5		
026056	104071		JMS	EIM		
026057	405746		XCT	EXPAD	/ MUL BY 10 'TIL EXP IS POS.	
026060	740000		NOP			
026061	606052		JMP	-.7		
026062	206755		LAC	(56)		
026063	125754		JMS*	FODEV		1070
026064	445753		ISZ	FRWD+1		1071
026065	741000		SKP			1072
026066	606143		JMP	ODN		1073
026067	106224	FRO1	JMS	DGO		1074
026070	606064		JMP	-.4		
026071	105074		JMS	DVTN	/ START 'INTEGER' OUTPUT.	1076
026072	446221		ISZ	DGO-3		
026073	204176		LAC	AC+1		
026074	740300		SMA ISZA			1080
026075	606071		JMP	-.4		1081
026076	205751		LAC	INWD		1082
026077	346221		TAD	DGO-3		1083
026100	741100		SPA			
026101	606113		JMP	+.12		1085
026102	206217		LAC	DGO-5	/ IF NUMBER TOO LARGE	
026103	125754		JMS*	FODEV	/ FOR FIELD - PRINT E FORMAT.	
026104	206755		LAC	(56)		
026105	125754		JMS*	FODEV		
026106	206603		LAC	(1)		
026107	045745		DAC	EFMD		
026110	740020		RAR		/ STL	
026111	206756		LAC	(6)	/ INSURE 6 DIGITS	
026112	606120		JMP	+.6		
026113	346603		TAD	(1)		
026114	741100		SPA			1097
026115	106244		JMS	SPAC		1098
026116	744000		CLL			1099
026117	206221		LAC	DGO-3		
026120	046255		DAC	FINPUT	/ SAVE # OF DIGITS.	
026121	740001		CMA			
026122	046220		DAC	DGO-4		1101
026123	206217		LAC	DGO-5		1102
026124	740400		SNL			1103
026125	125754		JMS*	FODEV		
026126	446220		ISZ	DGO-4		1104
026127	741000		SKP			1105
026130	606133		JMP	+.3		1106
026131	106224		JMS	DGO		
026132	606126		JMP	-.4		1108
026133	205745		LAC	EFMD		1109
026134	741200		SNA			
026135	606044		JMP	FRO		
026136	777772		LAW	-6		
026137	346255		TAD	FINPUT		
026140	045753		DAC	FRWD+1		
026141	741100		SPA			
026142	606067		JMP	FRO1		
026143	205745	ODN	LAC	EFMD		

026144	740200		SZA			
026145	606161		JMP	EXPOUT		
026146	203536		LAC	HSOSW		
026147	741200		SNA			
026150	606153		JMP	.+3		
026151	760215		LAW	215		
026152	125754		JMS*	FODEV		
026153	104071		JMS	EIM		
026154	206214		LAC	SVFAC	/ RESTORE FAC. USER	1111
026155	104303		JMS	RSMD	/ DATA MODE. AND	1112
026156	205755		LAC	FOUT-1	/ RETURN.	1113
026157	346603		TAD	(1)		1114
026160	604330		JMP	SRTN		1115
026161	760305	EXPOUT	LAW	305	/ E	
026162	125754		JMS*	FODEV		
026163	206221		LAC	DGO-3		
026164	744200		SZAICLL		/ INTEGER PART?	
026165	606202		JMP	SVFAC-12	/ YES	
026166	206216		LAC	SVFAC+2		
026167	346603		TAD	(1)		
026170	745102		SPAISTL			
026171	104210		JMS	CIA		
026172	046217		DAC	DGO-5		
026173	206754		LAC	(55)	/ PRINT - OR	
026174	744400		SNLICLL			
026175	125754		JMS*	FODEV		
026176	206217		LAC	DGO-5		
026177	657323		IDIVS			
026200	000003		3			
026201	641002		LACQ			
026202	653323		IDIV			
026203	000012		12			
026204	046220		DAC	DGO-4		
026205	641002		LACQ			
026206	306210		ADD	.+2	/ PRINT EXPONENT	
026207	125754		JMS*	FODEV		
026210	760260		LAW	260		
026211	346220		TAD	DGO-4		
026212	125754		JMS*	FODEV		
026213	606146		JMP	ODN+3		
026214		SVFAC	.BLOCK	10		1116
026224	740040	DGO	HLT			1117
026225	105052		JMS	MPTN	/ ROUTINE TO PRINT	1118
026226	104517		JMS	FXQ	/ LEADING DIGIT. THEN	1119
026227	744020		RCR		/ SUBTRACT IT FROM	1120
026230	246757		XOR	(752777)	/ PREVIOUS RESULT.	1121
026231	346603		TAD	(1)		1122
026232	506757		AND	(752777)		1123
026233	046241		DAC	.+6		1124
026234	641501		641501			1125
026235	206760		LAC	(60)		1126
026236	640002		OMQ			1127
026237	125754		JMS*	FODEV		1128
026240	104071		JMS	EIM		1129
026241	740040		HLT			1130
026242	740000		NOP			1131
026243	626224		JMP*	DGO		1132
026244	740040	SPAC	HLT		/ PRINT N SPACES.	1133

026245	046224		DAC	DGO			
026246	206733		LAC	(40)	/ ENTER WITH -N		
026247	125754		JMS*	FODEV	/ IN AC.		1134
026250	446224		ISZ	DGO			1135
026251	606246		JMP	.-3			1136
026252	626244		JMP*	SPAC			1137
026253	106255	FINP	JMS	FINPUT			1138
026254	605264		JMP	BAK			1139
026255	000000	FINPUT	0				
026256	146373		DZM	CHRX+1	/ FLOATING MODE DECIMAL		
026257	146371		DZM	NCHR	/ INPUT ROUTINE.		
026260	144175		DZM	AC	/ ASSEMBLE ONE FREE-FORMAT		1144
026261	144177		DZM	AC+2	/ DECIMAL NUMBER IN FAC.		1145
026262	144200		DZM	AC+3			1146
026263	144201		DZM	BC	/ CLEAR REGISTERS FOR		1147
026264	144202		DZM	BC+1	/ SET-UP OF DEFAULTS.		1148
026265	144203		DZM	BC+2			1149
026266	144204		DZM	BC+3			1150
026267	206745		LAC	(43)			1151
026270	044176		DAC	AC+1			1152
026271	106410	NUM1	JMS	FCHAR	/ CHAR FOR MANTISSA.		1153
026272	744100		SMAICLL				
026273	606276		JMP	.-3	/ IF 'MINUS', SET		1155
026274	444175		ISZ	AC	/ FAC NEGATIVE.		1156
026275	606271		JMP	NUM1			1157
026276	046410		DAC	FCHAR			1158
026277	204177		LAC	AC+2	/ IF DIGIT, MULTIPLY		
026300	653122		MUL		/ PREVIOUS DOUBLE WORD		1160
026301	000012		12		/ MANTISSA BY TEN AND		1161
026302	641002		LACQ		/ ADD NEW DIGIT.		1162
026303	044177		DAC	AC+2			1163
026304	204200		LAC	AC+3			1164
026305	653122		MUL				1165
026306	000012		12				1166
026307	344177		TAD	AC+2			1167
026310	044177		DAC	AC+2			1168
026311	641002		LACQ				1169
026312	346410		TAD	FCHAR			1170
026313	044200		DAC	AC+3			
026314	741400		SZL				1172
026315	444177		ISZ	AC+2			1173
026316	204201		LAC	BC	/ UPDATE FRACTION COUNTER.		1174
026317	344202		TAD	BC+1	/ THEN GO FOR		1175
026320	044201		DAC	BC	/ NEXT CHARACTER.		1176
026321	606271		JMP	NUM1			1177
026322	146373		DZM	CHRX+1	/ CLEAR BLANK AND SIGN		1178
026323	106410	EXPN	JMS	FCHAR	/ TERM FLAG AND		1179
026324	744100		SMAICLL		/ START EXPONENT.		
026325	606330		JMP	.-3	/ IF 'MINUS', SET		1181
026326	044204		DAC	BC+3	/ EXPONENT NEGATIVE.		1182
026327	606323		JMP	EXPN			1183
026330	046410		DAC	FCHAR			1184
026331	204203		LAC	BC+2	/ IF DIGIT, MULTIPLY		
026332	653122		MUL		/ CURRENT EXPONENT		1186
026333	000012		12		/ BY TEN AND ADD		1187
026334	641002		LACQ		/ NEW DIGIT.		1188
026335	346410		TAD	FCHAR			1189
026336	044203		DAC	BC+2			1191

026337	606323		JMP	EXPN		1192
026340	104731	INAN	JMS	NOR	/ TERMINATOR.	1193
026341	204204		LAC	BC+3		1194
026342	740010		RAL		/ CALCULATE EFFECTIVE	1195
026343	204203		LAC	BC+2	/ INPUT EXPONENT FROM	1196
026344	741400		SZL		/ EXPLICIT EXPONENT AND	1197
026345	104210		JMS	CIA	/ FRACTION COUNTER.	1198
026346	344201		TAD	BC		1199
026347	741200		SNA		/ IF ZERO, RETURN.	1200
026350	626255		JMP*	FINPUT		
026351	044201		DAC	BC		1202
026352	740100		SHA			1203
026353	104210		JMS	CIA		1204
026354	044202		DAC	BC+1		1205
026355	204201		LAC	BC		1206
026356	740010		RAL		/ MULTIPLY OR DIVIDE	1207
026357	206367		LAC	PMTN	/ FAC BY TEN UNTIL	1208
026360	745400		SZL ICLL		/ EFFECTIVE EXPONENT	1209
026361	206370		LAC	FDTN	/ IS ZERO.	1210
026362	046363		DAC	.+1		1211
026363	740040		HLT			1212
026364	444202		ISZ	BC+1		1213
026365	606363		JMP	.-2		1214
026366	626255		JMP*	FINPUT		
026367	105052	PMTN	JMS	MPTN		1216
026370	105074	PDTN	JMS	DVTN		1217
026371	740040	NCHR	HLT		/ INPUT CHARACTER COUNTER.	1218
026372	740040	CHRX	HLT		/ LAST INPUT CHARACTER.	1219
026373	740040		HLT			1220
026374	777777	DEC1	-1		/ SET FRACTION INDICATOR.	1221
026375	044202		DAC	BC+1		1222
026376	606271		JMP	NUM1		1223
026377	206373	MI	LAC	CHRX+1		1224
026400	740201		SZA ICHA		/ MINUS TERMINATES OR	1225
026401	606340		JMP	INAN	/ NEGATES CURRENT	1226
026402	046373		DAC	CHRX+1	/ NUMBER PART.	1227
026403	626410		JMP*	FCHAR		
026404	206373	CI	LAC	CHRX+1	/ BLANK IS TERMINATOR	1229
026405	745200		SNA ICLL		/ IF FOLLOWS NON-BLANK	1230
026406	606411		JMP	FCHAR+1	/ NON-TERMINATOR.	
026407	606340		JMP	INAN		1232
026410	740040	FCHAR	HLT			
026411	206463		LAC	INFLG		
026412	740200		SZA		/ USE CHAR IF 0.	
026413	606417		JMP	.+4		
026414	200050		LAC	CHAR		
026415	046463		DAC	INFLG	/ SET FLAG.	
026416	741000		SKP			
026417	124205		JMS*	ADR	/ USE USER-SPECIFIED	1234
026420	200050		LAC	CHAR		
026421	506610		AND	(177)	/ CHARACTER ROUTINE.	1235
026422	046372		DAC	CHRX	/ SAVE CHARACTER.	1236
026423	546753		SAD	(40)	/ TEST FOR BLANK.	1237
026424	606404		JMP	CI		1238
026425	546761		SAD	(11)	/ TREAT TAB AS BLANK.	1239
026426	606404		JMP	CI		1240
026427	745200		SNA ICLL		/ IGNORE LEADER.	1241
026430	604072		JMP	EIM+1	/ RESTART INPUT INSTRUCTION.	

026431	546762	SAD	(53)	/ 'PLUS' IS TERMINATOR	
026432	606404	JMP	CI	/ OR IS IGNORED.	1243
026433	546333	SAD	INAN-5	/ IGNORE LINE-FEED.	1244
026434	606411	JMP	FCHAR+1		1245
026435	546610	SAD	(177)	/ IGNORE RUB-OUT OR LEADER.	
026436	606411	JMP	FCHAR+1		1247
026437	546754	SAD	(55)	/ 'MINUS' NEGATES	
026440	606377	JMP	MI	/ OR TERMINATES.	1249
026441	546763	SAD	(105)	/ 'E' STARTS EXPONENT.	1250
026442	606322	ECHK	JMP	EXPN-1	1251
026443	046373		DAC		
026444	546755		SAD	/ SET BLANK TERMINATOR.	
026445	606374	PERCHK	JMP	/ TEST FOR DECIMAL POINT.	1253
026446	640504		DEC1		1254
026447	546630		LRS		
026450	741000		SAD	/ TEST FOR ASCII CODE	1256
026451	606340		SKP	/ FROM 60 THROUGH 71.	1257
026452	641604		JMP	/ IF NOT, TERMINATE.	1258
026453	652000		641604		1259
026454	740001		LMQ		1260
026455	346333		CHA	/ IF LEGAL DIGIT,	1261
026456	745100		TAD	/ TRUNCATE TO FOUR	1262
026457	606340		SPAICLL	/ BITS, INCREMENT	1263
026460	446371		JMP	/ CHARACTER COUNTER	1264
026461	641002		ISZ	/ AND RETURN.	1265
026462	626410		LACQ		1265
026463	000001	INFLG	JMP*	FCHAR	1266
026464	026464	OP	.		1267
026465	000000		0		
026466	505100		505100		
			IOBUF=.		
			COMEIN=IOBUF+2		
			COMEOUT=COMEIN+76		
			.LOC	COMEOUT	
026567	000000	FRST	0		
026570	000000		0		
026571	035506		035506	/ DUMMY LINE #	
026572	170301		170301	/ C-F	
026573	145422		145422	/ OCA	
026574	030440		030440	/ L.R	
026575	771500		771500	/ CD	
026576	000000	FRSTX	0		
		BUFDEG=40000			
			.LOC	IOBUF+114	
			.END		
026603	000001				
026604	096752				
026605	777477				
026606	777746				
026607	777600				
026610	000177				
026611	200000				
026612	000215				
026613	000377				
026614	000242				
026615	000306				
026616	000275				
026617	000077				

026620	000013
026621	000256
026622	777520
026623	777767
026624	000007
026625	300000
026626	000002
026627	340000
026630	000003
026631	440000
026632	000004
026633	400000
026634	000005
026635	021757
026636	000301
026637	000100
026640	777641
026641	000337
026642	000277
026643	777740
026644	000260
026645	777768
026646	012376
026647	000220
026650	006737
026651	000376
026652	026466
026653	016267
026654	777364
026655	016600
026656	016601
026657	747303
026660	777400
026661	030407
026662	022753
026663	007000
026664	022743
026665	022746
026666	000037
026667	000240
026670	002534
026671	002535
026672	006054
026673	006305
026674	006522
026675	002605
026676	031177
026677	005725
026700	006141
026701	006303
026702	023645
026703	023303
026704	006072
026705	000212
026706	031577
026707	013415
026710	013414
026711	006017

03/01/73 FOCAL-RCD RUN WITH RALPH

*** PDP9/15 ASSEMBLY LISTING ***

PAGE NO. 63

026712	032603
026713	000200
026714	031200
026715	006514
026716	023623
026717	002600
026720	023454
026721	000300
026722	022100
026723	022420
026724	023630
026725	011565
026726	007436
026727	007347
026730	024062
026731	000271
026732	000255
026733	000261
026734	000272
026735	000276
026736	023663
026737	024001
026740	011600
026741	000017
026742	060000
026743	777000
026744	000777
026745	000043
026746	660500
026747	000022
026750	377777
026751	166712
026752	000016
026753	000040
026754	000055
026755	000056
026756	000006
026757	752777
026760	000060
026761	000011
026762	000053
026763	000105

*** SYMBOL TABLE ***

AC	024175	DCONT	020355	ERG	022150	FMT	025736	IF3	020724
ACZ	024214	DEBGSW	020027	ERL	022145	FMUL	400000	IGNOR	020120
ADD	020045	DEDBLK	006522	ERROR2	022454	FNTABF	020266	ILIST	020664
ADDIR	005725	DECODEL	023347	ERROR3	022454	FNTABL	022107	IMOP	024716
ADIR	024723	DECOET	023161	ERROR4	022454	FOCALG	022745	INAN	026340
ADR	024205	DECGT1	023141	ERROR5	022451	FOCAL5	022742	INDEV	022401
ALIST	021252	DECIN	023423	ERT	022137	FODEV	025754	INFIX	022324
AOT	025263	DECIN1	023434	ERV	022142	FOPR	024134	INFLG	026463
ARONXT	021644	DECIN2	023454	ERVX	022162	FOR	020736	INFLT	023571
ARTN	022623	DECIN3	023504	ETERM	021537	FOUT	025756	INIG	023100
ASK	021064	DECLIB	023360	ETERMN	021534	FPUT	040000	INLIST	020063
ATLIST	021455	DECLI1	023372	ETERM1	021517	FREG	022637	INPUT	020651
ATN	025347	DECLOS	023264	ETERM2	021544	FREGR	022647	INPUTX	020172
ATSW	020041	DECNT	023242	EVAL	021500	FREG1	022671	INSUB	020036
AXIN	023055	DECO	023311	EXP	025667	FRO	026044	INWD	025751
AXOUT	023056	DECONV	023026	EXPAD	025746	FROI	026067	IO	023072
BAK	025264	DECOPN	023134	EXPN	026323	FRST	026567	IOBUF	026467
BC	024201	DECO1	023406	EXPOUT	026161	FRSTX	026576	IOSW	023071
BCR	013413	DECPAP	023572	EXTR	022235	FRWD	025752	IRETN	020126
BCZ	024226	DECPRT	023223	FADD	024774	FSDM	024167	ITERI	021656
BEGIN	022735	DECPUT	023303	FCAS	024403	FSGN	024365	KILL	023275
BINARY	023663	DECHT	023243	FCHAR	026410	FSIN	022627	LACXIN	023063
BINL1	023715	DECI	026374	FCONT	021000	FSUB	024767	LASTLN	020026
BINOUT	024001	DELETE	022007	FCOS	022631	FSUM	300000	LASTOP	020040
BINO1	024034	DELETR	006017	FCZ	024373	FTEMP	021653	LASTV	020032
BINY	023720	DGO	026224	FDAC	024450	FUPAR	021622	LDRFG	023540
BINY1	023747	DGRP	020311	FDIS	022715	FXQ	024517	LIBDAT	023602
BINY2	023744	DGRPI	020325	FDISR	022721	FZAC	024156	LIBGO	023122
BINI	024060	DIRFLG	006303	FDIV	025212	GEND	022257	LIBLST	023107
BIN2	024061	DISONE	010407	FDVD	440000	GERR	020236	LIBRARY	023101
BIN3	024070	DM	024206	FEND3	022210	GET	024572	LINENO	020051
BLKNO	006305	DMPSW	020061	FENF	022621	GETARG	021267	LISTGO	021250
BLSO	024675	DO	020305	FGET	200000	GETC	022216	LIST3	020060
BOTTOM	020035	DOK	022034	FINCR	020762	GETLN	020202	LIST6	020054
BUFBEG	040000	DONE	022052	FINDLN	022165	GETVAR	021273	LIST7	020056
BUFCNT	023077	DOONE	020347	FINDN	022170	GET1	022252	LOG	025570
BUFOUT	023076	DTRE1	002535	FINFIN	021034	GET3	022271	LOO	025651
BUFR	020043	DTRE2	002534	FINP	026253	GEXIT	020250	LT	023654
CASQ	024427	DVIR	024725	FINPUT	026255	GFND1	021404	MESAG	007000
CFRS	020070	DVTN	025074	FINQ	024514	GINC	020052	MESFOC	022753
CFRSX	020071	DZMTEL	022444	FINX	024555	GLIST	021257	MI	026377
CHAR	020050	ECALL	021466	FISW	020044	GONE	020131	MODIFY	021154
CHECK	023210	ECHK	026442	FIXL	024540	GOTO	020473	MPIR	024727
CHRX	026372	ECHOLST	021514	FJMS	024311	GSERCH	021330	MPTN	025052
CI	026404	EFMD	025745	FLAC	024353	GS1	021341	NAGSW	020047
CIA	024210	EFOP	020041	FLARG	021757	GS2	021341	NCHR	026371
CNTR	020042	EFUN	021673	FLIMIT	020774	GS3	021341	NEG1	025247
COMBOT	020072	EFUN2	021704	FLIST1	020470	GS4	021355	MOR	024731
COMBUF	020067	EFUN3	021747	FLIST2	020465	GTEM	020022	NUM1	026271
COMEIN	026471	EIM	024071	FLOAT	024325	GZERR	020257	ODN	026143
COMEOUT	026567	ELPAR	021713	FLOD	024321	HSOSH	023536	OOUT	016267
CONGO	021042	END	020073	FLOG	022625	HSOUT	023541	OP	026464
CONLST	020667	ENDLN	022275	FLOP	021602	HSPX	023516	OPNEXT	021507
COS	025485	ENDT	020074	FLOQ	024332	HSPXSW	023537	OPTABL	021652
CRLF	006737	ENUM	021661	FLTONE	022334	HSRSET	023560	OUTFLT	023074
DATA	023573	EPAR	021631	FLTZER	022332	IBAR	020113	OUTIO	023075
DATAIN	023610	EPAR2	021715	FMIN	340000	IF	020712	PACBUF	022757
DATAOP	023615	ERASE	022127	FMPY	025117	IFI	020734	PACKST	020030

*** SYMBOL TABLE ***

PARTEST	021774	SGN	024234	XAB	024240
PC	020023	SGOT	021212	XABS	021744
PCHK	020372	SIN	025476	XCT	020021
PCK!	023003	SORTC	020614	XCTIN	020046
PC1	020504	SORTCN	020037	XINT	021037
PDLXR	023054	SORTJ	021214	XRAN	021437
PDTN	026370	SPAC	026244	XRT	023067
PERCHK	026445	SPECIAL	022327	XRT2	023070
PIOT	025454	SPNOR	023045	XSGN	021741
PMTN	026367	SQAX	025266	XSQRT	022633
POPF	020451	SQO	025262	XT3	020611
POPJ	021451	SQRX	025276	XX	740040
POP17	020423	SRETN	020162	XYZ	022364
PREAD	023623	SRNLST	021244		
PREAD1	023636	SRTN	024330		
PRINT	006752	START	020075		
PRINTC	022420	STARTV	020043		
PRNT	022355	STAXIN	023057		
PRNTLN	022337	SUBS	023045		
PROC	020502	SVFAC	026214		
PROCESS	020501	SVMD	024272		
PSEQ	023771	TASK	021066		
PT1	020031	TASK4	021152		
PUNBIN	011600	TCRLF	021150		
PUNCH	023645	TCRLF2	021145		
PUNSH	007347	TDUMP	022554		
PUSHA	020361	TELSH	022443		
PUSHF	020431	TERBUF	023073		
PUSHJ	020402	TERMS	021720		
PUSH17	020415	TESTA	020220		
PUTDIS	022675	TESTC	020573		
PUTREG	022700	TESTN	021421		
RANO	021416	TEXTP	020020		
RDBLK	002606	THISLN	020024		
RDIR	006054	THISOP	020025		
RDIV	025205	TINTR	021135		
READC	022100	TLIST	021260		
READ1	012376	TLIST2	021264		
RECOVX	022470	TLIST3	022322		
RET	007436	TQUOT	021126		
RETC	006257	TSTGRP	020637		
RETRN	021447	TSTLPR	021762		
RPAPER	011565	TYPE	021065		
RSEQ	023753	TYPE2	021117		
RSHD	024303	T1	020033		
RTAPE	002600	T2	020053		
RUB1	022515	T3	020034		
RUB2	022532	UPAR	021617		
RUB3	022547	UTE	022220		
RUB4	022526	UTQ	022227		
SBAR	021201	UTX	022240		
SCHAR	021172	HALL	020557		
SCONT	021167	WRITE	020525		
SEARCH	006141	WTDEC	006514		
SET	020736	WDIR	006072		
SEX	021241	WTESTG	020562		
SEXC	020633	WTEST2	020546		
SFOUND	021206	WX	020566		

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/ LSGFIT RCD 11/72
 ABS=13726
 ACZ=13702
 DECIN=12461
 DISADD=7660
 DISONE=10407
 DM=15220
 FADD=300000
 FBLKSV=15570
 FCIA=13652
 FCLA=13666
 FDAC=060000
 FDIY=700000
 FEXT=13112
 FINT=13051
 FLAC=200000
 FMUL=500000
 FRDISK=15571
 MESAG=7000
 MNOCO=7657
 NOCD=10344
 OMARK=6746
 READ=12366
 RETC=6257
 S=40000
 SPASNA=13657
 SGR=13752
 UNITS=15703

		.LOC	20000	
		.LIT	SINGU*3	
020000	012415	012415		/ MATRIX
020001	020007	MATRIX		
020002	425661	425661		/ INVERT
020003	020163	INVERT		
020004	461037	461037		/ GSHIFT
020005	021336	GSHIFT		
020006	000000	0		
020007	121660	MATRIX	(DECIN)	/ ARRAY #.
020010	040102	DAC	SUM	
020011	341661	TAD	(-12)	
020012	740300	SHA1SZA		
020013	621662	JMP*	(OMARK)	/ # TOO LARGE.
020014	200102	LAC	SUM	
020015	744010	RCL		/ MULT BY 3
020016	340102	TAD	SUM	
020017	361663	TAD*	(FBLKSV)	/ START BLK.
020020	040055	DAC	MATBLK	
020021	221664	LAC*	(DISONE)	
020022	361665	TAD*	(DISADD)	
020023	040062	DAC	SPOOK	
020024	776400	LAM	-1400	
020025	041052	DAC	NCTR	
020026	777777	LAM	-1	
020027	340054	TAD	SPECB	
020030	061666	DAC*	(12)	
020031	160012	DZN*	12	/ ZERO OUT BUFFER
020032	441052	ISZ	NCTR	

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020033	600031		JMP	.-2	
020034	221667		LAC*	(MNOCD)	/ -# OF CHANNELS
020035	041052		DAC	MCTR	
020036	200054		LAC	SPECB	
020037	040061		DAC	SPEC	
020040	121670		JMS*	(FINT)	
020041	260062		FLACIS*	SPOOK	/ CONVERT INTEGER
020042	020061		FDAC*	SPEC	/ TO FLOATING.
020043	121671		JMS*	(FEXT)	
020044	440062		ISZ	SPOOK	
020045	100526		JMS	INCSP	
020046	441052		ISZ	MCTR	/ DONE?
020047	600040		JMP	.-7	
020050	121672		JMS*	(UNITS)	
020051	421673		XCT*	(FRDISK+2)	/ YES WRITE DATA
020052	000000		0		
020053	776400		-1400		/ MC
020054	026400	SPECB	26400		/ CA
020055	000000	MATBLK	0		
020056	000005		5		/ WRITE
020057	621674		JMP*	(RETC)	
020060	000000	MPUT	0		
020061	000000	SPEC	0		
020062	000000	SPOOK	0		
020063	000000	UNK	0		
020064	025000	SPOOKB	25000		
020065	023400	MBUFU	23400		
020066	023000	MBUF	23000		
020067	000000	INV1	0		
020070	000000	CINV1	0		
020071	000000	INV2	0		
020072	000000	SCALE	0		
020073	000000	B	0		
020074	000000	BIG	0		
020075	000000		0		
020076	000000		0		
020077	000000	R	0		
020100	000000		0		
020101	000000		0		
020102	000000	SUM	0		
020103	000000		0		
020104	000000		0		
020105	020106	SCALEB	.-+1		
020106	000000	ZERO	0		
020107	000000		0		
020110	000000		0		
020111	000000	X1	0		
020112	000000		0		
020113	000000		0		
020114	000000	X2	0		
020115	000000		0		
020116	000000		0		
020117	000000	X3	0		
020120	000000		0		
020121	000000		0		
020122	000000	Y1	0		
020123	000000		0		
020124	000000		0		

020125	000000	Y2	0		
020126	000000		0		
020127	000000		0		
020130	000000	Y3	0		
020131	000000		0		
020132	000000		0		
020133	000000	AA	0		
020134	000000		0		
020135	000000		0		
020136	000000	BB	0		
020137	000000		0		
020140	000000		0		
020141	000000	CC	0		
020142	000000		0		
020143	000000		0		
020144	000000	T1	0		
020145	000000		0		
020146	000000		0		
020147	000000	T2	0		
020150	000000		0		
020151	000000		0		
020152	000000	MATRD	0		/ READ 1400 WORDS.
020153	040157		DAC	.+4	
020154	421673		XCT*	(FRDISK+2)	
020155	000000		0		
020156	776400		-1400		/ WC
020157	000000		0		/ CA
020160	000000		0		/ BLK #
020161	000003		3		
020162	620152		JMP*	MATRD	
020163	121660	INVERT	JMS*	(DECIN)	/ GET # OF STANDARDS.
020164	741200		SNA		
020165	621662		JMP*	(QMARK)	
020166	040067		DAC	INV1	
020167	740001		CMA		
020170	341675		TAD	(1)	
020171	040070		DAC	CINV1	
020172	341666		TAD	(12)	
020173	741100		SPA		/ TOO MANY?
020174	621662		JMP*	(QMARK)	/ YES
020175	221663		LAC*	(FBLKSV)	
020176	040055		DAC	MATBLK	
020177	040160		DAC	MATRD+6	
020200	121672		JMS*	(UNITS)	
020201	200065		LAC	MBUFU	
020202	100152		JMS	MATRD	/ READ IN UNKNOWN
020203	200066		LAC	MBUF	
020204	040060		DAC	MPUT	
020205	200105		LAC	SCALEB	
020206	040072		DAC	SCALE	
020207	201676		LAC	(16606)	
020210	040073		DAC	B	
020211	140071		DZH	INV2	
020212	40600		DZH	LSUB	
020213	440071	LP632	ISZ	INV2	/ DO 632 I=1.#OF STDS.
020214	200071		LAC	INV2	
020215	744010		RCL		/ MULT BY 3.
020216	340071		TAD	INV2	

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020217	340055		TAD	MATBLK	
020220	040160		DAC	MATRD+6	/ BLK #.
020221	200054		LAC	SPECB	
020222	100152		JMS	MATRD	/ READ SPEC.
020223	141123		DZM	INV3	
020224	441123	LP635	ISZ	INV3	/ DO 635 J=1,1
020225	201123		LAC	INV3	
020226	744010		RCL		/ *3
020227	341123		TAD	INV3	
020230	340055		TAD	MATBLK	
020231	040160		DAC	MATRD+6	/ BLK #.
020232	200054		LAC	SPECB	
020233	040061		DAC	SPEC	
020234	200064		LAC	SPOOKB	
020235	040062		DAC	SPOOK	
020236	100152		JMS	MATRD	/ READ SPOOK.
020237	200065		LAC	MBUFU	
020240	040063		DAC	UNK	
020241	221667		LAC*	(MNOCD)	
020242	041052		DAC	MCTR	/ DO 637 M=LL,UL
020243	121677		JMS*	(FCLA)	
020244	121670		JMS*	(FINT)	
020245	000102		FDAC	SUM	/ SUM=0.0
020246	220061		FLAC*	SPEC	
020247	520062		FMUL*	SPOOK	
020250	720063		FDIV*	UNK	
020251	300102		FADD	SUM	/ SUM=SUM+SPEC*SPOOK/UNK
020252	100520		JMS	INCPT	
020253	100555		JMS	INCUNK	
020254	441052		ISZ	MCTR	/ DONE?
020255	600245		JMP	.-10	/ NO
020256	020060		FDAC*	MPUT	/ A(L)=SUM
020257	121671		JMS*	(FEXT)	
020260	440600		ISZ	LSUB	
020261	100550		JMS	INCPUT	
020262	200071		LAC	INV2	
020263	541123		SAD	INV3	
020264	741000		SKP		
020265	600224		JMP	LP635	
020266	121670		JMS*	(FINT)	
020267	121700		JMS*	(SQR)	
020270	020072		FDAC*	SCALE	
020271	121671		JMS*	(FEXT)	
020272	221667		LAC*	(MNOCD)	
020273	041052		DAC	MCTR	/ DO 648 M=LL,UL
020274	200054		LAC	SPECB	
020275	040061		DAC	SPEC	
020276	121670		JMS*	(FINT)	
020277	121677		JMS*	(FCLA)	
020300	000102		FDAC	SUM	/ SUM=0.0
020301	220061		FLAC*	SPEC	
020302	300102		FADD	SUM	/ SUM=SUM+SPEC
020303	100526		JMS	INCSP	
020304	441052		ISZ	MCTR	/ DONE?
020305	600300		JMP	.-5	/ NO
020306	720072		FDIV*	SCALE	
020307	100610		JMS	MODE2	
020310	020073		FDAC*	B	

020311	121671	JMS*	(FEXT)	
020312	100533	JMS	INCSB	
020313	200071	LAC	INV2	
020314	540067	SAD	INV1	
020315	741000	SKP		
020316	600213	JMP	LP632	
020317	100616	JMS	SCALA	/ SCALE A.
020320	100662	JMS	OMAIN	
020321	100616	JMS	SCALA	/ RE-SCALE A
020322	201676	LAC	(16606)	
020323	040073	DAC	B	
020324	200105	LAC	SCALEB	
020325	040072	DAC	SCALE	
020326	200070	LAC	CINV1	
020327	041052	DAC	MCTR	/ DO 662 I=1, #OF STDS.
020330	121670	JMS*	(FINT)	
020331	100610	JMS	MODE2	
020332	220073	LP662	FLAC*	B
020333	100613	JMS	MODE3	
020334	720072	FDIV*	SCALE	
020335	100610	JMS	MODE2	
020336	020073	FDAC*	B	/ B=B/SCALE
020337	100533	JMS	INCSB	
020340	441052	ISZ	MCTR	
020341	600332	JMP	LP662	
020342	121671	JMS*	(FEXT)	
020343	201676	LAC	(16606)	
020344	040073	DAC	B	
020345	777777	LAW	-1	
020346	340054	TAD	SPECB	
020347	061666	DAC*	(12)	
020350	776400	LAW	-1400	
020351	041052	DAC	MCTR	
020352	150012	DZH*	12	/ SPEC=0.0
020353	441052	ISZ	MCTR	
020354	600352	JMP	.-2	
020355	140071	DZH	INV2	
020356	440071	LP830	ISZ	/ DO 830 I=1, #OF STDS.
020357	200071	LAC	INV2	
020360	744010	RCL		/ MULT BY 3.
020361	340071	TAD	INV2	
020362	340055	TAD	MATBLK	
020363	040160	DAC	MATRD+6	/ BLK # OF SPECTRUM
020364	200054	LAC	SPOOKB	
020365	040062	DAC	SPOOK	
020366	100152	JMS	MATRD	
020367	200054	LAC	SPECB	
020370	040061	DAC	SPEC	
020371	221667	LAC*	(MHOC)	
020372	041052	DAC	MCTR	/ DO 829 J=LL,UL
020373	121670	JMS*	(FINT)	
020374	220062	LP829	FLAC*	SPOOK
020375	100610	JMS	MODE2	
020376	520073	FMUL*	B	
020377	100613	JMS	MODE3	
020400	320061	FADD*	SPEC	/ SPEC=SPEC+B*SPOOK
020401	020061	FDAC*	SPEC	
020402	100520	JMS	INCPT	

020403	441052	ISZ	MCTR	
020404	600374	JMP	LP829	
020405	121671	JMS*	(FEXT)	
020406	200071	LAC	INV2	
020407	540067	SAD	INVI	
020410	600413	JMP	.+3	
020411	100544	JMS	INCB	
020412	600356	JMP	LP830	
020413	221665	LAC*	(DISADD)	
020414	341701	TAD	(37400)	/ F BKG. BUFFER
020415	940080	DAC	MPUT	
020416	200065	LAC	MBUFU	
020417	040062	DAC	SPOOK	
020420	200054	LAC	SPECB	
020421	040061	DAC	SPEC	
020422	221667	LAC*	(MNOCD)	
020423	041052	DAC	MCTR	/ DO 831 I=LL,UL
020424	121670	JMS*	(FINT)	
020425	121677	JMS*	(FCLA)	
020426	000077	LP831	FDAC	R / R=0.0
020427	220061	FLAC*	SPEC	
020430	121702	JMS*	(FCIA)	
020431	320062	FADD*	SPOOK	
020432	060060	FDACIS*	MPUT	/ F DISPLAY = RESIDUALS.
020433	000102	FDAC	SUM	
020434	500102	FMUL	SUM	
020435	720062	FDIV*	SPOOK	
020436	300077	FADD	R	/ R=R*(RES*RES)/UNK
020437	440060	ISZ	MPUT	
020440	100520	JMS	INCPT	
020441	441052	ISZ	MCTR	
020442	600426	JMP	LP831	
020443	000077	FDAC	R	
020444	240067	FLACIS	INVI	
020445	121702	JMS*	(FCIA)	
020446	361703	FADDIS*	(NOCD)	
020447	000162	FDAC	SUM	/ SUM=UL-LL-#OF STDS.
020450	121671	JMS*	(FEXT)	
020451	201704	LAC	(16636)	
020452	040073	DAC	B	
020453	140505	DZN	L	
020454	200070	LAC	CINVI	
020455	041052	DAC	MCTR	
020456	121670	JMS*	(FINT)	
020457	200077	FLAC	R	
020460	700102	FDIV	SUM	
020461	000102	FDAC	SUM	
020462	100477	LP840	JMS	AADRS
020463	220060	FLAC*	MPUT	
020464	121705	JMS*	(ABS)	/ ABS(A)
020465	500102	FMUL	SUM	
020466	121700	JMS*	(SQR)	/ STD. DEV. = SQRT(ABS(A)*R/SUM)
020467	100610	JMS	MODE2	
020470	020073	FDAC*	B	
020471	100613	JMS	MODE3	
020472	100544	JMS	INCB	
020473	441052	ISZ	MCTR	
020474	600462	JMP	LP840	

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020475	121671		JMS*	(FEXT)
020476	621674		JMP*	(RETC)
020477	000000	AADRS	0	
020500	440505		ISZ	L
020501	744000		CLL	
020502	200505		LAC	L
020503	341675		TAD	(1)
020504	853122		MUL	
020505	000000	L	0	
020506	641002		LACQ	
020507	744020		RCR	
020510	341706		TAD	(-1)
020511	041123		DAC	INV3
020512	744010		RCL	
020513	341123		TAD	INV3
020514	041123		DAC	INV3
020515	340066		TAD	MBUF
020516	040080		DAC	MPUT
020517	620477		JMP*	AADRS
020520	000000	INCPT	0	
020521	440062		ISZ	SPOOK
020522	440062		ISZ	SPOOK
020523	440062		ISZ	SPOOK
020524	100526		JMS	INCSP
020525	620520		JMP*	INCPT
020526	000000	INCSP	0	
020527	440061		ISZ	SPEC
020530	440061		ISZ	SPEC
020531	440061		ISZ	SPEC
020532	620526		JMP*	INCSP
020533	000000	INCSB	0	
020534	100537		JMS	INCS
020535	100544		JMS	INCB
020536	620533		JMP*	INCSB
020537	000000	INCS	0	
020540	440072		ISZ	SCALE
020541	440072		ISZ	SCALE
020542	440072		ISZ	SCALE
020543	620537		JMP*	INCS
020544	000000	INCB	0	
020545	440073		ISZ	B
020546	440073		ISZ	B
020547	620544		JMP*	INCB
020550	000000	INCPUT	0	
020551	440060		ISZ	MPUT
020552	440060		ISZ	MPUT
020553	440060		ISZ	MPUT
020554	620550		JMP*	INCPUT
020555	000000	INCUNK	0	
020556	440063		ISZ	UNK
020557	440063		ISZ	UNK
020560	440063		ISZ	UNK
020561	620555		JMP*	INCUNK
020562	000000	JMTOKN	0	
020563	200505		LAC	L
020564	040577		DAC	KI
020565	341706		TAD	(-1)
020566	040576		DAC	K

/ START ADRS OF A.

/ INC. SCALE AND B.

020567	744310		RCL		
020570	340576		TAD		/ MULT BY 3.
020571	040576		DAC	K	
020572	201123		LAC	K	
020573	040575		DAC	INV3	
020574	620562		JMP*	N	
020575	000000			JHTOKN	
020576	000000	N	0		
020577	000000	K	0		
020600	000000	K1	0		
020601	000000	LSUB	0		
020602	220012	IFRL	0		
020603	741200		LAC*	12	
020604	461670		SMA		/ SKIP IF TRUE
020605	620601		ISZ*	(FINT)	
020606	026517		JMP*	IFRL	
020607	000000	RL	26517		/ SPECB+120
020610	000000	KM1	0		
020611	461707	MODE2	0		
020612	620610		ISZ*	(DM)	
020613	000000		JMP*	MODE2	
020614	161707	MODE3	0		
020615	620613		DZM*	(DM)	
020616	000000		JMP*	MODE3	
020617	200105	SCALA	0		
020620	040072		LAC	SCALEB	
020621	040063		DAC	SCALE	
020622	200066		DAC	UNK	
020623	040060		LAC	MBUF	
020624	140061		DAC	MPUT	
020625	140062		DZM	SPEC	
020626	200600		DZM	SPOOK	
020627	740001		LAC	LSUB	
020630	341675		CHA		
020631	041052		TAD	(I)	
020632	121670	LP655	DAC	MCTR	/ DO 655 I=1..L
020633	220072		JMS*	(FINT)	
020634	520063		FLAC*	SCALE	
020635	000102		FMUL*	UNK	
020636	220060		FDAC	SUM	
020637	700102		FLAC*	MPUT	
020640	020060		FDIV	SUM	
020641	121671		FDAC*	MPUT	/ A=A/(SCALE(M)*SCALE(J))
020642	200061		JMS*	(FEXT)	
020643	540062		LAC	SPEC	
020644	741000		SAD	SPOOK	/ M=J?
020645	600854		SKP		/ YES
020646	440062		JMP	.+7	
020647	100555		ISZ	SPOOK	
020650	140061		JMS	INCUNK	
020651	200105		DZM	SPEC	
020652	040072		LAC	SCALEB	
020653	600856		DAC	SCALE	
020654	440061		JMP	.+3	
020655	100537		ISZ	SPEC	
020656	100550		JMS	INCS	
020657	441052		JMS	INCPUT	
020660	600632		ISZ	MCTR	
			JMP	LP655	

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020661 620616      JMP*   SCALA
020662 000000      OMAIN  0
020663 200606      LAC    RL
020664 061666      DAC*   (12)
020665 777764      LAW    -14
020666 041052      DAC    MCTR
020667 160012      OZM*   12      / RL(1) = FALSE
020670 441052      ISZ    MCTR
020671 600667      JMP    .-2
020672 140071      OZM    INV2
020673 440071      LP20   ISZ    INV2      / DO 80 I=1, #OF STDS.
020674 140505      OZM    L
020675 200070      LAC    CINV1
020676 041052      DAC    MCTR
020677 200606      LAC    RL
020700 061666      DAC*   (12)
020701 121670      JMS*   (FINT)
020702 121677      JMS*   (FCLA)
020703 000074      FOAC   BIG      / BIG=0.0
020704 100477      LP20   JMS*   AADRS   / DO 20 J=1, #OF STDS.
020705 220060      FLAC*  MPUT
020706 121705      JMS*   (ABS)
020707 000102      FOAC   SUM
020710 200074      FLAC   BIG
020711 121702      JMS*   (FCIA)
020712 300102      FADD   SUM
020713 121710      JMS*   (SPASNA) / IF (ABS(A(M)-BIG) 20.20.15
020714 600723      JMP    .+7
020715 100601      JMS*   IFRL
020716 600724      JMP    .+6
020717 200102      FLAC   SUM
020720 000074      FOAC   BIG
020721 100562      JMS*   JHTOKN
020722 600724      JMP    .+2
020723 461666      ISZ*   (12)
020724 441052      ISZ    MCTR
020725 600704      JMP    LP20
020726 200074      FLAC   BIG
020727 121710      JMS*   (SPASNA)
020730 601332      JMP    L100-1 / SINGULAR MATRIX
020731 121671      JMS*   (FEXT)
020732 200576      LAC    K
020733 340054      TAD    SPECB
020734 040061      DAC    SPEC      / P(K)
020735 341711      TAD    (44)
020736 040072      DAC    SCALE     / Q(K)
020737 200577      LAC    K1
020740 340606      TAD    RL
020741 041123      DAC    INV3     / RL(K)
020742 200575      LAC    N
020743 340066      TAD    MBUF
020744 040060      DAC    MPUT
020745 121670      JMS*   (FINT)
020746 241673      FLACIS (1)
020747 020061      FOAC*  SPEC      / P(K)=1.0
020750 720060      FDIV*  MPUT
020751 020072      FOAC*  SCALE     / Q(K)=1.0/A(N)
020752 121677      JMS*   (FCLA)

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020753	020060		FDAC*	MPUT	/ A(N)=0.0
020754	121671		JMS*	(FEXT)	
020755	461123		ISZ*	INV3	/ RL=TRUE
020756	200577		LAC	K1	
020757	341675		TAD	(1)	
020760	041256		DAC	KPI	
020761	341712		TAD	(-2)	
020762	040607		DAC	KMI	
020763	741100		SPA		/ IF(KMI) 100.45.30
020764	601333		JMP	L100	
020765	741201		SNAICMA		
020766	601024		JMP	L45	
020767	341675		TAD	(1)	
020770	041052		DAC	MCTR	
020771	200054		LAC	SPECB	
020772	040061		DAC	SPEC	/ P
020773	341711		TAD	(44)	
020774	040062		DAC	SPOOK	/ Q
020775	200606		LAC	RL	
020776	061666		DAC*	(12)	
020777	750001		CLC		
021000	340607		TAD	KMI	
021001	040505		DAC	L	
021002	100477		JMS	AADRS	
021003	121670		JMS*	(FINT)	
021004	100550	LP40	JMS	INCPUT	
021005	220060		FLAC*	MPUT	
021006	020061		FDAC*	SPEC	/ P(J)=A(M)
021007	520072		FMUL*	SCALE	
021010	020062		FDAC*	SPOOK	/ Q(J)=P(J)*Q(K)
021011	121677		JMS*	(FCLA)	
021012	020060		FDAC*	MPUT	/ A(M)=0.0
021013	100601		JMS	IFRL	
021014	601020		JMP	.+4	
021015	220062		FLAC*	SPOOK	
021016	121702		JMS*	(FCIA)	
021017	020062		FDAC*	SPOOK	/ Q(J)=-Q(J)
021020	100520		JMS	INCPT	
021021	441052		ISZ	MCTR	
021022	601004		JMP	LP40	
021023	121671		JMS*	(FEXT)	
021024	200070	L45	LAC	CINVI	
021025	340577		TAD	K1	
021026	741200		SNA		/ IF(K1-NDIM) 50. .100
021027	601111		JMP	L65	
021030	740100		SMA		
021031	601333		JMP	L100	
021032	201256		LAC	KPI	
021033	041052		DAC	MCTR	
021034	200577		LAC	K1	
021035	040505		DAC	L	
021036	744010		RCL		
021037	340577		TAD	K1	
021040	340054		TAD	SPECB	
021041	040061		DAC	SPEC	/ P
021042	341711		TAD	(44)	
021043	040062		DAC	SPOOK	/ Q
021044	200606		LAC	RL	

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021045	340577		TAD	K1	
021046	061666		DAC*	(12)	/ RL
021047	200505	LP60	LAC	L	
021050	744000		CLL		
021051	653122		MUL		
021052	000000	HCTR	0		
021053	641002		LACQ		
021054	744020		RCR		
021055	340577		TAD	K1	
021056	341706		TAD	(-1)	
021057	040477		DAC	AADRS	
021060	744010		RCL		
021061	340477		TAD	AADRS	
021062	340066		TAD	MBUF	
021063	040060		DAC	MPUT	
021064	440505		ISZ	L	
021065	121670		JMS*	(FINT)	
021066	220060		FLAC*	MPUT	
021067	121702		JMS*	(FCIA)	
021070	020061		FDAC*	SPEC	/ P(J)=-A(M)
021071	520072		FMUL*	SCALE	
021072	020062		FDAC*	SPOOK	/ Q(J)=P(J)*Q(K)
021073	121677		JMS*	(FCLA)	
021074	020060		FDAC*	MPUT	/ A(M)=0.0
021075	100601		JMS	IFRL	
021076	601102		JMP	.+4	
021077	220061		FLAC*	SPEC	
021100	121702		JMS*	(FCIA)	
021101	020061		FDAC*	SPEC	/ P(J)=-P(J)
021102	121671		JMS*	(FEXT)	
021103	100520		JMS	INCPT	
021104	201052		LAC	MCTR	
021105	441052		ISZ	MCTR	
021106	540067		SAD	INVI	
021107	741000		SKP		
021110	601047		JMP	LP60	
021111	141052	L65	DZH	MCTR	
021112	200054		LAC	SPECB	
021113	040061		DAC	SPEC	/ P
021114	441052	LP70	ISZ	MCTR	/ DO 70 J=1,NDIM
021115	201052		LAC	MCTR	
021116	041123		DAC	INV3	/ DO 70 K=J,NDIM
021117	750001		CLC		
021120	341123		TAD	INV3	
021121	744000		CLL		
021122	653122		MUL		
021123	000000	INV3	0		
021124	641002		LACQ		
021125	744020		RCR		
021126	341052		TAD	MCTR	
021127	341706		TAD	(-1)	
021130	040073		DAC	B	
021131	744010		RCL		
021132	340073		TAD	B	
021133	340066		TAD	MBUF	
021134	040060		DAC	MPUT	/ A(M)
021135	750001		CLC		
021136	341123		TAD	INV3	

021137	040073		DAC	B	
021140	744010		RCL		
021141	340073		TAD	B	
021142	340054		TAD	SPECB	
021143	341711		TAD	(44)	
021144	040062		DAC	SPOOK	/ Q(K)
021145	121670		JMS*	(FINT)	
021146	220061		FLAC*	SPEC	
021147	520062		FMUL*	SPOOK	
021150	320060		FADD*	MPUT	
021151	020060		FDAC*	MPUT	/ A(H)=A(H)+P(J)*Q(K)
021152	121671		JMS*	(FEXT)	
021153	200067		LAC	INVI	
021154	541123		SAD	INV3	
021155	601160		JMP	.+3	
021156	441123		ISZ	INV3	
021157	601117		JMP	LP70+3	
021160	541052		SAD	MCTR	
021161	601164		JMP	.+3	
021162	100526		JMS	INCSP	
021163	601114		JMP	LP70	
021164	540071		SAD	INV2	
021165	741000		SKP		
021166	600673		JMP	LP80	
021167	200054		LAC	SPECB	
021170	040061		DAC	SPEC	/ P(K)
021171	140071		DZM	INV2	
021172	200071	LP90	LAC	INV2	/ DO 90 K=1,NDIM
021173	041200		DAC	.+5	
021174	341675		TAD	(1)	
021175	040071		DAC	INV2	
021176	744000		CLL		
021177	653122		MUL		
021200	000000		0		
021201	641002		LACQ		
021202	744020		RCR		/ M=K*(K-1)/2
021203	040060		DAC	MPUT	
021204	744010		RCL		
021205	340060		TAD	MPUT	
021206	340066		TAD	MBUF	
021207	040060		DAC	MPUT	
021210	200071		LAC	INV2	
021211	341675		TAD	(1)	
021212	041256		DAC	KPI	/ KPI=K+1
021213	200071		LAC	INV2	
021214	740001		CMA		
021215	341675		TAD	(1)	
021216	041052		DAC	MCTR	
021217	040505		DAC	L	
021220	201676		LAC	(16606)	
021221	040073		DAC	B	
021222	121670		JMS*	(FINT)	
021223	121677		JMS*	(FCLA)	
021224	020061		FDAC*	SPEC	/ P(K)=0.0
021225	220060	LP91	FLAC*	MPUT	/ DO 91 I=1,K
021226	100610		JMS	MODE2	
021227	520073		FMUL*	B	
021230	100613		JMS	MODE3	

021231	320061		FADD*	SPEC	
021232	020061		FDAC*	SPEC	/ P(K)=P(K)+B(I)*A(M)
021233	100544		JMS	INCB	
021234	100550		JMS	INCPUT	
021235	441052		ISZ	MCTR	
021236	601225		JMP	LP91	
021237	121671		JMS*	(FEXT)	
021240	200505		LAC	L	
021241	340067		TAD	INV1	
021242	741100		SPA		/ IF(NDIM-K)100,90,93
021243	601333		JMP	L100	
021244	741200		SNA		
021245	601306		JMP	L90	
021246	200071		LAC	INV2	
021247	744010		RCL		
021250	341676		TAD	(16606)	
021251	040073		DAC	B	
021252	750001	LP92	CLC		/ DO 92 I=KPI,NDIM
021253	341256		TAD	KPI	
021254	744000		CLL		
021255	653122		MUL		
021256	000000	KP1	0		
021257	641002		LACQ		
021260	744020		RCR		
021261	340071		TAD	INV2	/ M=K+I*(I-1)/2
021262	341706		TAD	(-1)	
021263	040505		DAC	L	
021264	744010		RCL		
021265	340505		TAD	L	
021266	340066		TAD	M8UF	
021267	040060		DAC	MPUT	
021270	121670		JMS*	(FINT)	
021271	100610		JMS	MODE2	
021272	220073		FLAC*	B	
021273	100613		JMS	MODE3	
021274	520060		FMUL*	MPUT	
021275	320061		FADD*	SPEC	
021276	020061		FDAC*	SPEC	/ P(K)=P(K)+B(I)*A(M)
021277	121671		JMS*	(FEXT)	
021300	100544		JMS	INCB	
021301	201256		LAC	KPI	
021302	441256		ISZ	KPI	
021303	540057		SAD	INV1	
021304	741000		SKP		
021305	601252		JMP	LP92	
021306	100526	L90	JMS	INCSP	
021307	200067		LAC	INV1	
021310	540071		SAD	INV2	
021311	741000		SKP		
021312	601172		JMP	LP90	
021313	200070		LAC	CINV1	
021314	041052		DAC	MCTR	
021315	201676		LAC	(16606)	
021316	040073		DAC	B	/ B
021317	200054		LAC	SPECB	
021320	040072		DAC	SCALE	/ P
021321	121670	LP95	JMS*	(FINT)	
021322	229072		FLAC*	SCALE	

021323	100610		JMS	MODE2	
021324	020073		FDAC*	B	/ B=P
021325	121671		JMS*	(FEXT)	
021326	100533		JMS	INCSB	
021327	441052		ISZ	MCTR	
021330	601321		JMP	LP95	
021331	620662		JMP*	DMAIN	
021332	121671		JMS*	(FEXT)	
021333	761655	L100	LAW	SINGU	
021334	121713		JMS*	(MESAG)	
021335	621674		JMP*	(RETC)	
021336	141052	GSHIFT	DZH	MCTR	/ 11=0
021337	750001		CLC		
021340	361664		TAD*	(DISONE)	
021341	361665		TAD*	(DISADD)	
021342	040073		DAC	B	
021343	201644		LAC	FNOP-1	
021344	041373		DAC	GSH1	/ SET POSITIVE.
021345	041402		DAC	GSH2	
021346	121714		JMS*	(READ)	
021347	740200		SZA		
021350	541715		SAD	(40)	/ END OF INPUT?
021351	601366		JMP	GSH0	/ YES BOTH POS.
021352	541716		SAD	(53)	
021353	601356		JMP	.+3	
021354	201404		LAC	SIGN	/ GAIN NEGATIVE.
021355	041373		DAC	GSH1	
021356	121714		JMS*	(READ)	
021357	740200		SZA		
021360	541715		SAD	(40)	
021361	601366		JMP	GSH0	
021362	541716		SAD	(53)	
021363	601366		JMP	.+3	
021364	201404		LAC	SIGN	/ ZERO NEGATIVE
021365	041402		DAC	GSH2	
021366	121670	GSH0	JMS*	(FINT)	
021367	121677		JMS*	(FCLA)	
021370	000102		FDAC	SUM	/ SUM=0.0
021371	221717		FLAC*	(16600)	
021372	721720		FDIV*	(16603)	
021373	101645	GSH1	JMS	FNOP	
021374	341675		FADDIS	(1)	
021375	000077		FDAC	R	/ RATIO
021376	100610		JMS	MODE2	
021377	221676		FLAC*	(16606)	
021400	721721		FDIV*	(16610)	
021401	100613		JMS	MODE3	
021402	101645	GSH2	JMS	FNOP	
021403	000106		FDAC	ZERO	/ ZERO
021404	121702	SIGN	JMS*	(FCIA)	
021405	361703		FADDIS*	(NOCD)	
021406	500077		FMUL	R	
021407	301652		FADD	F.5	
021410	040505		FDACIS	L	/ L=RATIO*(256-ZERO)+.5
021411	121702		JMS*	(FCIA)	
021412	361703		FADDIS*	(NOCD)	
021413	121710		JMS*	(SPASNA)	/ IF(L.GT.256) L=256
021414	101620		JMS	LP400	

021415	101631	L95P	JMS	ASPOOK	
021416	200102		FLAC	SUM	
021417	341675		FADDIS	(1)	
021420	000102		FDAC	SUM	/ SUM=SUM+1.0
021421	700077		FDIV	R	
021422	300106		FADD	ZERO	
021423	000074		FDAC	BIG	/ BIG=SUM/RATIO+ZERO
021424	301647		FADD	FMI	
021425	121710		JMS*	(SPASNA)	/ IF(BIG-1.) 105,105,100
021426	601434		JMP	L105P	
021427	301647		FADD	FMI	
021430	121710		JMS*	(SPASNA)	/ IF(BIG-2.) 110,115,115
021431	101624		JMS	ACZERO	
021432	601457		JMP	L115P	
021433	601440		JMP	L110P	
021434	260061	L105P	FLACIS*	SPEC	
021435	700077		FDIV	R	
021436	020062		FDAC*	SPOOK	/ SPOOK(11)=SPEC(1)/RATIO
021437	601415		JMP	L95P	
021440	241675	L110P	FLACIS	(1)	
021441	000111		FDAC	X1	/ X1=1
021442	341675		FADDIS	(1)	
021443	000114		FDAC	X2	/ X2=2
021444	341675		FADDIS	(1)	
021445	000117		FDAC	X3	/ X3=3
021446	260061		FLACIS*	SPEC	
021447	000122		FDAC	Y1	/ Y1=SPEC(1)
021450	440061		ISZ	SPEC	
021451	260061		FLACIS*	SPEC	
021452	000125		FDAC	Y2	/ Y2=SPEC(2)
021453	440061		ISZ	SPEC	
021454	260061		FLACIS*	SPEC	
021455	000130		FDAC	Y3	/ Y3=SPEC(3)
021456	601511		JMP	L125P	
021457	200074	L115P	FLAC	BIG	
021460	301652		FADD	F.5	
021461	040576		FDACIS	K	/ K=BIG+.5
021462	121671		JMS*	(FEXT)	
021463	221667		LAC*	(MNOCD)	
021464	340576		TAD	K	
021465	750301		SMAISZAICLC		/ IF(K.GT.256) GOTO 136
021466	601603		JMP	L136P	
021467	340576		TAD	K	
021470	340073		TAD	B	
021471	040061		DAC	SPEC	
021472	121670		JMS*	(FINT)	
021473	260061		FLACIS*	SPEC	
021474	000122		FDAC	Y1	/ Y1=SPEC(K-1)
021475	440061		ISZ	SPEC	
021476	260061		FLACIS*	SPEC	
021477	000125		FDAC	Y2	/ Y2=SPEC(K)
021500	440061		ISZ	SPEC	
021501	260061		FLACIS*	SPEC	
021502	000130		FDAC	Y3	/ Y3=SPEC(K+1)
021503	240576		FLACIS	K	
021504	000114		FDAC	X2	/ X2=K
021505	301647		FADD	FMI	/ X1=K-1
021506	000111		FDAC	X1	

021507 341722
 021510 000117
 021511 200125
 021512 541722
 021513 121702
 021514 300130
 021515 300122
 021516 741722
 021517 000133
 021520 200117
 021521 300114
 021522 500122
 021523 121702
 021524 000144
 021525 200111
 021526 300117
 021527 500125
 021530 541722
 021531 000147
 021532 200114
 021533 300111
 021534 500130
 021535 121702
 021536 300144
 021537 300147
 021540 741722
 021541 000136
 021542 200111
 021543 500114
 021544 500130
 021545 000144
 021546 241722
 021547 500111
 021550 500117
 021551 500125
 021552 121702
 021553 000147
 021554 200114
 021555 500117
 021556 500122
 021557 300144
 021560 300147
 021561 741722
 021562 000141
 021563 200133
 021564 500074
 021565 300136
 021566 500074
 021567 300141
 021570 700077
 021571 020052
 021572 121671
 021573 201052
 021574 740001
 021575 341675
 021576 340505
 021577 741300
 021600 601603

L125P

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FADDIS (2)
FDAC X3 / X3=K+1
FLAC Y2
FMULIS (2)
JMS* (FCIA)
FADD Y3
FADD Y1
FDIVIS (2)
FDAC AA / AA=(Y3-2*Y2+Y1)/2.0
FLAC X3
FADD X2
FMUL Y1
JMS* (FCIA)
FDAC T1 / -Y1*(X3+X2)
FLAC X1
FADD X3
FMUL Y2
FMULIS (2)
FDAC T2 / 2*Y2+(X1+X3)
FLAC X2
FADD X1
FMUL Y3
JMS* (FCIA) / -Y3*(X2+X1)
FADD T1
FADD T2
FDIVIS (2)
FDAC BB
FLAC X1
FMUL X2
FMUL Y3
FDAC T1
FLACIS (2)
FMUL X1
FMUL X3
FMUL Y2
JMS* (FCIA)
FDAC T2
FLAC X2
FMUL X3
FMUL Y1
FADD T1
FADD T2
FDIVIS (2)
FDAC CC / CC=(X1*X2*Y3-2*X1*X3*Y2+X2*X3*Y1)/2.0
FLAC AA
FMUL BIG
FADD BB
FMUL BIG
FADD CC
FDIV R
FDAC* SPOOK / SPOOK(11)=(BIG*(AA*BIG+BB)+CC)/R
JMS* (FEXT)
LAC MCTR
CMA
TAD (1)
TAD L
SPAISNA
JMP .+3
    
```

021601	121670		JMS*	(FINT)	
021602	601415		JMP	L95P	
021603	200064	L136P	LAC	SPOOKB	
021604	040061		DAC	SPEC	
021605	221667		LAC*	(MNOCD)	
021606	041052		DAC	MCTR	
021607	121670		JMS*	(FINT)	
021610	220061		FLAC*	SPEC	
021611	440073		ISZ	B	
021612	060073		FDACIS*	B	
021613	100526		JMS	INCSP	
021614	441052		ISZ	MCTR	
021615	601610		JMP	.-5	
021616	121671		JMS*	(FEXT)	
021617	621674		JMP*	(RETC)	
021620	000000	LP400	0		
021621	221703		LAC*	(NOCD)	
021622	040505		DAC	L	
021623	621620		JMP*	LP400	
021624	000000	ACZERO	0		
021625	121723		JMS*	(ACZ)	/ AC ZERO?
021626	621624		JMP*	ACZERO	/ YES
021627	461670		ISZ	(FINT)	
021630	621624		JMP*	ACZERO	/ NO
021631	000000	ASPOOK	0		
021632	200073		LAC	B	
021633	341675		TAD	(1)	
021634	040061		DAC	SPEC	
021635	201052		LAC	MCTR	
021636	744010		RCL		
021637	341052		TAD	MCTR	
021640	441052		ISZ	MCTR	
021641	340064		TAD	SPOOKB	
021642	040062		DAC	SPOOK	
021643	621631		JMP*	ASPOOK	
021644	101645		JMS	FNOP	
021645	000000	FNOP	0		
021646	621645		JMP*	FNOP	
021647	000000	FMI	0		
021650	600000		600000		
021651	000001		1		
021652	000000	F.5	0		
021653	200000		200000		
021654	000000		0		
021655	231116	SINGU	231116		/ SINGULAR
021656	072514		072514		
021657	012200		012200		
			.END		
021660	012461				
021661	777766				
021662	006746				
021663	015570				
021664	010407				
021665	007660				
021666	000012				
021667	007657				
021670	013051				
021671	013112				

03/01/73 LSOFIT RCD 11/72

*** PDP9/15 ASSEMBLY LISTING ***

PAGE NO. 18

021672	015703
021673	015573
021674	006257
021675	000001
021676	016606
021677	013666
021700	013752
021701	037400
021702	013652
021703	010344
021704	016636
021705	013726
021706	777777
021707	015220
021710	013657
021711	000044
021712	777776
021713	007000
021714	012366
021715	000040
021716	000053
021717	016600
021720	016603
021721	016610
021722	000002
021723	013702

AA	020133	LP655	020632	X1	020111
AADRS	020477	LP662	020332	X2	020114
ABS	013726	LP70	021114	X3	020117
ACZ	013702	LP80	020673	Y1	020122
ACZERO	021624	LP829	020374	Y2	020125
ASPOOK	021631	LP830	020356	Y3	020130
B	020073	LP831	020426	ZERO	020106
BB	020136	LP840	020462		
BIG	020074	LP90	021172		
CC	020141	LP91	021225		
CINVI	020070	LP92	021252		
DECIN	012461	LP95	021321		
DISADD	007660	LSUB	020600		
DISONE	010407	L100	021333		
DM	015220	L105P	021434		
DMAIN	020662	L110P	021440		
F.S	021652	L115P	021457		
FADD	300000	L125P	021511		
FBLKSV	015570	L136P	021603		
FCIA	013652	L45	021024		
FCLA	013666	L65	021111		
FOAC	000000	L90	021306		
FDI	700000	L95P	021415		
FEXT	013112	MATBLK	020055		
FINT	013051	MATRD	020152		
FLAC	200000	MATRIX	020007		
FMJL	500000	MBUF	020066		
FMJ	021647	MBUFU	020065		
FNOP	021645	MCTR	021052		
FROISK	015571	MESAG	007000		
GSHIFT	021336	MNOC0	007657		
GSH0	021366	MGDE2	020610		
GSH1	021373	MODE3	020613		
GSH2	021402	MPUT	020060		
IFRL	020601	N	020575		
INCB	020544	NOC0	010344		
INCPT	020520	QHARK	006746		
INCPUT	020550	R	020077		
INCS	020537	READ	012366		
INCSB	020533	RETC	006257		
INCSP	020526	RL	020606		
INCUNK	020555	S	040000		
INVERT	020163	SCALA	020616		
INVI	020067	SCALE	020072		
INV2	020071	SCALEB	020105		
INV3	021123	SIGN	021404		
JMTOXN	020562	SINGU	021655		
K	020576	SPASNA	013657		
KM1	020607	SPEC	020061		
KP1	021256	SPECB	020054		
K1	020577	SPOOK	020062		
L	020505	SPCOKB	020064		
LP20	020704	SQR	013752		
LP40	021004	SUM	020102		
LP400	021620	T1	020144		
LP60	021047	T2	020147		
LP632	020213	UNITS	015703		
LP635	020224	UNK	020063		


```

RETC=6257
      .LOC      20000
      .LIT      MAGCON+1
/DECTAPE FORMAT GENERATOR - PDP-9 TC02 TU55
/TAPE 1
020000      415276
020001      020003
020002      000000
020003      122116
020004      731026
020005      101006
020006      761056
020007      101006
020010      122117
020011      042113
020012      741200
020013      622120
020014      342121
020015      744100
020016      622120
020017      202113
020020      742020
020021      742020
020022      042113
020023      122116
020024      761070
020025      101006
020026      122122
020027      542114
020030      600124
020031      542063
020032      600036
020033      760277
020034      122123
020035      600023
020036      122116
020037      761137
020040      101006
020041      122117
020042      042041
020043      340357
020044      740100
020045      600051
020046      761740
020047      101006
020050      600037
020051      122116
020052      761150
020053      101006
020054      122117

      415276
      BEGIN
      0
      BEGIN      JMS*      (CRLF)
                  LAW      MESS1
                  JMS      MESSAGE      /TYPEOUT FIRST MESSAGE
                  LAW      MESS2
                  JMS      MESSAGE      /TYPE OUT SECOND MESSAGE
                  JMS*     (DECIN)
                  DAC      UNIT      /RETURN WITH UNIT NUMBER
                  SNA
                  JMP*     (QMARK)
                  TAD      (-7)
                  SMAICLL      / LESS THAN 7?
                  JMP*     (QMARK)      / NO.
                  LAC      UNIT
                  RTR
                  RTR      /YES, MOVE IT
                  RTR      / 4 RIGHT
                  DAC      UNIT      /AND STORE AWAY
      TMESS3     JMS*     (CRLF)
                  LAW      MESS3
                  JMS      MESSAGE      /TYPE 3RD MESSAGE
                  JMS*     (READ1)      / GET CHARACTER
                  SAD      YYY      /WAS IT Y?
                  JMP      STAND      /YES
                  SAD      NNN      /WAS IT N?
                  JMP      TMESS4-1      /YES
                  LAW      277      /IT WAS NEITHER
                  JMS*     (PRINT)      / TYPE "?"
                  JMP      TMESS3      /AND ASK AGAIN
                  JMS*     (CRLF)
      TMESS4     LAW      MESS4
                  JMS      MESSAGE      /TYPE OUT NEXT MESSAGE
                  JMS*     (DECIN)
                  DAC      BLOCKS      /STORE NUMBER OF BLOCKS
                  TAD      FOURTH+5
                  SMA
                  JMP      .+4      /MAKE SURE AT LEAST 2 BLOCKS
                  LAW      MESS24      /NOT 2 OR MORE
                  JMS      MESSAGE
                  JMP      TMESS4
                  JMS*     (CRLF)
      TMESS5     LAW      MESS5
                  JMS      MESSAGE      /TYPE OUT NEXT MESSAGE
                  JMS*     (DECIN)

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020055	042050		DAC	DATAS	/STORE NUMBER OF DATA WORDS
020056	342062		TAD	MINUS4	
020057	740100		SMA		/IS IT AT LEAST 4
020060	600064		JMP	.+4	/YES
020061	761163	TMESS6	LAW	MESS6	/NO TYPE OUT ERROR
020062	101006		JMS	MESSAGE	/MESSAGE
020063	600052		JMP	TMESS5	/ASK QUESTION AGAIN
020064	042050		DAC	DATAS	
020065	740020		RAR		
020066	740400		SNL		/IS NUMBER DIVISIBLE BY 2?
020067	600073		JMP	.+4	/YES
020070	761212	TMESS7	LAW	MESS7	/NO, TYPE OUT
020071	101006		JMS	MESSAGE	/ERROR MESSAGE
020072	600052		JMP	TMESS5	/ASK AGAIN
020073	202036		LAC	AA	
020074	744000		CLL		
020075	342050		TAD	DATAS	
020076	740400		SNL		/IS NUMBER OF DATAWORD TOO LARGE?
020077	600103		JMP	.+4	/NO
020100	761764	TMESS8	LAW	MESS25	/YES, TYPE OUT
020101	101006		JMS	MESSAGE	/ERROR MESSAGE
020102	600052		JMP	TMESS5	/TRY AGAIN
020103	202050		LAC	DATAS	/THIS
020104	342110		TAD	TEN	/LITTLE
020105	740001		CMA		/BIT
020106	342066		TAD	ONE	
020107	042046		DAC	CNTR1	/OF
020110	754000		CLAICLL		/CODING
020111	342041		TAD	BLOCKS	/MULTIPLIES
020112	442046		ISZ	CNTR1	/BLOCK NUMBER
020113	600111		JMP	.-2	/TIMES DATA WORD+10
020114	741400		SZL		
020115	600121		JMP	.+4	
020116	342115		TAD	MAGCON	/ADD THIS TO (-) MAX NUMBER OF MARKS
020117	740400		SNL		/TOO MANY?
020120	600131		JMP	NEXT	/NO
020121	761234		LAW	MESS8	/YES, TYPE OUT
020122	101006		JMS	MESSAGE	/ERROR MESSAGE
020123	600037		JMP	TMESS4	/GO 'WAY BACK
020124	122116	STAND	JMS*	(CRLF)	
020125	202043		LAC	CONST1	
020126	042041		DAC	BLOCKS	/SET UP 9BLOCKS
020127	202044		LAC	CONST2	
020130	042050		DAC	DATAS	/AND DATAS
020131	122116	NEXT	JMS*	(CRLF)	
020132	750004		LAS		
020133	741100		SPA		
020134	600137		JMP	.+3	
020135	761251		LAW	MESS9	
020136	101006		JMS	MESSAGE	/TYPE OUT NEXT MESSAGE
020137	122122		JMS*	(READ1)	
020140	202113		LAC	UNIT	
020141	242031		XOR	WTMT	
020142	242032		XOR	STOPGO	/FORM UNIT, WTMT, STOP
020143	707545		707545		/CLEAR AND LOAD 'A
020144	740000		NOP		/WAIT FOR XSA DELAY
020145	740000		NOP		
020146	740000		NOP		

020147	740000	NOP		
020150	740000	NOP		
020151	740000	NOP		
020152	707561	707561		/ERROR CONDITION? (E.F)
020153	600164	JMP	FIRST	/NO, PROCEED TO MAIN PROGRAM
020154	707572	707572		/YES, READ STATUS B
020155	707555	707555		
020156	502056	AND	MASK2	
020157	741200	SNA		/SELECT ERROR
020160	600737	JMP	ERROR1	/NO
020161	761404	LAW	MESS10	/YES
020162	101006	JMS	MESSAGE	/TYPE OUT ERROR MESSAGE
020163	600131	JMP	NEXT	
		/ROUTINE TO WRITE MARK TRACK		
020164	202031	FIRST	LAC	WTMT
020165	242113		XOR	UNIT
020166	707545		707545	/LOAD AC WITH WTMT FWD GO CONT
020167	760060	LAW		/COMBINE UNIT NUMBER
020170	062124	DAC*	(WC)	/CLEAR AND LOAD "A"
020171	202014	LAC	REVEND	/ WC = -8192
020172	042137	DAC	BUFFER	
020173	202136	LAC	BUFFER-1	/SET BUFFER TO "55"
020174	062125	DAC*	(CA)	/ CA = BUFFER-1
020175	222124	LAC*	(WC)	/ GET WC
020176	740200	SZA		/IS IT 0?
020177	600173	JMP	.-4	/NO, RESET CA
020200	707544	707544		/YES, CLEAR DTF (DONE REV.END)
020201	777471	LAW	-307	
020202	062124	DAC*	(WC)	/ WC = -199
020203	202015	LAC	EXPAND	
020204	042137	DAC	BUFFER	/SET BUFFER TO "25"
020205	202136	LAC	BUFFER-1	
020206	062125	DAC*	(CA)	
020207	222124	LAC*	(WC)	
020210	740200	SZA		/IS IT 0?
020211	600205	JMP	.-4	/NO, RESET CA
020212	707544	707544		/YES, CLEAR DTF (DONE EXPAND)
020213	202041	SECOND	LAC	BLOCKS
020214	740001		CMA	/GET NUMBER OF BLOCKS
020215	342066	TAD	ONE	/TAKE 2'S COMPLEMENT
020216	042102	DAC	SAVE1	/SAVE
020217	042045	DAC	CNTR	/AND STORE IN COUNTER
020220	202136	LAC	BUFFER-1	
020221	062125	DAC*	(CA)	
020222	062126	DAC*	(12)	/ ALSO 12
020223	202050	LAC	DATAS	/GET NUMBER OF DATA WORDS
020224	342110	TAD	TEN	/ADD 10
020225	740001	CMA		
020226	342066	TAD	ONE	/2'S COMPLEMENT
020227	042101	DAC	SAVE	/SAVE
020230	062124	DAC*	(WC)	/ AND STORE IN WC.
020231	202015	LAC	EXPAND	
020232	060012	DAC*	12	/ STORE EXPAND CODE IN BUFFER.
020233	202016	LAC	MARK	
020234	060012	DAC*	12	/ STORE MARK
020235	202017	LAC	REVGRD	
020236	060012	DAC*	12	/ STORE REVERSE GUARD
020237	202020	LAC	LOCK	

020240	060012	DAC*	12	/ STORE LOCK,
020241	060012	DAC*	12	/ REVERSE CHECK,
020242	060012	DAC*	12	/ REVERSE FINAL,
020243	060012	DAC*	12	/ AND REVERSE PREFINAL.
020244	202050	LAC	DATAS	
020245	342062	TAD	MINUS4	
020246	741200	SNA		
020247	600257	JMP	+.10	
020250	740001	CMA		
020251	342066	TAD	ONE	
020252	042046	DAC	CNTR1	/SET UP COUNTER FOR N-4 DATA WORDS
020253	202021	LAC	DATAM	
020254	060012	DAC*	12	/ STORE N-4 DATA MARKS
020255	442046	ISZ	CNTR1	
020256	600254	JMP	.-2	
020257	202022	LAC	PREFIN	
020260	060012	DAC*	12	/ STORE PREFINAL.
020261	060012	DAC*	12	/ FINAL.
020262	060012	DAC*	12	/ CHECK.
020263	060012	DAC*	12	/ AND REVERSE LOCK.
020264	202023	LAC	GUARD	
020265	060012	DAC*	12	/ STORE GUARD.
020266	202024	LAC	REVMRK	
020267	060012	DAC*	12	/ STORE REVERSE MARK.
020270	202015	LAC	EXPAND	
020271	060012	DAC*	12	/ STORE EXPAND.
020272	222124	LAC*	(WC)	
020273	740200	SZA		/HAS WHOLE BLOCK BEEN TRANSFERRED?
020274	600272	JMP	.-2	/NO
020275	707544	707544		/YES, CLEAR DTF (DONE WITH THIS BLOCK)
020276	202136	LAC	BUFFER-1	/AND SET UP FOR BLOCK AGAIN
020277	062125	DAC*	(CA)	
020300	202101	LAC	SAVE	
020301	062124	DAC*	(WC)	
020302	442045	ISZ	CNTR	/WRITTEN ALL BLOCKS?
020303	600272	JMP	.-11	/NO
020304	777471	LAH	-307	/YES, SET UP FOR 199 EXPANDS
020305	062124	DAC*	(WC)	
020306	202015	LAC	EXPAND	
020307	042137	DAC	BUFFER	/SET BUFFER TO "25"
020310	202136	LAC	BUFFER-1	
020311	062125	DAC*	(CA)	
020312	222124	LAC*	(WC)	
020313	740200	SZA		/IS IT 0?
020314	600310	JMP	.-4	/NO, RESET CA
020315	707544	707544		/YES, CLEAR DTF (DONE EXPAND)
020316	760000	LAH		
020317	062124	DAC*	(WC)	/ WC = -8192
020320	202025	LAC	END	
020321	042137	DAC	BUFFER	/SET BUFFER TO "22"
020322	202136	LAC	BUFFER-1	
020323	062125	DAC*	(CA)	
020324	222124	LAC*	(WC)	
020325	740200	SZA		/IS IT 0?
020326	600322	JMP	.-4	/NO
020327	202031	LAC	HTMT	/YES, THEN
020330	707544	707544		/STOP TAPE
020331	750004	LAS		

THIRD

THES11

```

020332 741100
020333 600336
020334 761507
020335 101006
020336 122122
020337 202113
020340 707545
020341 740000
020342 740000
020343 740000
020344 740000
020345 740000
020346 740000
020347 707561
020350 741000
020351 600331

020352 202130
020353 242113
020354 707545
020355 202135
020356 062125
020357 777776
020360 062124
020361 222124
020362 741200
020363 600367
020364 707561
020365 600361
020366 800352
020367 202027
020370 242113
020371 707545
020372 162124
020373 750001
020374 342041
020375 042104
020376 100757
020377 042103
020400 042137
020401 202136
020402 062125
020403 707561
020404 600401
020405 707572
020406 502055
020407 741200
020410 600737
020411 202030
020412 242034
020413 242113
020414 707545
020415 202135
020416 062125
020417 707601
020420 600417
020421 707552
    
```

```

SPA
JMP .+3
LAW MESS11
JMS MESSAGE /TYPE OUT NEXT MESSAGE
JMS* (READ1) /WAIT FOR A KEY TO BE STRUCK
LAC UNIT
707545 /CLEAR AND LOAD "A" WITH MOVE
NOP /WAIT FOR XSA DELAY
NOP
NOP
NOP
NOP
NOP
707561 /ERROR FLAG?
SKP /NO
JMP THES11 /YES, TYPE MESSAGE AGAIN
/ROUTINE TO WRITE LAST BLOCK NUMBER IN REVERSE MARK
/THEN ALL BLOCKS MARKS AND A VIRGIN PATTERN IN REVERSE DIRECTION
FOURTH LAC RESERC /LOAD AC WITH SEARCH, CONTINUOUS GO, REVERSE
XOR UNIT /COMBINE WITH UNIT NUMBER
707545 /CLEAR AND LOAD "A"
LAC BUFFER-2
DAC* (CA)
LAW -2
DAC* (WC)
LAC* (WC)
SNA
JMP .+4 /WAIT FOR WC = 0
707561 /ERROR FLAG?
JMP .-4 /NO
JMP FOURTH /YES, START AGAIN
LAC FWDWAC /LOAD AC WITH WRITE ALL, FWD, GO, CONT.
XOR UNIT /COMBINE WITH UNIT NUMBER
707545 /CLEAR AND LOAD "A"
DZM* (WC)
CLAICMA
TAD BLOCKS /COMPUTE LAST BLOCK NUMBER
DAC SAVE3
JMS CALQLB /FIND COMPLEMENT OVERSE
DAC SAVE2
DAC BUFFER /STORE IN BUFFER
LAC BUFFER-1
DAC* (CA)
707561 /WAIT FOR ERROR FLAG
JMP .-3
707572 /READ STATUS "B"
AND MASK1
SNA
JMP ERROR1 /END ZONE?
LAC RESERC /NO
XOR NORCON /YES, LOAD SEARCH REV GO CONTINUOUS
XOR UNIT /MAKE NORMAL
707545 /COMBINE WITH UNIT
LAC BUFFER-2 /CLEAR AND LOAD "A"
DAC* (CA)
707601
JMP .-1 /WAIT FOR DTF
707552 /READ "A"
    
```

020422	502075	AND	POINT+3	
020423	707544	707544		/CLEAR FUNCTION BITS
020424	202033	LAC	WAC	/LOAD AC WITH WRITE ALL CONT
020425	707544	707544		/TRANSFER INTO "A"
020426	202136	LAC	BUFFER-1	
020427	062126	DAC*	(12)	/ SETUP 12.
020430	342112	TAD	THREE	
020431	062125	DAC*	(CA)	
020432	202101	LAC	SAVE	
020433	342112	TAD	THREE	
020434	062124	DAC*	(WC)	/ WC = 2 LESS THAN USUAL.
020435	160012	DZM*	12	/ SETUP EXPAND
020436	750001	CLAICMA		
020437	342041	TAD	BLOCKS	
020440	060012	DAC*	12	/ SETUP BLK # INTO BUF+1
020441	202050	LAC	DATAS	
020442	342111	TAD	TWO	
020443	743001	CMA		
020444	042346	DAC	CNTRI	/SET UP COUNTER FOR # OF 0'S
020445	160012	DZM*	12	/ (DATA WORDS+3) IN MEMORY
020446	442046	ISZ	CNTRI	/AND THEN STORE IN BUFFER
020447	600445	JMP	.-2	
020450	750001	CLAICMA		
020451	060012	DAC*	12	/ REVERSE CHECKSUM
020452	060012	DAC*	12	/ LOCK
020453	060012	DAC*	12	/ REVERSE GUARD
020454	202103	LAC	SAVE2	
020455	060012	DAC*	12	/ COMPL OBVERSE IN BLK MARK
020456	750001	CLAICMA		
020457	060012	DAC*	12	/ EXPAND
020460	202102	LAC	SAVE1	
020461	042045	DAC	CNTR	/SET UP BLOCKS COUNTER
020462	750001	CLAICMA		
020463	362126	TAD*	(12)	
020464	042067	DAC	PNTR	/SET UP PNTR FOR BLOCK NUMBER
020465	222124	LAC*	(WC)	/ WAIT FOR BLK TO FINISH.
020466	741200	SNA		
020467	600473	JMP	+.4	
020470	707561	707561		
020471	600465	JMP	.-4	
020472	600737	JMP	ERROR1	
020473	707544	707544		/CLEAR DTF
020474	202136	LAC	BUFFER-1	
020475	062125	DAC*	(CA)	
020476	202101	LAC	SAVE	
020477	062124	DAC*	(WC)	
020500	750001	CLAICMA		
020501	342104	TAD	SAVE3	/COMPUTE NUMBER OF CURRENT BLOCK
020502	042104	DAC	SAVE3	
020503	042140	DAC	BUFFER+1	/AND STORE IN APPROPRIATE PLACE
020504	100757	JMS	CALQLB	/FORM COMPLEMENT OBVERSE
020505	062067	DAC*	PNTR	/AND STORE IT
020506	442045	ISZ	CNTR	/HAVE ALL BLOCKS BEEN PATTERNED?
020507	600465	JMP	HERE1	/NO
020510	202034	LAC	NORCON	
020511	707544	707544		/CLEAR CONTINUOUS
020512	707552	707552		/READ "A"
020513	502075	AND	POINT+3	

HERE1

020514	707544	707544		/CLEAR FUNCTION REGISTER
020515	202035	LAC	SERNOM	/LOAD AC WITH SEARCH NORMAL
020516	707544	707544		/XOR INTO "A"
020517	202135	LAC	BUFFER-2	
020520	062125	DAC*	(CA)	
020521	707601	707601		/SKIP IF BLOCK MARK FOUND
020522	741000	SKP		/NO. DTF, CHECK ERROR FLAG
020523	600747	JMP	ERROR2	/DTF, ERROR
020524	707561	707561		/SKIP ON ERROR FLAG
020525	600521	JMP	.-4	/NO FLAGS, CHECK ALL AGAIN
020526	707572	707572		/READ STATUS "B"
020527	502055	AND	MASK1	
020530	741200	SNA		/IS DECTAPE IN END ZONE?
020531	600737	JMP	ERROR1	/NO, ERROR
		/ROUTINE TO CHECK FORWARD BLOCK MARKS AND		
		/REWRITE LAST BLOCK		
020532	202102	FIFTH	LAC	SAVE1
020533	042045		DAC	CNTR
020534	142051		DZM	EXPECT
020535	202035		LAC	SERNOM
020536	242032		XOR	STOPGO
020537	242113		XOR	UNIT
020540	707545		707545	/COMBINE WITH UNIT
020541	202135		LAC	BUFFER-2
020542	062125		DAC*	(CA)
020543	162124		DZM*	(WC)
020544	707601	HERE2	707601	/WAIT FOR DTF
020545	600544		JMP	.-1
020546	707554		707554	/CLEAR IT
020547	202137		LAC	BUFFER
020550	542051		SAD	EXPECT
020551	741000		SKP	/COMPARE AGAINST EXPECTED
020552	600753		JMP	/OK
020553	442051		ISZ	ERROR3
020554	442045		ISZ	EXPECT
020555	600544		JMP	/SET UP EXPECT FOR NEXT
020556	707552		707552	/WILL THERE BE A NEXT?
020557	502075		AND	/YES
020560	707544		707544	/NO, READ "A"
020561	202033		LAC	POINT+3
020562	707544		707544	/CLEAR FUNCTION BITS
020563	202136		LAC	WAC
020564	062126		DAC*	/LOAD AC WITH WRITE ALL CONT
020565	342112		TAD	/TRANSFER INTO "A"
020566	062125		DAC*	12
020567	202101		LAC	BUFFER-1
020570	342112		TAD	THREE
020571	062124		DAC*	(12)
020572	160012		DZM*	THREE
020573	750001		CLAICMA	(CA)
020574	342041		TAD	(CA)
020575	060012		DAC*	THREE
020576	202050		LAC	(WC)
020577	342111		TAD	12
020600	740001		CMA	/EXPAND (NOT NEEDED)
020601	042046		DAC	BLOCKS
020602	750001		CLAICMA	12
020603	060012		DAC*	/FORWARD BLK MARK
			LAC	DATAS
			TAD	TWO
			CMA	
			DAC	CNTR1
			CLAICMA	/SET UP COUNTER FOR # OF 1'S
			DAC*	12
				/(DATAWORDS+3) IN MEMORY

020604	442046	ISZ	CNTRI	
020605	600603	JMP	.-2	
020606	160012	DZM*	12	/ CHECKSUM
020607	060012	DAC*	12	/ REVERSE LOCK
020610	060012	DAC*	12	/ GUARD
020611	342041	TAD	BLOCKS	
020612	100757	JMS	CALQLB	/FORM COMP. OBVERSE
020613	060012	DAC*	12	/ REV. MARK
020614	160012	DZM*	12	/ EXPAND
020615	222124	LAC*	(WC)	/ WAIT FOR BLK TO BE WRITTEN.
020616	741200	SNA		
020617	600623	JMP	+.4	
020620	707561	707561		
020621	600615	JMP	.-4	
020622	600737	JMP	ERROR1	
020623	707552	707552		/READ "A"
020624	502075	AND	POINT+3	
020625	707554	707554		/CLEAR FUNCTION REGISTER
020626	707561	707561		/WAIT FOR ERROR FLAG
020627	600626	JMP	.-1	
020630	707572	707572		/READ STATUS "B"
020631	502055	AND	MASK1	
020632	741200	SNA		/IS DECTAPE IN END ZONE?
020633	600737	JMP	ERROR1	/NO. ERROR
		/ROUTINE TO CHECK REVERSE BLOCK MARK AND READ DATA BACKWARDS		
		SIXTH	CLAICMA	
020634	750001	TAD	BLOCKS	/CREATE HIGHEST BLOCK NUMBER
020635	342041	DAC	EXPECT	/AND STORE IN EXPECT
020636	042051	LAC	UNIT	/FORM WORD
020637	202113	XOR	STOPGO	/TO SELECT UNIT
020640	242032	XOR	MASK2	/AND GO REVERSE
020641	242056	707545		/CLEAR AND LOAD "A"
020642	707545	707552		/READ "A"
020643	707552	AND	POINT+3	
020644	502075	707544		/CLEAR FUNCTION REGISTER
020645	707544	LAC	SERNOM	/LOAD AC WITH SEARCH NORMAL
020646	202035	707544		/XOR INTO "A"
020647	707544	LAC	BUFFER-2	
020650	202135	DAC*	(CA)	
020651	062125	707601		/WAIT FOR DTF
020652	707601	JMP	.-1	
020653	600652	LAC	BUFFER	/GET BLOCK NUMBER
020654	202137	SAD	EXPECT	/COMPARE AGAINST EXPECTED
020655	542051	SKP		/SAME ALL OK
020656	741000	JMP	ERROR3	/DIFFERENT. ERROR
020657	600753	707552		/READ "A"
020660	707552	AND	POINT+3	
020661	502075	707544		/CLEAR FUNCTION REGISTER
020662	707544	LAC	REDNOM	/LOAD AC WITH READ NORMAL
020663	202026	707544		/XOR INTO "A"
020664	707544	LAC	BUFFER-1	
020665	202136	DAC*	(CA)	
020666	062125	DZM*	(WC)	
020667	162124	707601		/DECTAPE FLAG?
020670	707601	JMP	.-1	/NO
020671	600670	707561		/ERROR FLAG?
020672	707561	SKP		/NO. ALL OK
020673	741000	JMP	ERROR1	/YES. ERROR
020674	600737			

020675	750001	CLAICMA	/DECREMENT EXPECT
020676	342051	TAD	EXPECT
020677	042051	DAC	EXPECT
020700	740001	CMA	
020701	750200	SZAICLA	/HAS EXPECT GONE TO -0?
020702	600643	JMP	HERE3 /NO, REPEAT FOR NEXT BLOCK
020703	202113	LAC	UNIT /YES
020704	740001	CMA	
020705	502077	AND	POINT+5
020706	707545	707545	/DESELECT UNIT
020707	761643	/ROUTINE TO INQUIRE OF OPERATORS INTENTIONS	
020710	101006	LAST	LAW MESS20
020711	202041	JMS	MESSAGE /TYPE OUT MESSAGE
020712	122127	LAC	BLOCKS
020713	202113	JMS*	(OOUT)
020714	242056	LAC	UNIT
020715	707545	XOR	MASK2
020716	760240	707545	/STOP DRIVE
020717	122123	LAW	240
020720	761653	JMS*	(PRINT)
020721	101006	LAW	MESS21
020722	202050	JMS	MESSAGE /TYPE OUT MESSAGE
020723	122127	LAC	DATAS
020724	760240	JMS*	(OOUT)
020725	122123	LAW	240
020726	761664	JMS*	(PRINT)
020727	101006	LAW	MESS22
020730	761675	JMS	MESSAGE /TYPE OUT MESSAGE
020731	101006	LAW	MESS23
020732	122122	JMS	MESSAGE /TYPE OUT MESSAGE
020733	542114	JMS*	(READ1)
020734	600131	SAD	YYY /HAS IT Y
020735	622130	JMP	NEXT /YES
		JMP*	(RETC)
		/UNEXPECTED ERROR FLAG TYPE OUT ROUTINE	
020736	000000	0	
020737	707572	ERROR1	707572 / READ B
020740	040736	DAC	ERROR1-1
020741	707555	707555	/ CLEAR A AND FLAGS.
020742	761562	LAW	MESS12
020743	101006	JMS	MESSAGE
020744	200736	LAC	ERROR1-1
020745	122127	JMS*	(OOUT)
020746	622130	JMP*	(RETC)
020747	707555	ERROR2	707555 / CLEAR A AND FLAGS.
020750	761573	LAW	MESS18
020751	101006	JMS	MESSAGE /TYPE OUT ERROR MESSAGE
020752	622130	JMP*	(RETC)
		/WRONG BLOCK NUMBER ERROR ROUTINE	
020753	707555	ERROR3	707555 / CLEAR A AND FLAGS.
020754	761623	LAW	MESS19
020755	101006	JMS	MESSAGE /TYPE OUT ERROR MESSAGE
020756	600367	JMP	FOURTH+15 /REPEAT VIRGIN PATTERN
		/CALCULATE 18 BIT COMPLEMENT OBERSE	
020757	000000	CALQL8	0
020760	744001	CMAICLL	
020761	042064	DAC	NUMBER
020762	142065	DZM	OBVERS

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020763 777772
 020764 042105
 020765 202042
 020766 042070
 020767 202064
 020770 741000
 020771 742010
 020772 742010
 020773 742010
 020774 042064
 020775 522070
 020776 242065
 020777 042065
 021000 442070
 021001 202064
 021002 442105
 021003 600771
 021004 202065
 021005 620757

LOOP

LAW -6
 DAC TALLY
 LAC CPOINT
 DAC PNTRI
 LAC NUMBER
 SKP
 RTL
 RTL
 RTL
 DAC NUMBER
 AND* PNTRI
 XOR OBVERS
 DAC OBVERS
 ISZ PNTRI
 LAC NUMBER
 ISZ TALLY
 JMP LOOP
 LAC OBVERS
 JMP* CALQLB

/MESSAGE PRINT SUBROUTINE
 MESSAGE 0

021006 000000
 021007 502131
 021010 042071
 021011 222071
 021012 640511
 021013 502100
 021014 542100
 021015 621006
 021016 122123
 021017 222071
 021020 502100
 021021 542100
 021022 621006
 021023 122123
 021024 442071
 021025 601011

AND (37777)
 DAC PNTR2
 LAC* PNTR2
 LRS 11
 AND RUBOUT
 SAD RUBOUT
 JMP* MESSAGE
 JMS* (PRINT)
 LAC* PNTR2
 AND RUBOUT
 SAD RUBOUT
 JMP* MESSAGE
 JMS* (PRINT)
 ISZ PNTR2
 JMP MESSAGE+3

/DECTAPE FORMAT GENERATOR - PDP-9, TC02, TU55

/TAPE 2

/MESSAGES

021026 304305
 021027 303324
 021030 301320
 021031 305240
 021032 306317
 021033 322315
 021034 301324
 021035 240307
 021036 305316
 021037 305322
 021040 301324
 021041 317322
 021042 255320
 021043 304320
 021044 255271
 021045 254240
 021046 324303
 021047 260262
 021050 254240

MESS1 304305
 303324
 301320
 305240
 306317
 322315
 301324
 240307
 305316
 305322
 301324
 317322
 255320
 304320
 255271
 254240
 324303
 260262
 254240

/D.E
 /C.T
 /A.P
 /E.SP
 /F.O
 /R.M
 /A.T
 /SP.G
 /E.N
 /E.R
 /A.T
 /O.R
 /-P
 /D.P
 /-P
 /..SP
 /T.C
 /O.2
 /..SP

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021051	324325		324325	/T,U
021052	265265		265265	/5,5
021053	215212		215212	/CR,LF
021054	212212		212212	/LF,LF
021055	212377		212377	/LF,R.O.
021056	315301	MESS2	315301	/M,A
021057	322313		322313	/R,K
021060	240324		240324	/SP,T
021061	301320		301320	/A,P
021062	305240		305240	/E,SP
021063	317316		317316	/O,N
021064	240325		240325	/SP,U
021065	316311		316311	/N,I
021066	324240		324240	/T,SP
021067	240377		240377	/SP,R.O.
021070	304317	MESS3	304317	/D,O
021071	240331		240331	/SP,Y
021072	317325		317325	/O,U
021073	240304		240304	/SP,D
021074	305323		305323	/E,S
021075	311322		311322	/I,R
021076	305240		305240	/E,SP
021077	323324		323324	/S,T
021100	301316		301316	/A,N
021101	304301		304301	/D,A
021102	322304		322304	/R,D
021103	240306		240306	/SP,F
021104	317322		317322	/O,R
021105	315301		315301	/M,A
021106	324240		324240	/T,SP
021107	250262		250262	/I,2
021110	265266		265266	/5,6
021111	240327		240327	/SP,W
021112	317322		317322	/O,R
021113	304323		304323	/D,S
021114	254240		254240	/..SP
021115	265267		265267	/5,7
021116	266240		266240	/6,SP
021117	302314		302314	/B,L
021120	317303		317303	/O,C
021121	313323		313323	/K,S
021122	251277		251277	/I,7
021123	215212		215212	/CR,LF
021124	240250		240250	/SP,I
021125	324331		324331	/T,Y
021126	320305		320305	/P,E
021127	240331		240331	/SP,Y
021130	255331		255331	/..Y
021131	305323		305323	/E,S
021132	254240		254240	/..SP
021133	316255		316255	/N-
021134	316317		316317	/N,O
021135	251240		251240	/I,SP
021136	240377		240377	/SP,R.O
021137	310317	MESS4	310317	/H,O
021140	327240		327240	/W,SP
021141	315301		315301	/M,A
021142	316331		316331	/N,Y

021143	240302		240302	/ SP,B
021144	314317		314317	/ L,O
021145	303313		303313	/ CK
021146	323277		323277	/ S,?
021147	240377		240377	/ SP,R.O
021150	310317	MESS5	310317	/ H,O
021151	327240		327240	/ W,SP
021152	315301		315301	/ H,A
021153	316331		316331	/ N,Y
021154	240304		240304	/ SP,D
021155	301324		301324	/ A,T
021156	301240		301240	/ A,SP
021157	327317		327317	/ H,O
021160	322304		322304	/ R,D
021161	323277		323277	/ S,?
021162	240377		240377	/ SP,R.O.
021163	302314	MESS5	302314	/ B,L
021164	317303		317303	/ O,C
021165	313240		313240	/ K,SP
021166	306317		306317	/ F,O
021167	322315		322315	/ R,M
021170	301324		301324	/ A,T
021171	240322		240322	/ SP,R
021172	305321		305321	/ E,O
021173	325311		325311	/ U,I
021174	322305		322305	/ R,E
021175	323240		323240	/ S,SP
021176	264240		264240	/ 4,SP
021177	317322		317322	/ O,R
021200	240315		240315	/ SP,M
021201	317322		317322	/ O,R
021202	305240		305240	/ E,SP
021203	304301		304301	/ D,A
021204	324301		324301	/ T,A
021205	240327		240327	/ SP,M
021206	317322		317322	/ O,R
021207	304323		304323	/ D,S
021210	215212		215212	/ CR,LF
021211	377000		377000	/ R,O
021212	316325	MESS7	316325	/ N,U
021213	315302		315302	/ H,B
021214	305322		305322	/ E,R
021215	240317		240317	/ SP,O
021216	306240		306240	/ F,SP
021217	304301		304301	/ D,A
021220	324301		324301	/ T,A
021221	240327		240327	/ SP,M
021222	317322		317322	/ O,R
021223	304323		304323	/ D,S
021224	240315		240315	/ SP,M
021225	325323		325323	/ U,S
021226	324240		324240	/ T,SP
021227	302305		302305	/ B,E
021230	240305		240305	/ SP,E
021231	326305		326305	/ V,E
021232	316215		316215	/ N,CR
021233	212377		212377	/ LF,R.O.
021234	324301	MESS8	324301	/ T,A

021235	320305		320305	/P.E
021236	240311		240311	/SP.I
021237	323240		323240	/S.SP
021240	316317		316317	/N.O
021241	324240		324240	/T.SP
021242	314317		314317	/L.O
021243	316307		316307	/N.O
021244	240305		240305	/SP.E
021245	316317		316317	/N.O
021246	325307		325307	/U.G
021247	310215		310215	/M.CR
021250	212377		212377	/LF.R.O.
021251	323305	MESS9	323305	/S.E
021252	324240		324240	/T.SP
021253	323327		323327	/S.W
021254	311324		311324	/I.T
021255	303310		303310	/C.H
021256	240314		240314	/SP.L
021257	301302		301302	/A.B
021260	305314		305314	/E.L
021261	305304		305304	/E.D
021262	240327		240327	/SP.W
021263	322324		322324	/R.T
021264	315255		315255	/M.-
021265	316317		316317	/N.O
021266	322315		322315	/R.M
021267	301314		301314	/A.L
021270	255322		255322	/-R
021271	304315		304315	/D.M
021272	313240		313240	/K.SP
021273	240324		240324	/SP.T
021274	317240		317240	/O.SP
021275	327322		327322	/W.R
021276	324315		324315	/T.M
021277	240301		240301	/SP.A
021300	316304		316304	/N.D
021301	240305		240305	/SP.E
021302	316301		316301	/N.A
021303	302314		302314	/B.L
021304	305240		305240	/E.SP
021305	215212		215212	/CR.LF
021306	327322		327322	/W.R
021307	311324		311324	/I.T
021310	305240		305240	/E.SP
021311	317316		317316	/O.N
021312	240323		240323	/SP.S
021313	320305		320305	/P.E
021314	303311		303311	/C.I
021315	306311		306311	/F.I
021316	305304		305304	/E.D
021317	240325		240325	/SP.U
021320	316311		316311	/N.I
021321	324240		324240	/T.SP
021322	324310		324310	/T.H
021323	305316		305316	/E.N
021324	240323		240323	/SP.S
021325	324322		324322	/T.R
021326	311313		311313	/I.K

021327	305240	305240	/E.SP
021330	301240	301240	/A.SP
021331	313305	313305	/K.E
021332	331240	331240	/Y.SP
021333	317316	317316	/O.N
021334	240324	240324	/SP.T
021335	310305	310305	/H.E
021336	240313	240313	/SP.K
021337	305331	305331	/E.Y
021340	302317	302317	/S.O
021341	301322	301322	/A.R
021342	304215	304215	/D.CR
021343	212301	212301	/LF.A
021344	306324	306324	/F.T
021345	305322	305322	/E.R
021346	240315	240315	/SP.H
021347	317325	317325	/O.U
021350	316324	316324	/N.T
021351	311316	311316	/I.N
021352	307240	307240	/G.SP
021353	301240	301240	/A.SP
021354	326311	326311	/V.I
021355	322307	322307	/R.G
021356	311316	311316	/I.N
021357	240324	240324	/SP.T
021360	301320	301320	/A.P
021361	305240	305240	/E.SP
021362	301316	301316	/A.N
021363	304240	304240	/D.SP
021364	324301	324301	/T.A
021365	313311	313311	/K.I
021366	316307	316307	/N.G
021367	240262	240262	/SP.2
021370	240327	240327	/SP.H
021371	322301	322301	/R.A
021372	320323	320323	/P.S
021373	240317	240317	/SP.O
021374	316240	316240	/N.SP
021375	324301	324301	/T.A
021376	313305	313305	/K.E
021377	325320	325320	/U.P
021400	240322	240322	/SP.R
021401	305305	305305	/E.E
021402	314215	314215	/L.CR
021403	212377	212377	/LF.R.O
021404	323305	323305	/S.E
021405	314305	314305	/L.E
021406	303324	303324	/C.T
021407	240305	240305	/SP.E
021410	322322	322322	/R.R
021411	317322	317322	/O.R
021412	254240	254240	/..SP
021413	303310	303310	/C.H
021414	305303	305303	/E.C
021415	313240	313240	/K.SP
021416	306317	306317	/F.O
021417	322240	322240	/R.SP
021420	324310	324310	/T.H

MESS10

021421	305323	305323	/E.S
021422	305240	305240	/E.SP
021423	303317	303317	/C.O
021424	316304	316304	/N.D
021425	311324	311324	/I.T
021426	311317	311317	/I.O
021427	316323	316323	/N.S
021430	272215	272215	/:.CR
021431	212327	212327	/LF.W
021432	322311	322311	/R.I
021433	324305	324305	/T.E
021434	240316	240316	/SP.N
021435	317324	317324	/O.T
021436	240305	240305	/SP.E
021437	316301	316301	/N.A
021440	302314	302314	/B.L
021441	305304	305304	/E.D
021442	215212	215212	/CR.LF
021443	316317	316317	/N.O
021444	316305	316305	/N.E
021445	330311	330311	/X.I
021446	323324	323324	/S.T
021447	301316	301316	/A.S
021450	324240	324240	/T.SP
021451	325316	325316	/U.N
021452	311324	311324	/I.T
021453	215212	215212	/CR.LF
021454	315325	315325	/M.U
021455	314324	314324	/L.T
021456	311320	311320	/I.P
021457	314331	314331	/L.Y
021460	240305	240305	/SP.E
021461	330311	330311	/X.I
021462	323324	323324	/S.T
021463	301316	301316	/A.N
021464	324240	324240	/T.SP
021465	325316	325316	/U.N
021466	311324	311324	/I.T
021467	215212	215212	/CR.LF
021470	323327	323327	/S.W
021471	311324	311324	/I.T
021472	303310	303310	/C.H
021473	240316	240316	/SP.N
021474	317324	317324	/O.T
021475	240311	240311	/SP.I
021476	316240	316240	/N.SP
021477	327322	327322	/W.R
021500	315324	315324	/M.T
021501	240320	240320	/SP.P
021502	317323	317323	/O.S
021503	311324	311324	/I.T
021504	311317	311317	/I.O
021505	316215	316215	/N.CR
021506	212377	212377	/LF.R.O.
021507	323305	323305	/S.E
021510	324240	324240	/T.SP
021511	323327	323327	/S.W
021512	311324	311324	/I.T

MESS11

021513	303310		303310	/C.H
021514	240314		240314	/SP.L
021515	301302		301302	/A.B
021516	305314		305314	/E.L
021517	305304		305304	/E.D
021520	240327		240327	/SP.W
021521	322324		322324	/R.T
021522	315255		315255	/M.-
021523	316317		316317	/N.O
021524	322315		322315	/R.M
021525	301314		301314	/A.L
021526	255322		255322	/-R
021527	304315		304315	/D.H
021530	313240		313240	/K.SP
021531	324317		324317	/T.O
021532	240316		240316	/SP.N
021533	317322		317322	/O.R
021534	315301		315301	/M.A
021535	314254		314254	/L..
021536	240324		240324	/SP.T
021537	310305		310305	/H.E
021540	316240		316240	/N.SP
021541	323324		323324	/S.T
021542	322311		322311	/R.I
021543	313305		313305	/K.E
021544	240301		240301	/SP.A
021545	240313		240313	/SP.K
021546	305331		305331	/E.Y
021547	240317		240317	/SP.O
021550	316240		316240	/N.SP
021551	215212		215212	/CR.LF
021552	324310		324310	/T.H
021553	305240		305240	/E.SP
021554	313305		313305	/K.E
021555	331302		331302	/Y.B
021556	317301		317301	/O.A
021557	322304		322304	/R.D
021560	215212		215212	/CR.LF
021561	377000		377000	/R.O
021562	215212	MESS12	215212	/CR.LF
021563	304305		304305	/DE
021564	303324		303324	/CT
021565	301320		301320	/AP
021566	305240		305240	/E
021567	305322		305322	/ER
021570	322317		322317	/RO
021571	322240		322240	/R
021572	377000		377000	
021573	324317	MESS18	324317	/T.O
021574	317240		317240	/O.SP
021575	315301		315301	/M.A
021576	316331		316331	/N.Y
021577	240302		240302	/SP.B
021600	314317		314317	/L.O
021601	303313		303313	/C.K
021602	323240		323240	/S.SP
021603	327322		327322	/W.R
021604	311324		311324	/I.T

021605	324305		324305	/T.E
021606	316254		316254	/N..
021607	240320		240320	/SP.P
021610	322317		322317	/R.O
021611	307322		307322	/G.R
021612	301315		301315	/A.M
021613	240305		240305	/SP.E
021614	322322		322322	/R.R
021615	317322		317322	/O.R
021616	255322		255322	/-.R
021617	305314		305314	/E.L
021620	317301		317301	/O.A
021621	304215		304215	/D.CR
021622	212377		212377	/LF.RO
021623	302314	MESS19	302314	/B.L
021624	317303		317303	/O.C
021625	313240		313240	/K.SP
021626	316325		316325	/N.U
021627	315302		315302	/M.B
021630	305322		305322	/E.R
021631	240323		240323	/SP.S
021632	305321		305321	/E.Q
021633	325305		325305	/U.E
021634	316303		316303	/N.C
021635	305240		305240	/E.SP
021636	302322		302322	/B.R
021637	317313		317313	/O.K
021640	305316		305316	/E.N
021641	215212		215212	/CR.LF
021642	377000		377000	/RO
021643	304317	MESS20	304317	/D.O
021644	316305		316305	/N.E
021645	241240		241240	/:.SP
021646	324301		324301	/T.A
021647	320305		320305	/P.E
021650	240310		240310	/SP.H
021651	301323		301323	/A.S
021652	240377		240377	/SP.RO
021653	302314	MESS21	302314	/B.L
021654	317303		317303	/O.C
021655	313323		313323	/K.S
021656	250317		250317	/(.O
021657	303324		303324	/C.T
021660	251240		251240	/).SP
021661	305301		305301	/E.A
021662	303310		303310	/C.H
021663	240377		240377	/SP.RO
021664	327317	MESS22	327317	/W.O
021665	322304		322304	/R.D
021666	323250		323250	/S.(
021667	317303		317303	/O.C
021670	324251		324251	/T.)
021671	240314		240314	/SP.L
021672	317316		317316	/O.N
021673	307215		307215	/G.CR
021674	212377		212377	/LF.RO
021675	304317	MESS23	304317	/D.O
021676	240331		240331	/SP.Y

021677	317325		317325	/O,U
021700	240304		240304	/SP,D
021701	305323		305323	/E,S
021702	311322		311322	/I,R
021703	305240		305240	/E,SP
021704	324317		324317	/T,O
021705	240315		240315	/SP,M
021706	301322		301322	/A,R
021707	313240		313240	/K,SP
021710	301316		301316	/A,N
021711	317324		317324	/O,T
021712	310305		310305	/H,E
021713	322240		322240	/R,SP
021714	324301		324301	/T,A
021715	320305		320305	/P,E
021716	240324		240324	/SP,T
021717	317240		317240	/O,SP
021720	324310		324310	/T,H
021721	311323		311323	/I,S
021722	240306		240306	/SP,F
021723	317322		317322	/O,R
021724	315301		315301	/M,A
021725	324250		324250	/T,(
021726	324331		324331	/T,Y
021727	320305		320305	/P,E
021730	240331		240331	/SP,Y
021731	255331		255331	/-,Y
021732	305323		305323	/E,S
021733	240316		240316	/SP,N
021734	255316		255316	/-,N
021735	317251		317251	/O,)
021736	277215		277215	/?,CR
021737	212377		212377	/LF,RO
021740	215212	MESS24	215212	/CRLF
021741	316325		316325	/N,U
021742	315302		315302	/M,B
021743	305322		305322	/E,R
021744	240317		240317	/SP,O
021745	306240		306240	/F,SP
021746	302314		302314	/B,L
021747	317303		317303	/O,C
021750	313323		313323	/K,S
021751	240315		240315	/SP,M
021752	325323		325323	/U,S
021753	324240		324240	/T,SP
021754	302305		302305	/B,E
021755	240262		240262	/SP,2
021756	240317		240317	/SP,O
021757	322240		322240	/R,SP
021760	315317		315317	/M,O
021761	322305		322305	/R,E
021762	215212		215212	/CR,LF
021763	377000		377000	/RO
021764	215212	MESS25	215212	/CR,LF
021765	270313		270313	/B,K
021766	240317		240317	/SP,O
021767	306240		306240	/F,SP
021770	315305		315305	/M,E

021771	315317	315317	/M.O
021772	322331	322331	/R.Y
021773	240303	240303	/SP.C
021774	301316	301316	/A.N
021775	247324	247324	/.T
021776	240303	240303	/SP.C
021777	317316	317316	/O.N
022000	324301	324301	/T.A
022001	311316	311316	/I.N
022002	240324	240324	/SP.T
022003	310311	310311	/H.I
022004	323240	323240	/S.SP
022005	323311	323311	/S.I
022006	332305	332305	/Z.E
022007	240302	240302	/SP.B
022010	314317	314317	/L.O
022011	303313	303313	/C.K
022012	240215	240215	/SP.CR
022013	212377	212377	/LF,RO
		/CONSTANTS AND VARIABLES	
		/HC AND CA DEFINITIONS	
		HC=30	
		CA=31	
		/MARK TRACK PATTERNS	
022014	404404	REVENO 404404	/55
022015	040404	EXPAND 040404	/25
022016	040440	MARK 040440	/26
022017	044040	REVGRD 044040	/32
022020	004000	LOCK 004000	/10
022021	444000	DATAM 444000	/70
022022	444044	PREFIN 444044	/73
022023	404004	GUARD 404004	/51
022024	400404	REVMRK 400404	/45
022025	040040	END 040040	/22
		/DECTAPE COMMAND	
022026	002000	REDNOM 002000	/READ DATA NORM
022027	035000	FWDWAC 035000	/WRITE ALL FWD GO CONT
022030	071000	RESERC 071000	/SEARCH REVERSE GO CONT
022031	036000	WTMT 036000	/WRITE T & MT FWD GO CONT
022032	020000	STOPGO 020000	/STOP OR GO
022033	015000	WAC 015000	/WRITE ALL CONTINUOUS
022034	010000	NORCON 010000	/NORMAL CONTINUOUS
022035	001000	SERNOM 001000	/SEARCH NORMAL
		/AASSORTED SUNDRY POINTERS, COUNTERS, CONSTANTS, VARIABLES, ETC.	
022036	772165	AA -A+1	/NUMBER OF DATA WORDS MAX (-)
022037	000000	ANSWER 0	/ANSWER TO DEC TO BIN TYPEIN (BCV)
022040	000260	ASKII 260	/MAGIC CONSTANT
022041	001100	BLOCKS 1100	/NUMBER OF BLOCKS
022042	022072	CPOINT POINT	
022043	001100	CONST1 1100	/576 DEC
022044	000400	CONST2 400	/256 DEC
022045	000000	CNTR 0	/BLOCKS COUNTER
022046	000000	CNTR1 0	/DATA WORD COUNTER
022047	000000	CNTR2 0	/COUNTER FOR OCTAL TYPEOUT
022050	000400	DATAS 400	/NUMBER OF DATA WORDS
022051	000000	EXPECT 0	/NUMBER OF BLOCK EXPECTED
022052	777767	M9 -1-11+1	
022053	777766	M12 -1-12+1	

022054	777520	M260	-1-260+1	
022055	100000	MASK1	100000	
022056	040000	MASK2	40000	
022057	020000	MASK3	20000	
022060	010000	MASK4	10000	
022061	007777	MASK5	7777	
022062	777774	MINUS4	-1-4+1	
022063	000316	NNN	316	
022064	000000	NUMBER	0	/NUMBER BEING OBVERSED
022065	000000	OBVERS	0	/COMP. OBVERSE CALCULATIONS
022066	000001	ONE	1	
022067	000000	PNTR	0	/POINTER FOR STORAGE OF BLOCK NUMBER
022070	022072	PNTR1	POINT	/POINTER FOR MASKS OF CALQL8
022071	000000	PNTR2	0	/POINTER FOR MESAGE
022072	000007	POINT	7	/MASK FOR CALQL8
022073	000070		70	
022074	000700		700	
022075	007000		7000	
022076	070000		70000	
022077	700000		700000	
022100	000377	RUBOUT	377	
022101	000000	SAVE	0	/# OF MARKS PER BLOCK (-)
022102	000000	SAVE1	0	/# OF BLOCKS (-)
022103	000000	SAVE2	0	/COMP. OBVERSE OF LAST BLOCK
022104	000000	SAVE3	0	/# OF PARTICULAR BLOCK
022105	000000	TALLY	0	/COMP. OBVERSE COUNTER
022106	000000	TEMP	0	/STORAGE FOR TYPEOUT AND TYPIN
022107	000000	TEM1	0	/STORAGE FOR DBCV
022110	000012	TEN	12	
022111	000002	TWO	2	
022112	000003	THREE	3	
022113	000000	UNIT	0	/UNIT NUMBER
022114	000331	YYY	331	
022115	323553	MAGCON	323553	/MINUS 153,749(DEC)
			.LOC	MAGCON+20
			/BEGINNING OF BUFFER AREA	
022135	022137		BUFFER	
022136	022136		BUFFER-1	
022137	000000	BUFFER	0	
			A=27763-BUFFER-10	
			.END	
022116	006737			
022117	012461			
022120	006746			
022121	777771			
022122	012376			
022123	006752			
022124	000030			
022125	000031			
022126	000012			
022127	016267			
022130	006257			
022131	037777			

*** SYMBOL TABLE ***

A	005614	MESS4	021137	WAC	022033
AA	022036	MESS5	021150	WC	000030
ANSWER	022037	MESS6	021163	WTMT	022031
ASCII	022040	MESS7	021212	YYY	022114
BEGIN	020003	MESS8	021234		
BLOCKS	022041	MESS9	021251		
BUFFER	022137	MINUS4	022062		
CA	000031	M12	022053		
CALQL8	020757	M260	022054		
CNTR	022045	M9	022052		
CNTR1	022046	NEXT	020131		
CNTR2	022047	NNN	022063		
CONST1	022043	NORCON	022034		
CONST2	022044	NUMBER	022064		
CPOINT	022042	OBVERS	022065		
CRLF	006737	ONE	022066		
DATAM	022021	OOOT	016267		
DATAS	022050	PNTR	022067		
DECIN	012461	PNTR1	022070		
END	022025	PNTR2	022071		
ERROR1	020737	POINT	022072		
ERROR2	020747	PREFIN	022022		
ERROR3	020753	PRINT	006752		
EXPAND	022015	QMARK	006746		
EXPECT	022051	READ1	012376		
FIFTH	020532	REDNOM	022026		
FIRST	020164	RESERC	022030		
FOURTH	020352	RET	007436		
FWDWAC	022027	RETC	006257		
GUARD	022023	REVEND	022014		
HERE1	020465	REVGRD	022017		
HERE2	020544	REVMRK	022024		
HERE3	020643	RUBOUT	022100		
LAST	020707	SAVE	022101		
LOCK	022020	SAVE1	022102		
LOOP	020771	SAVE2	022103		
MAGCON	022115	SAVE3	022104		
MARK	022016	SECOND	020213		
MASK1	022055	SERNOM	022035		
MASK2	022056	SIXTH	020634		
MASK3	022057	STAND	020124		
MASK4	022060	STOPGO	022032		
MASK5	022061	TALLY	022105		
MESSAGE	021006	TEMP	022106		
MESS1	021026	TEM1	022107		
MESS10	021404	TEN	022110		
MESS11	021507	THIRD	020304		
MESS12	021562	THREE	022112		
MESS18	021573	TMESS3	020023		
MESS19	021623	TMESS4	020037		
MESS2	021056	TMESS5	020052		
MESS20	021643	TMESS6	020061		
MESS21	021653	TMESS7	020070		
MESS22	021664	TMESS8	020100		
MESS23	021675	TMES11	020331		
MESS24	021740	TMESS23	020730		
MESS25	021764	TWO	022111		
MESS3	021070	UNIT	022113		

ACQETA=10721
ADECN=10620
AINF=62
DECCON=6571
DECIN=12461
DISADD=7660
DISONE=10407
FACT=10675
FOAC=0
FOIV=700000
FEXT=13112
FINT=13051
FLAC=200000
FMUL=500000
LOGLIN=10376
LOGSUB=10617
MNOCD=7657
NOCD=10344
PLOTGO=16127
QMARK=6746
READ=12366
RETC=6257
S=40000
STRPFG=53
TC=12714
XX=740040

		.TITLE	PLOTTER-RCD	
		.LOC	20000	
		.LIT	L12+1	
		/PLOTTER RCD PDP-9		
020000	474020	474020		/ PLOT
020001	020036	PLOTA		
020002	347402	347402		/ PLOT;A,B A=NORMAL B=BRIGHT
020003	020665	PLOTG		
020004	440200	440200		/ PLT PLOT OVER LAST
020005	020327	PLOT2		
020006	727020	727020		/ PORG
020007	020710	PORG		
020010	507424	507424		/ TOPM
020011	020647	TOPM		
020012	547202	547202		/ BOFM
020013	020645	TOPM-2		
020014	053230	053230		/ SEX;N
020015	020017	SEX		
020016	000000	0		
020017	122443	JMS*	(DECIN)	/ READ ELONGATION FACTOR.
020020	502444	AND	(17)	
020021	745200	SNAICLL		/ # MUST > 0.
020022	622445	JMP*	(QMARK)	
020023	342446	TAD	(1)	
020024	040040	DAC	PLOTA+2	
020025	040030	DAC	.+3	
020026	202447	LAC	(40)	
020027	653122	MUL		
020030	000002	2		
020031	641002	LACQ		
020032	744010	RCL		
020033	102237	JMS	TCHA	
020034	040222	DAC	DSEX	
020035	622450	JMP*	(RETC)	
020036	222451	LAC*	(NOCD)	
020037	653122	MUL		
020040	000002	2		
020041	641002	LACQ		
020042	040723	DAC	ML	
020043	744010	RCL		
020044	040364	DAC	XL	/ X AXIS LENGTH
020045	140206	DZM	YL	
020046	222451	LAC*	(NOCD)	
020047	640505	LRS	5	/ DIVIDE NOCD BY 32.
020050	741200	SNA		
020051	202446	LAC	(1)	
020052	342446	TAD	(1)	/ CAUSES VAL AT ORIG TO BE PLOTTED.
020053	102237	JMS	TCHA	
020054	040724	DAC	XTICK	/ -# OF TICKS ON X-AXIS
020055	222451	LAC*	(NOCD)	
020055	362452	TAD*	(DISADD)	
020057	342453	TAD	(-1)	
020060	040253	DAC	XCOOR	/ VALUE OF LAST X-COORD.
020061	140725	DZM	YCOORL	
020062	222454	LAC*	(LOGLIN)	
020063	740100	SMA		/ LOG OR LINEAR?
020064	600110	JMP	PLOTAL	/ LOG
020065	040510	DAC	LOGSCL	

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020066	140727		DZM	MK	
020067	502455		AND	(177)	/ DETERMINE MAX Y-SCALE.
020070	741200		SNA		
020071	600101		JMP	.+10	
020072	342456		TAD	(-100)	
020073	740100		SMA		
020074	600101		JMP	.+5	
020075	342457		TAD	(100)	
020076	102237		JMS	TCMA	
020077	342460		TAD	(12)	
020100	741000		SKP		
020101	440727		ISZ	MK	/ PRINT A 'K'.
020102	340412		TAD	LINADR	
020103	040726		DAC	YCOORU	
020104	220726		LAC*	YCOORU	
020105	040726		DAC	YCOORU	/ MAX Y-SCALE
020106	600137		JMP	PLOTX	
020107	100536		JMS	PLOGAR	
020110	222461	PLOTAL	LAC*	(FACT)	
020111	660514		LRSS	14	
020112	040643		DAC	PFACT	
020113	040726		DAC	YCOORU	/ # OF DECADES
020114	200107		LAC	PLOTAL-1	
020115	040510		DAC	LOGSCL	
020116	777772		LAW	-6	
020117	040466		DAC	CT2	
020120	222462		LAC*	(ADECM)	
020121	041010		DAC	ALPHA	
020122	222463		LAC*	(LOGSUB)	/ FIND BASE-LINE DECADE.
020123	561010		SAD*	ALPHA	
020124	600130		JMP	.+4	
020125	441010		ISZ	ALPHA	
020126	440466		ISZ	CT2	
020127	600123		JMP	.-4	
020130	200466		LAC	CT2	
020131	342464		TAD	(6)	
020132	040725		DAC	YCOORL	/ BASE LINE DECADE
020133	340726		TAD	YCOORU	/ + # OF DECADES
020134	040726		DAC	YCOORU	/ = MAX DECADE.
020135	342465		TAD	(60)	
020136	040431		DAC	MESSP+4	/ CONVERT TO ASCII.
020137	102015	PLOTX	JMS	PLOT	
020140	600144		JMP	.+4	
020141	402453		XCT	(-1)	
020142	402453		XCT	(-1)	
020143	402453		XCT	(-1)	
020144	102015		JMS	PLOT	
020145	600151		JMP	.+4	
020146	402466		XCT	(0)	
020147	402467		XCT	(-1750)	
020150	402470		XCT	(1750)	
020151	102015		JMS	PLOT	
020152	600156		JMP	.+4	
020153	402471		XCT	(2)	/ MOVE TO (0,0)
020154	402466		XCT	(0)	
020155	402466		XCT	(0)	
020156	102015		JMS	PLOT	/ MOVE TO (0,1")
020157	600153		JMP	.+4	

020160	402471		XCT	(2)	
020161	402466		XCT	(0)	
020162	402472		XCT	(74)	
020163	102015		JMS	PLOT	/ SET ORIGEN (0,0)
020164	600170		JMP	.+4	
020165	402466		XCT	(0)	
020166	402466		XCT	(0)	
020167	020206		YL		
020170	102015		JMS	PLOT	/ DRAW X-AXIS.
020171	600175		JMP	.+4	
020172	402473		XCT	(4)	
020173	020364		XL		
020174	020206		YL		
020175	202471		LAC	(2)	
020176	041226		DAC	R.SCL	
020177	102015	PLOTAT	JMS	PLOT	/ PLOT A TICK AND ITS VALUE.
020200	600204		JMP	.+4	
020201	402471		XCT	(2)	
020202	020364		XL		
020203	402464		XCT	(6)	
020204	100765		JMS	CONTRO	/ SET ORIG FOR X-VALUE.
020205	600212		JMP	.+5	
020206	000000	YL	0		
020207	402471		XCT	(2)	
020210	020364		XL		
020211	402474		XCT	(-20)	
020212	200253		LAC	XCOOR	
020213	100730		JMS	DECPLT	/ PRINT X VALUE AT TICK.
020214	100345		JMS	ORIG	/ GO BACK TO ORIG OF TICK.
020215	777740		LAW	-40	
020216	340253		TAD	XCOOR	
020217	741100		SPA		
020220	222452		LAC	(DISADD)	
020221	040253		DAC	XCOOR	
020222	777600	DSEX	LAW	-200	
020223	340364		TAD	XL	
020224	040364		DAC	XL	
020225	741100		SPA		
020226	140364		DZM	XL	/ DON'T GO BEYOND (0,0)
020227	102015		JMS	PLOT	/ DRAW BACK ON X-AXIS
020230	600234		JMP	.+4	
020231	402473		XCT	(4)	
020232	020364		XL		
020233	020206		YL		
020234	440724		ISZ	XTICK	/ DONE?
020235	600177		JMP	PLOTAT	/ NO
020236	140364		DZM	XL	
020237	202470		LAC	(1750)	
020240	040206		DAC	YL	
020241	102015		JMS	PLOT	/ DRAW Y-AXIS
020242	600246		JMP	.+4	
020243	402473		XCT	(4)	
020244	020364		XL		
020245	020206		YL		
020246	200434		LAC	MEST+1	
020247	741200		SNA		/ IS THERE A TOP MESSAGE?
020250	600271		JMP	PLOT1	/ NO.
020231	100765		JMS	CONTRO	

020252	600257		JMP	.+5	
020253	000000	XCOOR	0		
020254	402471		XCT	(2)	
020255	020723		ML		
020256	020206		YL		
020257	202475		LAC	(3)	
020260	041226		DAC	R.SCL	
020261	101010		JMS	ALPHA	/ PLOT TOP MESSAGE.
020262	020433		HESB		
020263	777764		-14		
020264	102015		JMS	PLOT	/ BACK TO (0,YL)
020265	600271		JMP	.+4	
020266	402471		XCT	(2)	
020267	020364		XL		
020270	020206		YL		
020271	100354	PLOT1	JMS	YMARK	/ DRAW TICK MARK
020272	102015		JMS	PLOT	
020273	600277		JMP	+4	
020274	402473		XCT	(4)	
020275	402466		XCT	(0)	
020276	402466		XCT	(0)	
020277	200725		LAC	YCOORL	
020300	040726		DAC	YCOORU	
020301	140206		DZM	YL	
020302	100354		JMS	YMARK	/ TICK MARK AT ORIGIN.
020303	200451		LAC	MESB+1	
020304	741200		SNA		/ BOTTOM MESSAGE?
020305	600326		JMP	PLOT2-1	/ NO
020306	100765		JMS	CONTR0	
020307	600314		JMP	.+5	
020310	000000		0		
020311	402471		XCT	(2)	
020312	020723		ML		
020313	402476		XCT	(-60)	
020314	202475		LAC	(3)	
020315	041226		DAC	R.SCL	
020316	101010		JMS	ALPHA	/ PLOT BOTTOM MESSAGE.
020317	020450		MESB		
020320	777764		-14		
020321	102015		JMS	PLOT	/ RETURN TO ORIGIN.
020322	600326		JMP	.+4	
020323	402471		XCT	(2)	
020324	020364		XL		
020325	402466		XCT	(0)	
020326	600341		JMP	PLOT3	
020327	102015	PLOT2	JMS	PLOT	/ SET ORIGIN.
020330	600334		JMP	.+4	
020331	402453		XCT	(-1)	
020332	402453		XCT	(-1)	
020333	402453		XCT	(-1)	
020334	102015		JMS	PLOT	
020335	600341		JMP	.+4	
020336	402466		XCT	(0)	
020337	402466		XCT	(0)	
020340	402466		XCT	(0)	
020341	222477	PLOT3	LAC*	(DISONE)	
020342	362452		TAD*	(DISADD)	
020343	100467		JMS	PLTOAT	/ PLOT DATA

020344	622450		JMP*	(RETC)	
020345	000000	ORIG	0		
020346	102015		JMS	PLOT	
020347	600353		JMP	.+4	
020350	402500		XCT	(5)	
020351	020364		XL		
020352	020206		YL		
020353	620345		JMP*	ORIG	
020354	000000	YMARK	0		
020355	102015		JMS	PLOT	/ PLOT TICK
020356	600362		JMP	.+4	
020357	402473		XCT	(4)	
020360	402464		XCT	(6)	
020361	020206		YL		
020362	100765		JMS	CONTRO	/ COORDINATE FOR VALUE AT TICK.
020363	600370		JMP	.+5	
020364	000000	XL	0		
020365	402471		XCT	(2)	
020366	402456		XCT	(-100)	
020367	020206		YL		
020370	202471		LAC	(2)	
020371	041226		DAC	R.SCL	
020372	200510		LAC	LOGSCL	
020373	740100		SMA		/ LOG OR LINEAR?
020374	600400		JMP	.+4	/ LOG.
020375	200726		LAC	YCOORU	
020376	100730		JMS	DECPLT	
020377	600410		JMP	.+11	
020400	202501		LAC	(MESSP)	
020401	040403		DAC	.+2	
020402	101010		JMS	ALPHA	
020403	000000		0		
020404	777774		-4		
020405	200725		LAC	YCOORL	
020406	342465		TAD	(60)	
020407	040431		DAC	MESSP+4	
020410	100345		JMS	ORIG	
020411	620354		JMP*	YMARK	
020412	020413	LINADR	.+1		
020413	000001		1	/ 1K	
020414	000002		2	/ 2K	
020415	000004		4	/ 4K	
020416	000010		10	/ 8K	
020417	000020		20	/ 16K	
020420	000040		40	/ 32K OR 32 CTS	
020421	000100		100	/ 64K OR 64 CTS	
020422	000200		200	/ 128K OR 128 CTS	
020423	000400		400	/ 256K OR 256 CTS	
020424	001000		1000	/ 512 CTS	
020425	000002	MESSP	2		
020426	000061		61	/ 10XP	
020427	000060		60		
020430	000130		130		
020431	000000		0		
020432	000000		0		
020433	000002	MEST	2	/ TOP MESSAGE	
020434	000000		0		
020435	000000		0		

020436	000000		0		
020437	000000		0		
020440	000000		0		
020441	000000		0		
020442	000000		0		
020443	000000		0		
020444	000000		0		
020445	000000		0		
020446	000000		0		
020447	000000		0		
020450	000002	MESB	2		/ BOTTOM MESSAGE
020451	000000		0		
020452	000000		0		
020453	000000		0		
020454	000000		0		
020455	000000		0		
020456	000000		0		
020457	000000		0		
020460	000000		0		
020461	000000		0		
020462	000000		0		
020463	000000		0		
020464	000000		0		
020465	000000	CT1	0		
020466	000000	CT2	0		
020467	000000	PLTDAT	0		
020470	140535		DZM	PSX	
020471	040534		DAC	DATA	/ STORE ADDRESS OF DATA.
020472	222502		LAC*	(MNOCD)	
020473	040465		DAC	CT1	/ # OF POINTS
020474	744002		STL		
020475	740020		RAR		
020476	040533		DAC	PDOTC	
020477	440533		ISZ	PDOTC	/ BRIGHT DOT?
020500	600503		JMP	.+3	/ NO
020501	202503		LAC	(CHARB)	
020502	600504		JMP	.+2	
020503	202504		LAC	(CHARN)	
020504	040516		DAC	LOGSCL+6	
020505	220534		LAC*	DATA	
020506	440534		ISZ	DATA	
020507	744000		CLL		
020510	100536	LOGSCL	JMS	PLOGAR	
020511	100633		JMS	STRP	
020512	342505		TAD	(754)	
020513	040726		DAC	YCOORU	
020514	101624		JMS	PLOT	
020515	600522		JMP	.+5	
020516	020531		CHARN		
020517	402471		XCT	(2)	
020520	020535		PSX		
020521	020726		YCOORU		
020522	200040		LAC	PLOTA+2	
020523	744010		RCL		
020524	340535		TAD	PSX	/ INCREMENT X
020525	040535		DAC	PSX	
020526	440465		ISZ	CT1	/ DONE?
020527	600477		JMP	LOGSCL-11	/ NO

020530	620467	JMP*	PLTDAT	
020531	000004	CHARN	4	/ DATA SYMBOL
020532	000003	CHARB	3	/ BRIGHT POINT SYMBOL
020533	000000	PDOTC	0	
020534	000000	DATA	0	
020535	000000	PSX	0	
020536	000000	PLOGAR	0	
020537	745200	SNAICLL		
020540	620536	JMP*	PLOGAR	/ LOG(0)=0
020541	740100	SMA		/ -VALUES NEED SPECIAL CARE.
020542	600513	JMP	PLOG1	
020543	100633	JMS	STRP	/ SKIP IF NOT STRIP.
020544	600551	JMP	.+5	
020545	744020	RCR		
020546	040253	DAC	XCOOR	/ SAVE VALUE.
020547	777756	LAW	-22	
020550	600557	JMP	PLOG2	
020551	102237	JMS	TCMA	
020552	440644	ISZ	PMFLG	/ SET NEG. FLAG
020553	650421	PLOG1	650421	/ CLQ NORM21.
020554	040253	DAC	XCOOR	
020555	777700	LAW	-100	
020556	640001	OSC		/ IOR SHIFT COUNT.
020557	744001	PLOG2	CMAICLL	
020560	653105		653105	/ MUL 5
020561	707070		707070	
020562	040642	DAC	PLOG	/ STORE DECADE.
020563	200253	LAC	XCOOR	/ GET MANTISA FROM TABLE.
020564	742010	RTL		
020565	653606		653606	/ LMQ CLA LLS+6
020566	362506	TAD*	(ACOETA)	
020567	040253	DAC	XCOOR	
020570	200642	LAC	PLOG	
020571	360253	TAD*	XCOOR	
020572	660507	LRSS	7	
020573	362463	TAD*	(LOGSUB)	/ BASE LINE DECADE
020574	745100	SPAICLL		
020575	750000	CLA		
020576	100633	JMS	STRP	
020577	600612	JMP	.+13	
020600	040642	DAC	PLOG	
020601	122507	JMS*	(FINT)	
020602	242470	FLACIS	(1750)	
020603	740643	FDIVIS	PFACT	
020604	742510	FDIVIS	(275)	
020605	540642	FMULIS	PLOG	
020606	040253	FDACIS	XCOOR	
020607	122511	JMS*	(FEXT)	
020610	200253	LAC	XCOOR	
020611	741000	SKP		
020612	740020	RAR		
020613	040253	DAC	XCOOR	
020614	342467	TAD	(-1750)	/ SET POINTS ABOVE RANGE TO 0.
020615	751300	SPAISNAICLA		
020616	200253	LAC	XCOOR	
020617	100633	JMS	STRP	
020620	741000	SKP		
020621	620536	JMP*	PLOGAR	

020622	200644		LAC	PMFLG	
020623	741200		SNA		
020624	600630		JMP	.+4	
020625	200253		LAC	XCOOR	
020626	102237		JMS	TCHA	
020627	741000		SKP		
020630	200253		LAC	XCOOR	
020631	140644		DZM	PMFLG	
020632	620536		JMP*	PLOGAR	
020633	000000	STRP	0		
020634	040642		DAC	.+6	/ SAVE AC
020635	222512		LAC*	(STRPFG)	
020636	745200		SNAICLL		/ STRIP?
020637	440633		ISZ	STRP	/ NO
020640	200642		LAC	.+2	/ RESTORE AC
020641	620633		JMP*	STRP	
020642	000000	PLOG	0		
020643	000005	PFACT	5		
020644	000000	PMFLG	0		
020645	202513		LAC	(MESB)	
020646	741000		SKP		
020647	202514	TOPM	LAC	(MEST)	
020650	041010		DAC	ALPHA	
020651	777764		LAW	-14	/ 12 CHARS MAX.
020652	040466		DAC	CT2	
020653	441010		ISZ	ALPHA	
020654	181010		DZM*	ALPHA	
020655	440466		ISZ	CT2	/ DONE?
020656	741000		SKP		
020657	622450		JMP*	(RETC)	/ YES
020660	122515		JMS*	(READ)	
020661	061010		DAC*	ALPHA	
020662	741200		SNA		/ CR?
020663	622450		JMP*	(RETC)	/ YES
020664	600633		JMP	.-11	
020665	100676	PLOTG	JMS	PLOTIN	
020666	040532		DAC	CHARN	/ NEW CHAR FOR PLOTTING DATA
020667	222516		LAC*	(TC)	
020670	542517		SAD	(54)	/ ANOTHER?
020671	741000		SKP		
020672	622450		JMP*	(RETC)	/ NO
020673	100676		JMS	PLOTIN	
020674	040532		DAC	CHARB	/ NEW CHAR FOR BRIGHT DOT
020675	622450		JMP*	(RETC)	
020676	000000	PLOTIN	0		
020677	122443		JMS*	(DECIN)	
020700	482520		ISZ*	(AINF)	/ SKIP IF NO INPUT.
020701	741200		SNA		/ * MUST BE > 0.
020702	622445		JMP*	(QMARK)	
020703	342521		TAD	(-13)	
020704	740300		SMAISZA		
020705	622445		JMP*	(QMARK)	/ * TOO LARGE.
020706	342522		TAD	(13)	
020707	620676		JMP*	PLOTIN	
020710	102015	PORG	JMS	PLOT	
020711	600715		JMP	.+4	
020712	402453		XCT	(-1)	
020713	402453		XCT	(-1)	

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020714	402453		XCT	(-1)	
020715	102015		JMS	PLOT	
020716	600722		JMP	.+4	
020717	402500		XCT	(5)	
020720	402466		XCT	(0)	
020721	402466		XCT	(0)	
020722	622450		JMP*	(RETC	
020723	000000	ML	0		
020724	000000	XTICK	0		
020725	000000	YCOORL	0		
020726	000000	YCOORU	0		
020727	000000	MK	0		
020730	000000	DECPLT	0		
020731	122523		JMS*	(DECCON)	/ PLOT * IN AC.
020732	000000		0		
020733	542524		SAD	(240)	/ DON'T PLOT SPACES
020734	620732		JMP*	.-2	
020735	440753		ISZ	DECPL1	
020736	060753		DAC*	DECPL1	
020737	740200		SZA		/ DONE?
020740	620732		JMP*	.-6	/ NO.
020741	200727		LAC	MK	
020742	741200		SNA		
020743	600750		JMP	.+5	
020744	202525		LAC	(113)	
020745	060753		DAC*	DECPL1	
020746	440753		ISZ	DECPL1	
020747	160753		DZM*	DECPL1	
020750	202526		LAC	(DECPLM)	
020751	040753		DAC	DECPL1	
020752	101010		JMS	ALPHA	
020753	020756	DECPL1	DECPLM		
020754	777772		-6		
020755	620730		JMP*	DECPLT	
020756	000002	DECPLM	2		
020757	000000		0		
020758	000000		0		
020761	000000		0		
020762	000000		0		
020763	000000		0		
020764	000000		0		

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        .TITLE ALPHA    5/19/69
// SYMBOL DEFINITIONS AND CONTROL LOGIC FOR ALPHANUMERIC OUTPUT
// ON THE PLOTTER AND/OR DISPLAY
// CONTROL ROUTINE FOR PLOTTER AND/OR CRT ALPHANUMERIC OUTPUT
// CALLING SEQUENCE, ALL ARGUMENTS ARE FIXED POINT
// CALL CONTRO(NDAT,NC,N1,N2)
// WHERE
// NDAT=.DAT SLOT NUMBER THAT IPA OR TVA IS ASSIGNED TO
// NC=CONTROL CODE(0,1, OR 2)
// NC=0, INITIALIZE SCALE
// NC=1, INITIALIZE ROTATION
// NC=2, INITIALIZE POSITION
020765      000000      CONTRO      0
020766      102401      JMS          .DA      /GET ARGUEMENTS
020767      600774      JMP          .+5
020770      000000      NDAT      0
020771      000000      NC        0
020772      000000      N1       0
020773      000000      N2       0
020774      220771      LAC*      NC
020775      040771      DAC      NC
020776      220772      LAC*      N1
020777      040772      DAC      N1
021000      220773      LAC*      N2
021001      040773      DAC      N2
021002      140770      DZM      NDAT
021003      101010      JMS      ALPHA
021004      020770      NDAT
021005      777774      -4
021006      620765      JMP*      CONTRO
//SYMBOL DEFINITIONS AND DECODING LOGIC FOR PLOTTER AND/OR CRT
//ENTER HERE WITH CAL ADDRESS IN HQ AND ADDRESS OF PLOT OR DRAW IN THE
//AC.
021007      000000      AW1      0
021010      000000      ALPHA    0
021011      201010      LAC      ALPHA
021012      041123      DAC      ARGP
021013      221123      WRITE    LAC*   ARGP
021014      041007      DAC      AW1    /AW1 CONTAINS ADDRESS OF WORD 1 OF LB
021015      441123      ISZ      ARGP
021016      221007      LAC*     AW1
021017      741200      SNA
021020      601164      JMP      CNTRL  /SPECIAL CODE=CONTROL INFO
021021      441007      ISZ      AW1    /IOPS ASCII ONLY
021022      102015      JMS      PLOT   /PICK UP THE PEN
021023      601027      JMP      .+4
021024      021623      ARG33
021025      000000      AW2      0
021026      000000      R.N2     0
021027      221007      SSI      LAC*   AW1
021030      441007      ISZ      AW1
021031      741200      SNA
021032      601146      JMP      DONE  /YES.
021033      342527      TAD      (-4)  /FIND ADDRESS OF CHARACTER IN TABLE
021034      741100      SPA
021035      342457      TAD      (100)
021036      502530      AND      (77)
021037      744020      RCR
    
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021040	342531		TAD	(ATABL	
021041	041025		DAC	AW2	
021042	221025		LAC*	AW2	
021043	740400		SNL		
021044	640511		LRS	11	
021045	502532		AND	(777	
021046	342533		TAD	(S1	
			/DECODE AND PLOT THE CHARACTER WHOSE ADDRESS IS IN THE AC		
021047	041026		DAC	R.N2	
021050	202534		LAC	(NOP	
021051	041104		DAC	R.CHPD	
021052	221026	R.CS2	LAC*	R.N2	/GET A PACKED WORD
021053	041614		DAC	R.MQ	
021054	777775		LAW	-3	
021055	041615		DAC	R.CCT	
021056	201614	R.CS1	LAC	R.MQ	
021057	653603		653603		/ LMQ, CLA, LLS+3
021060	041612		DAC	R.TX	
021061	641603		641603		/ CLA, LLS+3
021062	041613		DAC	R.TY	
021063	641002		LACQ		
021064	041614		DAC	R.MQ	
021065	202535		LAC	(7	
021066	541612		SAD	R.TX	
021067	601120		JMP	R.CS3	
021070	101516		JMS	R.ROTA	/NORMAL POINT
021071	201612		LAC	R.TX	
021072	341231		TAD	R.X	
021073	041112		DAC	R.PX	
021074	201613		LAC	R.TY	
021075	341232		TAD	R.Y	
021076	041113		DAC	R.PY	
021077	102015		JMS	PLOT	
021100	601104		JMP	+.4	
021101	021622		ARG22		
021102	021112		R.PX		
021103	021113		R.PY		
021104	740000	R.CHPD	NOP		
021105	201224		LAC	INS2	
021106	041104		DAC	R.CHPD	
021107	102015		JMS	PLOT	
021110	601114		JMP	+.4	
021111	021621		ARG11		
021112	000000	R.PX	0		
021113	000000	R.PY	0		
021114	441615	R.CHOK	ISZ	R.CCT	
021115	601056		JMP	R.CS1	
021116	441026		ISZ	R.N2	
021117	601052		JMP	R.CS2	
021120	102015	R.CS3	JMS	PLOT	/EITHER END OR PU
021121	601125		JMP	+.4	
021122	021623		ARG33		
021123	000000	ARGP	0		
021124	000000		0		
021125	750000		CLA		
021126	541613		SAD	R.TY	
021127	601133		JMP	R.CS4	/END
021130	202534		LAC	(NOP	'PEN UP

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021131 041104 DAC R.CHPD
021132 601114 JMP R.CHOK
021133 141613 R.CS4 DZM R.TY /END
021134 202464 LAC (6
021135 041612 DAC R.TX
021136 101516 JMS R.ROTA
021137 201612 LAC R.TX
021140 341231 TAD R.X
021141 041231 DAC R.X
021142 201613 LAC R.TY
021143 341232 TAD R.Y
021144 041232 DAC R.Y
021145 601027 JMP SSI
021146 141612 DONE DZM R.TX /SET CARRIAGE RETURN
021147 777767 LAW -10-1
021150 041613 DAC R.TY /-8 1'S COMP
021151 101516 JMS R.ROTA
021152 201233 LAC R.FX
021153 341612 TAD R.TX
021154 041231 DAC R.X
021155 041233 DAC R.FX
021156 201234 LAC R.FY
021157 341613 TAD R.TY
021160 041232 DAC R.Y
021161 041234 DAC R.FY
/RETURN FOLLOWING CAL
021162 441123 ISZ ARGP
021163 621123 OKOK JMP* ARGP
/PROCESS CONTROL INFORMATION
021164 441007 CNTRL ISZ AWI
021165 221007 LAC* AWI /GET CONTROL CODE
021166 441007 ISZ AWI
021167 745220 SNAIRCR
021170 601203 JMP C.SCAL
021171 741200 SNA
021172 601211 JMP C.ROT
021173 221007 C.INIT LAC* AWI /INITIALIZE POSITION(CODE=2)
021174 041231 DAC R.X /LEAVE IN 2'S COMP
021175 041233 DAC R.FX
021176 441007 ISZ AWI
021177 221007 LAC* AWI
021200 041232 DAC R.Y
021201 041234 DAC R.FY
021202 601162 JMP OKOK-1
021203 221007 C.SCAL LAC* AWI /INITIALIZE SCALE(CODE=0)
021204 041226 DAC R.SCL
021205 141227 DZM R.SN
021206 202470 LAC (1750
021207 041230 DAC R.CS
021210 601162 JMP OKOK-1
021211 221007 C.ROT LAC* AWI /INITIALIZE ROTATION
021212 741100 SPA /CONVERT AND STORE AS 1'S COMP
021213 342453 TAD (-1
021214 041227 DAC R.SN
021215 441007 ISZ AWI
021216 221007 LAC* AWI
021217 741100 SPA
021220 342453 TAD (-1

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021221	041230		DAC	R.CS	
021222	601162		JMP	OKOK-1	
021223	601007	INS1	JMP	AWI	
021224	601114	INS2	JMP	R.CHOK	
021225	000000	R.SUB	0		/ADDRESS OF CURRENT SUBROUTINE(PLOT OR DRAW)
021226	000003	R.SCL	3		/SCALE FACTOR
021227	000000	R.SN	0		/SIN
021230	001750	R.CS	1750		/COS
021231	000000	R.X	0		/X 0 OF CHAR
021232	000000	R.Y	0		/Y 0 OF CHAR
021233	000000	R.FX	0		/X OF FIRST CHAR
021234	000000	R.FY	0		/Y OF FIRST CHAR
021235	000000	AUXBF	0		
021236	000000		0		
021237	000000		0		
021240	000000		0		
021241	000000		0		
021242	000000		0		
021243	000000		0		
021244	000000		0		

/CHARACTER DEFINITIONS. GRID SIZE OF LETTER IS 4 BY 6.
 /SIZE INCLUDING SPACE IS 6 BY 8.
 /EACH OCTAL DIGIT AS A X OR Y COORDINATE.
 /3 PAIRS PER WORD. 70 IS END. 77 IS PEN UP.

021245	700000	S1	700000
021246	152620	C1	152620
021247	103070		103070
021250	051636	C2	051636
021251	450100		450100
021252	407000		407000
021253	051636	C3	051636
021254	454433		454433
021255	424130		424130
021256	100170		100170
021257	011030	C5	011030
021260	414233		414233
021261	030646		030646
021262	700000		700000
021263	021333	C6	021333
021264	424130		424130
021265	100105		100105
021266	163645		163645
021267	700000		700000
021270	130405	C8	130405
021271	163645		163645
021272	443313		443313
021273	020110		020110
021274	304142		304142
021275	337000		337000
021276	011030	C9	011030
021277	414536		414536
021300	160504		160504
021301	133344		133344
021302	700000		700000
021303	262470	S2	262470
021304	011030	CS	011030
021305	414233		414233
021306	130405		130405

021307	163645		163645
021310	700000		700000
021311	064626	CT	064626
021312	207000		207000
021313	211112	S7	211112
021314	222110		222110
021315	700000		700000
021316	060202	CU	060202
021317	020140	CJ	020140
021320	304146		304146
021321	700000		700000
021322	060002	CK	060002
021323	461340		461340
021324	700000		700000
021325	060040	CL	060040
021326	700000		700000
021327	000636	CP	000636
021330	454433		454433
021331	037000		037000
021332	341477	X2	341477
021333	133370		133370
021334	133370	X3	133370
021335	162635	X4	162635
021336	312010		312010
021337	700000		700000
021340	023577	X5	023577
021341	451277		451277
021342	441477		441477
021343	033370		033370
021344	362615	X6	362615
021345	112030		112030
021346	700000		700000
021347	443515	X7	443515
021350	041333		041333
021351	423111		423111
021352	027710		027710
021353	167736		167736
021354	307000		307000
021355	000636	CB	000636
021356	454433		454433
021357	033342		033342
021360	413000		413000
021361	700000		700000
021362	324241	CG	324241
021363	413010	CC	413010
021364	010516		010516
021365	364570		364570
021366	000636	CD	000636
021367	454130		454130
021370	007000		007000
021371	400000	CE	400000
021372	000333	CF	000333
021373	030646		030646
021374	700000		700000
021375	060003	CH	060003
021376	434046		434046
021377	700000		700000
021400	163626	CI	163626

021401	201030		201030
021402	700000		700000
021403	123477	X8	123477
021404	242277		242277
021405	321477		321477
021406	133370		133370
021407	101121	X9	101121
021410	201070		201070
021411	222423	Y1	222423
021412	133370		133370
021413	001333	CA	001333
021414	261333		261333
021415	407000		407000
021416	000620	CM	000620
021417	464070		464070
021420	000640	CN	000640
021421	467000		467000
021422	000636	CR	000636
021423	454433		454433
021424	032340		032340
021425	700000		700000
021426	062046	CV	062046
021427	700000		700000
021430	061026	CW	061026
021431	304670		304670
021432	062346	CX	062346
021433	002340		002340
021434	700000		700000
021435	062346	CY	062346
021436	232070		232070
021437	303602	C4	303602
021440	427000		427000
021441	400000	CZ	400000
021442	004606	C7	004606
021443	700000		700000
021444	042426	Z1	042426
021445	060477		060477
021446	204042		204042
021447	222077		222077
021450	004670	S5	004670
021451	325041	CO	325041
021452	414536	CO	414536
021453	160501		160501
021454	103041		103041
021455	700000		700000
021456	000000	ATABL	0
021457	000073		X5-S1
021460	102177		X7-S1*1000*Z1-S1
021461	000036		S2-S1
021462	077070		X6-S1*1000*X4-S1
021463	136144		X8-S1*1000*Y1-S1
021464	046067		S7-S1*1000*X3-S1
021465	142203		X9-S1*1000*S5-S1
021466	205001		CO-S1*1000*C1-S1
021467	003006		C2-S1*1000*C3-S1
021470	172012		C4-S1*1000*C5-S1
021471	016175		C6-S1*1000*C7-S1
021472	023031		C8-S1*1000*C9-S1

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021473 000000 0
021474 000065 X2-S1
021475 000000 0
021476 000146 CA-S1
021477 110116 CB-S1*1000+CC-S1
021500 121124 CD-S1*1000+CE-S1
021501 125115 CF-S1*1000+CG-S1
021502 130133 CH-S1*1000+CI-S1
021503 052055 CJ-S1*1000+CK-S1
021504 060151 CL-S1*1000+CM-S1
021505 153205 CN-S1*1000+CO-S1
021506 062204 CP-S1*1000+CQ-S1
021507 155037 CR-S1*1000+CS-S1
021510 044051 CT-S1*1000+CU-S1
021511 161163 CV-S1*1000+CW-S1
021512 165170 CX-S1*1000+CY-S1
021513 174000 CZ-S1*1000
021514 000000 0
021515 000000 0
/Routine TO ROTATE A VALUE.
/JMS HERE WITH X AND Y IN R.TX AND R.TY(1 COMP).
/R.TX AND R.TY WILL BE SCALED AND ROTATED AND CONVERTED TO 2 COMP.
021516 000000 R.ROTA 0
021517 101555 JMS R.MULS
021520 021612 R.TX
021521 021226 R.SCL
021522 041112 DAC R.PX
021523 101555 JMS R.MULS
021524 021613 R.TY
021525 021226 R.SCL
021526 041113 DAC R.PY
/NOW R.PX=R.TX*R.SCL, R.PY=R.TY*R.SCL
/COMPUTE R.TX=R.CS*R.PX-R.SN*R.PY
021527 101555 JMS R.MULS
021530 021227 R.SN
021531 021113 R.PY
021532 740001 CNA
021533 041612 DAC R.TX
021534 101555 JMS R.MULS
021535 021230 R.CS
021536 021112 R.PX
021537 301612 ADD R.TX
021540 101574 JMS DV1000
021541 041612 DAC R.TX
/COMPUTE R.TY=R.SN*R.PX+R.CS*R.PY
021542 101555 JMS R.MULS
021543 021227 R.SN
021544 021112 R.PX
021545 041613 DAC R.TY
021546 101555 JMS R.MULS
021547 021230 R.CS
021550 021113 R.PY
021551 301613 ADD R.TY
021552 101574 JMS DV1000
021553 041613 DAC R.TY
021554 621516 JMP R.ROTA
021555 000000 R.MULS 0
/MULTIPLY SIGNED ROUTINE

```

021556	221555		LAC*	R.MUL5
021557	041616		DAC	R.MUL1
021560	441555		ISZ	R.MUL5
021561	221555		LAC*	R.MUL5
021562	041617		DAC	R.MUL2
021563	441555		ISZ	R.MUL5
021564	221616		LAC*	R.MUL1
021565	664000		GSM	
021566	041571		DAC	.+3
021567	221617		LAC*	R.MUL2
021570	657122		MUL5	
021571	000000		0	
021572	641002		LACQ	
021573	621555		JMP*	R.MUL5
		/ROUTINE TO DIVIDE BY 1000 AND CONVERT TO 2 COMP		
021574	000000	DV1000	0	
021575	041620		DAC	DV111
021576	664000		GSM	
021577	202505		LAC	(764
021600	741400		SZL	
021601	740001		CHA	
021602	301620		ADD	DV111
021603	744000		CLL	
021604	657323		IDIVS	
021605	001750		1750	
021606	641002		LACQ	
021607	741100		SPA	
021610	342446		TAD	(1
021611	621574		JMP*	DV1000
021612	000000	R.TX	0	
021613	000000	R.TY	0	
021614	000000	R.MQ	0	/MQ HOLDER
021615	000000	R.CCT	0	
021616	000000	R.MUL1	0	
021617	000000	R.MUL2	0	
021620	000000	DV111	0	
021621	000001	ARG11	1	
021622	000002	ARG22	2	
021623	000003	ARG33	3	

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```

          .TITLE PLOT 5/19/69
// POINT PLOTTING ROUTINE
// CALLING SEQUENCE - ALL ARGUMENTS ARE FIXED POINT
// CALL PLOT(N,NS,NX,NY)
// WHERE N=CHARACTER CODE, NS=SCALE FACTOR,
// NX AND NY ARE X AND Y COORDINATES
021624 000000 PLOT 0
021625 102401 JMS .DA
021626 601633 JMP .+5
021627 000000 N 0
021630 000000 SCAL 0
021631 000000 PX 0
021632 000000 Y 0
021633 221630 LAC* SCAL
021634 660701 ALSS 1
021635 740001 CMA
021636 342446 TAD (1
021637 652000 LMQ
021640 361631 TAD* PX
021641 041631 DAC PX
021642 641002 LACQ
021643 361632 TAD* Y
021644 041632 DAC Y
021645 102015 JMS PLOT /PICK UP PEN
021646 601652 JMP .+4
021647 022014 ARG3
021650 000000 0
021651 000000 HOLD 0
021652 221627 LAC* N
021653 502444 AND (17
021654 342446 TAD (1
021655 744020 RCR
021656 542464 SAD (6
021657 601666 JMP PCRSH /CROSS-HASH ONLY
021660 342536 TAD (TABL-1
021661 101671 JMS PCHAR
021662 221627 LAC* N
021663 744020 RCR
021664 741400 SZL
021665 621624 JMP* PLOT /NO CRSH OVERLAY
021666 202537 PCRSH LAC (TABL+5 /PLOT CROSS-HASH
021667 101671 JMS PCHAR
021670 621624 JMP* PLOT
021671 000000 PCHAR 0 /PLOT A SYMBOL
021672 041650 DAC HOLD-1
021673 221650 LAC* HOLD-1
021674 041650 DAC HOLD-1
021675 202534 LAC (NOP
021676 041717 DAC PENS
021677 777775 P1 LAW -3
021700 041723 DAC CNT
021701 221650 LAC* HOLD-1
021702 041651 DAC HOLD
021703 441650 ISZ HOLD-1
021704 101733 P2 JMS GETMUL
021705 341631 TAD PX
021706 041754 DAC PNX
021707 101733 JMS GETMUL

```


021710	341632		TAD	Y	
021711	041755		DAC	PNY	
021712	102015		JMS	PLOT	
021713	601717		JMP	.+4	
021714	022013		ARG2		
021715	021754		PNX		
021716	021755		PNY		
021717	000000	PENS	0		
021720	102015		JMS	PLOT	/PEN DOWN AFTER FIRST POINT ONLY
021721	601725		JMP	.+4	
021722	022012		ARG1		
021723	000000	CNT	0		
021724	000000		0		
021725	201732		LAC	GETMUL-1	
021726	041717		DAC	PENS	
021727	441723	PENSWI	ISZ	CNT	
021730	601704		JMP	P2	
021731	601677		JMP	P1	
021732	601727		JMP	PENSWI	
021733	000000	GETMUL	0		/GET A COORDINATE AND SCALE IT
021734	201651		LAC	HOLD	
021735	744000		CLL		
021736	640517		LRs	17	/15DEC
021737	041746		DAC	GWRK	
021740	542535		SAD	17	
021741	601751		JMP	ENDGET	
021742	641002		LACQ		
021743	041651		DAC	HOLD	
021744	221630		LAC*	SCAL	
021745	653122		MUL		
021746	000000	GWRK	0		
021747	641002		LACQ		
021750	621733		JMP*	GETMUL	
021751	102015	ENDGET	JMS	PLOT	/PICK UP PEN
021752	601756		JMP	.+4	
021753	022014		ARG3		
021754	000000	PNX	0		
021755	000000	PNY	0		
021756	621671		JMP*	PCHAR	
021757	021765	TABL	SQR		
021760	021767		DIM		
021761	021771		OCT		
021762	021775		STR		
021763	022003		CRS		
021764	022010		CRSH		
021765	000444	SQR	000444		/ 5 X 5 GRID X=7,Y=0 IS END OF SYMBOL
021766	400070		400070		
021767	022442	DIM	022442		
021770	200270		200270		
021771	010314	OCT	010314		
021772	344341		344341		
021773	301001		301001		
021774	700000		700000		
021775	000112	STR	000112		
021776	030414		030414		
021777	233444		233444		
022000	433241		433241		
022001	403021		403021		

022002	100070		100070
022003	010313	CRS	010313
022004	143433		143433
022005	434131		434131
022006	301011		301011
022007	017000		017000
022010	024222	CRSH	024222
022011	242070		242070
022012	000001	ARG1	1
022013	000002	ARG2	2
022014	000003	ARG3	3

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```

        .TITLE PLOT      5/19/69
// BASIC CALCOMP HANDLING SUBROUTINE
// CALLING SEQUENCE, ALL ARGUMENTS ARE FIXED POINT
//      CALL PLOT(NC,NX,NY)
// NC IS A CONTROL CODE AND NX AND NY ARE X AND Y ARGUMENTS RESPECTIVELY
// NC=-2, FIRST CALL WITH BUSY SWITCH
// NC=-1, FIRST CALL
// NC=0, INITIALIZE
// NC=1, PUT PEN DOWN
// NC=2, MOVE PEN
// NC=3, PICK PEN UP
// NC=4, MOVE WITH PEN DOWN (PUT PEN DOWN AND MOVE)
// NC=5, MOVE WITH PEN UP (PICK PEN UP AND MOVE)
//
// COMMANDS ARE STORED IN 2 WORD PAIRS
//PEN UP COMMANDS ARE 000000 400000
//PEN DOWN COMMANDS ARE 000000 000000
//PEN MOVE COMMANDS ARE AAAAAA MBBBBB
//WHERE AAAAAA = ABS(X2-X1) OR ABS(Y2-Y1) WHICH EVER IS LARGER
//      BBBBBB = ABS(X2-X1) OR ABS(Y2-Y1) WHICH EVER IS NOT AAAAAA
//AND M= 3 BIT CODE SELECTING PROPER PAIR OF PLOTTER COMMANDS
//
// SEE ALGORITHM FOR COMPUTER CONTROL OF A DIGITAL PLOTTER
//      BY J. E. BRESENHAM, IBM SYSTEMS JOURNAL,VOL 4,NO 1,1965
/
/CALL HANDLER
/

```

022015	000000	PLOT	0		
022016	102401		JMS	.DA	/GET ARGUMENTS
022017	602023		JMP	.+4	
022020	000000	CNTROL	0		
022021	000900	BIGX	0		
022022	000000	BIGY	0		
022023	222020		LAC*	CNTROL	/IF CNTROL = 4 OR 5.
022024	342540		TAD	(-4	/GO THROUGH A PEN
022025	741120		SPAIRAR		/COMMAND PRIOR TO
022026	602037		JMP	G0G0G0	/PERFORMING THE MOVE
022027	202015		LAC	PLOT	
022030	042020		DAC	CNTROL	
022031	202541		LAC	(.+3	
022032	042015		DAC	PLOT	
022033	602054		JMP	PUORD	
022034	202020		LAC	CNTROL	
022035	042015		DAC	PLOT	
022036	602117		JMP	MOVE	
022037	222020	G0G0G0	LAC*	CNTROL	/CHECK CNTROL
022040	743120		SPAIRTR		
022041	602105		JMP	FIRSTG	
022042	741100		SPA		
022043	602054		JMP	PUORD	
022044	741400		SZL		
022045	602117		JMP	MOVE	
022046	222021		LAC*	BIGX	/PROCESS INIT COMMAND
022047	042064		DAC	LASTX	
022050	222022		LAC*	BIGY	
022051	042065		DAC	LASTY	
022052	142104		DZM	PENSW	
022053	744002		STL		

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022054 750000 PUORD CLA /PROCESS PEN UP OR DOWN
022055 740020 RAR
022056 042076 DAC WORD2
022057 142075 DZH WORD1
022060 542104 SAD PENSX
022061 622015 JMP* PLOT
022062 042104 DAC PENSX
022063 602202 JMP PLACEH
022064 000016 LASTX 16
022065 702401 LASTY PLSF
022066 000000 TEMPAC 0
022067 000000 AFG 0
022070 000000 IPXCT 0
022071 000000 IPVI 0
//
// PROCESS FIRST CALL (FORCES RESTART TO WORK AND ALLOCATES BUFFER
// IF DESIRED)
// IX NX=-1, USE ALL AVAILABLE CORE FOR BUFFER
// IF NX=0, USE INTERNAL 1 COMMAND BUFFER
// IF NX=N, USE N WORD BUFFER
// IF NOT ENOUGH CORE IS AVAILABLE FOR NX=N, IT IS TREATED AS NX=-1
// FOR A NX=-1, IF LESS THAN 2 WORDS OF CORE ARE AVAILABLE, TREAT IT
// AS A NX=0 AND USE THE BUFFER INTERNAL TO THIS ROUTINE
// NC=-2 IS TREATED AS NC=-1 EXCEPT THE BUSY SWITCH VARIABLE IS SET UP
022072 042236 BUSYSW DAC BUSYAD
022073 222021 LAC* BIGX
022074 741200 TEMPRA SNA
022075 000000 WORD1 0 /NX=0, USE INTERNAL BUFFER
022076 000000 WORD2 0 /CALCULATE AVAILABLE CORE
022077 102237 BUFF1 JMS TCMA
022100 000000 BUFF2 0
022101 744020 W1 RCR /AC=A, CORE LENGTH IN COMMANDS
022102 741200 W2 SNA /IS A, CORE AT LEAST 2 WORDS
022103 000001 PLSTOP 1 /NO, USE INTERNAL BUFFER
022104 744010 PENSX RCL /YES, CONVERT BUFFL TO WORDS
022105 202233 FIRSTG LAC ABUFF1
022106 042232 DAC LOAD
022107 042231 DAC UNLOAD
022110 202542 LAC (INDSTP+3
022111 062543 DAC* (PLOTGO)
022112 042103 DAC PLSTOP
022113 142235 DZH NCIB
022114 202237 LAC BUFFL /SET BUSY SWITCH TO
022115 062236 DAC* BUSYAD /BUFFER LENGTH
022116 622015 JMP* PLOT
022117 202064 MOVE LAC LASTX /CALCULATE DELTA X AND Y
022120 102237 JMS TCMA
022121 362021 TAD* BIGX
022122 042075 DAC DELX
022123 202065 LAC LASTY
022124 102237 JMS TCMA
022125 362022 TAD* BIGY
022126 042076 DAC DELY
022127 222021 LAC* BIGX /LAST X AND Y = THIS X AND Y
022130 042064 DAC LASTX
022131 222022 LAC* BIGY
022132 042065 DAC LASTY
/CALCULATE BOOL = XYZ

```

		BOOL=CNTR0L		
022133	142020		DZM	BOOL
022134	202075		LAC	DELX
022135	740100		SMA	
022136	442020		ISZ	BOOL
022137	741100		SPA	
022140	102237		JMS	TCMA
022141	042075		DAC	DELX
022142	202020		LAC	BOOL
022143	744010		RCL	
022144	042020		DAC	BOOL
022145	202076		LAC	DELY
022146	740100		SMA	
022147	442020		ISZ	BOOL
022150	741100		SPA	
022151	102237		JMS	TCMA
022152	042076		DAC	DELY
022153	102237		JMS	TCMA
022154	342075		TAD	DELX
022155	740010		RAL	
022156	740002		CML	
022157	202020		LAC	BOOL
022160	740010		RAL	
022161	660717		ALSS+17	/OCTAL
022162	042020		DAC	BOOL
022163	640702		ALS+2	
022164	741100		SPA	
022165	602174		JMP	NOSHAP
022166	202075		LAC	DELX
022167	652000		LMQ	/SWAP DELTA X AND Y
022170	202076		LAC	DELY
022171	042075		DAC	DELX
022172	641002		LACQ	
022173	042076		DAC	DELY
022174	202076	NOSHAP	LAC	DELY
022175	242020		XOR	BOOL
022176	042076		DAC	DELY
022177	202075		LAC	DELX
022200	741200		SMA	
022201	622015		JMP*	PLOT
022202	202257	PLACEW	LAC	BUFFL
022203	542235		SAD	NCIB
022204	602203		JMP	.-1
022205	202075		LAC	WORD1
022206	062232		DAC*	LOAD
022207	442232		ISZ	LOAD
022210	202076		LAC	WORD2
022211	062232		DAC*	LOAD
022212	442232		ISZ	LOAD
022213	442235		ISZ	NCIB
022214	700002		IOF	
022215	222236		LAC*	BUSYAD
022216	342453		TAD	(-1
022217	062236		DAC*	BUSYAD
022220	700042		ION	
022221	202232		LAC	LOAD
022222	542234		SAD	ABUFF2
022223	262233		LAC	ABUFF1

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022224 042232 DAC LOAD
022225 750000 CLA
022226 542103 SAD PLSTOP
022227 622015 JMP* PLOT
022230 602312 JMP INDSTP+3 /START UP PLOTTER
022231 022077 UNLOAD BUFF1
022232 022077 LOAD BUFF1
022233 022077 ABUFF1 BUFF1
022234 022101 ABUFF2 BUFF2+1
022235 000000 NCIB 0
022236 022072 BUSYAD BUSYSW
DELX=WORD1
DELY=WORD2
022237 000000 TCMA 0 /TWO CMA
022240 740001 CMA
022241 342446 TAD (-1
022242 622237 JMP* TCMA
/ INTERRUPT SERVICE - COMMAND EXECUTER
/
/ USE IOT'S FOR PDP-9
PLSF=702401
PLCF=702402
PLPU=702404
PLPR=702421
PLDU=702422
PLDD=702424
PLPL=702441
PLPD=702444
/
022243 702424 INSTAB PLDD
022244 702422 PLDU
022245 702441 PLPL
022246 702421 PLPR
/
022247 000031 FG TAB 31 /M7M6
022250 000013 13 /M5M6
022251 000021 21 /M3M4
022252 000012 12 /M5M4
022253 000030 30 /M7M8
022254 000003 03 /M1M8
022255 000020 20 /M3M2
022256 000002 02 /M1M2
/
022257 000001 BUFFL 1
/
/GET COMMAND FROM BUFFER AND EXECUTE
022260 202235 NEXTC LAC NCIB
022261 741200 SNA
022262 602307 JMP INDSTP
022263 342453 TAD (-1
022264 042235 DAC NCIB
022265 462236 ISZ* BUSYAD /INCREMENT BUSY SWITCH
022266 222231 LAC* UNLOAD
022267 442231 ISZ UNLOAD
022270 740200 SZA
022271 602314 JMP XMOVE
022272 700002 IOF /PEN UP OR DOWN
022273 562231 SAD* UNLOAD

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022274	602277		JMP	+3	
022275	702404		PLPU		/UP
022276	741000		SKP		
022277	702444		PLPD		/DOWN
022300	122543		JMS*	(PLOTGO)	
022301	442231	WRAP	ISZ	UNLOAD	
022302	202231		LAC	UNLOAD	
022303	542234		SAD	ABUFF2	
022304	202233		LAC	ABUFF1	
022305	042231		DAC	UNLOAD	
022306	602260		JMP	NEXTC	
022307	142103	/			
022310	442103	INDSTP	DZM	PLSTOP	/INDICATE PLOTTER STOPPED
022311	622015		ISZ	PLSTOP	
022312	142103		JMP*	PLOT	
022313	602260		DZM	PLSTOP	
		/	JMP	NEXTC	
022314	042101	XMOVE	DAC	M1	/MOVE PEN
022315	222231		LAC*	UNLOAD	
022316	502544		AND	(077777	
022317	042102		DAC	M2	
022320	222231		LAC*	UNLOAD	
022321	742010		RTL		
022322	742010		RTL		
022323	502535		AND	(7	
022324	342545		TAD	(FGTAB	
022325	042067		DAC	AFG	
022326	222067		LAC*	AFG	
022327	102367		JMS	XMGET	/SET UP M1 AND M2
022330	042352		DAC	M2	
022331	222067		LAC*	AFG	
022332	742020		RTR		
022333	740020		RAR		
022334	102367		JMS	XMGET	
022335	042353		DAC	M1	
022336	202102		LAC	IPDB	
022337	342102		TAD	IPDB	
022340	042102		DAC	IPDB	
022341	202101		LAC	IPDA	/INIT MOVE LOOP
022342	102375		JMS	ITCMA	
022343	042070		DAC	IPXCT	
022344	342070		TAD	IPXCT	
022345	042101		DAC	IPDA	
022346	202070		LAC	IPXCT	
022347	602364		JMP	IPCAL1	
022350	700062	IPA1	IOF		
022351	740100		SMA		
022352	700040	M2	XX		
022353	740040	M1	XX		
022354	122543		JMS*	(PLOTGO)	
022355	202071		LAC	IPV1	
022356	442070		ISZ	IPXCT	
022357	741000		SKP		
022360	602301		JMP	WRAP	
022361	741100		SPA		
022362	602364		JMP	IPCAL1	
022363	342101	IPCAL2	TAD	IPDA	

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022364 342102 IPCAL1 TAD IPDB
022365 042071 DAC IPVI
022366 602350 JMP IFAI
022367 000000 XMGET 0
022370 502535 AND (7
022371 342546 TAD (INSTAB
022372 042375 DAC ITCMA
022373 222375 LAC* ITCMA
022374 622367 JMP* XMGET

IPDA=W1
IPDB=W2
ITCMA 0 /TWO CMA FOR INT SERV
CMA
TAD (1
JMP* ITCMA
.DA 0
LAW -2
TAD .DA / ADDRESS OF SUBR ENTRY POINT.
AND (77777)
DAC .ADR
LAW -1 / GET ADDRESS OF JMS TO SUBR.
TAD* .ADR
AND (77777)
DAC* L12 / GET BANK BITS.
AND (60000)
DAC BANK / GET JMP AFTER JMS.
LAC* 12
AND (17777) / PUT ON BANK BITS
XOR BANK
JMS TCM
TAD* L12 / -1# OF ARG+1)
DAC .DAS / INCR TO ADDRESS WHERE
ISZ .ADR / TO PUT ARGUMENTS.
ISZ .ADR / DONE?
SKP .DAS / NO
JMP* .DA
ISZ .ADR
LAC* 12 / GET ARGUMENT ADR.
SMA
JMP .+3
AND (17777) / PUT ON BANK BITS.
XOR BANK
DAC* .ADR
JMP .-12
.ADR 0
BANK 0
.DAS 0
L12 12
.END

022443 012461
022444 000017
022445 006746
022446 000001
022447 000040
022450 005257
022451 010344
022452 007660

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022453	777777
022454	010376
022455	000177
022456	777700
022457	000100
022460	000012
022461	010675
022462	010620
022463	010617
022464	000006
022465	000060
022466	000000
022467	776030
022470	001750
022471	000002
022472	000074
022473	000004
022474	777760
022475	000003
022476	777720
022477	010407
022500	000005
022501	020425
022502	007657
022503	020532
022504	020531
022505	000764
022506	010721
022507	013051
022510	000275
022511	013112
022512	000053
022513	020450
022514	020433
022515	012366
022516	012714
022517	000054
022520	000062
022521	777765
022522	000013
022523	006571
022524	000240
022525	000113
022526	020756
022527	777740
022530	000077
022531	021456
022532	000777
022533	021245
022534	740000
022535	000007
022536	021756
022537	021764
022540	777774
022541	022034
022542	022312
022543	016127
022544	077777

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*** PDP9/15 ASSEMBLY LISTING ***

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022546	022243
022547	060000
022550	017777

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*** SYMBOL TABLE ***

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.ADR	022437	CRSH	022010	IPVI	022071	PLPD	702444	TC	012714
.DA	022401	CS	021304	IPXCT	022070	PLPL	702441	TCMA	022237
.DAS	022441	CT	021311	ITCMA	022375	PLPR	702421	TEMPAC	022066
ABUFF1	022233	CT1	020465	LASTX	022064	PLPU	702404	TEMPRA	022074
ABUFF2	022234	CT2	020466	LASTY	022065	PLSF	702401	TOPM	020647
ACOETA	010721	CU	021316	LINADR	020412	PLSTOP	022103	UNLOAD	022231
ADECM	010620	CV	021426	LOAD	022232	PLTDAT	020467	WORD1	022075
AFG	022067	CH	021430	LOGLIN	010376	PMFLG	020644	WORD2	022076
AINF	000062	CX	021432	LOGSCL	020510	PNX	021754	WRAP	022301
ALPHA	021010	CY	021435	LOGSUB	010617	PNY	021755	WRITE	021013
ARGP	021123	CZ	021441	L12	022442	PORG	020710	W1	022101
ARG1	022012	C1	021246	MESB	020450	PPL0T	021624	W2	022102
ARG11	021621	C2	021250	MESSP	020425	PSX	020535	XCOORD	020253
ARG2	022013	C3	021253	MEST	020433	PUORD	022054	XL	020364
ARG22	021622	C4	021437	MK	020727	PX	021631	XMGET	022367
ARG3	022014	C5	021257	ML	020723	P1	021677	XMOVE	022314
ARG33	021623	C6	021263	MN0CD	007657	P2	021704	XTICK	020724
ATABL	021456	C7	021442	MOVE	022117	QMARK	006746	XX	740040
AUXBF	021235	C8	021270	M1	022353	R.CCT	021615	X2	021332
AW1	021007	C9	021276	M2	022352	R.CHOK	021114	X3	021334
AW2	021025	DATA	020534	N	021627	R.CHPD	021104	X4	021335
BANK	022440	DECCON	006571	NC	020771	R.CS	021230	X5	021340
BIGX	022021	DECIN	012461	NCIB	022235	R.CS1	021056	X6	021344
BIGY	022022	DECPLM	020756	NDAT	020770	R.CS2	021052	X7	021347
BOOL	022020	DECPLT	020730	NEXTC	022260	R.CS3	021120	X8	021403
BUFFL	022257	DECPLI	020753	N0CD	010344	R.CS4	021133	X9	021407
BUFF1	022077	DELX	022075	NOSWAP	022174	R.CFX	021233	Y	021632
BUFF2	022100	DELY	022076	N1	020772	R.FY	021234	YCOORD	020725
BUSYAD	022236	DIH	021767	N2	020773	R.MQ	021614	YCOORDU	020726
BUSYSW	022072	DISADD	007660	OCT	021771	R.MULS	021555	YL	020206
C.INIT	021173	D1SONE	010407	OKOK	021163	R.MUL1	021616	YMARK	020354
C.ROT	021211	DONE	021146	ORIG	020345	R.MUL2	021617	Y1	021411
C.SCAL	021203	DSEX	020222	PCHAR	021671	R.N2	021026	Z1	021444
CA	021413	DV1000	021574	PCRSW	021666	R.PX	021112		
CB	021355	DV111	021620	PD0TC	020533	R.PY	021113		
CC	021363	ENDGET	021751	PENS	021717	R.ROTA	021516		
CD	021366	FACT	010675	PENSW	022104	R.SCL	021226		
CE	021371	FDAC	000000	PENSW1	021727	R.SN	021227		
CF	021372	FDIV	700000	PFACT	020643	R.SUB	021225		
CG	021362	FEXT	013112	PLACEW	022202	R.TX	021612		
CH	021375	FGTAB	022247	PLCF	702402	R.TY	021613		
CHARB	020532	FINT	013051	PLDD	702424	R.X	021231		
CHARN	020531	FIRSTG	022105	PLDU	702422	R.Y	021232		
CI	021400	FLAC	200000	PLOG	020642	READ	012366		
CJ	021317	FMUL	500000	PLOGAR	020536	RETC	006257		
CK	021322	GETMUL	021733	PLOG1	020553	S	040000		
CL	021325	G0G0G0	022037	PLOG2	020557	SCAL	021630		
CM	021416	GWRK	021746	PLOT	022015	SEX	020017		
CN	021420	HOLD	021651	PLOTA	020036	SQR	021765		
CNT	021723	INDSTP	022307	PLOTAL	020110	SSI	021027		
CNTRL	021164	INSTAB	022243	PLOTAT	020177	STR	021775		
CNTROL	022020	INS1	021223	PLOTAT	020177	STRP	020633		
CO	021452	INS2	021224	PLOTAT	020177	STRPFG	000053		
CONTR0	020765	IPA1	022350	PLOTAT	020177	S1	021245		
CP	021327	IPCAL1	022364	PLOTAT	020177	S2	021303		
CQ	021451	IPCAL2	022363	PLOTAT	020177	S5	021450		
CR	021422	IPDA	022101	PLOTAT	020177	S7	021313		
CRS	022003	IPDB	022102	PLOTAT	020177	TABL	021757		