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SYSTRAN (Systems Analysis Translator): A Digital Computer Program

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FOREWORD

The work leading to this program has been conducted during the period from Aug 62 to Oct 64. The actual program outlined in this report was largely written from Jun 63 to Oct 64. The work has been done in support of Project 7231, "Biomechanics of Aerospace Operations," Task 723101, "Human Factors of Abrupt Deceleration." The program was designed around a 14-channel FM magnetic-tape and light-galvanometer data acquisition system for Biomechanics Research. Digitization was accomplished both automatically and manually. The utilization of this capability has resulted in publications (refs 11, 12, 13, 14, 15). Mr. David J. La Jeunesse is a member of the Systems Dynamic Analysis Directorate, Digital Computation Division, Programing Branch, Research and Technology Division (RTD), Wright-Patterson Air Force Base, Ohio. Capt. E. B. Weis, Jr., USAF, MC, is a member of the Aerospace Medical Research Laboratories, Biophysics Laboratory, Biodynamics and Bionics Division, Vibration and Impact Branch. Mr. T. J. Hogan, Jr., is a member of Technology, Inc., 3090 Richfield Center, Dayton, Ohio. Mr. Hogan's efforts were applied under contract AF 33(616)-10010, "Human Factors of Abrupt Deceleration."

Copies of the Binary Program tape or the Symbolic Program tape will be available to authorized requestors from Mr. David J. La Jeunesse. The authors are aware that, while the program has been ostensibly debugged, there is considerable probability that errors still exist. They will be grateful if such are called to the attention of Mr. La Jeunesse.

Special thanks are due Mr. Edward A. van Schaik, Systems Engineer, IBM Corporation, and Mr. Fred Pitts (RTD) for their help in the utilization of the special capabilities of the Basic Monitor System utilized by SYSTRAN.

This technical report has been reviewed and is approved.

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ABSTRACT

The mechanics, mathematics, and usage of a program written in FORTRAN IV and MAP for the IBM 7094 are described. The program is called SYSTRAN (systems analysis translator) and it includes subroutines for most of the common tools for frequency domain analysis of linear systems (such as Fourier transforms and inverse Fourier transforms, complex algebra, and correlation functions). The report is essentially an instruction manual. It contains a discussion of all aspects of the program essential to competent usage.

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SECTION I

INTRODUCTION

BACKGROUND AND MOTIVATION

The development of the computer analysis capability to be described in the following pages was oriented specifically to the analysis of signals and systems pertaining to biomechanics research. Nevertheless, the capability thus developed is applicable and has been applied to mechanical, electrical, and acoustical problems.

A discussion of the requirements of an analysis capability for biomechanics is not unique; it is a requirement for a general systems analysis capability. Because of this, the motivation and philosophy for each part of the system will not be discussed. Rather, formal systems engineering is its own justification.

The signals found in biomechanics fall into the basic categorizations as periodic, transient, or random so that the usual methods of signal analysis are applicable.

A somewhat unusual capability of this analysis system consists of the ability to obtain a characterization of a signal in terms of sets of straight lines fit by regression.

The analysis capability to be discussed is called the Systems Analysis Translator (SYSTRAN). This is a digital computer program which compiles and executes a set of instructions (containing symbols and operations pertinent to systems analysis) on data supplied with or generated by the instructions.

THE CAPABILITY

SYSTRAN provides the capability to take appropriately digitized data (up to 14 channels) and find L-transfer functions for an M-port, N-terminal, linear, nontime variant network whose ports and terminals have provided the data. This can be done, including data presentation, in one computer pass.

The separate capabilities included are introduced below. Each of these units of capability may, of course, be used separately in so far as the mathematics or logic is applicable to a particular problem.

DATA EDITING

The system generates an edited form of the input data for processing.

FOURIER TRANSFORMS

The system will generate the Fourier Transforms of any or all of the input data channels for a set of frequencies which can be specified as to range, interval, and scale.

CORRELATION FUNCTIONS

The system will generate auto and/or cross correlation functions for any or all of the input data channels for a set of delays which can be specified as to range and interval.

INVERSE FOURIER TRANSFORMS

The system will generate the inverse Fourier Transforms of all frequency functions generated by the system (or input to the system in the correct form) for a set of time values which can be specified as to range and interval.

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COMPLEX ALGEBRA FOR FOURIER TRANSFORMS

The system will generate and combine complex frequency functions according to the rules of complex functions.

DATA STORAGE AND RETRIEVAL

The system provides for the generation of, addition to, and retrieval from master files for both time and frequency data.

COMPLEX MATRIX ALGEBRA

The system provides for matrix operations on sets of complex frequency functions according to the rules of complex matrix theory.

INPUT DATA FIT

The system will fit a set of connected straight lines to a signal by means of a least square error criterion.

DATA PRESENTATION

The system provides a standard format output for each general type of data which includes both prints and plots (with variable scaling) of desired functions.

SECTION II

GENERAL PROGRAM DISCUSSION

COMPUTER DESCRIPTION

HARDWARE

The programing system was initially written for use on an IBM 7094 Digital Computer. The system requires 11 tape units or the equivalent in disk files. The system may, with a minimum of effort, be modified so as to use only 7 tape units. However, under such a modification, certain restrictions, on the type of jobs run, are inherent. The system was later modified for use on the IBM 7044-7094 Direct Coupled System (See Appendix IV).

SOFTWARE

The software used in conjunction with the 7094 is that of the IBM Basic Monitor System (IBSYS). The actual program is written in FORTRAN IV and MAP. The loading process and subsequent operation procedure is dependent on the IEDIT, OVERLAY, and INTERNAL FILE features available under IBSYS and the modified version of FRWD contained in the program.

GENERAL SYSTEM CONFIGURATION

LOGIC LEVELS

The programing system is written on a three level logical breakdown: The Job Monitor Level, The Systems Group Level, and The System Level. The System Level contains the programs which define an actual mathematical system and all input-output control necessary for the system.

The System Group Level contains linkage among the various systems of the group, special

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purpose programs which are to be used by more than one system in the group and the common storage used by all the systems of the group. In special cases, the System Group Level also contains some of the functions available under the group. In the cases where the System Group contains only one system, the System Group Level and the System Level are combined.

The Job Monitor Level contains the linkage among the various Systems Groups, the common storage used by all groups, and all special purpose programs used by more than one group.

LINKAGE AND DATA FLOW

The following pages, containing figures 1 through 6, show pictorially the linkage among the various System Groups, systems, and sections of the programing system, along with the external data flow among the Systems of the Group.

Figure 1 shows the linkage between the Job Monitor and the various System Groups through the System Monitors.

Figures 2 through 6 show the breakdown of each individual System Group into the various systems and sections, and the linkage and external data flow, among these parts of the Group.

CONTROL CARDS

GENERAL CONSIDERATIONS

To enable the programing system to readily perform its primary function, as an experimental tool, it was necessary to so develop the system input that it could dictate the format and type of experimental input data, control the processing of such data, and define the output desired. It was further desirable to make the format of such input correspond in form to the actual mathematics involved in the processing. Both of these conditions were met by developing an input system comprised of Control Cards.

CONTROL CARD TYPES

The control cards were defined so as to fall into one or more of the following five categories.

1) The Job Control Card

2) System Group Linkage Cards

3) System Linkage Cards

4) Process Control Cards

5) Special Uses Cards

The Job Control Card is used for the initialization of a Job run. The System Group Linkage Cards provide the external means of control of the flow of processing among the various Groups. The System Linkage Cards provide the external means of control of the flow of processing among the various systems of a group.

The Process Control Cards provide a means of inputting pertinent data necessary for controlling the type of, and in some cases providing, the actual mathematics involved in the processing.

The Special Uses Cards provide a means of controlling the generation of data for future use, outputing the desired data in a desired form, providing for some physical control of the running of the program, and allowing documentation of the input and output data.

GENERAL INPUT-OUTPUT CONSIDERATIONS

PROGRAM DECK

Due to the large size of the program deck the system is loaded by use of the IEDIT feature

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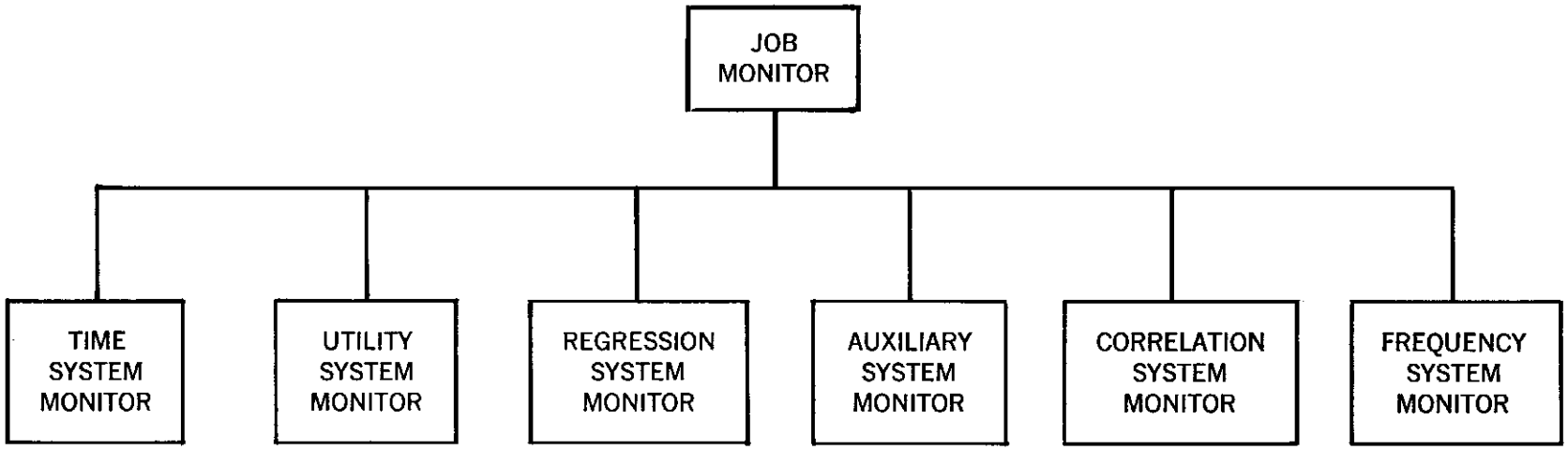

FIGURE 1 — GENERAL SYSTEM CONFIGURATION — ALPHA LEVEL LINKS

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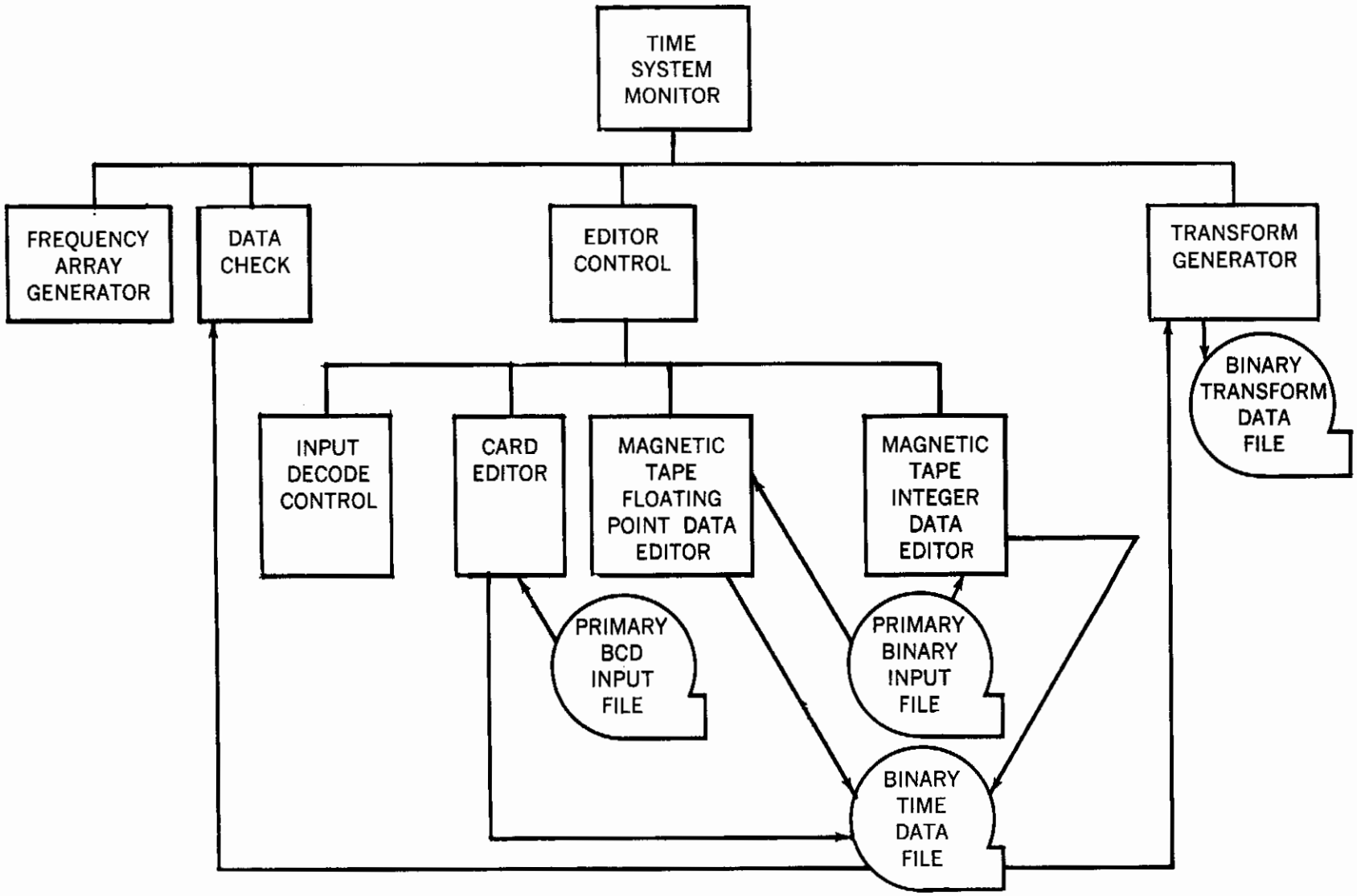

FIGURE 2 — TIME SYSTEM GROUP

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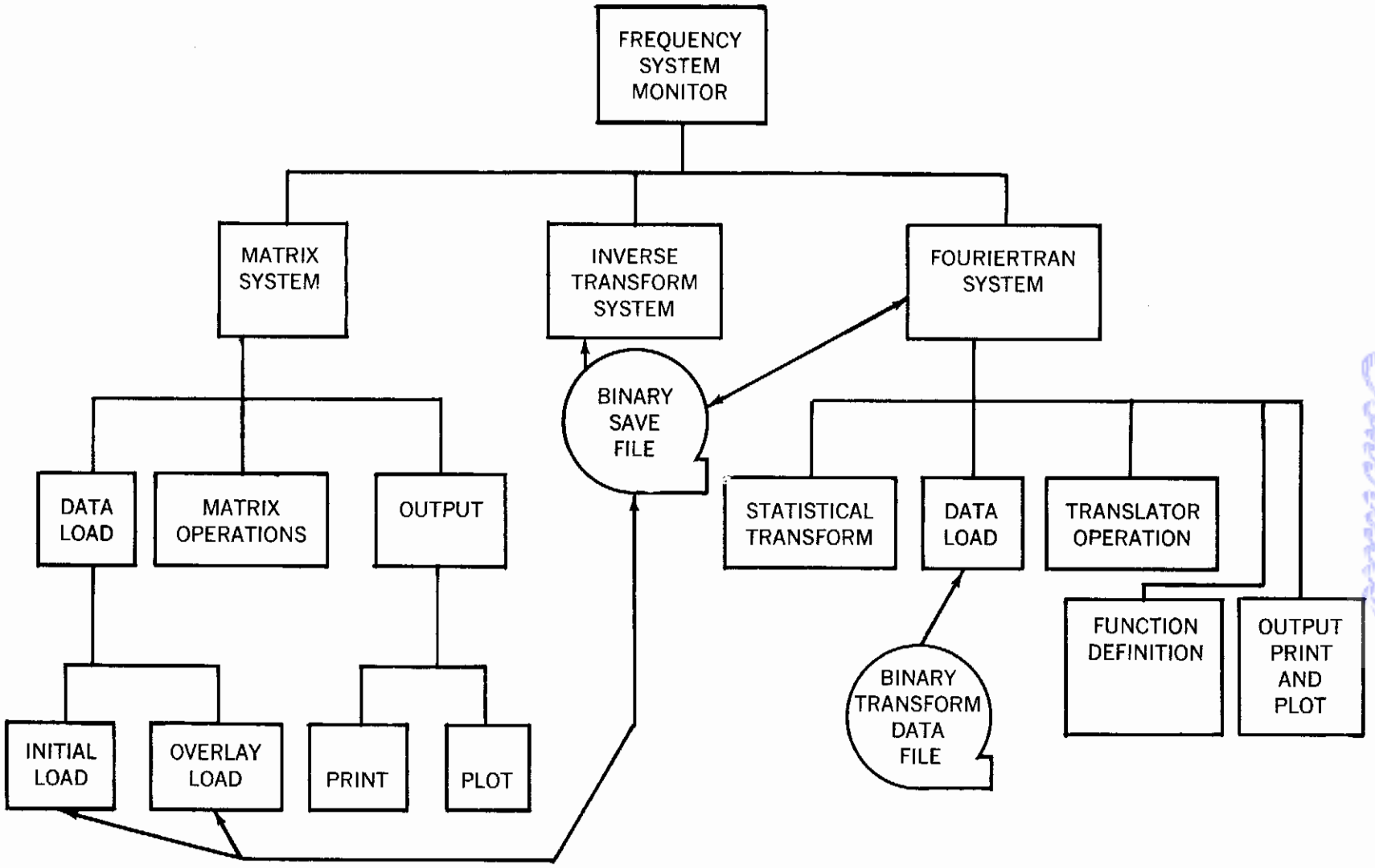

FIGURE 3 — FREQUENCY SYSTEM GROUP

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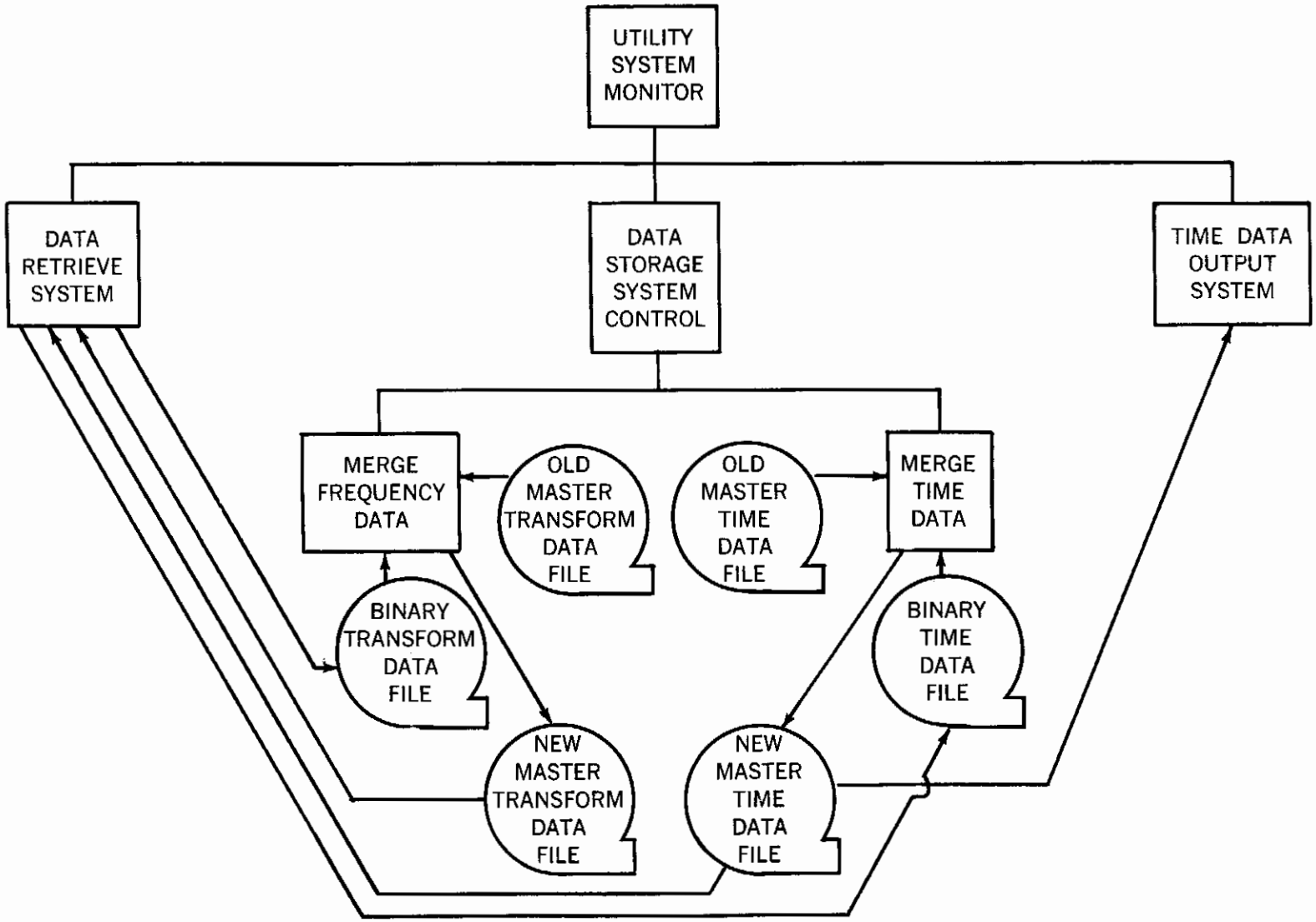

FIGURE 4 — UTILITY SYSTEM GROUP

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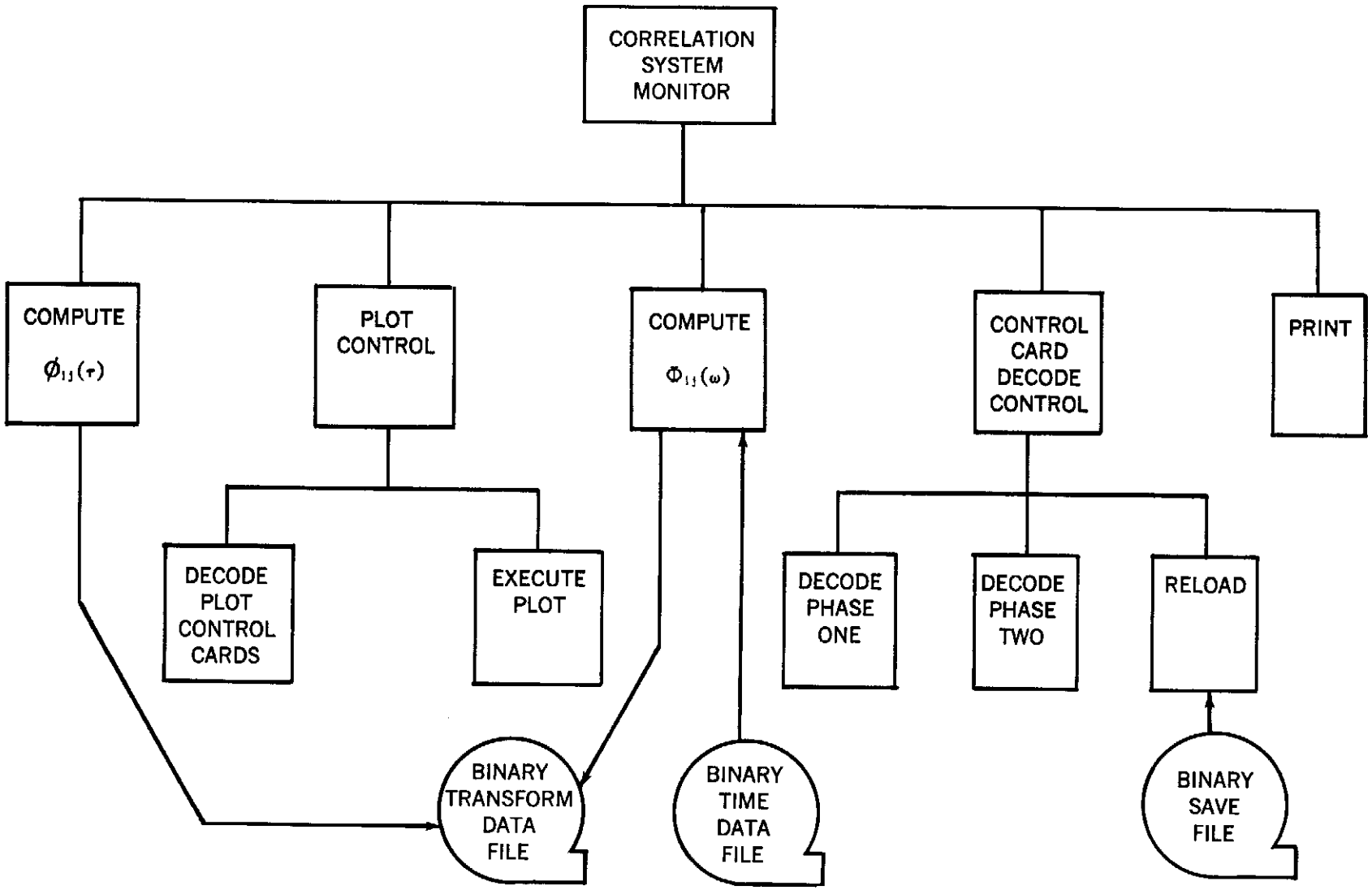

FIGURE 5 — CORRELATION SYSTEM

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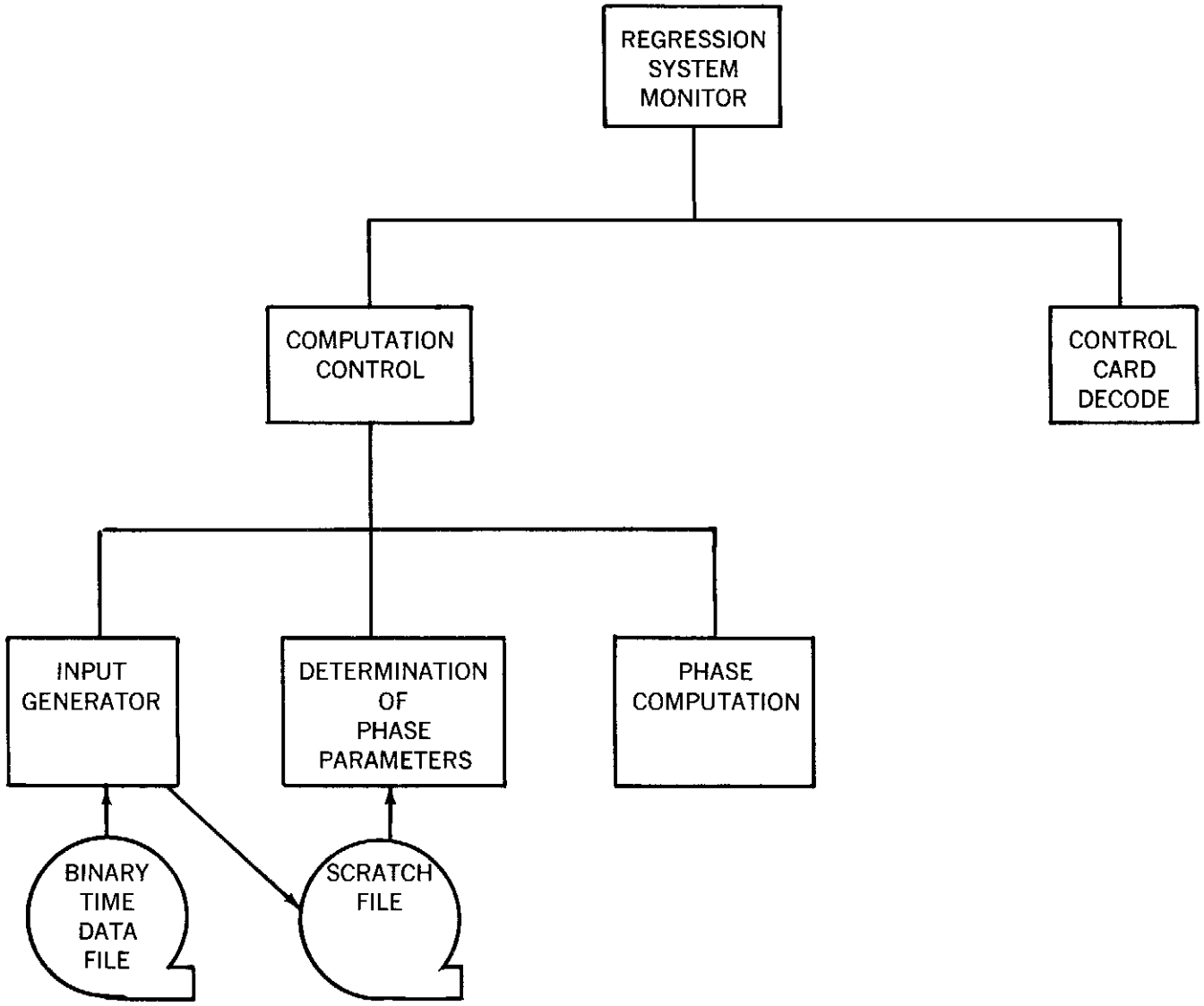

FIGURE 6 — REGRESSION SYSTEM

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available under IBSYS. With IEDIT, it is possible to permanently card-to-tape the binary program deck onto a special tape and load the program into the computer by use of a load deck. The binary program deck contains only the binary decks for all the programs available in the total system. The load deck contains all IBSYS control cards necessary for the running of the program followed by an IEDIT control card specifying the file on which the binary program deck has been mounted. These cards are followed by a deck comprised of the $IBLDR Cards for the decks present on the binary program deck and the $ORIGIN Cards necessary to set up the links for the OVERLAY feature. This is followed by an IEDIT Card specifying the normal IBSYS input file and an end file card. The data deck then follows the end file card and is itself ended with an end file card.

DATA DECK

The data deck is comprised of all of the program control cards necessary for the proper running of the Job.

EXPERIMENTAL DATA INPUT

The experimental data input which is necessary may be loaded in a number of different ways depending on the source of the data and/or the type of processing desired. The complete input requirements for all systems are explained in the descriptions of the systems.

PROGRAM OUTPUT

The program output consists of both binary coded decimal (BCD) and binary files. The binary files are for use as input to the various parts of the system. These files are further discussed in the sections which deal with the systems which use them.

There are two BCD output files, the normal IBSYS output file, and the SYSTRAN output file. The normal IBSYS output file contains, in addition to the information asked for by the options present on the IBSYS control cards, a list of all program control cards in the data deck and any diagnostics encountered in the processing of these cards. The SYSTRAN output file also contains a complete list of the control cards. This file contains all of the output which is standard for the system being run plus any of the output requested by use of the Special Uses Cards. A complete list of such output is described where these cards are described.

GENERAL PROGRAM FLOW

There are two types of flow necessary so that the programing system may perform its proper functions. Type 1 is that flow which causes a transfer of control to a lower level of the program, i.e., Job Monitor to System Monitor, System Monitor to System, etc. This is called externally controlled flow.

Type 2 is that flow which effects a transfer of control from a lower level to a higher level of the programing system, i.e., System to System Monitor, System Monitor to Job Monitor, etc. This is called internally controlled flow.

EXTERNALLY CONTROLLED FLOW

Externally controlled flow is effected when a section of the programing system encounters a control card which it recognizes and which indicates to this section that a transfer of control is desired. The transfer of control may not be immediately effected, since the program may have to perform certain computations before it is ready to transfer. In any case, control is transferred to the indicated section before any more data cards are read. This type of flow can only effect a one step transfer of control, i.e., from the level in which the programing system encounters the control card to the level immediately below it.

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INTERNALLY CONTROLLED FLOW

Internally controlled flow is effected when a section of the programing system encounters a control card which it does not recognize and therefore cannot process. The effect of this encounter indicates to the section that upon completion of processing of the information indicated by the previous control cards it is to return control to the section of the program which transferred control to it originally. This type of control transfer may be multilevel, since control will continually be returned to the next highest level until a section is reached which recognizes the control card or until the Job Monitor is reached.

PROGRAM DESCRIPTION

THE JOB MONITOR

The Job Monitor function is to provide the system with the following capabilities:

a) Job control

b) Data Linkage

c) Special Purpose Routines

All of the capabilities present in the Job Monitor are available to all parts of the programing system.

JOB CONTROL

A Job is defined as an ordered series of processing of a set of functions such that each type of processing contained in the series is dependent on the types which precede it. A Job is initialized by use of the *JOB[1] control card. This card has *JOB appearing in columns 1 thru 4. Columns 7 thru 80 may be used for identification of the Job. The function of the *JOB card is to initialize all error control switches. The error control switches are set when the program encounters an error which may affect future processing of the data. Before any processing of data is attempted, the program checks the appropriate switches to determine if the processing may be accomplished correctly. If any of the switches are set, the program will set any other switches necessary and then proceed to the next type of processing in the Job series without doing the actual processing of the data. A new *JOB card effectively tells the program that all subsequent processing is completely independent of any processing which occurred prior to the encountering of the card and consequently the previous errors encountered have no effect on the future processing.

The transfer of control from one system group to another is accomplished by the Job Monitor upon recognition of a * BEGIN card. The general format of this card is * BEGIN in columns 1 thru 6 and the System Group name in columns 8 through 80. The final termination of the program is accomplished when the Job Monitor encounters a * END card. This card has * END in columns 1 thru 4. Its effect on the program is to terminate all processing of data, rewind, and unload all files used during the run, and return control to the Basic Monitor System.

DATA LINKAGE

Certain variables, arrays, switches and headings must be available to many programs in various systems. To accomplish this, these parameters were assigned to Blank Common in the Job Monitor. These parameters are the basic time increment of the input data, the frequency values, a set of switches (not the error switches), the date of the run, and the input card image array. Even though the storage for these parameters is in the Job Monitor, the only ones that are set by it are the three date parameters (day, month, and year).

[1]Certain control cards will be referred to in Section III which are not defined until Section IV. This should not be confusing since only the processing concepts are being discussed in Section III.

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The Job Monitor also contains the nonexecutable routines which set the file specifications of the tape and/or disk files to be used, and the routines necessary for the rewinding and unloading of these files upon termination of the program.

SPECIAL PURPOSE ROUTINES

In addition to the file specification, rewind, unload, and date setting routines the Job Monitor also contains the following special purpose routines.

CARD — This routine reads a control card into the input card image array and checks the card for a totally blank card or a comment card. Any card which is blank or has a C in column 1 (a comment card) will be printed on both the SYSTRAN output file and the normal IBSYS output file but will have no effect on the processing. When CARD encounters such a card it prints it as specified then reads another card. In addition this routine uses the routines SQUEEZ, and MESAGE. The MESAGE routine is called when CARD encounters a * PAUSE card.

All blank columns of all cards read by CARD are eliminated by the routine SQUEEZ.

A comment card is any card with a C in column 1. Any legitimate Holerith character may appear in any other column of the card. This card is used to document the output and input for easy reading.

The card routine also recognizes the * PAGE card. This card causes the printing of the carriage control character, on the SYSTRAN output file, which spaces the paper to the top of the next page.

MESAGE — This routine reads and prints, on line and on the output files, all comment cards which follow the * PAUSE card. When a card other than a comment card is encountered, the routine halts the machine until the operator presses the start button. The * PAUSE card is used when it is desirable to print operating instructions during the running of the program.

SQUEEZ — This routine will remove all blank columns from the input card image array and left justify all data on the card in the array. Every card which is read by the program, with the exception of the data cards read in the card input data phase of the editor section and those cards which provide labels for output data, go through this routine. Although set formats are recommended for some control cards, the only fixed character on any card read by the system is the C on the comment card.

PACK — The input cards read into the input card image array are read and stored in Holerith format, one character to a word, left justified in the word. The PACK routine takes up to 6 sequential words from this or any other specified array and packs the first Holerith character of each of these words into one word.

ZERO — A logical function which returns True if the two arguments are bit by bit identical or False if the arguments differ in one or more bits.

NZER — A logical function which returns False if the two arguments are bit by bit identical or True, if the arguments differ in one or more bits.

PAUSE — This routine stops the machine with the internal clock turned off by using the IBJOB system routine (. PAUSE).

CLOCK — A call to this routine marks the time of the call and returns the lapsed time since the last call to the routine.

FIXEXE — This routine prints a message on line containing the octal location, which is the entry to the dump routine.

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DATE — This routine returns the Day, Month and Year on which the program was run.

SHFTCK — This routine checks the format of binary integer input data to see if a shift from decrement to address is necessary.

LSHFT — This routine will shift the second argument left the number of places specified by the first argument.

ARSHFT — This routine will shift right, the number of bits specified by the first argument of the calling sequence, the elements beginning with the element indicated by the second argument of the calling sequence, and continuing until the number of elements specified by the third argument have been shifted.

ATAN — This routine computes the arc tangent of the number, which is the second argument divided by the first argument and returns the angle (in the range 0 to 2π radians) in the third argument.

SCOSN — This routine computes both the sine and cosine of the first argument times 2π radians. The sine is returned in the second argument, the cosine in the third argument.

READ31 — This routine opens the internal file to enable the program to read this file.

RITE31 — This routine opens the internal file to enable the program to write on this file.

TDUMP — This is a transfer to the system location which initializes the System Dump Routine.

AEXIT — This routine empties the IBSYS Output File buffers and then calls TDUMP.

EXIT — This routine closes, rewinds, and unloads all files used by the program, and then transfers control to IBSYS.

KLOSE — This routine closes the N files indicated by the 2nd through the N + 1st arguments of the calling sequence. N is the first argument.

WROUT — This routine writes the diagnostic message indicated by the first argument and the location code given by the second argument.

SWITCH — This logical function will return True if any of the N switches indicated by arguments two through N + 1 are on, or False if all are off. N is the first argument.

SWALOF — This routine turns off both error and file switches.

SWTAOF — This routine turns off all error switches, but leaves on any file switches which were on.

SWTHON — This routine will turn on the switch indicated by the argument.

SWTHOF — This routine will turn off the switch indicated by the argument.

.UN01., .UN02., .UN03., .UN04., .UN.,
.UN11., .UN12., .UN13., .UN14., .UN31.

These non-executable routines set the file specifications for all files used by the program except the IBSYS Input File and the IBSYS Output File.

THE TIME SYSTEM GROUP

The Time System Group provides the programing system with the Time Data Editor, the Frequency Array Generator, and the Time Step Generator.

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THE TIME SYSTEM MONITOR

The Time System Monitor controls the linkage among the various systems in the Time System Group. It also contains the storage necessary for the various systems, and the program for setting the basic time increment. Entry to this program is accomplished by use of the * BEGIN TIME SYSTEM control card. This program will recognize and decode the * DELTAT control card. It also will recognize the following control cards * EDIT, * INTEGRATE, * FREQUENCY, and * DATA CHECK and transfer control to the appropriate system.

THE FREQUENCY ARRAY GENERATOR SYSTEM

This system recognizes, decodes and performs the operations specified on the * FREQUENCY control card to generate the Frequency Array.

THE TIME DATA EDIT SYSTEM

The Time Data Edit System prepares a Binary Time Data File from binary magnetic tape (Primary Binary Input File) or BCD cards. The system will accept binary magnetic tape which is multiplexed with from 1 to 14 channels of data or cards (multiplexed or unmultiplexed) containing 1 to 14 channels of data.

The Primary Binary Input File must have a physical record size of 256 words and a logical record size of N words such that 6000/N = any integer. The file may be either in floating point or integer format. If the file is integer format it may be either full word or decrement type integer format.

The data on the file must be in the following form:

> Channel 1 of the data must have a value greater than or equal to some designated saturation value before and after each individual test. This assigned saturation value must be greater than the largest value obtained by the data during all tests present on the file.

The data must be multiplexed, i.e., the data words on the file must be in the following order,

> Channel 1 word 1, channel 2 word 1, . . .
> Channel I word 1, channel 1 word 2,
> Channel 2 word 2, . . . , Channel I word M

The first 100 points of data for each channel must be at the zero or normal level of the data for that channel for each test on the file.

The Time Data Edit System for magnetic tape input scans channel 1 of the data until it encounters a level which is below saturation. At this point it checks 400 points ahead to see if saturation reoccurs. If not, the System assumes that a test has been encountered, computes the normal according to the method described later and transfers the data to the Binary Time Data File until saturation reoccurs. If saturation reoccurs within 400 points, the System assumes an error on the Primary Binary Input File, bypasses the data and continues the scan from the reoccurance of saturation. The method of scan requires that at least 7 out of 10 sequential points be at or above saturation. The System scans until the number of valid tests it encounters is equal to the number of * TRACE cards or until the number of records read is greater than the number of records designated on the * INPUT card. If the latter condition occurs before all tests are found a diagnostic is printed on the IBSYS output file and the appropriate error switches are turned on. Control is returned to the Time System Monitor after bypassing all further edit control cards.

The system will accept card input under any legitimate FORTRAN format provided the following conditions hold:

1) The data words must be all of the same type. (i.e., all integer, or all floating point).

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2) If data is multiplexed the number of words per card (NWPC) must be less than or equal to the number of channels (NC) or the number of channels must be evenly divisible into the number of words per card (i.e., NWPC $\leqslant$ NC, or NWPC/NC = any integer). If the data is unmultiplexed this condition does not hold.

The Time Data Edit System for card input data transfers the data which appears on the input cards in the format as described by the * DATA and * FORMAT control cards onto the Binary Time Data File in the proper format.

The first value which appears on the cards for each channel of each test is used as the normal value.

Each * TRACE card initializes a new test. The *last* test is terminated by using * TEND card.

In the case of unmultiplexed data if the total number of data points is greater than 12000 the data must be separated into groups of 12000 or fewer points with each group containing all of the data for all of the channels over the range contained by the group. As an example of this, suppose a test contains 6 channels with 2400 data points per channel. The data would then be grouped as follows:

Group 1
- 2000 points of channel 1
- 2000 points of channel 2
- 2000 points of channel 3
- 2000 points of channel 4
- 2000 points of channel 5
- 2000 points of channel 6

Group 2
- 400 points of channel 1
- 400 points of channel 2
- 400 points of channel 3
- 400 points of channel 4
- 400 points of channel 5
- 400 points of channel 6

with each set of points for each channel of each group being preceded by the appropriate * CHANNEL card.

The Time Data Edit system is entered when the Time System Monitor encounters the * EDIT control card. This system recognizes and decodes the information on the * INPUT, * TRACE, * DATA, * FORMAT, * CHANNEL, and * TEND control cards. The * INPUT card contains the necessary information as to the source and type of input data, the number of channels, the amount of data and the saturation value for magnetic tape data.

The * TRACE card contains information pertaining to the test identification, the number of channels to be edited, the method of computing normal value, as well as a field which allows the user to skip a given amount of data at the beginning of a test.

The * INPUT and * TRACE cards are used for all types of input data. The * DATA, * CHANNEL, * FORMAT, and * TEND cards are used only with card input. The * DATA card contains the information which tells the system if the data is multiplexed or unmultiplexed and the number of data words per card. The * FORMAT card contains the input format to be used in reading the data cards. The * CHANNEL card is used only in the case of unmultiplexed data. It contains the channel number for the data which immediately follows it.

The * TEND card is the card which signifies that the end of the edit has been reached. A further discussion of the format and usage of the above cards will be found later (Section 4).

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The Binary Time Data File prepared by the Edit System is used throughout the remaining systems as the primary source of time data. The format of this file is as follows. The basic physical record size is 256 words, and file contains 2 logical record sizes; 20 word ID records and 2800 word data records. The records are present on the file in the following order:

an ID record, a data record,
an ID record, a data record,
an ID record, a data record, . . . ,
an ID record.

The first and last records on the tape are ID records, the last ID record being a record of all zeros. The type of data in the data records will correspond in form to the type of data from which the file is generated with the exception that decrement type integer data is converted to full word type integer data. The ID records contain the following information:

WORD 1 — Test number.
WORD 2 — 1 if the following data record is the last data record for the test.
— 0 if the above is not true.
WORD 3 — The number of valid words per channel contained in the following data record.
WORD 4 — Not used.
WORD 5 — The number of valid channels for this test.
WORD 6 — Channel 1 switch.
WORD 7 — Channel 2 switch.
WORD 8 — Channel 3 switch.
.
.
.
WORD 19 — Channel 14 switch.
WORD 20 — 1 if the data is floating point.
— 0 if the data is integer.

The channel switches in words 6 thru 19 are 0 if the channel does not contain valid data or 1 if the channel does contain valid data. The ID records contain only integer type words.

The data records are multiplexed 14 channel records containing 200 words per channel. The data words on these records are in the following order:

Channel 1 word 1, Channel 2 word 1,
Channel 3 word 1, . . . Channel 14 word 1,
Channel 1 word 2, Channel 2 word 2, . . .
Channel 14 word 200.

The first data record for each test will contain the first 200 words on each channel for the test, the second data record, the second 200 etc. until all the data for the test is present.

THE TRANSFORM GENERATOR SYSTEM

The Transform Generator System computes the sine-cosine transforms of all the valid time data present on the Binary Time Data File, and generates the Binary Transform Data File.

This system is entered when the Time System Monitor encounters the * INTEGRATE control card. This system recognizes and decodes the information on the * SAMPLE control card. This card (* SAMPLE) contains a test identification number, the sample rate for that test and the starting and ending point for the integration. In the absence of this card for any test present on the Binary Time

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Data File the sample rate is assumed to be 1, the starting point the first point of the test, and the ending point the last point on the test.

The mathematics involved in the formation of the sine-cosine transforms have been derived from the classical formulation of the Fourier Transform which is normally used for functions which are neither even nor odd (1).

$$F(\omega) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(t) e^{-j\omega t} \, dt \tag{1}$$

For our purposes we shall drop the constant term and define $F(\omega)$ as:

$$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-j\omega t} \, dt \tag{2}$$

Where $\omega = 2\pi f$ and f is the frequency array as defined by the Frequency Array Generator

$$j = \sqrt{-1}$$

$f(t)$ is one of the input traces on the Binary Time Data File.

For our purposes, we further define $f(t)$ to be equal to zero everywhere outside of the range defined by the * SAMPLE card or in the absence of this card, before the first point of the test and after the last point. Because of this, $F(\omega)$ can be written

$$F(\omega) = \int_{T_1}^{T_2} f(t) e^{-j\omega t} \, dt. \tag{3}$$

Where T_1 is the starting point defined by the *SAMPLE card or the first point of the test in the absence of this card. T_2 is the ending point defined by the * SAMPLE card or the last point of the test in the absence of this card. Upon expansion of the exponential we obtain

$$F(\omega) = \int_{T_1}^{T_2} f(t) [\cos(\omega t) - j\sin(\omega t)] dt \tag{4}$$

or

$$F(\omega) = \int_{T_1}^{T_2} f(t) \cos(\omega t) dt - j \int_{T_1}^{T_2} f(t) \sin(\omega t) dt. \tag{5}$$

Define

$$F(\omega)_R = \int_{T_1}^{T_2} f(t) \cos(\omega t) dt \tag{6}$$

and

$$F(\omega)_I = -\int_{T_1}^{T_2} f(t) \sin(\omega t) dt. \tag{7}$$

The method used for the integration of the above expressions by the program is the trapezoidal rule. Thus

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$$F(\omega)_R = \frac{S\Delta t}{2}[f(T_1)\cos(\omega T_1) + f(T_2)\cos(\omega T_2) + 2\sum_{i=2}^{N-1} f(t_i)\cos(\omega t_i)] \tag{8}$$

and

$$F(\omega)_I = -\frac{S\Delta t}{2}[f(T_1)\sin(\omega T_1) + f(T_2)\sin(\omega T_2) + 2\sum_{i=2}^{N-1} f(t_i)\sin(\omega t_i)] \tag{9}$$

where:

- S is the sample rate as defined by the * SAMPLE card or 1 if this card is absent for this test.
- Δt is the basic time increment as defined on the * DELTAT card.
- N is the number of points defined on f(t) using the sample rate S.

These expressions may be further modified as follows by defining one more point at the beginning of f(t) and one at the end.

$$F(\omega)_R = \frac{S\Delta t}{2}[f(T_1 - S\Delta t)\cos(\omega T_1 - S\Delta t) + f(T_2 + S\Delta t)\cos(\omega T_2 + S\Delta t) + 2\sum_{i=1}^{N} f(t_i)\cos(\omega t_i)] \tag{10}$$

and in like manner

$$F(\omega)_I = -\frac{S\Delta t}{2}[f(T_1 - S\Delta t)\sin(\omega T_1 - S\Delta t) + f(T_2 + S\Delta t)\sin(\omega T_2 + S\Delta t) + 2\sum_{i=1}^{N} f(t_i)\sin(\omega t_i)] \tag{11}$$

however according to the definition of f(t)

$$f(T_1 - S\Delta t) = f(T_2 + S\Delta t) = 0.$$

Therefore

$$F(\omega)_R = S\Delta t\sum_{i=1}^{N} f(t_i)\cos(\omega t_i) \tag{12}$$

and

$$F(\omega)_I = -S\Delta t\sum_{i=1}^{N} f(t_i)\sin(\omega t_i). \tag{13}$$

The above are the final expressions from which we shall evaluate the sine - cosine transforms. To reduce computation time $\cos(\omega t_i)$ and $\sin(\omega t_i)$ are calculated from recursion formulas where possible.

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$\cos(\omega t_i), i = 1, 601, 1201, \cdots,$

$\sin(\omega t_i), i = 1, 601, 1201, \cdots,$

$\cos(\omega S\Delta t),$

$\sin(\omega S\Delta t),$

will each be computed using the routine SCOSN.

$\cos(\omega t_i)$ $i = 2, 3, \ldots 600, 602, 603, \ldots 1200, 1202 \ldots$

$\sin(\omega t_i)$ $i = 2, 3, \ldots 600, 602, 603, \ldots 1200, 1202 \ldots$

will each be computed from the following recursion formula:

Since

$$\cos(\omega t_i) = \cos(\omega t_{i-1} + \omega S\Delta t)$$

and

$$\sin(\omega t_i) = \sin(\omega t_{i-1} + \omega S\Delta t).$$

using the trigonometric identities

$$\cos(a + \beta) = \cos a \cos\beta - \sin a \sin\beta$$

$$\sin(a + \beta) = \sin a \cos\beta + \cos a \sin\beta.$$

these relations become

$$\cos(\omega t_i) = \cos(\omega t_{i-1})\cos(\omega S\Delta t) - \sin(\omega t_{i-1})\sin(\omega S\Delta t) \tag{14}$$

$$\sin(\omega t_i) = \sin(\omega t_{i-1})\cos(\omega S\Delta t) + \cos(\omega t_{i-1})\sin(\omega S\Delta t). \tag{15}$$

As is noted above, the recursion is reinitialized every 600 Δt. This is to prevent a constant error in the computation of $\cos(\omega t_1)$ and/or $\sin(\omega t_1)$ from propagating through the integral. The i index in the previous discussion denotes every sample of $f(t)$, i.e., $S = 1$.

The above expressions for $F(\omega)_R$ and $F(\omega)_I$ are to be evaluated for each frequency f defined in the frequency array. Thus

$$F(\omega_k)_R = S\Delta t \sum_{i=1}^{N} f(t_i)\cos(\omega_k t_i) \tag{16}$$

and

$$F(\omega_k)_I = -S\Delta t \sum_{i=1}^{N} f(t_i)\sin(\omega_k t_i). \tag{17}$$

The above method of computation using the sine and cosine recursion has been tested using 30000 points of the function $f(t) = 1$. With a sample rate of 1 and a Δt of .001. The results agreed with the analytic results to four significant figures.

The Binary Transform Data File which is written by the Transform Generator System has 256 word physical records and the following types of logical records.

One 101 word frequency array record containing the following:

Word 1 — The number of frequencies in the frequency array (integer word)

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Words 2 thru 101 — The 100 word frequency array (floating point words)

ID records containing the following 4 words:

Word 1 — Test number (integer word)

Word 2 — Channel number of f(t) (integer word)

Word 3 — Not used

Word 4 — Number of frequencies used (integer word)

Transform data records containing the following 200 words:

Word 1 = $F(\omega_1)_R$

Word 2 = $F(\omega_1)_I$

Word 3 = $F(\omega_2)_R$

Word 4 = $F(\omega_2)_I$

. .

. .

. .

Word 199 = $F(\omega_{100})_R$

Word 200 = $F(\omega_{100})_I$

The Binary Transform Data File contains the above records in the following order:

Record 1	The 101 word frequency array record.
Record 2	The ID record for the first valid channel of the first test on the Binary Time Data File.
Record 3	The transform data record for the first valid channel of the first test.
Record 4	The ID record for the second valid channel of the first test.
Record 5	The transform data record for the second valid channel of the first test.
.	.
.	.
.	.
.	.
Record N	The ID record for the last valid channel of the first test.
Record N + 1	The transform data record for the last valid channel of the first test.
Record N + 2	An ID record with each word equal to −1.
Record N + 3	The ID record for the first valid channel of the second test on the Binary Time Data File.
Record N + 4	The transform data record for the first valid channel of the second test.
.	.
.	.
.	.
.	.
.	.
.	.
Record M	The ID record for the last valid channel of the last test on the Binary Time Data File.
Record M + 1	The transform data record for the last valid channel of the last test.
Record M + 2	An ID record with each word equal to −2.

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Record M + 3 An ID record with each word equal to Zero.

An End of File Mark.

THE TIME DATA CHECK SYSTEM

The Time Data Check System computes the absolute range of the input data and the noise level inherent in the data. The noise level computed herein is defined by the following equation:

$$N_L = \frac{1}{400}\sum_{i=1}^{400}(f(t_i) - \bar{f}(t))^2. \tag{18}$$

Where:

$f(t)$ is one channel of data called for from the Binary Time Data File.

$\bar{f}(t)$ is the normal value for $f(t)$ (see Section 4.2.1.).

The range of the data is given as follows:

$$R_A = f(t)_{Max} - f(t)_{Min}. \tag{19}$$

Where:

$f(t)_{Max}$ is the maximum value which the data obtains.

$f(t)_{Min}$ is the minimum value which the data obtains.

The system is entered when the Time System Monitor encounters the * DATA CHECK control card. The information contained on this card (the test identification number and the channel numbers of the data on the Binary Time Data File which is to be processed) is decoded by the system. The system then locates the proper data on the Binary Time Data File, performs the above computations, and outputs the pertinent data on the SYSTRAN output file.

The computation of the noise level is dependent on the data being at a theoretical constant level for the first 400 points. If this is not true, the noise level indicated on the output must be disregarded. The computation of the absolute range of the data is dependent on the data obtaining its maximum and minimum values somewhere after the first 400 points have been processed.

THE FREQUENCY SYSTEM GROUP

The Frequency System Group provides the programing system with the Matrix System, the Inverse Transform System and the Fouriertran System.

THE FREQUENCY SYSTEM MONITOR

The Frequency System Monitor controls the linkage among the Matrix System, the Inverse Transform System and the Fouriertran System, and contains the storage used jointly by these three systems. The Frequency System Monitor recognizes the * MATRIX, * INVERSE, and * FOURIERTRAN control cards and transfers control to the proper system upon encountering one of these cards.

Entrance to the Frequency System Monitor is effected when the Job Monitor encounters the * BEGIN FREQUENCY SYSTEM control card.

THE MATRIX SYSTEM

The Matrix System incorporates into the programing system the fundamental processes of

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matrix algebra, including addition, subtraction, multiplication and inversion of matrices where the elements of the matrices are complex functions. Control is transferred to the system when the Frequency System Monitor encounters the * MATRIX control card.

The system recognizes, decodes, and performs the operations indicated on the * MATRIX, * MALOAD, * OVERLAY, * OUTPUT, and * OPERATE control cards.

The Matrix System provides the programing system with the ability to solve systems of equations where each element of the system is in itself a complex function.

The mathematics involved in the Matrix System are here defined.

Given the matrix R with elements r_{ij} such that

$r_{ij} = f_{ij}(\omega)$ and the matrix S with elements s_{ij} such that

$s_{ij} = g_{ij}(\omega)$.

Addition and Subtraction of R and S is defined as follows:

Assume R is N by M and S is N by M

then

T = R ± S is a N by M matrix with elements

$$t_{ij} = r_{ij} \pm s_{ij} = f_{ij}(\omega) \pm g_{ij}(\omega).$$

Multiplication of R and S is defined as follows:

Assume R is K by L and S is L by N

then

T = R * S is a K by N matrix with elements t_{kn}

where

$$t_{kn} = \sum_{m=1}^{L} r_{km} * s_{mn} = \sum_{m=1}^{L} f_{km}(\omega) * g_{mn}(\omega). \tag{20}$$

Inversion of R is defined as follows:

Assume R is N by N

then

$R^{-1} = X$ such that

$X * R = R * X = I$

where I is the identity matrix with elements i_{km} such that

$i_{km} = 0 + 0j$ if $k = m$

$i_{km} = 1 + 0j$ if $k = m$

The method used for the inversion process is the Jordan Gauss method (10).

This system is extended to include the operations of addition, subtraction, multiplication and division of matrices by scalars and literals. For our purposes we will define a scalar as a function of omega ($h(\omega)$) and a literal as a complex constant ($C = a + jb$). In general, a literal will mean a virtual symbol.

The resulting mathematical operations involving scalars and literals are defined as follows:

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Using the above defined matrix R (assumed to be N by M) and the addition or subtraction operation then it follows that:

$R \pm h(\omega) = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij} \pm h(\omega) = f_{ij}(\omega) \pm h(\omega)$

and

$R \pm C = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij} \pm C = f_{ij}(\omega) \pm C.$

Again using R defined to be N by M and the multiplication operation it follows that:

$R * h(\omega) = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij} * h(\omega) = f_{ij}(\omega) * h(\omega)$

and

$R * C = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij} * C = f_{ij}(\omega) * C.$

The division operation is identical in form to the multiplication operation.

$R/h(\omega) = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij}/h(\omega) = f_{ij}(\omega)/h(\omega)$

and

$R/C = T$, where T is N by M with elements t_{ij} such that

$t_{ij} = r_{ij}/C = f_{ij}(\omega)/C.$

By use of the * MALOAD and * OVERLAY control cards, data may be entered into matrices and scalars from the Save File.

The * OPERATE control cards provide the user of this system with the ability to define the matrix operations which he desires in a symbolic form. The Matrix System also provides the user with the ability to output entire matrices or individual elements of matrices in a printed and plotted form.

The * MSAVE control card section allows the user to save individual matrix elements on the Save File for use in subsequent computations.

There are certain restrictions placed on the use of the Matrix System. These restrictions pertain to the storage allocation used by the system when a matrix is defined. The total storage available for the matrices is 12200 cells. Since the matrices are composed of complex numbers containing both real and imaginary portions at all times, there are available only 6100 unique storage locations.

A Matrix Element is a vector of complex numbers whose length is equal to the number of frequencies which are to be used in the computations. Thus if NF is the number of frequencies to be used one Matrix Element requires NF of the 6100 unique storage locations.

A Matrix Term is one complex number. Each Matrix Term requires only one of the 6100 unique storage locations.

There are two methods of defining matrices, the direct definition and the implied definition. The direct definition is accomplished by use of the * MALOAD or * OVERLAY control cards. Each matrix defined by the * MALOAD or * OVERLOAD card (i.e., NAME(N, M)/I) requires NF * N * M of the 6100 unique storage locations. In the case of the * MALOAD card these are additional

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locations to the number of locations already in use. In the case of the * OVERLAY card however the locations which are necessary are obtained from the locations of the matrices which are overlaid by the new matrices. This imposes the restriction that the number of locations available is equal to the number of locations which were used by the overlaid matrices This restriction does not apply in the case where the last matrix to be overlaid was the last matrix previously defined. In this case the number of available locations is equal to the number of locations made available by the overlay plus the number of locations which were not previously in use.

The implied definition of a matrix is accomplished thru the use of the * OPERATE card. A new matrix is defined in this manner whenever the name which appears on the left of the equal sign is not currently defined. The storage allocated to this matrix is determined by the operation used. In the case of the inversion operator (I) there must be available, in addition to any storage necessary for an implied definition, a number of locations equal to the number of Matrix Elements present in the matrix which is to be inverted.

THE INVERSE TRANSFORM SYSTEM

The Inverse Transform System provides SYSTRAN with the capability of computing the inverse Fourier Transform of a complex function of frequency. The system is entered when the Frequency System Monitor encounters the * INVERSE control card. The system also recognizes and decodes the information on the * INFO control card. The input data necessary for this system is obtained from the Save File. The input frequency function may be defined for a maximum of 1000 frequencies. The maximum number of values which may be requested on the output time function (the computed inverse Transform) is 4200.

The output from this system consists of the printed values of the time function and a plot of this function against time. The mathematics involved in the computation of the inverse Transform are as follows:

Given the function $F(\omega)$, a complex function of frequency, we wish to form $f(t)$ such that:

$$f(t) = 1/2\pi \int_{-W}^{W} F(\omega) e^{jwt} d\omega \tag{21}$$

upon expansion of the exponential we obtain:

$$f(t) = 1/2\pi \int_{-W}^{W} [F(\omega)\ (\cos(\omega t) + j \sin(\omega t))]\ d\omega \tag{22}$$

$$= (1/2\pi) \int_{-W}^{W} F(\omega) \cos(\omega t) + j(1/2\pi) \int_{-W}^{W} F(\omega) \sin(\omega t) d\omega \tag{23}$$

$$= (1/2\pi) \int_{-W}^{0} F(\omega) \cos(\omega t) d\omega + (1/2\pi) \int_{0}^{W} F(\omega) \cos(\omega t) d\omega$$

$$+ j(1/2\pi) \int_{-W}^{0} F(\omega) \sin(\omega t) d\omega + j(1/2\pi) \int_{0}^{W} F(\omega) \sin(\omega t) d\omega \tag{24}$$

$$= -(1/2\pi) \int_{0}^{-W} F(\omega) \cos t(\omega t) d\omega + (1/2\pi) \int_{0}^{W} F(\omega) \cos(\omega t) d\omega$$

$$- j(1/2\pi) \int_{0}^{-W} F(\omega) \sin(\omega t) d\omega + j(1/2\pi) \int_{0}^{W} F(\omega) \sin(\omega t) d\omega. \tag{25}$$

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Now since the value of the integral is independent of the variable integration

$$\int_0^{-W} F(\omega')\cos(\omega' t)d\omega' = \int_0^{-W} F(\omega)\cos(\omega t)d\omega \tag{26}$$

and

$$\int_0^{-W} F(\omega')\sin(\omega' t)d\omega' = \int_0^{-W} F(\omega)\sin(\omega t)d\omega. \tag{27}$$

Substituting in the original equation

$$f(t) = -(1/2\pi)\int_0^{-W} F(\omega')\cos(\omega' t)d\omega' + (1/2\pi)\int_0^{-W} F(\omega)\cos(\omega t)d\omega$$

$$-j(1/2\pi)\int_0^{-W} F(\omega')\sin(\omega' t)d\omega' + j(1/2\pi)\int_0^{W} F(\omega)\sin(\omega t)d\omega \tag{28}$$

Now let

$$\omega' = -\omega,$$

then

$$-W = W$$

$$\sin(\omega' t) = \sin(-\omega t)$$

$$= -\sin(\omega t)$$

$$\cos(\omega' t) = \cos(-\omega t)$$

$$= \cos(\omega t)$$

$$d\omega' = -d\omega$$

and since $f(t)$ is a real valued function (Ref. 2, P. 19)

$$F(\omega') = \overline{F(\omega)}. \tag{29}$$

Also, since $F(\omega)$ is complex, define:

$$F(\omega) = F_R(\omega) + jF_I(\omega), \tag{30}$$

then

$$\overline{F(\omega)} = F_R(\omega) - jF_I(\omega). \tag{31}$$

The Function $f(t)$ can now be written

$$f(t) = (1/2\pi)\int_0^{W} \overline{F(\omega)}\cos(\omega t)d\omega + (1/2\pi)\int_0^{W} F(\omega)\cos(\omega t)d\omega$$

$$-j(1/2\pi)\int_0^{W} \overline{F(\omega)}\sin(\omega t)d\omega + j(1/2\pi)\int_0^{W} F(\omega)\sin(\omega t)d\omega \tag{32}$$

or

$$f(t) = (1/2\pi)\int_0^{W} [F_R(\omega)\cos(\omega t) - jF_I(\omega)\cos(\omega t)]d\omega$$

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$$+ (1/2\pi)\int_0^W [F_R(\omega)\cos(\omega t) + j\,F_I(\omega)\cos(\omega t)]d\omega$$

$$- j\,(1/2\pi)\int_0^W [F_R(\omega)\sin(\omega t) - j\,F_I(\omega)\sin(\omega t)]d\omega$$

$$+ j\,(1/2\pi)\int_0^W [F_R(\omega)\sin(\omega t) + j\,F_I(\omega)\sin(\omega t)]d\omega \tag{33}$$

upon simplification

$$f(t) = (1/\pi)\int_0^W F_R(\omega)\cos(\omega t)d\omega - (1/\pi)\int_0^W F_I(\omega)\sin(\omega t)d\omega. \tag{34}$$

This final expression for f(t) is the expression which is used in the Inverse Transform System. The integration method employed by the system for the evaluation of f(t) is the trapezoidal method. The following expression is used.

$$f(t_k) = (1/\pi)\sum_{i=1}^{N-1}\left[\frac{F_R(\omega_i)\cos(\omega_i t_k) + F_R(\omega_{i+1}t_k)\cos(\omega_{i+1}t_k)}{2}\right][\omega_{i+1}-\omega_i]$$

$$- (1/\pi)\sum_{i=1}^{N-1}\left[\frac{F_I(\omega_i)\sin(\omega_i t_k) + F_I(\omega_{i+1})\sin(\omega_{i+1}t_k)}{2}\right][\omega_{i+1}-\omega_i] \tag{35}$$

$$= (1/2\pi)\sum_{i=1}^{N-1}[F_R(\omega_i)\cos(\omega_i t_k) + F_R(\omega_{i+1})\cos(\omega_{i+1}t_k)\,[\omega_{i+1}-\omega_i]$$

$$-\frac{1}{2\pi}\sum_{i=1}^{N-1}F_I(\omega_i)\sin(\omega_i t_k) - F_I(\omega_{i+1})\sin(\omega_{i+1}t_k)][\omega_{i+1}-\omega_i] \tag{36}$$

N = the number of values of $F(\omega)$ which are used. The accuracy of the above method of integration is a function of how well the straight line approximation of $F(\omega)$, used in this method, represents the actual function $F(\omega)$. The accuracy is therefore dependent on the omega increment $(\omega_{i+1}-\omega_i)$ which was used in the initial computation of $F(\omega)$. The smaller this value is the more accurate f(t) will be. This ω increment need not be constant since $(\omega_{i+1}-\omega_i)$ is computed for each term in the sum forming f(t).

THE FOURIERTRAN SYSTEM

The Fouriertran System incorporates into the programing system the following: 1) the Fouriertran Language (which enables the user to perform complex algebraic manipulations on Transforms), 2) an Output option (which enables the user to label and output Transforms in a printed and plotted form), 3) the Save option (which enables the user to generate input for the Inverse Transform System, the Matrix System, and the Correlation System), 4) the Load option (which enables the user to input Transforms from the Binary Transform Data File), 5) the Average Transform option (which enables the user to perform certain statistical operations on groups of Transforms), and 6) the Function Definition Option (which provides Labels).

All references to complex functions, $F(\omega)$, internal to the Fouriertran System for purposes of input or output are made by use of the BCD character F and an integer N separated by a slash (i.e., F/N, $1 \leqslant N \leqslant 40$). References to $F(\omega)$ in the Fouriertran Language are made by use of the BCD

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character F and the integer N without the use of the slash (i.e., FN $1 \leqslant N \leqslant 39$). F40 is reserved in the Fouriertran Language for the omega values (i.e., $\omega = 2\pi f$ where f is the frequency array defined by the Frequency Array Generator).

The omega values are loaded into F40 if, and only if, the W Symbol is used in the Fouriertran Language, and not until its first appearance. However, once it has been loaded it will remain until control is transferred out of the Fouriertran System.

FOURIERTRAN ENTRY

The Fouriertran System is entered when the Frequency System Monitor encounters the * FOURIERTRAN control card. The system recognizes and performs the indicated operations on the * SAVE and * TEST control cards. It will also recognize the * LOAD, * PRINT, * PLOT, * TRANSLATE, * FUNCTION DEFINITION, and * AVERAGE control cards and transfer control to the option indicated by the card.

SAVE OPTION

The Save Option generates the Save File. This file is a binary file comprised of two types of records. Four word ID records containing the four integer values in the ID field on the * SAVE control card and 200 word data records containing the transform indicated on the * SAVE card.

The Save File is the only source of input for the Inverse Transform and Matrix Systems. In addition it may be used as an input source to the Correlation System and the Fouriertran System.

Examples of generation of the Save File

* SAVE, F/1, ID(1, 2, 3, 4), F/2, ID(5, 6, 7, 8) would generate the following records on the Save File.

Record	*Data*	*Type*
1	1	Integer
	2	Integer
	3	Integer
	4	Integer
2	${}^{F1}R_1$	Floating Point
	${}^{F1}I_1$	Floating Point
	${}^{F1}R_2$	Floating Point
	${}^{F1}I_2$	Floating Point
	.	. .
	.	. .
	.	. .
	${}^{F1}R_{100}$	Floating Point
	${}^{F1}I_{100}$	Floating Point
3	5	Integer
	6	Integer
	7	Integer
	8	Integer
4	${}^{F2}R_1$	Floating Point
	${}^{F2}I_1$	Floating Point
	${}^{F2}R_2$	Floating Point
	${}^{F2}I_2$	Floating Point
	.	. .

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Record	*Data*	*Type*
	.	. .
	.	. .
	$^{F2}R_{100}$	Floating Point
	$^{F2}I_{100}$	Floating Point

TEST LABELING

The * TEST control card provides a means of entering a test identification number for use in labeling the printed and plotted output. If this card is not used the test number which is used on the output will be the last test identification number which was encountered in the Load option.

THE LOAD OPTION

This option is used to input data from the Binary Transform Data File and assign the integers N which are to be used in referencing the Transforms. This option recognizes the * LOAD and * DEFINE control cards, and performs the operations specified by the various fields contained thereon.

THE FUNCTION DEFINITION OPTION

This option provides a means of labeling functions which are to be printed and/or plotted by the Output option. This option recognizes the * NAME control card and assigns the label contained thereon to be indicated F/N. This label will remain in effect until changed by use of another * NAME card or until control is transferred out of the Fouriertran System.

THE OUTPUT OPTION

This option provides the user with the ability to obtain hard copy prints and plots of the desired F/N. This option recognizes the * PRINT control card and outputs the real, imaginary, magnitude, $\log_{10}$ magnitude and phase angle of each of the specified F/N's. It also recognizes the * PLOT control card and plots the parameters as indicated by the fields on this card. A maximum of five parameters may appear on any one plot. The print and plot definitions are retained until new definitions are specified or until control is transferred out of the Fouriertran System.

THE AVERAGE TRANSFORM SYSTEM

This system enables the user to compute an average Transform from the group of Transforms specified on the * AVERAGE control card. This option also computes the variance of the group. The mathematics involved in this option are as follows.

Denote $\overline{F}$ as the average transform and σ^2 as the variance of the group.

$$\overline{F}(\omega_k) = \frac{1}{N}\sum_{i=1}^{N} F_i(\omega_k) \tag{37}$$

or

$$\overline{F}(\omega_k) = \frac{1}{N}\sum_{i=1}^{N} F_{R_i}(\omega_k) + \frac{j}{N}\sum_{i=1}^{N} F_{I_i}(\omega_k) \tag{38}$$

and

$$\sigma^2(\omega_k) = 1/N\sum_{i=1}^{N}[F_i(\omega_k) - \overline{F}(\omega_k)]^2 \tag{39}$$

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or

$$\sigma^2(\omega_k) = \frac{1}{N}\sum_{i=1}^{N}[F_i(\omega_k) - \bar{F}(\omega_k)]\,[\text{conjugate } (F_i(\omega_k) - \bar{F}(\omega_k))] \tag{40}$$

$$= \frac{1}{N}\sum_{i=1}^{N}[F_{R_i}(\omega_k) - \bar{F}_R(\omega_k)]^2 - [F_{I_i}(\omega_k) - \bar{F}_I(\omega_k)]^2 \tag{41}$$

N = the number of Transforms in the group
Printed and plotted values of $\bar{F}(\omega)$ and $\sigma^2(\sigma)$ are obtained through the Output option.

THE FOURIERTRAN LANGUAGE OPTION

This option is comprised of a translator which decodes the symbolic Fouriertran statements and prepares from them an ordered pseudo instruction set in the form FN = FN op FK or FN = CFUN(FM). It also includes an operations program which performs the indicated operations (op or CFUN). This option of the Fouriertran System is entered when the system encounters a * TRANSLATE control card. This option also recognizes the * LIST control card if it immediately follows the * TRANSLATE card. If the * LIST card is present the option will write the generated pseudo instruction set on the IBSYS Output File.

The mathematical operators which are included in the language and the operations which result from their usage are as follows (assume FN = $a_i + jb_i$ and FM = $c_i + jd_i$ i = 1, . . . , 100).

Operator	*Operation*	*Results*
+	FN + FM	$= (a_i + jb_i) + (c_i + jd_i) = (a_i + c_i) + j(b_i + d_i)$
−	FN − FM	$= (a_i + jb_i) - (c_i + jd_i) = (a_i - c_i) + j(b_i - d_i)$
*	FN * FM	$= (a_i + jb_i) * (c_i + jd_i)$
		$= (a_ic_i - b_id_i) + j(c_ib_i + a_id_i)$
/	FN/FM	$= (a_i + jb_i) / (c_i + jd_i)$
		$= \dfrac{(a_ic_i + b_id_i) + j(b_ic_i - a_id_i)}{c_i^2 + d_i^2}$
J + K	FNJ + K	$= (\cdots((((a_i + jb_i)*j\omega_i)_1*j\omega_i)_2*j\omega_i)_3 \cdots *j\omega_i)_K$
J − K	FNJ − K	$= (\cdots((((a_i + jb_i)/j\omega_i)_1/j\omega_i)_2/j\omega_i)_3 \cdots /j\omega_i)_K$
P + K	FNP + K	$= (a_i + jb_i)*_1(a_i + jb_i)*_2 \cdots *_K(a_i + jb_i)$
		$= (a_i + jb_i)^K$

The system recognizes the symbol W when combined with FN by the use of the operators (*, /, +, −) with the following results.

$$FN * W = (a_i + jb_i) * \omega_i = a_i\omega_i + jb_i\omega_i$$
$$FN / W = (a_i + jb_i) / \omega_i = a_i/\omega_i + j\,(b_i/\omega_i)$$
$$FN \pm W = (a_i + jb_i) \pm \omega_i = a_i \pm \omega_i + jb_i$$

The set of complex functions (CFUN(FN)) recognized by this option are as follows.

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CFUN	*FUNCTION DESCRIPTION*
CONJ	conjugate
CMAG	magnitude
CSIN	sine
CCOS	cosine
CEXP	exponential
CLOG	natural logarithm
CATN	phase angle
CSQT	square root
CNRM	normalization constant

The mathematics involved in the use of these functions are

$$\text{CONJ(FN)} = a_i - jb_i$$

$$\text{CMAG(FN)} = \sqrt{a_i^2 + b_i^2} + (\text{zero})j$$

$$\text{CEXP(FN)} = e^{FN} = e^{a_i + jb_i} = e^{a_i}(\cos(b_i) + j\sin(b_i))$$

$$\text{CSIN(FN)} = (1/2j)(e^{jFN} - e^{-jFN})$$

$$= (1/2j)(e^{j(a_i + jb_i)} - e^{-j(a_i + jb_i)})$$

$$\text{CCOS(FN)} = 1/2(e^{jFN} + e^{-jFN})$$

$$= 1/2(e^{j(a_i + jb_i)} + e^{-j(a_i + jb_i)})$$

$$\text{CATN(FN)} = \tan^{-1}\left(\frac{b_i}{a_i}\right) + (\text{zero})j \qquad \left(0 \leqslant \tan^{-1}\left(\frac{b_i}{a_i}\right) \leqslant 2\pi\right)$$

$$\text{CLOG(FN)} = \log_e(\text{FN}) = \log_e(\sqrt{a_i^2 + b_i^2}) + j\tan^{-1}\left(\frac{b_i}{a_i}\right)$$

$$\text{CSQT(FN)} = (a_i + jb_i)^{1/2} = e^{1/2\log_e(a_i + jb_i)}$$

$$= \exp\left[(1/2)\log_e(\sqrt{a_i^2 + b_i^2}) + (1/2)j\tan^{-1}\left(\frac{b_i}{a_i}\right)\right]$$

$$= \exp\left[(1/2)\log(\sqrt{a_i^2 + b_i^2})\right]\left[\cos\left((1/2)\tan^{-1}\left(\frac{b_i}{a_i}\right)\right)\right.$$

$$\left. + j\sin\left((1/2)\tan^{-1}\left(\frac{b_i}{a_i}\right)\right)\right]$$

$$\text{CNRM(FN)} = \text{MAX(CMAG(FN)} = \text{MAX}(\sqrt{a_i^2 + b_i^2}) + (\text{zero})\,j$$

(successive use of this function causes the maximum value found in all specified "FN" to be chosen).

The Fouriertran Language translator recognizes the symbol K which pertains to a complex constant. These complex constants are referred to in the language by the symbols KN where K is the BCD character K and N is an integer $1 \leqslant K \leqslant 90$. Once a KN has been defined it will retain the defined value until it is redefined or until control is transferred out of the Fouriertran System. Complex literals may be used in Fouriertran statements only on the right side of the equal sign. A complex literal is composed of the real and imaginary portions of a complex number separated by a comma and enclosed in parenthesis. Thus the complex literal x + jy, would be written (x, y). These literals retain their value only in the statement in which they appear. A maximum of 9 such literals may appear in any one statement.

The heirarchy of operations in the Fouriertran Language are as follows.

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1) CFUN references
2) P and J operators
3) * and / operators
4) + and − operators

Parenthesis may be used to overide the heirarchy, in which case all operations internal to the innermost parenthesis set are performed according to the heirarchy dictated by the above list, then all operations in the next set, etc.

A Fouriertran statement controls one of two operations, the definition of a complex constant, or the definition of a complex function ($F(\omega)$). The general form of a Fouriertran statement is as follows.

$$r = s$$

where r is a complex constant or complex function notation (KN or FN). s is a complex literal when r is KN. When r is FN, s is an expression which may contain complex constants (KN), complex literals (X, Y), complex functions (FN), function references (CFUN), and the special symbol W combined by use of the operators and parenthesis to define a desired ordered mathematical operation.

An example of usage of the Fouriertran Language follows.

Assume that F1 and F2 have been loaded through the use of the Load Option. F1 is the Transform of $f_1(t)$ and F2 is the transform of $f_2(t)$. Let $L(f(t))$ denote the Transform of $f(t)$. It is desired to compute the following functions.

$$F_1(\omega) = 3L\,(f_1(t)) + 2(L(f_2(t) - L(f_1(t)) + 3.14159$$

$$F_2(\omega) = \sqrt{F_1(\omega)} + (2 + 3j)\,\left|F_1(\omega)\right|$$

$$F_3(\omega) = (2 + 3j)\,(F_1(\omega))^2$$

The following Fouriertran statements would properly instruct the program to perform the desired computations.

```
K1 = (2., 3.)
F3 = (3., 0.) * F1 + (2., 0.) * (F2 ω F1) + (3.14159, 0)
F4 = CSQT(F3) + K1 * CMAG(F3)
F5 = K1 * F3P + 2
```

Any one Fouriertran statement must be contained all on one card. More than one statement may appear on one card provided that each statement is complete and the statements are separated by one comma. The presence of 2 successive commas terminates the card so far as processing is concerned. Therefore comments may be placed on the cards by preceding them with two successive commas. There is one special Fouriertran statement which must appear as the last Fouriertran statement before any other control card will be recognized and processed properly. This statement is the word END. This statement causes control to return to the Fouriertran System control section for the processing of any following control cards.

THE UTILITY SYSTEM GROUP

The Utility System Group incorporates into the programing system the capability to store large volumes of time or frequency data on master files and to prepare from these master files either a Binary Time Data File or a Binary Transform Data File containing selected data present on the master files. The ability to prepare a hard copy print of selected data present on a Master Time Data File, and to perform certain physical file handling operations of special files used by the program is also included in the Utility System.

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THE UTILITY SYSTEM MONITOR

Control is transferred to the Utility System Monitor when the Job Monitor encounters the * BEGIN UTILITY SYSTEM control card. The Utility System Monitor in turn recognizes and transfers control to the system indicated by the * MERGE, * RETRIEVE, and * WRITE control cards. It also recognizes and performs the operation indicated on the * REWIND, * ENDFILE, and * UNLOAD control cards.

THE DATA STORAGE SYSTEM

The Data Storage System contains two options, the Time Data Merge option and the frequency Data Merge option. Control is transferred to this system when the Utility System Monitor encounters the * MERGE control card. The executive control section of this system decodes the information present on the * MERGE control card and transfers control to the option indicated by the second field on the card.

THE TIME DATA MERGE OPTION

The Time Data Merge option inputs the time data of the tests indicated in the UPDATE TESTS field of the * MERGE card from the Binary Time Data File and the time data of the tests indicated in the MASTER TESTS field from the Old Master Time Data File and places all such tests on the New Master Time Data File. The format of the Old Master Time Data File and the New Master Time Data File is identical to the format of the Binary Time Data File. The order in which the tests will appear on the New Master Time Data File after a merge has been finished is; all tests called for from the Old Master Time Data File in the order in which they appeared on that file followed by all tests called for from the Binary Time Data File in the order in which they appeared on that file.

As was previously noted all files used by this option are identical in format. Therefore, any file generated by this option or any Binary Time Data File may be used as, a Binary Time Data File, an Old Master Time Data File, or a New Master Time Data File.

THE FREQUENCY DATA MERGE OPTION

The Frequency Data Merge option inputs the frequency data of the tests indicated in the UPDATE TESTS field of the * MERGE card from the Binary Transform Data File and the frequency data of the tests indicated in the MASTER TESTS field from the Old Master Transform Data File and places all such tests on the New Master Transform Data File. The formats of the two master files are identical. This format however differs from the format of the Binary Transform Data File. Therefore the master files and the Binary Transform Data File may not be used interchangeably.

The master files contain three types of records. Frequency array records of 101 words, ID records of four words, and Transform records of 200 words. Since the Transforms are functions of frequencies they will be grouped on the master files following the frequency array record containing the values of frequencies of which they are function. Each Transform record is preceded by an ID record containing four integer words defined as follows.

Word 1	Test Number
Word 2	Channel Number
Word 3	Not Used
Word 4	Not Used

Each frequency array record is comprised of one integer word followed by 100 floating point words defined as follows.

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Word 1	Number of frequencies	
Word 2	f_1	f_i is the ith frequency
Word 3	f_2	
Word 4	f_3	
.	.	
.	.	
.	.	
Word 101	f_{100}	

Each Transform record contains 200 words defined as follows. Denote $F_R(\omega_i)$ as the real portion of the Transform at f_i and $F_I(\omega_i)$ as the imaginary value of the Transform at f_i Then

Word 1	$F_R(\omega_1)$
Word 2	$F_I(\omega_1)$
Word 3	$F_R(\omega_2)$
Word 4	$F_I(\omega_2)$
.	.
.	.
.	.
Word 199	$F_R(\omega_{100})$
Word 200	$F_I(\omega_{100})$

Four special ID records are used in the file format, they are:

1) An ID record containing the value –1 in each of the four words. This record follows the Transform record of the last channel for each test.

2) An ID record containing the value –3 in each of the four words. This record precedes each frequency record except the first one.

3) An ID record containing the value –2 in each of the four words. This record follows the last ID record, as defined in 1) above, present on the file.

4) An ID record containing zero in each of the four words. This record is the last record on the file.

The general file format is as follows:

Record 1.....Frequency record.
Record 2.....ID record for the first channel of the first test.
Record 3.....Transform record for the first channel of the first test.
Record 4.....ID record for the 2nd channel of the first test.
Record 5.....Transform record of the 2nd channel of the first test.
. .
. .
. .

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Record N .....ID record for the last channel of the first test.

Record N + 1.....Transform record for the last channel of the first test.

Record N + 2.....ID record of –1's.

Record N + 3.....ID record for the first channel of the second test.

Record N + 4.....Transform record for the second channel of the second test.

Record M.....Transform record for the last channel of the last test, which is a function of the frequencies given in Record 1.

Record M + 1.....ID record of –1's.

Record M + 2.....ID record of –3's.

Record M + 3.....Frequency record

Record M + 4.....ID record for the first channel of the first test.

.
.
.

Record K.....Transform record for the last channel of the last test which is a function of the last set of frequencies.

Record K + 1.....ID record of –1's.

Record K + 2.....ID record of –2's.

Record K + 3.....ID record of zero's.

End of File mark.

Due to the difference in formats between the Master Transform Data Files and the Binary Transform Data File, the Frequency Data Merge option contains the capability to generate a master file from a Binary Transform Data File only.

The procedure for the utilization of this capability is explained later when the usage of the * MERGE control card is explained.

THE DATA RETRIEVAL SYSTEM

The Data Retrieval System provides the means of preparing a Binary Time Data File and/or a Binary Transform Data File containing selected tests from respective master files. Control is transferred to this system upon recognition of the * RETRIEVE control card by the Utility System Monitor.

THE TIME DATA OUTPUT SYSTEM

The Time Data Output System will write on the SYSTRAN output file the normalized and calibrated data from selected channels of selected tests from a Master Time Data File.

Control is transferred to this system when the Utility System Monitor encounters the * WRITE control card.

THE PHYSICAL FILE MANIPULATION SYSTEM

The Physical File Manipulation System is contained in the Utility System Monitor. It recognizes the * REWIND, * UNLOAD, and * ENDFILE control cards and performs the indicated operations on the files specified on the cards.

* REWIND	rewinds the file
* UNLOAD	rewinds then unloads the file
* ENDFILE	writes an end of file mark on the file

The correspondence of the actual files to the file specification on the above control cards is given in the Tapen table defined on page 56.

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THE CORRELATION SYSTEM

The Correlation System provides the programing system with the capability of computing auto and cross-correlation functions of various time functions from a test. The system also includes the ability to compute the power and cross-power spectrum functions of the time functions with the inclusion of a spectral (lag) window in the computations.

THE CORRELATION SYSTEM MONITOR

Control is transferred to the Correlation System Monitor when the Job Monitor encounters the * BEGIN CORRELATION SYSTEM control card. The system monitor in turn recognizes the following control cards, * CRLOAD, * COMPUTE, * CORRELATION FUNCTIONS, * RELOAD, * PRINT, * PLOT, and * CONTINUE and transfers control to the various sections of the system which decode and operate on the information contained on these cards.

INPUT FOR THE SYSTEM

The Correlation System may either compute auto and/or cross correlation functions and the specified power spectrum functions, or input the auto and/or cross correlation functions and compute the power spectrum functions specified.

In the case where the auto and cross correlation functions are computed the * CORRELATION FUNCTIONS control card contains the specification of the correlation functions which are to be computed and which power spectrum functions are desired. In this case the input data from which the correlation functions are computed is obtained from a Binary Time Data File. In the latter case where the correlation functions are to be input, the * RELOAD control card is used to specify which correlation functions are to be read in and which power spectrum functions are desired. For this case the input data is taken from the Save File.

MATHEMATICS INVOLVED IN THE SYSTEM

The correlation function is the limit as T approaches infinity of the following expression.

$$\phi_{ij}(\tau) = 1/T \int_{T_1}^{T_2} f_i(t) f_j(t+\tau)\,dt \tag{42}$$

where

$$T = T_2 - T_1.$$

If $i = j$ the function is the auto correlation function and if $i \neq j$ the function is a cross correlation function.

It is assumed for this program, that the functions $f(t)$, from which the correlation functions are computed, are defined and bounded over the range T_1 to T_2 and zero outside this range. Using the approximation

$$1/T \int_{T_1}^{T_2} f_i(t) f_j(t+\tau)\,dt = 1/N \sum_{k=1}^{N} f_i(t_k) f_j(t_k+\tau) \tag{43}$$

which follows from the definition of the integral

$$\int_{T_1}^{T_2} g(t)\,dt = \underset{N \to \infty}{\text{Limit}} \sum_{i=1}^{N} g(t_i) \frac{T_2 - T_1}{N} \tag{44}$$

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$$= \lim_{N \to \infty} \frac{T_2 - T_1}{N} \sum_{i=1}^{N} g(t_i) \tag{45}$$

$\phi_{ij}(\tau)$ is redefined as

$$\phi_{ij}(\tau) = 1/N \sum_{k=1}^{N} f_i(t_k) f_j(t_k + \tau). \tag{46}$$

The power density function computed in the system is defined by the following.

$$\Phi_{ik}(\omega) = \int_{\tau_0}^{\tau_M} u_m(\tau) \phi_{ik}(\tau) e^{-j\omega\tau} d\tau \tag{47}$$

upon expansion of the exponential

$$\Phi_{ik}(\omega) = \int_{\tau_0}^{\tau_M} u_m(\tau)\ \phi_{ik}(\tau)\ \cos(\omega\tau)\, d\tau - j \int_{\tau_0}^{\tau_M} u_m(\tau)\ \phi_{ik}(\tau)\ \sin(\omega\tau)\, d\tau \tag{48}$$

applying the trapezoidal rule for integration and separating the real and imaginary parts.

$$\Phi_{ik}(\omega)_R = \frac{\Delta\tau}{2} \Big[u_m(\tau_1)\ \phi_{ik}(\tau_1)\ \cos(\omega\tau_1) + u_m(\tau_N)\ \phi_{ik}(\tau_N)\ \cos(\omega\tau_N) + 2 \sum_{i=2}^{M-1} u_m(\tau_i) \phi_{ik}(\tau_i)\ \cos(\omega\tau_i) \Big] \tag{49}$$

and

$$\Phi_{ik}(\omega)_I = -\frac{j\Delta\tau}{2} \Big[u_m(\tau_1)\ \phi_{ik}(\tau_1)\ \sin(\omega\tau_1) + u_m(\tau_N)\ \phi_{ik}(\tau_N)\ \sin(\omega\tau_N) + 2 \sum_{i=2}^{M-1} u_m(\tau_i) \phi_{ik}(\tau_i)\ \sin(\omega\tau_i) \Big] \tag{50}$$

This is the expression which the system implements for the computation of the power spectrum function. The $u_m(\tau)$ used in the above expression is the spectral window mentioned previously. As denoted by the subscript, associated with this function more than one option is available for use. The actual number of options available is ten. The use of the various options is explained in the Section which deals with the Correlation System Control cards.

SPECTRAL WINDOWS

The use of a spectral window is motivated by the definition of the correlation functions which involves a limit as the observation time approaches infinity. Since a finite time is always used the power spectrum function calculated on such a basis is merely an estimate of the true value. As an estimate it should be unbiased and consistent while producing a high resolution in the power spectrum and not requiring a long observation time for convergence. This then is the purpose of the spectral window—to improve the estimate of the power density spectrum. The observation window can be thought of as being convolved with the true power spectrum to produce an estimated power spectrum in which each estimated value is a function of several true values according to the window shape. The convolution in the frequency domain becomes a multiplication in the time domain. The requirements of the optimum, consistent estimator are discussed in Reference 7. The program is written such that the windows are defined as follows.

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$$u_m(\tau) = \frac{3}{2}(1 - (\frac{\tau}{T})^2)\ (m = 1, \cdots 9) \tag{51}$$

m = 1, T = TAUMAX
m = 2, T = 200
m = 3, T = 300
m = 4, T = 400
m = 6, T = 150
m = 7, T = 250
m = 8, T = 350
m = 9, T = 450

$$u_m(\tau) = 1 \qquad m = 10 \tag{52}$$

$$u_m(\tau) = 0.54 + 0.46 \cos\frac{\pi\tau}{TAUMAX} \qquad m = 5 \tag{53}$$

m is the integer defined in the option field of the * CORRELATION FUNCTIONS control card. The program is written so that any desired window may be incorporated by rewriting subroutine OPTION and defining a new $u_m(\tau)$.

POWER DENSITY SPECTRA

It must be remembered that the Fourier Transform has limits from minus to plus infinity on the integration. This means that the correlation functions must actually be integrated over non-zero minus Tau values. It can be proven (Ref. 3, p. 78) that:

$$\phi_{ij}(-\tau) = \phi_{ji}(\tau). \tag{54}$$

Therefore, since the program only generates the Transform for positive Tau, the power spectrum can be developed as:

$$\Phi_{ij}(\omega) + \Phi^*_{ji}(\omega). \qquad \text{(*indicates conjugate)} \tag{55}$$

OUTPUT OF THE SYSTEM

The Correlation System control cards, * PLOT and * PRINT, provide a means of obtaining hard copy plots and prints of the correlation functions as described in the Section which defines the usage of these control cards.

The TAU and OUTPUT fields on the * RELOAD and * CORRELATION FUNCTIONS control cards provide a means of generating a Binary Transform Data File containing the correlation functions and the power spectrum functions which may then be loaded into the Fouriertran System. The only way to obtain hard copy prints and plots of the power spectrum functions is to use the OUTPUT field to generate the Binary Transform Data File containing the functions which are to be printed and plotted and to then use the Load and Output options of the Fouriertran System to prepare the copies.

RESTRICTIONS ON THE SYSTEM

The Correlation System is restricted as to the number of correlation functions which may be requested on one set of Correlation System Control Cards. The maximum number which may be requested is 25. This restricts the number of power spectrum functions which may be obtained to 250 (i.e., the number of correlation functions times the number of possible spectral window options).

Each correlation function requested by any one set of Correlation System control cards may be defined at a maximum of 100 discrete Tau values. In turn each power spectrum function requested may be defined at a maximum of 100 Omega values. The Tau values are set by parameters contained

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on the * CRLOAD control card. The Omega values are set by the Frequency Array Generator.

A set of Correlation System Control Cards consists of the following:

One * CRLOAD control card

One * COMPUTE control card

One * CORRELATION FUNCTIONS control card

or

One * RELOAD control card

One or more * PRINT control cards (if printing is desired)

One or more * PLOT control cards

One * CONTINUE control card

The restrictions on the control card set are as follows:

The set must be in the above order.

The set must contain at least one * PLOT control card.

The set must be terminated by a * CONTINUE control card, if the Fouriertran System Output option is to be used (only after the last set of Correlation control cards for a given output test.)

One restriction is placed on a Job which requires the usage of the Correlation System. This being that the Transform Generator System may not be run within the same Job as the Correlation System. This restriction is due to the fact that each system generates a Binary Transform Data File on the same physical unit.

SPECIAL CONSIDERATIONS OF THE SYSTEM

Since the Correlation System generates a Binary Transform Data File, any of the systems which require such a file as input may be run in conjunction with the Correlation System. The operations within a system so entered can be used on the correlation and power spectrum functions.

THE REGRESSION SYSTEM

The Regression System provides a means of obtaining a sectional linear representation of a time function of one of two types (described below).

THE REGRESSION SYSTEM MONITOR

Control is transferred to the Regression System Monitor when the Job Monitor encounters a * BEGIN REGRESSION SYSTEM control card. The system monitor recognizes and decodes the information present on the * IBLOAD control cards. It then channels the flow of control through the various sections of the system which generates the auxiliary input file, performs the computations necessary and prepares the hard copy output from the system.

THE SYSTEM INPUT

The Regression System prepares an auxiliary input file (this is actually the Old Master Transform Data File mounted with a scratch tape) containing the tests requested on the * IBLOAD cards from the Binary Time Data File. On this auxiliary input file the order of the tests is the same as the order was on the Binary Time Data File. The tests are processed in this sequential order regardless of the order in which they were specified on the * IBLOAD control cards. A maximum of 25 tests may be specified for any one pass through the Regression System. This means that each set of 25 * IBLOAD control cards must be preceded by a * BEGIN REGRESSION SYSTEM or a * CONTINUE control card.

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THE MATHEMATICS OF THE SYSTEM

As was noted in the introduction to the system two types of functions are processed by the system. These two types are defined as follows:

Type 1

1. f(t) is continuous and finite over the range T_o to T_m and zero at the endpoints (T_o and T_m) and outside this range.

2. f(t) further exhibits the following properties.

$f(t) = 0$	$T_o \leqslant t \leqslant T_1$	$T_o \leqslant T_1 \leqslant T_2 \leqslant T_3$
$f(t) = -A$	$T_1 \leqslant t \leqslant T_2$	
$f(t) = 0$	for $t = T_3$	
$f(t) > 0$	$T_3 \leqslant t \leqslant (T + 20\,\Delta t)$	

3. f(t) attains, alternately, a maximum value at T_4, a minimum value at T_5, a maximum at T_6 a minimum at T_7 etc., such that the following holds.

$$(T_3 + 20\Delta t) \leqslant T_4$$
$$(T_4 + 20\Delta t) \leqslant T_5$$
$$(T_5 + 20\Delta t) \leqslant T_6$$

and

$$f(t) < f(T_4) \qquad T_3 \leqslant t < T_4$$

and

$$T_4 < t \leqslant T_5$$

$$f(t) > f(T_5) \qquad T_4 \leqslant t < T_5$$

and

$$T_5 < t \leqslant T_6$$

etc.

Type 2

The definition of Type 2 function is identical with that of the Type 1 functions with the exception that

$$f(t) = 0 \qquad T_0 \leqslant t \leqslant T_3$$

in which case

$$T_0 = T_1 = T_2 = T_3.$$

Pictorially the general form of the two types of functions are shown below.

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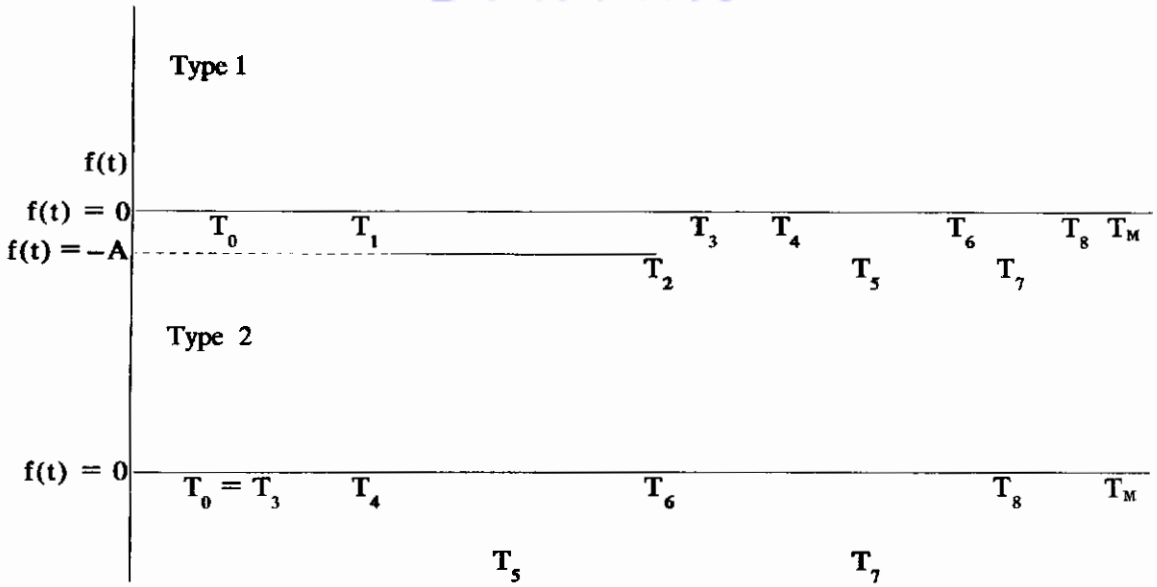

Each of the types of functions are divided into phases defined as follows:

Phase 1 is f(t)	$T_3 \leqslant t \leqslant T_5$
Phase 2 is f(t)	$T_5 \leqslant t \leqslant T_7$
.	.
.	.
.	.
Phase I is f(t)	$T_{2I+1} \leqslant t \leqslant T_{2I+3}$

The Regression System approximates the function f(t) over each of the first through fourth phases as requested on the * IBLOAD control card by the set of functions $g_I(t)$ where

$$g_I(t) = a_{1,I}t + b_{1,I} \qquad T_{2I+1} \leqslant t \leqslant T_{K_I}$$

$$a_{2,I}t + b_{2,I} \qquad T_{K_I} \leqslant t \leqslant T_{K_{I+1}}$$

$$a_{i,I}t + b_{i,I} \qquad T_{K_{K+i-2}} \leqslant t \leqslant T_{2I+3}$$

I indicates phase number
i indicates line segment number within Phase I ($i \leqslant 6$)
T_{k_I} is the far endpoint of line segment K for Phase I

The values of T_{K_I} are defined on the * IBLOAD control card referenced to particular functional values of f(t) in the following manner:
The field on the * IBLOAD cards which defines the T_k is the POINTS field. The notations used in this field are Z, L, *n*, T, and P. The correspondence to functional values of f(t) of these notations is given in the following table.

Notation	*Functional Value of f(t)*
Z (BCD character Z)	$f(T_3)$
L (BCD character L)	$f(T_{2(I-1)+3})$
P (BCD character P)	$f(T_{2I+2})$
T (BCD character T)	$f(T_{2I+3})$

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Notation	*Functional Value of $f(t)$*
n (integer $1 \leqslant n \leqslant 99$)	$f(t)$ such that $f(t_n) \leqslant \frac{n}{100}[f(T_{2I+2}) - f(T_{2I+1})]$ and $f(t) > f(t_n)$ $t_n < t < T_{2I+2}$ for all n appearing before P in the points field or $f(t_n) \leqslant \frac{n}{100}[f(T_{2I+2}) - f(T_{2I+3})]$ and $f(t) > f(tn)$ $T_{2I+2} \leqslant t \leqslant t_n$ for all n appearing after P in the points field.

The method used for the determination of the best $a_{i,I}$ and $b_{i,I}$ is a least square error criterion including the Lagrange multipliers to insure that $g_I(t)$ is continuous (connected) over the interval on which it is defined. To develop this criterion the following will be assumed.

Given a function $f(t)$ defined and bounded over the interval t_o to t_m and the points t_i on the interval it is desirable to obtain the function $g(t)$ such that $g(t)$ is itself defined and continuous (connected) over the interval and is of the form:

$$
\begin{aligned}
g(t) = {} & a_1 t + b_1 && t_0 \leqslant t \leqslant t_1 \\
& a_2 t + b_2 && t_1 \leqslant t \leqslant t_2 \\
& a_3 t + b_3 && t_2 \leqslant t \leqslant t_3 \\
& \quad \vdots && \quad \vdots \\
& a_M t + b_M && t_{M-1} \leqslant t \leqslant t_M
\end{aligned}
$$

Where:

$$a_i t_i + b_i = a_{i+1} t_i + b_{i+1}$$

Such that:

$$\int_{t_0}^{t_M} (f(t) - g(t))^2 dt \tag{56}$$

is the minimum value for all possible a_i and b_i. The error function for a set of a_i and b_i values is $H(t)$ such that

$$H(t) = \sum_{i=1}^{M} h_i(t)$$

where $h_i(t)$ is defined as

$$h_i(t) = \int_{t_{i-1}}^{t_i} (f(t) - a_i t - b_i)^2 \, dt + \lambda_i (a_i(t_i) + b_i - a_{i+1}(t_i) - b_{i+1}) \tag{57}$$

where λ_i is the Lagrange multiplier which insures that the function $g(t)$ is continuous (connected).

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The method used to minimize the function H(t) is the classical method of setting the partial derivatives of H taken with respect to the variables a_i, b_i, and λ_i equal to zero.

The following partial derivatives result:

$$\frac{\delta H}{\delta a_i} = -2\int_{t_{i-1}}^{t_i} t(f(t) - a_i t - b_i)dt + \lambda_i t_i - \lambda_{i-1} t_{i-1}$$

$$= -2\int_{t_{i-1}}^{t_i} tf(t)dt + (2/3)\, a_i(t_i^2 - t_{i-1}^2) + b_i(t_i - t_{i-1}) + \lambda_i t_i - \lambda_{i-1} t_{i-1} \tag{58}$$

$$\frac{\delta H}{\delta b_i} = -2\int_{t_{i-1}}^{t_i} (f(t) - a_i t - b_i)dt + \lambda_i - \lambda_{i-1}$$

$$= -2\int_{t_{i-1}}^{t_i} f(t)dt + a_i(t_i^2 - t_{i-1}^2) + 2b_i(t_i - t_{i-1}) + \lambda_i - \lambda_{i-1} \tag{59}$$

$$\frac{\delta H}{\delta \lambda_i} = a_i t_i + b_i - a_{i+2} t_i - b_{i+1} \tag{60}$$

setting $\frac{\delta H}{\delta a_i}$, $\frac{\delta H}{\delta b_i}$, $\frac{\delta H}{\delta \lambda_i}$ equal to zero results in the following set of equations in a_i, b_i, and λ_i.

$$(2/3)\, a_1(t_1^3 - t_0^3) + b_1(t_1^2 - t_0^2) + \lambda_1 t_1 = 2\int_{t_0}^{t_1} t\, f(t)dt$$

$$a_1(t_1^2 - t_0^2) + 2b_1(t_1 - t_0) + \lambda_1 = 2\int_{t_0}^{t_1} f(t)dt$$

$$a_1 t_1 + b_1 - a_2 t_1 - b_2 = 0$$

$$(2/3)\, a_2(t_2^3 - t_1^3) + b_2(t_2^2 - t_1^2) + \lambda_2 t_2 - \lambda_1 t_1 = 2\int_{t_1}^{t_2} t\, f(t)dt$$

$$a_2(t_2^2 - t_1^2) + 2\, b_2(t_2 - t_1) + \lambda_2 - \lambda_1 = 2\int_{t_1}^{t_2} t\, f(t)dt$$

$$a_2 t_2 + b_2 - a_3 t_2 - b_3 = 0$$

$$\vdots \qquad \vdots$$

$$(2/3)\, a_M(t_M^3 - t_{M-1}^3) + b_M(t_M^2 - t_{M-1}^2) - \lambda_{M-1} t_{M-1} = 2\int_{t_{M-1}}^{t_M} t\, f(t)dt$$

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$$a_M(t_M^2 - t_{M-1}^2) + 2\,b_M(t_M - t_{M-1}) - \lambda_{M-1} = 2\int_{t_{M-1}}^{t_M} f(t)dt$$

Since the function $f(t)$ and all t_i are known, the above system is a set of linear equations in the variables a_i, b_i, and λ_i which is solved by the classical Jordan-Gauss method (10). The integration of the $f(t)$ and $tf(t)$ functions is performed using the trapezoidal method.

THE SYSTEM OUTPUT

The output of the Regression System for each phase of each function $f(t)$ consists of the following:

1. The values of a_i and b_i for each range of t.
2. A plot of $f(t)$ with the superimposed values of $g(t_i)$ at each t_i.
3. The values of the following integrals.

$$(1/2)\int_{T_1}^{T_{2I+3}} |f(t)|\,dt$$

$$\int_{T_3}^{T_{2I+3}} f(t)dt$$

$$\int_{T_1}^{T_{2I+3}} f(t)dt$$

$$\int_{T_3}^{T_{2I+3}} g(t)dt$$

In addition for each $f(t)$ the following values are printed.

$$-A,\ (1/2)\int_{T_1}^{T_M} |f(t)|\,dt,$$

$$\int_{T_3}^{T_M} f(t)dt,\quad \int_{T_1}^{T_M} f(t)dt,\ \text{and}\quad \int_{T_3}^{T_M} g(t)dt$$

RESTRICTIONS ON THE SYSTEM

The number of points requested in the POINTS field must be less than or equal to seven. This restricts $g(t)$ to be composed of at most six line segments for any one phase. The maximum number of phases which may be requested is four. The maximum time duration of any phase is $600\Delta t$.

THE AUXILIARY SYSTEM

The Auxiliary System provides the user with the ability to include into SYSTRAN a program of his own definition which may be desirable for further manipulation of the data by SYSTRAN.

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THE AUXILIARY SYSTEM MONITOR

Control is transferred to the Auxiliary System Monitor when the Job Monitor encounters a * BEGIN AUXILIARY SYSTEM control card. The subroutine name of the Auxiliary System Monitor is AUXILU. The calling sequence for this transfer is:

CALL AUXILU (I)

where the value of I upon return determines the next processing step in the following manner:

I = 1 process the control card presently in the card image array.
I = 2 read a control card into the card image array then process this card.

The only condition for a I = 2 return should be when the next card to be read and processed is a * BEGIN card.

UTILIZATION OF THE SYSTEM

INPUT-OUTPUT

The Auxiliary System has available for input and/or output all of the available SYSTRAN utility files, the normal IBSYS input and output files, and the SYSTRAN output files. The only transfer of data into and out of this system must be accomplished through the utilization of these files.

AVAILABLE STORAGE

The user can use 40000 (octal) storage locations in his definition of the Auxiliary System.

THE PROGRAM CONTROL CARDS AND THEIR USAGE

THE JOB MONITOR

*JOB any comment

The * JOB card initializes all program error switches.

*END

This card causes the program to terminate execution.

*BEGIN { TIME / FREQUENCY / CORRELATION / REGRESSION / UTILITY / AUXILIARY } SYSTEM GROUP

This card will effect the loading of the specified System Group and transfer control to the initialization point of the System Group.

*PAUSE

This card halts the machine after all comment cards which immediately follow it are read and printed on the on line printer.

C

Any card which has the character "C" in Column 1 is a comment card. The remaining columns of the card may contain any legitimate Holerith character.

*PAGE

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This card causes the writing of the page skip carriage control character on the SYSTRAN output file.

(NOTE)

Any completely blank card will be bypassed by the program but will cause a blank line to be written on both the SYSTRAN output file and the normal IBSYS output file.

THE TIME SYSTEM GROUP

THE EDITOR SYSTEM

*EDIT

This card will effect a transfer of control to the editor initialization point.

$$\text{* INPUT, TYPE/} \left\{ \begin{array}{l} \text{BI} \\ \text{BF} \\ \text{I} \\ \text{F} \end{array} \right\} \text{, SAT/ [S], N/ [n], COT/ [M]}$$

This card describes the experimental data input in the following manner:

The TYPE of input is
- BI — magnetic tape binary integer format
- BF — magnetic tape binary floating point format
- I — card BCD integer format
- F — card BCD floating point format

The saturation level on the magnetic tape is [S] (units to be compatible with data on tape).

The number of logical records of data on the magnetic tape is [n]. The number of multiplexed channels on the tape is [M]. If the TYPE specified is [I] or [F] the SAT, and N fields are not necessary.

If the TYPE specified is [BI] or [BF] the card which follows the * INPUT cards must have in columns 1 thru 6 the length of the logical records on the magnetic tape. This length must be evenly divisible into 6,000.

$$\text{* TRACE, ID/ [I], CH/ [M] [}(m_1, m_2, m_3, \ldots, m_M)\text{], TYPE/} \left[\begin{array}{c} \text{I} \\ \text{V} \end{array} \right] \text{, SKIP/ [J]}$$

One of these cards must be present for each input test. The number of identification of the input test is [I] . The [M] channels which contain good data are $[(m_1, m_2, m_3, \ldots, m_M)]$.

The type of test is
- [I] — Impact
- [V] — Vibration

If the test is an Impact test the normal value for each channel of valid data will be computed as the arithmetic mean of the 10th thru the 90th values taken from the Primary Binary Input File for that channel.

If the test is a vibration test the normal value for each channel of valid data will be computed as the arithmetic mean of the 10th thru the 20th values taken from Primary Binary Input File for that channel.

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These normal values will appear as the first value for each channel on the Binary Time Data File. The normal value for each channel will be the zero level for that channel for all uses of data taken from the Binary Time Data File except for the usage as input of this file in the Correlation System when the normal values are specified by the NORMS field of the * CRLOAD card.

The number of values to be skipped at the beginning of the test (for each channel) is [J] .

The SKIP field is not necessary if [I] or [F] was specified in the TYPE field on the * INPUT card.

The following cards must be used only when [I] or [F] was specified in the TYPE field on the * INPUT card.

* DATA, MULTIPLEXED/ [YES / NO], NWPC/ N

The data on the cards YES — is / NO — is not multiplexed.

There are [N] data words per card.

* FORMAT [(Input format)]

The format of the data cards is [(input format)].

* CHANNEL/ [I]

This card precedes each channel of data when the data is not multiplexed.

[I] is the channel number for the following set of data.

*TEND

This card must follow the last data card to be processed by the Card Input editor.

THE FREQUENCY ARRAY GENERATOR

* FREQUENCY, COMPUTE/ [M], BASE/ [F_1], NFREQ/ [N], DELT/ [D], ENDFREQ [F_N]

[N] frequencies will be defined in the following manner:

if [M] = 1

$$F_i = F_{i-1} + D * F_{i-1} \qquad i = 2, 3, 4, \ldots, [N] \quad (61)$$

if [M] = 2

$$F_i = F_{i-1} + D \qquad i = 2, 3, 4, \ldots, [N] \quad (62)$$

The relationship for [M] = 1 is based on the following equations.

Define scales, F and G, such that:

$$F = \text{antilog}_a G \qquad (63)$$

(NB) the antilog is used because mechanical plotters are limited to equal increments and such a function produces a log scale for equal increments of the argument.

rewriting

$$\log_a F = G$$

consider differences

$$\log_a e * \frac{\Delta F}{F} = \Delta G$$

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or

$$\Delta F = F * \Delta G / \log_a e$$

$$\Delta F = D * F$$

where

$$D = \frac{\Delta G}{\log_a e}$$

$$F = \text{antilog}_a G$$

$$\log_a F = G$$

$$\log_a e * \frac{\Delta F}{F} = \Delta G$$

$$\Delta F = \frac{F * \Delta G}{\log_a e} = D * F$$

$$F + \Delta F = F + D * F$$

$$F_{i+1} = F_i + D * F_i$$

$$F_i = F_{i-1} + D * F_{i-1} \tag{64}$$

Inherent in the above scale are four parameters: F_1, the starting value; N, the number of values; D, the increment; and F_N, the final value of the scale. Three of these four parameters are necessary for the control card. The following three equations define the method of computing the fourth parameter when three are known. These computations are performed by the frequency array generator when the appropriate [M] is used and the appropriate fields are present on the * FREQUENCY control card.

Given: F_1, D, and F_N [M] = 5

$$N = \frac{\text{Log}_a F_N - \text{Log}_a F_1}{\text{Log}_a (1 + D)} + 1 \tag{65}$$

Given: F_1, F_N, and N [M] = 3

$$D = \text{antilog}_a \left[\frac{\log_a F_N - \log_a F_1}{N - 1} \right] - 1 \tag{66}$$

Given: F_N, D, and N [M] = 4

$$F_1 = \text{antilog}_a [\text{Log}_a F_N - (N - 1) \text{Log}_a (1 + D)] \tag{67}$$

In addition given F_1, N, and D [M] = 1

$$F_N = \text{antilog}_a [\text{Log}_a F_1 + (N + 1) \text{Log}_a (1 + D)] \tag{68}$$

* FREQUENCY, INPUT/ [N] , [F_1, F_2, F_3, . . . , F_N.]

The N frequencies desired are read from this and the following cards as [F_1, F_2, F_3, . . . , F_N.]

THE TIME STEP GENERATOR

* DELTAT, [DT]

[DT] is the basic time increment of all time input data.

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THE TRANSFORM GENERATOR

* INTEGRATE

This card will effect a transfer of control to the transform generator initialization point.

* SAMPLE, TEST/ [I], RATE/ [R], ZT/ [K], NT/ [L]

This card tells the transform generator to integrate test [I], using every $[R]^{th}$ point starting at point [K] and ending at point [K] + [L].

This card is not necessary if, the desired rate is 1, the starting point is the first point of the test, and the ending point is the last point of the test.

THE DATA CHECK PROGRAM

* DATA CHECK, TEST/ [I], CH/ [M] (m_1, m_2, m_3, . . . , m_M)

This card transfers control to the data check program which analyzes the [M] channels [(m_1, m_2, m_3, . . . m_M)] of test [I].

THE FREQUENCY SYSTEM GROUP

THE MATRIX SYSTEM

* MATRIX, NFREQ/ [NF_1, NF_2]

This card transfers control to the Matrix System initialization point and sets the frequency array to be used in the matrix calculations to F_{NF_1} thru F_{NF_2} of the normal frequency array. If the NFREQ field is missing the total normal frequency array is used.

*MALOAD [A] [(N_1, M_1)] / [I_1], [B] [(N_2, M_2)] / [I_2], etc.

This card affects the loading of matrices [A], [B], . . . where [A], [B], . . . are the names assigned to the matrices. Each name may be 1 to 6 Holerith characters. None of the names may contain the characters I, +, –, *, or /. The matrix [A] has [N_1] rows and [M_1] columns, [B] has [N_2] rows and [M_2] columns, etc. The matrices are loaded from the save file. The element a_{ij} of matrix [A] is loaded from the array on the save file for which the ID record is i, j, [I_1], 0. The array on the save file for element b_{ij} of matrix [B] has an ID of i, j, [I_2], 0, etc. (See the Save Option). Any matrix for which the $N_i = 1$ and $M_i = 0$ will be treated as a scalar rather than a matrix. Up to 20 matrices (scalars) may be defined on a * MALOAD card provided the following inequality is true:

$$(NF_2 - NF_1 + 1)\sum_{i=1}^{K} N_i * M_i \leqslant 6100 - NS(NF_2 - NF_1 + 1)$$

where NS is the number of scalars defined on the card.

* OPERATE, [X] = [A] OP [B]

This card tells the matrix system to perform the indicated operation [A] OP [B] and store the results in [X]. If [X] was not defined previously this operation will define and allocate storage for it.

The operations which may be used are defined as follows:

OP	FUNCTION
I	Matrix Inversion
+	Addition
–	Subtraction
*	Multiplication
/	Division (by scalars only)

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[A] or [B] may be defined as complex literals of the form, X + jY by using

[(X, Y)] instead of [A] or [B].

The following table shows the allowable order of operations which may be used on the * OPERATE card.

DIVISION	ADDITION SUBTRACTION	MULTIPLICATION
M/L	M ± M	M * M
S/L	M ± S	M * S
M/S	M ± L	M * L
S/S	S ± S	S * S
L/S	S ± L	S * L

M — Matrix
S — Scalar
L — Literal

* OVERLAY, [A], THRU, [B], WITH, [C] [(N_1, M_1)] / [I], etc.

This card defines and loads matrix (scalar) [C] in the same manner as the * MALOAD card. However, when allocating storage for [C], all matrices previously defined in order from [A] to [B] are destroyed and the storage area previously allocated to these matrices is used for [C].

The order of definition of Matrices is the order in which they are encountered on the * MALOAD and * OPERATE cards. Thus the above * OVERLAY card would destroy all matrices encountered by the program on * MALOAD and/or * OPERATE cards from (and including) matrix [A] thru (and including) matrix [B] and use the storage area so defined for matrix [C], etc.

* OUTPUT, PRINT / [A], ELEMENTS / [ALL / (I, J/K, L/ . . .)]

Print the real, imaginary, magnitude, $\log_{10}$magnitude, and phase angle of the indicated elements of Matrix [A].

ELEMENTS/ [ALL / (I, J/K, L/ . . .)]

ALL — Print all elements of the matrix.

(I, J/K, L/ . . .)

Print element I, J and K, L and . . .

* OUTPUT, [PLOT] / [A], N/ [K], [M / L / R / I / A] E/ [I, J],

SCALE/ [ABS(MIN, MAX) / DYN / REF], USE/ [CHAR], . . .

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Plot the [M] magnitude
[L] $\log_{10}$ magnitude
[R] real part
[I] imaginary part
[A] phase angle

of element [I, J] of matrix [A] on plot number [K] using [CHAR] to represent the function and scaling between the minimum and maximum defined by one of the following: [ABS(MIN, MAX)] (the given values [MIN] and [MAX]), [DYN] (the true minimum and maximum contained in the element), [REF] (the true minimum and maximum contained by all the elements on plot [K]).

The matrix plot allows 16 traces per plot. The plots are performed dynamically, i.e., each plot [K] is written upon encountering a different value of [K] or a card other than a * OUTPUT, [PLOT] card.

The matrix [PRINT / PLOT] definitions are not held in storage, thus a *OUTPUT, [PRINT / PLOT] card must be present for each desired [PRINT] or [PLOT].

* MSAVE, REWIND

This card causes the Msave File to be rewound so that it may be regenerated.

* MSAVE, COPY

This card effects the copying of the Msave File onto the Save File. The Save File is rewound before the copy is effected, thus all data previously on this file is destroyed. The Save File is not rewound after the copy, therefore additional data may be placed on this file by using the * SAVE option of the Fouriertran System.

* MSAVE, [NAME] ([I, J]), ID ([K_1, K_2, K_3, K_4])

This card will instruct the Msave Option to write element [I, J] of matrix [NAME] on the Msave File preceded by a four work ID record containing the values [K_1, K_2, K_3, K_4]. This card may be continued from card to card without repeating the * MSAVE field however each NAME and corresponding ID field must be on the same card and no continuation card may begin with a "C" in column 1.

The * MALOAD, * OVERLAY, and * OUTPUT cards may be continued from card to card without the use of the * [Control Name] appearing on each card. These cards may be broken at the beginning of any field on the card. Two commas terminate each physical card, thus comments may appear on the cards if they follow two commas. Because of the continuation allowed on these cards they must be followed by another control card since it is the * on this following control card which terminates the present card. The only restriction on the continuation cards is that none of them may have a "C" in column 1 since such a card will be treated as a comment card and will not be executed. If a continuation card must begin with a "C" start the card in column 2 and it will be accepted.

THE FOURIERTRAN SYSTEM

* FOURIERTRAN

This card transfers control to the Fouriertran System initialization point.

THE SAVE OPTION

* SAVE, F/ [N] ID/ (I_1, I_2, I_3, I_4)

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This card will cause the writing of the function F [N] on the Save file preceded by the four word ID record (I_1, I_2, I_3, I_4).

* SAVE, LOAD, F/ [N], ID (I_1, I_2, I_3, I_4)

This card will cause the loading of the record on the Save File, for which the ID record is I_1 I_2 I_3, I_4, into function F [N].

* SAVE, REWIND

This card will cause the rewinding of the Save File.

* SAVE, ENDFILE

This card will cause the writing of an end of file mark on the Save File.

THE TEST IDENTIFICATION OPTION

* TEST, [I]

If all functions FN are to be generated internal to the Fouriertran System and therefore have no test identification number assigned, the * TEST, [I] will provide the test number [I] for use in the output feature of the Fouriertran System.

THE FUNCTION DEFINITION OPTION

* FUNCTION DEFINITIONS

This card effects a transfer of control to the Function Definition section.

* NAME, F/ [N], AS/$ [18 BCD characters] $, UNITS/$ [18 BCD characters] $

After this card is encountered any output of F [N] will contain the two 18 character BCD fields in the heading. There will be no spaces between the fields. The fields may contain fewer than 18 characters in which case the remaining portion of the fields will be blank. The UNITS field is not necessary if not included this field will be totally blank. Any BCD character except the $ is allowed in the 18 character field. Blanks are included in the character count.

* NAME, ,

This card will destroy all previous function definitions. Once a function has been defined the definition will hold until destroyed by the above method or until control is transferred out of the Fouriertran System.

THE DATA LOAD OPTION

* LOAD, TEST/ [I]

This card will cause the positioning of the Binary Transform Data File for the input of test [I].

*DEFINE, F/ [N], CH/ [M], CAL/ [C]

This card causes the transform of channel [M] to be loaded into F [N] after being multiplied by [C].

THE OUTPUT OPTION

* PRINT, F/ [N]

Print the real, imaginary, magnitude, $\log_{10}$ magnitude, and phase angle of F[N].

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Contrails

```
* PLOT, N/ [I], [R] F/ [K], SCALE/ [ABS(MIN, MAX)]
                [I]                [DYNAMIC]
                [M]                [REF (N)]
                [L]
                [A]
```

USE / [CHAR]

Plot on plot number [I] using [CHAR] the

R	real part
I	imaginary part
M	magnitude
L	$\log_{10}$ magnitude
A	phase angle

of F [K] scaled between the minimum and maximum defined by one of the following: [ABS(MIN, MAX)] (the given [MIN] and [MAX]), [DYNAMIC] the actual minimum and maximum obtained by the function being plotted, [REF(N)] (the minimum and maximum defined for the *first* occurrence of F [N] on plot [I].

The Fouriertran System plot allows up to 5 functions per plot. The plots are performed after all * PLOT cards are decoded. To continue a plot control card the * PLOT control name must appear first on the card.

The print and plot definitions are retained in memory as long as control remains in the Fouriertran System or until new print and plot definitions are encountered. A * PRINT, , or * PLOT, , card will effect the printing or plotting of the previously defined prints or plots.

A maximum of 40 prints and 40 plots may be defined at one time.

THE AVERAGE TRANSFORM OPTION

* AVERAGE, F/ [N (m_1, m_2, . . . m_M)], SIG/ [I]

Perform the defined operations on the M Transforms [m_1, m_2, . . . m_M] storing the resulting average Transform in [N] and the variance in [I].

THE FOURIERTRAN TRANSLATOR

* TRANSLATE

This card transfers control to the initialization phase of the translator option.

* LIST

If this card is present following the * TRANSLATE card the program will write the translation breakdown of each Fouriertran statement on the IBSYS output file.

END

This card terminates the translation and returns control to the Fouriertran System. It must be present.

RESTRICTIONS ON THE TRANSLATOR

1) A maximum of 39 Fouriertran functions may be defined.

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2) A maximum of 90 constants may be defined.

3) A maximum of 9 literals (not necessarily unique) may be used in each Fouriertran function definition.

FOURIERTRAN TRANSLATOR CARD FORMAT CONSIDERATIONS

1) A Fouriertran function definition or a constant definition must be contained all on one card.

2) More than one Fouriertran function definition or constant definitions may appear on one card if they are separated by one comma.

3) A comment may be placed on a card after the last Fouriertran function definition or constant definition if it follows two commas. (i.e., ", ,")

4) A Fouriertran function definition and a constant definition may not appear on the same card.

THE FOURIERTRAN LANGUAGE

CONSTANT DEFINITIONS

K [N] = ([X], [Y])

[N] is an integer $1 \leqslant [N] \leqslant 90$. [X] and [Y] are the real and imaginary parts respectively of the complex number desired. (i.e.; x + jy). [X] and [Y] may be either E or F type floating point numbers.

LITERALS

([X], [Y])

([X] and [Y] are the real and imaginary parts respectively of the complex constant x + jy. [X] and [Y] may be E or F type floating point numbers.

COMPLEX FUNCTIONS

Certain of the more useful complex functions are available. These functions are written in the form C [XXX] ([S])

[S] is a Fouriertran statement (see Fouriertran function definitions)

[XXX] is given in the following Table:

[S] = x + iy

[XXX]	Function	Mathematical Statement
MAG	Magnitude	CMAG(S) = $[x^2 + y^2]^{1/2}$
CONJ	Conjugate	CONJ(S) = x − iy
SIN	Sine	CSIN(S) = sin (x + iy)
COS	Cosine	CCOS(S) = cos (x + iy)
EXP	Exponential	CEXP(S) = $e^{(x + iy)}$
LOG	Logarithm (natural)	CLOG(S) = ln (x + iy)
ATN	Arc Tangent	CATN(S) = $\tan^{-1}$ (y/x)
SQT	Square Root	CSQT(S) = $(x + iy)^{1/2}$
NRM	Normalization	CNRM(S) = max (CMAG(S)) (Successive use of this function causes the maximum value found in all of the specified "S" to be chosen)

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THE FOURIERTRAN OPERATORS

The operator set defined for the Fouriertran Translator is comprised of two classes of operators, the mathematical operators and the special function operators. These operators are defined in the following two tables.

MATHEMATICAL OPERATORS

$$S = x + iy, T = u + iv$$

Operator	*Usage*	*Mathematics*
+	Addition	$S + T = (x + u) + i(y + v)$
–	Subtraction	$S - T = (x - u) + i(y + v)$
*	Multiplication	$S * T = (x * u - y * v) + i(x * v + y * u)$
/	Division	$S / T = \frac{(x * u + y * v) + i(y * u - x * v)}{u^2 + v^2}$
P + N	Power	$SP + N = (x + iy)^{+N}$

SPECIAL OPERATORS

$$S = x + jy$$

Operator	*Usage*	*Mathematics*
(	enclosure	——
)	enclosure	——
J + N	differentiation	$SJ + N = ((:::(((x + jy) * j\omega)_1 j\omega)_2 \cdots) * j\omega)_N$
J – N	integration	$SJ - N = ((:::(((x + jy/j\omega)_1 j\omega)_2 \cdots)/j\omega)_N$
W	multiplication by frequency array	$SW = (x + jy) *_\omega$

$\omega = 2\pi f$ where f is the frequency array
j is the complex operator $\sqrt{-1}$

The hierarchy of the operators, if parenthesis are not used for enclosure, is as follows:

P and J

*, /, and W

+ and –

FOURIERTRAN FUNCTION DEFINITIONS

F [N] = [S]

N an integer $1 \leqslant N \leqslant 39$

S a Fouriertran Statement

FOURIERTRAN STATEMENTS

A Fouriertran statement is an expression in which constants, literals, Fouriertran functions and complex functions are combined by use of the Fouriertran operators to produce a required complex algebraic function.

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THE INVERSE TRANSFORM SYSTEM

* INVERSE/ [K]

This card transfers control to the Inverse Transform System initialization point.

[K]

The integer [K] identifies the data set on the Save file from which the Inverse Transform is to be computed.

* INFO, DTIME/ [D], NTIME/ [N]

DTIME/ [D]

[D] is the Δt of the resulting function.

NTIME/ [N]

[N] is the number of time values for which the Inverse Transform is to be computed.

The input function $(F(\omega))$ is obtained from the Save file which must be generated in the following format:

Record	*Contains*
ID_0	TEST NUMBER, NOMG, INSAV, 0
F_0	first NOMG ω values
ID_1	K_1, 0, 0, $KOUT_1$
F_1	$F_{K_1}(\omega)$
ID_2	K_2, 0, 0, $KOUT_2$
F_2	$F_{K_2}(\omega)$
.	.
.	.
.	.
ID_{INSAV}	K_{INSAV}, 0, 0, $KOUT_{INSAV}$
F_{INSAV}	$F_{K_{INSAV}}(\omega)$

repeat the above for each set of ω values desired.

INSAV — The number of functions $(F(\omega))$.
NOMG — The number of ω values in this set.
K_i — the K value associated with the K on the * INVERSE card.
$KOUT_i$ — = 0 this *is not* the last set for the associated $F(\omega)$.
= 1 this *is* the last set for the associated $F(\omega)$.

The maximum number of ω values which may be used is 1000. The maximum number of time points for which the inverse transform may be computed is 4200.

THE UTILITY SYSTEM GROUP

THE PHYSICAL FILE MANIPULATION SYSTEM

* REWIND, TAPE/ [N]

* UNLOAD, TAPE/ [N]

* ENDFILE, TAPE/ [N]

The three cards above enable the user to rewind, rewind and unload or write an end of file mark on any of the SYSTRAN utility files. The integer [N] is the file designation upon which the action is to be taken. The following table gives the correspondence between the value of N and the file usage.

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TAPEN TABLE

N	FILE USAGE
1	Binary Transform Data File
2	Binary Time Data File
3	Primary Binary Input File
4	Binary Save File
5	Old Master Transform Data File
6	Old Master Time Data File
7	New Master Time Data File
8	New Master Transform Data File

THE MASTER FILE MERGE SYSTEMS

$$* \text{ MERGE, TIME, UPDATE TEST/ } \begin{bmatrix} \text{ALL} \\ N(m_1, m_2, \ldots m_N) \end{bmatrix},$$

$$\text{MASTER TESTS/ } \begin{bmatrix} \text{ALL} \\ J(K_1, K_2, \ldots K_j) \end{bmatrix}, \text{ ID/ [NAME]}$$

This card transfers control to the Master File Time Merge System and instructs the system to prepare a New Master Time Data File containing either [All] tests or the [N] tests [$m_1, m_2, \ldots m_N$] from the Binary Time Data File and either [All] tests or the [J] tests [$K_1, K_2, \ldots K_j$] from the Old Master Time Data File.

ID/ [NAME]

[NAME] — 1 to 6 BCD characters which will appear as the New Master tape identification number on the merge output.

Any Binary Time Data File can be used as an Old Master Time Data File and conversely.

$$* \text{ MERGE, FREQUENCY, UPDATE TESTS/ } \begin{bmatrix} \text{ALL} \\ N(m_1, m_2, \ldots m_N), \end{bmatrix}$$

$$\text{MASTER TESTS/ } \begin{bmatrix} \text{ALL} \\ J(K_1, K_2, \ldots K_j) \end{bmatrix}, \text{ ID/ [NAME]}$$

This card transfers control to the Master File Frequency Merge System and instructs the system to prepare a New Master Transform Data File containing either [ALL] of the tests on the file or the [N] tests [$m_1, m_2, \ldots m_N$] from the Binary Transform Data File, and either [ALL] the tests on the file or the [J] tests [$K_1, K_2, \ldots K_J$] from the Old Master Transform Data File.

ID /[NAME]

[NAME] — 1 to 6 BCD characters which will appear as the New Master tape designation number on the merge output.

Unlike the Time Data Merge, a Binary Transform Data File may not be used as an Old Master Transform Data File. Only a previously developed New Master Transform Data File may be used for this purpose.

Therefore it is possible to develop a New Master Transform Data File from a Binary Transform Data File only. To do this it is necessary to use the expanded test notation for the UPDATE TESTS field, i.e., [$N(m_1, m_2, \ldots m_N)$] as well as to set [N] to the *negative* of the number of tests desired on the New Master.

Example:

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We wish to develop a New Master Transform Data File containing tests 1, 2, 4, 6, 10, and 15 from a Binary Transform Data File which contains tests 1 thru 20. The control card necessary to accomplish this is the following.

* MERGE, FREQUENCY, UPDATE TESTS/ –6(1, 2, 4, 6, 10, 15), ID/XXXXXX

Notice the MASTER TESTS field is not necessary.

THE TIME DATA OUTPUT SYSTEM

* WRITE, TEST/ [I], CH/ [ALL / K(J_1, J_2, . . . J_k)], CALS/ [K(C_1, C_2, . . . C_K)]

This card will effect a transfer of control to the Time Data Output System and instruct the system to obtain test [I] from the New Master Time Data File and write the designated channels ([ALL], or the K channels [J_1, J_2, . . . J_k]) normalized and calibrated. The [K] calibration factors to be used are [C_1, C_2, . . . C_K]. [C_1] is used with channel [J_1], [C_2], with [J_2] etc. If [ALL] was used in the CH field the CALS field will be as follows:

CALS/ [14(C_1, C_2, . . . C_{14})] with [C_1] used with channel 1, [C_2] with channel 2, etc.

THE DATA RETRIEVAL SYSTEM

* RETRIEVE, TIME, TESTS/ [N(m_1, m_2, . . . m_N)]

This card effects a transfer of control to the Data Retrieval System and instructs the system to prepare a Binary Time Data File containing the [N] test [m_1, m_2, . . . m_n)] from the New Master Time Data File.

*RETRIEVE, FREQUENCY, TESTS/ [N(m_1, m_2, . . . m_N)]

This card effects a transfer of control to the Data Retrieval System and instructs the system to prepare a Binary Transform Data File containing the [N] tests [m_1, m_2, . . . m_N] from the New Master Transform Data File.

THE CORRELATION SYSTEM

* CRLOAD, TEST/ [I], CHANNELS/ [(J_1, J_2, . . . , J_K)], CALS/ [(C_1, C_2, . . . C_K)], NORMS/ [(N_1, N_2, . . . , N_K)], SAMPLE/ [M], TZERO/ [L], TMAX/ [LL], TAUZERO/ [II], NTAU/ [NN], DELTA TAU/ [MM]

TEST/ [I]

[I] — The test number of the test to be used.

CHANNELS/ [(J_1, J_2, . . . J_K)]

[J_1, J_2, . . . J_K] — The channel numbers of the channels to be used.

CALS/ [(C_1, C_2, . . . C_K)]

[C_1, C_2, . . . C_K] — The calibration factors for the channels to be used.

NORMS/ [(N_1, N_2, . . . N_K)]

[N_1, N_2, . . . N_K] — The normal values for the channels to be used.

If it is desired to use as the normals those values computed in the Editor System this field must appear as NORMS/ [( )].

SAMPLE/ [M]

[M] — Sample the time data at every M^{th} point.

TZERO/ [L]

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Begin the correlation study at the [L]th time data point.

TMAX/ [LL]

Terminate the correlation study at the [LL]th time data point.

(reckon [L], and [LL] as if M were 1)

TAUZERO/ [II]

$\tau_o = II * \Delta t$

Δt is the basic time increment of the input data entered by use of the * DELTAT card in the Time Step Generator.

NTAU/ [NN]

[NN] — The number of Tau values to be used in the computations.

DELTATAU/ [MM]

$\Delta_\tau = MM * \Delta t$

* COMPUTE, ID/ [I]

ID/ [I]

[I] — The test number associated with the output data which is to be used in the Frequency System Group.

* CORRELATION FUNCTIONS, TAU [(K)], PHI [(I, J)], OUTPUT [(M)], LABELED $ [NAME] $, TPHI [(I, J)], OPTION [(N)], OUTPUT [(L)]

TAU [(K)] — Causes the output of the Tau values as channel [K] for use in the Frequency System Group.

PHI [(I, J)], OUTPUT [(M)], LABELED $ [NAME] $

These fields cause the following actions.

Compute the correlation function between channels [I] and [J].

Output this function as channel [M] for use in the Frequency System Group. Attach the 1 - 36 character NAME to all output of this function within the Correlation System.

As many as 25 sets of the above 3 fields may appear on a * CORRELATION FUNCTIONS card.

TPHI [(I, J)], OPTION [(N_1)], OUTPUT [(L_1)], OPTION [(N_2)], OUTPUT [(L_2)], . . .

These fields cause the following action.

Compute the power density spectrum functions of the correlation function PHI [(I, J)] using window options [N_1, N_2, . . .] and output these functions for use in the Frequency Systems Group as channels [L_1, L_2, . . .] respectively.

TPHI [(I, J)] may only be defined if PHI [(I, J)] was previously defined on the same * CORRELATION FUNCTIONS card. One to ten window options may be used for each TPHI [(I, J)]. See the Correlation System mathematical statement for the definitions and usage of these window options.

* RELOAD, TAU [(N)], PHI [(I, J)], FROM SAVE [(K)], OUTPUT [(M)], LABELED $ [NAME] $, TPHI [(I, J)], OPTION [(N_1)], OUTPUT[(L_1)]

The fields on this card have the same meaning as the corresponding fields on the * CORRELATION FUNCTIONS card with the exception that with this card the correlation function PHI [(I, J)] is input taken from the real portion of the Save File for which the ID record contains the test number indicated on the CRLOAD card as the first word and [K] as the second word.

The * RELOAD card and the * CORRELATION FUNCTIONS card may not be used in the same set of Correlation System control cards.

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* PRINT, PHI [(I, J)], PHI [(K, L)], . . .

Print the defined correlation functions PHI [(I, J)], PHI [(K, L)], . . .

*PLOT, PHI [(I, J)], SCALED/ [A(MIN, MAX) | DYNAMIC | REFERENCE], USE/ [CHAR], END, . . .

Plot PHI [(I, J)] using [CHAR] as the plot character. Scale the function in one of the following ways. [A (MIN, MAX)] (absolutely between the given minimum MIN and the given maximum MAX, [DYNAMIC] (between the actual minimum contained in the function and the actual maximum contained in the function), [REFERENCE] (referenced to the minimum and maximum values for all functions which appear on the individual plot which contains this function). Five or fewer functions may appear on an individual plot. The END field ends the function definitions for an individual plot. In the absence of the END field the first five functions will appear on the first plot, the second five on the second plot etc.

* CONTINUE

This card must terminate each set of Correlation System control cards (for a given output test).

The Correlation System control cards must appear in the order in which they were defined on the preceding pages. The * PRINT card is not necessary if prints are not desired, however, the * PLOT card must be present even if no plot definitions are on it. The format for the * PLOT card when no plots are specified is * PLOT, [NONE]. The control cards here defined may be continued from physical card to physical card by beginning each continuation card with a new field. Care must be taken however not to begin any continuation card in column 1.

THE REGRESSION SYSTEM

* IBLOAD, TEST/ [N], CHANNELS / [M(m_1, m_2, . . . , m_N)],
FTYPE/ [1 | 2], CALS/ [M(C_1, C_2, . . . , C_N)], ZTEST/ [K],
VALUE/ [F], PHASE/ [1], POINTS/ [J(Z, n_1, n_2, . . . , $n_{(J-2)}$, T)],
PHASE/ [2], POINTS/ [JJ(L, n_1, n_2, . . . , $n_{(JJ-2)}$, T)],
PHASE/ [3] ,POINTS/ [JK(L, n_1, n_2, . . . , $n_{(JK-2)}$, T)],
PHASE/ [4], POINTS/ [KK(L, n_1, n_2, . . . ,$n_{(KK-2)}$, T)]

TEST/ [N]

[N] — The test number of the test to be used in the regression analysis.

CHANNELS/ [M(m_1, m_2, . . . , m_M)]

[M] — The number of channels to be used.

[M_i] — The channel numbers of the channels to be used.

FTYPE/ [1 | 2]

[1] — The type of function upon which the regression analysis is to be performed is type 1 as defined in the mathematics of the system.

[2] — The type of function upon which the regression analysis is to be performed is type 2 as defined in the mathematics of the system.

ZTEST/ [K]

[K] — The channel on which the drop to zero level is to be found.

VALUE/ [F]

[F] — 1/2 of the value to which the channel value must drop to establish the zero level.

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PHASE/ 1, POINTS/ [J(Z, n_1, n_2, . . . , P, N_3, N_4, . . . , n_{J-2}, T)]

[J] — The number of points for phase 1.

[Z] — The normal level.

[P] — The peak value of the phase.

[n_j] — An integer percentage of P – Z or P – T depending on whether n_j lies between Z and P or P and T.

[T] — The trough value of the phase.

PHASE/ [J], POINTS/ [JJ(L, n_1 n_2, . . . , P, n_3, n_4, . . . , n_{J-2}, T)]

[J] — 2, 3, or 4.

[JJ] — The number of points for phase J.

[L] — The last point of phase J – 1.

[P] — Same as phase 1 definitions.

[n_i] — Same as phase 1 definitions.

[T] — Same as phase 1 definitions.

A maximum of 7 points may be used for any phase. It is not necessary to use all 4 phases. The card may be discontinued at the end of any POINTS field. The card may be continued from physical card to physical card by starting each continuation card with a new field. Do not begin any continuation card in column 1.

* CONTINUE

This card must be used after the last * IBLOAD control card for which processing is desired and also between any two * IBLOAD cards for which the FTYPE fields are different.

Example:

Test No. 3 is a type 1 function of f(t) which is to run for the 4 channels 1, 2, 6, 7 over 2 phases. The calibration for channel 1 is 1. Channel 2 is 2. Channel 6 is 100000, and channel 7 is .00001. Channel 1 contains the most definite drop to zero level and this drop has a value of 8. Phase 1 is to have 7 points, they are Z, 10% of the value between Z and P, 70% of the value between Z and P, 60% of the value between P and T, and 30% of the value between P and T. Phase 2 is to have 5 points, they are the last point of Phase 1, 50% of the value between L and P, and 50% of the value between P and T. The control card would then be:

* IBLOAD, TEST/3, CHANNELS/4(1, 2, 6, 7), FTYPE/1, CALS/4(1., 2., 1.E + 5, 1.E – 5), ZTEST/1, VALUE/4., PHASE/1, POINTS/7, (Z, 10, 70, P, 60, 30, T), PHASE/2, POINTS/5 (L, 50, P, 50, T)

The POINTS field must begin with Z or L, contain P and terminate with T.

THE SYSTEM CORE DUMP (DCS)

* DUMP [N], [L_1], [L_2], [D], [F]

This card will cause a system core dump of the 7094 to be taken according to the following options.

[N]	—	blank	dump upon encountering this card
	—	non-blank	dump after all previous control cards have been processed

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[L_1] — Lower limit of core dump (octal)

[L_2] — Upper limit of core dump (octal)

[D] — blank continue processing after the dump has been taken

— non-blank Terminate processing with the dump.

[F] — Format of the dump

= 1 Octal 8 words per line

= 2 BCD 16 words per line

= 3 Squezy (mnemonics with address and tag field)

= 4 Octal and Squezy

= 5 Octal and mnemonics

= 6 Octal and mnemonics and BCD

This card is only for use with the 7044 - 7094 DCS system.

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APPENDIX I

PROGRAM LISTING

PART 1

CROSS REFFERENCE BETWEEN DECK NAMES AND ROUTINE NAMES AND FUNCTION

THE DECK NAMES ARE COMPRISED OF 5 CHARACTERS WHICH CONSTITUTE THE 4 FIELDS DEFINED BELOW.

FIELD	CHARACTERS	TYPE	USAGE
1	1	ALPHABETIC	SYSTEM GROUP CODE
2	2	ALPHABETIC	OVERLAY LINK NAME
3	3	NUMERIC	LINK OCCURENCE NUMBER
4	4-5	NUMERIC	DECK POSITION NUMBER

SYSTEM GROUP CODES

CODE	SYSTEM GROUP
J	JOB MONITOR
T	TIME
R	REGRESSION
U	UTILITY
C	CORRELATION
F	FREQUENCY
A	AUXILIARY

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DECK NAME	ROUTINE NAME	ROUTINE FUNCTION	PAGE
J0001	EXEUTV	EXECUTIVE CONTROL PROGRAM	6
J0002	(MAP)	MACHINE PAUSE ROUTINE (NOP ON DCS)	7
J0003	MESAGE	ON LINE MESSAGE WRITER	7
J0004	(MAP)	UTILITY FILE AND SWITCH ROUTINE	8
J0005	SQUEEZ	LEFT JUSTIFY DATA IN CARD INPUT IMAGE ARRAY	12
J0006	AEXIT	FLUSH BUFFERS THEN DUMP	12
J0007	WROUT	DIAGNOSTIC MESSAGE WRITER	12
J0008	(MAP)	AUXILIARY SPECIAL PURPOSE ROUTINES	14
J0009	CARD	CONTROL CARD READER	22
JA110	FIXEXT	DETERMINE DUMP TRANSFER LOCATION	23
JA111	(MAP)	DETERMINE DATE OF RUN	23
TA212	MAIN	TIME SYSTEM MONITOR	26
TB113	FRQTSZ	FREQUENCY ARRAY GENERATOR (CONTROL)	27
TB114	FRQC	FREQUENCY ARRAY GENERATOR (COMPUTE)	32
TB215	CHCKD	DATA CHECK SYSTEM	32
TB216	BUFG	DATA CHECK INPUT ROUTINE	35
TB317	EDIT	DATA EDIT CONTROL ROUTINE	35
TB318	INPUT	DATA EDIT TAPE INPUT ROUTINE	38
TC119	IPDC	DECODE *INPUT CONTROL CARD	39
TC220	CRDINP	CARD EDIT CONTROL ROUTINE	41
TC221	XIN	CARD EDIT COMPUTATION ROUTINE	43
TC322	EDITII	TAPE EDIT (INTEGER) COMPUTATION ROUTINE	46
TC323	SATCK	CHECK SATURATION ROUTINE	49
TC424	EDITFI	TAPE EDIT (FL. POINT) COMPUTATION ROUTINE	49
TB425	INTG	TRANSFORM GENERATOR SYSTEM	52
TB426	(MAP)	SET ID RECORD	55
RA428	IBALL	REGRESSION SYSTEM MONITOR	58
RD129	IBLOAD	REGRESSION CONTROL CARD DECODE ROUTINE	58
RD130	NUMBER	AUXILIARY CARD DECODE ROUTINE	62
RD131	GTCRD	REGRESSION CONTROL CARD READER	63
RD232	COMP	REGRESSION SYSTEM COMPUTATIONAL CONTROL	63
RE133	TPGEN	REGRESSION SYSTEM INPUT GENERATOR	64
RE234	TFND	REGRESSION SYSTEM POINT DETERMINATION	65
RE235	BUFILL	COMPUTATIONAL INPUT ROUTINE	72
RE336	ACOMP	COMPUTATION CONTROL FOR SEGMENT FIT	73
RE337	MASTUP	MATRIX SETUP ROUTINE	77
RE338	INTR	INTEGRATION ROUTINE	79
RE339	MSOL	MATRIX SOLVER	79
UA540	UTIL	UTILITY SYSTEM MONITOR	82
UA541	REREAD	UTILITY SYSTEM CONTROL CARD INPUT	83
UA542	TESRT	AUXILIARY CONTROL CARD DECODE ROUTINE	84
UA543	(MAP)	UTILITY REWIND-UNLOAD ROUTINE	85
UF144	MERGE	MASTER TAPE MERGE CONTROL ROUTINE	85
UG145	FMERG	FREQUENCY MERGE ROUTINE	86
UG146	UDMRG	UPDATE MERGE ROUTINE	88
UG147	FRQTS	FREQUENCY ARRAY TEST ROUTINE	89
UG248	MERGT	TIME MERGE ROUTINE	89
UF249	RETRI	DATA RETRIEVAL SYSTEM	91
UF350	WOTD	TIME DATA OUTPUT SYSTEM	94
CA651	CORR	CORRELATION SYSTEM MONITOR	98
CA652	KARD	CORRELATION SYSTEM CARD INPUT ROUTINE	99
CH153	DECOD	CONTROL CARD DECODE CONTROL ROUTINE	100
CI154	DECO1	PARTIAL CONTROL CARD DECODER	101
CI255	DECO2	PARTIAL CONTROL CARD DECODER	104
CH256	PHITAU	COMPUTE PHI(TAU)	108
CH257	GETDAT	CORRELATION SYSTEM INPUT CONTROL	110

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DECK NAME	ROUTINE NAME	ROUTINE FUNCTION	PAGE
CH258	REDAT	READ ONE BUFFER OF DATA	111
CZ257	FILBUP	CORRELATION INPUT ROUTINE (ALL BUFFERS)	111
CZ258	FILONE	CORRELATION INPUT ROUTINE (ONE BUFFER)	113
CH359	TPHIP	COMPUTE POWER SPECTRAL DENSITY	113
CH360	OPTION	POWER SPECTRAL WINDOW ROUTINE	114
CH461	PTPRI	PRINT ROUTINE	116
CH562	PLPHI	PLOT EXECUTIVE ROUTINE	117
CJ163	DECPL	DECODE *PLOT CONTROL CARD	117
CJ264	PLTT	PLOT ROUTINE INTERNAL COMPUTE	120
CJ265	ACPL	PLOT WRITER	122
FA766	NUCLUS	FREQUENCY SYSTEM MONITOR	125
FK167	MATRIX	MATRIX SYSTEM CONTROL ROUTINE	125
FL168	OPERAT	MATRIX ALGEBRA ROUTINE	127
FL269	MALOAD	DECODE *MALOAD AND *OVERLAY CARDS	134
FL270	RECARD	MATRIX SYSTEM CARD INPUT ROUTINE	135
FL271	GETNUM	AUXILIARY CARD DECODE ROUTINE	136
FL272	BYPASC	BYPASS CONTROL CARDS	136
FM173	LONE	LOAD DATA DEFINED ON *MALOAD CARD	136
FM274	LTWO	LOAD DATA DEFINED ON *OVERLAY CARD	139
FL375	OUTPUT	MATRIX OUTPUT CONTROL ROUTINE	142
FL376	CAROU	CONTROL CARD INPUT ROUTINE	143
FL377	CBNUM	AUXILIARY CARD DECODE ROUTINE	143
FN178	PRINT	MATRIX OUTPUT PRINT ROUTINE	144
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FO386	SCAN	PRE-TRANSLATOR SCAN ROUTINE	163
FO387	IPREC	OPERATOR PRECEDENCE SCANNER	171
FO388	COMOPS	COMPLEX OPERATIONS ROUTINE	172
FO389	XLATE	FOURIERTRAN TRANSLATOR	174
FO490	FUNDE	FUNCTION DEFINITION OPTION ROUTINE	175
FO591	PRPLEX	FOURIERTRAN PRINT-PLOT ROUTINE	178
FO592	DCPLOT	DECODE *PLOT CONTROL CARDS	182
AA893	AUXILU	AUXILIARY SYSTEM MONITOR	187

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APPENDIX I (CONT.)

PART 2

INDIVIDUAL PROGRAM LISTINGS

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JOB PROMOTION

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```
$IBFTC J0001   M94,FULIST,REF,XR6                                      J0001000
C              EXECUTIVE CONTROL PROGRAM                               J0001001
CEXE     EXECUTIVE PROGRAM FOR FOURIER TRANSFORM SYSTEM                J0001002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         J0001003
      COMMON IDMPIT                                                    J0001004
      LOGICAL SWITCH                                                   J0001005
      LOGICAL ZERO,NZER                                                J0001006
 1    FORMAT (80A1)                                                    J0001007
 2    FORMAT (1H 80A1)                                                 J0001008
 3    FORMAT (1H1)                                                     J0001009
 4    FORMAT (1H1,26H***** JOB SEPARATION *****/1H0)                   J0001010
      DATA JOB/3HJOB/                                                  J0001011
      DATAPAUSE/5HREGR /,ENTER/5HBEGIN/,DATA/4HTIME/,COMP/4HFREQ/      J0001012
      DATA COMMA,COMCOM/1H,,3H,,,/                                     J0001013
      DATA ENN/3HEND/                                                  J0001014
      DATA UTI/4HUTIL/                                                 J0001015
      DATA CENTER/4HPROB/                                              J0001016
      DATA CORR/4HCORR/                                                J0001017
      DATA AUXI/4HAUXI/                                                J0001018
      DATA CFLT/4HFILT/                                                J0001019
      IDMPIT=0                                                         J0001020
      RA(81)=COMMA                                                     J0001021
      RA(82)=COMMA                                                     J0001022
      CALL FIXEXT                                                      J0001023
      CALL SWALOF                                                      J0001024
      CALL DAET (DAY,DON,YEAR)                                         J0001025
 50   CALL CARD                                                        J0001026
      CALL PACK (2,4,WO,RA)                                            J0001027
      IF(ZERO(WO,ENN)) GO TO 1000                                      J0001028
      IF(ZERO(WO,COMCOM)) GO TO 50                                     J0001029
      IF(NZER(WO,JOB)) GO TO 50                                        J0001030
      WRITE (10,4)                                                     J0001031
      CALL SWTAOF                                                      J0001032
      WRITE (6,3)                                                      J0001033
 100  CALL CARD                                                        J0001034
 106  CONTINUE                                                         J0001035
      CALL PACK (2,6,WO,RA)                                            J0001036
      IF(NZER(WO,ENTER)) GO TO 110                                     J0001037
      IDMPIT=1                                                         J0001038
      CALL CARD                                                        J0001039
      IDMPIT=0                                                         J0001040
      CALL PACK (7,10,WO,RA)                                           J0001041
      IF(ZERO(WO,DATA)) GO TO 120                                      J0001042
      IF(ZERO(WO,COMP)) GO TO 130                                      J0001043
      IF(ZERO(WO,PAUSE)) GO TO 150                                     J0001044
      IF(ZERO(WO,UTI)) GO TO 140                                       J0001045
      IF(ZERO(WO,CENTER)) GO TO 160                                    J0001046
      IF(ZERO(WO,CORR)) GO TO 170                                      J0001047
      IF(ZERO(WO,AUXI)) GO TO 210                                      J0001048
      IF(ZERO(WO,CFLT)) GO TO 220                                      J0001049
 110  CALL WROUT (20,0)                                                J0001050
      CALL WROUT (10,3)                                                J0001051
      GO TO 50                                                         J0001052
```


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```
 120  CALL MAIN                                                        J0001053
      GO TO 200                                                        J0001054
 130  CALL NUCLUS                                                      J0001055
      GO TO 200                                                        J0001056
 140  CALL UTIL                                                        J0001057
      GO TO 200                                                        J0001058
 150  CALL IBALL                                                       J0001059
      GO TO 200                                                        J0001060
 160  CALL PDSM                                                        J0001061
      GO TO 200                                                        J0001062
 170  CALL CORR                                                        J0001063
 200  CALL PACK (2,4,WO,RA)                                            J0001064
      IF(ZERO(WO,ENN)) GO TO 1000                                      J0001065
      IF(ZERO(WO,COMCOM)) GO TO 100                                    J0001066
      IF(NZER(WO,JOB)) GO TO 106                                       J0001067
      WRITE (10,4)                                                     J0001068
      CALL SWTAOF                                                      J0001069
      DO 205 I=1,10                                                    J0001070
 205  ISWTCH(I)=4382                                                   J0001071
      GO TO 100                                                        J0001072
 210  CALL AUXILU (I)                                                  J0001073
      GO TO (100,200),I                                                J0001074
 220  CALL FILTER                                                      J0001075
      GO TO 200                                                        J0001076
 1000 IDMPIT=1                                                         J0001077
      CALL CARD                                                        J0001078
      CALL EXIT                                                        J0001079
      GO TO 100                                                        J0001080
      END                                                              J0001081
```

```
$IBMAP J0002    50,M94                                                 J0002000
*               MACHINE PAUSE ROUTINE (NOP ON DCS)                     J0002001
       ENTRY    PAUSE                                                  J0002002
CLOCK  EQU      5                    CLOCK CELL                        J0002003
PAUSE  SXA      *+2,4                PAUSE WITH CLOCK                  J0002004
       NOP                              HOBBLED.                       J0002005
       AXT      **,4                                                   J0002006
       TRA      1,4                                                    J0002007
       END                                                             J0002008
```

```
$IBFTC J0003    M94,FULIST,REF,XR6                                     J0003000
      SUBROUTINE MESAGE                                                J0003001
C               ON LINE MESSAGE WRITER                                 J0003002
      LOGICAL ZERO,NZER                                                J0003003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         J0003004
 1    FORMAT (80A1)                                                    J0003005
 2    FORMAT (20X,80A1)                                                J0003006
 3    FORMAT (1H0)                                                     J0003007
      DATA CHK/1HC/                                                    J0003008
 10   READ (5,1)(RA(I),I=1,80)                                         J0003009
```


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```
      IF(NZER(RA(1),CHK)) GO TO 20                                      J0003010
      WRITE (6,2)(RA(I),I=1,80)                                         J0003011
      WRITE (10,2) (RA(I),I=1,80)                                       J0003012
      PRINT 2,(RA(I),I=1,80)                                            J0003013
      GO TO 10                                                          J0003014
 20   PRINT 3                                                           J0003015
      PRINT 3                                                           J0003016
      CALL PAUSE                                                        J0003017
      RETURN                                                            J0003018
      END                                                               J0003019


$IBMAP J0004    50,M94                                                  J0004000
*               UTILITY FILE AND SWITCH ROUTINE                         J0004001
       REM      ENTRY POINTS                                            J0004002
       ENTRY    KLOSE                                                   J0004003
       ENTRY    EXIT                                                    J0004004
       ENTRY    SWITCH                                                  J0004005
       ENTRY    SWTHON                                                  J0004006
       ENTRY    SWTHOF                                                  J0004007
       ENTRY    SWALOF                                                  J0004008
       ENTRY    SWTAOF                                                  J0004009
       ENTRY    .UN01.                                                  J0004010
       ENTRY    .UN02.                                                  J0004011
       ENTRY    .UN03.                                                  J0004012
       ENTRY    .UN04.                                                  J0004013
       ENTRY    .UN10.                                                  J0004014
       ENTRY    .UN11.                                                  J0004015
       ENTRY    .UN12.                                                  J0004016
       ENTRY    .UN13.                                                  J0004017
       ENTRY    .UN14.                                                  J0004018
       EJECT                                                            J0004019
       REM      CLOSE UTILITY TAPE FILES INDICATED IN                   J0004020
       REM      CALLING SEQUENCE                                        J0004021
       REM      CALL KLOSE (M,N1,N2,...,NM)                             J0004022
       REM      CLOSE FILES UTN1,UTN2,...,UTNM                          J0004023
       REM      TREAT AS NOP IF FILE IS DEFERED OR                      J0004024
       REM      ALLREADY CLOSED                                         J0004025
       SPACE    3                                                       J0004026
KLOSE  SAVE     (1,2,4)                                                 J0004027
       CLA*     3,4                NUMBER OF UNITS (M)                  J0004028
       PAC      0,2                SET FOR                              J0004029
       SXD      TXLT,2             RETURN                               J0004030
       AXC      1,2                SET LOOP TO OBTAIN                   J0004031
       PCA      0,4                UNIT NUMBER                          J0004032
       REM                         OBTAIN ACTUAL ADDRESS                J0004033
       ADD      =3                 OF ARGUMENT 1                        J0004034
       STA      *+2                                                     J0004035
SATRT  AXC      LIST,1                                                  J0004036
       CLA*     **,2               OBTAIN UNIT NUMBER (NI)              J0004037
       STA      *+1                                                     J0004038
       CLA      **,1               OBTAIN ADDRESS OF FCW1               J0004039
       STA      URT                                                     J0004040
       STA      CLC                                                     J0004041
URT    LDQ      **                 OBTAIN FCW1                          J0004042
```


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```
        RQL     18              TEST FOR DEFERED FILE           J0004043
        TQP     *+2             NO                              J0004044
        TRA     INC             YES                             J0004045
        CAL     URT             OBTAIN ADDRESS OF               J0004046
        ADD     =1              2ND WORD OF                     J0004047
        STA     *+1             FILE CONTROL BLOCK              J0004048
        LDQ     **              LOAD 2ND WORD OF FCB            J0004049
        RQL     3               TEST FOR OPEN FILE              J0004050
        TQP     INC             FILE CLOSED                     J0004051
        TSX     .CLCSE,4        CLOSE FILE                      J0004052
CLO     MON     **              NO REW OR EOF                   J0004053
INC     TXI     *+1,2,-1                                        J0004054
TXLT    TXL     *+2,2,**                                        J0004055
        TRA     SATRT                                           J0004056
        RETURN  KLOSE                                           J0004057
LIST    PZE     0                                               J0004058
        PZE     UNIT01                                          J0004059
        PZE     UNIT02                                          J0004060
        PZE     UNIT03                                          J0004061
        PZE     UNIT04                                          J0004062
        PZE     UNIT11                                          J0004063
        PZE     UNIT12                                          J0004064
        PZE     UNIT13                                          J0004065
        PZE     UNIT14                                          J0004066
        EJECT                                                   J0004067
EXIT    SAVE    (4,2,3)                                         J0004068
        AXT     8,2                                             J0004069
        CAL     SWTH                                            J0004070
        STO     TAPTST                                          J0004071
        TRA     *+4                                             J0004072
PUS     CAL     TAPTST                                          J0004073
        ARS     1                                               J0004074
        SLW     TAPTST                                          J0004075
        LBT                                                     J0004076
        TRA     INCP                                            J0004077
        CLA     TRC+8,2                                         J0004078
        STO     UT1C+1                                          J0004079
        TRA     UT1C                                            J0004080
INCP    TXI     *+1,2,-1                                        J0004081
        TXH     PUS,2,0                                         J0004082
        TSX     .CLCSE,4                                        J0004083
        PTW     UNIT10                                          J0004084
        TRA     IBEXIT                                          J0004085
UT1C    TSX     .CLCSE,4                                        J0004086
        NOP                                                     J0004087
        TRA     INCP                                            J0004088
        SPACE   3                                               J0004089
TRC     MON     UNIT14                                          J0004090
        MON     UNIT13                                          J0004091
        MON     UNIT12                                          J0004092
        MON     UNIT11                                          J0004093
        MON     UNIT04                                          J0004094
        MON     UNIT03                                          J0004095
        MON     UNIT02                                          J0004096
        MON     UNIT01                                          J0004097
        SPACE   3                                               J0004098
FIL     PZE     .UN14.                                          J0004099
        PZE     .UN13.                                          J0004100
```


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```
        PZE     .UN12.                                  J0004101
        PZE     .UN11.                                  J0004102
        PZE     .UN04.                                  J0004103
        PZE     .UN03.                                  J0004104
        PZE     .UN02.                                  J0004105
        PZE     .UN01.                                  J0004106
TAPTST  BSS     1                                       J0004107
TRTST   BSS     1                                       J0004108
        EJECT                                           J0004109
SWITCH  SAVE    (4)                                     J0004110
        STZ     TEST                                    J0004111
        CLA*    3,4                                     J0004112
        ADD     =3                                      J0004113
        STO     SWNC                                    J0004114
START   STA     *+1                                     J0004115
        CLA*    **,4                                    J0004116
        STA     *+2                                     J0004117
        CAL     BIT                                     J0004118
        ARS     **                                      J0004119
        ORA     TEST                                    J0004120
        SLW     TEST                                    J0004121
        CLA     SWNC                                    J0004122
        SUB     =1                                      J0004123
        STO     SWNC                                    J0004124
        SUB     =3                                      J0004125
        TZE     *+3                                     J0004126
        CLA     SWNC                                    J0004127
        TRA     START                                   J0004128
        CAL     SWTH                                    J0004129
        ANA     TEST                                    J0004130
        TNZ     *+3                                     J0004131
        CLA     FALSE                                   J0004132
        RETURN  SWITCH                                  J0004133
        CLA     TRUE                                    J0004134
        RETURN  SWITCH                                  J0004135
        EJECT                                           J0004136
SWTHON  SAVE    (4)                                     J0004137
        CLA*    3,4                                     J0004138
        STA     *+2                                     J0004139
        CAL     BIT                                     J0004140
        ARS     **                                      J0004141
        ORS     SWTH                                    J0004142
        LXA     SWTH,7                                  J0004143
        RETURN  SWTHON                                  J0004144
        SPACE   3                                       J0004145
SWTHOF  SAVE    (4)                                     J0004146
        CLA*    3,4                                     J0004147
        STA     *+2                                     J0004148
        CAL     BIT                                     J0004149
        ARS     **                                      J0004150
        COM                                             J0004151
        ANS     SWTH                                    J0004152
        LXA     SWTH,7                                  J0004153
        RETURN  SWTHOF                                  J0004154
        SPACE   3                                       J0004155
SWALOF  SAVE    (4)                                     J0004156
        STZ     SWTH                                    J0004157
        RETURN  SWALOF                                  J0004158
```


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```
        SPACE   3                                                       J0004159
SWTAOF  SAVE    (4)                                                     J0004160
        CAL     SWTB                                                    J0004161
        ANA     TAPON                                                   J0004162
        SLW     SWTB                                                    J0004163
        RETURN  SWTAOF                                                  J0004164
        SPACE   3                                                       J0004165
TEST    BSS     1                                                       J0004166
SWNO    BSS     1                                                       J0004167
BIT     OCT     400000000000                                            J0004168
SWTH    BSS     1                                                       J0004169
TRUE    OCT     777777777777                                            J0004170
FALSE   OCT     0                                                       J0004171
NOBIT   OCT     377777777777                                            J0004172
TAPON   OCT     377                                                     J0004173
        EJECT                                                           J0004174
        REM     INTEGRATION OUTPUT - FOURIERTRAN INPUT  (A-5)           J0004175
.UN01.  PZE     UNIT01                                                  J0004176
UNIT01  FILE    ,A(1),READY,INOUT,BLK=256,BIN,NOLIST                    J0004177
        SPACE   3                                                       J0004178
        REM     EDIT OUTPUT - INTEGRATION INPUT  (B-5)                  J0004179
.UN02.  PZE     UNIT02                                                  J0004180
UNIT02  FILE    ,A(2),READY,INOUT,BLK=256,BIN,NOLIST                    J0004181
        SPACE   3                                                       J0004182
        REM     EDIT INPUT  (A-6)                                       J0004183
.UN03.  PZE     UNIT03                                                  J0004184
UNIT03  FILE    ,A(3),READY,INPUT,BLK=256,BIN,NOLIST                    J0004185
        SPACE   3                                                       J0004186
        REM     SAVE TAPE  (B-6)                                        J0004187
.UN04.  PZE     UNIT04                                                  J0004188
UNIT04  FILE    ,A(4),READY,INOUT,BLK=256,BIN,NOLIST                    J0004189
        SPACE   3                                                       J0004190
        SPACE   3                                                       J0004191
        REM     PRINT PLOT OUTPUT  (A-7)                                J0004192
.UN10.  MZE     UNIT10                                                  J0004193
UNIT10  FILE    ,C(1),READY,OUTPUT,BLK=23,BCD,NOLIST                    J0004194
.UN11.  PZE     UNIT11                                                  J0004195
UNIT11  FILE    ,B(1),READY,INOUT,BLK=256,BIN,NOLIST                    J0004196
        SPACE   3                                                       J0004197
.UN12.  PZE     UNIT12                                                  J0004198
UNIT12  FILE    ,B(2),READY,INOUT,BLK=256,BIN,NOLIST                    J0004199
        SPACE   3                                                       J0004200
.UN13.  PZE     UNIT13                                                  J0004201
UNIT13  FILE    ,B(3),READY,INOUT,BLK=256,BIN,NOLIST                    J0004202
        SPACE   3                                                       J0004203
.UN14.  PZE     UNIT14                                                  J0004204
UNIT14  FILE    ,B(4),READY,INOUT,BLK=256,BIN,NOLIST                    J0004205
        END                                                             J0004206
```


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```
$IBFTC J0005   M94,FULIST,REF,XR6                                      J0005000
      SUBROUTINE SQUEEZ                                                J0005001
C               LEFT JUSTIFY DATA IN CARD INPUT IMAGE ARRAY            J0005002
      LOGICAL ZERO,NZER,SWITCH                                         J0005003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         J0005004
      DATA BLANK/1H /                                                  J0005005
      DATA COMMA/1H,/                                                  J0005006
      K=1                                                              J0005007
      DO 50 I=1,82                                                     J0005008
      IF(ZERO(BLANK,RA(I))) GO TO 50                                   J0005009
      RA(K)=RA(I)                                                      J0005010
      K=K+1                                                            J0005011
 50   CONTINUE                                                         J0005012
      IF(K-80)60,60,100                                                J0005013
 60   DO 70 I=K,80                                                     J0005014
      RA(I)=COMMA                                                      J0005015
 70   CONTINUE                                                         J0005016
 100  RETURN                                                           J0005017
      END                                                              J0005018
```

```
$IBFTC J0006   M94,FULIST,REF,XR6                                      J0006000
      SUBROUTINE AEXIT                                                 J0006001
C               FLUSH BUFFERS THEN DUMP                                J0006002
 1    FORMAT (36H ************************************)                J0006003
      DO 10 I=1,50                                                     J0006004
      WRITE (6,1)                                                      J0006005
 10   CONTINUE                                                         J0006006
      CALL TDUMP                                                       J0006007
      RETURN                                                           J0006008
      END                                                              J0006009
```

```
$IBFTC J0007   M94,FULIST,REF,XR6                                      J0007000
      SUBROUTINE WROUT (N,MM)                                          J0007001
C               DIAGNOSTIC MESSAGE WRITER                              J0007002
 1    FORMAT (6H *****,1X,10A6,6H *****,26X,I3)                        J0007003
      DIMENSION XOUT(300),XIUT(10,30)                                  J0007004
      EQUIVALENCE (XOUT,XIUT)                                          J0007005
      DATA XOUT(1)/                                                    J0007006
     160HTHE ABOVE CARD CONTAINS A FIELD WHICH IS INCORRECTLY WRITTEN/ J0007007
      DATA XOUT(11)/                                                   J0007008
     260HTHE ABOVE CARD CONTAINS AN ILLEGITIMATE FIELD               / J0007009
      DATA XOUT(21)/                                                   J0007010
     360HA FIELD ON THE ABOVE CARD HAS A PARENTHESIS ERROR           / J0007011
      DATA XOUT(31)/                                                   J0007012
     460HA FIELD ON THE ABOVE CARD USES AN OPERATOR INCORRECTLY      / J0007013
      DATA XOUT(41)/                                                   J0007014
     560HIN A FIELD ON THE ABOVE CARD THE = IS NOT THE FIRST OPERATOR/ J0007015
      DATA XOUT(51)/                                                   J0007016
     660HTEMPORARY STORAGE EXCEEDED -- ERROR SCAN CONTINUES          / J0007017
      DATA XOUT(61)/                                                   J0007018
```


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```
      76OHTHE OPERATIONS ROUTINE HAS ENCOUNTERED AN UNDEFINED OPERATOR/  J0007019
       DATA XOUT(71)/                                                    J0007020
      86OHTHE ABOVE CARD IS A REFERENCE  TO AN UNDEFINED SYSTEM       /  J0007021
       DATA XOUT(81)/                                                    J0007022
      96OHTHE DUMMY CENTER OF MASS ROUTINE HAS BEEN LOADED            /  J0007023
       DATA XOUT(91)/                                                    J0007024
      16OHTHE PROGRAM WILL GO TO THE NEXT JOB OR TERMINATE WITH *END  /  J0007025
       DATA XOUT(101)/                                                   J0007026
      26OHTHE ABOVE CARD CONTAINS AN UNDEFINED FIELD                  /  J0007027
       DATA XOUT(111)/                                                   J0007028
      36OHA FIELD IS MISSING FROM THE ABOVE CARD                      /  J0007029
       DATA XOUT(121)/                                                   J0007030
      46OHLOADING OF ALL CHANNELS IS NOT POSSIBLE FOR THIS TEST       /  J0007031
       DATA XOUT(131)/                                                   J0007032
      56OHAN ILLEGAL PRINT OR PLOT HAS BEEN SPECIFIED FOR THIS TEST   /  J0007033
       DATA XOUT(141)/                                                   J0007034
      66OHATTEMPT TO LOAD A TEST WHICH IS NOT ON THE INPUT TAPE       /  J0007035
       DATA XOUT(151)/                                                   J0007036
      76OH(REF. SCALING) TO AN UNDEFINED PLOT (DYN. SCALING SUB.)     /  J0007037
       DATA XOUT(161)/                                                   J0007038
      86OHAN ATTEMPT TO OVERLOAD THE FREQUENCY ARRAY HAS BEEN MADE    /  J0007039
       DATA XOUT(171)/                                                   J0007040
      96OHTHE ABOVE FREQUENCY DATA IS INCORRECTLY WRITTEN             /  J0007041
       DATA XOUT(181)/                                                   J0007042
      16OHAN ATTEMPT TO UNDERLOAD THE FREQUENCY ARRAY HAS BEEN MADE   /  J0007043
       DATA XOUT(191)/                                                   J0007044
      26OHTHE PROGRAM EXPECTS A *END, *JOB, OR *BEGIN CONTROL CARD    /  J0007045
       DATA XOUT(201)/                                                   J0007046
      36OHTHE FREQUENCIES ARE NOT THOSE USED DURING INTEGRATION       /  J0007047
       DATA XOUT(211)/                                                   J0007048
      46OHTHE ABOVE EDIT CONTROL CARD IS INCORRECTLY WRITTEN          /  J0007049
       DATA XOUT(221)/                                                   J0007050
      56OHEDIT INPUT TAPE RECORD COUNT IS INCORRECT                   /  J0007051
       DATA XOUT(231)/                                                   J0007052
      56OHFUNCTION MISSING FROM LIBRARY CANNOT PROCEED                /  J0007053
       DATA XOUT(241)/                                                   J0007054
      56OHPROGRAM EXPECTS A * INPUT CARD AT THIS POINT                /  J0007055
       DATA XOUT(251)/                                                   J0007056
      56OHMATRIX ON RIGHT OF = NOT DEFINED                            /  J0007057
       DATA XOUT(261)/                                                   J0007058
      56OHMATRIX TO BE INVERTED IS NOT N X N                          /  J0007059
       DATA XOUT(271)/                                                   J0007060
      56OHMORE THAN 25 MATRICES HAVE BEEN DEFINED                     /  J0007061
       DATA XOUT(281)/                                                   J0007062
      56OHINSUFFICIENT STORAGE AVAILABLE FOR MATRIX                   /  J0007063
       DATA XOUT(291)/                                                   J0007064
      56OHMATRIX ELEMENT ON LOAD FILE EXCEEDS DEFINED DIMENSIONS      /  J0007065
       M=MM                                                              J0007066
10     WRITE (6,1)(XIOT(I,N),I=1,10),M                                   J0007067
       RETURN                                                            J0007068
       END                                                               J0007069
```


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```
$IBMAP J0008   400,M94                                                J0008000
*              AUXILIARY SPECIAL PURPOSE ROUTINES                     J0008001
       REM     ENTRY POINTS IN THE ORDER WHICH THEY OCCUR IN THE      J0008002
       REM     PROGRAM                                                J0008003
       ENTRY   TDUMP                                                  J0008004
       ENTRY   .UN31.                                                 J0008005
*      ENTRY   .OPTW.                                                 J0008006
       ENTRY   READ31                                                 J0008007
       ENTRY   RITE31                                                 J0008008
       ENTRY   CLOCK                                                  J0008009
       ENTRY   NZER                                                   J0008010
       ENTRY   ZERO                                                   J0008011
       ENTRY   PACK                                                   J0008012
       ENTRY   SCOSN                                                  J0008013
       ENTRY   ATAN                                                   J0008014
       ENTRY   SHFTCK                                                 J0008015
       ENTRY   LSHFT                                                  J0008016
       ENTRY   ARSHFT                                                 J0008017
       EJECT                                                          J0008018
       REM     TRANSFER TO SYSDUMP                                    J0008019
TDUMP  SAVE    (2,4)                                                  J0008020
       CLA*    4,4                                                    J0008021
       TPL     CLD                                                    J0008022
       CLA     3,4                                                    J0008023
       STA     A                                                      J0008024
       STA     B                                                      J0008025
       STA     C                                                      J0008026
       STA     D                                                      J0008027
       STA     E                                                      J0008028
       STA     F                                                      J0008029
       STA     G                                                      J0008030
       STZ     L1                                                     J0008031
       STZ     L2                                                     J0008032
       AXC     1,2                                                    J0008033
A      CAL     **,2                                                   J0008034
       ERA     COMMA                                                  J0008035
       TZE     HIT                                                    J0008036
       TIX     A,2,1                                                  J0008037
HIT    TIX     *+1,2,1                                                J0008038
B      CAL     **,2                                                   J0008039
       ERA     COMMA                                                  J0008040
       TZE     SNDC                                                   J0008041
C      LDQ     **,2                                                   J0008042
       CLA     L1                                                     J0008043
       RQL     3                                                      J0008044
       LGL     3                                                      J0008045
       STO     L1                                                     J0008046
       TRA     HIT                                                    J0008047
SNDC   TIX     *+1,2,1                                                J0008048
D      CAL     **,2                                                   J0008049
       ERA     COMMA                                                  J0008050
       TZE     TRC                                                    J0008051
E      LDQ     **,2                                                   J0008052
       CLA     L2                                                     J0008053
       RQL     3                                                      J0008054
       LGL     3                                                      J0008055
       STO     L2                                                     J0008056
       TRA     SNDC                                                   J0008057
```


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```
TRC     TIX     *+1,2,1                                         J0008058
F       CAL     **,2                                            J0008059
        ERA     COMMA                                           J0008060
        TZE     SETZ                                            J0008061
        LXA     INST,4                                          J0008062
        SXD     CLD,4                                           J0008063
        TIX     *+1,2,1                                         J0008064
SETZ    TIX     *+1,2,1                                         J0008065
G       LDQ     **,2                                            J0008066
        RQL     3                                               J0008067
        ZAC                                                     J0008068
        LGL     3                                               J0008069
        PAX     0,4                                             J0008070
        CLA     INST,4                                          J0008071
        STO     ARG                                             J0008072
        LXA     L1,2                                            J0008073
        SXA     ARG,2                                           J0008074
        LXA     L2,2                                            J0008075
        SXD     ARG,2                                           J0008076
        RETURN  TDUMP                                           J0008077
CLD     TSX     SYSDMP,4                                        J0008078
ARG     NOP                                                     J0008079
        RETURN  TDUMP                                           J0008080
COMMA   OCT     736060606060                                    J0008081
        MTW     0                                               J0008082
        MON     0                                               J0008083
        MZE     0                                               J0008084
        PZE     0                                               J0008085
        PTW     0                                               J0008086
        PON     0                                               J0008087
INST    PZE     1                                               J0008088
CHECK   BSS     2                                               J0008089
L1      BSS     1                                               J0008090
L2      BSS     1                                               J0008091
        SPACE   3                                               J0008092
        REM     MESSAGE WRITTER SWITCH SETTINGS                 J0008093
*OPTW.  OCT     377777777777                                    J0008094
*       OCT     076223400000                                    J0008095
        SPACE   3                                               J0008096
        REM     INTERNAL FILE SPECIFICATIONS                    J0008097
.UN31.  PZE     UNIT31                                          J0008098
UNIT31  FILE    ,INT,INOUT,BLK=15,BCD                           J0008099
        EJECT                                                   J0008100
        REM     OPEN INTERNAL FILE FOR READING                  J0008101
READ31  SAVE    (4)I                OPEN FOR READING            J0008102
        REM     CHECK TO SEE IF FILE IS OPEN IF IT IS CLOSE IT  J0008103
        LDI     UNIT31+1                                        J0008104
        OCT     405600040000                                    J0008105
        TRA     *+3                                             J0008106
        TSX     .CLOSE,4                                        J0008107
        MZE     UNIT31                                          J0008108
        TSX     .OPEN,4             BUFFERS NOT RETURNED        J0008109
        MON     UNIT31              TO BUFFER POOL              J0008110
        RETURN  READ31                                          J0008111
        SPACE   3                                               J0008112
        REM     OPEN INTERNAL FILE FOR WRITEING                 J0008113
RITE31  SAVE    (4)I                OPEN FOR WRITEING           J0008114
        REM     CHECK TO SEE IF FILE IS OPEN IF IT IS CLOSE IT  J0008115
```


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```
        LDI     UNIT31+1                                                J0008116
        OCT     405600040000                                            J0008117
        TRA     *+3                                                     J0008118
        TSX     .CLCSE,4                                                J0008119
        MZE     UNIT31                                                  J0008120
        TSX     .OPEN,4             WITH REWIND                         J0008121
        PZE     UNIT31                                                  J0008122
        RETURN  RITE31                                                  J0008123
ADOU31  PZE     UNIT31                                                  J0008124
SETUP1  OCT     000027000000                                            J0008125
SETUP2  OCT     300000000000                                            J0008126
        EJECT                                                           J0008127
        SPACE   3                                                       J0008128
        REM     RETURNS TIME OF FIRST CALLING                           J0008129
        REM     OR LAPSE TIME FROM PREVIOUS CALLING                     J0008130
        REM     TIME IS IN 1/60 SECONDS                                 J0008131
CLOCK   SAVE    (4)                                                     J0008132
        CLA*    =05                                                     J0008133
        SUB     ACLC                                                    J0008134
        STO*    3,4                                                     J0008135
        CLA*    =05                                                     J0008136
        STO     ACLC                                                    J0008137
        RETURN  CLOCK                                                   J0008138
        EJECT                                                           J0008139
        REM     EXCLUSIVE OR TO AC                                      J0008140
        REM     SET AC TRUE IF ARG(1) IS NOT IDENTICAL TO ARG(2)        J0008141
        REM     OTHERWISE SET AC FALSE                                  J0008142
 NZER   SAVE    (4)                 LOGICAL NON ZERO SET TRUE           J0008143
        CAL*    3,4                                                     J0008144
        ERA*    4,4                                                     J0008145
        RETURN  NZER                                                    J0008146
        SPACE   3                                                       J0008147
        REM     EXCLUSIVE OR TO AC                                      J0008148
        REM     SET AC TRUE IF ARG(1) IS     IDENTICAL TO ARG(2)        J0008149
        REM     OTHERWISE SET AC FALSE                                  J0008150
 ZERO   SAVE    (4)                 LOGICAL ZERO SET TRUE               J0008151
        CAL*    3,4                                                     J0008152
        ERA*    4,4                                                     J0008153
        TZE     *+3                                                     J0008154
        ZAC                                                             J0008155
        RETURN  ZERO                                                    J0008156
        CAL     *                                                       J0008157
        RETURN  ZERO                                                    J0008158
        EJECT                                                           J0008159
        REM     THIS ROUTINE PACKS THE FIRST BCD CHARACTER OF THE WORDS J0008160
        REM     ARG4(ARG1) THRU ARG4(ARG2) INTO ARG3                    J0008161
        REM     UPPER LIMIT OF 6 CHARACTERS                             J0008162
        REM     IF LESS THAN 6 CHARACTERS ARE CALLED FOR THE            J0008163
        REM     REMAINING PORTION OF ARG3 WILL BE BLANKS                J0008164
PACK    SAVE    (1,2,4)                                                 J0008165
        CLA     6,4                                                     J0008166
        STA     LOOP                                                    J0008167
        CLA*    3,4                                                     J0008168
        SUB     =1                                                      J0008169
        PAC     0,1                                                     J0008170
        CLA*    4,4                                                     J0008171
        PAC     0,2                                                     J0008172
        SXD     TR,2                                                    J0008173
```


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```
LOOP    LDQ     **,1                                          J0008174
        LGL     6                                             J0008175
        TXI     *+1,1,-1                                      J0008176
TR      TXH     LOOP,1,**                                     J0008177
        SLW     TEMP                                          J0008178
        CLA     =5                                            J0008179
        SUB*    4,4                                           J0008180
        ADD*    3,4                                           J0008181
LOOP2   STO     COUNT                                         J0008182
        TZE     STOR                                          J0008183
        CAL     TEMP                                          J0008184
        LDQ     BLANK                                         J0008185
        LGL     6                                             J0008186
        SLW     TEMP                                          J0008187
        CLA     COUNT                                         J0008188
        SUB     =1                                            J0008189
        TRA     LOOP2                                         J0008190
STOR    CAL     TEMP                                          J0008191
        SLW*    5,4                                           J0008192
        RETURN  PACK                                          J0008193
        EJECT                                                 J0008194
        REM     COMPUTE SINE AND COSINE OF ARG                J0008195
        REM     CALLING SEQUENCE                              J0008196
        REM          CALL SCOSN (ARG,SINE,COSINE)             J0008197
SCOSN   SAVE    (4,1)                                         J0008198
        CLA*    3,4                                           J0008199
        ANA     MASK                                          J0008200
        SUB     MASK+1                                        J0008201
        TMI     START                                         J0008202
        TZE     START                                         J0008203
        ARS     9                                             J0008204
        PDX     0,1                                           J0008205
        SXA     *+2,1                                         J0008206
        CLA*    3,4                                           J0008207
        ALS     **                                            J0008208
        ANA     MASK+3                                        J0008209
        ORA     MASK+1                                        J0008210
        FAD     MASK+1                                        J0008211
        XCA                                                   J0008212
        TRA     *+2                                           J0008213
START   LDQ*    3,4                                           J0008214
        FMP     TPI                                           J0008215
        FSB     PI                                            J0008216
        TMI     FOSQD                                         J0008217
        FSB     PIDT                                          J0008218
        TMI     TRQD                                          J0008219
 FTQD   STO     X                                             J0008220
        CLA     FTSS+8                                        J0008221
        STO     CTR                                           J0008222
        TRA     CAL                                           J0008223
 FOSQD  FAD     PIDT                                          J0008224
        TMI     FSQD                                          J0008225
        STO     X                                             J0008226
 SNQD   CLA     FTSS+6                                        J0008227
        STO     CTR                                           J0008228
        TRA     CAL                                           J0008229
 FSQD   FAD     PIDT                                          J0008230
        STO     X                                             J0008231
```


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```
        CLA     FTSS+5                                          J0008232
        STO     CTR                                             J0008233
        TRA     CAL                                             J0008234
TRQD    FAD     PIDT                                            J0008235
        STO     X                                               J0008236
        CLA     FTSS+7                                          J0008237
        STO     CTR                                             J0008238
CAL     CLA     PIDT            CALCULATE POWERS                J0008239
        FSB     X                                               J0008240
        XCA                                                     J0008241
        FMP     TDP                                             J0008242
        STO     Y                                               J0008243
        XCA                                                     J0008244
        FMP     Y                                               J0008245
        STO     Y+1                                             J0008246
        LDQ     X                                               J0008247
        FMP     TDP                                             J0008248
        STO     X                                               J0008249
        XCA                                                     J0008250
        FMP     X                                               J0008251
        STO     X+1             X**2                            J0008252
        XCA                     CALCULATE SINE                  J0008253
        FMP     C9                                              J0008254
        FAD     C7                                              J0008255
        XCA                                                     J0008256
        FMP     X+1                                             J0008257
        FAD     C5                                              J0008258
        XCA                                                     J0008259
        FMP     X+1                                             J0008260
        FAD     C3                                              J0008261
        XCA                                                     J0008262
        FMP     X+1                                             J0008263
        FAD     C1                                              J0008264
        XCA                                                     J0008265
        FMP     X                                               J0008266
        STO     SIN                                             J0008267
        LDQ     C9                                              J0008268
        FMP     Y+1                                             J0008269
        FAD     C7                                              J0008270
        XCA                                                     J0008271
        FMP     Y+1                                             J0008272
        FAD     C5                                              J0008273
        XCA                                                     J0008274
        FMP     Y+1                                             J0008275
        FAD     C3                                              J0008276
        XCA                                                     J0008277
        FMP     Y+1                                             J0008278
        FAD     C1                                              J0008279
        XCA                                                     J0008280
        FMP     Y                                               J0008281
        STO     COS                                             J0008282
CTR     NOP                                                     J0008283
FSSS    CLA     SIN                                             J0008284
STSIN   XCA                                                     J0008285
        CLA     COS                                             J0008286
        STO*    5,4                                             J0008287
        STQ*    4,4                                             J0008288
        RETURN  SCOSN                                           J0008289
```


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```
SNSS   CLS     SIN                                                  J0008290
       XCA                                                          J0008291
       CLA     COS                                                  J0008292
       STQ     COS                                                  J0008293
       TRA     STSIN                                                J0008294
THSS   CLS     COS                                                  J0008295
       STO     COS                                                  J0008296
       CLS     SIN                                                  J0008297
       TRA     STSIN                                                J0008298
FTSS   CLA     SIN                                                  J0008299
       XCA                                                          J0008300
       CLS     COS                                                  J0008301
       STQ     COS                                                  J0008302
       TRA     STSIN                                                J0008303
       TRA     FSSS                                                 J0008304
       TRA     SNSS                                                 J0008305
       TRA     THSS                                                 J0008306
       TRA     FTSS                                                 J0008307
       EJECT                                                        J0008308
       REM     COMPUTES THE ARC TANGENT (ARG3) OF ARG2/ARG1         J0008309
       REM     CALLING SEQUENCY                                     J0008310
       REM          CALL ATAN (ARG1,ARG2,ARG3)                      J0008311
ATAN   SAVE    (4)                                                  J0008312
       CLA*    3,4                                                  J0008313
       TZE     SETIFN                                               J0008314
       CLA*    4,4                                                  J0008315
       FDP*    3,4                                                  J0008316
       STQ     SIN                                                  J0008317
       XCA                                                          J0008318
       SSP                                                          J0008319
       FSB     =.01                                                 J0008320
       TPL     GOAHD                                                J0008321
       CLA*    3,4                                                  J0008322
       TPL     RP                                                   J0008323
       CLA     SIN                                                  J0008324
       FAD     PI                                                   J0008325
STANG  STO*    5,4                                                  J0008326
       RETURN  ATAN                                                 J0008327
RP     CLA*    4,4                                                  J0008328
       TPL     *+4                                                  J0008329
       CLA     TPI                                                  J0008330
       FAD     SIN                                                  J0008331
       TRA     STANG                                                J0008332
       CLA     SIN                                                  J0008333
       TRA     STANG                                                J0008334
SETIFN CLA*    4,4                                                  J0008335
       TPL     *+4                                                  J0008336
       CLA     TPI                                                  J0008337
       FSB     PIDT                                                 J0008338
       TRA     STANG                                                J0008339
       CLA     PIDT                                                 J0008340
       TRA     STANG                                                J0008341
GOAHD  CLA     SIN                                                  J0008342
       SSP                                                          J0008343
       FSB     =60.                                                 J0008344
       TPL     SETIFN                                               J0008345
       CLA     SIN                                                  J0008346
       TPL     *+6                                                  J0008347
```


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```
        TZE     *+5                                                     J0008348
        CLS     SIN                                                     J0008349
        STO     SIN                                                     J0008350
        CLS     ONE                                                     J0008351
        TRA     *+2                                                     J0008352
        CLA     ONE                                                     J0008353
        STO     AK                                                      J0008354
        CLA     SIN                                                     J0008355
        FAD     ONE                                                     J0008356
        STO     COS                                                     J0008357
        FSB     TWO                                                     J0008358
        FDP     COS                                                     J0008359
        STQ     X                   (X-1)/(X+1)                         J0008360
        FMP     X                                                       J0008361
        STO     X+1                                                     J0008362
        XCA                                                             J0008363
        FMP     RFIVE                                                   J0008364
        FAD     RTHRE                                                   J0008365
        XCA                                                             J0008366
        FMP     X+1                                                     J0008367
        FAD     RONE                                                    J0008368
        XCA                                                             J0008369
        FMP     X                                                       J0008370
        FAD     PIDF                                                    J0008371
        XCA                                                             J0008372
        FMP     AK                                                      J0008373
        STO     Y+1                                                     J0008374
        CLA*    4,4                                                     J0008375
        TZE     ATEST                                                   J0008376
        TPL     ATEST                                                   J0008377
        CLA*    3,4                                                     J0008378
        TZE     XPTPI                                                   J0008379
        TPL     XPTPI                                                   J0008380
XPPI    CLA     Y+1                                                     J0008381
        FAD     PI                                                      J0008382
        STO*    5,4                                                     J0008383
RETU    RETURN  ATAN                                                    J0008384
ATEST   CLA*    3,4                                                     J0008385
        TZE     RETUN                                                   J0008386
        TPL     RETUN                                                   J0008387
        TRA     XPPI                                                    J0008388
XPTPI   CLA     Y+1                                                     J0008389
        FAD     TPI                                                     J0008390
        STO*    5,4                                                     J0008391
        TRA     RETU                                                    J0008392
 RETUN  CLA     Y+1                                                     J0008393
        TRA     RETU-1                                                  J0008394
        EJECT                                                           J0008395
        REM     CHECK FOR DECREMENT ARITHMETIC                          J0008396
SHFTCK  SAVE    (4)                                                     J0008397
        CLA*    3,4                                                     J0008398
        ANA     MASK1                                                   J0008399
        TZE     *+3                                                     J0008400
        STZ*    4,4                                                     J0008401
        RETURN  SHFTCK                                                  J0008402
        CLA     *                                                       J0008403
        STO*    4,4                                                     J0008404
        RETURN  SHFTCK                                                  J0008405
```


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```
        SPACE   3                                                       J0008406
        REM     SHIFT ARG2 LEFT ARG1 BITS                               J0008407
LSHFT   SAVE    (4)                                                     J0008408
        CLA*    3,4                                                     J0008409
        STA     *+2                                                     J0008410
        CLA*    4,4                                                     J0008411
        ALS     **                                                      J0008412
        STO*    4,4                                                     J0008413
        RETURN  LSHFT                                                   J0008414
        SPACE   3                                                       J0008415
        REM     SHIFT EACH ELEMENT OF ARRAY ARG2                        J0008416
        REM     RIGHT ARG1 BITS                                         J0008417
        REM     TOTAL DIMENSION ON ARG2 IS ARG3                         J0008418
ARSHFT  SAVE    (4,1)                                                   J0008419
        CLA*    5,4                                                     J0008420
        ADD     4,4                                                     J0008421
        STA     SHI-1                                                   J0008422
        STA     SHI+1                                                   J0008423
        CLA*    3,4                                                     J0008424
        STA     SHI                                                     J0008425
        CLA*    5,4                                                     J0008426
        PAX     0,1                                                     J0008427
        SXD     SHI+3,1                                                 J0008428
        LXA     =1,1                                                    J0008429
        CLA     **,1                                                    J0008430
SHI     ARS     **                                                      J0008431
        STO     **,1                                                    J0008432
        TXI     *+1,1,1                                                 J0008433
        TXL     SHI-1,1,**                                              J0008434
        RETURN  ARSHFT                                                  J0008435
        EJECT                                                           J0008436
        REM     PROGRAM CONSTANTS AND STORAGE                           J0008437
TEMP    BSS     1                                                       J0008438
BLANK   OCT     606060606060                                            J0008439
COUNT   BSS     1                                                       J0008440
 TRUE   OCT     777777777777                                            J0008441
ACLO    PZE                                                             J0008442
 SIN    BSS     1                                                       J0008443
 COS    BSS     1                                                       J0008444
 X      BSS     2                                                       J0008445
 Y      BSS     2                                                       J0008446
 C1     DEC     1.57079632                                              J0008447
 C3     DEC     -.645963711                                             J0008448
 C5     DEC     .0796896793                                             J0008449
 C7     DEC     -.00467376557                                           J0008450
 C9     DEC     .00015148419                                            J0008451
 TDP    DEC     .6366197723                                             J0008452
 TPI    DEC     6.2831854                                               J0008453
 PIDT   DEC     1.57079635                                              J0008454
 PI     DEC     3.1415927                                               J0008455
 ONE    DEC     1.                                                      J0008456
 MASK   OCT     377000000000                                            J0008457
        OCT     200000000000                                            J0008458
        BSS     1                                                       J0008459
        OCT     000777777777                                            J0008460
PIDF    DEC     .785398175                                              J0008461
TWO     DEC     2.                                                      J0008462
RFIVE   DEC     .079331                                                 J0008463
```


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```
RTHRE   DEC     -.288679                                        J0008464
RONE    DEC     .995354                                         J0008465
AK      BSS     1                                               J0008466
MASK1   OCT     777777                                          J0008467
MASKA   OCT     77777                                           J0008468
        END                                                     J0008469
```

```
$IBFTC J0009    M94,FULIST,REF,XR6                              J0009000
      SUBROUTINE CARD                                           J0009001
C               CONTROL CARD READER                             J0009002
      LOGICAL ZERO                                              J0009003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR  J0009004
      COMMON IDMPIT                                             J0009005
      DATA C,COMMA,PAUSE,PAGE/1HC,1H,,4HPAUS,4HPAGE/            J0009006
      DATA CDMP/4HCUMP/                                         J0009007
      DATA ICD/0/                                               J0009008
 1    FORMAT (80A1)                                             J0009009
 2    FORMAT (1H ,80A1)                                         J0009010
 3    FORMAT (1H1)                                              J0009011
      IF(ICD.NE.0) GO TO 125                                    J0009012
      IF(IDMPIT.EQ.2) ICD=1                                     J0009013
 90   IF(IDMPIT.GE.1) RETURN                                    J0009014
 100  READ (5,1) (RA(I),I=1,80)                                 J0009015
 105  WRITE (6,2) (RA(I),I=1,80)                                J0009016
      WRITE (10,2) (RA(I),I=1,80)                               J0009017
      IF(ZERO(RA(1),C)) GO TO 100                               J0009018
      CALL SQUEEZ                                               J0009019
      IF(ZERO(RA(1),COMMA)) GO TO 100                           J0009020
      CALL PACK (2,5,WO,RA)                                     J0009021
      IF(ZERO(WO,PAUSE)) GO TO 110                              J0009022
      IF(ZERO(WO,PAGE)) GO TO 115                               J0009023
      IF(ZERO(WO,CDMP)) GO TO 120                               J0009024
      RETURN                                                    J0009025
 110  CALL MESAGE                                               J0009026
      GO TO 105                                                 J0009027
 115  WRITE (10,3)                                              J0009028
      GO TO 100                                                 J0009029
 120  CALL TDUMP (RA,-1)                                        J0009030
      IF(ZERO(RA(6),COMMA)) GO TO 125                           J0009031
      ICD=1                                                     J0009032
      GO TO 100                                                 J0009033
 125  CALL TDUMP (RA,1)                                         J0009034
      ICD=0                                                     J0009035
      GO TO 90                                                  J0009036
      END                                                       J0009037
```


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```
$ORIGIN          A,CK2,NOREW                                          000
$IBFTC JA110     M94,FULIST,REF,XR6                                JA110000
      SUBROUTINE FIXEXT                                            JA110001
C                DETERMINE DUMP TRANSFER LOCATION                  JA110002
 1    FORMAT (39H IF IT BECOMES NECESSARY TO GIVE A DUMP,          JA110003
     120H PLEASE TRANSFER TO 012,15H INSTEAD OF 115)               JA110004
      CALL FIXADD (IJ)                                             JA110005
      PRINT 1,IJ                                                   JA110006
      WRITE (6,1)IJ                                                JA110007
      RETURN                                                       JA110008
      END                                                          JA110009
```

```
$IBMAP JA111     100,M94                                           JA111000
*                DETERMINE DATE OF RUN                             JA111001
       ENTRY     FIXADD                                            JA111002
       REM       FIND ADDRESS OF EXIT SUBROUTINE                   JA111003
FIXADD SAVE      (4)                                               JA111004
       CLA       AOE                                               JA111005
       ANA       MASKA                                             JA111006
       STO*      3,4                                               JA111007
       RETURN    FIXADD                                            JA111008
AOE    TSX       AEXIT,4                                           JA111009
       SPACE     3                                                 JA111010
       ENTRY     DAET                                              JA111011
DAET   SAVE      (4)                                               JA111012
       LDQ       SYSDAT                                            JA111013
       RQL       24                                                JA111014
       STQ       TEMP                                              JA111015
       CAL       TEMP                                              JA111016
       LGR       24                                                JA111017
       ANA       MASK                                              JA111018
       SLW       YEAR                                              JA111019
       LGL       12                                                JA111020
       ANA       MASK                                              JA111021
       SLW       TEMP+1                                            JA111022
       STQ       TEMP+2                                            JA111023
       LGR       6                                                 JA111024
       LBT                                                         JA111025
       TRA       LTN                                               JA111026
       LGL       5                                                 JA111027
       LBT                                                         JA111028
       TRA       ZEF                                               JA111029
       CLA       ADMCD                                             JA111030
       ADD       TWE                                               JA111031
       STO       ADMCD                                             JA111032
       TRA       ADMOD                                             JA111033
 LTN   LGL       6                                                 JA111034
       ADD       ADMOD                                             JA111035
       STO       ADMOD                                             JA111036
       TRA       ADMCD                                             JA111037
 ZEF   LGL       1                                                 JA111038
       LBT                                                         JA111039
       TRA       TEN                                               JA111040
       CLA       ADMCD                                             JA111041
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        ADD     ELE                                     JA111042
        STO     ADMCD                                   JA111043
        TRA     ADMCD                                   JA111044
 TEN    CLA     ADMCD                                   JA111045
        ADD     TN                                      JA111046
        STO     ADMCD                                   JA111047
 ADMOD  CLA     INS                                     JA111048
        STO*    4,4                                     JA111049
        CLA     INS                                     JA111050
        STO     ADMCD                                   JA111051
        CAL     TEMP+2                                  JA111052
        ANA     MASK+2                                  JA111053
        ORA     MASK+3                                  JA111054
        SLW     TEMP+2                                  JA111055
        ANA     MASK+5                                  JA111056
        TZE     NOW                                     JA111057
        CAL     TEMP+2                                  JA111058
STDAY   SLW*    3,4                                     JA111059
        CAL     YEAR                                    JA111060
        ALS     18                                      JA111061
        ORA     MASK+4                                  JA111062
        SLW*    5,4                                     JA111063
        RETURN  DAET                                    JA111064
NOW     CAL     TEMP+2                                  JA111065
        ORA     MASK+4                                  JA111066
        TRA     STDAY                                   JA111067
YEAR    BSS     1                                       JA111068
 MASK   OCT     7777                                    JA111069
        OCT     606001110000                            JA111070
        OCT     777700000000                            JA111071
        OCT     000060606060                            JA111072
        OCT     600000000000                            JA111073
        OCT     070000000000                            JA111074
 TEMP   PZE                                             JA111075
        PZE                                             JA111076
        PZE                                             JA111077
 TWE    OCT     14                                      JA111078
 ELE    OCT     13                                      JA111079
 TN     OCT     12                                      JA111080
 INS    CLA     INS                                     JA111081
        OCT     412145337360        JAN.,               JA111082
        OCT     262522337360        FEB.,               JA111083
        OCT     442151233073        MARCH,              JA111084
        OCT     214751314373        APRIL,              JA111085
        OCT     442170736060        MAY,                JA111086
        OCT     416445257360        JUNE,               JA111087
        OCT     416443707360        JULY,               JA111088
        OCT     216427337360        AUG.,               JA111089
        OCT     622547633373        SEPT.,              JA111090
        OCT     462363337360        OCT.,               JA111091
        OCT     454665337360        NOV.,               JA111092
        OCT     242523337360        DEC.,               JA111093
MASKA   OCT     77777                                   JA111094
        END                                             JA111095
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THE SYSTEM

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```
$ORIGIN        A,CK2,NOREW                                                  000
$IBFTC TA212   M94,FULIST,REF,XR6                                        TA212000
       SUBROUTINE MAIN                                                   TA212001
C              TIME SYSTEM MONITOR                                       TA212002
      LOGICAL SWITCH                                                     TA212003
      LOGICAL ZERO,NZER                                                  TA212004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           TA212005
 1    FORMAT (80A1)                                                      TA212006
 2    FORMAT (1H ,80A1)                                                  TA212007
 4    FORMAT (2A6)                                                       TA212008
 6    FORMAT (E12.0)                                                     TA212009
      COMMON /MAINC/DUMMY(14800)                                         TA212010
      DATA TEND/4HTEND/                                                  TA212011
      DATA CHK,COMMA,FRE,IBAL,DELT,CONS,INTE,EDI,PAUS,CGST/              TA212012
     11HC,1H,,4HFREQ,4HIBAL,4HDELT,.001,4HINTE,4HEDIT,4HPAUS,4HCGST/     TA212013
      DATA BLANK/1H /                                                    TA212014
      DATA DTA/4HDATA/                                                   TA212015
      CALL KLOSE (4,5,6,7,8)                                             TA212016
      CALL SWTHOF (1)                                                    TA212017
 100  CALL CARD                                                          TA212018
 102  CALL PACK (2,5,WO,RA)                                              TA212019
      IF(ZERO(WO,FRE))GO TO 200                                          TA212020
      IF(NZER(WO,DELT)) GO TO 150                                        TA212021
      IDTS=9                                                             TA212022
      J=6                                                                TA212023
 105  IF(ZERO(RA(J),COMMA)) GO TO 110                                    TA212024
      J=J+1                                                              TA212025
      GO TO 105                                                          TA212026
 110  L=J+1                                                              TA212027
 115  J=J+1                                                              TA212028
      IF(NZER(RA(J),COMMA)) GO TO 115                                    TA212029
      M=J-1                                                              TA212030
      IF(L-M)125,125,120                                                 TA212031
 120  DT=CONS                                                            TA212032
      GO TO 100                                                          TA212033
 125  IF(M-L-5)130,130,135                                               TA212034
 130  CALL PACK (L,M,WO,RA)                                              TA212035
      CALL RITE31                                                        TA212036
      WRITE (31,4) WO,BLANK                                              TA212037
 132  CALL READ31                                                        TA212038
      READ (31,6) DT                                                     TA212039
      GO TO 100                                                          TA212040
 135  M1=L+5                                                             TA212041
      M2=M1+1                                                            TA212042
      CALL PACK (L,M1,WO,RA)                                             TA212043
      CALL PACK (M2,M,WOO,RA)                                            TA212044
      CALL RITE31                                                        TA212045
      WRITE (31,4) WO,WOO                                                TA212046
      GO TO 132                                                          TA212047
 150  IF(IDTS-9)155,160,155                                              TA212048
 155  DT=CONS                                                            TA212049
 160  IF(IFRS-9)165,170,165                                              TA212050
 165  IQIR=1                                                             TA212051
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      CALL FRQTSZ (IQIR)                                                TA212052
      IFRS=9                                                            TA212053
 170  IF(ZERO(WO,INTE)) GO TO 175                                       TA212054
      IF(ZERO(WO,TEND)) GO TO 100                                       TA212055
      IF(ZERO(WO,EDI )) GO TO 180                                       TA212056
      IF(ZERO(WO,DTA))GO TO 190                                         TA212057
      RETURN                                                            TA212058
 175  CALL INTG                                                         TA212059
      ISWTCH(1)=0                                                       TA212060
      GO TO 102                                                         TA212061
 180  ISWTCH(2)=0                                                       TA212062
      ISWTCH(3)=0                                                       TA212063
      CALL EDIT                                                         TA212064
      GO TO 102                                                         TA212065
 190  CALL CHCKD                                                        TA212066
      GO TO 100                                                         TA212067
 200  IQIR=0                                                            TA212068
      CALL FRQTSZ (IQIR)                                                TA212069
      IFRS=9                                                            TA212070
      IF(IQIR)100,100,102                                               TA212071
      END                                                               TA212072
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```
$ORIGIN          B,CK2,NOREW                                                000
$IBFTC TB113     M94,FULIST,REF,XR6                                      TB113000
      SUBROUTINE FRQTSZ (IQIR)                                           TB113001
C                FREQUENCY ARRAY GENERATOR (CONTROL)                    TB113002
      LOGICAL ZERO,NZER,SWITCH                                           TB113003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           TB113004
 1    FORMAT (80A1)                                                      TB113005
 2    FORMAT (1H ,80A1)                                                  TB113006
 4    FORMAT (2A6)                                                       TB113007
 6    FORMAT (E12.0)                                                     TB113008
      DIMENSION OP(4)                                                    TB113009
      DATA COMMA,INPUT,SLASH,CHK,BASE,NORMFC,DELFRQ,STAR/                TB113010
     11H,,1HI,1H/,1HC,1HB,1HN,1HD,1H*/,(OP(I),I=1,4)/                    TB113011
     24HADDI,4HADDE,4HINSE,4HDELE/                                       TB113012
      DATA BLANK/1H /,ENDFRQ/1HE/                                        TB113013
 3    FORMAT (A6)                                                        TB113014
 5    FORMAT (3A6)                                                       TB113015
 7    FORMAT (I6)                                                        TB113016
 8    FORMAT (I6,E12.0)                                                  TB113017
      BASFE=.1                                                           TB113018
      NNFREQ=100                                                         TB113019
      DETFR=.1                                                           TB113020
      ENDFR=1515.                                                        TB113021
      NFTP=1                                                             TB113022
      IF(IQIR)200,200,105                                                TB113023
 100  IQIR=-1                                                            TB113024
      RETURN                                                             TB113025
 101  IQIR=1                                                             TB113026
      RETURN                                                             TB113027
 105  CALL FRQC (BASFE,DETFR,NNFREQ,NFTP)                                TB113028
      RETURN                                                             TB113029
 200  J=5                                                                TB113030
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      IFRS=9                                                            TB113031
205   J=J+1                                                             TB113032
      IF(NZER(RA(J),COMMA)) GO TO 205                                   TB113033
      J=J+1                                                             TB113034
      IF(NZER(RA(J),INPUT)) GO TO 250                                   TB113035
210   J=J+1                                                             TB113036
      IF(NZER(RA(J),SLASH)) GO TO 210                                   TB113037
      L=J+1                                                             TB113038
215   J=J+1                                                             TB113039
      IF(NZER(RA(J),COMMA)) GO TO 215                                   TB113040
      M=J-1                                                             TB113041
      CALL PACK (L,M,WO,RA)                                             TB113042
      CALL RITE31                                                       TB113043
      WRITE (31,3) WO                                                   TB113044
      CALL READ31                                                       TB113045
      READ (31,7) NFREQ                                                 TB113046
      K=1                                                               TB113047
219   L=J+1                                                             TB113048
220   J=J+1                                                             TB113049
      IF(NZER(RA(J),COMMA)) GO TO 220                                   TB113050
      IF(L-J)230,225,225                                                TB113051
225   CALL CARD                                                         TB113052
226   J=0                                                               TB113053
      GO TO 219                                                         TB113054
230   M=J-1                                                             TB113055
      IF(M-L-5)235,235,240                                              TB113056
235   CALL PACK (L,M,WO,RA)                                             TB113057
      CALL RITE31                                                       TB113058
      WRITE (31,4) WO,BLANK                                             TB113059
236   CALL READ 31                                                      TB113060
      READ (31,6)FREQ(K)                                                TB113061
      K=K+1                                                             TB113062
      IF(K-NFREQ)219,219,237                                            TB113063
237   IF(NFREQ-100)100,100,238                                          TB113064
238   CALL WROUT (17,100)                                               TB113065
      CALL SWTHON (1)                                                   TB113066
      GO TO 470                                                         TB113067
240   M1=L+5                                                            TB113068
      M2=M1+1                                                           TB113069
      CALL PACK (L,M1,WO,RA)                                            TB113070
      CALL PACK (M2,M,WOO,RA)                                           TB113071
      CALL RITE31                                                       TB113072
      WRITE (31,4) WO,WOO                                               TB113073
      GO TO 236                                                         TB113074
250   ICS=0                                                             TB113075
      J=J+1                                                             TB113076
      IF(ZERO(RA(J),SLASH)) GO TO 275                                   TB113077
      IF(NZER(RA(J),COMMA)) GO TO 250                                   TB113078
      L=J+1                                                             TB113079
251   J=L-2                                                             TB113080
      IF(ZERO(RA(L),BASE)) GO TO 260                                    TB113081
      IF(ZERO(RA(L),ENDFRQ)) GO TO 255                                  TB113082
      IF(ZERO(RA(L),NORMFC)) GO TO 270                                  TB113083
      IF(NZER(RA(L),DELFRQ)) GO TO 300                                  TB113084
      M=L+3                                                             TB113085
      CALL PACK (L,M,WO,RA)                                             TB113086
      IF(ZERO(WO,OP(4))) GO TO 300                                      TB113087
      M=2                                                               TB113088
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      GO TO 261                                                         TB113089
255   M=3                                                               TB113090
      GO TO 261                                                         TB113091
260   M=1                                                               TB113092
261   L=L+1                                                             TB113093
      IF(NZER(RA(L),SLASH)) GO TO 261                                   TB113094
      L1=L+1                                                            TB113095
262   L=L+1                                                             TB113096
      IF(NZER(RA(L),COMMA)) GO TO 262                                   TB113097
      L2=L-1                                                            TB113098
      IF(L2-L1-5) 263,263,264                                           TB113099
263   WOO=BLANK                                                         TB113100
      CALL PACK (L1,L2,WO ,RA)                                          TB113101
      GO TO 265                                                         TB113102
264   IL=L1+5                                                           TB113103
      CALL PACK (L1,IL,WO,RA)                                           TB113104
      IL=IL+1                                                           TB113105
      CALL PACK (IL,L2,WOO,RA)                                          TB113106
265   CALL RITE31                                                       TB113107
      WRITE (31,4) WO,WOO                                               TB113108
      CALL READ31                                                       TB113109
      READ (31,6) BASFI                                                 TB113110
      GO TO (266,267,268),M                                             TB113111
266   BASFE=BASFI                                                       TB113112
      GO TO 269                                                         TB113113
267   DETFR=BASFI                                                       TB113114
      GO TO 269                                                         TB113115
268   ENDFR=BASFI                                                       TB113116
269   L=L+1                                                             TB113117
      IF(ZERO(RA(L),COMMA)) GO TO 300                                   TB113118
      GO TO 251                                                         TB113119
270   L=L+1                                                             TB113120
      IF(NZER(RA(L),SLASH)) GO TO 270                                   TB113121
      L1=L+1                                                            TB113122
271   L=L+1                                                             TB113123
      IF(NZER(RA(L),COMMA)) GO TO 271                                   TB113124
      L2=L-1                                                            TB113125
      CALL PACK (L1,L2,WO,RA)                                           TB113126
      CALL RITE31                                                       TB113127
      WRITE (31,3) WO                                                   TB113128
      CALL READ31                                                       TB113129
      READ (31,7) NNFREQ                                                TB113130
      GO TO 269                                                         TB113131
275   L=J+1                                                             TB113132
276   J=J+1                                                             TB113133
      IF(NZER(RA(J),COMMA)) GO TO 276                                   TB113134
      M=J-1                                                             TB113135
      CALL PACK (L,M,WO,RA)                                             TB113136
      CALL RITE31                                                       TB113137
      WRITE(31,3) WO                                                    TB113138
      CALL READ31                                                       TB113139
      READ (31,7) NFTP                                                  TB113140
      L=J+1                                                             TB113141
      GO TO 251                                                         TB113142
300   IF(ICS-9)305,310,305                                              TB113143
305   ICS=9                                                             TB113144
      IF(NFTP.GE.3) GO TO 601                                           TB113145
      CALL FRQC (BASFE,DETFR,NNFREQ,NFTP)                               TB113146
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310   J=J+1                                                    TB113147
      IF(NZER(RA(J),COMMA)) GO TO 310                          TB113148
      L=J+1                                                    TB113149
      M=L+3                                                    TB113150
      CALL PACK (L,M,WO,RA)                                    TB113151
      DO 350 I=1,4                                             TB113152
      IF(NZER(WO,OP(I))) GO TO 350                             TB113153
      K=I                                                      TB113154
      J=M                                                      TB113155
315   J=J+1                                                    TB113156
      IF(NZER(RA(J),SLASH)) GO TO 315                          TB113157
      M=J+1                                                    TB113158
320   J=J+1                                                    TB113159
      IF(NZER(RA(J),COMMA)) GO TO 320                          TB113160
      L=J-1                                                    TB113161
      CALL PACK (M,L,WO,RA)                                    TB113162
      CALL RITE31                                              TB113163
      WRITE (31,3) WO                                          TB113164
      CALL READ31                                              TB113165
      READ (31,7) IN                                           TB113166
      GO TO (400,430,500,600),K                                TB113167
350   CONTINUE                                                 TB113168
      GO TO 100                                                TB113169
400   IF(NFREQ+IN-100)410,410,405                              TB113170
405   CALL WROUT (17,101)                                      TB113171
      CALL SWTHON (1)                                          TB113172
      GO TO 470                                                TB113173
410   IC=NFREQ+IN                                              TB113174
      K=NFREQ                                                  TB113175
415   FREQ(IC)=FREQ(K)                                         TB113176
      IC=IC-1                                                  TB113177
      K=K-1                                                    TB113178
      IF(K)420,420,415                                         TB113179
420   I=1                                                      TB113180
      GO TO 445                                                TB113181
430   IF(NFREQ+IN-100)440,440,435                              TB113182
435   CALL WROUT (17,102)                                      TB113183
      CALL SWTHON (1)                                          TB113184
      GO TO 470                                                TB113185
440   I=NFREQ+1                                                TB113186
      NFREQ=NFREQ+IN                                           TB113187
445   L=J+1                                                    TB113188
446   J=J+1                                                    TB113189
      IF(NZER(RA(J),COMMA)) GO TO 446                          TB113190
      IF(J-L)450,450,455                                       TB113191
450   CALL CARD                                                TB113192
      J=0                                                      TB113193
      GO TO 445                                                TB113194
455   M=J-1                                                    TB113195
      IF(M-L-5)460,460,465                                     TB113196
460   CALL PACK (L,M,WO,RA)                                    TB113197
      CALL RITE31                                              TB113198
      WRITE (31,4) WO,BLANK                                    TB113199
462   CALL READ31                                              TB113200
      READ (31,6) FREQ(I)                                      TB113201
      I=I+1                                                    TB113202
      IN=IN-1                                                  TB113203
      IF(IN)100,100,445                                        TB113204
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465   M1=L+5                                                    TB113205
      M2=M1+1                                                   TB113206
      CALL PACK (L,M1,WO,RA)                                    TB113207
      CALL PACK (M2,M,WOO,RA)                                   TB113208
      CALL RITE31                                               TB113209
      WRITE (31,4) WO,WOO                                       TB113210
      GO TO 462                                                 TB113211
470   CALL CARD                                                 TB113212
      IF(ZERO(RA(1),STAR)) GO TO 101                            TB113213
      GO TO 470                                                 TB113214
500   ISC=1                                                     TB113215
      IF(NFREQ+IN-100)510,510,505                               TB113216
505   CALL WROUT (17,103)                                       TB113217
      CALL SWTHON (1)                                           TB113218
      GO TO 470                                                 TB113219
510   J=J+1                                                     TB113220
      IF(NZER(RA(J),COMMA))GO TO 515                            TB113221
511   CALL CARD                                                 TB113222
      J=0                                                       TB113223
      GO TO 510                                                 TB113224
515   IF(NZER(RA(J),SLASH)) GO TO 520                           TB113225
      CALL WROUT (18,104)                                       TB113226
      CALL SWTHON (1)                                           TB113227
      GO TO 470                                                 TB113228
520   L=J                                                       TB113229
522   J=J+1                                                     TB113230
      IF(NZER(RA(J),SLASH)) GO TO 522                           TB113231
      M=J                                                       TB113232
524   J=J+1                                                     TB113233
      IF(NZER(RA(J),COMMA)) GO TO 524                           TB113234
      IF(J-M-1)525,525,530                                      TB113235
525   CALL WROUT (18,105)                                       TB113236
      CALL SWTHON (1)                                           TB113237
      GO TO 470                                                 TB113238
530   N=J-1                                                     TB113239
      M1=M-1                                                    TB113240
      CALL PACK (L,M1,WO,RA)                                    TB113241
      M=M+1                                                     TB113242
      IF(N-M-5)535,535,540                                      TB113243
535   CALL PACK (M,N,WOO,RA)                                    TB113244
      CALL RITE31                                               TB113245
      WRITE (31,5) WO,WOO,BLANK                                 TB113246
537   CALL READ31                                               TB113247
      READ (31,8) IS,FR                                         TB113248
      GO TO 550                                                 TB113249
540   M1=M+5                                                    TB113250
      M2=M1+1                                                   TB113251
      CALL PACK (M,M1,WOO,RA)                                   TB113252
      CALL PACK (M2,N,W1,RA)                                    TB113253
      CALL RITE31                                               TB113254
      WRITE (31,5) WO,WOO,W1                                    TB113255
      GO TO 537                                                 TB113256
550   IM=IS+ISC                                                 TB113257
      K=NFREQ                                                   TB113258
552   K1=K+1                                                    TB113259
      FREQ(K1)=FREQ(K)                                          TB113260
      K=K-1                                                     TB113261
      IF(K-IM)555,552,552                                       TB113262
```


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```
 555  ISC=ISC+1                                                        TB113263
      FREQ(IM)=FR                                                      TB113264
      NFREQ=NFREQ+1                                                    TB113265
      IN=IN-1                                                          TB113266
      IF(IN)100,100,510                                                TB113267
C600* DELETE OPTION HAS BEEN DELETED                                   TB113268
 600  CALL WROUT (2,106)                                               TB113269
      CALL SWTHON (1)                                                  TB113270
      GO TO 470                                                        TB113271
C601* COMPUTE F(N),DELTA F, OR F(1)                                    TB113272
 601  IF(NFTP-4)605,610,615                                            TB113273
C605* GIVEN F(N), F(1), AND N COMPUTE DELTA F  (OPTION (3))            TB113274
 605  XX=NNFREQ-1                                                      TB113275
      DETFR=EXP((ALOG(ENDFR)-ALOG(BASFE))/XX)-1.                       TB113276
 608  NFTP=1                                                           TB113277
      GO TO 305                                                        TB113278
C610* GIVEN F(N), N, AND DELTA F COMPUTE F(1)  (OPTION (4))            TB113279
 610  XX=NNFREQ-1                                                      TB113280
      BASFE=EXP(ALOG(ENDFR)-XX*ALOG(1.+DETFR))                         TB113281
      GO TO 608                                                        TB113282
C615* GIVEN F(1), F(N), AND DELTA F COMPUTE N  (OPTION (5))            TB113283
 615  XX=(ALOG(ENDFR)-ALOG(BASFE))/(ALOG(1.+DETFR))                    TB113284
      NNFREQ=XX+1.                                                     TB113285
C**** CHECK NNFREQ FOR PROPER RANGE   (1 TO 100 )                      TB113286
      IF(NNFREQ.GT.100) NNFREQ=100                                     TB113287
      IF(NNFREQ.LT.1) NNFREQ=1                                         TB113288
      GO TO 608                                                        TB113289
      END                                                              TB113290
```

```
$IBFTC TB114    M94,FULIST,REF,XR6                                     TB114000
      SUBROUTINE FRQC (BASE,DF,NF,N)                                   TB114001
C               FREQUENCY ARRAY GENERATOR (COMPUTE)                    TB114002
      COMMON NFREQ,DT,FREQ(100),RA(82)                                 TB114003
      NN=N                                                             TB114004
      FREQ(1)=BASE                                                     TB114005
      GO TO (1,10),NN                                                  TB114006
 1    DO 2 I=2,NF                                                      TB114007
 2    FREQ(I)=FREQ(I-1)+DF*FREQ(I-1)                                   TB114008
 3    NFREQ=NF                                                         TB114009
      RETURN                                                           TB114010
 10   DO 12 I=2,NF                                                     TB114011
 12   FREQ(I)=FREQ(I-1)+DF                                             TB114012
      GO TO 3                                                          TB114013
      END                                                              TB114014
```

```
$ORIGIN         B,CK2,NOREW                                                000
$IBFTC TB215    M94,FULIST,REF,XR6                                     TB215000
      SUBROUTINE CHCKD                                                 TB215001
C               DATA CHECK SYSTEM                                      TB215002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         TB215003
```


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```
      COMMON/MAINC/ID(20),B(14,200,5),BT(14),TP(14),ANS(2,14),SUM(14),   TB215004
     1FNOR(14),ICH(14),A(15),Q,K,J,L,M,WO,ITST,IS,IST,IN,DUM             TB215005
      DIMENSION INS(2,14)                                                TB215006
      EQUIVALENCE (ANS,INS)                                              TB215007
      LOGICAL ZERO,NZER,SWITCH                                           TB215008
      DATA COMMA,SLASH,T,LPRN,RPRN/1H,,1H/,1HT,1H(,1H)/                  TB215009
1     FORMAT (1H1,25X,10HDATA CHECK,5X,6HTEST  I6,11HCHANNELS  (,        TB215010
     114(I2,1H,),1H),29X,3A3)                                            TB215011
2     FORMAT (20X,7HCHANNEL,20X,16HMAXIMUM DEFLECTION,20X,               TB215012
     121HR.M.S. VALUE OF NOISE)                                          TB215013
3     FORMAT (23X,I2,25X,I6,7H COUNTS,27X,1PE12.5)                       TB215014
      IF(SWITCH(1,3)) GO TO 1000                                         TB215015
      K=0                                                                TB215016
      I=0                                                                TB215017
      J=4                                                                TB215018
      DO 100 L=1,14                                                      TB215019
100   ICH(L)=0                                                           TB215020
105   J=J+1                                                              TB215021
      IF(NZER(RA(J),COMMA)) GO TO 105                                    TB215022
110   Q=RA(J+1)                                                          TB215023
115   J=J+1                                                              TB215024
      IF(NZER(RA(J),SLASH)) GO TO 115                                    TB215025
      IF(NZER(Q,T)) GO TO 200                                            TB215026
      L=J+1                                                              TB215027
120   J=J+1                                                              TB215028
      IF(NZER(RA(J),COMMA)) GO TO 120                                    TB215029
      M=J-1                                                              TB215030
      I=1                                                                TB215031
      CALL PACK (L,M,WO,RA)                                              TB215032
      CALL RITE31                                                        TB215033
      WRITE (31,4) WO                                                    TB215034
4     FORMAT (15A6)                                                      TB215035
5     FORMAT (15I6)                                                      TB215036
      CALL READ31                                                        TB215037
      READ (31,5) ITST                                                   TB215038
125   IF(I+K-2)110,110,300                                               TB215039
200   L=J+1                                                              TB215040
205   J=J+1                                                              TB215041
      IF(NZER(RA(J),LPRN)) GO TO 205                                     TB215042
      M=J-1                                                              TB215043
      CALL PACK (L,M,A(1),RA)                                            TB215044
      K=2                                                                TB215045
      IS=0                                                               TB215046
210   L=J+1                                                              TB215047
215   J=J+1                                                              TB215048
      IF(ZERO(RA(J),RPRN)) GO TO 220                                     TB215049
      IF(ZERO(RA(J),COMMA)) GO TO 225                                    TB215050
      GO TO 215                                                          TB215051
220   IS=1                                                               TB215052
225   M=J-1                                                              TB215053
      CALL PACK (L,M,A(K),RA)                                            TB215054
      K=K+1                                                              TB215055
      IF(IS)210,210,230                                                  TB215056
230   CALL RITE31                                                        TB215057
      WRITE (31,4) A                                                     TB215058
      CALL READ31                                                        TB215059
      READ (31,5) IN,(ICH(L),L=1,IN)                                     TB215060
      GO TO 125                                                          TB215061
```


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```
300   CALL SWTHON (29)                                          TB215062
      REWIND 2                                                  TB215063
305   READ (2) ID                                               TB215064
      IF(ID(1)-ITST)310,400,310                                 TB215065
310   IF(ID(1)+ID(3))320,315,320                                TB215066
315   CALL WROUT (15,107)                                       TB215067
      RETURN                                                    TB215068
320   READ (2) DUM                                              TB215069
      GO TO 305                                                 TB215070
400   I=1                                                       TB215071
      IST=10                                                    TB215072
405   CALL BUFG (I)                                             TB215073
      IF(IST-5)415,415,410                                      TB215074
410   I=I+1                                                     TB215075
      IF(I-5)405,405,415                                        TB215076
415   DO 420 L=1,14                                             TB215077
420   SUM(L)=0.                                                 TB215078
      DO 425 K=1,IN                                             TB215079
      L=ICH(K)                                                  TB215080
      FNOR(L)=B(L,1,1)                                          TB215081
425   CONTINUE                                                  TB215082
      DO 430 I=1,2                                              TB215083
      DO 430 J=1,200                                            TB215084
      DO 430 K=1,IN                                             TB215085
      L=ICH(K)                                                  TB215086
      SUM(L)=SUM(L)+(B(L,J,I)-FNOR(L))**2                       TB215087
430   CONTINUE                                                  TB215088
      DO 435 L=1,14                                             TB215089
435   SUM(L)=SUM(L)/400.                                        TB215090
      CALL BUFG (1)                                             TB215091
      CALL BUFG (2)                                             TB215092
      I=3                                                       TB215093
      M=3                                                       TB215094
      DO 440 L=1,14                                             TB215095
      TP(L)=B(L,1,I)                                            TB215096
440   BT(L)=TP(L)                                               TB215097
445   J=1                                                       TB215098
450   K=1                                                       TB215099
455   L=ICH(K)                                                  TB215100
      IF(TP(L)-B(L,J,I))485,480,460                             TB215101
460   IF(J-2)465,480,465                                        TB215102
465   N=J-1                                                     TB215103
      R=(B(L,J,I)-B(L,N,I))/DT                                  TB215104
      IF(R)480,480,470                                          TB215105
470   IF(R-15000.)475,480,480                                   TB215106
475   TP(L)=B(L,J,I)                                            TB215107
480   K=K+1                                                     TB215108
      IF(K-IN)455,455,495                                       TB215109
485   IF(BT(L)-B(L,J,I))480,480,490                             TB215110
490   BT(L)=B(L,J,I)                                            TB215111
      GO TO 480                                                 TB215112
495   J=J+1                                                     TB215113
      IF(J-200)450,450,500                                      TB215114
500   I=I+1                                                     TB215115
      IF(I.GT.5) I=1                                            TB215116
      IF(I-IST)505,600,505                                      TB215117
505   CALL BUFG (M)                                             TB215118
      M=I                                                       TB215119
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      GO TO 445                                                         TB215120
 600  DO 605 L=1,14                                                     TB215121
      ANS(1,L)=TP(L)-BT(L)                                              TB215122
      ANS(2,L)=SUM(L)                                                   TB215123
      INS(1,L)=ANS(1,L)                                                 TB215124
 605  CONTINUE                                                          TB215125
      WRITE (10,1) ITST,ICH,DAY,DON,YEAR                                TB215126
      WRITE (10,2)                                                      TB215127
      DO 610 L=1,IN                                                     TB215128
      K=ICH(L)                                                          TB215129
      WRITE (10,3) K,INS(1,K),ANS(2,K)                                  TB215130
 610  CONTINUE                                                          TB215131
 1000 RETURN                                                            TB215132
      END                                                               TB215133
```

```
$IBFTC TB216    M94,FULIST,REF,XR6                                      TB216000
      SUBROUTINE BUFG (I)                                               TB216001
C                DATA CHECK INPUT ROUTINE                               TB216002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TB216003
      COMMON/MAINC/ID(20),B(14,200,5),BT(14),TP(14),ANS(2,14),SUM(14),  TB216004
     1FNOR(14),ICH(14),A(15),Q,K,J,L,M,WO,ITST,IS,IST,IN,DUM            TB216005
      DIMENSION BB(2800,5),IB(14,200,5)                                 TB216006
      EQUIVALENCE (B,BB,IB)                                             TB216007
      IF(IST-5)200,200,100                                              TB216008
 100  READ (2) (BB(N,I),N=1,2800)                                       TB216009
      IF(ID(2))105,110,105                                              TB216010
 105  IST=I                                                             TB216011
      GO TO 115                                                         TB216012
 110  READ (2) ID                                                       TB216013
 115  IF(ID(20))200,120,200                                             TB216014
 120  DO 125 N=1,14                                                     TB216015
      DO 125 NN=1,200                                                   TB216016
      B(N,NN,I)=IB(N,NN,I)                                              TB216017
 125  CONTINUE                                                          TB216018
 200  RETURN                                                            TB216019
      END                                                               TB216020
```

```
$ORIGIN         B,CK2,NOREW                                                 000
$IBFTC TB317    M94,FULIST,REF,XR6                                      TB317000
      SUBROUTINE EDIT                                                   TB317001
C                DATA EDIT CONTROL ROUTINE                              TB317002
      LOGICAL SWITCH                                                    TB317003
      LOGICAL ZERO,NZER                                                 TB317004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TB317005
      COMMON /MAINC/IB(6000,2),IBUE(2800)                               TB317006
      COMMON/EDITC/ITYPBB,ISAT,N,J,ITCS,NT,NOPTS,ISHS,IDB(20)           TB317007
      COMMON/NCOTC/NCOT,NC10T                                           TB317008
      DIMENSION FIB(6000,2),FIBUE(2800),FISU(14),ISU(14)                TB317009
      EQUIVALENCE(IB,FIB),(IBUE,FIBUE),(ISAT,SAT),(FISU,ISU)            TB317010
      DATA STAR,CH,ID,TRACE,SLASH,TYPE,COMMA,LPRN,RPRN/1H*,1HC,1HI,5HTRATB317011
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```
     1CE,1H/,1HT,1H,,1H(,1H)/                                          TB317012
      DATAINPT,ST,UT,NOT/5HINPUT,1HS,1HU,1HN/,FTE,BTE/1HF,1HB/,BLANK/1H TB317013
     1/,PAUS/5HPAUSE/                                                  TB317014
1     FORMAT (80A1)                                                    TB317015
2     FORMAT (1H ,80A1)                                                TB317016
3     FORMAT (A6)                                                      TB317017
4     FORMAT (I6)                                                      TB317018
5     FORMAT (I9)                                                      TB317019
6     FORMAT (E12.0)                                                   TB317020
7     FORMAT (2A6)                                                     TB317021
      REWIND 2                                                         TB317022
      CALL KLOSE (1,1)                                                 TB317023
      CALL SWTHOF (3)                                                  TB317024
      CALL IPDC (IGOTO)                                                TB317025
      GO TO (120,105,100),IGOTO                                        TB317026
100   CALL CARD                                                        TB317027
105   IF(NZER(RA(1),STAR)) GO TO 110                                   TB317028
      CALL PACK (2,6,WO,RA)                                            TB317029
      IF(ZERO(WO,TRACE))GO TO 120                                      TB317030
110   DO 112 L=1,19                                                    TB317031
112   IDB(L)=0                                                         TB317032
      CALL SWTHON (29)                                                 TB317033
      WRITE (2)IDB                                                     TB317034
      END FILE 2                                                       TB317035
      REWIND 2                                                         TB317036
      RETURN                                                           TB317037
120   K=6                                                              TB317038
      ISKIP=0                                                          TB317039
      IFC=3                                                            TB317040
      DO 122 L=6,19                                                    TB317041
122   IDB(L)=0                                                         TB317042
125   K=K+1                                                            TB317043
126   IF(NZER(RA(K),COMMA)) GO TO 125                                  TB317044
      K=K+1                                                            TB317045
      IF(ZERO(RA(K),TYPE))GO TO 140                                    TB317046
      IF(ZERO(RA(K),CH)) GO TO 160                                     TB317047
      IF(ZERO(RA(K),ID)) GO TO 130                                     TB317048
      IF(ZERO(RA(K),ST)) GO TO 190                                     TB317049
      CALL WROUT (22,108)                                              TB317050
      CALL SWTHON (3)                                                  TB317051
      GO TO 100                                                        TB317052
130   K=K+1                                                            TB317053
      IF(NZER(RA(K),SLASH)) GO TO 130                                  TB317054
      L=K+1                                                            TB317055
135   K=K+1                                                            TB317056
      IF(NZER(RA(K),COMMA)) GO TO 135                                  TB317057
      M=K-1                                                            TB317058
      CALL PACK (L,M,WO,RA)                                            TB317059
      CALL RITE31                                                      TB317060
      WRITE (31,3)WO                                                   TB317061
      CALL READ31                                                      TB317062
      READ (31,4)IDB(1)                                                TB317063
      GO TO 150                                                        TB317064
140   K=K+1                                                            TB317065
      IF(NZER(RA(K),SLASH)) GO TO 140                                  TB317066
      K=K+1                                                            TB317067
      IF(ZERO(RA(K),ID)) GO TO 145                                     TB317068
      IDB(4)=2                                                         TB317069
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      GO TO 150                                                         TB317070
145   IDB(4)=1                                                          TB317071
150   IFC=IFC-1                                                         TB317072
155   IF(IFC)200,200,126                                                TB317073
160   K=K+1                                                             TB317074
      IF(NZER(RA(K),LPRN)) GO TO 160                                    TB317075
      M=K-1                                                             TB317076
      L=M                                                               TB317077
162   L=L-1                                                             TB317078
      IF(NZER(RA(L),SLASH)) GO TO 162                                   TB317079
      L=L+1                                                             TB317080
      CALL PACK (L,M,WO,RA)                                             TB317081
      CALL RITE31                                                       TB317082
      WRITE (31,3)WO                                                    TB317083
      CALL READ31                                                       TB317084
      READ (31,4)IDB(5)                                                 TB317085
165   L=K+1                                                             TB317086
170   K=K+1                                                             TB317087
      IF(ZERO(RA(K),COMMA)) GO TO 175                                   TB317088
      IF(NZER(RA(K),RPRN)) GO TO 170                                    TB317089
      IS=0                                                              TB317090
      GO TO 180                                                         TB317091
175   IS=1                                                              TB317092
180   M=K-1                                                             TB317093
      CALL PACK (L,M,WO,RA)                                             TB317094
      CALL RITE31                                                       TB317095
      WRITE (31,3)WO                                                    TB317096
      CALL READ31                                                       TB317097
      READ (31,4)IN                                                     TB317098
      IN=IN+5                                                           TB317099
      IDB(IN)=1                                                         TB317100
      IF(IS)150,150,165                                                 TB317101
190   K=K+1                                                             TB317102
      IF(NZER(RA(K),SLASH)) GO TO 190                                   TB317103
      L=K+1                                                             TB317104
195   K=K+1                                                             TB317105
      IF(NZER(RA(K),COMMA)) GO TO 195                                   TB317106
      M=K-1                                                             TB317107
      CALL PACK (L,M,WO,RA)                                             TB317108
      CALL RITE31                                                       TB317109
      WRITE (31,3) WO                                                   TB317110
      CALL READ31                                                       TB317111
      READ (31,4) ISKIP                                                 TB317112
      GO TO 155                                                         TB317113
200   IF(ZERO(RA(K),COMMA)) GO TO 205                                   TB317114
202   K=K+1                                                             TB317115
      IF(NZER(RA(K),COMMA)) GO TO 202                                   TB317116
205   IF(ZERO(RA(K+1),ST)) GO TO 190                                    TB317117
      IF(SWITCH(1,3)) GO TO 100                                         TB317118
      IGOTO=ISKIP                                                       TB317119
      IF(ITCS.NE.0) GO TO 500                                           TB317120
      IF(ITYPBB)401,201,401                                             TB317121
201   CALL EDITII (IGOTO)                                               TB317122
      GO TO (105,100),IGOTO                                             TB317123
401   CALL EDITFI (IGOTO)                                               TB317124
      GO TO (105,100),IGOTO                                             TB317125
500   CALL CRDINP                                                       TB317126
      GO TO 105                                                         TB317127
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      END                                                               TB317128


$IBFTC TB318   M94/2,XR6,LIST                                           TB318000
      SUBROUTINE INPUT (N,NT,NC,K)                                      TB318001
C               DATA EDIT TAPE INPUT ROUTINE                            TB318002
      LOGICAL SWITCH                                                    TB318003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TB318004
      COMMON /MAINC/IB(6000,2),IBUE(2800)                               TB318005
      DIMENSION FMTIN(12)                                               TB318006
 1    FORMAT (I6)                                                       TB318007
 2    FORMAT (27H THE BINARY RECORD SIZE IS I6)                         TB318008
 3    FORMAT (12A6)                                                     TB318009
 4    FORMAT (24H THE BCD DATA FORMAT IS 12A6)                          TB318010
      DATA IST/0377777777777/                                           TB318011
      NTT=NT                                                            TB318012
      IF(K)30,10,30                                                     TB318013
 10   ICOUNT=0                                                          TB318014
      NCC=NC                                                            TB318015
      ITIN=1                                                            TB318016
 15   READ (5,1)IBRC                                                    TB318017
      REWIND 3                                                          TB318018
      CALL SWTHON (30)                                                  TB318019
      IQ=6000/IBRC                                                      TB318020
      WRITE (6,2)IBRC                                                   TB318021
 30   IF(ITIN.EQ.2) GO TO 100                                           TB318022
      IF(K-1) 45,60,50                                                  TB318023
 45   DO 49 J=1,IQ                                                      TB318024
      IS=(J-1)*IBRC+1                                                   TB318025
      IE=J*IBRC                                                         TB318026
      GO TO (48,46),ITIN                                                TB318027
 46   DO 47 I=IS,IE                                                     TB318028
 47   IB(I,1)=IST                                                       TB318029
      GO TO 49                                                          TB318030
 48   READ (3) (IB(I,1),I=IS,IE)                                        TB318031
      ICOUNT=ICOUNT+1                                                   TB318032
      IF(ICOUNT.GE.NCC) ITIN=2                                          TB318033
 49   CONTINUE                                                          TB318034
 50   DO 59 J=1,IQ                                                      TB318035
      IS=(J-1)*IBRC+1                                                   TB318036
      IE=J*IBRC                                                         TB318037
      GO TO (58,53),ITIN                                                TB318038
 53   DO 55 I=IS,IE                                                     TB318039
 55   IB(I,2)=IST                                                       TB318040
      GO TO 59                                                          TB318041
 58   READ (3) (IB(I,2),I=IS,IE)                                        TB318042
      ICOUNT=ICOUNT+1                                                   TB318043
      IF(ICOUNT.GE.NCC) ITIN=2                                          TB318044
 59   CONTINUE                                                          TB318045
      GO TO 95                                                          TB318046
 60   DO 69 J=1,IQ                                                      TB318047
      IS=(J-1)*IBRC+1                                                   TB318048
      IE=J*IBRC                                                         TB318049
      GO TO (68,63),ITIN                                                TB318050
 63   DO 65 I=IS,IE                                                     TB318051
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```
 65    IB(I,1)=IST                                                      TB318052
       GO TO 69                                                         TB318053
 68    READ (3) (IB(I,1),I=IS,IE)                                       TB318054
       ICOUNT=ICOUNT+1                                                  TB318055
       IF(ICOUNT.GE.NCC) ITIN=2                                         TB318056
 69    CONTINUE                                                         TB318057
 95    RETURN                                                           TB318058
 100   ISWTCH(3)=10                                                     TB318059
       RETURN                                                           TB318060
       END                                                              TB318061


$ORIGIN          C,CK2,NOREW                                                000
$IBFTC TC119     M94,FULIST,REF,XR6                                      TC119000
       SUBROUTINE IPDC (IGOTO)                                           TC119001
C                DECODE *INPUT CONTROL CARD                              TC119002
       LOGICAL SWITCH                                                    TC119003
       LOGICAL ZERO,NZER                                                 TC119004
       COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TC119005
       COMMON /MAINC/IB(6000,2),IBUE(2800)                               TC119006
       COMMON/EDITC/ITYPBB,ISAT,N,J,ITCS,NT,NOPTS,ISHS,IDB(20)           TC119007
       COMMON/NCOTC/NCOT,NC1OT                                           TC119008
       DIMENSION FIB(6000,2),FIBUE(2800),FISU(14),ISU(14)                TC119009
       EQUIVALENCE(IB,FIB),(IBUE,FIBUE),(ISAT,SAT),(FISU,ISU)            TC119010
       DATA STAR,CH,ID,TRACE,SLASH,TYPE,COMMA,LPRN,RPRN/1H*,1HC,1HI,5HTRATC119011
      1CE,1H/,1HT,1H,,1H(,1H)/                                           TC119012
       DATAINPT,ST,UT,NOT/5HINPUT,1HS,1HU,1HN/,FTE,BTE/1HF,1HB/,BLANK/1H TC119013
      1/,PAUS/5HPAUSE/                                                   TC119014
       DATA NCTE/1HC/                                                    TC119015
 1     FORMAT (80A1)                                                     TC119016
 2     FORMAT (1H ,80A1)                                                 TC119017
 3     FORMAT (A6)                                                       TC119018
 4     FORMAT (I6)                                                       TC119019
 5     FORMAT (I9)                                                       TC119020
 6     FORMAT (E12.0)                                                    TC119021
 7     FORMAT (2A6)                                                      TC119022
       NCOT=14                                                           TC119023
       NT=3                                                              TC119024
 9     CALL CARD                                                         TC119025
 10    CALL PACK (2,6,WO,RA)                                             TC119026
       IF(ZERO(WO,INPT))GO TO 11                                         TC119027
       CALL WROUT (25,109)                                               TC119028
       CALL SWTHON (3)                                                   TC119029
       IF(ZERO(WO,TRACE))GO TO 110                                       TC119030
       IF(NZER(RA(1),STAR))GO TO 9                                       TC119031
       IGOTO=1                                                           TC119032
 100   RETURN                                                            TC119033
 11    J=6                                                               TC119034
       K=4                                                               TC119035
 12    J=J+1                                                             TC119036
       IF(NZER(RA(J),COMMA))GO TO 12                                     TC119037
 15    Q=RA(J+1)                                                         TC119038
 16    J=J+1                                                             TC119039
       IF(NZER(RA(J),SLASH))GO TO 16                                     TC119040
       IF(ZERO(Q,TYPE)) GO TO 20                                         TC119041
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      IF(ZERO(Q,ST)) GO TO 30                                           TC119042
      IF(ZERO(Q,NOT)) GO TO 40                                          TC119043
      IF(ZERO(Q,NCTE)) GO TO 120                                        TC119044
      CALL WROUT (22,110)                                               TC119045
      CALL SWTHON (3)                                                   TC119046
      GO TO 9                                                           TC119047
20    J=J+1                                                             TC119048
      IF(ZERO(RA(J),BTE)) GO TO 25                                      TC119049
      IF(ZERO(RA(J),FTE)) GO TO 27                                      TC119050
      IF(NZER(RA(J),ID)) GO TO 26                                       TC119051
      ITCS=-1                                                           TC119052
      ITYPBB=0                                                          TC119053
      IDB(20)=0                                                         TC119054
      GO TO 94                                                          TC119055
25    J=J+1                                                             TC119056
      IF(NZER(RA(J),ID))GO TO 28                                        TC119057
26    ITCS=0                                                            TC119058
      ITYPBB=0                                                          TC119059
      IDB(20)=0                                                         TC119060
      GO TO 29                                                          TC119061
27    ITCS=1                                                            TC119062
      ITYPBB=1                                                          TC119063
      IDB(20)=1                                                         TC119064
      GO TO 94                                                          TC119065
28    ITCS=0                                                            TC119066
      ITYPBB=1                                                          TC119067
      IDB(20)=1                                                         TC119068
29    IF(ZERO(RA(J),COMMA)) GO TO 60                                    TC119069
      J=J+1                                                             TC119070
      GO TO 29                                                          TC119071
30    L1=J+1                                                            TC119072
31    J=J+1                                                             TC119073
      IF(NZER(RA(J),COMMA)) GO TO 31                                    TC119074
      L2=J-1                                                            TC119075
      IF(L1-L2)33,33,32                                                 TC119076
32    ISAT=0                                                            TC119077
      GO TO 60                                                          TC119078
33    IF(L2-L1-6)34,35,35                                               TC119079
34    CALL PACK (L1,L2,WO,RA)                                           TC119080
      WOO=BLANK                                                         TC119081
      GO TO 36                                                          TC119082
35    M1=L1+5                                                           TC119083
      M2=M1+1                                                           TC119084
      CALL PACK (L1,M1,WO,RA)                                           TC119085
      CALL PACK (M2,L2,WOO,RA)                                          TC119086
36    CALL RITE31                                                       TC119087
      WRITE (31,7)WO,WOO                                                TC119088
      CALL READ31                                                       TC119089
      IF(ITYPBB)37,38,37                                                TC119090
37    READ (31,6)SAT                                                    TC119091
      GO TO60                                                           TC119092
38    READ (31,5)ISAT                                                   TC119093
      GO TO 60                                                          TC119094
40    L1=J+1                                                            TC119095
41    J=J+1                                                             TC119096
      IF(NZER(RA(J),COMMA)) GO TO 41                                    TC119097
      L2=J-1                                                            TC119098
      CALL PACK(L1,L2,WO,RA)                                            TC119099
```


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      CALL RITE31                                                       TC119100
      WRITE (31,3) WO                                                   TC119101
      CALL READ31                                                       TC119102
      READ (31,4)NCPTS                                                  TC119103
      GO TO 60                                                          TC119104
 60   K=K-1                                                             TC119105
      IF(K)65,65,15                                                     TC119106
 65   IF(SWITCH(1,3)) GO TO 9                                           TC119107
      CALL INPUT (ITCS,NT,NOPTS,0)                                      TC119108
      IF(ITYPBB)90,66,90                                                TC119109
 66   CALL SHFICK (IB(1,1),ISHS)                                        TC119110
      IF(ISHS)70,90,70                                                  TC119111
 70   CALL LSHFT (18,ISAT)                                              TC119112
 90   IF(ISWTCH(2)-6)93,92,93                                           TC119113
 92   ISWTCH(3)=0                                                       TC119114
      GO TO 94                                                          TC119115
 93   REWIND 2                                                          TC119116
 94   N=1                                                               TC119117
      J=1                                                               TC119118
      IGOTO=3                                                           TC119119
      GO TO 100                                                         TC119120
 110  IGOTO=2                                                           TC119121
      GO TO 100                                                         TC119122
 120  J=J+1                                                             TC119123
      IF(ZERO(RA(J),COMMA)) GO TO 60                                    TC119124
      L1=J                                                              TC119125
 125  J=J+1                                                             TC119126
      IF(NZER(RA(J),COMMA)) GO TO 125                                   TC119127
      L2=J-1                                                            TC119128
      CALL PACK (L1,L2,WO,RA)                                           TC119129
      CALL RITE31                                                       TC119130
      WRITE (31,3) WO                                                   TC119131
      CALL READ31                                                       TC119132
      READ (31,4) NCOT                                                  TC119133
      GO TO 60                                                          TC119134
      END                                                               TC119135
```

```
$ORIGIN        C,CK2,NOREW                                                 000
$IBFTC TC220   M94,FULIST,REF,XR6                                       TC220000
      SUBROUTINE CRDINP                                                 TC220001
C               CARD EDIT CONTROL ROUTINE                               TC220002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TC220003
      COMMON/MAINC/C(12000),B(2800)                                     TC220004
      COMMON/EDITC/ITYPBB,ISAT,NQSS,J,ITCS,NT,NOPTS,ISHS,IDB(20)        TC220005
      COMMON/CICA/FMTIN(13),IMULT,NWPC                                  TC220006
      LOGICAL ZERO,NZER,SWITCH                                          TC220007
      DATA D,F,LPRN,RPRN,BLANK,COMMA,SLASH,N,Y/1HD,1HF,1H(,1H),1H ,     TC220008
     11H,,1H/,1HN,1HY/,FOR/6H(10I5)/                                    TC220009
 1    FORMAT (14A6)                                                     TC220010
 2    FORMAT (14I6)                                                     TC220011
 3    FORMAT (80A1)                                                     TC220012
 4    FORMAT (1X,8CA1)                                                  TC220013
 5    FORMAT (5X,6HTEST  I6,15H COMPLETED FOR I2,9H CHANNELS)           TC220014
      IF(SWITCH(1,26)) GO TO 100                                        TC220015
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      CALL SWTHON (26)                                                  TC220016
      IMULT=1                                                           TC220017
      NWPC=10                                                           TC220018
      FMTIN(1)=FOR                                                      TC220019
100   READ (5,3) (RA(K),K=1,80)                                         TC220020
      WRITE (6,4) (RA(K),K=1,80)                                        TC220021
      WRITE (10,4) (RA(K),K=1,80)                                       TC220022
      CALL RITE31                                                       TC220023
      WRITE (31,3) (RA(K),K=1,80)                                       TC220024
      CALL SQUEEZ                                                       TC220025
      IF(ZERO(RA(2),D)) GO TO 200                                       TC220026
      IF(ZERO(RA(2),F)) GO TO 300                                       TC220027
      CALL XIN (C,NC,NW)                                                TC220028
      WRITE (10,5) IDB(1),IDB(5)                                        TC220029
      RETURN                                                            TC220030
200   J=2                                                               TC220031
205   J=J+1                                                             TC220032
      IF(NZER(RA(J),COMMA)) GO TO 205                                   TC220033
210   Q=RA(J+1)                                                         TC220034
      IF(NZER(Q,COMMA)) GO TO 215                                       TC220035
      NC=IDB(5)                                                         TC220036
      NW=12000/NC                                                       TC220037
      GO TO 100                                                         TC220038
215   J=J+1                                                             TC220039
      IF(NZER(RA(J),SLASH)) GO TO 215                                   TC220040
      J=J+1                                                             TC220041
      IF(ZERO(Q,N)) GO TO 220                                           TC220042
      IMULT=1                                                           TC220043
      IF(NZER(RA(J),Y)) IMULT=0                                         TC220044
      GO TO 205                                                         TC220045
220   L=J                                                               TC220046
225   J=J+1                                                             TC220047
      IF(NZER(RA(J),COMMA)) GO TO 225                                   TC220048
      M=J-1                                                             TC220049
      CALL PACK (L,M,WO,RA)                                             TC220050
      CALL RITE31                                                       TC220051
      WRITE (31,1) WO                                                   TC220052
      CALL READ31                                                       TC220053
      READ (31,2) NWPC                                                  TC220054
      GO TO 210                                                         TC220055
300   CALL READ31                                                       TC220056
      READ (31,3) (RA(K),K=1,80)                                        TC220057
      J=2                                                               TC220058
305   J=J+1                                                             TC220059
      IF(NZER(RA(J),LPRN)) GO TO 305                                    TC220060
      L=J                                                               TC220061
      J=81                                                              TC220062
310   J=J-1                                                             TC220063
      IF(NZER(RA(J),RPRN)) GO TO 310                                    TC220064
      M=J                                                               TC220065
      II=L-1                                                            TC220066
      DO 315 I=L,J                                                      TC220067
      K=I-II                                                            TC220068
      RA(K)=RA(I)                                                       TC220069
315   CONTINUE                                                          TC220070
320   K=K+1                                                             TC220071
      IF(K-80)325,325,330                                               TC220072
325   RA(K)=BLANK                                                       TC220073
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      GO TO 320                                                         TC220074
 330  CALL RITE31                                                       TC220075
      WRITE (31,3) (RA(K),K=1,80)                                       TC220076
      CALL READ31                                                       TC220077
      READ (31,1) FMTIN                                                 TC220078
      GO TO 100                                                         TC220079
      END                                                               TC220080


$IBFTC TC221    M94,FULIST,REF,XR6                                      TC221000
      SUBROUTINE XIN (B,NC,NW)                                          TC221001
C                CARD EDIT COMPUTATION ROUTINE                          TC221002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TC221003
      COMMON/MAINC/C(12000),OB(14,200)                                  TC221004
      COMMON/EDITC/DUP(8),IDB(20)                                       TC221005
      COMMON/CICA/FMTIN(13),IMULT,NWPC                                  TC221006
      DIMENSION B(NC,NW),ICH(14)                                        TC221007
      LOGICAL ZERO,NZER,SWITCH                                          TC221008
      DATA CC,T,COMMA,SLASH,STAR/1HC,1HT,1H,,1H/,1H*/                   TC221009
 1    FORMAT (14A6)                                                     TC221010
 2    FORMAT (14I6)                                                     TC221011
 3    FORMAT (80A1)                                                     TC221012
 4    FORMAT (1X,80A1)                                                  TC221013
 5    FORMAT (1X,31H***** NO. OF POINTS ON CHANNEL I2,                  TC221014
     127H EXECEEDS AVAILABLE STORAGE)                                   TC221015
      DO 100 K=1,14                                                     TC221016
 100  ICH(K)=0                                                          TC221017
      IDB(3)=200                                                        TC221018
      IDB(2)=0                                                          TC221019
      IFW=0                                                             TC221020
      IIW=1                                                             TC221021
      IQ=0                                                              TC221022
      IBC=0                                                             TC221023
 105  IF(ZERO(RA(2),CC)) GO TO 200                                      TC221024
      IF(NZER(RA(2),T)) GO TO 300                                       TC221025
      IF(SWITCH(1,3)) GO TO 1000                                        TC221026
 108  IF(IFW-IIW-200)110,130,130                                        TC221027
 110  IF(IFW)115,115,120                                                TC221028
 115  CALL SWTHON (3)                                                   TC221029
      GO TO 1000                                                        TC221030
 120  IF(IDB(2))1000,125,1000                                           TC221031
 125  IDB(2)=1                                                          TC221032
      IDB(3)=IFW-IIW+1                                                  TC221033
 130  DO 135 K=1,200                                                    TC221034
      KK=IIW+K-1                                                        TC221035
      DO 135 L=1,NC                                                     TC221036
 135  OB(L,K)=B(L,KK)                                                   TC221037
      CALL SWTHON (29)                                                  TC221038
      WRITE (2) IDB                                                     TC221039
      WRITE (2) OB                                                      TC221040
      IIW=IIW+200                                                       TC221041
      GO TO 108                                                         TC221042
 200  IF(IMULT)260,205,260                                              TC221043
 205  J=2                                                               TC221044
 210  J=J+1                                                             TC221045
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      IF(NZER(RA(J),SLASH)) GO TO 210                                   TC221046
      L=J+1                                                             TC221047
215   J=J+1                                                             TC221048
      IF(NZER(RA(J),COMMA)) GO TO 215                                   TC221049
      M=J-1                                                             TC221050
      CALL PACK (L,M,WO,RA)                                             TC221051
      CALL RITE31                                                       TC221052
      WRITE (31,1) WO                                                   TC221053
      CALL READ31                                                       TC221054
      READ (31,2) IC                                                    TC221055
      IF(ICH(IC))225,220,225                                            TC221056
220   ICH(IC)=1                                                         TC221057
      IFW=IQ                                                            TC221058
      GO TO 260                                                         TC221059
225   IF(SWITCH(1,3)) GO TO 490                                         TC221060
230   IF(IFW-IIW-200)245,235,235                                        TC221061
235   DO 240 K=1,200                                                    TC221062
      KK=IIW+K-1                                                        TC221063
      DO 240 L=1,NC                                                     TC221064
240   OB(L,K)=B(L,KK)                                                   TC221065
      CALL SWTHON (29)                                                  TC221066
      WRITE (2) IDB                                                     TC221067
      WRITE (2) OB                                                      TC221068
      IIW=IIW+200                                                       TC221069
      GO TO 230                                                         TC221070
245   DO 250 K=IIW,IFW                                                  TC221071
      KK=K-IIW+1                                                        TC221072
      DO 250 L=1,NC                                                     TC221073
250   B(L,KK)=B(L,K)                                                    TC221074
      IFW=KK                                                            TC221075
      IQ=KK                                                             TC221076
      IIW=1                                                             TC221077
      DO 255 K=1,14                                                     TC221078
255   ICH(K)=0                                                          TC221079
      ICH(IC)=1                                                         TC221080
260   READ (5,3) (RA(K),K=1,80)                                         TC221081
      CALL RITE31                                                       TC221082
      WRITE (31,3) (RA(K),K=1,80)                                       TC221083
      CALL SQUEEZ                                                       TC221084
      IF(NZER(RA(1),STAR)) GO TO 300                                    TC221085
      WRITE (6,4) (RA(K),K=1,80)                                        TC221086
      WRITE (10,4) (RA(K),K=1,80)                                       TC221087
      GO TO 105                                                         TC221088
300   IF(IMULT)400,305,400                                              TC221089
305   K=IFW+1                                                           TC221090
      L=IFW+NWPC                                                        TC221091
      CALL READ31                                                       TC221092
      READ (31,FMTIN) (B(IC,N),N=K,L)                                   TC221093
      IFW=L                                                             TC221094
      IF(IFW-NW)260,260,310                                             TC221095
310   CALL SWTHON (3)                                                   TC221096
      IFW=0                                                             TC221097
      WRITE (6,5) IC                                                    TC221098
      GO TO 260                                                         TC221099
400   IF(NC-NWPC)500,500,405                                            TC221100
405   K=1                                                               TC221101
410   IF(ICH(K))415,420,415                                             TC221102
415   K=K+1                                                             TC221103
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      GO TO 410                                                         TC221104
420   L=K+NWPC-1                                                        TC221105
      IF(L.GT.NC) L=NC                                                  TC221106
      IF(K-1)430,425,430                                                TC221107
425   IFW=IFW+1                                                         TC221108
      IF(IFW-NW)430,430,455                                             TC221109
430   CALL READ31                                                       TC221110
      READ (31,FMTIN) (B(J,IFW),J=K,L)                                  TC221111
      IF(L-NC)435,445,445                                               TC221112
435   DO 440 J=K,L                                                      TC221113
440   ICH(J)=1                                                          TC221114
      GO TO 260                                                         TC221115
445   DO 450 J=1,14                                                     TC221116
450   ICH(J)=0                                                          TC221117
      GO TO 260                                                         TC221118
455   IF(SWITCH(1,3)) GO TO 490                                         TC221119
460   IF(IFW-IIW-200)475,465,465                                        TC221120
465   DO 470 K=1,200                                                    TC221121
      KK=IIW+K-1                                                        TC221122
      DO 470 L=1,NC                                                     TC221123
470   OB(L,K)=B(L,KK)                                                   TC221124
      CALL SWTHON (29)                                                  TC221125
      WRITE (2) IDB                                                     TC221126
      WRITE (2) OB                                                      TC221127
      IIW=IIW+200                                                       TC221128
      GO TO 460                                                         TC221129
475   DO 480 K=IIW,IFW                                                  TC221130
      KK=K-IIW+1                                                        TC221131
      DO 480 L=1,NC                                                     TC221132
480   B(L,KK)=B(L,K)                                                    TC221133
      IIW=1                                                             TC221134
      IFW=KK+1                                                          TC221135
      IQ=KK                                                             TC221136
      GO TO 430                                                         TC221137
490   IFW=0                                                             TC221138
      IQ=0                                                              TC221139
      GO TO 260                                                         TC221140
500   K=1                                                               TC221141
      L=NC                                                              TC221142
      N=NWPC/NC                                                         TC221143
      N=IFW+N                                                           TC221144
      M=IFW+1                                                           TC221145
      IF(N-NW)535,535,520                                               TC221146
505   IF(IFW-IIW-200)525,510,510                                        TC221147
510   DO 515 K=1,200                                                    TC221148
      KK=K+IIW-1                                                        TC221149
      DO 515 L=1,NC                                                     TC221150
515   OB(L,K)=B(L,KK)                                                   TC221151
      CALL SWTHON (29)                                                  TC221152
      WRITE (2) IDB                                                     TC221153
      WRITE (2) OB                                                      TC221154
      IIW=IIW+200                                                       TC221155
      GO TO 505                                                         TC221156
520   IF(SWITCH(1,3)) GO TO 490                                         TC221157
      GO TO 505                                                         TC221158
525   DO 530 K=IIW,IFW                                                  TC221159
      KK=K-IIW+1                                                        TC221160
      DO 530 L=1,NC                                                     TC221161
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 530  B(L,KK)=B(L,K)                                                    TC221162
      IFW=KK                                                            TC221163
      IQ=KK                                                             TC221164
      IIW=1                                                             TC221165
      N=NWPC/NC                                                         TC221166
      N=IFW+N                                                           TC221167
      M=IFW+1                                                           TC221168
 535  CALL READ31                                                       TC221169
      READ (31,FMTIN) ((B(J,I),J=K,L),I=M,N)                            TC221170
      IFW=N                                                             TC221171
      GO TO 260                                                         TC221172
 1000 RETURN                                                            TC221173
      END                                                               TC221174


$ORIGIN          C,CK2,NOREW                                                000
$IBFTC TC322     M94,FULIST,REF,XR6                                      TC322000
      SUBROUTINE EDITII (IGOTO)                                          TC322001
C                TAPE EDIT (INTEGER) COMPUTATION ROUTINE                 TC322002
      LOGICAL SWITCH                                                     TC322003
      LOGICAL ZERO,NZER                                                  TC322004
      LOGICAL SATCK                                                      TC322005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           TC322006
      COMMON /MAINC/IB(6000,2),IBUE(2800)                                TC322007
      COMMON/EDITC/ITYPBB,ISAT,N,J,ITCS,NT,NOPTS,ISHS,IDB(20)            TC322008
      COMMON/NCOTC/NCOT,NC10T                                            TC322009
      DIMENSION FIB(6000,2),FIBUE(2800),FISU(14),ISU(14)                 TC322010
      EQUIVALENCE(IB,FIB),(IBUE,FIBUE),(ISAT,SAT),(FISU,ISU)             TC322011
      DATA STAR,CH,ID,TRACE,SLASH,TYPE,COMMA,LPRN,RPRN/1H*,1HC,1HI,5HTRATC322012
     1CE,1H/,1HT,1H,,1H(,1H)/                                            TC322013
      DATAINPT,ST,UT,NOT/5HINPUT,1HS,1HU,1HN/,FTE,BTE/1HF,1HB/,BLANK/1H TC322014
     1/,PAUS/5HPAUSE/                                                    TC322015
 1    FORMAT (80A1)                                                      TC322016
 2    FORMAT (1H ,80A1)                                                  TC322017
 3    FORMAT (A6)                                                        TC322018
 4    FORMAT (I6)                                                        TC322019
 5    FORMAT (I9)                                                        TC322020
 6    FORMAT (E12.0)                                                     TC322021
 7    FORMAT (2A6)                                                       TC322022
      NC10T=10*NCOT                                                      TC322023
      ISKIP=IGOTO                                                        TC322024
 201  KBL=0                                                              TC322025
 205  IF(IB(J,N)-ISAT)220,210,210                                        TC322026
 210  J=J+NC10T                                                          TC322027
      IF(J-6000)205,205,211                                              TC322028
 211  IF(ISWTCH(3))700,215,700                                           TC322029
 215  J=J-6000                                                           TC322030
      CALL INPUT (ITCS,NT,NOPTS,N)                                       TC322031
      IF(N-1)216,217,216                                                 TC322032
 216  N=1                                                                TC322033
      GO TO 205                                                          TC322034
 217  N=2                                                                TC322035
      GO TO 205                                                          TC322036
 220  IF(SATCK(J,N,ISAT)) GO TO 210                                      TC322037
      KDP=J                                                              TC322038
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      KBL=N                                                             TC322039
      DO 235 I=1,40                                                     TC322040
      J=J+NC10T                                                         TC322041
      IF(J-6000)230,230,225                                             TC322042
225   J=J-6000                                                          TC322043
      IF(N-1)226,227,226                                                TC322044
226   N=1                                                               TC322045
      GO TO 230                                                         TC322046
227   N=2                                                               TC322047
230   IF(IB(J,N)-ISAT)235,233,233                                       TC322048
233   IF(SATCK(J,N,ISAT)) GO TO 240                                     TC322049
235   CONTINUE                                                          TC322050
      IF(ISKIP)237,237,900                                              TC322051
237   IF(IDB(4)-1)236,300,236                                           TC322052
236   N=KBL                                                             TC322053
      J=KDP+NC10T                                                       TC322054
      MN=10                                                             TC322055
      GO TO 301                                                         TC322056
240   IF(ISWTCH(3))700,241,700                                          TC322057
241   IF(KBL-N)245,210,245                                              TC322058
245   IF(N-1)247,248,247                                                TC322059
247   CALL INPUT (ITCS,NT,NOPTS,1)                                      TC322060
      GO TO 210                                                         TC322061
248   CALL INPUT (ITCS,NT,NOPTS,2)                                      TC322062
      GO TO 210                                                         TC322063
300   N=KBL                                                             TC322064
      J=KDP                                                             TC322065
      MN=80                                                             TC322066
301   DO 302 M=1,NCOT                                                   TC322067
302   ISU(M)=0                                                          TC322068
      DO 325 I=1,MN                                                     TC322069
      DO 320L=1,NCOT                                                    TC322070
      M=J+L-1                                                           TC322071
      IF(M-6000)315,315,305                                             TC322072
305   J=2-L                                                             TC322073
      IF(N-1)306,307,306                                                TC322074
306   N=1                                                               TC322075
      GO TO 310                                                         TC322076
307   N=2                                                               TC322077
310   M=J+L-1                                                           TC322078
315   ISU(L)=ISU(L)+IB(M,N)                                             TC322079
320   CONTINUE                                                          TC322080
      J=J+NCOT                                                          TC322081
325   CONTINUE                                                          TC322082
      J=KDP+NCCT*MN                                                     TC322083
      IF(J-6000)340,340,330                                             TC322084
330   IF(ISWTCH(3))700,331,700                                          TC322085
331   J=J-6000                                                          TC322086
      IF(KBL-1)332,333,332                                              TC322087
332   KBL=1                                                             TC322088
      CALL INPUT (ITCS,NT,NOPTS,2)                                      TC322089
      GO TO 340                                                         TC322090
333   KBL=2                                                             TC322091
      CALL INPUT (ITCS,NT,NOPTS,1)                                      TC322092
340   N=KBL                                                             TC322093
      DO 345 I=1,NCOT                                                   TC322094
      IBUE(I)=(ISU(I)/MN)                                               TC322095
345   CONTINUE                                                          TC322096
```


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```
      I=15                                                              TC322097
350   DO 355 L=1,NCOT                                                   TC322098
      IBUE(I)=IB(J,N)                                                   TC322099
      J=J+1                                                             TC322100
      IF(J-6000)355,355,351                                             TC322101
351   IF(ISWTCH(3))700,354,700                                          TC322102
354   J=1                                                               TC322103
      CALL INPUT (ITCS,NT,NOPTS,N)                                      TC322104
      IF(N-1)353,352,353                                                TC322105
352   N=2                                                               TC322106
      GO TO 355                                                         TC322107
353   N=1                                                               TC322108
355   I=I+1                                                             TC322109
      I=I-NCOT+14                                                       TC322110
      IF(IB(J,N)-ISAT)360,358,358                                       TC322111
358   IF(SATCK(J,N,ISAT)) GO TO 370                                     TC322112
360   IF(I-2800)350,350,365                                             TC322113
365   K=1                                                               TC322114
      IDB(3)=200                                                        TC322115
      GO TO 375                                                         TC322116
370   K=2                                                               TC322117
      IDB(3)=I/14                                                       TC322118
375   IDB(2)=K-1                                                        TC322119
      WRITE (2) IDB                                                     TC322120
      IF(ISHS)380,385,380                                               TC322121
380   CALL ARSHFT (18,IBUE,2800)                                        TC322122
385   WRITE (2) IBUE                                                    TC322123
      GO TO (400,710),K                                                 TC322124
400   I=1                                                               TC322125
      GO TO 350                                                         TC322126
700   CALL WROUT (23,111)                                               TC322127
      CALL SWTHON (3)                                                   TC322128
710   CALL CARD                                                         TC322129
      IGOTO=1                                                           TC322130
      IF(ZERO(RA(1),STAR)) IGOTO=0                                      TC322131
      IGOTO=IGOTO+1                                                     TC322132
      RETURN                                                            TC322133
900   MSKIP=-1                                                          TC322134
      MMSKIP=KDP+ISKIP*NCOT                                             TC322135
905   IF(MMSKIP-6000)910,910,915                                        TC322136
910   KDP=MMSKIP                                                        TC322137
      GO TO 237                                                         TC322138
915   MMSKIP=MMSKIP-6000                                                TC322139
      IF(ISWTCH(3))920,925,920                                          TC322140
920   MSKIP=MSKIP+1                                                     TC322141
      IF(MSKIP)930,930,700                                              TC322142
925   CALL INPUT (ITCS,NT,NOPTS,KBL)                                    TC322143
930   KBL=KBL+1                                                         TC322144
      IF(KBL.GT.2) KBL=1                                                TC322145
      GO TO 905                                                         TC322146
      END                                                               TC322147
```


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```
$IBFTC TC323    M94,FULIST,REF,XR6                                      TC323000
      LOGICAL FUNCTION SATCK(J,N,ISAT)                                  TC323001
C               CHECK SATURATION ROUTINE                                TC323002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TC323003
      COMMON /MAINC/IB(6000,2),IBUE(2800)                               TC323004
      COMMON/NCOTC/NCOT,NC1OT                                           TC323005
      K=0                                                               TC323006
      JJ=J                                                              TC323007
      NN=N                                                              TC323008
      DO 5 KK=1,10                                                      TC323009
      JJ=JJ+NCOT                                                        TC323010
      IF(JJ-6000)4,4,1                                                  TC323011
 1    JJ=JJ-6000                                                        TC323012
      IF(NN-1)2,2,3                                                     TC323013
 2    NN=2                                                              TC323014
      GO TO 4                                                           TC323015
 3    NN=1                                                              TC323016
 4    IF(IB(JJ,NN).GE.ISAT) K=K+1                                       TC323017
 5    CONTINUE                                                          TC323018
      IF(K.GE.7)SATCK=.TRUE.                                            TC323019
      IF(K.LT.7)SATCK=.FALSE.                                           TC323020
      RETURN                                                            TC323021
      END                                                               TC323022
```

```
$ORIGIN         C,CK2,NOREW                                                 000
$IBFTC TC424    M94,FULIST,REF,XR6                                      TC424000
      SUBROUTINE EDITFI (IGOTO)                                         TC424001
C               TAPE EDIT (FL. POINT) COMPUTATION ROUTINE               TC424002
      LOGICAL SWITCH                                                    TC424003
      LOGICAL ZERO,NZER                                                 TC424004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          TC424005
      COMMON /MAINC/IB(6000,2),IBUE(2800)                               TC424006
      COMMON/EDITC/ITYPBB,ISAT,N,J,ITCS,NT,NOPTS,ISHS,IDB(20)           TC424007
      COMMON/NCOTC/NCOT,NC1OT                                           TC424008
      DIMENSION FIB(6000,2),FIBUE(2800),FISU(14),ISU(14)                TC424009
      EQUIVALENCE(IB,FIB),(IBUE,FIBUE),(ISAT,SAT),(FISU,ISU)            TC424010
      DATA STAR,CH,ID,TRACE,SLASH,TYPE,COMMA,LPRN,RPRN/1H*,1HC,1HI,5HTRATC424011
     1CE,1H/,1HT,1H,,1H(,1H)/                                           TC424012
      DATAINPT,ST,UT,NOT/5HINPUT,1HS,1HU,1HN/,FTE,BTE/1HF,1HB/,BLANK/1H TC424013
     1/,PAUS/5HPAUSE/                                                   TC424014
 1    FORMAT (80A1)                                                     TC424015
 2    FORMAT (1H ,80A1)                                                 TC424016
 3    FORMAT (A6)                                                       TC424017
 4    FORMAT (I6)                                                       TC424018
 5    FORMAT (I9)                                                       TC424019
 6    FORMAT (E12.0)                                                    TC424020
 7    FORMAT (2A6)                                                      TC424021
      NC1OT=10*NCOT                                                     TC424022
      ISKIP=IGOTO                                                       TC424023
 401  KBL=0                                                             TC424024
 405  IF(FIB(J,N)-SAT)420,410,410                                       TC424025
 410  J=J+NC1OT                                                         TC424026
      IF(J-6000)405,405,411                                             TC424027
 411  IF(ISWTCH(3))700,415,700                                          TC424028
```


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```
415   J=J-6000                                                          TC424029
      CALL INPUT(ITCS,NT,NOPTS,N)                                       TC424030
      IF(N-1)416,417,416                                                TC424031
416   N=1                                                               TC424032
      GO TO 405                                                         TC424033
417   N=2                                                               TC424034
      GO TO 405                                                         TC424035
420   KDP=J                                                             TC424036
      KBL=N                                                             TC424037
      DO 435 I=1,40                                                     TC424038
      J=J+NC10T                                                         TC424039
      IF(J-6000)430,430,425                                             TC424040
425   J=J-6000                                                          TC424041
      IF(N-1)426,427,426                                                TC424042
426   N=1                                                               TC424043
      GO TO 430                                                         TC424044
427   N=2                                                               TC424045
430   IF(FIB(J,N)-SAT)435,440,440                                       TC424046
435   CONTINUE                                                          TC424047
      IF(ISKIP)437,437,900                                              TC424048
437   IF(IDB(4)-1)436,500,436                                           TC424049
436   N=KBL                                                             TC424050
      J=KDP                                                             TC424051
      L=1                                                               TC424052
      GO TO 600                                                         TC424053
440   IF(ISWTCH(3))700,441,700                                          TC424054
441   IF(KBL-N)445,410,445                                              TC424055
445   IF(N-1)447,448,447                                                TC424056
447   CALL INPUT (ITCS,NT,NOPTS,1)                                      TC424057
      GO TO 410                                                         TC424058
448   CALL INPUT (ITCS,NT,NOPTS,2)                                      TC424059
      GO TO 410                                                         TC424060
500   N=KBL                                                             TC424061
      J=KDP                                                             TC424062
      DO 502 M=1,NCOT                                                   TC424063
502   FISU(M)=0.                                                        TC424064
      DO 525 I=1,80                                                     TC424065
      DO 520 L=1,NCOT                                                   TC424066
      M=J+L-1                                                           TC424067
      IF(M-6000)515,515,505                                             TC424068
505   J=2-L                                                             TC424069
      IF(N-1)506,507,506                                                TC424070
506   N=1                                                               TC424071
      GO TO 510                                                         TC424072
507   N=2                                                               TC424073
510   M=J+L-1                                                           TC424074
515   FISU(L)=FISU(L)+FIB(M,N)                                          TC424075
520   CONTINUE                                                          TC424076
      J=J+NCOT                                                          TC424077
525   CONTINUE                                                          TC424078
      J=KDP+8*NC10T                                                     TC424079
      IF(J-6000)540,540,530                                             TC424080
530   IF(ISWTCH(3))700,531,700                                          TC424081
531   J=J-6000                                                          TC424082
      IF(KBL-1)532,533,532                                              TC424083
532   KBL=1                                                             TC424084
      CALL INPUT (ITCS,NT,NOPTS,2)                                      TC424085
      GO TO 540                                                         TC424086
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533   KBL=2                                                          TC424087
      CALL INPUT (ITCS,NT,NOPTS,1)                                   TC424088
540   N=KBL                                                          TC424089
      DO 545 I=1,NCOT                                                TC424090
      FIBUE(I)=FISU(I)/80.                                           TC424091
545   CONTINUE                                                       TC424092
      I=15                                                           TC424093
550   DO 555 L=1,NCOT                                                TC424094
      FIBUE(I)=FIB(J,N)                                              TC424095
      J=J+1                                                          TC424096
      IF(J-6000)555,555,551                                          TC424097
551   IF(ISWTCH(3))700,554,700                                       TC424098
554   J=1                                                            TC424099
      CALL INPUT (ITCS,NT,NOPTS,N)                                   TC424100
      IF(N-1)553,552,553                                             TC424101
552   N=2                                                            TC424102
      GO TO 555                                                      TC424103
553   N=1                                                            TC424104
555   I=I+1                                                          TC424105
      I=I+14-NCOT                                                    TC424106
      IF(FIB(J,N)-SAT)560,570,570                                    TC424107
560   IF(I-2800)550,550,565                                          TC424108
565   K=1                                                            TC424109
      IDB(3)=200                                                     TC424110
      GO TO 575                                                      TC424111
570   K=2                                                            TC424112
      IDB(3)=I/14                                                    TC424113
575   IDB(2)=K-1                                                     TC424114
      WRITE (2) IDB                                                  TC424115
      WRITE (2) FIBUE                                                TC424116
      GO TO (600,710),K                                              TC424117
600   I=1                                                            TC424118
      GO TO 550                                                      TC424119
700   CALL WROUT (23,112)                                            TC424120
      CALL SWTHON (3)                                                TC424121
710   CALL CARD                                                      TC424122
      IGOTO=1                                                        TC424123
      IF(ZERO(RA(1),STAR)) IGOTO=0                                   TC424124
      IGOTO=IGOTO+1                                                  TC424125
      RETURN                                                         TC424126
900   MSKIP=-1                                                       TC424127
      MMSKIP=KDP+ISKIP*NCOT                                          TC424128
905   IF(MMSKIP-6000)910,910,915                                     TC424129
910   KDP=MMSKIP                                                     TC424130
      GO TO 437                                                      TC424131
915   MMSKIP=MMSKIP-6000                                             TC424132
      IF(ISWTCH(3))920,925,920                                       TC424133
920   MSKIP=MSKIP+1                                                  TC424134
      IF(MSKIP)930,930,700                                           TC424135
925   CALL INPUT (ITCS,NT,NOPTS,KBL)                                 TC424136
930   KBL=KBL+1                                                      TC424137
      IF(KBL.GT.2) KBL=1                                             TC424138
      GO TO 905                                                      TC424139
      END                                                            TC424140
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$ORIGIN        B,CK2,NOREW                                                  000
$IBFTC TB425   M94,FULIST,REF,XR6                                        TB425000
      SUBROUTINE INTG                                                    TB425001
C               TRANSFORM GENERATOR SYSTEM                               TB425002
      LOGICAL SWITCH                                                     TB425003
      LOGICALZERO,NZER                                                   TB425004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           TB425005
      COMMON /MAINC/F(600,14),IB(2800),SUM(100,14,2),ID(20),IDO(4),      TB425006
     1NOR(15),T,J,JJ,K,L,N,ARG,SINE,COSINE,                              TB425007
     1SSINA(100),SSINB(100),SCOSA(100),SCOSB(100),DUMMY(352)             TB425008
      DIMENSION IC(14,200)                                               TB425009
      DIMENSIONFIC(14,200),FNOR(14)                                      TB425010
      EQUIVALENCE(FIC,IB),(NOR,FNOR)                                     TB425011
      DIMENSION ISRT(50,4)                                               TB425012
      EQUIVALENCE(IB,IC)                                                 TB425013
 4    FORMAT (80A1)                                                      TB425014
 5    FORMAT (1H 80A1)                                                   TB425015
 6    FORMAT (A6)                                                        TB425016
 7    FORMAT (I6)                                                        TB425017
      DATA COMMA,SLASH,TEST,INTE/1H,,1H/,1HT,4HSAMP/                     TB425018
      DATA CHK/1HC/                                                      TB425019
      DATA PAUS/4HPAUS/                                                  TB425020
      DATA ZRT,NOT/1HZ,1HN/                                              TB425021
      DO 400 J=1,50                                                      TB425022
      ISRT(J,1)=0                                                        TB425023
      ISRT(J,2)=1                                                        TB425024
      ISRT(J,3)=1                                                        TB425025
      ISRT(J,4)=1000000                                                  TB425026
 400  CONTINUE                                                           TB425027
      CALL KLOSE (1,3)                                                   TB425028
      REWIND 1                                                           TB425029
      REWIND 2                                                           TB425030
      CALL SWTHON (28)                                                   TB425031
      CALL SWTHON (29)                                                   TB425032
      I=0                                                                TB425033
      IF(SWITCH(2,1,3)) GO TO 9                                          TB425034
      CALL SWTHOF(2)                                                     TB425035
      GO TO 10                                                           TB425036
 9    CALL SWTHON (2)                                                    TB425037
 10   CALL CARD                                                          TB425038
      CALL PACK (2,5,WO,RA)                                              TB425039
      IF(NZER(WO,INTE))GO TO 90                                          TB425040
 30   J=5                                                                TB425041
 31   J=J+1                                                              TB425042
      IF(NZER(RA(J),COMMA)) GO TO 31                                     TB425043
      J=J+1                                                              TB425044
      IF(ZERO(RA(J),COMMA)) GO TO 10                                     TB425045
      I=I+1                                                              TB425046
 34   Q=RA(J)                                                            TB425047
 35   J=J+1                                                              TB425048
      IF(NZER(RA(J),SLASH))GO TO 35                                      TB425049
      L1=J+1                                                             TB425050
 36   J=J+1                                                              TB425051
      IF(NZER(RA(J),COMMA))GO TO 36                                      TB425052
      L2=J-1                                                             TB425053
      CALL PACK (L1,L2,WO,RA)                                            TB425054
      CALL RITE31                                                        TB425055
      WRITE (31,6) WO                                                    TB425056
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```
      CALL READ31                                                       TB425057
      READ (31,7) IW                                                    TB425058
      IF(ZERO(Q,TEST))GO TO 40                                          TB425059
      IF(ZERO(C,ZRT)) GO TO 50                                          TB425060
      IF(ZERO(Q,NOT)) GO TO 55                                          TB425061
      ISRT(I,2)=IW                                                      TB425062
      GO TO 41                                                          TB425063
40    ISRT(I,1)=IW                                                      TB425064
41    J=J+1                                                             TB425065
      IF(ZERO(RA(J),COMMA)) GO TO 10                                    TB425066
      GO TO 34                                                          TB425067
50    ISRT(I,3)=IW                                                      TB425068
      GO TO 41                                                          TB425069
55    ISRT(I,4)=IW                                                      TB425070
      GO TO 41                                                          TB425071
90    IF(SWITCH(3,1,2,3)) GO TO 110                                     TB425072
      WRITE (1) NFREQ,FREQ                                              TB425073
      CALL CLOCK (ITIME)                                                TB425074
100   DO 105 I=1,14                                                     TB425075
      NOR(I)=0                                                          TB425076
      DO 105 J=1,100                                                    TB425077
      SUM(J,I,1)=0.0                                                    TB425078
      SUM(J,I,2)=0.0                                                    TB425079
105   CONTINUE                                                          TB425080
      ICOSW=1                                                           TB425081
      T=0.0                                                             TB425082
      NOR(15)=0                                                         TB425083
108   N=0                                                               TB425084
      READ (2) ID                                                       TB425085
      IF(ID(1)+ID(2)+ID(3))120,110,120                                  TB425086
110   DO 115 J=1,4                                                      TB425087
115   IDO(J)=0                                                          TB425088
      WRITE (1) IDC                                                     TB425089
      END FILE 1                                                        TB425090
      REWIND 1                                                          TB425091
      REWIND 2                                                          TB425092
      RETURN                                                            TB425093
120   READ (2) IB                                                       TB425094
      IF(NOR(15))121,121,130                                            TB425095
121   NOR(15)=10                                                        TB425096
      DO 122 J=1,14                                                     TB425097
      NOR(J)=IC(J,1)                                                    TB425098
122   CONTINUE                                                          TB425099
123   DO 126 L=1,50                                                     TB425100
      IF(ID(1)-ISRT(L,1))124,125,124                                    TB425101
124   IF(ISRT(L,1))127,127,126                                          TB425102
125   ISR=ISRT(L,2)                                                     TB425103
      IMNM=ISRT(L,3)                                                    TB425104
      INMN=ISRT(L,4)                                                    TB425105
      DTU=ISR                                                           TB425106
      DTU=DT*DTU                                                        TB425107
      GO TO 128                                                         TB425108
126   CONTINUE                                                          TB425109
127   DTU=DT                                                            TB425110
      IMNM=1                                                            TB425111
      INMN=32000                                                        TB425112
      ISR=1                                                             TB425113
128   DO 129 L=1,NFREQ                                                  TB425114
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```
      SSINA(L)=0.0                                                      TB425115
      SCOSA(L)=1.0                                                      TB425116
      ARG=FREQ(L)*DTU                                                   TB425117
      CALL SCOSN (ARG,SSINB(L),SCOSB(L))                                TB425118
129   CONTINUE                                                          TB425119
      CALL IDSET (ID(4),IMNM,INMN,IDO(3))                               TB425120
500   IF(IMNM -200)510,510,505                                          TB425121
505   READ (2) ID                                                       TB425122
      READ (2) IB                                                       TB425123
      IMNM=IMNM-200                                                     TB425124
      GO TO 500                                                         TB425125
510   N=IMNM-1                                                          TB425126
      MNM=600-N                                                         TB425127
      AMNM=MNM                                                          TB425128
      BT=AMNM*DT                                                        TB425129
      JJ=N+1                                                            TB425130
      N=-N                                                              TB425131
      NNN=N                                                             TB425132
      J=1                                                               TB425133
      GO TO 131                                                         TB425134
130   J=1                                                               TB425135
      JJ=1                                                              TB425136
131   N=N+ID(3)                                                         TB425137
      NNN=NNN+ID(3)                                                     TB425138
      IF(NNN-INMN)133,133,160                                           TB425139
132   N=N+(INMN-NNN)                                                    TB425140
      ICOSW=2                                                           TB425141
133   DO 140 K=1,14                                                     TB425142
      L=K+5                                                             TB425143
      IF(ID(L))140,140,135                                              TB425144
135   IF(ID(20))136,137,136                                             TB425145
136   F(J,K)=FIC(K,JJ)-FNOR(K)                                          TB425146
      GO TO 140                                                         TB425147
137   F(J,K)=IC(K,JJ)-NOR(K)                                            TB425148
140   CONTINUE                                                          TB425149
      J=J+1                                                             TB425150
      JJ=JJ+1                                                           TB425151
      IF(J-N)133,133,145                                                TB425152
145   IF(ID(2))200,150,200                                              TB425153
150   IF(N-400)155,155,200                                              TB425154
155   READ (2) ID                                                       TB425155
      READ (2) IB                                                       TB425156
      JJ=1                                                              TB425157
      IF(NNN-INMN)131,145,145                                           TB425158
160   GO TO (132,165),ICOSW                                             TB425159
165   IF(ID(2)) 300,170,300                                             TB425160
170   READ (2) ID                                                       TB425161
      READ (2) IB                                                       TB425162
      GO TO 165                                                         TB425163
200   DO 230 K=1,N,ISR                                                  TB425164
201   DO 220 L=1,NFREQ                                                  TB425165
      DO 210 M=1,14                                                     TB425166
      IF(ID(M+5))210,210,205                                            TB425167
205   SUM(L,M,1)=SUM(L,M,1)+F(K,M)*SCOSA(L)                             TB425168
      SUM(L,M,2)=SUM(L,M,2)+F(K,M)*SSINA(L)                             TB425169
210   CONTINUE                                                          TB425170
      ARG=SCOSA(L)                                                      TB425171
      SCOSA(L)=SCOSA(L)*SCOSB(L)-SSINA(L)*SSINB(L)                      TB425172
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      SSINA(L)=SSINA(L)*SCOSB(L)+ARG*SSINB(L)                           TB425173
 220  CONTINUE                                                          TB425174
 230  CONTINUE                                                          TB425175
      T=T+BT                                                            TB425176
      BT=600.*DT                                                        TB425177
      DO 240 L=1,NFREQ                                                  TB425178
      ARG=FREQ(L)*T                                                     TB425179
      CALL SCOSN (ARG,SSINA(L),SCOSA(L))                                TB425180
 240  CONTINUE                                                          TB425181
      IF(ID(2))108,108,300                                              TB425182
 300  IDO(1)=ID(1)                                                      TB425183
      IDO(3)=ID(4)                                                      TB425184
      IDO(4)=NFREQ                                                      TB425185
      DO 315 M=1,14                                                     TB425186
      IF(ID(M+5))315,315,305                                            TB425187
 305  DO 310 L=1,NFREQ                                                  TB425188
      SUM(L,M,1)=SUM(L,M,1)*DTU                                         TB425189
      SUM(L,M,2)=-SUM(L,M,2)*DTU                                        TB425190
 310  CONTINUE                                                          TB425191
      IDO(2)=M                                                          TB425192
      WRITE (1) IDO                                                     TB425193
      WRITE (1) ((SUM(I,M,K),K=1,2),I=1,100)                            TB425194
 315  CONTINUE                                                          TB425195
      IX=-1                                                             TB425196
      WRITE (1) IX,IX,IX,IX                                             TB425197
      CALL CLOCK (ITIME)                                                TB425198
      TIME=ITIME                                                        TB425199
      TIME=TIME/60.                                                     TB425200
 2    FORMAT (6H TEST I6,2X,19HINTEGRATION TIME = F7.2,6H SECS.)        TB425201
      WRITE (6,2)IDO(1),TIME                                            TB425202
      GO TO 100                                                         TB425203
      END                                                               TB425204
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```
$IBMAP TB426    50,M94                                                  TB426000
*               SET ID RECORD                                           TB426001
       ENTRY    IDSET                                                   TB426002
IDSET  SAVE     (4,1)                                                   TB426003
       CLA*     4,4                                                     TB426004
       STO      TEM                                                     TB426005
       CLA*     5,4                                                     TB426006
       STO      TEP                                                     TB426007
       LXA      TEM,1                                                   TB426008
       SXD      TEP,1                                                   TB426009
       CLA*     3,4                                                     TB426010
       SUB      =1                                                      TB426011
       TZE      A                                                       TB426012
       CLA      TEP                                                     TB426013
       SSM                                                              TB426014
       STO*     6,4                                                     TB426015
       RETURN   IDSET                                                   TB426016
A      CLA      TEP                                                     TB426017
       SSP                                                              TB426018
       STO*     6,4                                                     TB426019
       RETURN   IDSET                                                   TB426020
```


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```
TEM     PZE     0                                                    TB426021
TEP     PZE     0                                                    TB426022
        END                                                          TB426023
```


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DISCUSSION

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```
$ORIGIN        A,CK2,NOREW                                                  000
$IBFTC RA428   M94,FULIST,REF,XR6                                       RA428000
      SUBROUTINE IBALL                                                  RA428001
C               REGRESSION SYSTEM MONITOR                               RA428002
      LOGICAL NZER,ZERO                                                 RA428003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RA428004
      COMMON/FTYPE/ITYPEF                                               RA428005
      COMMON/IBALC/ICHZT,VALZT                                          RA428006
      COMMON/IBALC/DUMMY(14065)                                         RA428007
      DATA C,COMMA,PAUS,IBLO/1HC,1H,,4HPAUS,4HIBLO/                     RA428008
      DATA CONT/4HCONT/                                                 RA428009
      CALL CLOCK (ITIME)                                                RA428010
      IBC=0                                                             RA428011
 100  CALL CARD                                                         RA428012
      CALL PACK (2,5,WO,RA)                                             RA428013
 110  IF(ZERO(WO,IBLO)) GO TO 120                                       RA428014
 115  RETURN                                                            RA428015
 120  CALL IBLCAD (IBC)                                                 RA428016
      IF(IBC)125,115,125                                                RA428017
 125  CALL COMP                                                         RA428018
      CALL PACK (2,5,WO,RA)                                             RA428019
      IF(ZERO(WO,CONT)) GO TO 100                                       RA428020
      GO TO 115                                                         RA428021
      END                                                               RA428022
```

```
$ORIGIN        D,CK2,NOREW                                                  000
$IBFTC RD129   M94,FULIST,REF,XR6                                       RD129000
      SUBROUTINE IBLOAD (IBC)                                           RD129001
C               REGRESSION CONTROL CARD DECODE ROUTINE                  RD129002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RD129003
      COMMON/FTYPE/ITYPEF                                               RD129004
      COMMON/IBALC/ICHZT,VALZT                                          RD129005
      COMMON/IBALC/IO(25),IB(14,25),AB(14,25),IP(25,8,4),IT(2,25),      RD129006
     1L,A(2),B(2),IBB,N,IS,I,M,K,J,WO,II,DXUYMZ(12476)                  RD129007
      LOGICAL ZERO,NZER                                                 RD129008
      DATA FTTST/2HFT/                                                  RD129009
      DATA COMMA,TH,TA,TE,PH,PO,SLASH,LPRN,RPRN,ONE,TWO,THR,FOU,BLANK/  RD129010
     11H,,2HCH,2HCA,2HTE,2HPH,2HPO,1H/,1H(,1H),1H1,1H2,1H3,1H4,1H /     RD129011
      DATA P/1HP/,ZT,LT,TT/1HZ,1HL,1HT/                                 RD129012
      DATA ZTEST,VALU/2HZT,2HVA/                                        RD129013
      ITYPEF=1                                                          RD129014
      ICHZT=1                                                           RD129015
      VALZT=-5.                                                         RD129016
      DO 105 J=1,25                                                     RD129017
      DO 100 I=1,2                                                      RD129018
 100  IT(I,J)=0                                                         RD129019
      DO 102 I=1,14                                                     RD129020
      IB(I,J)=0                                                         RD129021
 102  AB(I,J)=0.0                                                       RD129022
```


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```
105   CONTINUE                                                          RD129023
      L=1                                                               RD129024
      K=-3                                                              RD129025
      J=5                                                               RD129026
      IBC=0                                                             RD129027
      IBB=0                                                             RD129028
110   J=J+1                                                             RD129029
      IF(NZER(RA(J),COMMA)) GO TO 110                                   RD129030
      IF(NZER(RA(J+1),COMMA)) GO TO 120                                 RD129031
      CALL GTCRD (J)                                                    RD129032
      IF(J-1)120,115,110                                                RD129033
115   RETURN                                                            RD129034
120   CALL PACK (J+1,J+2,WO,RA)                                         RD129035
      J=J+2                                                             RD129036
      IF(ZERO(WO    ,TH)) GO TO 200                                     RD129037
      IF(ZERO(WO    ,TA)) GO TO 300                                     RD129038
      IF(ZERO(WO,TE)) GO TO 125                                         RD129039
      IF(ZERO(WO,FTTST)) GO TO 600                                      RD129040
      IF(ZERO(WO,ZTEST)) GO TO 250                                      RD129041
      IF(ZERO(WO,VALU)) GO TO 260                                       RD129042
      DO 121 I=1,4                                                      RD129043
121   IP(L,8,I)=0                                                       RD129044
122   IF(ZERO(WO,PH)) GO TO 400                                         RD129045
      IF(ZERO(WO,PC)) GO TO 500                                         RD129046
125   J=J+1                                                             RD129047
      IF(NZER(RA(J),SLASH)) GO TO 125                                   RD129048
      M=J+1                                                             RD129049
130   J=J+1                                                             RD129050
      IF(NZER(RA(J),COMMA)) GO TO 130                                   RD129051
      CALL PACK (M,J-1,A(1),RA)                                         RD129052
      CALL NUMBER (A,IT(1,L),-1)                                        RD129053
140   IF(NZER(RA(J+1),COMMA)) GO TO 190                                 RD129054
      CALL GTCRD (J)                                                    RD129055
      IF(J-1)190,160,150                                                RD129056
150   J=J+1                                                             RD129057
      IF(NZER(RA(J),COMMA)) GO TO 150                                   RD129058
      GO TO 140                                                         RD129059
160   K=K+1                                                             RD129060
      IF(K)165,165,170                                                  RD129061
165   CALL WROUT (12,300)                                               RD129062
      GO TO 115                                                         RD129063
170   IF(IBB)115,180,115                                                RD129064
180   IBC=1                                                             RD129065
      RETURN                                                            RD129066
190   K=K+1                                                             RD129067
      IF(K)120,120,195                                                  RD129068
195   K=-3                                                              RD129069
      L=L+1                                                             RD129070
      GO TO 120                                                         RD129071
200   J=J+1                                                             RD129072
      IF(NZER(RA(J),SLASH)) GO TO 200                                   RD129073
      M=J+1                                                             RD129074
205   J=J+1                                                             RD129075
      IF(NZER(RA(J),LPRN)) GO TO 205                                    RD129076
      CALL PACK (M,J-1,A(1),RA)                                         RD129077
      CALL NUMBER (A,IT(2,L),-1)                                        RD129078
      N=1                                                               RD129079
210   M=J+1                                                             RD129080
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215   J=J+1                                                    RD129081
      IF(ZERO(RA(J),COMMA)) GO TO 225                          RD129082
      IF(NZER(RA(J),RPRN)) GO TO 215                           RD129083
      CALL PACK (M,J-1,A(1),RA)                                RD129084
      CALL NUMBER (A,IB(N,L),-1)                               RD129085
      J=J+1                                                    RD129086
      IF(N-IT(2,L))220,140,220                                 RD129087
220   CALL WROUT (1,301)                                       RD129088
      IBB=1                                                    RD129089
      GO TO 140                                                RD129090
225   CALL PACK (M,J-1,A(1),RA)                                RD129091
      CALL NUMBER (A,IB(N,L),-1)                               RD129092
      IF(ZERO(RA(J+1),COMMA)) GO TO 235                        RD129093
230   N=N+1                                                    RD129094
      GO TO 210                                                RD129095
235   CALL GTCRD (J)                                           RD129096
      IF(J-1)230,240,245                                       RD129097
240   CALL WROUT (1,302)                                       RD129098
      RETURN                                                   RD129099
245   J=J+1                                                    RD129100
      IF(NZER(RA(J),COMMA)) GO TO 245                          RD129101
      GO TO 230                                                RD129102
250   J=J+1                                                    RD129103
      IF(NZER(RA(J),SLASH)) GO TO 250                          RD129104
      M=J+1                                                    RD129105
255   J=J+1                                                    RD129106
      IF(NZER(RA(J),COMMA)) GO TO 255                          RD129107
      M1=J-1                                                   RD129108
      CALL PACK (M,M1,A(1),RA)                                 RD129109
      CALL NUMBER (A,ICHZT,-1)                                 RD129110
      J=J-1                                                    RD129111
      GO TO 110                                                RD129112
260   J=J+1                                                    RD129113
      IF(NZER(RA(J),SLASH)) GO TO 260                          RD129114
      M=J+1                                                    RD129115
265   J=J+1                                                    RD129116
      IF(NZER(RA(J),COMMA)) GO TO 265                          RD129117
      CALL PACK (M,J-1,A(2),RA)                                RD129118
      A(1)=BLANK                                               RD129119
      CALL NUMBER (A,VALZT,1)                                  RD129120
      J=J-1                                                    RD129121
      GO TO 110                                                RD129122
300   N=1                                                      RD129123
      IS=0                                                     RD129124
305   J=J+1                                                    RD129125
      IF(NZER(RA(J),SLASH)) GO TO 305                          RD129126
      M=J+1                                                    RD129127
310   J=J+1                                                    RD129128
      IF(NZER(RA(J),LPRN)) GO TO 310                           RD129129
      CALL PACK (M,J-1,A(1),RA)                                RD129130
      CALL NUMBER (A,LL,-1)                                    RD129131
320   I=1                                                      RD129132
325   M=J+1                                                    RD129133
330   J=J+1                                                    RD129134
      IF(ZERO(RA(J),COMMA)) GO TO 335                          RD129135
      IF(NZER(RA(J),RPRN)) GO TO 330                           RD129136
      IS=1                                                     RD129137
335   IF(J-M-6)340,340,345                                     RD129138
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340   WO=BLANK                                                    RD129139
      GO TO 350                                                   RD129140
345   CALL PACK (M,M+5,WO,RA)                                     RD129141
      M=M+6                                                       RD129142
350   CALL PACK (M,J-1,WOO,RA)                                    RD129143
      IF(I-1)355,355,370                                          RD129144
355   A(1)=WO                                                     RD129145
      A(2)=WOO                                                    RD129146
      IF(IS)360,360,375                                           RD129147
360   I=I+1                                                       RD129148
      GO TO 325                                                   RD129149
370   B(1)=WO                                                     RD129150
      B(2)=WOO                                                    RD129151
375   CALL NUMBER (A,B,I)                                         RD129152
      AB(N,L)=B(1)                                                RD129153
      M=N+1                                                       RD129154
      AB(M,L)=B(2)                                                RD129155
      IF(IS)380,380,385                                           RD129156
380   N=N+2                                                       RD129157
      GO TO 320                                                   RD129158
385   J=J+1                                                       RD129159
      N=N+I-1                                                     RD129160
      IF(N-LL)220,140,220                                         RD129161
400   J=J+1                                                       RD129162
      IF(NZER(RA(J),SLASH)) GO TO 400                             RD129163
      J=J+1                                                       RD129164
      I=4                                                         RD129165
      IF(ZERO(RA(J),ONE)) I=1                                     RD129166
      IF(ZERO(RA(J),TWO)) I=2                                     RD129167
      IF(ZERO(RA(J),THR)) I=3                                     RD129168
405   J=J+1                                                       RD129169
      IF(NZER(RA(J),COMMA)) GO TO 405                             RD129170
      IF(NZER(RA(J+1),COMMA)) GO TO 415                           RD129171
      CALL GTCRD (J)                                              RD129172
      IF(J-1)415,160,405                                          RD129173
410   CALL WROUT (1,303)                                          RD129174
      RETURN                                                      RD129175
415   IF(NZER(RA(J+1),P)) GO TO 140                               RD129176
      CALL PACK (J+1,J+2,WO,RA)                                   RD129177
      GO TO 122                                                   RD129178
500   J=J+1                                                       RD129179
      IF(NZER(RA(J),SLASH)) GO TO 500                             RD129180
      M=J+1                                                       RD129181
505   J=J+1                                                       RD129182
      IF(NZER(RA(J),LPRN)) GO TO 505                              RD129183
      CALL PACK (M,J-1,WO,RA)                                     RD129184
      CALL NUMBER (WO,II,-1)                                      RD129185
      IP(L,8,I)=II                                                RD129186
      IS=0                                                        RD129187
      KL=1                                                        RD129188
510   M=J+1                                                       RD129189
515   J=J+1                                                       RD129190
      IF(ZERO(RA(J),COMMA)) GO TO 520                             RD129191
      IF(NZER(RA(J),RPRN)) GO TO 515                              RD129192
      IS=1                                                        RD129193
520   IF(NZER(RA(M),ZT)) GO TO 525                                RD129194
      II=-1                                                       RD129195
      GO TO 540                                                   RD129196
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525   IF(NZER(RA(M),P)) GO TO 530                                    RD129197
      II=-2                                                          RD129198
      GO TO 540                                                      RD129199
530   IF(NZER(RA(M),TT)) GO TO 535                                   RD129200
      II=-3                                                          RD129201
      GO TO 540                                                      RD129202
535   IF(NZER(RA(M),LT)) GO TO 555                                   RD129203
      II=-4                                                          RD129204
540   IP(L,KL,I)=II                                                  RD129205
      KL=KL+1                                                        RD129206
      IF(IS-1)545,405,545                                            RD129207
545   IF(NZER(RA(J+1),COMMA)) GO TO 510                              RD129208
      CALL GTCRD (J)                                                 RD129209
      IF(J-1)510,410,550                                             RD129210
550   J=J+1                                                          RD129211
      IF(NZER(RA(J),COMMA)) GO TO 550                                RD129212
      GO TO 510                                                      RD129213
555   CALL PACK (M,J-1,WO,RA)                                        RD129214
      CALL NUMBER (WO,II,-1)                                         RD129215
      GO TO 540                                                      RD129216
600   J=J+1                                                          RD129217
      IF(NZER(RA(J),SLASH)) GO TO 600                                RD129218
      M=J+1                                                          RD129219
605   J=J+1                                                          RD129220
      IF(NZER(RA(J),COMMA)) GO TO 605                                RD129221
      CALL PACK (M,J-1,WO,RA)                                        RD129222
      CALL NUMBER (WO,ITYPEF,-1)                                     RD129223
      J=J-1                                                          RD129224
      GO TO 110                                                      RD129225
      END                                                            RD129226
```

```
$IBFTC RD130   M94,FULIST,REF,XR6                                    RD130000
      SUBROUTINE NUMBER (A,B,I)                                      RD130001
C                AUXILIARY CARD DECODE ROUTINE                       RD130002
      DIMENSION A(2),B(2)                                            RD130003
 1    FORMAT (4A6)                                                   RD130004
 2    FORMAT (2I6)                                                   RD130005
 3    FORMAT (2E12.0)                                                RD130006
      CALL RITE31                                                    RD130007
      WRITE (31,1) A,B                                               RD130008
      CALL READ31                                                    RD130009
      IF(I)100,100,110                                               RD130010
 100  READ (31,2) (B(J),J=1,I)                                       RD130011
 105  RETURN                                                         RD130012
 110  READ (31,3) (B(J),J=1,I)                                       RD130013
      RETURN                                                         RD130014
      END                                                            RD130015
```


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```
$IBFTC RD131    M94,FULIST,REF,XR6                                      RD131000
      SUBROUTINE GTCRD (J)                                              RD131001
C                REGRESSION CONTROL CARD READER                       RD131002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RD131003
      LOGICAL NZER,ZERO                                                 RD131004
      DATA STAR,IBLO/1H*,4HIBLO/                                        RD131005
      CALL CARD                                                         RD131006
      J=0                                                               RD131007
      IF(NZER(RA(1),STAR)) GO TO 100                                    RD131008
      J=1                                                               RD131009
      CALL PACK (2,5,WO,RA)                                             RD131010
      IF(ZERO(WO,IBLO)) J=5                                             RD131011
 100  RETURN                                                            RD131012
      END                                                               RD131013
```

```
$ORIGIN         D,CK2,NOREW                                                 000
$IBFTC RD232    M94,FULIST,REF,XR6                                      RD232000
      SUBROUTINE CCMP                                                   RD232001
C                REGRESSION SYSTEM COMPUTATIONAL CONTROL              RD232002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RD232003
      COMMON/IBALC/ICHZT,VALZT                                          RD232004
      COMMON/IBALC/IO(25),IB(14,25),DXUYMZ(13690)                       RD232005
      COMMON/ISBCOM/ISB                                                 RD232006
      LOGICAL SWITCH                                                    RD232007
 1234 FORMAT (23H REGRESSION TIME PHASE I2,9H CHANNEL I2,               RD232008
     16H TIME F6.2,6H SECS.)                                            RD232009
 1244 FORMAT (32H REGRESSION INITIALIZATION TIME F6.2,6H SECS.)         RD232010
      IF(SWITCH(1,3)) GO TO 200                                         RD232011
      CALL TPGEN (N)                                                    RD232012
      CALL CLOCK (ITIME)                                                RD232013
      TIME=ITIME                                                        RD232014
      TIME=TIME/60.                                                     RD232015
      WRITE (6,1244) TIME                                               RD232016
      IF(N)200,200,100                                                  RD232017
 100  DO 190 K=1,N                                                      RD232018
      IJKL=1                                                            RD232019
 125  CALL TFND (IO(K),M,IPH,IJKL)                                      RD232020
      IF(IJKL)190,190,150                                               RD232021
 150  L=IO(K)                                                           RD232022
      DO 160 J=1,M                                                      RD232023
      K=IB(J,L)                                                         RD232024
      CALL ACOMP (K,IPH,L)                                              RD232025
      CALL CLOCK (ITIME)                                                RD232026
      TIME=ITIME                                                        RD232027
      TIME=TIME/60.                                                     RD232028
      WRITE (6,1234) IPH,K,TIME                                         RD232029
 160  CONTINUE                                                          RD232030
      IJKL=2                                                            RD232031
      GO TO 125                                                         RD232032
 190  CONTINUE                                                          RD232033
 200  RETURN                                                            RD232034
      END                                                               RD232035
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```
$ORIGIN        E,CK2,NOREW                                                  000
$IBFTC RE133   M94,FULIST,REF,XR6                                        RE133000
      SUBROUTINE TRGEN (N)                                               RE133001
C               REGRESSION SYSTEM INPUT GENERATOR                        RE133002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           RE133003
      COMMON/IBALC/ICHZT,VALZT                                           RE133004
      COMMON/IBALC/IO(25),IB(14,25),AB(14,25),IP(25,8,4),IT(2,25),L,     RE133005
     1K,DUM,NORM(14),CAL(14),ID(20),BUF(2800),DXUYMZ(9639)               RE133006
      DIMENSION IBUF(2800),BBUF(14,200),JBUF(14,200),FNORM(14)           RE133007
      EQUIVALENCE (NORM,FNORM),(IBUF,BBUF,JBUF,BUF)                      RE133008
 1    FORMAT (44H ***** IBALL CASE COUNT IS NOT CORRECT *****)           RE133009
      REWIND 2                                                           RE133010
      REWIND 11                                                          RE133011
      N=1                                                                RE133012
 95   READ (2) ID                                                        RE133013
      IF(ID(1))200,200,100                                               RE133014
 100  DO 180 I=1,L                                                       RE133015
      IF(ID(1)-IT(1,L))180,110,180                                       RE133016
 110  IO(N)=I                                                            RE133017
      K=0                                                                RE133018
 115  WRITE (11) IC                                                      RE133019
      READ (2) BUF                                                       RE133020
      IF(K)120,120,135                                                   RE133021
 120  K=10                                                               RE133022
      DO 125 J=1,14                                                      RE133023
 125  NORM(J)=IBUF(J)                                                    RE133024
      M=IT(2,I)                                                          RE133025
      DO 130 J=1,M                                                       RE133026
      KK=IB(J,I)                                                         RE133027
 130  CAL(KK)=AB(J,I)                                                    RE133028
 135  DO 160 II=1,14                                                     RE133029
      DO 160 J=1,200                                                     RE133030
      IF(ID(20))145,140,145                                              RE133031
 140  BBUF(II,J)=JBUF(II,J)-NORM(II)                                     RE133032
      GO TO 150                                                          RE133033
 145  BBUF(II,J)=BBUF(II,J)-FNORM(II)                                    RE133034
 150  BBUF(II,J)=BBUF(II,J)*CAL(II)                                      RE133035
 160  CONTINUE                                                           RE133036
      WRITE (11) BUF                                                     RE133037
      IF(ID(2))175,170,175                                               RE133038
 170  READ (2) ID                                                        RE133039
      GO TO 115                                                          RE133040
 175  N=N+1                                                              RE133041
      GO TO 95                                                           RE133042
 180  CONTINUE                                                           RE133043
 185  READ (2) DUM                                                       RE133044
      IF(ID(2))95,190,95                                                 RE133045
 190  READ (2) ID                                                        RE133046
      GO TO 185                                                          RE133047
 200  N=N-1                                                              RE133048
      IF(N-L)205,210,205                                                 RE133049
 205  WRITE (6,1)                                                        RE133050
 210  REWIND 11                                                          RE133051
      RETURN                                                             RE133052
      END                                                                RE133053
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```
$ORIGIN        E,CK2,NOREW                                                  000
$IBFTC RE234   M94,FULIST,REF,XR6                                        RE234000
      SUBROUTINE TFND (L,K,IPH,IJKL)                                     RE234001
C               REGRESSION SYSTEM POINT DETERMINATION                    RE234002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           RE234003
      COMMON/FTYPE/ITYPEF                                                RE234004
      COMMON/IBALC/ICHZT,VALZT                                           RE234005
      COMMON/IBALC/IO(25),IB(14,25),AB(14,25),IP(25,8,4),JT(2,25),IT(14,RE234006
     17,3),ID(20),BU(2800,4),FFL(14),TRZ(14),PHT(14,4),S(14),AINT(14,5),RE234007
     1P(14),TR(14),A(17,17),B(17),DXUYMZ(474)                            RE234008
      COMMON/ISBCOM/ISB                                                  RE234009
      DIMENSION BE(14,200,4)                                             RE234010
      EQUIVALENCE (BU,BE)                                                RE234011
 1    FORMAT (6H TEST I6,32H NO RELEASE POINT COULD BE FOUND)            RE234012
 2    FORMAT (6H TEST I6,37H NO INITIAL ZERO CROSSINGS WERE FOUND)       RE234013
 3    FORMAT (6H TEST I6,42H INITIAL ZERO CROSSINGS FOR THE FOLLOWING ,  RE234014
     129HCHANNEL(S) COULD NOT BE FOUND)                                  RE234015
 4    FORMAT (10X,8HCHANNEL I3)                                          RE234016
 5    FORMAT (6H TEST I6,9H CHANNEL I3,23H DISCONTINUED IN PHASE I2)     RE234017
 6    FORMAT (60X,6HTEST  I6/58X,15HINTEGRAL VALUES/1H0,5X,7HCHANNEL,    RE234018
     12X,30H1/2 ABS(F(T)) (T(0) TO T(END)),2X,25H  (F(T)) (T(3) TO T(ENDRE234019
     2)),2X,21HF(T) (T(0) TO T(END)),2X,28HA(F(T)) (T(0) TO (END OF A)))RE234020
 7    FORMAT (8X,I3,11X,1PE12.5,17X,1PE12.5,13X,1PE12.5,15X,1PE12.5)     RE234021
 8    FORMAT (34H0*****  *****  *****  END OF TEST I3,                   RE234022
     120H *****  *****  *****)                                           RE234023
 10   FORMAT (6(2X,1PE12.5,2X))                                          RE234024
 11   FORMAT (8(2X,I6,2X))                                               RE234025
      IC=JT(2,L)                                                         RE234026
      GO TO (90,905),IJKL                                                RE234027
 90   CONTINUE                                                           RE234028
      INM=10                                                             RE234029
      MMNN=0                                                             RE234030
      DO 100 I=1,14                                                      RE234031
      TRZ(I)=0.0                                                         RE234032
      FFL(I)=0.0                                                         RE234033
      DO 100 J=1,7                                                       RE234034
      IT(I,J,3)=0                                                        RE234035
 100  CONTINUE                                                           RE234036
 105  I=1                                                                RE234037
 107  READ (11) ID                                                       RE234038
      READ (11) (BU(J,I),J=1,2800)                                       RE234039
      IF(I-4)110,115,115                                                 RE234040
 110  IF(ID(2))112,113,112                                               RE234041
 112  INM=I+1                                                            RE234042
      GO TO 115                                                          RE234043
 113  I=I+1                                                              RE234044
      GO TO 107                                                          RE234045
 115  IC=JT(2,L)                                                         RE234046
      IN=1                                                               RE234047
      GO TO (120,116),ITYPEF                                             RE234048
 116  NN=0                                                               RE234049
      MM=1                                                               RE234050
      DO 117 I=1,14                                                      RE234051
      DO 117 J=1,5                                                       RE234052
 117  AINT(I,J)=0.0                                                      RE234053
      ISB=0                                                              RE234054
      IDT=0                                                              RE234055
      GO TO 247                                                          RE234056
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120   DO 160 J=1,200                                                  RE234057
      IF(BE(ICHZT,J,IN)-VALZT) 125,125,160                            RE234058
125   K=J+19                                                          RE234059
      S(1)=0.0                                                        RE234060
      J=J                                                             RE234061
      DO 145 M=J,K                                                    RE234062
      IF(M-200)140,140,130                                            RE234063
130   MM=M-200                                                        RE234064
      NN=IN+1                                                         RE234065
      IF(NN.LE.4) GO TO 135                                           RE234066
      DMD=M-J+1                                                       RE234067
      GO TO 150                                                       RE234068
135   S(1)=S(1)+BE(ICHZT,MM,NN)                                       RE234069
      GO TO 145                                                       RE234070
140   MM=M                                                            RE234071
      NN=IN                                                           RE234072
      GO TO 135                                                       RE234073
145   CONTINUE                                                        RE234074
      DMD=20.                                                         RE234075
150   S(1)=S(1)/DMD                                                   RE234076
      IF(S(1)-VALZT)170,170,160                                       RE234077
160   CONTINUE                                                        RE234078
      IN=IN+1                                                         RE234079
      IF(IN-INM)165,185,185                                           RE234080
165   IF(IN.GT.4) GO TO 105                                           RE234081
      GO TO 120                                                       RE234082
170   DO 175 M=1,IC                                                   RE234083
      K=IB(M,L)                                                       RE234084
      IT(K,1,3)=1                                                     RE234085
      IT(K,1,2)=IN                                                    RE234086
      IT(K,1,1)=J                                                     RE234087
175   CONTINUE                                                        RE234088
      NN=IN-1                                                         RE234089
      MM=J                                                            RE234090
      GO TO 203                                                       RE234091
185   WRITE (6,1) JT(1,L)                                             RE234092
      IJKL=0                                                          RE234093
      RETURN                                                          RE234094
203   CONTINUE                                                        RE234095
      IF(INM.LE.4) GO TO 210                                          RE234096
      J=NN+1                                                          RE234097
      IF(J.LE.1)GO TO 210                                             RE234098
      CALL BUFILL (INM,1)                                             RE234099
      IF(INM.LE.4) GO TO 210                                          RE234100
      IF(J.LE.2)GO TO 210                                             RE234101
      CALL BUFILL (INM,2)                                             RE234102
      IF(INM.LE.4) GO TO 210                                          RE234103
      IF(J.LE.3) GO TO 210                                            RE234104
      CALL BUFILL (INM,3)                                             RE234105
210   DO 215 I=1,14                                                   RE234106
      S(I)=0.0                                                        RE234107
      DO 215 J=1,5                                                    RE234108
      AINT(I,J)=0.0                                                   RE234109
215   CONTINUE                                                        RE234110
      ISB=0                                                           RE234111
      IDT=0                                                           RE234112
      N=MM+110                                                        RE234113
      IN=NN+1                                                         RE234114
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      IF(MM-190)216,216,217                                             RE234115
216   M=MM+10                                                           RE234116
      GO TO 220                                                         RE234117
217   M=MM-190                                                          RE234118
      IN=IN+1                                                           RE234119
      IF(IN.GT.4)IN=1                                                   RE234120
220   DO 222 J=1,IC                                                     RE234121
      K=IB(J,L)                                                         RE234122
      S(K)=S(K)+BE(K,M,IN)                                              RE234123
222   CONTINUE                                                          RE234124
      M=M+1                                                             RE234125
      IF(M-N)225,225,240                                                RE234126
225   IF(M-200)220,220,230                                              RE234127
230   M=1                                                               RE234128
      N=N-200                                                           RE234129
      IN=IN+1                                                           RE234130
      IF(IN.GT.4)  IN=1                                                 RE234131
      GO TO 220                                                         RE234132
240   DO 245 J=1,IC                                                     RE234133
      K=IB(J,L)                                                         RE234134
      FFL(K)=S(K)/100.                                                  RE234135
245   CONTINUE                                                          RE234136
247   CONTINUE                                                          RE234137
      DO 250 I=1,14                                                     RE234138
      DO 250 J=1,7                                                      RE234139
      IT(I,J,1)=0                                                       RE234140
      IT(I,J,2)=0                                                       RE234141
      IT(I,J,3)=0                                                       RE234142
250   CONTINUE                                                          RE234143
      IPH=1                                                             RE234144
      M=MM                                                              RE234145
      IN=NN+1                                                           RE234146
253   DO 300 J=1,IC                                                     RE234147
      K=IB(J,L)                                                         RE234148
      IF(IT(K,1,3))300,255,300                                          RE234149
255   AINT(K,1)=AINT(K,1)+ABS(BE(K,M,IN))                               RE234150
      AINT(K,3)=AINT(K,3)+BE(K,M,IN)                                    RE234151
      IF(ITYPEF.GT.1) GO TO 280                                         RE234152
      IF(BE(K,M,IN))300,260,260                                         RE234153
260   I=M+1                                                             RE234154
      IQ=IN                                                             RE234155
      II=I+20                                                           RE234156
263   IF(I-200)270,270,265                                              RE234157
265   I=1                                                               RE234158
      II=II-200                                                         RE234159
      IQ=IQ+1                                                           RE234160
      IF(IQ.GT.4)  IQ=1                                                 RE234161
270   IF(BE(K,I,IQ))300,300,275                                         RE234162
275   I=I+1                                                             RE234163
      IF(I-II)263,263,280                                               RE234164
280   IT(K,1,1)=M                                                       RE234165
      IT(K,1,2)=IN                                                      RE234166
      IT(K,1,3)=1                                                       RE234167
      DDT=IDT                                                           RE234168
      TRZ(K)=DDT*DT                                                     RE234169
      IP(L,1,IPH)=1                                                     RE234170
      IF(ISB)300,290,300                                                RE234171
290   ISB=IN                                                            RE234172
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      ISP=M                                                             RE234173
  300 CONTINUE                                                          RE234174
      NM=0                                                              RE234175
      DO 305 J=1,IC                                                     RE234176
      K=IB(J,L)                                                         RE234177
      NM=NM+IT(K,1,3)                                                   RE234178
  305 CONTINUE                                                          RE234179
      IF(NM.GE.IC)GO TO 400                                             RE234180
      IDT=IDT+1                                                         RE234181
      M=M+1                                                             RE234182
      IF(M-200)253,253,310                                              RE234183
  310 M=1                                                               RE234184
      IF(ISB)325,315,325                                                RE234185
  315 IF(INM-4)325,325,320                                              RE234186
  320 CALL BUFILL (INM,IN)                                              RE234187
  325 IN=IN+1                                                           RE234188
      IF(IN.GT.4) IN=1                                                  RE234189
      IF(IN-INM)330,340,330                                             RE234190
  330 IF(IN-ISB)253,350,253                                             RE234191
  340 IF(NM)345,345,350                                                 RE234192
  345 WRITE (6,2) JT(1,L)                                               RE234193
      GO TO 2000                                                        RE234194
  350 WRITE (6,3) JT(1,L)                                               RE234195
      DO 360 J=1,IC                                                     RE234196
      K=IB(J,L)                                                         RE234197
      IF(IT(K,1,3))360,355,360                                          RE234198
  355 WRITE (6,4) K                                                     RE234199
  360 CONTINUE                                                          RE234200
      J=1                                                               RE234201
  365 K=IB(J,L)                                                         RE234202
      IF(IT(K,1,3))366,368,366                                          RE234203
  366 J=J+1                                                             RE234204
      GO TO 375                                                         RE234205
  368 M=J+1                                                             RE234206
      DO 370 K=M,IC                                                     RE234207
      I=K-1                                                             RE234208
      IB(I,L)=IB(K,L)                                                   RE234209
  370 CONTINUE                                                          RE234210
      IC=IC-1                                                           RE234211
      IF(IC)2000,2000,375                                               RE234212
  375 IF(J-IC)365,365,400                                               RE234213
  400 J=1                                                               RE234214
  403 K=IB(J,L)                                                         RE234215
      IF(J-IC)405,405,701                                               RE234216
  405 M=IT(K,1,1)                                                       RE234217
      IN=IT(K,1,2)                                                      RE234218
      S(K)=0.0                                                          RE234219
  410 I=M+19                                                            RE234220
      IF(I-200)412,412,415                                              RE234221
  412 IM=IN                                                             RE234222
      GO TO 440                                                         RE234223
  415 IM=IN+1                                                           RE234224
      I=I-200                                                           RE234225
      IF(IM.GT.4) IM=1                                                  RE234226
      IF(IM-ISB)420,425,420                                             RE234227
  420 IF(IM-INM)440,425,440                                             RE234228
  425 WRITE (6,5) JT(1,L),K,IPH                                         RE234229
      DO 430 I=K,IC                                                     RE234230
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      IB(I,L)=IB(I+1,L)                                                 RE234231
430   CONTINUE                                                          RE234232
      IC=IC-1                                                           RE234233
      J=J+1                                                             RE234234
      IF(IC)2000,2000,403                                               RE234235
440   S(K)=BE(K,I,IM)-BE(K,M,IN)                                        RE234236
      IF(S(K))455,455,445                                               RE234237
445   M=M+1                                                             RE234238
      IF(M-200)410,410,450                                              RE234239
450   M=1                                                               RE234240
      IN=IN+1                                                           RE234241
      IF(IN.GT.4) IN=1                                                  RE234242
      GO TO 410                                                         RE234243
455   II=M+18                                                           RE234244
      IK=M+1                                                            RE234245
      DO 463 JJ=IK,II                                                   RE234246
      IF(JJ-200)460,460,461                                             RE234247
460   J1=JJ                                                             RE234248
      J2=IN                                                             RE234249
      GO TO 462                                                         RE234250
461   J1=JJ-200                                                         RE234251
      J2=IN+1                                                           RE234252
      IF(J2.GT.4) J2=1                                                  RE234253
462   IF(BE(K,J1,J2)-BE(K,M,IN)) 463,445,445                            RE234254
463   CONTINUE                                                          RE234255
475   S(K)=BE(K,M,IN)                                                   RE234256
      IIJ=IN                                                            RE234257
      III=M                                                             RE234258
      I=IP(L,8,IPH)                                                     RE234259
      DO 500 M=1,I                                                      RE234260
      IF(IP(L,M,IPH)+2)500,498,500                                      RE234261
498   IT(K,M,1)=III                                                     RE234262
      IT(K,M,2)=IIJ                                                     RE234263
      IT(K,M,3)=0                                                       RE234264
      P(K)=S(K)                                                         RE234265
      IP(L,M,IPH)=0                                                     RE234266
      IPSFP=M                                                           RE234267
      GO TO 505                                                         RE234268
500   CONTINUE                                                          RE234269
505   M=II                                                              RE234270
      IN=IM                                                             RE234271
510   I=M+19                                                            RE234272
      IF(I-200)528,528,515                                              RE234273
515   I=I-200                                                           RE234274
      IM=IN+1                                                           RE234275
      IF(IM.GT.4)IM=1                                                   RE234276
      IF(IM-ISB)525,520,525                                             RE234277
520   IB(J,L)=-1                                                        RE234278
      M=200                                                             RE234279
      GO TO 555                                                         RE234280
525   IF(IM-INM)530,520,530                                             RE234281
528   IM=IN                                                             RE234282
530   S(K)=BE(K,I,IM)-BE(K,M,IN)                                        RE234283
      IF(S(K))535,545,545                                               RE234284
535   M=M+1                                                             RE234285
      IF(M-200)510,510,540                                              RE234286
540   M=1                                                               RE234287
      IN=IM                                                             RE234288
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      GO TO 510                                                         RE234289
545   IK=M+1                                                            RE234290
      II=M+18                                                           RE234291
      DO 549 JJ=IK,II                                                   RE234292
      IF(JJ-200)546,546,547                                             RE234293
546   J1=JJ                                                             RE234294
      J2=IN                                                             RE234295
      GO TO 548                                                         RE234296
547   J1=JJ-200                                                         RE234297
      J2=IN+1                                                           RE234298
      IF(J2.GT.4) J2=1                                                  RE234299
548   IF(BE(K,M,IN)-BE(K,J1,J2)) 549,535,535                            RE234300
549   CONTINUE                                                          RE234301
555   S(K)=BE(K,M,IN)                                                   RE234302
      IJ=IN                                                             RE234303
      II=M                                                              RE234304
      I=IP(L,8,IPH)                                                     RE234305
      IT(K,I,1)=II                                                      RE234306
      IT(K,I,2)=IN                                                      RE234307
      IT(K,I,3)=1                                                       RE234308
      TR(K)=S(K)                                                        RE234309
      IP(L,I,IPH)=1                                                     RE234310
      I=I-1                                                             RE234311
      II=1                                                              RE234312
      DO 700 N=2,I                                                      RE234313
      IF(IP(L,N,IPH))695,695,600                                        RE234314
600   IF(II-1)605,605,650                                               RE234315
605   IJ=IT(K,1,1)                                                      RE234316
      IM=IT(K,1,2)                                                      RE234317
      S(K)=P(K)-BE(K,IJ,IM)                                             RE234318
      AP=IP(L,N,IPH)                                                    RE234319
      S(K)=BE(K,IJ,IM)+AP*S(K)/100.                                     RE234320
      M=III                                                             RE234321
      IN=IIJ                                                            RE234322
608   M=M-1                                                             RE234323
      IF(M)610,610,615                                                  RE234324
610   M=200                                                             RE234325
      IN=IN-1                                                           RE234326
      IF(IN.LE.0) IN=4                                                  RE234327
      IF(IN.EQ.IIJ) GO TO 620                                           RE234328
615   IF(BE(K,M,IN)-S(K))690,690,608                                    RE234329
620   WRITE (6,11) IT(K,1,1),IT(K,1,2)                                  RE234330
      DO 625 IQR=1,4                                                    RE234331
625   WRITE (6,10) (BE(K,IRQ,IQR),IRQ=1,200)                            RE234332
      J=J+1                                                             RE234333
      IF(J-IC)702,702,185                                               RE234334
650   S(K)=P(K)-TR(K)                                                   RE234335
      AP=IP(L,N,IPH)                                                    RE234336
      S(K)=TR(K)+AP*S(K)/100.                                           RE234337
      M=III                                                             RE234338
      IN=IIJ                                                            RE234339
655   M=M+1                                                             RE234340
      IF(M-200)670,670,660                                              RE234341
660   M=1                                                               RE234342
      IN=IN+1                                                           RE234343
      IF(IN.GT.4) IN=1                                                  RE234344
670   IF(BE(K,M,IN)-S(K))690,690,655                                    RE234345
690   IT(K,N,1)=M                                                       RE234346
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      IT(K,N,2)=IN                                                      RE234347
      IT(K,N,3)=1                                                       RE234348
      GO TO 700                                                         RE234349
695   II=2                                                              RE234350
700   CONTINUE                                                          RE234351
      J=J+1                                                             RE234352
      IF(J.GT.IC) GO TO 701                                             RE234353
702   IP(L,IPSFP,IPH)=-2                                                RE234354
      GO TO 403                                                         RE234355
701   IJKL=1                                                            RE234356
      K=IC                                                              RE234357
      RETURN                                                            RE234358
750   IF(IPH.GT.4) GO TO 1000                                           RE234359
      IF(IP(L,8,IPH))760,1000,760                                       RE234360
760   II=IPH-1                                                          RE234361
      I=IP(L,8,II)                                                      RE234362
      IF(IP(L,I,II))1000,1000,770                                       RE234363
770   DO 775 K=1,14                                                     RE234364
      IT(K,1,1)=IT(K,I,1)                                               RE234365
      IT(K,1,2)=IT(K,I,2)                                               RE234366
      IT(K,1,3)=1                                                       RE234367
      DO 775 M=2,7                                                      RE234368
      IT(K,M,3)=0                                                       RE234369
775   CONTINUE                                                          RE234370
      IN=ISB                                                            RE234371
778   J=1                                                               RE234372
780   K=IB(J,L)                                                         RE234373
      IF(IT(K,1,2)-IN)785,805,785                                       RE234374
785   J=J+1                                                             RE234375
      IF(J-IC)780,780,790                                               RE234376
790   IF(INM-4)800,800,795                                              RE234377
795   CALL BUFILL (INM,IN)                                              RE234378
800   IN=IN+1                                                           RE234379
      IF(IN.GT.4) IN=1                                                  RE234380
      IF(IN.NE.INM) GO TO 778                                           RE234381
      ISB=IN                                                            RE234382
      GO TO 1000                                                        RE234383
805   ISB=IN                                                            RE234384
      GO TO 400                                                         RE234385
905   IPH=IPH+1                                                         RE234386
      GO TO 750                                                         RE234387
1000  IPH=IPH-1                                                         RE234388
      I=IP(L,8,IPH)                                                     RE234389
      DO 1010 J=1,IC                                                    RE234390
      K=IB(J,L)                                                         RE234391
      M=IT(K,I,1)                                                       RE234392
      IN=IT(K,I,2)                                                      RE234393
1003  M=M+1                                                             RE234394
      IF(M.LE.200) GO TO 1005                                           RE234395
      M=1                                                               RE234396
      IN=IN+1                                                           RE234397
      IF(IN.GT.4) IN=1                                                  RE234398
      IF(IN-ISB)1005,1010,1005                                          RE234399
1005  DDT=ABS(BE(K,M,IN))                                               RE234400
      AINT(K,1)=AINT(K,1)+DDT                                           RE234401
      AINT(K,2)=AINT(K,2) +BE(K,M,IN)                                   RE234402
      AINT(K,3)=AINT(K,3)+BE(K,M,IN)                                    RE234403
      GO TO 1003                                                        RE234404
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 1010 CONTINUE                                                          RE234405
      IF(INM-4)1050,1050,1015                                           RE234406
 1015 CALL BUFILL (INM,1)                                               RE234407
      IF(INM.LE.4)GO TO 1050                                            RE234408
      CALL BUFILL (INM,2)                                               RE234409
      ISB=2                                                             RE234410
      IF(INM.LE.4) GO TO 1025                                           RE234411
      CALL BUFILL (INM,3)                                               RE234412
      ISB=3                                                             RE234413
      IF(INM.LE.4) GO TO 1025                                           RE234414
      CALL BUFILL (INM,4)                                               RE234415
      ISB=4                                                             RE234416
      IF(INM.LE.4) GO TO 1025                                           RE234417
      ISB=1                                                             RE234418
 1025 DO 1040 J=1,IC                                                    RE234419
      K=IB(J,L)                                                         RE234420
      M=0                                                               RE234421
      IN=1                                                              RE234422
 1030 M=M+1                                                             RE234423
      IF(M.LE.200) GO TO 1035                                           RE234424
      M=1                                                               RE234425
      IN=IN+1                                                           RE234426
      IF(IN.GT.4) IN=1                                                  RE234427
      IF(IN.EQ.ISB) GO TO 1040                                          RE234428
 1035 DDT=ABS(BE(K,M,IN))                                               RE234429
      AINT(K,1)=AINT(K,1)+DDT                                           RE234430
      AINT(K,2)=AINT(K,2) +BE(K,M,IN)                                   RE234431
      AINT(K,3)=AINT(K,3)+BE(K,M,IN)                                    RE234432
      GO TO 1030                                                        RE234433
 1040 CONTINUE                                                          RE234434
      IF(ISB.EQ.1) GO TO 1015                                           RE234435
 1050 DO 1055 J=1,IC                                                    RE234436
      K=IB(J,L)                                                         RE234437
      AINT(K,1)=.5*AINT(K,1)*DT                                         RE234438
      AINT(K,2)=AINT(K,2)*DT                                            RE234439
      AINT(K,3)=AINT(K,3)*DT                                            RE234440
 1055 CONTINUE                                                          RE234441
      WRITE (10,6) JT(1,L)                                              RE234442
      DO 1060 J=1,IC                                                    RE234443
      K=IB(J,L)                                                         RE234444
      WRITE (10,7) K,(AINT(K,I),I=1,3),AINT(K,5)                        RE234445
 1060 CONTINUE                                                          RE234446
 2000 WRITE (10,8) JT(1,L)                                              RE234447
      IJKL=0                                                            RE234448
      RETURN                                                            RE234449
      END                                                               RE234450


$IBFTC RE235   M94,FULIST,REF,XR6                                       RE235000
      SUBROUTINE BUFILL (I,J)                                           RE235001
C               COMPUTATIONAL INPUT ROUTINE                             RE235002
      COMMON/IBALC/ICHZT,VALZT                                          RE235003
      COMMON/IBALC/DUMMY(1869),ID(20),BU(2800,4),DXUYMZ(976)            RE235004
      IF(ID(2))200,100,200                                              RE235005
 100  READ (11) ID                                                      RE235006
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```
      READ (11) (BU(K,J),K=1,2800)                                      RE235007
      GO TO 300                                                         RE235008
 200  I=J                                                               RE235009
 300  RETURN                                                            RE235010
      END                                                               RE235011
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$ORIGIN         E,CK2,NOREW                                                 000
$IBFTC RE336    M94,FULIST,REF,XR6                                        RE336000
      SUBROUTINE ACOMP (KCS,IPHCS,LCS)                                    RE336001
C               COMPUTATION CONTROL FOR SEGMENT FIT                       RE336002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR            RE336003
      COMMON/IBALC/ICHZT,VALZT                                            RE336004
      COMMON/IBALC/IO(25),IB(14,25),AB(14,25),IP(25,8,4),JT(2,25),IT(14,RE336005
     17,3),ID(20),BE(14,200,4),FFL(14),TRZ(14),PHT(14,4),S(14),AINT(14,5RE336006
     2),P(14),TR(14),A(17,17),Z(17),IX(2,7),X(7),RT(14),D(7),Y1,Y2,Y3,BORE336007
     3T(14),TOP(14),RAT(14),MT(14),IS(120),ISL(120),PA(120),IQ,ICT,NT,HERE336008
     4AD(10)                                                              RE336009
      DIMENSION W(6)                                                      RE336010
      DIMENSION HAE(7),HEA(10),HAD(10)                                    RE336011
      DATA BLANK,STAR,POINT,T/1H ,1H*,1H.,1HT/,(HAE(J),J=1,7)/1H ,3H2ND,RE336012
     13H3RD,3H4TH,3H5TH,3H6TH,3H7TH/,(HEA(J),J=1,10)/1H ,1H ,2H P,6H E  RE336013
     2 L,6H R O I,6H C F M,6H E   I,6H N   T,2H T,1H /,(HAD(J),J=1,10)/ RE336014
     *4H-100,4H -75,4H -50,4H -25,4H   0,4H  25,4H  50,4H  75,4H 100,   RE336015
     *1H /                                                                RE336016
      DATA CROSS/1HX/                                                     RE336017
 1    FORMAT(1H1,12X,5HTEST I6,2X,8HCHANNEL I3,2X,6HPHASE I2,4X,4HT = , RE336018
     1F8.4,4H TO F8.4,6H SECS.,20X,6HDATE  3A3/56X,20HAPPROXIMATION VALURE336019
     2ES,11H  (A(F(T))),1A1)                                              RE336020
 2    FORMAT (A6,10X,I2,3X,10HA(F(T)) = 1PE12.5,5H*T + 1PE12.5,3X,5HFOR RE336021
     1 ,0PF8.4,13H .LE. T .LE. F8.4)                                      RE336022
 3    FORMAT (A6/A6,2X,24H.   F(T)   PEAK VALUE = 1PE12.5,3X,13HRESOLUTIRE336023
     1ON = ,1PE12.5,2X,18HG UNITS/PRINT LINE,4X,6HEVERY A3,14H POINT PLORE336024
     2TTED/A6,2X,26H   A(F(T))   PEAK VALUE = 1PE12.5,10X,11HINTEGRAL = RE336025
     31PE12.5,5X,24HACCUMULATING INTEGRAL = 1PE12.5)                      RE336026
 4    FORMAT (1X,A4,3X,1H(,120A1,1H))                                     RE336027
 5    FORMAT (8X,120A1)                                                   RE336028
 6    FORMAT (5X,24H***** PLOT DELETED *****,15X,6HINT = 1PE12.5)         RE336029
 7    FORMAT (A6)                                                         RE336030
 8    FORMAT (8X,120A1)                                                   RE336031
      K=KCS                                                               RE336032
      IPH=IPHCS                                                           RE336033
      L=LCS                                                               RE336034
      IF(IPH.EQ.1) RT(K)=TRZ(K)                                           RE336035
      X(1)=RT(K)                                                          RE336036
      I=IP(L,8,IPH)                                                       RE336037
      II=I-1                                                              RE336038
      IX(1,1)=IT(K,1,1)                                                   RE336039
      IX(2,1)=IT(K,1,2)                                                   RE336040
      DO 100 J=2,I                                                        RE336041
      IX(1,J)=IT(K,J,1)                                                   RE336042
      IX(2,J)=IT(K,J,2)                                                   RE336043
 100  CONTINUE                                                            RE336044
      DO 130 J=2,I                                                        RE336045
      L=J-1                                                               RE336046
```


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```
      IF(IX(2,L)-IX(2,J))105,110,115                                    RE336047
105   N=IX(2,J)                                                         RE336048
      GO TO 120                                                         RE336049
110   D(J)=IX(1,J)-IX(1,L)                                              RE336050
      GO TO 125                                                         RE336051
115   N=IX(2,J)+4                                                       RE336052
120   M=200*(N-IX(2,L)-1)                                               RE336053
      D(J)=M+200-IX(1,L)+IX(1,J)                                        RE336054
125   X(J)=X(L)+D(J)*DT                                                 RE336055
130   CONTINUE                                                          RE336056
      L=LCS                                                             RE336057
      CALL MASTUP (II,K,W)                                              RE336058
      CALL MSOL (II)                                                    RE336059
      DO 135 J=1,II                                                     RE336060
      AINT(K,3)=AINT(K,3)+W(J)/DT                                       RE336061
135   CONTINUE                                                          RE336062
      M=IX(1,1)                                                         RE336063
      IN=IX(2,1)                                                        RE336064
138   M=M+1                                                             RE336065
      IF(M-200)145,145,140                                              RE336066
140   M=1                                                               RE336067
      IN=IN+1                                                           RE336068
      IF(IN.GT.4) IN=1                                                  RE336069
145   IF(M-IX(1,I))155,150,155                                          RE336070
150   IF(IN-IX(2,I))155,160,155                                         RE336071
155   AINT(K,1)=AINT(K,1)+ABS(BE(K,M,IN))                               RE336072
      AINT(K,2)=AINT(K,2)+   (BE(K,M,IN))                               RE336073
      GO TO 138                                                         RE336074
160   AINT(K,4)=0.0                                                     RE336075
      AINT(K,1)=AINT(K,1)+ABS(BE(K,M,IN))                               RE336076
      AINT(K,2)=AINT(K,2)+   (BE(K,M,IN))                               RE336077
      N=3*II-1                                                          RE336078
      DO 165 J=1,N,3                                                    RE336079
      M=J+1                                                             RE336080
      LL=(J/3)+1                                                        RE336081
      Y2=Z(J)*X(LL+1)+Z(M)                                              RE336082
      Y1=Z(J)*X(LL)+Z(M)                                                RE336083
      Y3=.5*(Y1+Y2)*(X(LL+1)-X(LL))                                     RE336084
      AINT(K,4)=AINT(K,4)+Y3                                            RE336085
165   CONTINUE                                                          RE336086
      AINT(K,5)=AINT(K,5)+AINT(K,4)                                     RE336087
      DO 170 J=1,I                                                      RE336088
      IF(IP(L,J,1).EQ.0) GO TO 175                                      RE336089
170   CONTINUE                                                          RE336090
      MT(K)=0                                                           RE336091
      GO TO 300                                                         RE336092
175   MT(K)=J                                                           RE336093
      DO 180 J=1,120                                                    RE336094
      IS(J)=0                                                           RE336095
      ISL(J)=0                                                          RE336096
180   CONTINUE                                                          RE336097
      M=MT(K)                                                           RE336098
      IN=IX(2,M)                                                        RE336099
      N=IX(1,M)                                                         RE336100
      NN=3*M-2                                                          RE336101
      Y1=Z(NN)*X(M)+Z(NN+1)                                             RE336102
      IF(Y1-BE(K,N,IN))190,190,185                                      RE336103
185   TOP(K)=Y1                                                         RE336104
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```
      GO TO 195                                                         RE336105
190   TOP(K)=BE(K,N,IN)                                                 RE336106
195   IY4=IP(L,8,IPH)                                                   RE336107
      IY44=3*IY4-2                                                      RE336108
      IY45=IY44+1                                                       RE336109
      Y4=Z(IY44)*X(IY4)+Z(IY45)                                         RE336110
      IY44=IT(K,IY4,1)                                                  RE336111
      IY45=IT(K,IY4,2)                                                  RE336112
      BOT(K)=BE(K,IY44,IY45)                                            RE336113
      IF(BOT(K).GT.Y4) BOT(K)=Y4                                        RE336114
      IF(-BOT(K).GT.TOP(K)) TOP(K)=-BOT(K)                              RE336115
      RAT(K)=80./(TOP(K)-BOT(K))                                        RE336116
200   IF(IX(2,1)-IX(2,I))205,205,210                                    RE336117
205   N=IX(2,I)                                                         RE336118
      GO TO 215                                                         RE336119
210   N=IX(2,I)+4                                                       RE336120
215   NT=(N-IX(2,1))*200-IX(1,1)+IX(1,I)                                RE336121
      ICT=((NT-1)/120)+1                                                RE336122
      IQ=NT/ICT                                                         RE336123
      IF(IQ.GE.120) GO TO 225                                           RE336124
      DO 220 J=IQ,120                                                   RE336125
      PA(J)=BLANK                                                       RE336126
220   CONTINUE                                                          RE336127
225   M=IX(1,1)                                                         RE336128
      IN=IX(2,1)                                                        RE336129
      DO 235 J=1,IQ                                                     RE336130
      IS(J)=(BE(K,M,IN)-BOT(K))*RAT(K)+1.                               RE336131
      ISL(J)=0                                                          RE336132
      IF(IS(J).LE.0) IS(J)=1                                            RE336133
      IF(IS(J).GT.81) IS(J)=81                                          RE336134
      M=M+ICT                                                           RE336135
      IF(M-200)235,235,230                                              RE336136
230   M=M-200                                                           RE336137
      IN=IN+1                                                           RE336138
      IF(IN.GT.4) IN=1                                                  RE336139
235   CONTINUE                                                          RE336140
      Y1=Z(1)*X(1)+Z(2)                                                 RE336141
      IF(Y1-BOT(K))240,250,245                                          RE336142
240   Y2=(BOT(K)-Z(2))/Z(1)                                             RE336143
      Y2=(Y2-X(1))/DT                                                   RE336144
      KL=Y2+1.                                                          RE336145
      KL=1+KL/ICT                                                       RE336146
      ISL(KL)=1                                                         RE336147
      GO TO 260                                                         RE336148
245   IF(Y1-TOP(K))250,250,255                                          RE336149
250   ISL(1)=(Y1-BOT(K))*RAT(K)+1.                                      RE336150
      GO TO 260                                                         RE336151
255   Y2=(TOP(K)-Z(2))/Z(1)                                             RE336152
      Y2=(Y2-X(1))/DT                                                   RE336153
      KL=Y2+1.                                                          RE336154
      KL=1+KL/ICT                                                       RE336155
      ISL(KL)=81                                                        RE336156
260   M=3*II-1                                                          RE336157
      N=M-1                                                             RE336158
      Y1=Z(N)*X(I)+Z(M)                                                 RE336159
      IF(Y1-BOT(K))270,275,265                                          RE336160
265   IF(Y1-TOP(K))275,275,280                                          RE336161
270   Y2=(BOT(K)-Z(M))/Z(N)                                             RE336162
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      Y2=(X(I)-Y2)/DT                                                   RE336163
      KL=Y2+1.                                                          RE336164
      KL=IQ-KL/ICT                                                      RE336165
      ISL(KL)=1                                                         RE336166
      GO TO 285                                                         RE336167
275   Y2=(Y1-BOT(K))*RAT(K)+1.                                          RE336168
      ISL(IQ)=Y2                                                        RE336169
      GO TO 285                                                         RE336170
280   Y2=(BOT(K)-Z(M))/Z(N)                                             RE336171
      Y2=(X(I)-Y2) /DT                                                  RE336172
      KL=Y2+1.                                                          RE336173
      KL=IQ-KL/ICT                                                      RE336174
      ISL(KL)=81                                                        RE336175
285   DO 290 J=2,II                                                     RE336176
      M=3*J-4                                                           RE336177
      N=M-1                                                             RE336178
      Y1=Z(N)*X(J)+Z(M)                                                 RE336179
      Y2=(Y1-BOT(K))*RAT(K)+1.                                          RE336180
      KL=(X(J)-X(1)+DT/3.)/DT                                           RE336181
      KL=1+KL/ICT                                                       RE336182
      IF(Y2.GT.81.) GO TO 287                                           RE336183
      IF(Y2.LT.1.) GO TO 288                                            RE336184
      ISL(KL)=Y2                                                        RE336185
      GO TO 290                                                         RE336186
286   Y2=(FIX-Z(M))/Z(N)                                                RE336187
      KL=(Y2-X(1)+DT/3.)/DT                                             RE336188
      KL=1+KL/ICT                                                       RE336189
      ISL(KL)=IFIX                                                      RE336190
      M=3*(J+1)-4                                                       RE336191
      N=M-1                                                             RE336192
      KL=(((FIX-Z(M))/Z(N))-X(1)+DT/3.)/DT                              RE336193
      KL=1+KL/ICT                                                       RE336194
      ISL(KL)=IFIX                                                      RE336195
      GO TO 290                                                         RE336196
287   FIX=TOP(K)                                                        RE336197
      IFIX=-81                                                          RE336198
      GO TO 286                                                         RE336199
288   FIX=BOT(K)                                                        RE336200
      IFIX=-1                                                           RE336201
      GO TO 286                                                         RE336202
290   CONTINUE                                                          RE336203
300   IF(MT(K))305,305,315                                              RE336204
305   DO 310 J=1,7                                                      RE336205
      HEAD(J)=BLANK                                                     RE336206
310   CONTINUE                                                          RE336207
      GO TO 330                                                         RE336208
315   DO 320 J=1,10                                                     RE336209
      HEAD(J)=HEA(J)                                                    RE336210
320   CONTINUE                                                          RE336211
      WRITE (10,1) IO(LCS),KCS,IPH,X(1),X(I),DAY,DON,YEAR,BLANK         RE336212
330   DO 340 J=1,II                                                     RE336213
      M=3*J-2                                                           RE336214
      N=M+1                                                             RE336215
      WRITE (10,2) HEAD(J),J,Z(M),Z(N),X(J),X(J+1)                      RE336216
340   CONTINUE                                                          RE336217
      IF(MT(K))345,345,350                                              RE336218
345   WRITE (10,6) AINT(K,4)                                            RE336219
      GO TO 400                                                         RE336220
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 350  IF(I-7)355,355,360                                                RE336221
 355  DO 357 J=I,7                                                      RE336222
      WRITE (10,7) HEAD(J)                                              RE336223
 357  CONTINUE                                                          RE336224
 360  Y1=1./RAT(K)                                                      RE336225
      KL=MT(K)                                                          RE336226
      M=3*KL-1                                                          RE336227
      N=M-1                                                             RE336228
      Y2=Z(N)*X(KL)+Z(M)                                                RE336229
      Y3=AINT(K,2)*DT                                                   RE336230
      WRITE (10,3) HEAD(8),HEAD(9),P(K),Y1,HAE(ICT),HEAD(10),Y2,        RE336231
     1AINT(K,4),Y3                                                      RE336232
      DO 375 J=1,81                                                     RE336233
      KL=82-J                                                           RE336234
      DO 365 M=1,IQ                                                     RE336235
      PA(M)=BLANK                                                       RE336236
      IF(IS(M).EQ.KL)PA(M)=POINT                                        RE336237
      IF(ISL(M).EQ.KL)PA(M)=STAR                                        RE336238
      IDMY=-ISL(M)                                                      RE336239
      IF(IDMY.EQ.KL) PA(M)=CROSS                                        RE336240
 365  CONTINUE                                                          RE336241
      IF(((KL-1)/10)*10)-KL+1)367,369,367                               RE336242
 367  N=10                                                              RE336243
      GO TO 370                                                         RE336244
 369  N=(KL-1)/10+1                                                     RE336245
 370  WRITE (10,4) HAD(N),PA                                            RE336246
 375  CONTINUE                                                          RE336247
      DO 380 J=1,120                                                    RE336248
      PA(J)=BLANK                                                       RE336249
 380  CONTINUE                                                          RE336250
      PA(1)=T                                                           RE336251
      PA(IQ)=T                                                          RE336252
      DO 385 J=2,II                                                     RE336253
      KL=(X(J)-X(1)+DT/3.)/DT                                           RE336254
      KL=1+KL/ICT                                                       RE336255
      PA(KL)=T                                                          RE336256
 385  CONTINUE                                                          RE336257
      WRITE (10,8) PA                                                   RE336258
 400  RT(K)=X(I)                                                        RE336259
      RETURN                                                            RE336260
      END                                                               RE336261


$IBFTC RE337   M94,FULIST,REF,XR6                                       RE337000
      SUBROUTINE MASTUP (N,KQK,W)                                       RE337001
C                MATRIX SETUP ROUTINE                                   RE337002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RE337003
      COMMON/IBALC/ICHZT,VALZT                                          RE337004
      COMMON/IBALC/DUMMY(13285),Y(17,17),Z(17),IX(2,7),X(7),DXUYMZ(453) RE337005
      DIMENSION W(6)                                                    RE337006
C     CLEAR MATRIX (Y) AERA AND MATRIX (Z) AERA                         RE337007
      K=3*N-1                                                           RE337008
      DO 1 I=1,K                                                        RE337009
      Z(I)=0.                                                           RE337010
      DO 1 J=1,K                                                        RE337011
```


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```
 1    Y(I,J)=0.                                                        RE337012
C     SETUP FIRST BLOCK OF Y MATRIX                                    RE337013
      Y(1,1)=.666666667*(X(2)**3-X(1)**3)                              RE337014
      Y(1,2)=X(2)**2-X(1)**2                                           RE337015
      Y(1,3)=-X(2)                                                     RE337016
      Y(2,1)=Y(1,2)                                                    RE337017
      Y(2,2)=2.*(X(2)-X(1))                                            RE337018
      Y(2,3)=-1.                                                       RE337019
      Y(3,1)=X(2)                                                      RE337020
      Y(3,2)=1.                                                        RE337021
      Y(3,4)=-X(2)                                                     RE337022
      Y(3,5)=-1.                                                       RE337023
      IF(N-2)3,3,4                                                     RE337024
C     SETUP GENERAL BLOCK(S) OF MATRIX Y                               RE337025
 4    I=N-1                                                            RE337026
      DO 2 J=2,I                                                       RE337027
      K=J+1                                                            RE337028
      K1=3*(J-1)                                                       RE337029
      K2=K1+1                                                          RE337030
      K3=K1+2                                                          RE337031
      K4=K1+3                                                          RE337032
      K5=K1+4                                                          RE337033
      K6=K1+5                                                          RE337034
      Y(K2,K1)=X(J)                                                    RE337035
      Y(K2,K2)=.666666667*(X(K)**3-X(J)**3)                            RE337036
      Y(K2,K3)=X(K)**2-X(J)**2                                         RE337037
      Y(K2,K4)=-X(K)                                                   RE337038
      Y(K3,K1)=1.                                                      RE337039
      Y(K3,K2)=Y(K2,K3)                                                RE337040
      Y(K3,K3)=2.*(X(K)-X(J))                                          RE337041
      Y(K3,K4)=-1.                                                     RE337042
      Y(K4,K2)=X(K)                                                    RE337043
      Y(K4,K3)=1.                                                      RE337044
      Y(K4,K5)=-X(K)                                                   RE337045
      Y(K4,K6)=-1.                                                     RE337046
 2    CONTINUE                                                         RE337047
C     SETUP FINAL BLOCK OF MATRIX Y                                    RE337048
 3    K=N+1                                                            RE337049
      K3=3*N-1                                                         RE337050
      K2=K3-1                                                          RE337051
      K1=K2-1                                                          RE337052
      L1=K2                                                            RE337053
      L2=K3                                                            RE337054
      Y(L1,K1)=X(N)                                                    RE337055
      Y(L1,K2)=.666666667*(X(K)**3-X(N)**3)                            RE337056
      Y(L1,K3)=X(K)**2-X(N)**2                                         RE337057
      Y(L2,K1)=1.                                                      RE337058
      Y(L2,K2)=Y(L1,K3)                                                RE337059
      Y(L2,K3)=2.*(X(K)-X(N))                                          RE337060
C     SETUP Z MATRIX AND STORE W MATRIX FOR ERROR FUNCTION             RE337061
      DO 5 J=1,N                                                       RE337062
      K1=3*J-2                                                         RE337063
      K2=K1+1                                                          RE337064
      CALL INTR (J,A1,A2,KQK)                                          RE337065
      Z(K1)=-A2*2.                                                     RE337066
      Z(K2)=-A1*2.                                                     RE337067
      W(J)=A1                                                          RE337068
 5    CONTINUE                                                         RE337069
```


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```
      RETURN                                                            RE337070
      END                                                               RE337071


$IBFTC RE338   M94,FULIST,REF,XR6                                       RE338000
      SUBROUTINE INTR (J,A1,A2,K)                                       RE338001
C               INTEGRATION ROUTINE                                     RE338002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RE338003
      COMMON/IBALC/ICHZT,VALZT                                          RE338004
      COMMON/IBALC/DUMMY(1889),BE(14,200,4),DUM(502),IX(2,7),X(7),D(453)RE338005
      XX=X(J)                                                           RE338006
      M=IX(1,J)                                                         RE338007
      IN=IX(2,J)                                                        RE338008
      L=J+1                                                             RE338009
      A1=BE(K,M,IN)                                                     RE338010
      A2=A1*XX                                                          RE338011
      XX=XX+DT                                                          RE338012
      M=M+1                                                             RE338013
      IF(M.LE.200) GO TO 100                                            RE338014
      M=1                                                               RE338015
      IN=IN+1                                                           RE338016
      IF(IN.GT.4) IN=1                                                  RE338017
 100  A1=A1+BE(K,M,IN)*2.                                               RE338018
      A2=A2+BE(K,M,IN)*XX*2.                                            RE338019
      XX=XX+DT                                                          RE338020
      M=M+1                                                             RE338021
      IF(M.LE.200) GO TO 200                                            RE338022
      M=1                                                               RE338023
      IN=IN+1                                                           RE338024
      IF(IN.GT.4) IN=1                                                  RE338025
 200  IF(M.NE.IX(1,L)) GO TO 100                                        RE338026
      IF(IN.NE.IX(2,L)) GO TO 100                                       RE338027
      A1=(A1+BE(K,M,IN))*DT/2.                                          RE338028
      A2=(A2+BE(K,M,IN)*XX)*DT/2.                                       RE338029
      RETURN                                                            RE338030
      END                                                               RE338031


$IBFTC RE339   M94,FULIST,REF,XR6                                       RE339000
      SUBROUTINE MSOL (N)                                               RE339001
C               MATRIX SOLVER                                           RE339002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          RE339003
      COMMON/IBALC/ICHZT,VALZT                                          RE339004
      COMMON/IBALC/DUMMY(13285),Y(17,17),Z(17),IX(2,7),X(7),DXUY(453)   RE339005
C     TRIANGULARIZE INTIIAL MATRIX                                      RE339006
      K=3*N-1                                                           RE339007
      DO 7 J=1,K                                                        RE339008
      DF=Y(J,J)                                                         RE339009
      DO 1 L=J,K                                                        RE339010
      IF(Y(J,L))1,2,1                                                   RE339011
 1    Y(J,L)=Y(J,L)/DF                                                  RE339012
 2    Z(J)=Z(J)/DF                                                      RE339013
```


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```
      I=J+1                                                             RE339014
      IF(I-K)3,3,8                                                      RE339015
 3    DO 6 L=I,K                                                        RE339016
      IF(Y(L,J))4,7,4                                                   RE339017
 4    FM=Y(L,J)                                                         RE339018
      Y(L,J)=0                                                          RE339019
      DO 5 M=I,K                                                        RE339020
      IF(Y(J,M))5,6,5                                                   RE339021
 5    Y(L,M)=Y(L,M)-FM*Y(J,M)                                           RE339022
 6    Z(L)=Z(L)-FM*Z(J)                                                 RE339023
 7    CONTINUE                                                          RE339024
 8    DO 12 J=1,K                                                       RE339025
      Z(J)=-Z(J)                                                        RE339026
 12   CONTINUE                                                          RE339027
C     PREFORM BACK SUBSTITUTION TO OBTAIN SOLUTION                      RE339028
      DO 14 J=1,K                                                       RE339029
      L=K-J                                                             RE339030
      I=L+1                                                             RE339031
      IF(L)13,13,9                                                      RE339032
 9    II=I+2                                                            RE339033
      IF(II.GT.K) II=K                                                  RE339034
      DO 11 M=I,II                                                      RE339035
      IF(Y(L,M))10,11,10                                                RE339036
 10   Z(L)=Z(L)-Z(M)*Y(L,M)                                             RE339037
 11   CONTINUE                                                          RE339038
 14   CONTINUE                                                          RE339039
C     SET SLOPE, INTERCEPT, AND LAMBDA VALUES IN PROPER LOCATION        RE339040
 13   CONTINUE                                                          RE339041
 15   RETURN                                                            RE339042
      END                                                               RE339043
```


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```
*    *  *******  ***  *      ***  *******  *   *
*    *     *      *   *      *      *      * *
*    *     *      *   *      *      *       *
*    *     *      *   *      *      *       *
 ****      *     ***  *****  ***    *       *

 ***   *   *   ***   *******  *****  **   **
*      * *   *         *     *      * * * *
 ***     *     ***      *     ***    *  *  *
    *    *        *     *     *      *     *
****     *    ****      *     *****  *     *
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```
$ORIGIN        A,CK2,NOREW                                                  000
$IBFTC UA540   M94,FULIST,REF,XR6                                        UA540000
      SUBROUTINE UTIL                                                    UA540001
C               UTILITY SYSTEM MONITOR                                   UA540002
      LOGICAL ZERO,NZER                                                  UA540003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           UA540004
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),       UA540005
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,         UA540006
     2IDT(20),BB(2800)                                                   UA540007
      DATA PAUS,REWI,UNLO,ENDF,MERG,RETR,POSI,SLASH,COMMA,WRIT,CHK/      UA540008
     14HPAUS,4HREWI,4HUNLO,4HENDF,4HMERG,4HRETR,4HPOSI,1H/,1H,,4HWRIT,1HUA540009
     2C/                                                                 UA540010
 3    FORMAT (A6)                                                        UA540011
 4    FORMAT (I6)                                                        UA540012
      DO 90 I=1,4                                                        UA540013
      IDM1(I)=-1                                                         UA540014
      IDM2(I)=-2                                                         UA540015
      IDM3(I)=-3                                                         UA540016
      IDZ(I)=0                                                           UA540017
 90   CONTINUE                                                           UA540018
 100  CALL CARD                                                          UA540019
 115  CALL PACK (2,5,WO,RA)                                              UA540020
      IF(ZERO(WO,REWI)) GO TO 130                                        UA540021
      IF(ZERO(WO,UNLO)) GO TO 131                                        UA540022
      IF(ZERO(WO,ENDF)) GO TO 132                                        UA540023
      IF(ZERO(WO,MERG)) GO TO 160                                        UA540024
      IF(ZERO(WO,RETR)) GO TO 170                                        UA540025
      IF(ZERO(WO,WRIT)) GO TO 190                                        UA540026
      RETURN                                                             UA540027
 130  L=1                                                                UA540028
      GO TO 133                                                          UA540029
 131  L=2                                                                UA540030
      GO TO 133                                                          UA540031
 132  L=3                                                                UA540032
 133  J=5                                                                UA540033
 134  J=J+1                                                              UA540034
      IF(NZER(RA(J),SLASH)) GO TO 134                                    UA540035
      M=J+1                                                              UA540036
      CALL RITE31                                                        UA540037
      WRITE (31,3) RA(M)                                                 UA540038
      CALL READ31                                                        UA540039
      READ (31,4) N                                                      UA540040
      GO TO (140,135,150),L                                              UA540041
 135  CALL RUN (N)                                                       UA540042
      N=N+27                                                             UA540043
      CALL SWTHOF (N)                                                    UA540044
 136  J=J+1                                                              UA540045
      IF(NZER(RA(J),COMMA)) GO TO 136                                    UA540046
      J=J+1                                                              UA540047
      IF(ZERO(RA(J),COMMA)) GO TO 100                                    UA540048
      GO TO 134                                                          UA540049
 140  GO TO (141,142,143,144,145,146,147,148),N                          UA540050
 141  REWIND 1                                                           UA540051
```


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```
      GO TO 136                                                         UA540052
  142 REWIND 2                                                          UA540053
      GO TO 136                                                         UA540054
  143 REWIND 3                                                          UA540055
      GO TO 136                                                         UA540056
  144 REWIND 4                                                          UA540057
      GO TO 136                                                         UA540058
  145 REWIND 11                                                         UA540059
      GO TO 136                                                         UA540060
  146 REWIND 12                                                         UA540061
      GO TO 136                                                         UA540062
  147 REWIND 13                                                         UA540063
      GO TO 136                                                         UA540064
  148 REWIND 14                                                         UA540065
      GO TO 136                                                         UA540066
  150 GO TO (151,152,153,154,155,156,157,158),L                         UA540067
  151 ENDFILE 1                                                         UA540068
      GO TO 136                                                         UA540069
  152 ENDFILE 2                                                         UA540070
      GO TO 136                                                         UA540071
  153 ENDFILE 3                                                         UA540072
      GO TO 136                                                         UA540073
  154 ENDFILE 4                                                         UA540074
      GO TO 136                                                         UA540075
  155 ENDFILE 11                                                        UA540076
      GO TO 136                                                         UA540077
  156 ENDFILE 12                                                        UA540078
      GO TO 136                                                         UA540079
  157 ENDFILE 13                                                        UA540080
      GO TO 136                                                         UA540081
  158 ENDFILE 14                                                        UA540082
      GO TO 136                                                         UA540083
  160 CALL MERGE                                                        UA540084
      GO TO 100                                                         UA540085
  170 CALL RETRI                                                        UA540086
      GO TO 100                                                         UA540087
  190 CALL WOTD                                                         UA540088
      GO TO 115                                                         UA540089
      END                                                               UA540090


$IBFTC UA541    M94,FULIST,REF,XR6                                      UA541000
      SUBROUTINE REREAD (J)                                             UA541001
C               UTILITY SYSTEM CONTROL CARD INPUT                       UA541002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UA541003
      CALL CARD                                                         UA541004
      J=0                                                               UA541005
      RETURN                                                            UA541006
      END                                                               UA541007
```


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```
$IBFTC UA542    M94,FULIST,REF,XR6                                      UA542000
      SUBROUTINE TESRT (LIST,J,L,ICD)                                   UA542001
C                AUXILIARY CONTROL CARD DECODE ROUTINE                  UA542002
      LOGICAL ZERO,NZER                                                 UA542003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UA542004
      DIMENSION LIST(500,2),ICD(2)                                      UA542005
      DATA LPRN,RPRN,COMMA/1H(,1H),1H,/                                 UA542006
 1    FORMAT (A6)                                                       UA542007
 2    FORMAT (I6)                                                       UA542008
      I=2                                                               UA542009
      N1=J                                                              UA542010
 100  J=J+1                                                             UA542011
      IF(ZERO(RA(J),LPRN)) GO TO 105                                    UA542012
      IF(NZER(RA(J),COMMA)) GO TO 100                                   UA542013
      N2=J-1                                                            UA542014
      CALL PACK (N1,N2,WO,RA)                                           UA542015
      CALL REREAD (J)                                                   UA542016
      J=J+1                                                             UA542017
      GO TO 108                                                         UA542018
 105  N2=J-1                                                            UA542019
      CALL PACK (N1,N2,WO,RA)                                           UA542020
 108  CALL RITE31                                                       UA542021
      WRITE (31,1) WO                                                   UA542022
      CALL READ31                                                       UA542023
      READ (31,2) II                                                    UA542024
      IF(II)110,109,110                                                 UA542025
 109  ICD(L)=1                                                          UA542026
      RETURN                                                            UA542027
 110  LIST(1,L)=II                                                      UA542028
      M=IABS(II)                                                        UA542029
      IF(NZER(RA(J+1),COMMA)) GO TO 112                                 UA542030
      CALL REREAD (J)                                                   UA542031
 112  N1=J+1                                                            UA542032
 113  J=J+1                                                             UA542033
      IF(ZERO(RA(J),COMMA)) GO TO 115                                   UA542034
      IF(NZER(RA(J),RPRN)) GO TO 113                                    UA542035
      N2=J-1                                                            UA542036
      J=J+1                                                             UA542037
      IS=2                                                              UA542038
      GO TO 117                                                         UA542039
 115  N2=J-1                                                            UA542040
      IS=1                                                              UA542041
 117  CALL PACK (N1,N2,WO,RA)                                           UA542042
      CALL RITE31                                                       UA542043
      WRITE (31,1) WO                                                   UA542044
      CALL READ31                                                       UA542045
      READ (31,2) II                                                    UA542046
      LIST(I,L)=II                                                      UA542047
      IF(IS-1)116,116,120                                               UA542048
 116  I=I+1                                                             UA542049
      IF(NZER(RA(J+1),COMMA)) GO TO 112                                 UA542050
      CALL REREAD (J)                                                   UA542051
      GO TO 112                                                         UA542052
 120  IF(M-I+1)122,121,122                                              UA542053
 121  ICD(L)=0                                                          UA542054
      GO TO 130                                                         UA542055
 122  CALL WROUT (1,500)                                                UA542056
      ICD(L)=1                                                          UA542057
```


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```
      LIST(1,L)=I-1                                                     UA542058
 130  RETURN                                                            UA542059
      END                                                               UA542060
```

```
$IBMAP UA543    100,M94                                                 UA543000
*               UTILITY REWIND-UNLOAD ROUTINE                           UA543001
       ENTRY    RUN                                                     UA543002
RUN    SAVE     (4,2)                                                   UA543003
       RETURN   RUN                                                     UA543004
       END                                                              UA543005
```

```
$ORIGIN         F,CK2,NOREW                                                 000
$IBFTC UF144    M94,FULIST,REF,XR6                                      UF144000
      SUBROUTINE MERGE                                                  UF144001
C               MASTER TAPE MERGE CONTROL ROUTINE                       UF144002
      LOGICAL NZER,ZERO                                                 UF144003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UF144004
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),      UF144005
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,        UF144006
     2IDT(20),BB(2800)                                                  UF144007
      DATA COMMA,YOU,SLASH,EM,P/1H,,1HU,1H/,1HM,1HA/,T/1HT/             UF144008
      ICD(1)=0                                                          UF144009
      ICD(2)=0                                                          UF144010
      M=0                                                               UF144011
      J=5                                                               UF144012
 100  J=J+1                                                             UF144013
      IF(NZER(RA(J),COMMA)) GO TO 100                                   UF144014
      IF(NZER(RA(J+1),COMMA)) GO TO 105                                 UF144015
      CALL REREAD (J)                                                   UF144016
 105  J=J+1                                                             UF144017
      IS=1                                                              UF144018
      IF(NZER(RA(J),T)) IS=IS+1                                         UF144019
 110  J=J+1                                                             UF144020
      IF(NZER(RA(J),COMMA)) GO TO 110                                   UF144021
 112  IF(NZER(RA(J+1),COMMA)) GO TO 115                                 UF144022
      CALL REREAD (J)                                                   UF144023
 115  J=J+1                                                             UF144024
      L=1                                                               UF144025
      IF(ZERO(RA(J),YOU)) GO TO 120                                     UF144026
      IF(NZER(RA(J),EM)) GO TO 200                                      UF144027
      L=L+1                                                             UF144028
 120  J=J+1                                                             UF144029
      IF(NZER(RA(J),SLASH)) GO TO 120                                   UF144030
      IF(NZER(RA(J+1),COMMA)) GO TO 125                                 UF144031
      CALL REREAD (J)                                                   UF144032
 125  J=J+1                                                             UF144033
      IF(ZERO(RA(J),P)) GO TO 130                                       UF144034
      CALL TESRT (LIST,J,L,ICD)                                         UF144035
      IF(LIST(1,1).LT.0) M=M+1                                          UF144036
      GO TO 132                                                         UF144037
```


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```
 130  LIST(1,L)=0                                                    UF144038
 132  M=M+1                                                          UF144039
 133  IF(M-2)112,112,135                                             UF144040
 135  IF(ICD(1)+ICD(2))150,140,150                                   UF144041
 140  IF(IS-1)144,144,146                                            UF144042
 144  CALL MERGT                                                     UF144043
      GO TO 150                                                      UF144044
 146  CALL FMERG                                                     UF144045
 150  RETURN                                                         UF144046
 200  J=J+1                                                          UF144047
      IF(NZER(RA(J),SLASH)) GO TO 200                                UF144048
      N1=J+1                                                         UF144049
 205  J=J+1                                                          UF144050
      IF(NZER(RA(J),COMMA)) GO TO 205                                UF144051
      N2=J-1                                                         UF144052
      CALL PACK (N1,N2,IDD,RA)                                       UF144053
      M=M+1                                                          UF144054
      GO TO 133                                                      UF144055
      END                                                            UF144056


$ORIGIN          G,CK2,NOREW                                            000
$IBFTC UG145     M94,FULIST,REF,XR6                                 UG145000
      SUBROUTINE FMERG                                              UG145001
C                FREQUENCY MERGE ROUTINE                            UG145002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR      UG145003
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),  UG145004
     1LISTN(1000),CUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,    UG145005
     2IDT(20),BB(2800)                                              UG145006
 1    FORMAT (1H1,30X,34HTHE FOLLOWING CASSES ARE ON MASTER,        UG145007
     16H TAPE A6,7H AS OF 3A3/6X,15(I6,2X))                         UG145008
 2    FORMAT (1H0,25X,36HTHE FOLLOWING CASSES WERE CALLED FOR,      UG145009
     146H BUT COULD NOT BE FOUND ON THE OLD MASTER TAPE/            UG145010
     26X,15(I6,2X))                                                 UG145011
 3    FORMAT (1H0,27X,36HTHE FOLLOWING CASES WERE CALLED FOR,       UG145012
     142H BUT COULD NOT BE FOUND ON THE UPDATE TAPE/6X,             UG145013
     215(I6,2X))                                                    UG145014
      CALL KLOSE (4,2,3,6,7)                                        UG145015
      L=0                                                           UG145016
      LL=0                                                          UG145017
      I=1                                                           UG145018
      I2=0                                                          UG145019
      K=0                                                           UG145020
      M=LIST(1,2)+1                                                 UG145021
      IF(LIST(1,1))200,100,100                                      UG145022
 100  REWIND 11                                                     UG145023
      READ (11) NF1,A                                               UG145024
      REWIND 1                                                      UG145025
      READ (1) NF2,C                                                UG145026
      CALL FRQTS (A,C,NF1,NF2,I1)                                   UG145027
      READ (11) ID                                                  UG145028
 115  IF(LIST(1,2))145,145,116                                      UG145029
 116  DO 120 J=2,M                                                  UG145030
      IF(ID(1)-LIST(J,2))120,118,120                                UG145031
 118  LISTN(I)=ID(1)                                                UG145032
```


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```
      LIST(J,2)=0                                                       UG145033
      I=I+1                                                             UG145034
      GO TO 150                                                         UG145035
120   CONTINUE                                                          UG145036
121   READ (11) DUM                                                     UG145037
      READ (11) ID                                                      UG145038
      IF(ID(1))122,121,121                                              UG145039
122   READ (11) ID                                                      UG145040
      IF(ID(1)+2)160,170,115                                            UG145041
145   LISTN(I)=ID(1)                                                    UG145042
      I=I+1                                                             UG145043
150   IF(L)151,153,152                                                  UG145044
151   WRITE (14) IDM3                                                   UG145045
      GO TO 153                                                         UG145046
152   WRITE (14) IDM1                                                   UG145047
153   IF(K)155,154,155                                                  UG145048
154   WRITE (14) NF1,A                                                  UG145049
      K=2                                                               UG145050
155   READ (11) B                                                       UG145051
      WRITE (14) ID                                                     UG145052
      WRITE (14) B                                                      UG145053
      READ (11) ID                                                      UG145054
      L=2                                                               UG145055
      IF(ID(1))156,156,155                                              UG145056
156   LL=1                                                              UG145057
      READ (11) ID                                                      UG145058
      IF(ID(1)+2)160,170,115                                            UG145059
160   IF(I1)161,165,161                                                 UG145060
161   CALL UDMRG (I,0)                                                  UG145061
162   READ (11) NF1,A                                                   UG145062
      I1=0                                                              UG145063
      L=-1                                                              UG145064
      I2=2                                                              UG145065
      K=0                                                               UG145066
163   READ (11) ID                                                      UG145067
      GO TO 115                                                         UG145068
165   WRITE (14) IDM1                                                   UG145069
166   READ (11) NF1,A                                                   UG145070
      CALL FRQTS (A,C,NF1,NF2,I1)                                       UG145071
      L=-1                                                              UG145072
      K=0                                                               UG145073
      GO TO 163                                                         UG145074
170   IF(I2)190,175,190                                                 UG145075
175   IF(I1)180,180,186                                                 UG145076
180   WRITE (14) IDM1                                                   UG145077
      CALL UDMRG (I,NF2)                                                UG145078
      GO TO 195                                                         UG145079
186   CALL UDMRG (I,0)                                                  UG145080
      GO TO 195                                                         UG145081
190   WRITE (14) IDM1                                                   UG145082
195   WRITE (14) IDM2                                                   UG145083
      GO TO 300                                                         UG145084
200   REWIND 1                                                          UG145085
      READ (1) NF2,C                                                    UG145086
      J=-NF2                                                            UG145087
      CALL UDMRG (I,J)                                                  UG145088
      WRITE (14) IDM2                                                   UG145089
      WRITE (14) IDZ                                                    UG145090
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      GO TO 310                                                         UG145091
  300 WRITE (14) ICZ                                                    UG145092
      CALL SWTHON (32)                                                  UG145093
  310 CALL SWTHON (30)                                                  UG145094
      CALL SWTHON (35)                                                  UG145095
      ENDFILE 14                                                        UG145096
      I=I-1                                                             UG145097
      WRITE (6,1) IDD,DAY,DON,YEAR,(LISTN(J),J=1,I)                     UG145098
      IF(LIST(1,1))315,330,315                                          UG145099
  315 M=IABS(LIST(1,1))+1                                               UG145100
      I=0                                                               UG145101
      DO 320 J=2,M                                                      UG145102
      IF(LIST(J,1))320,320,316                                          UG145103
  316 I=I+1                                                             UG145104
      LISTN(I)=LIST(J,1)                                                UG145105
  320 CONTINUE                                                          UG145106
      IF(I)330,330,325                                                  UG145107
  325 WRITE (6,3)(LISTN(J),J=1,I)                                       UG145108
  330 IF(LIST(1,1))350,350,331                                          UG145109
  331 M=LIST(1,2)+1                                                     UG145110
      I=0                                                               UG145111
      DO 335 J=2,I                                                      UG145112
      IF(LIST(J,2))335,335,332                                          UG145113
  332 I=I+1                                                             UG145114
      LISTN(I)=LIST(J,2)                                                UG145115
  335 CONTINUE                                                          UG145116
      IF(I)350,350,340                                                  UG145117
  340 WRITE (6,2) (LISTN(J),J=1,I)                                      UG145118
  350 RETURN                                                            UG145119
      END                                                               UG145120
```

```
$IBFTC UG146   M94,FULIST,REF,XR6                                       UG146000
      SUBROUTINE UDMRG (I,NF)                                           UG146001
C               UPDATE MERGE ROUTINE                                    UG146002
C     NF LESS THAN ZERO   WRITE (NF,C)                                  UG146003
C     NF GREATER THAN ZERO    WRITE (IDM3),(NF,C)                       UG146004
C      NF EQUAL TO ZERO    WRITE (IDM1)                                 UG146005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UG146006
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),      UG146007
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,        UG146008
     2IDT(20),BB(2800)                                                  UG146009
      K=NF                                                              UG146010
      L=0                                                               UG146011
      IF(NF)100,105,105                                                 UG146012
  100 K=-1                                                              UG146013
      NF=-NF                                                            UG146014
  105 READ (1) ID                                                       UG146015
  110 IF(ID(1))115,111,115                                              UG146016
  111 IF(K)112,113,113                                                  UG146017
  112 IF(L)113,114,113                                                  UG146018
  113 WRITE (14) IDM1                                                   UG146019
  114 RETURN                                                            UG146020
  115 IF(LIST(1,1))116,200,116                                          UG146021
  116 M=IABS(LIST(1,1))+1                                               UG146022
```


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```
      DO 120 J=2,M                                                      UG146023
      IF(ID(1)-LIST(J,1))120,117,120                                    UG146024
 117  LIST(J,1)=0                                                       UG146025
      GO TO 200                                                         UG146026
 120  CONTINUE                                                          UG146027
 125  READ (1) DUM                                                      UG146028
      READ (1) ID                                                       UG146029
      IF(ID(1))105,105,125                                              UG146030
 200  LISTN(I)=ID(1)                                                    UG146031
      I=I+1                                                             UG146032
      L=1                                                               UG146033
      IF(K)205,215,210                                                  UG146034
 205  WRITE (14) NF,C                                                   UG146035
      GO TO 220                                                         UG146036
 210  WRITE (14) IDM3                                                   UG146037
      WRITE (14) NF,C                                                   UG146038
      GO TO 220                                                         UG146039
 215  WRITE (14) IDM1                                                   UG146040
 220  READ (1) B                                                        UG146041
      WRITE (14) ID                                                     UG146042
      WRITE (14) B                                                      UG146043
      READ (1) ID                                                       UG146044
      K=0                                                               UG146045
      IF(ID(1))105,105,220                                              UG146046
      END                                                               UG146047
```

```
$IBFTC UG147    M94,FULIST,REF,XR6                                      UG147000
      SUBROUTINE FRQTS (A,C,NF1,NF2,I1)                                 UG147001
C                FREQUENCY ARRAY TEST ROUTINE                           UG147002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UG147003
      DIMENSION A(100),C(100)                                           UG147004
      I1=0                                                              UG147005
      IF(NF1-NF2)140,100,140                                            UG147006
 100  K=NF1/2                                                           UG147007
      IF(A(1)-C(1))140,110,140                                          UG147008
 110  IF(A(NF1)-C(NF2))140,120,140                                      UG147009
 120  IF(A(K)-C(K))140,130,140                                          UG147010
 130  I1=1                                                              UG147011
 140  RETURN                                                            UG147012
      END                                                               UG147013
```

```
$ORIGIN         G,CK2,NOREW                                                000
$IBFTC UG248    M94,FULIST,REF,XR6                                      UG248000
      SUBROUTINE MERGT                                                  UG248001
C                TIME MERGE ROUTINE                                     UG248002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UG248003
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),      UG248004
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,        UG248005
     2IDT(20),BB(2800)                                                  UG248006
 1    FORMAT (1H1,30X,34HTHE FOLLOWING CASSES ARE ON MASTER,            UG248007
```


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```
      16H TAPE A6,7H AS OF 3A3/6X,15(I6,2X))                            UG248008
2      FORMAT (1H0,25X,36HTHE FOLLOWING CASSES WERE CALLED FOR,         UG248009
      146H BUT COULD NOT BE FOUND ON THE OLD MASTER TAPE/               UG248010
      26X,15(I6,2X))                                                    UG248011
3      FORMAT (1H0,27X,36HTHE FOLLOWING CASES WERE CALLED FOR,          UG248012
      142H BUT COULD NOT BE FOUND ON THE UPDATE TAPE/6X,                UG248013
      215(I6,2X))                                                       UG248014
       CALL KLOSE (4,1,3,5,8)                                           UG248015
       REWIND 2                                                         UG248016
       REWIND 12                                                        UG248017
       REWIND 13                                                        UG248018
       I=1                                                              UG248019
100    READ (12) IDT                                                    UG248020
       IF(IDT(1))105,200,105                                            UG248021
105    IF(LIST(1,2))140,140,110                                         UG248022
110    M=LIST(1,2)+1                                                    UG248023
       DO 115 J=2,M                                                     UG248024
       IF(LIST(J,2)-IDT(1))115,112,115                                  UG248025
112    LIST(J,2)=0                                                      UG248026
       GO TO 140                                                        UG248027
115    CONTINUE                                                         UG248028
120    READ (12) DUM                                                    UG248029
       IF(IDT(2))100,125,100                                            UG248030
125    READ (12) IDT                                                    UG248031
       GO TO 120                                                        UG248032
140    LISTN(I)=IDT(1)                                                  UG248033
       I=I+1                                                            UG248034
145    READ (12) BB                                                     UG248035
       WRITE (13) IDT                                                   UG248036
       WRITE (13) BB                                                    UG248037
       IF(IDT(2))100,150,100                                            UG248038
150    READ (12) IDT                                                    UG248039
       GO TO 145                                                        UG248040
200    READ (2) IDT                                                     UG248041
       IF(IDT(1))205,300,205                                            UG248042
205    IF(LIST(1,1))240,240,210                                         UG248043
210    M=LIST(1,1)+1                                                    UG248044
       DO 215 J=2,M                                                     UG248045
       IF(LIST(J,1)-IDT(1))215,212,215                                  UG248046
212    LIST(J,1)=0                                                      UG248047
       GO TO 240                                                        UG248048
215    CONTINUE                                                         UG248049
225    READ (2) DUM                                                     UG248050
       IF(IDT(2))200,230,200                                            UG248051
230    READ (2) IDT                                                     UG248052
       GO TO 225                                                        UG248053
240    LISTN(I)=IDT(1)                                                  UG248054
       I=I+1                                                            UG248055
245    READ (2) BB                                                      UG248056
       WRITE (13) IDT                                                   UG248057
       WRITE (13) BB                                                    UG248058
       IF(IDT(2))200,250,200                                            UG248059
250    READ (2) IDT                                                     UG248060
       GO TO 245                                                        UG248061
300    WRITE (13) IDT                                                   UG248062
       ENDFILE 13                                                       UG248063
       CALL SWTHON (29)                                                 UG248064
       CALL SWTHON (33)                                                 UG248065
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      CALL SWTHON (34)                                                  UG248066
      I=I-1                                                             UG248067
      WRITE (6,1) IDD,DAY,DON,YEAR,(LISTN(J),J=1,I)                     UG248068
      IF(LIST(1,1))320,320,310                                          UG248069
 310  I=0                                                               UG248070
      M=LIST(1,1)+1                                                     UG248071
      DO 315 J=2,M                                                      UG248072
      IF(LIST(J,1))312,315,312                                          UG248073
 312  I=I+1                                                             UG248074
      LISTN(I)=LIST(J,1)                                                UG248075
 315  CONTINUE                                                          UG248076
      IF(I)320,320,317                                                  UG248077
 317  WRITE (6,3) (LISTN(J),J=1,I)                                      UG248078
 320  IF(LIST(1,2))350,350,325                                          UG248079
 325  I=0                                                               UG248080
      M=LIST(1,2)+1                                                     UG248081
      DO 330 J=2,M                                                      UG248082
      IF(LIST(J,2))327,330,327                                          UG248083
 327  I=I+1                                                             UG248084
      LISTN(I)=LIST(J,2)                                                UG248085
 330  CONTINUE                                                          UG248086
      IF(I)335,350,335                                                  UG248087
 335  WRITE (6,2) (LISTN(J),J=1,I)                                      UG248088
 350  RETURN                                                            UG248089
      END                                                               UG248090
```

```
$ORIGIN        F,CK2,NOREW                                                 000
$IBFTC UF249   M94,FULIST,REF,XR6                                       UF249000
      SUBROUTINE RETRI                                                  UF249001
C               DATA RETRIEVAL SYSTEM                                   UF249002
      LOGICAL NZER,ZERO                                                 UF249003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          UF249004
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),      UF249005
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,        UF249006
     2IDT(20),BB(2800)                                                  UF249007
      DATA COMMA,SLASH,T/1H,,1H/,1HT/                                   UF249008
 1    FORMAT (1H4,35X,37HTHE RETRIEVED TIME DATA TESTS NOW ON ,         UF249009
     112HUNIT UT2 ARE/6X,15(I6,2X))                                     UF249010
 2    FORMAT (1H0,26X,36HTHE FOLLOWING TESTS WERE CALLED FOR ,          UF249011
     141HBUT COULD NOT BE FOUND ON THE MASTER TAPE/6X,15(I6,2X))        UF249012
 3    FORMAT (1H0,23X,4HTHE I3,27H FREQUENCIES WHICH PRETAIN ,          UF249013
     148HFOR THE FOLLOWING FREQUENCY DATA RETRIVAL CASES ,              UF249014
     23HARE/2X,10(1PE11.4,2X))                                          UF249015
 4    FORMAT (1H4,30X,36HNONE OF THE TESTS WHICH WERE CALLED ,          UF249016
     135HFOR WERE PRESENT ON THE MASTER TAPE)                           UF249017
 5    FORMAT (1H0,55X,21HTHE TESTS PRESENT ARE/6X,15(I6,2X))            UF249018
 6    FORMAT (1H0,9X,36HTHE TESTS WHICH WERE CALLED FOR BUT ,           UF249019
     146HWERE NOT ON THE MASTER TAPE OR PRETAINED TO A ,                UF249020
     132HDIFFERENT SET OF FREQUENCIES ARE/6X,15(I6,2X))                 UF249021
      J=5                                                               UF249022
      I=1                                                               UF249023
 100  J=J+1                                                             UF249024
      IF(NZER(RA(J),COMMA)) GO TO 100                                   UF249025
      IF(NZER(RA(J+1),COMMA)) GO TO 103                                 UF249026
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```
      CALL REREAD (J)                                                   UF249027
103   J=J+1                                                             UF249028
      Q=RA(J)                                                           UF249029
105   J=J+1                                                             UF249030
      IF(NZER(RA(J),SLASH)) GO TO 105                                   UF249031
      J=J+1                                                             UF249032
      CALL TESRT (LIST,J,1,ICD)                                         UF249033
      IF(ICD(1))500,110,500                                             UF249034
110   IF(NZER(Q,T)) GO TO 300                                           UF249035
      CALL KLOSE (5,1,3,5,6,8)                                          UF249036
      REWIND13                                                          UF249037
      REWIND2                                                           UF249038
      M=LIST(1,1)+1                                                     UF249039
      READ (13) IDT                                                     UF249040
200   DO 210 K=2,M                                                      UF249041
      IF(LIST(K,1)-IDT(1))210,205,210                                   UF249042
205   LISTN(I)=IDT(1)                                                   UF249043
      I=I+1                                                             UF249044
      LIST(K,1)=0                                                       UF249045
      GO TO 250                                                         UF249046
210   CONTINUE                                                          UF249047
215   READ (13) DUM                                                     UF249048
      KK=1                                                              UF249049
      IF(IDT(2).NE.0) KK=2                                              UF249050
      READ (13) IDT                                                     UF249051
      GO TO (215,220),KK                                                UF249052
220   IF(IDT(1))200,260,200                                             UF249053
250   READ (13) BB                                                      UF249054
      WRITE (2) IDT                                                     UF249055
      WRITE (2) BB                                                      UF249056
      KK=1                                                              UF249057
      IF(IDT(2).NE.0) KK=2                                              UF249058
      READ (13)IDT                                                      UF249059
      GO TO (250,255),KK                                                UF249060
255   IF(IDT(1))200,260,200                                             UF249061
260   CALL SWTHON (34)                                                  UF249062
      CALL SWTHON (29)                                                  UF249063
      WRITE (2) IDT                                                     UF249064
      ENDFILE 2                                                         UF249065
      IF(I-1)261,261,262                                                UF249066
261   WRITE (6,4)                                                       UF249067
      RETURN                                                            UF249068
262   I=I-1                                                             UF249069
      WRITE (6,1) (LISTN(J),J=1,I)                                      UF249070
      M=LIST(1,1)+1                                                     UF249071
      I=0                                                               UF249072
      DO 265 J=2,M                                                      UF249073
      IF(LIST(J,1))265,265,263                                          UF249074
263   I=I+1                                                             UF249075
      LISTN(I)=LIST(J,1)                                                UF249076
265   CONTINUE                                                          UF249077
      IF(I)500,500,270                                                  UF249078
270   WRITE (6,2) (LISTN(J),J=1,I)                                      UF249079
      RETURN                                                            UF249080
300   CALL KLOSE (5,2,3,5,6,7)                                          UF249081
      REWIND 1                                                          UF249082
      REWIND 14                                                         UF249083
      M=LIST(1,1)+1                                                     UF249084
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```
      READ (14) NF1,A                                                   UF249085
      L=0                                                               UF249086
305   READ (14) ID                                                      UF249087
307   DO 310 K=2,M                                                      UF249088
      IF(LIST(K,1)-ID(1))310,306,310                                    UF249089
306   LISTN(I)=ID(1)                                                    UF249090
      LIST(K,1)=0                                                       UF249091
      I=I+1                                                             UF249092
      GO TO 350                                                         UF249093
310   CONTINUE                                                          UF249094
315   READ (14) DUM                                                     UF249095
      READ (14) ID                                                      UF249096
      IF(ID(1))320,315,315                                              UF249097
320   READ (14) ID                                                      UF249098
      IF(ID(1)+2)325,335,307                                            UF249099
325   IF(L)370,330,370                                                  UF249100
330   READ (14) NF1,A                                                   UF249101
      GO TO 305                                                         UF249102
335   IF(L)370,380,370                                                  UF249103
350   IF(L)355,351,355                                                  UF249104
351   WRITE (1) NF1,A                                                   UF249105
      L=1                                                               UF249106
      GO TO 356                                                         UF249107
355   WRITE (1) IDM1                                                    UF249108
356   READ (14) B                                                       UF249109
      WRITE (1) ID                                                      UF249110
      WRITE (1) B                                                       UF249111
      READ (14) ID                                                      UF249112
      IF(ID(1))360,356,356                                              UF249113
360   READ (14) ID                                                      UF249114
      IF(ID(1))370,370,307                                              UF249115
370   WRITE (1) IDM1                                                    UF249116
      WRITE (1) IDZ                                                     UF249117
      ENDFILE 1                                                         UF249118
      I=I-1                                                             UF249119
      WRITE (6,3) NF1,(A(J),J=1,NF1)                                    UF249120
      WRITE (6,5) (LISTN(J),J=1,I)                                      UF249121
      M=LIST(1,1)+1                                                     UF249122
      I=0                                                               UF249123
      DO 375 J=2,M                                                      UF249124
      IF(LIST(J,1))375,375,372                                          UF249125
372   I=I+1                                                             UF249126
      LISTN(I)=LIST(J,1)                                                UF249127
375   CONTINUE                                                          UF249128
      IF(I)390,390,377                                                  UF249129
377   WRITE (6,6) (LISTN(J),J=1,I)                                      UF249130
      GO TO 390                                                         UF249131
380   WRITE (6,4)                                                       UF249132
390   CALL SWTHON (28)                                                  UF249133
      CALL SWTHON (35)                                                  UF249134
500   RETURN                                                            UF249135
      END                                                               UF249136
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$ORIGIN        F,CK2,NOREW                                                  000
$IBFTC UF350   M94,FULIST,REF,XR6                                        UF350000
      SUBROUTINE WGTD                                                    UF350001
C                TIME DATA OUTPUT SYSTEM                                 UF350002
      LOGICAL NZER,ZERO                                                  UF350003
      LOGICAL ISTST                                                      UF350004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           UF350005
      COMMON/UTILC/LIST(500,2),ICD(2),NF1,A(100),NF2,C(100),ID(4),       UF350006
     1LISTN(1000),DUM,IDM1(4),IDM2(4),IDM3(4),B(200),IDZ(4),IDD,         UF350007
     2IDT(20),BB(2800)                                                   UF350008
      DIMENSION CC(14,200),IC(14,200)                                    UF350009
      EQUIVALENCE(CC,BB,IC)                                              UF350010
      DIMENSION ICH(14),BUF(14),CAL(14)                                  UF350011
      DIMENSION AORM(14),IORM(14)                                        UF350012
      EQUIVALENCE (AORM,IORM)                                            UF350013
      DATA COMMA,SLASH,TE,CH,P,LPRN,RPRN,STAR/1H,,1H/,2HTE,2HCA,         UF350014
     11HA,1H(,1H),1H*/,BLANK/1H /                                        UF350015
 1    FORMAT (2A6)                                                       UF350016
 2    FORMAT (I6)                                                        UF350017
 3    FORMAT (E12.0)                                                     UF350018
 4    FORMAT (1H0,50X,5HTEST I6,19H IS NOT ON THE TAPE)                  UF350019
 5    FORMAT (1H1,53X,12HTEST NUMBER I6,40X,3A3/6X,8HCHANNELS/           UF350020
     17X,7(8X,I2,8X)/8X,7(8X,I2,8X))                                     UF350021
 6    FORMAT (1X,I6,7(3X,1PE12.5,3X)/8X,7(3X,1PE12.5,3X))                UF350022
      CALL KLOSE (6,1,2,3,5,6,8)                                         UF350023
      IK=0                                                               UF350024
      J=5                                                                UF350025
      K=0                                                                UF350026
 100  J=J+1                                                              UF350027
      IF(NZER(RA(J),COMMA)) GO TO 100                                    UF350028
      IF(NZER(RA(J+1),COMMA)) GO TO 103                                  UF350029
      CALL REREAD (J)                                                    UF350030
 103  J=J+1                                                              UF350031
      L=J                                                                UF350032
      M=J+1                                                              UF350033
 105  CALL PACK (L,M,WO,RA)                                              UF350034
      ISTST=.FALSE.                                                      UF350035
 110  J=J+1                                                              UF350036
      IF(NZER(RA(J),SLASH)) GO TO 110                                    UF350037
      IF(ZERO(WO,TE)) GO TO 150                                          UF350038
      IF(ZERO(WO,CH)) GO TO 200                                          UF350039
      J=J+1                                                              UF350040
      IF(ZERO(RA(J),P)) GO TO 115                                        UF350041
      CALL TESRT (ICH,J,1,IK)                                            UF350042
      GO TO 120                                                          UF350043
 115  ICH(1)=0                                                           UF350044
 117  J=J+1                                                              UF350045
      IF(NZER(RA(J),COMMA)) GO TO 117                                    UF350046
 120  K=K+1                                                              UF350047
      IF(K-3)125,300,300                                                 UF350048
 125  J=J+1                                                              UF350049
      IF(NZER(RA(J),COMMA)) GO TO 130                                    UF350050
      CALL REREAD (J)                                                    UF350051
      IF(ZERO(RA(1),STAR)) GO TO 500                                     UF350052
      J=J+1                                                              UF350053
 130  L=J                                                                UF350054
      M=J+1                                                              UF350055
      GO TO 105                                                          UF350056
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150   L=J+1                                                    UF350057
155   J=J+1                                                    UF350058
      IF(NZER(RA(J),COMMA)) GO TO 155                          UF350059
      M=J-1                                                    UF350060
      CALL PACK (L,M,WO,RA)                                    UF350061
      CALL RITE31                                              UF350062
      WRITE (31,1) WO                                          UF350063
      CALL READ31                                              UF350064
      READ (31,2) ITE                                          UF350065
      GO TO 120                                                UF350066
200   L=J+1                                                    UF350067
      I=1                                                      UF350068
205   J=J+1                                                    UF350069
      IF(NZER(RA(J),LPRN)) GO TO 205                           UF350070
      M=J-1                                                    UF350071
      CALL PACK (L,M,WO,RA)                                    UF350072
      CALL RITE31                                              UF350073
      WRITE (31,1) WO                                          UF350074
      CALL READ31                                              UF350075
      READ (31,2) INC                                          UF350076
210   L=J+1                                                    UF350077
      JK=0                                                     UF350078
215   J=J+1                                                    UF350079
      IF(ZERO(RA(J),COMMA)) GO TO 220                          UF350080
      IF(NZER(RA(J),RPRN)) GO TO 215                           UF350081
      JK=2                                                     UF350082
      GO TO 225                                                UF350083
220   IF(ZERO(RA(J+1),COMMA)) JK=-2                            UF350084
225   M=J-1                                                    UF350085
      IF(M-L-5)230,230,235                                     UF350086
230   W1=BLANK                                                 UF350087
      GO TO 240                                                UF350088
235   L1=L+5                                                   UF350089
      CALL PACK (L,L1,W1,RA)                                   UF350090
      L=L1+1                                                   UF350091
240   CALL PACK (L,M,W2,RA)                                    UF350092
      CALL RITE31                                              UF350093
      WRITE (31,1) W1,W2                                       UF350094
      CALL READ31                                              UF350095
      READ (31,3) CAL(I)                                       UF350096
      IF(JK)245,250,260                                        UF350097
245   CALL REREAD (J)                                          UF350098
250   I=I+1                                                    UF350099
      GO TO 210                                                UF350100
260   IF(I-INC)265,270,265                                     UF350101
265   IK=1                                                     UF350102
      CALL WROUT (1,501)                                       UF350103
270   J=J+1                                                    UF350104
      GO TO 120                                                UF350105
300   IRW=0                                                    UF350106
      K=0                                                      UF350107
      IF(IK)125,305,125                                        UF350108
305   READ (13) IDT                                            UF350109
      IF(IDT(1)-ITE)310,400,310                                UF350110
310   IF(IDT(1))315,325,315                                    UF350111
315   READ (13) DUM                                            UF350112
      IF(IDT(2))305,320,305                                    UF350113
320   READ (13) IDT                                            UF350114
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      GO TO 315                                                         UF350115
325   IF(IRW)335,330,335                                                UF350116
330   REWIND 13                                                         UF350117
      IRW=2                                                             UF350118
      GO TO 305                                                         UF350119
335   WRITE (6,4) ITE                                                   UF350120
      REWIND 13                                                         UF350121
      GO TO 125                                                         UF350122
400   IKJ=0                                                             UF350123
      LINE=0                                                            UF350124
      IPOINT=1                                                          UF350125
405   READ (13) BB                                                      UF350126
      IF(ISTST) GO TO 406                                               UF350127
      ISTST=.TRUE.                                                      UF350128
      DO 401 M=1,14                                                     UF350129
401   AORM(M)=BB(M)                                                     UF350130
406   KK=1                                                              UF350131
      KL=IDT(3)                                                         UF350132
      IF(IKJ)420,410,420                                                UF350133
410   L=ICH(1)+1                                                        UF350134
415   WRITE (10,5) ITE,DAY,DON,YEAR,(ICH(M),M=2,L)                      UF350135
      IKJ=1                                                             UF350136
420   IF(LINE-55)425,425,450                                            UF350137
425   IF(KK-KL)430,430,460                                              UF350138
430   DO 436 M=2,L                                                      UF350139
431   IM=ICH(M)                                                         UF350140
      KJ=M-1                                                            UF350141
      IF(IDT(20))435,434,435                                            UF350142
434   CC(IM,KK)=IC(IM,KK)-IORM(IM)                                      UF350143
      GO TO 436                                                         UF350144
435   CC(IM,KK)=CC(IM,KK)-AORM(IM)                                      UF350145
436   BUF(KJ)=CC(IM,KK)*CAL(KJ)                                         UF350146
      WRITE (10,6) IPOINT,(BUF(M),M=1,KJ)                               UF350147
      IPOINT=IPOINT+1                                                   UF350148
      IF(KJ-7)445,445,440                                               UF350149
440   LINE=LINE+1                                                       UF350150
445   LINE=LINE+1                                                       UF350151
      KK=KK+1                                                           UF350152
      GO TO 420                                                         UF350153
450   LINE=0                                                            UF350154
      IKJ=0                                                             UF350155
      IF(KK-KL)415,415,460                                              UF350156
460   KK=1                                                              UF350157
      IF(IDT(2))125,465,125                                             UF350158
465   READ (13) IDT                                                     UF350159
      GO TO 405                                                         UF350160
500   CALL SWTHON (34)                                                  UF350161
      RETURN                                                            UF350162
      END                                                               UF350163
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CORRELATION SYSTEM

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$ORIGIN         A,CK2,NOREW                                                  000
$IBFTC CA651    M94/2,XR6,LIST                                            CA651000
      SUBROUTINE CORR                                                     CA651001
C               CORRELATION SYSTEM MONITOR                                CA651002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR            CA651003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,   CA651004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),         CA651005
     2BUF(2800,4)                                                         CA651006
      COMMON/NRLSWT/NRLSW,ANORM(14)                                       CA651007
      DIMENSION IDZ(4)                                                    CA651008
      DIMENSION CP(20,25)                                                 CA651009
      EQUIVALENCE (ICP,CP)                                                CA651010
      LOGICAL ZERO,SWITCH,NZER                                            CA651011
      DATA RELO,COMP,CORRA,PRIN,CRLO,PPOT/4HRELO,4HCOMP,4HCORR,           CA651012
     14HPRIN,4HCRLO,4HPLOT/,BLANK/1H /                                    CA651013
      DATA CONT/4HCONT/                                                   CA651014
      IS=0                                                                CA651015
      CALL SWTHOF (18)                                                    CA651016
      CALL SWTHOF (19)                                                    CA651017
      CALL SWTHOF (20)                                                    CA651018
 90   CONTINUE                                                            CA651019
      DO 110 J=1,25                                                       CA651020
      DO 100 I=1,14                                                       CA651021
 100  ICP(I,J)=0                                                          CA651022
      DO 105 I=15,20                                                      CA651023
 105  CP(I,J)=BLANK                                                       CA651024
 110  CONTINUE                                                            CA651025
 115  CALL KARD (J)                                                       CA651026
 120  CALL PACK (2,5,WO,RA)                                               CA651027
      IF(IS)130,125,130                                                   CA651028
 125  REWIND 1                                                            CA651029
      WRITE (1) NFREQ,FREQ                                                CA651030
      IS=2                                                                CA651031
 130  IF(ZERO(WO,RELO)) GO TO 135                                         CA651032
      IF(ZERO(WO,COMP)) GO TO 140                                         CA651033
      IF(ZERO(WO,CORRA)) GO TO 145                                        CA651034
      IF(ZERO(WO,PRIN)) GO TO 150                                         CA651035
      IF(ZERO(WO,CRLO)) GO TO 155                                         CA651036
      IF(ZERO(WO,PPOT)) GO TO 170                                         CA651037
      IF(ZERO(WO,CONT)) GO TO 180                                         CA651038
      IDZ(1)=0                                                            CA651039
      IDZ(2)=0                                                            CA651040
      IDZ(3)=0                                                            CA651041
      IDZ(4)=0                                                            CA651042
      WRITE (1) IDZ                                                       CA651043
      ENDFILE 1                                                           CA651044
      REWIND 1                                                            CA651045
      RETURN                                                              CA651046
 135  I=3                                                                 CA651047
      J=2                                                                 CA651048
      GO TO 160                                                           CA651049
 140  I=1                                                                 CA651050
      J=1                                                                 CA651051
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      GO TO 160                                                         CA651052
  145 I=2                                                               CA651053
      J=1                                                               CA651054
      GO TO 160                                                         CA651055
  150 I=2                                                               CA651056
      J=2                                                               CA651057
      GO TO 160                                                         CA651058
  155 I=1                                                               CA651059
      J=2                                                               CA651060
  160 CALL DECOD (I,J)                                                  CA651061
      GO TO 120                                                         CA651062
  170 CALL PHITAU                                                       CA651063
      CALL TPHIP                                                        CA651064
      CALL PTPRI                                                        CA651065
      CALL PLPHI                                                        CA651066
      GO TO 120                                                         CA651067
  180 IDZ(1)=-1                                                         CA651068
      IDZ(2)=-1                                                         CA651069
      IDZ(3)=-1                                                         CA651070
      IDZ(4)=-1                                                         CA651071
      WRITE (1) IDZ                                                     CA651072
      IF(SWITCH(2,18,19)) CALL SWTHON(2)                                CA651073
      GO TO 90                                                          CA651074
      END                                                               CA651075


$IBFTC CA652   M94,FULIST,REF,XR6                                       CA652000
      SUBROUTINE KARD (J)                                               CA652001
C               CORRELATION SYSTEM CARD INPUT ROUTINE                   CA652002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CA652003
      COMMON IDMPIT                                                     CA652004
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CA652005
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),       CA652006
     2BUF(2800,4)                                                       CA652007
      LOGICAL ZERO,NZER                                                 CA652008
      DATA C,COMMA,PAUS,STAR/1HC,1H,,4HPAUS,1H*/                        CA652009
      DATA PAGE/4HPAGE/                                                 CA652010
      DATA CDMP/4HDUMP/                                                 CA652011
  1   FORMAT (80A1)                                                     CA652012
  2   FORMAT (1H ,80A1)                                                 CA652013
  3   FORMAT (1H1)                                                      CA652014
      IDMPIT=1                                                          CA652015
      CALL CARD                                                         CA652016
      IDMPIT=0                                                          CA652017
  100 READ (5,1) (RA(I),I=1,80)                                         CA652018
  105 WRITE (6,2) (RA(I),I=1,80)                                        CA652019
      WRITE (10,2) (RA(I),I=1,80)                                       CA652020
      DO 110 I=1,82                                                     CA652021
  110 SA(I)=RA(I)                                                       CA652022
      IF(ZERO(RA(1),C)) GO TO 100                                       CA652023
      CALL SQUEEZ                                                       CA652024
      IF(ZERO(RA(1),COMMA)) GO TO 100                                   CA652025
      CALL PACK (2,5,WO,RA)                                             CA652026
      IF(ZERO(WO,PAGE)) GO TO 120                                       CA652027
      IF(ZERO(WO,CDMP)) GO TO 125                                       CA652028
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      IF(NZER(WO,PAUS)) GO TO 115                                       CA652029
      CALL MESAGE                                                       CA652030
      GO TO 105                                                         CA652031
 115  J=1                                                               CA652032
      IF(NZER(RA(1),STAR)) J=0                                          CA652033
      RETURN                                                            CA652034
 120  WRITE (10,3)                                                      CA652035
      GO TO 100                                                         CA652036
 125  CALL TDUMP (RA,-1)                                                CA652037
      IF(ZERO(RA(6),COMMA)) GO TO 130                                   CA652038
      IDMPIT=2                                                          CA652039
      CALL CARD                                                         CA652040
      IDMPIT=0                                                          CA652041
      GO TO 100                                                         CA652042
 130  CALL TDUMP (RA,1)                                                 CA652043
      GO TO 100                                                         CA652044
      END                                                               CA652045
```

```
$ORIGIN          H,CK2,NOREW                                                000
$IBFTC CH153     M94,FULIST,REF,XR6                                      CH153000
      SUBROUTINE DECOD (I1,I2)                                           CH153001
C                CONTROL CARD DECODE CONTROL ROUTINE                    CH153002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           CH153003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,  CH153004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),        CH153005
     2BUF(2800,4)                                                        CH153006
      LOGICAL ZERO,NZER                                                  CH153007
      DATA COMMA,SLASH/1H,,1H//                                          CH153008
      I=I1+I2                                                            CH153009
      GO TO (200,100,150,140,130),I                                      CH153010
 100  J=5                                                                CH153011
 105  J=J+1                                                              CH153012
      IF(NZER(RA(J),COMMA)) GO TO 105                                    CH153013
      IF(NZER(RA(J+1),COMMA)) GO TO 110                                  CH153014
      ITOUT=ITIN                                                         CH153015
      GO TO 120                                                          CH153016
 110  J=J+1                                                              CH153017
      IF(NZER(RA(J),SLASH)) GO TO 110                                    CH153018
      L=J+1                                                              CH153019
 115  J=J+1                                                              CH153020
      IF(NZER(RA(J),COMMA)) GO TO 115                                    CH153021
      M=J-1                                                              CH153022
      CALL PACK (L,M,WO,RA)                                              CH153023
 1    FORMAT (A6)                                                        CH153024
 2    FORMAT (I6)                                                        CH153025
      CALL RITE31                                                        CH153026
      WRITE (31,1) WO                                                    CH153027
      CALL READ31                                                        CH153028
      READ (31,2) ITOUT                                                  CH153029
 120  CALL KARD (J)                                                      CH153030
      GO TO 200                                                          CH153031
 130  CALL DECO2 (3)                                                     CH153032
      GO TO 200                                                          CH153033
 140  I=I/2                                                              CH153034
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      CALL DECC2 (I)                                                    CH153035
      GO TO 200                                                         CH153036
 150  GO TO (160,140),I1                                                CH153037
 160  CALL DECO1                                                        CH153038
 200  RETURN                                                            CH153039
      END                                                               CH153040
```

```
$ORIGIN          I,CK2,NOREW                                                000
$IBFTC CI154     M94,FULIST,REF,XR6                                     CI154000
      SUBROUTINE DECO1                                                  CI154001
C                PARTIAL CONTROL CARD DECODER                           CI154002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CI154003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CI154004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),       CI154005
     2BUF(2800,4)                                                       CI154006
      COMMON/NRLSWT/NRLSW,ANORM(14)                                     CI154007
      LOGICAL ZERO,NZER,SWITCH                                          CI154008
      DATA NR/2HNO/                                                     CI154009
      DATA BLANK,COMMA,CRLO,TE,ST,TZ,TM,NT,CH,CA,TA,DE,SLASH,           CI154010
     1LPRN,RPRN/1H ,1H,,4HCRLO,2HTE,2HSA,2HTZ,2HTM,2HNT,2HCH,2HCA,      CI154011
     22HTA,2HDE,1H/,1H(,1H)/                                            CI154012
 1    FORMAT (14A6)                                                    CI154013
 2    FORMAT (14I6)                                                    CI154014
 3    FORMAT (7E12.0)                                                  CI154015
 4    FORMAT (12H ***** TEST I6,2X,18HIS NOT ON THE TAPE)              CI154016
 5    FORMAT (14F6.0)                                                  CI154017
      DIMENSION AO1(21),AO2(2,14),TCAL(14)                              CI154018
      DIMENSION AO3(14)                                                 CI154019
      DO 100 I=1,21                                                     CI154020
 100  AO1(I)=BLANK                                                      CI154021
      DO 105 J=1,14                                                     CI154022
      AO3(J)=BLANK                                                      CI154023
      DO 105 I=1,2                                                      CI154024
 105  AO2(I,J)=BLANK                                                    CI154025
      IC=10                                                             CI154026
 110  J=5                                                               CI154027
 115  J=J+1                                                             CI154028
      IF(NZER(RA(J),COMMA)) GO TO 115                                   CI154029
 120  IF(NZER(RA(J+1),COMMA)) GO TO 140                                 CI154030
      CALL KARD (J)                                                     CI154031
      IF(J)125,140,125                                                  CI154032
 125  CALL PACK (2,5,WO,RA)                                             CI154033
      IF(ZERO(WO,CRLO)) GO TO 110                                       CI154034
      IF(IC)135,130,135                                                 CI154035
 130  CALL SWTHOF (18)                                                  CI154036
      GO TO 400                                                         CI154037
 135  CALL WROUT (1,400)                                                CI154038
      CALL SWTHON (18)                                                  CI154039
      RETURN                                                            CI154040
 140  J=J+1                                                             CI154041
      L=J+1                                                             CI154042
      I=1                                                               CI154043
      K=3                                                               CI154044
      CALL PACK (J,L,WO,RA)                                             CI154045
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      IF(ZERO(WO,TE)) GO TO 175                                         CI154046
      IF(ZERO(WO,ST)) GO TO 173                                         CI154047
      IF(ZERO(WO,TZ)) GO TO 172                                         CI154048
      IF(ZERO(WO,TM)) GO TO 171                                         CI154049
      IF(ZERO(WO,NT)) GO TO 170                                         CI154050
      IF(ZERO(WO,CH)) GO TO 200                                         CI154051
      IF(ZERO(WO,CA)) GO TO 300                                         CI154052
      IF(ZERO(WO,TA)) GO TO 155                                         CI154053
      IF(ZERO(WO,DE)) GO TO 150                                         CI154054
      IF(ZERO(WO,NR)) GO TO 600                                         CI154055
145   CALL KARD (J)                                                     CI154056
      IF(J)135,145,135                                                  CI154057
150   I=I+1                                                             CI154058
155   J=J+1                                                             CI154059
      IF(NZER(RA(J),SLASH)) GO TO 155                                   CI154060
      L=J+1                                                             CI154061
160   J=J+1                                                             CI154062
      IF(NZER(RA(J),COMMA)) GO TO 160                                   CI154063
      M=J-1                                                             CI154064
      CALL PACK (L,M,AO1(I),RA)                                         CI154065
      IC=IC-1                                                           CI154066
      GO TO 120                                                         CI154067
170   K=K+1                                                             CI154068
171   K=K+1                                                             CI154069
172   K=K+1                                                             CI154070
173   K=K+1                                                             CI154071
175   J=J+1                                                             CI154072
      IF(NZER(RA(J),SLASH)) GO TO 175                                   CI154073
      L=J+1                                                             CI154074
180   J=J+1                                                             CI154075
      IF(NZER(RA(J),COMMA)) GO TO 180                                   CI154076
      M=J-1                                                             CI154077
      CALL PACK (L,M,AO1(K),RA)                                         CI154078
      IC=IC-1                                                           CI154079
      GO TO 120                                                         CI154080
200   I=8                                                               CI154081
      IS=0                                                              CI154082
205   J=J+1                                                             CI154083
      IF(NZER(RA(J),LPRN)) GO TO 205                                    CI154084
210   L=J+1                                                             CI154085
215   J=J+1                                                             CI154086
      IF(ZERO(RA(J),COMMA)) GO TO 220                                   CI154087
      IF(NZER(RA(J),RPRN)) GO TO 215                                    CI154088
      IS=1                                                              CI154089
220   M=J-1                                                             CI154090
      CALL PACK (L,M,AO1(I),RA)                                         CI154091
      IF(IS)230,225,230                                                 CI154092
225   I=I+1                                                             CI154093
      GO TO 210                                                         CI154094
230   J=J+1                                                             CI154095
      IC=IC-1                                                           CI154096
      GO TO 120                                                         CI154097
300   I=1                                                               CI154098
      IS=0                                                              CI154099
305   J=J+1                                                             CI154100
      IF(NZER(RA(J),LPRN)) GO TO 305                                    CI154101
310   L=J+1                                                             CI154102
315   J=J+1                                                             CI154103
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      IF(ZERO(RA(J),COMMA)) GO TO 320                                   CI154104
      IF(NZER(RA(J),RPRN)) GO TO 315                                    CI154105
      IS=1                                                              CI154106
320   M=J-1                                                             CI154107
      K=1                                                               CI154108
      IF(M-L-5)325,325,340                                              CI154109
325   K=K+1                                                             CI154110
      CALL PACK (L,M,AO2(K,I),RA)                                       CI154111
330   IF(IS)230,335,230                                                 CI154112
335   I=I+1                                                             CI154113
      GO TO 310                                                         CI154114
340   L1=L+5                                                            CI154115
      CALL PACK (L,L1,AO2(K,I),RA)                                      CI154116
      L=L1+1                                                            CI154117
      GO TO 325                                                         CI154118
400   CALL RITE31                                                       CI154119
      WRITE (31,1) (AO1(I),I=1,7)                                       CI154120
      CALL READ31                                                       CI154121
      READ (31,2) ITAZ,IDEL,ITIN,ISA,ITZ,ITM,NTV                        CI154122
      CALL RITE31                                                       CI154123
      WRITE (31,1) (AO1(I),I=8,21)                                      CI154124
      CALL READ31                                                       CI154125
      READ (31,2) ICH                                                   CI154126
      CALL RITE31                                                       CI154127
      WRITE (31,1) ((AO2(I,K),I=1,2),K=1,7)                             CI154128
      CALL READ31                                                       CI154129
      READ (31,3) (TCAL(I),I=1,7)                                       CI154130
      CALL RITE31                                                       CI154131
      WRITE (31,1) ((AO2(I,K),I=1,2),K=8,14)                            CI154132
      CALL READ31                                                       CI154133
      READ (31,3) (TCAL(I),I=8,14)                                      CI154134
      IF(NRLSW)402,403,402                                              CI154135
402   CALL RITE31                                                       CI154136
      WRITE (31,1)AO3                                                   CI154137
      CALL READ31                                                       CI154138
      READ (31,5)AC3                                                    CI154139
403   CONTINUE                                                          CI154140
      DO 415 I=1,14                                                     CI154141
405   K=ICH(I)                                                          CI154142
      IF(K)410,420,410                                                  CI154143
410   CAL(K)=TCAL(I)                                                    CI154144
      IF(NRLSW)412,415,412                                              CI154145
412   ANORM(K)=AO3(I)                                                   CI154146
415   CONTINUE                                                          CI154147
420   ITAU(1)=ITAZ                                                      CI154148
      DO 425 K=2,NTV                                                    CI154149
      L=K-1                                                             CI154150
      ITAU(K)=ITAU(L)+IDEL                                              CI154151
425   CONTINUE                                                          CI154152
      IF(SWITCH(1,3)) GO TO 470                                         CI154153
430   REWIND 2                                                          CI154154
435   READ (2) ID                                                       CI154155
      IF(ID(1)-ITIN) 440,500,440                                        CI154156
440   IF(ID(1))445,450,445                                              CI154157
445   READ (2) DUM                                                      CI154158
      GO TO 435                                                         CI154159
450   IF(I-99)455,460,455                                               CI154160
455   I=99                                                              CI154161
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      GO TO 430                                                         CI154162
 460  WRITE (6,4) ITIN                                                  CI154163
 470  CALL SWTHON (18)                                                  CI154164
 500  RETURN                                                            CI154165
 600  NRLSW=1                                                           CI154166
 605  J=J+1                                                             CI154167
      IF(NZER(RA(J),LPRN)) GO TO 605                                    CI154168
      IF(NZER(RA(J+1),RPRN)) GO TO 610                                  CI154169
      NRLSW=0                                                           CI154170
      IC=IC-1                                                           CI154171
      GO TO 115                                                         CI154172
 610  IS=0                                                              CI154173
      K=1                                                               CI154174
 615  L=J+1                                                             CI154175
 620  J=J+1                                                             CI154176
      IF(ZERO(RA(J),COMMA)) GO TO 625                                   CI154177
      IF(NZER(RA(J),RPRN)) GO TO 620                                    CI154178
      IS=1                                                              CI154179
 625  M=J-1                                                             CI154180
      CALL PACK (L,M,AO3(K),RA)                                         CI154181
      K=K+1                                                             CI154182
      IF(IS)630,615,630                                                 CI154183
 630  NRLSW=1                                                           CI154184
      IC=IC-1                                                           CI154185
      GO TO 115                                                         CI154186
      END                                                               CI154187
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$ORIGIN          I,CK2,NOREW                                                 000
$IBFTC CI255     M94,FULIST,REF,XR6                                       CI255000
      SUBROUTINE DECO2 (IN)                                               CI255001
C                PARTIAL CONTROL CARD DECODER                            CI255002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR            CI255003
      COMMON/CCRRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,   CI255004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),         CI255005
     2BUF(2800,4)                                                         CI255006
      LOGICAL ZERO,NZER,SWITCH                                            CI255007
      DATA COMMA,LPRN,RPRN,TA,PH,OU,TP,OP,LA,DOLAR/1H,,1H(,1H),           CI255008
     12HTA,2HPH,2HOU,2HTP,2HOP,2HLA,1H$/,COOR/4HCORR/                     CI255009
      DATA FROM/2HFR/                                                     CI255010
      DIMENSION ISAVEK(25),IDSAV(4),SAVBUF(2,100)                         CI255011
 1    FORMAT (14A6)                                                       CI255012
 2    FORMAT (14I6)                                                       CI255013
 3    FORMAT (37H ***** TPHI DEFINED FOR UNDEFINED PHI)                   CI255014
 4    FORMAT (42H ***** CALL FOR A PRINT OF A UNDEFINED PHI)              CI255015
      GO TO (200,100,400),IN                                              CI255016
 100  J=5                                                                 CI255017
      IRELOA=0                                                            CI255018
 105  J=J+1                                                               CI255019
      IF(NZER(RA(J),COMMA)) GO TO 105                                     CI255020
 110  IF(NZER(RA(J+1),COMMA)) GO TO 120                                   CI255021
      CALL KARD (J)                                                       CI255022
      IF(J)115,120,115                                                    CI255023
 115  IF(IRELOA.EQ.1) GO TO 420                                           CI255024
      RETURN                                                              CI255025
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120   J=J+1                                                    CI255026
      IF(NZER(RA(J),LPRN)) GO TO 120                           CI255027
      L=J+1                                                    CI255028
125   J=J+1                                                    CI255029
      IF(NZER(RA(J),COMMA)) GO TO 130                          CI255030
      M1=J-1                                                   CI255031
      M2=J+1                                                   CI255032
      J=J+1                                                    CI255033
130   IF(NZER(RA(J),RPRN)) GO TO 125                           CI255034
      M=J-1                                                    CI255035
      J=J+1                                                    CI255036
      CALL PACK (L,M1,W1,RA)                                   CI255037
      CALL PACK (M2,M,W2,RA)                                   CI255038
      CALL RITE31                                              CI255039
      WRITE (31,1) W1,W2                                       CI255040
      CALL READ31                                              CI255041
      READ (31,2) I1,I2                                        CI255042
135   DO 160 I=1,25                                            CI255043
      IF(ICP(1,I))140,165,140                                  CI255044
140   IF(ICP(1,I)-I1)160,150,160                               CI255045
150   IF(ICP(2,I)-I2)160,155,160                               CI255046
155   ICP(14,I)=1                                              CI255047
      GO TO 110                                                CI255048
160   CONTINUE                                                 CI255049
165   WRITE (6,4)                                              CI255050
      GO TO 110                                                CI255051
200   CALL SWTHOF (20)                                         CI255052
      IRELOA=0                                                 CI255053
      J=5                                                      CI255054
205   J=J+1                                                    CI255055
      IF(NZER(RA(J),COMMA)) GO TO 205                          CI255056
      J=J+1                                                    CI255057
      I=0                                                      CI255058
      IC=0                                                     CI255059
      ITPRI=0                                                  CI255060
      IT=0                                                     CI255061
210   IF(NZER(RA(J),COMMA)) GO TO 225                          CI255062
      CALL KARD (J)                                            CI255063
      IF(J)215,211,215                                         CI255064
211   J=1                                                      CI255065
      GO TO 225                                                CI255066
215   CALL PACK (2,5,WO,RA)                                    CI255067
      IF(NZER(WO,CCOR)) GO TO 115                              CI255068
      J=5                                                      CI255069
220   J=J+1                                                    CI255070
      IF(NZER(RA(J),COMMA)) GO TO 220                          CI255071
      J=J+1                                                    CI255072
      GO TO 210                                                CI255073
225   CALL PACK (J,J+1,WO,RA)                                  CI255074
      IF(ZERO(WO,TA)) GO TO 240                                CI255075
      IF(ZERO(WO,PH)) GO TO 300                                CI255076
      IF(ZERO(WO,OU)) GO TO 360                                CI255077
      IF(ZERO(WO,TP)) GO TO 305                                CI255078
      IF(ZERO(WO,OP)) GO TO 355                                CI255079
      IF(ZERO(WO,LA)) GO TO 255                                CI255080
      IF(ZERO(WO,FROM)) GO TO 405                              CI255081
      CALL SWTHON (19)                                         CI255082
230   CALL KARD (J)                                            CI255083
```


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```
      IF(J)235,230,235                                                  CI255084
235   CALL WROUT (1,401)                                                CI255085
      RETURN                                                            CI255086
240   J=J+1                                                             CI255087
      IF(NZER(RA(J),LPRN)) GO TO 240                                    CI255088
      L=J+1                                                             CI255089
245   J=J+1                                                             CI255090
      IF(NZER(RA(J),RPRN)) GO TO 245                                    CI255091
      M=J-1                                                             CI255092
      J=J+2                                                             CI255093
      CALL PACK (L,M,WO,RA)                                             CI255094
      CALL RITE31                                                       CI255095
      WRITE (31,1) WO                                                   CI255096
      CALL READ31                                                       CI255097
      READ (31,2) ITPRI                                                 CI255098
      ID1=ITOUT                                                         CI255099
      ID2=ITPRI                                                         CI255100
      ID3=1                                                             CI255101
      ID4=NTV                                                           CI255102
      WRITE (1) ID1,ID2,ID3,ID4                                         CI255103
      DO 250 L=1,100                                                    CI255104
      PHI(L,1)=ITAU(L)                                                  CI255105
      PHI(L,1)=PHI(L,1)*DT                                              CI255106
250   PHI(L,2)=0.                                                       CI255107
      WRITE (1) ((PHI(L,K),K=1,2),L=1,100)                              CI255108
      GO TO 210                                                         CI255109
255   K=J                                                               CI255110
260   K=K+1                                                             CI255111
      IF(NZER(SA(K),DOLAR)) GO TO 260                                   CI255112
      L=K+1                                                             CI255113
265   K=K+1                                                             CI255114
      IF(NZER(SA(K),DOLAR)) GO TO 265                                   CI255115
      M=K-1                                                             CI255116
      K=15                                                              CI255117
270   L1=L+5                                                            CI255118
      IF(L1-M)275,280,280                                               CI255119
275   CALL PACK (L,L1,ICP(K,I),SA)                                      CI255120
      K=K+1                                                             CI255121
      L=L1+1                                                            CI255122
      IF(K-20)270,270,285                                               CI255123
280   CALL PACK (L,M,ICP(K,I),SA)                                       CI255124
285   J=M+1                                                             CI255125
290   J=J-1                                                             CI255126
      IF(NZER(RA(J),DOLAR)) GO TO 290                                   CI255127
      J=J+2                                                             CI255128
      GO TO 210                                                         CI255129
300   I=I+1                                                             CI255130
      IC=1                                                              CI255131
      IT=0                                                              CI255132
      GO TO 310                                                         CI255133
305   IT=1                                                              CI255134
      IC=0                                                              CI255135
310   J=J+1                                                             CI255136
      IF(NZER(RA(J),LPRN)) GO TO 310                                    CI255137
      L=J+1                                                             CI255138
315   J=J+1                                                             CI255139
      IF(NZER(RA(J),COMMA)) GO TO 320                                   CI255140
      M1=J-1                                                            CI255141
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```
      M2=J+1                                                            CI255142
      J=J+1                                                             CI255143
320   IF(NZER(RA(J),RPRN)) GO TO 315                                    CI255144
      M=J-1                                                             CI255145
      CALL PACK (L,M1,W1,RA)                                            CI255146
      CALL PACK (M2,M,W2,RA)                                            CI255147
      CALL RITE31                                                       CI255148
      WRITE (31,1) W1,W2                                                CI255149
      CALL READ31                                                       CI255150
      READ (31,2) I1,I2                                                 CI255151
      IF(IC)325,330,325                                                 CI255152
325   ICP(1,I)=I1                                                       CI255153
      ICP(2,I)=I2                                                       CI255154
      J=J+2                                                             CI255155
      GO TO 210                                                         CI255156
330   K=I                                                               CI255157
333   IF(ICP(1,K)-I1)345,335,345                                        CI255158
335   IF(ICP(2,K)-I2)345,340,345                                        CI255159
340   KI=K                                                              CI255160
      J=J+2                                                             CI255161
      GO TO 210                                                         CI255162
345   K=K-1                                                             CI255163
      IF(K)350,350,333                                                  CI255164
350   WRITE (6,3)                                                       CI255165
      KI=-1                                                             CI255166
      J=J+2                                                             CI255167
      GO TO 210                                                         CI255168
355   IG=1                                                              CI255169
      GO TO 365                                                         CI255170
360   IG=0                                                              CI255171
365   J=J+1                                                             CI255172
      IF(NZER(RA(J),LPRN)) GO TO 365                                    CI255173
      L=J+1                                                             CI255174
370   J=J+1                                                             CI255175
      IF(NZER(RA(J),RPRN)) GO TO 370                                    CI255176
      M=J-1                                                             CI255177
      J=J+2                                                             CI255178
      CALL PACK (L,M,WO,RA)                                             CI255179
      CALL RITE31                                                       CI255180
      WRITE (31,1) WO                                                   CI255181
      CALL READ31                                                       CI255182
      READ (31,2) I1                                                    CI255183
      IF(IG)395,375,395                                                 CI255184
375   IF(IT)385,380,385                                                 CI255185
380   ICP(3,I)=I1                                                       CI255186
      GO TO 210                                                         CI255187
385   IF(KI)210,210,390                                                 CI255188
390   ICP(K,KI)=I1                                                      CI255189
      GO TO 210                                                         CI255190
395   K=I1+3                                                            CI255191
      GO TO 210                                                         CI255192
400   CALL SWTHON (20)                                                  CI255193
      IRELOA=1                                                          CI255194
      J=5                                                               CI255195
      GO TO 205                                                         CI255196
405   J=J+1                                                             CI255197
      IF(NZER(RA(J),LPRN)) GO TO 405                                    CI255198
      L=J+1                                                             CI255199
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410   J=J+1                                                          CI255200
      IF(NZER(RA(J),RPRN)) GO TO 410                                 CI255201
      M=J-1                                                          CI255202
415   J=J+1                                                          CI255203
      IF(NZER(RA(J),COMMA)) GO TO 415                                CI255204
      J=J+1                                                          CI255205
      CALL PACK (L,M,WO,RA)                                          CI255206
      CALL RITE31                                                    CI255207
      WRITE (31,1) WO                                                CI255208
      CALL READ31                                                    CI255209
      READ (31,2) ISAVEK(I)                                          CI255210
      GO TO 210                                                      CI255211
420   REWIND 4                                                       CI255212
      IF(SWITCH(1,15)) GO TO 505                                     CI255213
425   READ (4) IDSAV                                                 CI255214
      READ (4) SAVBUF                                                CI255215
      IF(IDSAV(1).EQ.ITIN) GO TO 430                                 CI255216
      IF(IDSAV(1)+IDSAV(2))425,500,425                               CI255217
430   DO 450 J=1,25                                                  CI255218
      IF(IDSAV(2).NE.ISAVEK(J)) GO TO 450                            CI255219
      DO 440 K=1,NTV                                                 CI255220
440   PHI(K,J)=SAVBUF(1,K)                                           CI255221
450   CONTINUE                                                       CI255222
      GO TO 425                                                      CI255223
500   RETURN                                                         CI255224
505   CALL SWTHON (19)                                               CI255225
      CALL SWTHOF (20)                                               CI255226
      RETURN                                                         CI255227
      END                                                            CI255228
```

```
$ORIGIN         H,CK2,NOREW                                              000
$IBFTC CH256    M94/2,XR6,LIST                                        CH256000
      SUBROUTINE PHITAU                                               CH256001
C               COMPUTE PHI(TAU)                                      CH256002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR        CH256003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CH256004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),     CH256005
     2BUF(2800,4)                                                     CH256006
      COMMON/NRLSWT/NRLSW,ANORM(14)                                   CH256007
      COMMON/NFIXST/NCA,NPPC                                          CH256008
      LOGICAL SWITCH                                                  CH256009
      DIMENSION IQ(4)                                                 CH256010
      AZE=0.0                                                         CH256011
      IF(SWITCH(2,18,19)) GO TO 500                                   CH256012
      IF(SWITCH(1,20)) GO TO 312                                      CH256013
      CALL GETDAT (1,NT,NB,IQ,IBE,IFF)                                CH256014
      IF(SWITCH(2,18,19)) GO TO 500                                   CH256015
      IF(NT)500,500,100                                               CH256016
 100  DO 105 I=1,100                                                  CH256017
      DO 105 J=1,25                                                   CH256018
 105  PHI(I,J)=0.                                                     CH256019
      ITMC=ITM-ITZ                                                    CH256020
      ITC=1                                                           CH256021
 108  DO 200 ITAC=1,NTV                                               CH256022
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      ITACI=ITAU(ITAC)                                                  CH256023
      KK=NT+ITACI                                                       CH256024
      IF(KK-NPPC)110,110,115                                            CH256025
110   NBT=NB                                                            CH256026
      GO TO 130                                                         CH256027
115   NBT=NB+1                                                          CH256028
116   KK=KK-NPPC                                                        CH256029
      IF(NBT.GT.4) NBT=1                                                CH256030
      IF(KK-NPPC)118,118,117                                            CH256031
117   NBT=NBT+1                                                         CH256032
      GO TO 116                                                         CH256033
118   IF(NBT-IBE)130,120,130                                            CH256034
120   F2=0.                                                             CH256035
      GO TO 140                                                         CH256036
130   KIK=ITC+ITACI                                                     CH256037
      IF(KIK-ITMC)135,135,120                                           CH256038
135   F2=1.                                                             CH256039
140   DO 150 IFC=1,25                                                   CH256040
      I=ICP(1,IFC)                                                      CH256041
      J=ICP(2,IFC)                                                      CH256042
      IF(I)150,150,145                                                  CH256043
145   INT=(NT-1)*NCA+I                                                  CH256044
      JKK=(KK-1)*NCA+J                                                  CH256045
      F1=BUF(INT,NB)*CAL(I)                                             CH256046
      F3=F2*BUF(JKK,NBT)*CAL(J)                                         CH256047
      PHI(ITAC,IFC)=PHI(ITAC,IFC)+F1*F3                                 CH256048
150   CONTINUE                                                          CH256049
200   CONTINUE                                                          CH256050
      NT=NT+ISA                                                         CH256051
      IF(NT-IQ(NB))300,300,205                                          CH256052
205   CALL GETDAT (2,NT,NB,IQ,IBE,IFF)                                  CH256053
      NB=NB+1                                                           CH256054
      NT=1                                                              CH256055
      IF(NB.GT.4) NB=1                                                  CH256056
      IF(NB-IBE)300,306,300                                             CH256057
300   ITC=ITC+ISA                                                       CH256058
      IF(ITC-ITMC)108,108,305                                           CH256059
305   CONTINUE                                                          CH256060
306   F1=(ITC+ISA)/ISA                                                  CH256061
      DO 310 I=1,100                                                    CH256062
      DO 310 J=1,25                                                     CH256063
310   PHI(I,J)=PHI(I,J)/F1                                              CH256064
      CALL SWTHON (20)                                                  CH256065
312   ID1=ITOUT                                                         CH256066
      ID3=1                                                             CH256067
      ID4=NTV                                                           CH256068
      DO 325 I=1,25                                                     CH256069
      IF(ICP(1,I))325,325,315                                           CH256070
315   ID2=ICP(3,I)                                                      CH256071
      WRITE (1) ID1,ID2,ID3,ID4                                         CH256072
      WRITE (1) ((PHI(J,I),AZE),J=1,100)                                CH256073
325   CONTINUE                                                          CH256074
500   RETURN                                                            CH256075
      END                                                               CH256076
```


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```
$IBFTC CH257   M94/2,XR6,LIST                                          CH257000
      SUBROUTINE GETDAT (L,NT,NB,IQ,IBE,IFF)                           CH257001
C                CORRELATION SYSTEM INPUT CONTROL                      CH257002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR,IDMT    CH257003
      COMMON/CORRC/ICD(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,    CH257004
     1ITZ,ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),  CH257005
     2BUF(14,200,4)                                                    CH257006
      COMMON/NORFI/INOR(14)                                            CH257007
      COMMON/NFIXST/NCA,NPPC                                           CH257008
      DIMENSION IQ(3),DUF(2800,4),IDO(20)                              CH257009
      EQUIVALENCE (BUF,DUF)                                            CH257010
 1    FORMAT (39H ***** STORAGE EXECEED FOR TAU SHIFT OF,              CH257011
     *1X,1PE12.5,28H MAXIMUM ALLOWABLE SHIFT IS 1PE12.5)               CH257012
      GO TO (100,200),L                                                CH257013
 100  IF((ITAU(NTV)-ITAU(1)).GT.600) GO TO 110                         CH257014
      NCA=14                                                           CH257015
      NPPC=200                                                         CH257016
      J=-1                                                             CH257017
      K=1                                                              CH257018
      CALL REDAT (J,K,IQ)                                              CH257019
      CALL FILBUP (NT,NB,IQ,IBE,IFF)                                   CH257020
      RETURN                                                           CH257021
 110  NCA=1                                                            CH257022
      DO 115 J=1,14                                                    CH257023
      IF(ICH(J).GT.NCA) NCA=ICH(J)                                     CH257024
 115  CONTINUE                                                         CH257025
      IF(((NCA/3)*3).EQ.NCA) NCA=NCA+1                                 CH257026
      IF(NCA.GE.11) GO TO 190                                          CH257027
      IF((ITAU(NTV)-ITAU(1)).GT.((2800/NCA)*3))GO TO 190               CH257028
      J=-1                                                             CH257029
      K=2                                                              CH257030
      CALL REDAT(J,K,IQ)                                               CH257031
      REWIND 11                                                        CH257032
      DO 120 J=1,20                                                    CH257033
 120  IDO(J)=ID(J)                                                     CH257034
      NPPC=2800/NCA                                                    CH257035
      REWIND 11                                                        CH257036
      N=1                                                              CH257037
      IDO(3)=0                                                         CH257038
 125  READ (2) (DUF(J,4),J=1,2800)                                     CH257039
      NITR=ID(3)                                                       CH257040
      DO 150 J=1,NITR                                                  CH257041
      DO 130 K=1,NCA                                                   CH257042
      DUF(N,1)=BUF(K,J,4)                                              CH257043
      N=N+1                                                            CH257044
 130  CONTINUE                                                         CH257045
      IDO(3)=IDO(3)+1                                                  CH257046
      IF(N.LE.2800) GO TO 150                                          CH257047
      IF((ID(2).NE.0).AND.(J.EQ.NITR)) IDO(2)=1                        CH257048
      WRITE (11) ICO                                                   CH257049
      WRITE (11) (DUF(IJ,1),IJ=1,2800)                                 CH257050
      N=1                                                              CH257051
      IDO(3)=0                                                         CH257052
 150  CONTINUE                                                         CH257053
      READ (2) ID                                                      CH257054
      IF(ID(1).EQ.ITIN) GO TO 125                                      CH257055
      IF(IDO(3).EQ.0) GO TO 170                                        CH257056
      IDO(2)=1                                                         CH257057
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```
      WRITE (11) ICO                                                    CH257058
      WRITE (11) (DUF(IJ,1),IJ=1,2800)                                  CH257059
 170  DO 175 J=1,19                                                     CH257060
      IDO(J)=0                                                          CH257061
 175  CONTINUE                                                          CH257062
      WRITE (11) ICO                                                    CH257063
      ENDFILE 11                                                        CH257064
      REWIND 11                                                         CH257065
      READ (11) ID                                                      CH257066
      CALL FILBUP (NT,NB,IQ,IBE,IFF)                                    CH257067
      RETURN                                                            CH257068
 190  F=ITAU(NTV)                                                       CH257069
      F=F*DT                                                            CH257070
      G=NPPC*3                                                          CH257071
      G=G*DT                                                            CH257072
      WRITE (6,1) F,G                                                   CH257073
      CALL SWTHON (18)                                                  CH257074
      CALL SWTHOF (20)                                                  CH257075
      RETURN                                                            CH257076
 200  CALL FILONE (NB,IFF,IBE,IQ)                                       CH257077
      RETURN                                                            CH257078
      END                                                               CH257079
```

```
$IBFTC CH258    M94/2,XR6,LIST                                          CH258000
      SUBROUTINE REDAT (I,IBE,IQ)                                       CH258001
C                READ ONE BUFFER OF DATA                                CH258002
      COMMON/CORRC/ICD(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,     CH258003
     1ITZ,ITM,NTV,ICH(14),ID(20), ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),  CH258004
     2BUF(2800,4)                                                       CH258005
      DIMENSION IQ(4)                                                   CH258006
      IF(I.GT.0) GO TO 100                                              CH258007
      KS=IBE                                                            CH258008
      RETURN                                                            CH258009
 100  GO TO (120,140),KS                                                CH258010
 120  READ (2) (BUF(J,I),J=1,2800)                                      CH258011
      IQ(I)=ID(3)                                                       CH258012
      READ (2) ID                                                       CH258013
      RETURN                                                            CH258014
 140  READ (11) (BUF(J,I),J=1,2800)                                     CH258015
      IQ(I)=ID(3)                                                       CH258016
      READ (11) ID                                                      CH258017
      RETURN                                                            CH258018
      END                                                               CH258019
```

```
$ORIGIN         Z,CK2,NOREW                                                 000
$IBFTC CZ257    M94/2,XR6,LIST                                          CZ257000
      SUBROUTINE FILBUP (NT,NB,IQ,IBE,IFF)                              CZ257001
C                CORRELATION INPUT ROUTINE (ALL BUFFERS)                CZ257002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CZ257003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CZ257004
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```
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),      CZ257005
     2BUF(2800,4)                                                      CZ257006
      COMMON/NRLSWT/NRLSW,ANOR(14)                                     CZ257007
      COMMON/NORFI/INOR(14)                                            CZ257008
      COMMON/NFIXST/NCA,NPPC                                           CZ257009
      DIMENSION FNOR(14)                                               CZ257010
      EQUIVALENCE (FNOR,INOR)                                          CZ257011
      DIMENSION IQ(4),IBUF(2800,4)                                     CZ257012
      EQUIVALENCE (BUF,IBUF)                                           CZ257013
      I=1                                                              CZ257014
      IBE=10                                                           CZ257015
      IFF=ID(20)                                                       CZ257016
      IT=ITZ                                                           CZ257017
100   CALL REDAT (I,IBE,IQ)                                            CZ257018
      IF(I-1)101,101,103                                               CZ257019
101   DO 102 J=1,NCA                                                   CZ257020
102   FNOR(J)=BUF(J,1)                                                 CZ257021
      IF(NRLSW.EQ.0) GO TO 103                                         CZ257022
      IF(IFF.NE.0) GO TO 205                                           CZ257023
      DO 200 J=1,NCA                                                   CZ257024
200   INOR(J)=ANOR(J)                                                  CZ257025
      GO TO 103                                                        CZ257026
205   DO 210 J=1,NCA                                                   CZ257027
210   FNOR(J)=ANOR(J)                                                  CZ257028
103   DO 108 J=1,NCA                                                   CZ257029
      DO 108 K=1,NPPC                                                  CZ257030
      L=(K-1)*NCA+J                                                    CZ257031
      IF(IFF)106,105,106                                               CZ257032
105   BUF(L,I)=IBUF(L,I)-INOR(J)                                       CZ257033
      GO TO 108                                                        CZ257034
106   BUF(L,I)=BUF(L,I)-FNOR(J)                                        CZ257035
108   CONTINUE                                                         CZ257036
115   CONTINUE                                                         CZ257037
      IF(ID(1)-ITIN)120,125,120                                        CZ257038
120   IBE=I+1                                                          CZ257039
      GO TO 130                                                        CZ257040
125   I=I+1                                                            CZ257041
      IF(I-4)100,100,130                                               CZ257042
130   I=1                                                              CZ257043
135   IF(IT-NPPC) 140,140,145                                          CZ257044
140   NB=I                                                             CZ257045
      NT=IT                                                            CZ257046
      RETURN                                                           CZ257047
145   IT=IT-NPPC                                                       CZ257048
      IF(IBE-5)175,185,150                                             CZ257049
150   CALL REDAT (I,IBE,IQ)                                            CZ257050
      DO 160 J=1,NCA                                                   CZ257051
      DO 160 K=1,NPPC                                                  CZ257052
      L=(K-1)*NCA+J                                                    CZ257053
      IF(IFF)158,155,158                                               CZ257054
155   BUF(L,I)=IBUF(L,I)-INOR(J)                                       CZ257055
      GO TO 160                                                        CZ257056
158   BUF(L,I)=BUF(L,I)-FNOR(J)                                        CZ257057
160   CONTINUE                                                         CZ257058
165   CONTINUE                                                         CZ257059
      IF(ID(1).NE.ITIN) IBE=5                                          CZ257060
170   I=I+1                                                            CZ257061
      IF(I.GT.4) I=1                                                   CZ257062
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      GO TO 135                                                         CZ257063
 175  IF(I-IBE)170,180,170                                              CZ257064
 180  NT=0                                                              CZ257065
      CALL SWTHON (19)                                                  CZ257066
      RETURN                                                            CZ257067
 185  IBE=I                                                             CZ257068
      GO TO 170                                                         CZ257069
      END                                                               CZ257070
```

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$ORIGIN         Z,CK2,NOREW                                                 000
$IBFTC CZ258    M94/2,XR6,LIST                                           CZ258000
      SUBROUTINE FILONE (NB,IFF,IBE,IQ)                                  CZ258001
C               CORRELATION INPUT ROUTINE (ONE BUFFER)                   CZ258002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           CZ258003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,  CZ258004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),        CZ258005
     2BUF(2800,4)                                                        CZ258006
      COMMON/NCRFI/INOR(14)                                              CZ258007
      COMMON/NFIXST/NCA,NPPC                                             CZ258008
      DIMENSION FNOR(14)                                                 CZ258009
      EQUIVALENCE (FNOR,INOR)                                            CZ258010
      DIMENSION IQ(4),IBUF(2800,4)                                       CZ258011
      EQUIVALENCE (BUF,IBUF)                                             CZ258012
      IF(IBE-5)200,100,105                                               CZ258013
 100  IBE=NB                                                             CZ258014
      GO TO 200                                                          CZ258015
 105  CALL REDAT (NB,IBE,IQ)                                             CZ258016
      DO 115 J=1,NCA                                                     CZ258017
      DO 115 K=1,NPPC                                                    CZ258018
      L=(K-1)*NCA+J                                                      CZ258019
      IF(IFF)112,110,112                                                 CZ258020
 110  BUF(L,NB)=IBUF(L,NB)-INOR(J)                                       CZ258021
      GO TO 115                                                          CZ258022
 112  BUF(L,NB)=BUF(L,NB)-FNOR(J)                                        CZ258023
 115  CONTINUE                                                           CZ258024
 120  CONTINUE                                                           CZ258025
      IF(ID(1)-ITIN)125,200,125                                          CZ258026
 125  IBE=5                                                              CZ258027
 200  RETURN                                                             CZ258028
      END                                                                CZ258029
```

```
$ORIGIN         H,CK2,NOREW                                                 000
$IBFTC CH359    M94,FULIST,REF,XR6                                       CH359000
      SUBROUTINE TPHIP                                                   CH359001
C               COMPUTE POWER SPECTRAL DENSITY                           CH359002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           CH359003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,  CH359004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),        CH359005
     2S(100,4),ANS(10,100),TPH(2,100)                                    CH359006
      LOGICAL SWITCH                                                     CH359007
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      ID1=ITOUT                                                         CH359008
      ID3=1                                                             CH359009
      ID4=NFREQ                                                         CH359010
      IF(SWITCH(1,20))GO TO 200                                         CH359011
100   RETURN                                                            CH359012
200   T=ITAU(1)                                                         CH359013
      TD=IDEL                                                           CH359014
      TD=TD*DT                                                          CH359015
      DO 205 I=1,NFREQ                                                  CH359016
      AR1=T*FREQ(I)                                                     CH359017
      AR2=TD*FREQ(I)                                                    CH359018
      CALL SCOSN (AR1,S(I,1),S(I,2))                                    CH359019
      CALL SCOSN (AR2,S(I,3),S(I,4))                                    CH359020
205   CONTINUE                                                          CH359021
      DO 400 I=1,25                                                     CH359022
      DO 300 J=1,10                                                     CH359023
      JJ=J+3                                                            CH359024
      IF(ICP(JJ,I))230,300,230                                          CH359025
230   DO 290 K=1,NFREQ                                                  CH359026
      SIN1=S(K,1)                                                       CH359027
      COS1=S(K,2)                                                       CH359028
      CALL OPTION (I,J,1)                                               CH359029
      G=ANS(J,1)*PHI(1,I)                                               CH359030
      A=COS1*G                                                          CH359031
      B=SIN1*G                                                          CH359032
      D=2.                                                              CH359033
      DO 270 L=2,NTV                                                    CH359034
      CALL OPTION (I,J,L)                                               CH359035
      C=SIN1*S(K,4)+COS1*S(K,3)                                         CH359036
      COS1=COS1*S(K,4)-SIN1*S(K,3)                                      CH359037
      SIN1=C                                                            CH359038
      G=D*ANS(J,L)*PHI(L,I)                                             CH359039
      A=A+G*COS1                                                        CH359040
      B=B+G*SIN1                                                        CH359041
      IF(L-NTV+1)270,250,270                                            CH359042
250   D=1.                                                              CH359043
270   CONTINUE                                                          CH359044
      TPH(1,K)=TD*A/2.                                                  CH359045
      TPH(2,K)=-TD*B/2.                                                 CH359046
290   CONTINUE                                                          CH359047
      ID2=ICP(JJ,I)                                                     CH359048
      WRITE (1) ID1,ID2,ID3,ID4                                         CH359049
      WRITE (1) TPH                                                     CH359050
300   CONTINUE                                                          CH359051
400   CONTINUE                                                          CH359052
      RETURN                                                            CH359053
      END                                                               CH359054


$IBFTC CH360   M94,FULIST,REF,XR6                                       CH360000
      SUBROUTINE OPTION (IPHI,JOPT,LNCT)                                CH360001
C               POWER SPECTRAL WINDOW ROUTINE                           CH360002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CH360003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CH360004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),       CH360005
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      2S(100,4),ANS(10,100),TPH(2,100)                                  CH360006
C      LNCT - SUBSCRIPT OF CURRENT TAU                                  CH360007
C      JOPT - OPTION SUBSCRIPT                                          CH360008
C      IPHI - SUBSCRIPT OF CURRENT PHI(TAU)                             CH360009
C      PHI(LNCT,IPHI) - CURRENT PHI(TAU)                                CH360010
C      TAU(CURRENT) = ITAU(LNCT)*DT                                     CH360011
C      T(PEROID) = (ITM-ITZ)*DT                                         CH360012
C      MU(OPTION,TAU) = ANS(JOPT,LNCT)                                  CH360013
C      ANS(JOPT,LNCT) MUST BE DEFINED BY THE USER                       CH360014
       TAUC=ITAU(LNCT)                                                  CH360015
       TAUC=TAUC*DT                                                     CH360016
       GO TO (100,200,300,400,500,600,700,800,900,1000),JOPT            CH360017
C100   DEFINITION OF OPTION 1                                           CH360018
 100   TP=ITAU(NTV)                                                     CH360019
       TP=TP*DT                                                         CH360020
       ANS(1,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360021
       GO TO 2000                                                       CH360022
C200   DEFINITICN OF OPTION 2                                           CH360023
 200   TP=200.*DT                                                       CH360024
       ANS(2,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360025
       GO TO 2000                                                       CH360026
C300   DEFINITICN OF OPTION 3                                           CH360027
 300   TP=300.*DT                                                       CH360028
       ANS(3,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360029
       GO TO 2000                                                       CH360030
C400   DEFINITICN OF OPTION 4                                           CH360031
 400   TP=400.*DT                                                       CH360032
       ANS(4,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360033
       GO TO 2000                                                       CH360034
C500   DEFINITICN OF OPTION 5                                           CH360035
 500   TP=ITAU(NTV)                                                     CH360036
       TP=TP*DT                                                         CH360037
       ANS(5,LNCT)=.54+.46*COS(3.1415926*TAUC/TP)                       CH360038
       GO TO 2000                                                       CH360039
C600   DEFINITICN OF OPTION 6                                           CH360040
 600   TP=150.*DT                                                       CH360041
       ANS(6,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360042
       GO TO 2000                                                       CH360043
C700   DEFINITICN OF OPTION 7                                           CH360044
 700   TP=250.*DT                                                       CH360045
       ANS(7,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360046
       GO TO 2000                                                       CH360047
C800   DEFINITICN OF OPTION 8                                           CH360048
 800   TP=350.*DT                                                       CH360049
       ANS(8,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360050
       GO TO 2000                                                       CH360051
C900   DEFINITICN OF OPTION 9                                           CH360052
 900   TP=450.*DT                                                       CH360053
       ANS(9,LNCT)=(1.-(TAUC/TP)**2)*3./2.                              CH360054
       GO TO 2000                                                       CH360055
C1000  DEFINITICN OF OPTION 10                                          CH360056
 1000  TP=99.                                                           CH360057
       ANS(10,LNCT)=.54+.46*COS(3.1415926*TAUC/TP)                      CH360058
       GO TO 2000                                                       CH360059
 2000  RETURN                                                           CH360060
       END                                                              CH360061
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$ORIGIN        H,CK2,NOREW                                                  000
$IBFTC CH461   M94,FULIST,REF,XR6                                       CH461000
      SUBROUTINE PTPRI                                                  CH461001
C               PRINT ROUTINE                                           CH461002
C***  THIS ROUTINE PRINTS ALL DESIRED AUTO AND CROSS CORRELATION        CH461003
C***  FUNCTIONS                                                         CH461004
      LOGICAL SWITCH                                                    CH461005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CH461006
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CH461007
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),       CH461008
     2BUF(2800,4)                                                       CH461009
      DIMENSION DUM(6),CP(20,25),IDUM(6)                                CH461010
      EQUIVALENCE (CP,ICP),(DUM,IDUM)                                   CH461011
      DATA AUTO,CROSS/6H AUTO ,6HCROSS /                                CH461012
 1    FORMAT (1H1,25X,33HCORRELATION PARAMETER INPUT TEST I6,26X,       CH461013
     13A3/25X,A6,26HCORRELATION FUNCTION  PHI(I2,1H,I2,                 CH461014
     216H)   OUTPUT TEST I6,3X,15HOUTPUT CHANNEL I2/                    CH461015
     316X,17HIDENTIFICATION   6A6,10X,11HTIME RANGE 1PE12.5,4H TO 1PE12.CH461016
     45/10X,2(14X,1HL,6X,6HTAU(L),9X,8HPHI(TAU)))                       CH461017
 2    FORMAT (11X,2(12X,I3,2X,1PE12.5,4X,1PE12.5))                      CH461018
      IF(SWITCH(2,18,19)) RETURN                                        CH461019
      DUM2=ITZ-1                                                        CH461020
      DUM2=DUM2*DT                                                      CH461021
      DUM3=ITM-1                                                        CH461022
      DUM3=DUM3*DT                                                      CH461023
      DO 200 I=1,25                                                     CH461024
      IF(ICP(14,I))200,200,100                                          CH461025
 100  DUM1=CROSS                                                        CH461026
      IF(ICP(1,I).EQ.ICP(2,I)) DUM1=AUTO                                CH461027
      J=(NTV+1)/2                                                       CH461028
      WRITE (10,1) ITIN,DAY,DON,YEAR,DUM1,ICP(1,I),ICP(2,I),ITOUT,ICP(3,CH461029
     1I),(CP(K,I),K=15,20),DUM2,DUM3                                    CH461030
      DO 190 L=1,J                                                      CH461031
      M=J+L                                                             CH461032
      DUM(2)=ITAU(L)                                                    CH461033
      DUM(2)=DUM(2)*DT                                                  CH461034
      DUM(5)=ITAU(M)                                                    CH461035
      DUM(5)=DUM(5)*DT                                                  CH461036
      IDUM(1)=L                                                         CH461037
      IDUM(4)=M                                                         CH461038
      DUM(3)=PHI(L,I)                                                   CH461039
      DUM(6)=PHI(M,I)                                                   CH461040
      K=3                                                               CH461041
      IF(M.LE.NTV) K=6                                                  CH461042
      WRITE (10,2) (DUM(N),N=1,K)                                       CH461043
 190  CONTINUE                                                          CH461044
 200  CONTINUE                                                          CH461045
      RETURN                                                            CH461046
      END                                                               CH461047
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$ORIGIN         H,CK2,NOREW                                                 000
$IBFTC CH562    M94,FULIST,REF,XR6                                       CH562000
      SUBROUTINE PLPHI                                                   CH562001
C               PLOT EXECUTIVE ROUTINE                                   CH562002
C***  PLOT EXECUTIVE CONTROL PROGRAM                                     CH562003
      LOGICAL SWITCH                                                     CH562004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           CH562005
      COMMON/CORRC/DUM(3241),IPL(8,50)                                   CH562006
      CALL DECPL                                                         CH562007
      IF(SWITCH(2,18,19)) GO TO 200                                      CH562008
      IF(IPL(1,1))100,200,100                                            CH562009
 100  CALL PLTT                                                          CH562010
 200  RETURN                                                             CH562011
      END                                                                CH562012
```

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$ORIGIN         J,CK2,NOREW                                                 000
$IBFTC CJ163    M94,FULIST,REF,XR6                                       CJ163000
      SUBROUTINE DECPL                                                   CJ163001
C               DECCDE *PLOT CONTROL CARD                                CJ163002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           CJ163003
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ,  CJ163004
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),        CJ163005
     2IPL(8,50),PA(125),IS(5,100)                                        CJ163006
      LOGICAL NZER,ZERO                                                  CJ163007
      DIMENSION PL(8,50),IFI(3)                                          CJ163008
      EQUIVALENCE (IPL,PL)                                               CJ163009
 1    FORMAT (20I6)                                                      CJ163010
 2    FORMAT (20A6)                                                      CJ163011
 3    FORMAT (2E12.0)                                                    CJ163012
      DATA COMMA,P,S,U,E,PLOT,LPRN,RPRN,SLASH,R,D,BLANK/                 CJ163013
     11H,,1HP,1HS,1HU,1HE,4HPLOT,1H(,1H),1H/,1HR,1HD,1H /                CJ163014
      DATA NONE/1HN/                                                     CJ163015
      DO 100 J=1,5                                                       CJ163016
      DO 100 K=1,50                                                      CJ163017
 100  IPL(J,K)=0                                                         CJ163018
      K=-1                                                               CJ163019
      I=0                                                                CJ163020
 105  J=1                                                                CJ163021
 110  J=J+1                                                              CJ163022
      IF(NZER(RA(J),COMMA)) GO TO 110                                    CJ163023
      IF(NZER(RA(J+1),COMMA)) GO TO 120                                  CJ163024
 115  RETURN                                                             CJ163025
 120  IFI(1)=0                                                           CJ163026
      IFI(2)=0                                                           CJ163027
      IFI(3)=0                                                           CJ163028
      I=I+1                                                              CJ163029
      IPL(1,I)=-K                                                        CJ163030
 125  J=J+1                                                              CJ163031
      IF(ZERO(RA(J),P)) GO TO 200                                        CJ163032
      IF(ZERO(RA(J),S)) GO TO 300                                        CJ163033
      IF(ZERO(RA(J),U)) GO TO 400                                        CJ163034
      IF(ZERO(RA(J),E)) GO TO 150                                        CJ163035
      IF(ZERO(RA(J),NONE)) GO TO 130                                     CJ163036
      CALL WROUT (14,402)                                                CJ163037
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130   CALL KARD (J)                                                  CJ163038
      IF(J)135,130,135                                               CJ163039
135   CALL PACK (2,5,WO,RA)                                          CJ163040
      IF(ZERO(WO,PLOT)) GO TO 140                                    CJ163041
      IPL(1,I)=0                                                     CJ163042
      GO TO 115                                                      CJ163043
140   I=I-1                                                          CJ163044
      IF(I)105,105,145                                               CJ163045
145   K=IPL(1,I)                                                     CJ163046
      GO TO 105                                                      CJ163047
150   K=IPL(1,I)                                                     CJ163048
155   J=J+1                                                          CJ163049
      IF(NZER(RA(J),COMMA)) GO TO 155                                CJ163050
      IF(NZER(RA(J+1),COMMA)) GO TO 120                              CJ163051
      CALL KARD (J)                                                  CJ163052
      IF(J)160,120,160                                               CJ163053
160   CALL PACK (2,5,WO,RA)                                          CJ163054
165   IF(ZERO(WO,PLOT)) GO TO 105                                    CJ163055
      GO TO 115                                                      CJ163056
170   IF(NZER(RA(J+1),COMMA)) GO TO 125                              CJ163057
      CALL KARD (J)                                                  CJ163058
      IF(J)175,125,175                                               CJ163059
175   K=IPL(1,I)                                                     CJ163060
      GO TO 160                                                      CJ163061
200   IF(IFI(1))205,210,205                                          CJ163062
205   I=I+1                                                          CJ163063
      IFI(2)=0                                                       CJ163064
      IPL(1,I)=-K                                                    CJ163065
      IFI(3)=0                                                       CJ163066
210   IFI(1)=1                                                       CJ163067
215   J=J+1                                                          CJ163068
      IF(NZER(RA(J),LPRN)) GO TO 215                                 CJ163069
      L=J+1                                                          CJ163070
220   J=J+1                                                          CJ163071
      IF(NZER(RA(J),COMMA)) GO TO 220                                CJ163072
      M=J-1                                                          CJ163073
      N=J+1                                                          CJ163074
225   J=J+1                                                          CJ163075
      IF(NZER(RA(J),RPRN)) GO TO 225                                 CJ163076
      CALL PACK (L,M,WO,RA)                                          CJ163077
      JJ=J-1                                                         CJ163078
      CALL PACK (N,JJ,W1,RA)                                         CJ163079
      CALL RITE31                                                    CJ163080
      WRITE (31,2) WO,W1                                             CJ163081
      CALL READ31                                                    CJ163082
      READ (31,1) IPL(2,I),IPL(3,I)                                  CJ163083
230   J=J+1                                                          CJ163084
      IF(NZER(RA(J),COMMA)) GO TO 230                                CJ163085
      GO TO 170                                                      CJ163086
300   IF(IFI(2))305,310,305                                          CJ163087
305   IFI(3)=0                                                       CJ163088
      IFI(1)=0                                                       CJ163089
      I=I+1                                                          CJ163090
      IPL(1,I)=-K                                                    CJ163091
310   IFI(2)=1                                                       CJ163092
315   J=J+1                                                          CJ163093
      IF(NZER(RA(J),SLASH)) GO TO 315                                CJ163094
      J=J+1                                                          CJ163095
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      IF(NZER(RA(J),R)) GO TO 320                                       CJ163096
      IPL(5,I)=3                                                        CJ163097
      GO TO 230                                                         CJ163098
320   IF(NZER(RA(J),0)) GO TO 325                                       CJ163099
      IPL(5,I)=2                                                        CJ163100
      GO TO 230                                                         CJ163101
325   IF(ZERO(RA(J),LPRN)) GO TO 330                                    CJ163102
      J=J+1                                                             CJ163103
      GO TO 325                                                         CJ163104
330   IPL(5,I)=1                                                        CJ163105
      L=J+1                                                             CJ163106
335   J=J+1                                                             CJ163107
      IF(NZER(RA(J),COMMA)) GO TO 335                                   CJ163108
      M=J-1                                                             CJ163109
      N=J+1                                                             CJ163110
340   J=J+1                                                             CJ163111
      IF(NZER(RA(J),RPRN)) GO TO 340                                    CJ163112
      JJ=J-1                                                            CJ163113
      IF(M-L-5)345,345,350                                              CJ163114
345   W1=BLANK                                                          CJ163115
      GO TO 355                                                         CJ163116
350   JK=L+5                                                            CJ163117
      CALL PACK (L,JK,W1,RA)                                            CJ163118
      L=L+6                                                             CJ163119
355   CALL PACK (L,M,W2,RA)                                             CJ163120
      IF(JJ-N-5)360,360,365                                             CJ163121
360   W3=BLANK                                                          CJ163122
      GO TO 370                                                         CJ163123
365   JK=N+5                                                            CJ163124
      CALL PACK (N,JK,W3,RA)                                            CJ163125
      N=N+6                                                             CJ163126
370   CALL PACK (N,JJ,W4,RA)                                            CJ163127
      CALL RITE31                                                       CJ163128
      WRITE (31,2) W1,W2,W3,W4                                          CJ163129
      CALL READ31                                                       CJ163130
      READ (31,3) PL(6,I),PL(7,I)                                       CJ163131
      GO TO 230                                                         CJ163132
400   IF(IFI(3)) 405,410,405                                            CJ163133
405   I=I+1                                                             CJ163134
      IFI(2)=0                                                          CJ163135
      IFI(1)=0                                                          CJ163136
      IPL(1,I)=-K                                                       CJ163137
410   IFI(3)=1                                                          CJ163138
415   J=J+1                                                             CJ163139
      IF(NZER(RA(J),SLASH)) GO TO 415                                   CJ163140
      J=J+1                                                             CJ163141
      PL(4,I)=RA(J)                                                     CJ163142
      GO TO 230                                                         CJ163143
      END                                                               CJ163144
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$ORIGIN          J,CK2,NOREW                                          000
$IBFTC CJ264     M94,FULIST,REF,XR6                                 CJ264000
      SUBROUTINE PLTT                                               CJ264001
C                PLOT ROUTINE INTERNAL COMPUTE                      CJ264002
C***  THIS ROUTINE CONTROLS THE LOGIC INVOLVED IN THE PLOTTING      CJ264003
C***  OF THE CORRELATION FUNCTIONS                                  CJ264004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR      CJ264005
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CJ264006
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),   CJ264007
     2IPL(8,50),PA(125),IS(5,100),BT(100),TP(100)                   CJ264008
      DIMENSION PL(8,50),CP(20,25),IKL(5)                           CJ264009
      EQUIVALENCE (IPL,PL),(CP,ICP)                                 CJ264010
      DO 125 I=1,25                                                 CJ264011
      TP(I)=PHI(1,I)                                                CJ264012
      BT(I)=TP(I)                                                   CJ264013
      IF(ICP(1,I))100,125,100                                       CJ264014
 100  DO 120 J=2,NTV                                                CJ264015
      IF(PHI(J,I)-TP(I))110,110,105                                 CJ264016
 105  TP(I)=PHI(J,I)                                                CJ264017
      GO TO 120                                                     CJ264018
 110  IF(PHI(J,I)-BT(I))115,120,120                                 CJ264019
 115  BT(I)=PHI(J,I)                                                CJ264020
 120  CONTINUE                                                      CJ264021
 125  CONTINUE                                                      CJ264022
      DO 160 I=1,50                                                 CJ264023
      IF(IPL(1,I))130,160,130                                       CJ264024
 130  DO 155 J=1,25                                                 CJ264025
      IF(IPL(2,I)-ICP(1,J))155,135,155                              CJ264026
 135  IF(IPL(3,I)-ICP(2,J))155,140,155                              CJ264027
 140  IF(IPL(5,I)-1)150,145,150                                     CJ264028
 145  IPL(8,I)=J                                                    CJ264029
      GO TO 160                                                     CJ264030
 150  PL(6,I)=BT(J)                                                 CJ264031
      PL(7,I)=TP(J)                                                 CJ264032
      GO TO 145                                                     CJ264033
 155  CONTINUE                                                      CJ264034
      CALL WROUT (14,403)                                           CJ264035
      IPL(1,I)=0                                                    CJ264036
 160  CONTINUE                                                      CJ264037
      I=1                                                           CJ264038
 165  IF(IPL(1,I))175,170,175                                       CJ264039
 170  I=I+1                                                         CJ264040
      GO TO 165                                                     CJ264041
 175  TR=PL(7,I)                                                    CJ264042
      J=I                                                           CJ264043
      BR=PL(6,I)                                                    CJ264044
      K=IPL(1,I)                                                    CJ264045
 180  I=I+1                                                         CJ264046
      IF(IPL(1,I)-K)210,185,210                                     CJ264047
 185  IF(PL(7,I)-TR)195,195,190                                     CJ264048
 190  TR=PL(7,I)                                                    CJ264049
 195  IF(PL(6,I)-BR)200,205,205                                     CJ264050
 200  BR=PL(6,I)                                                    CJ264051
 205  IF(I-50)180,230,230                                           CJ264052
 210  IF(IPL(1,I)) 215,211,215                                      CJ264053
 211  KQ=I                                                          CJ264054
      DO 213 L=KQ,50                                                CJ264055
      IF(IPL(1,L)) 212,213,212                                      CJ264056
```


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```
212   I=L-1                                                    CJ264057
      GO TO 180                                                CJ264058
213   CONTINUE                                                 CJ264059
      LL=KQ-1                                                  CJ264060
      I=51                                                     CJ264061
      GO TO 216                                                CJ264062
215   LL=I-1                                                   CJ264063
216   DO 225 L=J,LL                                            CJ264064
      IF(IPL(5,L)-3)225,220,225                                CJ264065
220   PL(6,L)=BR                                               CJ264066
      PL(7,L)=TR                                               CJ264067
225   CONTINUE                                                 CJ264068
      IF(I-50)175,230,230                                      CJ264069
230   DO 240 I=1,50                                            CJ264070
      IF(IPL(1,I))235,240,235                                  CJ264071
235   PL(5,I)=(PL(7,I)-PL(6,I))/125.                           CJ264072
240   CONTINUE                                                 CJ264073
      I=1                                                      CJ264074
245   IF(IPL(1,I))255,250,255                                  CJ264075
250   I=I+1                                                    CJ264076
      GO TO 245                                                CJ264077
255   K=IPL(1,I)                                               CJ264078
260   DO 265 J=1,5                                             CJ264079
265   IKL(J)=0                                                 CJ264080
      J=1                                                      CJ264081
270   IF(IPL(1,I))290,275,290                                  CJ264082
275   I=I+1                                                    CJ264083
      IF(I-50)270,270,280                                      CJ264084
280   IF(J-1)500,500,285                                       CJ264085
285   L=3                                                      CJ264086
      GO TO 400                                                CJ264087
290   IF(IPL(1,I)-K)305,295,305                                CJ264088
295   IKL(J)=I                                                 CJ264089
      J=J+1                                                    CJ264090
      IF(J-5)275,275,300                                       CJ264091
300   L=2                                                      CJ264092
      GO TO 400                                                CJ264093
305   L=1                                                      CJ264094
400   M=J-1                                                    CJ264095
      CALL ACPL (M,IKL)                                        CJ264096
      IF(L-2)455,405,500                                       CJ264097
405   I=I+1                                                    CJ264098
      IF(IPL(1,I))410,405,410                                  CJ264099
410   IF(I-50)260,260,500                                      CJ264100
450   I=I+1                                                    CJ264101
455   IF(IPL(1,I)) 460,450,460                                 CJ264102
460   IF(I-50)255,255,500                                      CJ264103
500   RETURN                                                   CJ264104
      END                                                      CJ264105
```


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```
$IBFTC CJ265   M94,FULIST,REF,XR6                                       CJ265000
      SUBROUTINE ACPL (M,IKL)                                           CJ265001
C                PLOT WRITER                                            CJ265002
C***  THIS ROUTINE WRITES THE PLOT OUTPUT FOR THE CORRELATION SYSTEM    CJ265003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          CJ265004
      COMMON/CORRC/ICP(20,25),SA(82),ITOUT,ITAU(100),ITIN,IDEL,ISA,ITZ, CJ265005
     1ITM,NTV,ICH(14),ID(20),ID1,ID2,ID3,ID4,PHI(100,25),CAL(14),       CJ265006
     2PL(8,50),PA(125),IS(5,100),BT(100),TB(100),CH(5),TA(100),TP(10)   CJ265007
      LOGICAL ZERO,NZER                                                 CJ265008
 1    FORMAT (1H1,51X,27HCORRELATION PARAMETER PLOTS,21X,3A3//35X,      CJ265009
     113HTEST   INPUT I6,9H  OUTPUT I6,13H  TIME RANGE 1PE11.4,4H TO ,  CJ265010
     *1PE11.4//                                                         CJ265011
     261X,10HTAU VALUES)                                                CJ265012
 2    FORMAT (10X,5(2X,I3,3X,1PE12.5,2X))                               CJ265013
 3    FORMAT (/4X,9HCHARACTER,7X,8HFUNCTION,18X,14HIDENTIFICATION,20X,  CJ265014
     17HMINIMUM,11X,7HMAXIMUM,11X,10HRESOLUTION)                        CJ265015
 4    FORMAT (9X,A1,10X,4HPHI(I2,1H,I2,1H),6X,6A6,3(6X,1PE12.5))        CJ265016
 5    FORMAT (6X,25A5)                                                  CJ265017
 6    FORMAT (1X,I3,2H (125A1,1H))                                      CJ265018
      DATA BLANK,DOTZ,DOT5,XX/1H ,5H0....,5H5....,1HX/                  CJ265019
 7    FORMAT (9X,1HX,26X,18HTRACE INTERSECTION)                         CJ265020
      DIMENSION IKL(5),IPL(8,50),CP(20,25),ITP(10)                      CJ265021
      EQUIVALENCE (ICP,CP),(IPL,PL),(TP,ITP)                            CJ265022
      MM=M                                                              CJ265023
      DO 100 J=1,NTV                                                    CJ265024
      TA(J)=ITAU(J)                                                     CJ265025
 100  TA(J)=TA(J)*DT                                                    CJ265026
      DO 105 N=1,MM                                                     CJ265027
      I=IKL(N)                                                          CJ265028
 105  CH(N)=PL(4,I)                                                     CJ265029
      T1=ITZ-1                                                          CJ265030
      T1=T1*DT                                                          CJ265031
      T2=ITM-1                                                          CJ265032
      T2=T2*DT                                                          CJ265033
      NTS=(NTV+4)/5                                                     CJ265034
      WRITE (10,1) DAY,DON,YEAR,ITIN,ITOUT,T1,T2                        CJ265035
      DO 120 I=1,NTS                                                    CJ265036
      I1=I+NTS                                                          CJ265037
      I2=I1+NTS                                                         CJ265038
      I3=I2+NTS                                                         CJ265039
      I4=I3+NTS                                                         CJ265040
      N=2                                                               CJ265041
      IF(I4-NTV)110,110,115                                             CJ265042
 110  ITP(9)=I4                                                         CJ265043
      TP(10)=TA(I4)                                                     CJ265044
      N=N+2                                                             CJ265045
 115  N=N+6                                                             CJ265046
      TP(8)=TA(I3)                                                      CJ265047
      TP(6)=TA(I2)                                                      CJ265048
      TP(4)=TA(I1)                                                      CJ265049
      TP(2)=TA(I)                                                       CJ265050
      ITP(1)=      I                                                    CJ265051
      ITP(3)=I1                                                         CJ265052
      ITP(5)=I2                                                         CJ265053
      ITP(7)=I3                                                         CJ265054
      WRITE (10,2) (TP(J),J=1,N)                                        CJ265055
 120  CONTINUE                                                          CJ265056
      WRITE (10,3)                                                      CJ265057
```


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```
      DO 125 N=1,MM                                                     CJ265058
      I=IKL(N)                                                          CJ265059
      K=IPL(8,I)                                                        CJ265060
      WRITE (10,4) CH(N),IPL(2,I),IPL(3,I),(CP(J,K),J=15,20),PL(6,I),PL(CJ265061
     17,I),PL(5,I)                                                      CJ265062
125   CONTINUE                                                          CJ265063
      WRITE (10,7)                                                      CJ265064
      WRITE (10,5) (DOTZ,DOT5,J=1,12),DOTZ                              CJ265065
      DO 135 N=1,MM                                                     CJ265066
      I=IKL(N)                                                          CJ265067
      J=IPL(8,I)                                                        CJ265068
      DO 130 K=1,NTV                                                    CJ265069
      IS(N,K)=((PHI(K,J)-PL(6,I))/PL(5,I))+1.                           CJ265070
130   CONTINUE                                                          CJ265071
135   CONTINUE                                                          CJ265072
      DO 155 K=1,NTV                                                    CJ265073
      DO 140 J=1,125                                                    CJ265074
140   PA(J)=BLANK                                                       CJ265075
      DO 150 N=1,MM                                                     CJ265076
      J=IS(N,K)                                                         CJ265077
      IF(J.GT.125) J=125                                                CJ265078
      IF(J.LE.0) J=1                                                    CJ265079
      IF(ZERO(PA(J),BLANK)) GO TO 145                                   CJ265080
      PA(J)=XX                                                          CJ265081
      GO TO 150                                                         CJ265082
145   PA(J)=CH(N)                                                       CJ265083
150   CONTINUE                                                          CJ265084
      WRITE (10,6) K,PA                                                 CJ265085
155   CONTINUE                                                          CJ265086
      WRITE (10,5) (DOTZ,DOT5,J=1,12),DOTZ                              CJ265087
      RETURN                                                            CJ265088
      END                                                               CJ265089
```


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SECURITY SYSTEM

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```
$ORIGIN        A,CK2,NOREW                                              000
$IBFTC FA766   M94,FULIST,REF,XR6                                     FA766000
      SUBROUTINE NUCLUS                                               FA766001
C               FREQUENCY SYSTEM MONITOR                              FA766002
      LOGICAL SWITCH                                                  FA766003
      LOGICALZERO,NZER,SWITCH                                         FA766004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR        FA766005
      COMMON /NUCLC/DUMMY(12323)                                      FA766006
      COMMON /SCNUC/WO,DUMY(614)                                      FA766007
      DIMENSION ENT(3)                                                FA766008
      DATA CHK,PAUS,FOUR,TNVE,COMMA/1HC,4HPAUS,4HFOUR,4HINVE,1H,/     FA766009
      DATA MATX,NUCL/4HMATR,4HNUCL/                                   FA766010
      CALL KLOSE (6,2,3,5,6,7,8)                                      FA766011
 100  CALL CARD                                                       FA766012
 106  CALL PACK (2,5,WO,RA)                                           FA766013
      IF(ZERO(WO,FOUR)) GO TO 110                                     FA766014
      IF(ZERO(WO,TNVE)) GO TO 120                                     FA766015
      IF(ZERO(WO,MATX)) GO TO 140                                     FA766016
      ISWTCH(1)=123456                                                FA766017
      RETURN                                                          FA766018
 110  CALL SCANX                                                      FA766019
      GO TO 106                                                       FA766020
 120  CALL ANTI                                                       FA766021
      GO TO 106                                                       FA766022
 140  CALL MATRIX                                                     FA766023
      GO TO 106                                                       FA766024
      END                                                             FA766025
```

```
$ORIGIN        K,CK2,NOREW                                              000
$IBFTC FK167   M94,FULIST,REF,XR6                                     FK167000
      SUBROUTINE MATRIX                                               FK167001
C               MATRIX SYSTEM CONTROL ROUTINE                         FK167002
      COMPLEX F,FL                                                    FK167003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR        FK167004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FK167005
     1FL(2),ILS                                                       FK167006
      DATA MSAV/4HMSAV/                                               FK167007
 3    FORMAT (A6)                                                     FK167008
 4    FORMAT (I6)                                                     FK167009
      LOGICAL ZERO,NZER,SWITCH                                        FK167010
      NAC=1                                                           FK167011
      DO 100 I=1,6100                                                 FK167012
 100  F(I)=(0.,0.)                                                    FK167013
      J=5                                                             FK167014
      IM=0                                                            FK167015
 105  J=J+1                                                           FK167016
      IF(NZER(RA(J),COMMA)) GO TO 105                                 FK167017
      DATA COMMA,SLASH,CHK,PAUS,MALO,OVER,OUTP,OPER/                  FK167018
     11H,,1H/,1HC,4HPAUS,4HMALO,4HOVER,4HOUTP,4HOPER/                 FK167019
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```
      IF(NZER(RA(J+1),COMMA)) GO TO 110                                 FK167020
      NF1=1                                                             FK167021
      NF2=NFREQ                                                         FK167022
      NF=NFREQ                                                          FK167023
      GO TO 200                                                         FK167024
110   J=J+1                                                             FK167025
      IF(NZER(RA(J),SLASH)) GO TO 110                                   FK167026
      L=J+1                                                             FK167027
115   J=J+1                                                             FK167028
      IF(NZER(RA(J),COMMA)) GO TO 115                                   FK167029
      M=J-1                                                             FK167030
      CALL PACK (L,M,WO,RA)                                             FK167031
      CALL RITE31                                                       FK167032
      WRITE (31,3) WO                                                   FK167033
      CALL READ31                                                       FK167034
      READ (31,4) NF1                                                   FK167035
      IF(NZER(RA(J+1),COMMA)) GO TO 120                                 FK167036
      NF2=NFREQ                                                         FK167037
      NF=NF2-NF1+1                                                      FK167038
      GO TO 200                                                         FK167039
120   L=J+1                                                             FK167040
125   J=J+1                                                             FK167041
      IF(NZER(RA(J),COMMA)) GO TO 125                                   FK167042
      M=J-1                                                             FK167043
      CALL PACK (L,M,WO,RA)                                             FK167044
      CALL RITE31                                                       FK167045
      WRITE (31,3) WO                                                   FK167046
      CALL READ31                                                       FK167047
      READ (31,4) NF2                                                   FK167048
      NF=NF2-NF1+1                                                      FK167049
200   CALL CARD                                                         FK167050
208   CALL PACK (2,5,WO,RA)                                             FK167051
210   IF(NZER(WO,MALO)) GO TO 215                                       FK167052
      K=1                                                               FK167053
      GO TO 220                                                         FK167054
215   IF(NZER(WO,OVER)) GO TO 225                                       FK167055
      K=2                                                               FK167056
220   CALL MALOAD (K)                                                   FK167057
      GO TO 208                                                         FK167058
225   IF(NZER(WO,OUTP)) GO TO 230                                       FK167059
      CALL OUTPUT                                                       FK167060
      GO TO 208                                                         FK167061
230   IF(NZER(WO,OPER)) GO TO 250                                       FK167062
      CALL OPERAT                                                       FK167063
      GO TO 200                                                         FK167064
250   IF(NZER(WO,MSAV)) GO TO 260                                       FK167065
      K=3                                                               FK167066
      CALL MALOAD (K)                                                   FK167067
      GO TO 208                                                         FK167068
260   RETURN                                                            FK167069
      END                                                               FK167070
```


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```
$ORIGIN        L,CK2,NOREW                                                  000
$IBFTC FL168   M94,FULIST,REF,XR6                                        FL168000
      SUBROUTINE OPERAT                                                  FL168001
C               MATRIX ALGEBRA ROUTINE                                   FL168002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           FL168003
      COMPLEX F,FL,A                                                     FL168004
      LOGICAL ZERO,NZER,SWITCH                                           FL168005
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3,  FL168006
     1FL(2),ILS                                                          FL168007
      DIMENSION OP(5)                                                    FL168008
      DIMENSION B(2)                                                     FL168009
      EQUIVALENCE (A,B)                                                  FL168010
      DATA COMMA,LPRN,(OP(I),I=1,5),BLANK,RPRN/1H,,1H(,1HI,1H+,1H-,1H*,1FL168011
     1H/,1H ,1H)/,EQUAL/1H=/                                             FL168012
 1    FORMAT (4A6)                                                       FL168013
 2    FORMAT (2E12.0)                                                    FL168014
 5213 FORMAT (41H ***** SINGULAR MATRIX ENCOUNTERED WHILE ,              FL168015
     118HINVERTING MATRIX (A6,16H) AT FREQUENCY (1PE12.5,6H)*****/       FL168016
     255H     INVERTED MATRIX SET TO (1.0,0.0) AT THIS FREQUENCY)        FL168017
      J=5                                                                FL168018
 100  J=J+1                                                              FL168019
      IF(NZER(RA(J),COMMA)) GO TO 100                                    FL168020
      IJNMMN=J                                                           FL168021
 105  LL=0                                                               FL168022
      J=IJNMMN                                                           FL168023
      ILS=0                                                              FL168024
      IF(ZERO(RA(J+1),COMMA)) GO TO 270                                  FL168025
      L=J+1                                                              FL168026
 110  J=J+1                                                              FL168027
      IF(NZER(RA(J),EQUAL)) GO TO 110                                    FL168028
      CALL PACK (L,J-1,NM,RA)                                            FL168029
      IF(NZER(RA(J+1),LPRN)) GO TO 115                                   FL168030
      MLIT=1                                                             FL168031
      GO TO 200                                                          FL168032
 115  L2=0                                                               FL168033
      L=J+1                                                              FL168034
 120  J=J+1                                                              FL168035
      DO 125 KK=1,5                                                      FL168036
      K=KK                                                               FL168037
      IF(ZERO(RA(J),OP(K))) GO TO 130                                    FL168038
 125  CONTINUE                                                           FL168039
      GO TO 120                                                          FL168040
 130  CALL PACK (L,J-1,LM,RA)                                            FL168041
 135  IF(K-1)150,140,150                                                 FL168042
 140  MR=0                                                               FL168043
      L3=-1                                                              FL168044
 145  J=J+1                                                              FL168045
      IF(NZER(RA(J),COMMA)) GO TO 145                                    FL168046
      GO TO 165                                                          FL168047
 150  IF(NZER(RA(J+1),LPRN)) GO TO 155                                   FL168048
      MLIT=2                                                             FL168049
      GO TO 200                                                          FL168050
 155  L3=0                                                               FL168051
      L=J+1                                                              FL168052
 160  J=J+1                                                              FL168053
      IF(NZER(RA(J),COMMA)) GO TO 160                                    FL168054
      CALL PACK (L,J-1,MR,RA)                                            FL168055
 165  L1=0                                                               FL168056
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```
      DO 185 L=1,IM                                                     FL168057
      IF(ZERO(NM,IMA(L,1))) L1=L                                        FL168058
      IF(L2)175,170,175                                                 FL168059
170   IF(ZERO(LM,IMA(L,1))) L2=L                                        FL168060
175   IF(L3)185,180,185                                                 FL168061
180   IF(ZERO(MR,IMA(L,1))) L3=L                                        FL168062
185   CONTINUE                                                          FL168063
      GO TO 300                                                         FL168064
200   J=J+1                                                             FL168065
      L=J+1                                                             FL168066
      LL=LL+1                                                           FL168067
205   J=J+1                                                             FL168068
      IF(NZER(RA(J),COMMA)) GO TO 205                                   FL168069
      M=J-1                                                             FL168070
      IF(M-L-6)210,220,220                                              FL168071
210   W1=BLANK                                                          FL168072
215   CALL PACK (L,M,W2,RA)                                             FL168073
      GO TO 225                                                         FL168074
220   M=L+5                                                             FL168075
      CALL PACK (L,M,W1,RA)                                             FL168076
      L=M+1                                                             FL168077
      M=J-1                                                             FL168078
      GO TO 215                                                         FL168079
225   L=J+1                                                             FL168080
230   J=J+1                                                             FL168081
      IF(NZER(RA(J),RPRN)) GO TO 230                                    FL168082
      M=J-1                                                             FL168083
      IF(M-L-6)235,245,245                                              FL168084
235   W3=BLANK                                                          FL168085
240   CALL PACK (L,M,W4,RA)                                             FL168086
      CALL RITE31                                                       FL168087
      WRITE (31,1) W1,W2,W3,W4                                          FL168088
      CALL READ31                                                       FL168089
      READ (31,2) FL(MLIT)                                              FL168090
      GO TO 250                                                         FL168091
245   M=L+5                                                             FL168092
      CALL PACK (L,M,W3,RA)                                             FL168093
      L=M+1                                                             FL168094
      M=J-1                                                             FL168095
      GO TO 240                                                         FL168096
250   ILS=MLIT                                                          FL168097
      J=J+1                                                             FL168098
      IF(MLIT-1)260,260,255                                             FL168099
255   L3=-2                                                             FL168100
      GO TO 165                                                         FL168101
260   L2=-1                                                             FL168102
      DO 265 KK=1,5                                                     FL168103
      K=KK                                                              FL168104
      IF(ZERO(RA(J),OP(KK))) GO TO 135                                  FL168105
265   CONTINUE                                                          FL168106
      CALL WROUT (4,200)                                                FL168107
      CALL SWTHON (16)                                                  FL168108
270   RETURN                                                            FL168109
300   IJNMMN=J                                                          FL168110
      IF(L3)305,315,305                                                 FL168111
305   IF(L2)310,315,310                                                 FL168112
310   IF(L1)500,320,500                                                 FL168113
315   CALL WROUT (26,201)                                               FL168114
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```
318   CALL SWTHON (16)                                                FL168115
      GO TO 105                                                       FL168116
320   IF(K-2)325,335,335                                              FL168117
325   IF(IMA(L2,2)-IMA(L2,3))330,395,330                              FL168118
330   CALL WROUT (27,202)                                             FL168119
      GO TO 318                                                       FL168120
335   IF(K-4)345,340,355                                              FL168121
340   IF(IMA(L2,3)-IMA(L3,2))355,410,355                              FL168122
345   IF(IMA(L2,2)-IMA(L3,2))355,350,355                              FL168123
350   IF(IMA(L2,3)-IMA(L3,3))355,425,355                              FL168124
355   IF(IMA(L2,3))360,370,360                                        FL168125
360   IF(IMA(L3,3))365,375,365                                        FL168126
365   IF(ILS-1)330,370,380                                            FL168127
370   N=1                                                             FL168128
      M=1                                                             FL168129
      NN=0                                                            FL168130
      GO TO 385                                                       FL168131
375   IF(ILS-1)380,370,380                                            FL168132
380   N=IMA(L2,2)                                                     FL168133
      M=IMA(L2,3)                                                     FL168134
      NN=N                                                            FL168135
      L1=IM+1                                                         FL168136
      IMA(L1,2)=NN                                                    FL168137
      IMA(L1,3)=M                                                     FL168138
      IM=L1                                                           FL168139
      IF(IM-25)450,450,390                                            FL168140
385   L1=IM+1                                                         FL168141
      IM=L1                                                           FL168142
      IF(IM-25)395,395,390                                            FL168143
390   CALL WROUT (28,203)                                             FL168144
      GO TO 318                                                       FL168145
395   M=IMA(L2,2)                                                     FL168146
      MM=M*M*(NF+1)+NAC-1                                             FL168147
      IF(MM-6100)405,405,400                                          FL168148
400   CALL WROUT (29,204)                                             FL168149
      GO TO 318                                                       FL168150
405   IM=IM+1                                                         FL168151
      L1=IM                                                           FL168152
      IMA(L1,1)=NM                                                    FL168153
      IMA(L1,2)=M                                                     FL168154
      IMA(L1,3)=M                                                     FL168155
      IMA(L1,4)=NAC                                                   FL168156
      NAC=M*M*NF+NAC                                                  FL168157
      GO TO 420                                                       FL168158
410   MM=IMA(L2,2)*IMA(L3,3)*(NF+1)+NAC-1                             FL168159
      IF(MM-6100)415,415,400                                          FL168160
415   IM=IM+1                                                         FL168161
      L1=IM                                                           FL168162
      IMA(L1,1)=NM                                                    FL168163
      IMA(L1,2)=IMA(L2,2)                                             FL168164
      IMA(L1,3)=IMA(L3,3)                                             FL168165
      IMA(L1,4)=NAC                                                   FL168166
      NAC=NAC+IMA(L1,2)*IMA(L1,3)*NF                                  FL168167
420   IF(IM-25)600,600,390                                            FL168168
425   IF(IMA(L2,2))435,430,435                                        FL168169
430   MM=NF+NAC-1                                                     FL168170
      GO TO 440                                                       FL168171
435   MM=IMA(L2,2)*IMA(L2,3)*NF+NAC-1                                 FL168172
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```
440   IF(MM-6100)445,445,400                                    FL168173
445   IM=IM+1                                                   FL168174
      L1=IM                                                     FL168175
      IMA(L1,1)=NM                                              FL168176
      IMA(L1,2)=IMA(L2,2)                                       FL168177
      IMA(L1,3)=IMA(L2,3)                                       FL168178
      IMA(L1,4)=NAC                                             FL168179
      NAC=MM+1                                                  FL168180
      IF(IM-25)600,600,390                                      FL168181
450   MM=N*M*NF+NAC-1                                           FL168182
      IF(MM-6100)455,455,400                                    FL168183
455   IMA(L1,1)=NM                                              FL168184
      IMA(L1,4)=NAC                                             FL168185
      NAC=MM+1                                                  FL168186
      GO TO 600                                                 FL168187
500   M=IMA(L1,2)*IMA(L1,3)                                     FL168188
      IF(K-2)505,525,525                                        FL168189
505   L=IMA(L2,2)-IMA(L2,3)                                     FL168190
      N=IMA(L2,2)*IMA(L2,3)                                     FL168191
      IF(N-M)510,510,400                                        FL168192
510   IF(L)515,520,515                                          FL168193
515   CALL WROUT (4,205)                                        FL168194
      GO TO 318                                                 FL168195
520   IF(NAC+N-1-6100)600,600,400                               FL168196
525   IF(ILS-1)545,530,535                                      FL168197
530   N=IMA(L3,2)*IMA(L3,3)                                     FL168198
      GO TO 540                                                 FL168199
535   N=IMA(L2,2)*IMA(L2,3)                                     FL168200
540   IF(N-M)600,600,400                                        FL168201
545   IF(K-4)591,550,565                                        FL168202
550   IF(IMA(L2,3)-IMA(L3,2))587,555,587                        FL168203
555   N=IMA(L2,2)*IMA(L3,3)                                     FL168204
560   IF(N-M)520,520,400                                        FL168205
565   IF(IMA(L3,2))515,570,515                                  FL168206
570   IF(IMA(L2,2))575,580,575                                  FL168207
575   N=IMA(L2,2)*IMA(L2,3)                                     FL168208
      GO TO 585                                                 FL168209
580   N=IMA(L2,3)                                               FL168210
585   IF(N-M)600,600,400                                        FL168211
587   IF(IMA(L2,2))588,589,588                                  FL168212
588   IF(IMA(L3,2))515,590,515                                  FL168213
589   N=IMA(L3,2)*IMA(L3,3)                                     FL168214
      GO TO 585                                                 FL168215
590   N=IMA(L2,2)*IMA(L2,3)                                     FL168216
      GO TO 585                                                 FL168217
591   IF(IMA(L2,2))592,593,592                                  FL168218
592   IF(IMA(L3,2))594,575,594                                  FL168219
593   IF(IMA(L3,2))589,580,589                                  FL168220
594   IF(IMA(L2,2)-IMA(L3,2))515,595,515                        FL168221
595   IF(IMA(L2,3)-IMA(L3,3))515,590,515                        FL168222
600   IJNMMN=J                                                  FL168223
      IF(SWITCH(1,16)) GO TO 105                                FL168224
      GO TO (2000,4000,3000,1000,5000),K                        FL168225
5000  IF(ILS-1)750,705,700                                      FL168226
700   IF(IMA(L2,2))710,705,710                                  FL168227
705   LS=NF                                                     FL168228
      GO TO 715                                                 FL168229
710   LS=IMA(L2,2)*IMA(L2,3)*NF                                 FL168230
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```
715   DO 740 K=1,LS                                                  FL168231
      I=IMA(L1,4)-1+K                                                FL168232
      J=IMA(L2,4)-1+K                                                FL168233
      L=IMA(L3,4)-1+K                                                FL168234
      IF(ILS-1)720,725,730                                           FL168235
720   F(I)=F(J)/F(L)                                                 FL168236
      GO TO 740                                                      FL168237
725   F(I)=FL(1)/F(L)                                                FL168238
      GO TO 740                                                      FL168239
730   F(I)=F(J)/FL(2)                                                FL168240
740   CONTINUE                                                       FL168241
      GO TO 105                                                      FL168242
750   IF(IMA(L2,2))755,705,755                                       FL168243
755   K=IMA(L2,2)*IMA(L2,3)                                          FL168244
      DO 770 L=1,K                                                   FL168245
      I=IMA(L1,4)+(L-1)*NF-1                                         FL168246
      J=IMA(L2,4)+(L-1)*NF-1                                         FL168247
      DO 760 M=1,NF                                                  FL168248
      II=I+M                                                         FL168249
      JJ=J+M                                                         FL168250
      KK=IMA(L3,4)-1+M                                               FL168251
      F(II)=F(JJ)/F(KK)                                              FL168252
760   CONTINUE                                                       FL168253
770   CONTINUE                                                       FL168254
      GO TO 105                                                      FL168255
4000  AS=1.                                                          FL168256
      GO TO 4001                                                     FL168257
3000  AS=-1.                                                         FL168258
4001  IF(ILS)800,825,800                                             FL168259
800   I=IMA(L1,4)-1                                                  FL168260
      J=IMA(L2,4)-1                                                  FL168261
      IF(IMA(L2,2))805,810,805                                       FL168262
805   NS=IMA(L2,2)*IMA(L2,3)*NF                                      FL168263
      GO TO 815                                                      FL168264
810   NS=NF                                                          FL168265
815   DO 820 L=1,NS                                                  FL168266
      II=I+L                                                         FL168267
      JJ=J+L                                                         FL168268
      F(II)=F(JJ)+AS*FL(2)                                           FL168269
820   CONTINUE                                                       FL168270
      GO TO 105                                                      FL168271
825   IF(IMA(L2,2)-IMA(L3,2))830,850,830                             FL168272
830   NS=IMA(L2,2)*IMA(L2,3)                                         FL168273
      DO 840 L=1,NS                                                  FL168274
      LL=(L-1)*NF-1                                                  FL168275
      I=IMA(L1,4)+LL                                                 FL168276
      J=IMA(L2,4)+LL                                                 FL168277
      K=IMA(L3,4)-1                                                  FL168278
      DO 835 M=1,NF                                                  FL168279
      II=I+M                                                         FL168280
      JJ=J+M                                                         FL168281
      KK=K+M                                                         FL168282
      F(II)=F(JJ)+AS*F(KK)                                           FL168283
835   CONTINUE                                                       FL168284
840   CONTINUE                                                       FL168285
      GO TO 105                                                      FL168286
850   I=IMA(L1,4)-1                                                  FL168287
      J=IMA(L2,4)-1                                                  FL168288
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      K=IMA(L3,4)-1                                                     FL168289
      IF(IMA(L2,2))855,860,855                                          FL168290
855   NS=IMA(L2,2)*IMA(L2,3)*NF                                         FL168291
      GO TO 865                                                         FL168292
860   NS=NF                                                             FL168293
865   DO 870 L=1,NS                                                     FL168294
      II=I+L                                                            FL168295
      JJ=J+L                                                            FL168296
      KK=K+L                                                            FL168297
      F(II)=F(JJ)+AS*F(KK)                                              FL168298
870   CONTINUE                                                          FL168299
      GO TO 105                                                         FL168300
1000  IF(ILS)900,925,900                                                FL168301
900   IF(IMA(L2,2))905,910,905                                          FL168302
905   NS=NF                                                             FL168303
      GO TO 915                                                         FL168304
910   NS=IMA(L2,2)*IMA(L2,3)*NF                                         FL168305
915   I=IMA(L1,4)-1                                                     FL168306
      J=IMA(L2,4)-1                                                     FL168307
      DO 920 L=1,NS                                                     FL168308
      II=I+L                                                            FL168309
      JJ=J+L                                                            FL168310
      F(II)=F(JJ)*FL(2)                                                 FL168311
920   CONTINUE                                                          FL168312
      GO TO 105                                                         FL168313
925   IF(IMA(L2,2))940,930,940                                          FL168314
930   I=IMA(L1,4)-1                                                     FL168315
      J=IMA(L2,4)-1                                                     FL168316
      K=IMA(L3,4)-1                                                     FL168317
      DO 935 L=1,NF                                                     FL168318
      II=I+L                                                            FL168319
      JJ=J+L                                                            FL168320
      KK=K+L                                                            FL168321
      F(II)=F(JJ)*F(KK)                                                 FL168322
935   CONTINUE                                                          FL168323
      GO TO 105                                                         FL168324
940   IF(IMA(L3,2))960,945,960                                          FL168325
945   NS=IMA(L2,2)*IMA(L2,3)                                            FL168326
      DO 955 L=1,NS                                                     FL168327
      LL=(L-1)*NF-1                                                     FL168328
      I=IMA(L1,4)+LL                                                    FL168329
      J=IMA(L2,4)+LL                                                    FL168330
      K=IMA(L3,4)+LL                                                    FL168331
      DO 950 M=1,NF                                                     FL168332
      II=I+M                                                            FL168333
      JJ=J+M                                                            FL168334
      KK=K+M                                                            FL168335
      F(II)=F(JJ)*F(KK)                                                 FL168336
950   CONTINUE                                                          FL168337
955   CONTINUE                                                          FL168338
      GO TO 105                                                         FL168339
960   IRS=IMA(L1,2)*NF                                                  FL168340
      IA=IMA(L2,3)                                                      FL168341
      IRD=IMA(L2,2)*NF                                                  FL168342
      IC=IMA(L3,3)                                                      FL168343
      IR=IMA(L2,2)                                                      FL168344
      DO 985 I=1,NF                                                     FL168345
      DO 980 J=1,IR                                                     FL168346
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      DO 970 K=1,IC                                                     FL168347
      IRI=IMA(L2,4)-1+I+(J-1)*NF                                        FL168348
      IND=NAC-1+K                                                       FL168349
      F(IND)=(0.,0.)                                                    FL168350
      ICI=IMA(L3,4)-1+I+(K-1)*IMA(L3,2)*NF                              FL168351
      DO 965 L=1,IA                                                     FL168352
      F(IND)=F(IND)+F(IRI)*F(ICI)                                       FL168353
      IRI=IRI+IRD                                                       FL168354
      ICI=ICI+NF                                                        FL168355
965   CONTINUE                                                          FL168356
970   CONTINUE                                                          FL168357
      ISI=IMA(L1,4)-1+I+(J-1)*NF                                        FL168358
      DO 975 L=1,IC                                                     FL168359
      IN=NAC-1+L                                                        FL168360
      F(ISI)=F(IN)                                                      FL168361
      ISI=ISI+IRS                                                       FL168362
975   CONTINUE                                                          FL168363
980   CONTINUE                                                          FL168364
985   CONTINUE                                                          FL168365
      GO TO 105                                                         FL168366
2000  IF(L1-L2)1100,1110,1100                                           FL168367
1100  IE=IMA(L1,4)-1                                                    FL168368
      ID=IMA(L2,4)-1                                                    FL168369
      NN=IMA(L2,2)*IMA(L2,3)*NF                                         FL168370
      DO1105 I=1,NN                                                     FL168371
      J=IE+I                                                            FL168372
      K=ID+I                                                            FL168373
      F(J)=F(K)                                                         FL168374
1105  CONTINUE                                                          FL168375
1110  DO1300 INF=1,NF                                                   FL168376
1115  IE=IMA(L1,4)-1+INF                                                FL168377
      IN=IMA(L2,2)                                                      FL168378
      NN=IN-1                                                           FL168379
      ICD=IN*NF                                                         FL168380
      INN=IN*IN                                                         FL168381
      DO1120 I=1,INN                                                    FL168382
      IS=NAC-1+I                                                        FL168383
      F(IS)=(0.,0.)                                                     FL168384
1120  CONTINUE                                                          FL168385
      DO1125 I=1,IN                                                     FL168386
      IS=NAC-1+I+(I-1)*IN                                               FL168387
      F(IS)=(1.,0.)                                                     FL168388
1125  CONTINUE                                                          FL168389
      DO 1160 J=1,IN                                                    FL168390
      JF=(J-1)*NF                                                       FL168391
      IS=IE+JF*(1+IN)                                                   FL168392
      A=F(IS)                                                           FL168393
      IF((B(1).EQ.0.).AND.(B(2).EQ.0.)) GO TO 1290                      FL168394
      DO 1130 I=J,IN                                                    FL168395
      IS=IE+JF+(I-1)*NF*IN                                              FL168396
1130  F(IS)=F(IS)/A                                                     FL168397
      DO 1135 I=1,J                                                     FL168398
      IS=NAC+J-1+(I-1)*IN                                               FL168399
1135  F(IS)=F(IS)/A                                                     FL168400
      IF(J.EQ.IN) GO TO 1170                                            FL168401
      K=J+1                                                             FL168402
      DO 1150 L=K,IN                                                    FL168403
      IS=IE+(L-1)*NF+JF*IN                                              FL168404
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      A=F(IS)                                                           FL168405
      F(IS)=(0.,0.)                                                     FL168406
      IF((B(1).EQ.0.).AND.(B(2).EQ.0.)) GO TO 1150                      FL168407
      DO 1140 I=K,IN                                                    FL168408
      IS=IE+(L-1)*NF+(I-1)*NF*IN                                        FL168409
      IT=IE+JF+(I-1)*NF*IN                                              FL168410
 1140 F(IS)=F(IS)-F(IT)*A                                               FL168411
      DO 1145 I=1,K                                                     FL168412
      IS=NAC+L-1+(I-1)*IN                                               FL168413
      IT=NAC+J-1+(I-1)*IN                                               FL168414
 1145 F(IS)=F(IS)-F(IT)*A                                               FL168415
 1150 CONTINUE                                                          FL168416
 1160 CONTINUE                                                          FL168417
 1170 L=IN+1                                                            FL168418
      INM1=IN-1                                                         FL168419
      DO 1185 J=1,INM1                                                  FL168420
      KB=L-J                                                            FL168421
      KBM1=KB-1                                                         FL168422
      DO 1180 M=1,KBM1                                                  FL168423
      IS=IE+(M-1)*NF+KBM1*NF*IN                                         FL168424
      A=F(IS)                                                           FL168425
      DO 1175 I=1,IN                                                    FL168426
      IS=NAC+M-1+(I-1)*IN                                               FL168427
      IT=NAC+KB-1+(I-1)*IN                                              FL168428
 1175 F(IS)=F(IS)-F(IT)*A                                               FL168429
 1180 CONTINUE                                                          FL168430
 1185 CONTINUE                                                          FL168431
      NQ=IN*IN                                                          FL168432
      DO 1190 J=1,NQ                                                    FL168433
      IS=NAC+J-1                                                        FL168434
      IT=IE+(J-1)*NF                                                    FL168435
 1190 F(IT)=F(IS)                                                       FL168436
      GO TO 1300                                                        FL168437
 1290 IS=NF1+INF-1                                                      FL168438
      C=FREQ(IS)                                                        FL168439
      WRITE (6, 5213) IMA(L2,1),C                                       FL168440
      K=0                                                               FL168441
      DO1295 I=1,NN                                                     FL168442
      J=K+IE                                                            FL168443
      K=K+NF                                                            FL168444
      F(J)=(1.,0.)                                                      FL168445
 1295 CONTINUE                                                          FL168446
 1300 CONTINUE                                                          FL168447
      GO TO 105                                                         FL168448
      END                                                               FL168449
```

```
$ORIGIN        L,CK2,NOREW                                                 000
$IBFTC FL269   M94,FULIST,REF,XR6                                       FL269000
      SUBROUTINE MALOAD (K)                                             FL269001
C               DECODE *MALOAD AND *OVERLAY CARDS                       FL269002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL269003
      COMPLEX BUF                                                       FL269004
      COMPLEX F,FL                                                      FL269005
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FL269006
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```
     1FL(2),ILS                                                         FL269007
      COMMON/MASRCH/BUF(100),IAR(11),ID(4),LS,LE,LL,M,N,L,I,KK,DUMMY(5) FL269008
      DATA COMMA/1H,/                                                   FL269009
      LOGICAL ZERO,NZER,SWITCH                                          FL269010
      IF(K.EQ.3) GO TO 180                                              FL269011
      CALL BYPASC (1)                                                   FL269012
      J=5                                                               FL269013
      IF(SWITCH(1,15)) GO TO 170                                        FL269014
      REWIND 4                                                          FL269015
 100  J=J+1                                                             FL269016
      IF(NZER(RA(J),COMMA)) GO TO 100                                   FL269017
      IF(K-1)105,105,110                                                FL269018
 105  CALL LONE (J)                                                     FL269019
      GO TO 115                                                         FL269020
 110  CALL LTWO (J)                                                     FL269021
 115  IF(J)120,125,130                                                  FL269022
 120  CALL SWTHON (16)                                                  FL269023
 125  RETURN                                                            FL269024
 130  READ (4) ID                                                       FL269025
      IF(ID(1)+ID(2)+ID(3)+ID(4))135,125,135                            FL269026
 135  KK=LF-LS+1                                                        FL269027
      DO 165 K=1,KK                                                     FL269028
      IF(ID(3)-IAR(K))165,140,165                                       FL269029
 140  READ (4) BUF                                                      FL269030
      I=LS+K-1                                                          FL269031
      IF(ID(1)-IMA(I,2))145,145,150                                     FL269032
 145  IF((ID(2).LE.IMA(I,3)).OR.(IMA(I,3).LE.0)) GO TO 155              FL269033
 150  CALL WROUT (30,206)                                               FL269034
      GO TO 120                                                         FL269035
 155  L=(ID(1)-1)*NF+(ID(2)-1)*NF*IMA(I,2)+IMA(I,4)-1                   FL269036
      LL=NF2-NF1+1                                                      FL269037
      DO 160 MM=1,LL                                                    FL269038
      M=NF1+MM-1                                                        FL269039
      N=L+MM                                                            FL269040
      F(N)=BUF(M)                                                       FL269041
 160  CONTINUE                                                          FL269042
      IAR(11)=IAR(11)-1                                                 FL269043
      IF(IAR(11))125,125,130                                            FL269044
 165  CONTINUE                                                          FL269045
      READ (4) DUM                                                      FL269046
      GO TO 130                                                         FL269047
 170  CALL BYPASC (3)                                                   FL269048
      GO TO 120                                                         FL269049
 180  J=-1                                                              FL269050
      CALL LONE (J)                                                     FL269051
      RETURN                                                            FL269052
      END                                                               FL269053
```

```
$IBFTC FL270   M94,FULIST,REF,XR6                                       FL270000
      SUBROUTINE RECARD (J)                                             FL270001
C               MATRIX SYSTEM CARD INPUT ROUTINE                        FL270002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL270003
      LOGICAL NZER                                                      FL270004
      DATA A/1H*/                                                       FL270005
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```
      CALL CARD                                                         FL270006
      J=0                                                               FL270007
      IF(NZER(RA(1),A)) J=1                                             FL270008
      RETURN                                                            FL270009
      END                                                               FL270010
```

```
$IBFTC FL271    M94,FULIST,REF,XR6                                      FL271000
      SUBROUTINE GETNUM (A,I)                                           FL271001
C               AUXILIARY CARD DECODE ROUTINE                           FL271002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL271003
 1    FORMAT (A6)                                                       FL271004
 2    FORMAT (I6)                                                       FL271005
      CALL RITE31                                                       FL271006
      WRITE (31,1)A                                                     FL271007
      CALL READ31                                                       FL271008
      READ (31,2)I                                                      FL271009
      RETURN                                                            FL271010
      END                                                               FL271011
```

```
$IBFTC FL272    M94,FULIST,REF,XR6                                      FL272000
      SUBROUTINE BYPASC (J)                                             FL272001
C               BYPASS CONTROL CARDS                                    FL272002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL272003
      LOGICAL NZER                                                      FL272004
      DATA STAR/1H*/                                                    FL272005
      GO TO (100,200,300),J                                             FL272006
 100  IQ=1                                                              FL272007
      RETURN                                                            FL272008
 200  IQ=-1                                                             FL272009
      RETURN                                                            FL272010
 300  IF(IQ)310,310,305                                                 FL272011
 305  CALL RECARD (J)                                                   FL272012
 310  IF(NZER(RA(1),STAR)) GO TO 305                                    FL272013
      RETURN                                                            FL272014
      END                                                               FL272015
```

```
$ORIGIN         M,CK2,NOREW                                                000
$IBFTC FM173    M94,FULIST,REF,XR6                                      FM173000
      SUBROUTINE LONE (J)                                               FM173001
C               LOAD DATA DEFINED ON *MALOAD CARD                       FM173002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FM173003
      COMPLEX F,FL                                                      FM173004
      COMPLEX FMSAV                                                     FM173005
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FM173006
     1FL(2),ILS                                                         FM173007
      COMMON/MASRCH/BUF(200),IAR(11),ID(4),LS,LE,LL,QA,WO,L,K,DUMMY(6)  FM173008
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```
      DIMENSION SET(3),ISET(2,4),FMSAV(100)                             FM173009
      DATA (SET(I),I=1,3)/2HID,2HCO,2HRE/                               FM173010
      DATA COMMA,RPRN,LPRN,SLASH/1H,,1H),1H(,1H//                       FM173011
      LOGICAL ZERO,NZER,SWITCH                                          FM173012
      IF(J.LE.0) GO TO 200                                              FM173013
      K=1                                                               FM173014
      IAR(11)=0                                                         FM173015
100   IF(NZER(RA(J+1),COMMA)) GO TO 115                                 FM173016
      CALL BYPASC (2)                                                   FM173017
      CALL RECARD (J)                                                   FM173018
      IF(J)105,105,110                                                  FM173019
105   J=IAR(11)                                                         FM173020
      LS=LE-K+2                                                         FM173021
      RETURN                                                            FM173022
110   J=0                                                               FM173023
115   L=J+1                                                             FM173024
120   J=J+1                                                             FM173025
      IF(NZER(RA(J),LPRN)) GO TO 120                                    FM173026
      LL=J-1                                                            FM173027
      CALL PACK (L,LL,IO,RA)                                            FM173028
      L1=IM+1                                                           FM173029
      IM=L1                                                             FM173030
      LE=IM                                                             FM173031
      IF(IM-25)130,130,125                                              FM173032
125   J=-1                                                              FM173033
      CALL WROUT (28,207)                                               FM173034
      GO TO 175                                                         FM173035
130   L=J+1                                                             FM173036
      IMA(L1,1)=IO                                                      FM173037
135   J=J+1                                                             FM173038
      IF(NZER(RA(J),COMMA)) GO TO 135                                   FM173039
      LL=J-1                                                            FM173040
      CALL PACK (L,LL,WO,RA)                                            FM173041
      CALL GETNUM (WO,IMA(L1,2))                                        FM173042
      L=J+1                                                             FM173043
140   J=J+1                                                             FM173044
      IF(NZER(RA(J),RPRN)) GO TO 140                                    FM173045
      LL=J-1                                                            FM173046
      CALL PACK (L,LL,WO,RA)                                            FM173047
      CALL GETNUM (WO,IMA(L1,3))                                        FM173048
145   J=J+1                                                             FM173049
      IF(NZER(RA(J),SLASH)) GO TO 145                                   FM173050
      L=J+1                                                             FM173051
150   J=J+1                                                             FM173052
      IF(NZER(RA(J),COMMA)) GO TO 150                                   FM173053
      LL=J-1                                                            FM173054
      CALL PACK (L,LL,WO,RA)                                            FM173055
      CALL GETNUM (WO,IAR(K))                                           FM173056
      K=K+1                                                             FM173057
      IMA(L1,4)=NAC                                                     FM173058
      IF(IMA(L1,3))160,155,160                                          FM173059
155   NAC=NF*IMA(L1,2)+NAC                                              FM173060
      IAR(11)=IAR(11)+1                                                 FM173061
      GO TO 165                                                         FM173062
160   NAC=NAC+IMA(L1,2)*IMA(L1,3)*NF                                    FM173063
      IAR(11)=IAR(11)+IMA(L1,2)*IMA(L1,3)                               FM173064
165   IF(NAC-6101)100,100,170                                           FM173065
170   J=-1                                                              FM173066
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```
      CALL WROUT (29,208)                                               FM173067
175   CALL BYPASC (3)                                                   FM173068
      RETURN                                                            FM173069
200   J=1                                                               FM173070
      KSC=KSC                                                           FM173071
205   J=J+1                                                             FM173072
      IF(NZER(RA(J),COMMA)) GO TO 205                                   FM173073
206   IF(NZER(RA(J+1),COMMA)) GO TO 211                                 FM173074
207   CALL RECARD (J)                                                   FM173075
      IF(J.GT.0) GC TO 210                                              FM173076
      CALL PACK (2,5,WO,RA)                                             FM173077
      IF(NZER(WO,MSAV)) RETURN                                          FM173078
      GO TO 200                                                         FM173079
210   J=0                                                               FM173080
211   K1=0                                                              FM173081
      K2=0                                                              FM173082
215   J=J+1                                                             FM173083
      IF(ZERO(RA(J),COMMA)) GO TO 215                                   FM173084
      CALL PACK (J,J+1,WO,RA)                                           FM173085
      IF(ZERO(WO,SET(1))) GO TO 220                                     FM173086
      IF(ZERO(WO,SET(2))) GO TO 300                                     FM173087
      IF(NZER(WO,SET(3))) GO TO 225                                     FM173088
      CALL SWTHOF(25)                                                   FM173089
      REWIND 11                                                         FM173090
      GO TC 207                                                         FM173091
220   K1=1                                                              FM173092
      K=1                                                               FM173093
      GO TO 230                                                         FM173094
225   K2=1                                                              FM173095
      KS=J                                                              FM173096
      K=2                                                               FM173097
230   J=J+1                                                             FM173098
      IF(NZER(RA(J),LPRN))GO TO 230                                     FM173099
      IF(K.EQ.2) KE=J-1                                                 FM173100
      IS=0                                                              FM173101
      M=1                                                               FM173102
235   L=J+1                                                             FM173103
240   J=J+1                                                             FM173104
      IF(ZERO(RA(J),COMMA)) GO TO 250                                   FM173105
      IF(NZER(RA(J),RPRN)) GO TO 240                                    FM173106
      IS=1                                                              FM173107
250   CALL PACK (L,J-1,ID(M),RA)                                        FM173108
      IF(IS.NE.0) GO TO 255                                             FM173109
      M=M+1                                                             FM173110
      IF(M.LE.4) GC TO 235                                              FM173111
253   CALL WROUT (1,208)                                                FM173112
      CALL SWTHON (25)                                                  FM173113
      GO TO 207                                                         FM173114
255   DO 260 I=1,M                                                      FM173115
      CALL GETNUM (ID(I),ISET(K,I))                                     FM173116
260   CONTINUE                                                          FM173117
      IF((K1+K2).LT.2) GO TO 215                                        FM173118
      CALL PACK (KS,KE,WO,RA)                                           FM173119
      DO 265 L=1,IM                                                     FM173120
      IF(NZER(WO,IMA(L,1))) GO TO 265                                   FM173121
      LM=L                                                              FM173122
      GO TO 270                                                         FM173123
265   CONTINUE                                                          FM173124
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 267  CALL WROUT (11,208)                                              FM173125
      CALL SWTHON (25)                                                 FM173126
      GO TO 207                                                        FM173127
 270  DO 275 I=1,100                                                   FM173128
 275  FMSAV(I)=(0.,0.)                                                 FM173129
      I=IMA(LM,2)                                                      FM173130
      JJ=IMA(LM,3)                                                     FM173131
      IK=IMA(LM,4)                                                     FM173132
      IF(I.LE.0) I=1                                                   FM173133
      IF(JJ.LE.0) JJ=1                                                 FM173134
      IB=ISET(2,1)                                                     FM173135
      JB=ISET(2,2)                                                     FM173136
      IF((IB.GT.I).OR.(JB.GT.JJ)) GO TO 253                            FM173137
      IF(JB.LE.0) JB=1                                                 FM173138
      JS=IK+(IB-1)*NF+(JB-1)*I*NF                                      FM173139
      DO 280 I=1,NF                                                    FM173140
      JK=JS+I-1                                                        FM173141
      JP=NF1+I-1                                                       FM173142
 280  FMSAV(JP)=F(JK)                                                  FM173143
      WRITE (11) (ISET(1,I),I=1,4)                                     FM173144
      WRITE (11) FMSAV                                                 FM173145
      CALL SWTHON (32)                                                 FM173146
      GO TO 205                                                        FM173147
 300  IF(SWITCH(1,25)) GO TO 325                                       FM173148
      CALL SWTHOF (15)                                                 FM173149
      DO 305 J=1,4                                                     FM173150
 305  ID(J)=0                                                          FM173151
      WRITE (11) ID                                                    FM173152
      ENDFILE 11                                                       FM173153
      REWIND 11                                                        FM173154
      REWIND 4                                                         FM173155
 310  READ (11) ID                                                     FM173156
      IF((ID(1)+ID(2)+ID(3)+ID(4)).NE.0) GO TO 320                     FM173157
      REWIND 11                                                        FM173158
      GO TO 207                                                        FM173159
 320  READ (11) FMSAV                                                  FM173160
      WRITE (4) ID                                                     FM173161
      WRITE (4) FMSAV                                                  FM173162
      GO TO 310                                                        FM173163
 325  CALL SWTHON (15)                                                 FM173164
      GO TO 207                                                        FM173165
      END                                                              FM173166
```

```
$ORIGIN        M,CK2,NOREW                                                 000
$IBFTC FM274   M94,FULIST,REF,XR6                                       FM274000
      SUBROUTINE LTWO (J)                                               FM274001
C               LOAD DATA DEFINED ON *OVERLAY CARD                      FM274002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FM274003
      LOGICAL ZERO,N7ER                                                 FM274004
      COMPLEX F,FL                                                      FM274005
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FM274006
     1FL(2),ILS                                                         FM274007
      COMMON/MASRCH/BUF(200),IAR(11),ID(4),LS,LE,LL,IRAN,WO,L,MAONE,    FM274008
     1MATWO,IQM,ID,KK,N,NN                                              FM274009
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1     FORMAT (37H ***** OVERLAY CARD SET IS INCOMPLETE,30X,5H*****)      FM274010
2     FORMAT (33H ***** OVERLAY RANGE IS UNDEFINED,34X,5H*****)          FM274011
      DATA COMMA,THRU,WITH,LPRN,RPRN,SLASH/1H,,4HTHRU,4HWITH,1H(,1H),1H/FM274012
     1/                                                                  FM274013
      LS=0                                                               FM274014
      LE=0                                                               FM274015
      IF(NZER(RA(J+1),COMMA)) GO TO 111                                  FM274016
      CALL BYPASC (2)                                                    FM274017
      CALL RECARD (J)                                                    FM274018
      IF(J)100,100,110                                                   FM274019
100   CALL BYPASC (3)                                                    FM274020
      RETURN                                                             FM274021
105   WRITE (6,1)                                                        FM274022
106   J=-1                                                               FM274023
      GO TO 100                                                          FM274024
110   J=0                                                                FM274025
111   L=J+1                                                              FM274026
115   J=J+1                                                              FM274027
      IF(NZER(RA(J),COMMA)) GO TO 115                                    FM274028
      LL=J-1                                                             FM274029
      CALL PACK (L,LL,MAONE,RA)                                          FM274030
      IF(NZER(RA(J+1),COMMA)) GO TO 125                                  FM274031
      CALL BYPASC (2)                                                    FM274032
      CALL RECARD (J)                                                    FM274033
      IF(J)105,105,120                                                   FM274034
120   J=0                                                                FM274035
125   L=J+1                                                              FM274036
      LL=J+4                                                             FM274037
      CALL PACK (L,LL,WO,RA)                                             FM274038
      IF(ZERO(WO,THRU)) GO TO 130                                        FM274039
127   CALL WKOUT (1,209)                                                 FM274040
      GO TO 106                                                          FM274041
130   J=J+6                                                              FM274042
      IF(NZER(RA(J),COMMA)) GO TO 140                                    FM274043
      CALL BYPASC (2)                                                    FM274044
      CALL RECARD (J)                                                    FM274045
      IF(J)105,105,135                                                   FM274046
135   J=1                                                                FM274047
140   L=J                                                                FM274048
145   J=J+1                                                              FM274049
      IF(NZER(RA(J),COMMA)) GO TO 145                                    FM274050
      LL=J-1                                                             FM274051
      CALL PACK (L,LL,MATWO,RA)                                          FM274052
      IF(NZER(RA(J+1),COMMA)) GO TO 155                                  FM274053
      CALL BYPASC (2)                                                    FM274054
      CALL RECARD (J)                                                    FM274055
      IF(J)105,105,150                                                   FM274056
150   J=0                                                                FM274057
155   L=J+1                                                              FM274058
      LL=J+4                                                             FM274059
      CALL PACK (L,LL,WO,RA)                                             FM274060
      IF(NZER(WO,WITH)) GO TO 127                                        FM274061
      J=J+5                                                              FM274062
      DO 160 K=1,IM                                                      FM274063
      IF(ZERO(MAONE,IMA(K,1))) LS=K                                      FM274064
      IF(ZERO(MATWO,IMA(K,1))) LE=K                                      FM274065
160   CONTINUE                                                           FM274066
      IF(LS)165,165,170                                                  FM274067
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165   WRITE (6,2)                                                    FM274068
      GO TO 106                                                      FM274069
170   IF(LE)165,165,175                                              FM274070
175   IF(LE-IM)185,180,180                                           FM274071
180   IRAN=6100                                                      FM274072
      GO TO 200                                                      FM274073
185   IF(IMA(LE,3))190,190,195                                       FM274074
190   IRAN=IMA(LE,4)+NF-1                                            FM274075
      GO TO 200                                                      FM274076
195   IRAN=IMA(LE,4)+NF*IMA(LE,3)*IMA(LE,2)-1                        FM274077
200   K=1                                                            FM274078
      IAR(11)=0                                                      FM274079
205   IF(NZER(RA(J+1),COMMA)) GO TO 300                              FM274080
      CALL BYPASC (2)                                                FM274081
      CALL RECARD (J)                                                FM274082
      IF(J)215,215,210                                               FM274083
210   J=0                                                            FM274084
      GO TO 300                                                      FM274085
215   IF(IAR(11))105,105,220                                         FM274086
220   IQM=LE-(LS+K-1)                                                FM274087
      IF(IQM)225,225,230                                             FM274088
225   J=1                                                            FM274089
      GO TO 100                                                      FM274090
230   IF(LE-IM)240,235,235                                           FM274091
235   IM=LS+K-1                                                      FM274092
      LE=IM                                                          FM274093
      GO TO 225                                                      FM274094
240   L=LE+1                                                         FM274095
      DO 245 M=L,IM                                                  FM274096
      N=M-IQM                                                        FM274097
      DO 245 MM=1,4                                                  FM274098
      IMA(N,MM)=IMA(M,MM)                                            FM274099
245   CONTINUE                                                       FM274100
      IM=IM-IQM                                                      FM274101
      LE=LS+K-1                                                      FM274102
      GO TO 225                                                      FM274103
300   L=J+1                                                          FM274104
305   J=J+1                                                          FM274105
      IF(NZER(RA(J),LPRN)) GO TO 305                                 FM274106
      LL=J-1                                                         FM274107
      CALL PACK (L,LL,IO,RA)                                         FM274108
      L1=LS+K-1                                                      FM274109
      IF(L1-LE)335,335,310                                           FM274110
310   IF(LE-IM)315,340,340                                           FM274111
315   IF(IM+1-25)325,325,320                                         FM274112
320   CALL WROUT (28,210)                                            FM274113
      GO TO 106                                                      FM274114
325   KK=IM-LE                                                       FM274115
      DO 330 M=1,KK                                                  FM274116
      N=IM-M+1                                                       FM274117
      NN=N+1                                                         FM274118
      DO 330 MM=1,4                                                  FM274119
      IMA(NN,MM)=IMA(N,MM)                                           FM274120
330   CONTINUE                                                       FM274121
332   LE=L1                                                          FM274122
      IM=IM+1                                                        FM274123
335   IMA(L1,1)=IO                                                   FM274124
      GO TO 350                                                      FM274125
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 340  IF(L1-25)332,332,320                                          FM274126
 350  L=J+1                                                         FM274127
 355  J=J+1                                                         FM274128
      IF(NZER(RA(J),COMMA)) GO TO 355                               FM274129
      LL=J-1                                                        FM274130
      CALL PACK (L,LL,WO,RA)                                        FM274131
      CALL GETNUM (WO,IMA(L1,2))                                    FM274132
      L=J+1                                                         FM274133
 360  J=J+1                                                         FM274134
      IF(NZER(RA(J),RPRN)) GO TO 360                                FM274135
      LL=J-1                                                        FM274136
      CALL PACK (L,LL,WO,RA)                                        FM274137
      CALL GETNUM (WO,IMA(L1,3))                                    FM274138
 365  J=J+1                                                         FM274139
      IF(NZER(RA(J),SLASH)) GO TO 365                               FM274140
      L=J+1                                                         FM274141
 370  J=J+1                                                         FM274142
      IF(NZER(RA(J),COMMA)) GO TO 370                               FM274143
      LL=J-1                                                        FM274144
      CALL PACK (L,LL,WO,RA)                                        FM274145
      CALL GETNUM (WO,IAR(K))                                       FM274146
      L2=L1-1                                                       FM274147
      IF(L2)375,375,380                                             FM274148
 375  IMA(L1,4)=1                                                   FM274149
      GO TO 400                                                     FM274150
 380  IF(IMA(L2,3))385,385,390                                      FM274151
 385  L3=IMA(L2,4)+NF                                               FM274152
      GO TO 395                                                     FM274153
 390  L3=IMA(L2,4)+NF*IMA(L2,3)*IMA(L2,2)                           FM274154
 395  IMA(L1,4)=L3                                                  FM274155
 400  IF(IMA(L1,3))405,405,410                                      FM274156
 405  IAR(11)=IAR(11)+1                                             FM274157
      L2=L3+NF-1                                                    FM274158
      GO TO 415                                                     FM274159
 410  L2=L3+NF*IMA(L1,2)*IMA(L1,3)-1                                FM274160
      IAR(11)=IAR(11)+IMA(L1,2)*IMA(L1,3)                           FM274161
 415  IF(L2-IRAN)425,425,420                                        FM274162
 420  CALL WRQUT (29,211)                                           FM274163
      GO TO 106                                                     FM274164
 425  IF(LE-IM)435,430,430                                          FM274165
 430  NAC=L2+1                                                      FM274166
 435  K=K+1                                                         FM274167
      GO TO 205                                                     FM274168
      END                                                           FM274169
```

```
$ORIGIN        L,CK2,NOREW                                              000
$IBFTC FL375   M94,FULIST,REF,XR6                                    FL375000
      SUBROUTINE OUTPUT                                              FL375001
C               MATRIX OUTPUT CONTROL ROUTINE                        FL375002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR       FL375003
      COMPLEX F,FL                                                   FL375004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FL375005
     1FL(2),ILS                                                      FL375006
      COMMON/DUSRCH/DUMMY(270),WO                                    FL375007
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```
      DATA COMMA,PR/1H,,2HPR/                                           FL375008
      LOGICAL ZERO,NZER                                                 FL375009
      J=5                                                               FL375010
 100  J=J+1                                                             FL375011
      IF(NZER(RA(J),COMMA)) GO TO 100                                   FL375012
      IF(NZER(RA(J+1),COMMA)) GO TO 115                                 FL375013
      CALL CARDU (J)                                                    FL375014
      IF(J)105,105,110                                                  FL375015
 105  RETURN                                                            FL375016
 110  J=0                                                               FL375017
 115  L=J+1                                                             FL375018
      J=J+2                                                             FL375019
      CALL PACK (L,J,WO,RA)                                             FL375020
 120  J=J+1                                                             FL375021
      IF(NZER(RA(J),COMMA)) GO TO 120                                   FL375022
      IF(ZERO(WO,PR)) GO TO 125                                         FL375023
      CALL PLOT (J)                                                     FL375024
      GO TO 105                                                         FL375025
 125  CALL PRINT (J)                                                    FL375026
      GO TO 105                                                         FL375027
      END                                                               FL375028
```

```
$IBFTC FL376   M94,FULIST,REF,XR6                                       FL376000
      SUBROUTINE CARDU (J)                                              FL376001
C               CONTROL CARD INPUT ROUTINE                              FL376002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL376003
      COMPLEX F,FL                                                      FL376004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FL376005
     1FL(2),ILS                                                         FL376006
      LOGICAL NZER                                                      FL376007
      DATA STAR/1H*/                                                    FL376008
      CALL CARD                                                         FL376009
      J=0                                                               FL376010
      IF(NZER(RA(1),STAR)) J=J+1                                        FL376011
      RETURN                                                            FL376012
      END                                                               FL376013
```

```
$IBFTC FL377   M94,FULIST,REF,XR6                                       FL377000
      SUBROUTINE OBNUM (A,B,I)                                          FL377001
C               AUXILIARY CARD DECODE ROUTINE                           FL377002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FL377003
      COMPLEX F,FL                                                      FL377004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FL377005
     1FL(2),ILS                                                         FL377006
      DIMENSION A(2),B(2)                                               FL377007
 1    FORMAT (4A6)                                                      FL377008
 2    FORMAT (2I6)                                                      FL377009
 3    FORMAT (2E12.0)                                                   FL377010
      CALL RITE31                                                       FL377011
      WRITE (31,1) A,B                                                  FL377012
```


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```
      CALL READ31                                                       FL377013
      IF(I)100,100,110                                                  FL377014
 100  READ (31,3) B                                                     FL377015
      RETURN                                                            FL377016
 110  READ (31,2) (B(J),J=1,I)                                          FL377017
      RETURN                                                            FL377018
      END                                                               FL377019


$ORIGIN        N,CK2,NOREW                                                 000
$IBFTC FN178   M94,FULIST,REF,XR6                                       FN178000
      SUBROUTINE PRINT (J)                                              FN178001
C              MATRIX OUTPUT PRINT ROUTINE                              FN178002
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FN178003
      COMPLEX F,FL                                                      FN178004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FN178005
     1FL(2),ILS                                                         FN178006
      COMMON/OUSRCH/KK,LL,L,MAT,IS,KEY,M,II(2),A(2),K1,KL,IPAGE,AM,AL,  FN178007
     1X,Y,Z,I,K,MAS(125,2)                                              FN178008
      DIMENSION C(2,6100)                                               FN178009
      EQUIVALENCE (F,C)                                                 FN178010
      DATA SLASH,COMMA,TA,RPRN,TP,TE/1H/,1H,,1HA,1H),1HP,1HE/           FN178011
 1    FORMAT (33H ***** PRINT OF UNDEFINED MATRIX A6,16H REQUESTED *****FN178012
     1)                                                                 FN178013
      LOGICAL NZER,ZERO,SWITCH                                          FN178014
 2    FORMAT (1H1,57X,A6,2H (,I3,1H,,I3,1H),40X,3A3/8X,4HREAL,13X,      FN178015
     19HIMAGINARY,11X,9HMAGNITUDE,9X,13HLOG MAGNITUDE,8X,               FN178016
     211HPHASE ANGLE,11X,9HFREQUENCY,8X,6HF-CODE/1H0,130X,A1)           FN178017
 3    FORMAT (6(4X,1PE12.5,4X),5X,I3)                                   FN178018
 95   KK=0                                                              FN178019
      LL=J-1                                                            FN178020
 100  J=J-1                                                             FN178021
      IF(NZER(RA(J),SLASH)) GO TO 100                                   FN178022
      L=J+1                                                             FN178023
      CALL PACK (L,LL,MAT,RA)                                           FN178024
      J=LL+1                                                            FN178025
      IF(NZER(RA(J+1),COMMA)) GO TO 115                                 FN178026
      CALL CARDU (J)                                                    FN178027
      IF(J)105,105,110                                                  FN178028
 105  RETURN                                                            FN178029
 110  J=0                                                               FN178030
 115  J=J+1                                                             FN178031
      IF(NZER(RA(J),SLASH)) GO TO 115                                   FN178032
      L=J+1                                                             FN178033
      J=J+1                                                             FN178034
      IF(NZER(RA(J),TA)) GO TO 125                                      FN178035
      IS=-1                                                             FN178036
      KEY=-1                                                            FN178037
 120  IF(KK)160,160,170                                                 FN178038
 125  L=J+1                                                             FN178039
      KEY=1                                                             FN178040
 130  J=J+1                                                             FN178041
      IF(NZER(RA(J),COMMA)) GO TO 130                                   FN178042
      LL=J-1                                                            FN178043
      M=J+1                                                             FN178044
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135   J=J+1                                                          FN178045
      IF(ZERO(RA(J),SLASH)) GO TO 140                                FN178046
      IF(NZER(RA(J),RPRN)) GO TO 135                                 FN178047
      IS=1                                                           FN178048
      GO TO 145                                                      FN178049
140   IS=0                                                           FN178050
145   CALL PACK (L,LL,A(1),RA)                                       FN178051
      CALL PACK (M,J-1,A(2),RA)                                      FN178052
      CALL OBNUM (A,II,2)                                            FN178053
      MAS(KEY,1)=II(1)                                               FN178054
      MAS(KEY,2)=II(2)                                               FN178055
      IF(IS)120,150,120                                              FN178056
150   IF(KEY-124)155,155,120                                         FN178057
155   KEY=KEY+1                                                      FN178058
      L=J+1                                                          FN178059
      GO TO 130                                                      FN178060
160   L1=0                                                           FN178061
      L2=0                                                           FN178062
      L3=0                                                           FN178063
      DO 165 K=1,IM                                                  FN178064
      IF(NZER(MAT,IMA(K,1))) GO TO 165                               FN178065
      KK=K                                                           FN178066
      GO TO 170                                                      FN178067
165   CONTINUE                                                       FN178068
      WRITE (6,1) MAT                                                FN178069
      GO TO 500                                                      FN178070
170   IF(KEY)179,175,175                                             FN178071
175   L3=L3+1                                                        FN178072
      L1=MAS(L3,1)                                                   FN178073
      L2=MAS(L3,2)                                                   FN178074
      IF(L3-KEY)195,195,230                                          FN178075
179   L2=1                                                           FN178076
180   L1=L1+1                                                        FN178077
      IF(L1-IMA(KK,2))195,195,185                                    FN178078
185   IF(L2-IMA(KK,3))190,230,230                                    FN178079
190   L1=1                                                           FN178080
      L2=L2+1                                                        FN178081
195   IF(L2-1)200,200,205                                            FN178082
200   K1=0                                                           FN178083
      GO TO 210                                                      FN178084
205   K1=(L2-1)*NF*IMA(KK,2)                                         FN178085
210   K=IMA(KK,4)+(L1-I)*NF+K1                                       FN178086
      KL=K+NF-1                                                      FN178087
      IPAGE=55                                                       FN178088
      WRITE (10,2) MAT,L1,L2,DAY,DON,YEAR,COMMA                      FN178089
      DO 220 I=1,NF                                                  FN178090
      AM=SQRT(C(1,K)*C(1,K)+C(2,K)*C(2,K))                           FN178091
      AL=0.                                                          FN178092
      Z=0.                                                           FN178093
      IF(AM.LE.0.) GO TO 211                                         FN178094
      AL=.43429448*ALOG(AM)                                          FN178095
      CALL ATAN (C(2,K),C(1,K),Z)                                    FN178096
211   CONTINUE                                                       FN178097
      IJK=NF1+I-1                                                    FN178098
      WRITE (10,3) F(K),AM,AL,Z,FREQ(IJK),IJK                        FN178099
      K=K+1                                                          FN178100
      IF(I-IPAGE)220,220,215                                         FN178101
215   IPAGE=IPAGE+55                                                 FN178102
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      WRITE (10,2) MAT,L1,L2,DAY,DON,YEAR,SLASH                         FN178103
220   CONTINUE                                                          FN178104
      IF(KEY)180,175,175                                                FN178105
230   IF(IS)245,125,235                                                 FN178106
235   J=J+2                                                             FN178107
      IF(ZERO(RA(J),TP)) GO TO 255                                      FN178108
      IF(ZERO(RA(J),TE)) GO TO 115                                      FN178109
      CALL CARDU (J)                                                    FN178110
      IF(J)105,105,240                                                  FN178111
240   J=-1                                                              FN178112
      GO TO 235                                                         FN178113
245   J=J+1                                                             FN178114
      IF(NZER(RA(J),COMMA)) GO TO 245                                   FN178115
      IF(NZER(RA(J+1),COMMA)) GO TO 255                                 FN178116
      CALL CARDU (J)                                                    FN178117
      IF(J)105,105,250                                                  FN178118
250   J=0                                                               FN178119
255   J=J+1                                                             FN178120
      IF(NZER(RA(J),COMMA)) GO TO 255                                   FN178121
      GO TO 95                                                          FN178122
500   IF(ZERO(RA(J),COMMA)) GO TO 505                                   FN178123
      J=J+1                                                             FN178124
      GO TO 500                                                         FN178125
505   IF(ZERO(RA(J+1),TP)) GO TO 255                                    FN178126
      IF(NZER(RA(J+1),COMMA)) GO TO 510                                 FN178127
      CALL CARDU (J)                                                    FN178128
      IF(J)105,105,500                                                  FN178129
510   J=J+2                                                             FN178130
      GO TO 500                                                         FN178131
      END                                                               FN178132
```

```
$ORIGIN          N,CK2,NOREW                                                000
$IBFTC FN279     M94,FULIST,REF,XR6                                      FN279000
      SUBROUTINE PLOT (J)                                                FN279001
C                MATRIX OUTPUT PLOT ROUTINE (COMPUTE)                   FN279002
      LOGICAL ZERO,NZER                                                  FN279003
      COMPLEX F,FL                                                       FN279004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           FN279005
      COMMON/DUSRCH/A(16,9),K,KN,KL(5),L,WO,C(2),D(2),M,N,JI,DUME(111)   FN279006
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3,  FN279007
     1FL(2),ILS                                                          FN279008
      DIMENSION            I(2),IA(16,9)                                 FN279009
      EQUIVALENCE (A,IA)                                                 FN279010
      DATA SLASH,TP,TN,TS,TU,COMMA,TD,TR,LPRN,RPRN,TL,TI,TA,BLANK/       FN279011
     11H/,1HP,1HN,1HS,1HU,1H,,1HD,1HR,1H(,1H),1HL,1HI,1HA,1H /           FN279012
      DO 100 II=1,5                                                      FN279013
 100  KL(II)=0                                                           FN279014
      L=J-1                                                              FN279015
      K=1                                                                FN279016
      KN=0                                                               FN279017
 105  J=J-1                                                              FN279018
      IF(NZER(RA(J),SLASH)) GO TO 105                                    FN279019
      CALL PACK (J+1,L,WO,RA)                                            FN279020
      KL(1)=1                                                            FN279021
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      A(K,1)=WO                                                         FN279022
      J=L+1                                                             FN279023
110   J=J+1                                                             FN279024
      IF(ZERO(RA(J),TP)) GO TO 200                                      FN279025
      IF(ZERO(RA(J),TN)) GO TO 300                                      FN279026
      IF(ZERO(RA(J),TS)) GO TO 400                                      FN279027
      IF(ZERO(RA(J),TU)) GO TO 500                                      FN279028
      IF(NZER(RA(J),COMMA)) GO TO 600                                   FN279029
      CALL CARDU (J)                                                    FN279030
      IF(J)120,120,115                                                  FN279031
115   J=0                                                               FN279032
      GO TO 110                                                         FN279033
120   CALL FILIN                                                        FN279034
      IF(K-1)130,130,125                                                FN279035
125   CALL PLXX (K)                                                     FN279036
130   RETURN                                                            FN279037
150   DO 155 II=1,5                                                     FN279038
      IF(KL(II))110,110,155                                             FN279039
155   CONTINUE                                                          FN279040
      DO 160 II=1,5                                                     FN279041
160   KL(II)=0                                                          FN279042
      K=K+1                                                             FN279043
      IF(K-16)110,110,165                                               FN279044
165   CALL PLXX (16)                                                    FN279045
      K=1                                                               FN279046
      GO TO 110                                                         FN279047
200   IF(KL(1))205,210,205                                              FN279048
205   CALL FILIN                                                        FN279049
      K=K+1                                                             FN279050
210   KL(1)=1                                                           FN279051
      IF(K-16)220,220,215                                               FN279052
215   CALL PLXX (16)                                                    FN279053
      K=1                                                               FN279054
220   J=J+1                                                             FN279055
      IF(NZER(RA(J),SLASH)) GO TO 220                                   FN279056
      L=J+1                                                             FN279057
225   J=J+1                                                             FN279058
      IF(NZER(RA(J),COMMA)) GO TO 225                                   FN279059
      CALL PACK (L,J-1,WO,RA)                                           FN279060
      A(K,1)=WO                                                         FN279061
      GO TO 150                                                         FN279062
300   J=J+1                                                             FN279063
      IF(NZER(RA(J),SLASH)) GO TO 300                                   FN279064
      L=J+1                                                             FN279065
305   J=J+1                                                             FN279066
      IF(NZER(RA(J),COMMA)) GO TO 305                                   FN279067
      CALL PACK (L,J-1,C(1),RA)                                         FN279068
      CALL OBNUM (C,I,1)                                                FN279069
      IF(KL(2))310,335,310                                              FN279070
310   CALL FILIN                                                        FN279071
      IF(I(1)-KN)315,320,315                                            FN279072
315   CALL PLXX (K)                                                     FN279073
      GO TO 330                                                         FN279074
320   K=K+1                                                             FN279075
      IF(K-16)150,150,325                                               FN279076
325   CALL PLXX (16)                                                    FN279077
330   K=1                                                               FN279078
335   KL(2)=1                                                           FN279079
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      KN=I(1)                                                           FN279080
      GO TO 150                                                         FN279081
400   IF(KL(3))405,415,405                                              FN279082
405   CALL FILIN                                                        FN279083
      K=K+1                                                             FN279084
      IF(K-16)415,415,410                                               FN279085
410   CALL PLXX (16)                                                    FN279086
      K=1                                                               FN279087
415   KL(3)=1                                                           FN279088
420   J=J+1                                                             FN279089
      IF(NZER(RA(J),SLASH)) GO TO 420                                   FN279090
      J=J+1                                                             FN279091
      IF(ZERO(RA(J),TD)) GO TO 475                                      FN279092
      IF(ZERO(RA(J),TR)) GO TO 480                                      FN279093
      IA(K,2)=3                                                         FN279094
425   J=J+1                                                             FN279095
      IF(NZER(RA(J),LPRN)) GO TO 425                                    FN279096
      L=J+1                                                             FN279097
430   J=J+1                                                             FN279098
      IF(NZER(RA(J),COMMA)) GO TO 430                                   FN279099
      M=J                                                               FN279100
435   J=J+1                                                             FN279101
      IF(NZER(RA(J),RPRN)) GO TO 435                                    FN279102
      N=J-1                                                             FN279103
      IF(M-L-6)440,440,445                                              FN279104
440   C(1)=BLANK                                                        FN279105
      GO TO 450                                                         FN279106
445   CALL PACK (L,L+5,C(1),RA)                                         FN279107
      L=L+6                                                             FN279108
450   CALL PACK (L,M-1,C(2),RA)                                         FN279109
      IF(N-M-6)455,455,460                                              FN279110
455   D(1)=BLANK                                                        FN279111
      GO TO 465                                                         FN279112
460   CALL PACK (M+1,M+6,D(1),RA)                                       FN279113
      M=M+6                                                             FN279114
465   CALL PACK (M+1,N,D(2),RA)                                         FN279115
      CALL OBNUM (C,D,-1)                                               FN279116
      A(K,4)=D(2)                                                       FN279117
      A(K,3)=D(1)                                                       FN279118
470   J=J+1                                                             FN279119
      IF(NZER(RA(J),COMMA)) GO TO 470                                   FN279120
      GO TO 150                                                         FN279121
475   IA(K,2)=1                                                         FN279122
      GO TO 470                                                         FN279123
480   IA(K,2)=2                                                         FN279124
      GO TO 470                                                         FN279125
500   IF(KL(4))505,510,505                                              FN279126
505   CALL FILIN                                                        FN279127
      K=K+1                                                             FN279128
510   KL(4)=1                                                           FN279129
      IF(K-16)520,520,515                                               FN279130
515   CALL PLXX (16)                                                    FN279131
      K=1                                                               FN279132
520   J=J+1                                                             FN279133
      IF(NZER(RA(J),SLASH)) GO TO 520                                   FN279134
      J=J+1                                                             FN279135
      A(K,5)=RA(J)                                                      FN279136
      GO TO 470                                                         FN279137
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600   JI=1                                                          FN279138
      IF(ZERO(RA(J),TL)) JI=2                                       FN279139
      IF(ZERO(RA(J),TR)) JI=3                                       FN279140
      IF(ZERO(RA(J),TI)) JI=4                                       FN279141
      IF(ZERO(RA(J),TA)) JI=5                                       FN279142
      IF(KL(5))605,610,605                                          FN279143
605   CALL FILIN                                                    FN279144
      K=K+1                                                         FN279145
610   KL(5)=1                                                       FN279146
      IF(K-16)620,620,615                                           FN279147
615   CALL PLXX (16)                                                FN279148
      K=1                                                           FN279149
620   IA(K,6)=JI                                                    FN279150
625   J=J+1                                                         FN279151
      IF(NZER(RA(J),SLASH)) GO TO 625                               FN279152
      L=J+1                                                         FN279153
630   J=J+1                                                         FN279154
      IF(NZER(RA(J),COMMA)) GO TO 630                               FN279155
      CALL PACK (L,J-1,C(1),RA)                                     FN279156
      L=J+1                                                         FN279157
635   J=J+1                                                         FN279158
      IF(NZER(RA(J),COMMA)) GO TO 635                               FN279159
      CALL PACK (L,J-1,C(2),RA)                                     FN279160
      CALL OBNUM (C,I,2)                                            FN279161
      IA(K,8)=I(2)                                                  FN279162
      IA(K,7)=I(1)                                                  FN279163
      GO TO 150                                                     FN279164
      END                                                           FN279165
```

```
$IBFTC FN280   M94,FULIST,REF,XR6                                   FN280000
      SUBROUTINE FILIN                                              FN280001
C               AUXILIARY MATRIX OUTPUT ROUTINE                     FN280002
      COMPLEX F,FL                                                  FN280003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR      FN280004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FN280005
     1FL(2),ILS                                                     FN280006
      COMMON/OUSRCH/A(16,9),K,KN,KL(5),DUME(120)                    FN280007
      DIMENSION IA(16,9)                                            FN280008
      EQUIVALENCE (IA,A)                                            FN280009
1     FORMAT (41H ***** UNDEFINED MATRIX PLOT FIELDS *****)         FN280010
      K=K-1                                                         FN280011
      IF((KL(1)+KL(2)+KL(3)+KL(4)+KL(5)).EQ.0) RETURN               FN280012
      K=K+1                                                         FN280013
      IF(K-1)140,140,100                                            FN280014
100   IF(KL(1).EQ.0) A(K,1)=A(K-1,1)                                FN280015
      IF(KL(3))105,105,115                                          FN280016
105   A(K,2)=A(K-1,2)                                               FN280017
      IF(IA(K,2)-3)115,110,115                                      FN280018
110   A(K,3)=A(K-1,3)                                               FN280019
      A(K,4)=A(K-1,4)                                               FN280020
115   IF(KL(4).EQ.0) A(K,5)=A(K-1,5)                                FN280021
      IF(KL(5))125,120,125                                          FN280022
120   A(K,6)=A(K-1,6)                                               FN280023
      A(K,7)=A(K-1,7)                                               FN280024
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      A(K,8)=A(K-1,8)                                                   FN280025
  125 DO 130 I=1,5                                                      FN280026
  130 KL(I)=0                                                           FN280027
  135 RETURN                                                            FN280028
  140 CALL SWTHON (17)                                                  FN280029
      WRITE (6,1)                                                       FN280030
      RETURN                                                            FN280031
      END                                                               FN280032


$IBFTC FN281   M94,FULIST,REF,XR6                                       FN281000
      SUBROUTINE PLXX                                                   FN281001
C               MATRIX OUTPUT PLOT ROUTINE (WRITE)                      FN281002
      COMPLEX F,FL                                                      FN281003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FN281004
      COMMON/NUCLC/F(6100),DUM(4),IMA(25,4),NF1,NF2,NF,IM,NAC,L1,L2,L3, FN281005
     1FL(2),ILS                                                         FN281006
      COMMON/OUSRCB/A(16,9),K,KN,PA(125)                                FN281007
      DIMENSION G(2,6100),IA(16,9),IPA(125)                             FN281008
      EQUIVALENCE (G,F),(IA,A),(PA,IPA)                                 FN281009
      DATA BLANK/1H /,LED1,LED2,LED3/5H0....,5H5....,5H0...4/,CX/1HX/   FN281010
    1 FORMAT (41H ***** UNDEFINED MATRIX PLOT FIELDS *****              FN281011
     12X,I6,6H *****,A1)                                                FN281012
    2 FORMAT (1H1,53X,19HMATRIX PLOT NUMBER I6,30X,3A6/1H0,55X,         FN281013
     120HFREQUENCY CODE SCALE,A1)                                       FN281014
    3 FORMAT (14X,5(I4,2X,1PE12.5,4X))                                  FN281015
    4 FORMAT (1H0,57X,16HPLOT DESCRIPTION/5X,9HCHARACTER,6X,4HTYPE,     FN281016
     124X,14HMATRIX ELEMENT,24X,7HMINIMUM,9X,7HMAXIMUM,8X,              FN281017
     210HRESOLUTION)                                                    FN281018
    5 FORMAT (9X,A1,10X,2A6,13X,A6,1H(,I6,1H,,I6,1H),17X,1PE12.5,4X,    FN281019
     11PE12.5,4X,1PE12.5)                                               FN281020
    6 FORMAT (1H0,5X,12(A5,A5),A5)                                      FN281021
    7 FORMAT (1X,I3,2H (,125A1,1H))                                     FN281022
    8 FORMAT (9X,1HX,10X,18HTRACE INTERSECTION)                         FN281023
      DIMENSION PLTP(2,5)                                               FN281024
      DATA((PLTP(I,J),I=1,2),J=1,5)/6HMAGNIT,3HUDE,6HLN MAG,            FN281025
     16HNITUDE,4HREAL,1H ,6HIMAGIN,3HARY,5HPHASE,5HANGLE/               FN281026
      LOGICAL NZER,SWITCH,ZERO                                          FN281027
      IF(SWITCH(2,16,17)) GO TO 500                                     FN281028
      DO 200 I=1,K                                                      FN281029
      DO 100 J=1,IM                                                     FN281030
      IF(NZER(IMA(J,1),A(I,1)))GO TO 100                                FN281031
      KK=J                                                              FN281032
      GO TO 105                                                         FN281033
  100 CONTINUE                                                          FN281034
      WRITE (6,1) KN,BLANK                                              FN281035
      GO TO 500                                                         FN281036
  105 IA(I,9)=IMA(KK,4)+(IA(I,8)-1)*NF*IMA(KK,2)+(IA(I,7)-1)*NF         FN281037
      L=IA(I,9)                                                         FN281038
      LL=L+NF-1                                                         FN281039
      IF(IA(I,2)-3)110,200,110                                          FN281040
  110 LQ=IA(I,6)                                                        FN281041
      GO TO (115,115,125,130,135),LQ                                    FN281042
  115 T=SQRT(G(1,L)*G(1,L)+G(2,L)*G(2,L))                               FN281043
      GO TO (140,120),LQ                                                FN281044
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120   IF(T.GT.0.) T=ALOG(T)*.43429448                                  FN281045
      GO TO 140                                                        FN281046
125   T=G(1,L)                                                         FN281047
      GO TO 140                                                        FN281048
130   T=G(2,L)                                                         FN281049
      GO TO 140                                                        FN281050
135   CALL ATAN (G(2,L),G(1,L),T)                                      FN281051
140   B=T                                                              FN281052
145   L=L+1                                                            FN281053
      GO TO (150,150,160,165,170),LQ                                   FN281054
150   C=SQRT(G(1,L)*G(1,L)+G(2,L)*G(2,L))                              FN281055
      GO TO (175,155),LQ                                               FN281056
155   IF(C.GT.0.) C=ALOG(C)*.43429448                                  FN281057
      GO TO 175                                                        FN281058
160   C=G(1,L)                                                         FN281059
      GO TO 175                                                        FN281060
165   C=G(2,L)                                                         FN281061
      GO TO 175                                                        FN281062
170   CALL ATAN (G(2,L),G(1,L),C)                                      FN281063
175   IF(C-T)185,195,180                                               FN281064
180   T=C                                                              FN281065
      GO TO 195                                                        FN281066
185   IF(C-B)190,195,195                                               FN281067
190   B=C                                                              FN281068
195   IF(L-LL)145,198,198                                              FN281069
198   A(I,3)=B                                                         FN281070
      A(I,4)=T                                                         FN281071
200   CONTINUE                                                         FN281072
      B=A(1,3)                                                         FN281073
      T=A(1,4)                                                         FN281074
      DO 220 I=2,K                                                     FN281075
      IF(T-A(I,4))205,210,210                                          FN281076
205   T=A(I,4)                                                         FN281077
      GO TO 220                                                        FN281078
210   IF(B-A(I,3))215,220,220                                          FN281079
215   B=A(I,3)                                                         FN281080
220   CONTINUE                                                         FN281081
      DO 230 I=1,K                                                     FN281082
      IF(IA(I,2)-2)230,225,230                                         FN281083
225   A(I,3)=B                                                         FN281084
      A(I,4)=T                                                         FN281085
230   CONTINUE                                                         FN281086
      WRITE (10,2) KN,BLANK                                            FN281087
      LQ=NF2-5                                                         FN281088
      DO 235 I=NF1,NF2,5                                               FN281089
      I1=I+1                                                           FN281090
      I2=I+2                                                           FN281091
      I3=I+3                                                           FN281092
      I4=I+4                                                           FN281093
      WRITE (10,3) I,FREQ(I),I1,FREQ(I1),I2,FREQ(I2),I3,FREQ(I3),      FN281094
     1I4,FREQ(I4)                                                      FN281095
235   CONTINUE                                                         FN281096
      IF(I4.EQ.NF2) GO TO 238                                          FN281097
      LQ=LQ+1                                                          FN281098
      WRITE (10,3) (I,FREQ(I),I=LQ,NF2)                                FN281099
238   WRITE (10,4)                                                     FN281100
      DO 400 J=1,NF                                                    FN281101
      DO 300 I=1,K                                                     FN281102
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      L=IA(I,9)+J-1                                                     FN281103
      LQ=IA(I,6)                                                        FN281104
      GO TO (240,240,250,255,260),LQ                                    FN281105
 240  T=SQRT(G(1,L)*G(1,L)+G(2,L)*G(2,L))                               FN281106
      GO TO (265,245),LQ                                                FN281107
 245  IF(T.GT.0.) T=ALOG(T)*.43429448                                   FN281108
      GO TO 265                                                         FN281109
 250  T=G(1,L)                                                          FN281110
      GO TO 265                                                         FN281111
 255  T=G(2,L)                                                          FN281112
      GO TO 265                                                         FN281113
 260  CALL ATAN (G(2,L),G(1,L),T)                                       FN281114
 265  B=124./(A(I,4)-A(I,3))                                            FN281115
      IF(J-1)275,270,275                                                FN281116
 270  LQ=IA(I,6)                                                        FN281117
      A(I,2)=1./B                                                       FN281118
      WRITE (10,5) A(I,5),PLTP(1,LQ),PLTP(2,LQ),A(I,1),IA(I,7),IA(I,8), FN281119
     1A(I,3),A(I,4),A(I,2)                                              FN281120
 275  IA(I,1)=(T-A(I,3))*B+1.                                           FN281121
      IF(IA(I,1).LE.0) IA(I,1)=1                                        FN281122
      IF(IA(I,1).GT.125) IA(I,1)=125                                    FN281123
 300  CONTINUE                                                          FN281124
      IF(J.EQ.1) WRITE (10,8)                                           FN281125
      IF(J-1)305,305,310                                                FN281126
 305  WRITE (10,6) (LED1,LED2,I=1,12),LED3                              FN281127
 310  DO 315 I=1,125                                                    FN281128
 315  PA(I)=BLANK                                                       FN281129
      DO 325 I=1,K                                                      FN281130
      N=IA(I,1)                                                         FN281131
      IF(ZERO(PA(N),BLANK)) GO TO 320                                   FN281132
      PA(N)=CX                                                          FN281133
      GO TO 325                                                         FN281134
 320  PA(N)=A(I,5)                                                      FN281135
 325  CONTINUE                                                          FN281136
      WRITE (10,7) J,PA                                                 FN281137
 400  CONTINUE                                                          FN281138
      WRITE (10,6) (LED1,LED2,I=1,12),LED3                              FN281139
 500  DO 510 I=1,5                                                      FN281140
 510  IPA(I)=0                                                          FN281141
      RETURN                                                            FN281142
      END                                                               FN281143
```

```
$ORIGIN        K,CK2,NOREW                                                 000
$IBFTC FK282   M94,FULIST,REF,XR6                                      FK282000
      SUBROUTINE ANTI                                                  FK282001
C               INVERSE TRANSFORM SYSTEM                               FK282002
      LOGICAL SWITCH,ZERO,NZER                                         FK282003
      COMMON NFREQ,BT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         FK282004
      COMMON /NUCLC/F(100,20),FR(2000),T(4200),S(80),NB(40),NS,LL,KO   FK282005
      COMPLEX F,FR                                                     FK282006
C     LOGICAL 4 IS SAVE TAPE                                           FK282007
C     FORMAT RECORD 1,4 WORDS, KTEST,NOMG,0,1...                       FK282008
C     NOMG.LT.100 IMPLIES LAST OMEGA,F(W) SET...                       FK282009
C             RECORD 2,100 OMEGAS                                      FK282010
```


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```
C             RECORD 3, ID AGAIN..IGNORED                                FK282011
C             RECORD 4, 100 F(W)                                         FK282012
C             RECORD 5, SAME AS RECORD 1                                 FK282013
C       OUTPUT IS CK1,LOGICAL 10                                         FK282014
        DATA C/1HC/,COMMA/1H,/,PAUS/4HPAUS/,INFO/4HINFO/,DT/2HDT/,NT/2HNT/FK282015
        DATA KNT,KDT/0,0/,BLANK,STAR/1H ,1H*/                            FK282016
        DATA SLASH/1H//                                                  FK282017
        DIMENSION G(2,2000),R(2,2000),ARRAY(100)                         FK282018
        EQUIVALENCE (F,G),(FR,R)                                         FK282019
 1001   FORMAT (2A6)                                                     FK282020
        J=5                                                              FK282021
 400    J=J+1                                                            FK282022
        IF(ZERO(RA(J),COMMA)) GO TO 405                                  FK282023
        IF(NZER(RA(J),SLASH)) GO TO 400                                  FK282024
 405    L=J+1                                                            FK282025
 410    J=J+1                                                            FK282026
        IF(NZER(RA(J),COMMA)) GO TO 410                                  FK282027
        CALL PACK (L,J-1,WO,RA)                                          FK282028
        CALL RITE31                                                      FK282029
        WRITE (31,1001) WO                                               FK282030
        CALL READ31                                                      FK282031
        READ (31,1111) ICAS                                              FK282032
 1      CALL CARD                                                        FK282033
 47     CALL PACK(2,5,WO,RA)                                             FK282034
 3      IF(ZERO(WO,INFO)) GO TO 5                                        FK282035
 4      RETURN                                                           FK282036
 5      J=2                                                              FK282037
 6      J=J+1                                                            FK282038
        IF(NZER(RA(J),COMMA))GO TO 6                                     FK282039
        J=J+1                                                            FK282040
 12     N=J+1                                                            FK282041
        CALL PACK (J,N,WO,RA)                                            FK282042
        IF(NZER(WO,DT)) GO TO 29                                         FK282043
 7      J=J+1                                                            FK282044
        IF(ZERO(RA(J),SLASH)) GO TO 16                                   FK282045
        IF(J.LE.82) GO TO 7                                              FK282046
        GO TO 44                                                         FK282047
 16     L1=J+1                                                           FK282048
 17     J=J+1                                                            FK282049
 19     IF(NZER(RA(J),COMMA)) GO TO 17                                   FK282050
 20     L2=J-1                                                           FK282051
        IF(L2-L1-5)205,205,200                                           FK282052
 200    LN=L1+5                                                          FK282053
        CALL PACK (L1,L2,WO,RA)                                          FK282054
        L1=LN+1                                                          FK282055
        GO TO 210                                                        FK282056
 205    WO=BLANK                                                         FK282057
 210    CALL PACK ( L1,L2,WOO,RA)                                        FK282058
        CALL RITE31                                                      FK282059
        WRITE (31,1001) WO,WOO                                           FK282060
        CALL READ31                                                      FK282061
        READ (31,1004) DELT                                              FK282062
 1004   FORMAT(E12.5)                                                    FK282063
        KDT=1                                                            FK282064
        IF(KNT.NE.0) GO TO 43                                            FK282065
 26     IF(ZERO(RA(J+1),COMMA)) GO TO 44                                 FK282066
        L1=J+1                                                           FK282067
        L2=J+2                                                           FK282068
```


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```
27    CALL PACK(L1,L2,WO,RA)                                    FK282069
29    IF(NZERO(WO,NT)) GO TO 44                                 FK282070
30    J=J+1                                                     FK282071
      IF(ZERO(RA(J),SLASH))GO TO 33                             FK282072
      IF(J.LE.81) GO TO 30                                      FK282073
      GO TO 44                                                  FK282074
33    L1=J+1                                                    FK282075
34    J=J+1                                                     FK282076
      IF(ZERO(RA(J),COMMA)) GO TO 36                            FK282077
      IF(J.LE.81) GO TO 34                                      FK282078
      GO TO 44                                                  FK282079
36    L2=J-1                                                    FK282080
      CALL PACK (L1,L2,WO,RA)                                   FK282081
      CALL RITE31                                               FK282082
      WRITE (31,1001) WO                                        FK282083
      CALL READ31                                               FK282084
      READ (31,1111) NTIME                                      FK282085
1111  FORMAT(I6)                                                FK282086
40    KNT=1                                                     FK282087
41    IF(KDT.NE.0) GO TO 43                                     FK282088
42    IF(ZERO(RA(J+1),COMMA)) GO TO 44                          FK282089
      GO TO 12                                                  FK282090
43    REWIND 4                                                  FK282091
      IF(SWITCH(1,15)) GO TO 45                                 FK282092
      NOMG=0                                                    FK282093
      J=1                                                       FK282094
      KK=1                                                      FK282095
53    KJ=KK+99                                                  FK282096
54    READ (4) KTEST,IOMG,INSAV,D                               FK282097
      READ(4) (FR(L),L=KK,KJ)                                   FK282098
      NOMG=NOMG+IOMG                                            FK282099
      DO 55 MNS=1,INSAV                                         FK282100
      READ (4) ICAST,D,D,KOUT                                   FK282101
      READ (4) (F(L,J),L=1,100)                                 FK282102
      IF(ICAST.NE.ICAS) GO TO 55                                FK282103
      KK=KK+100                                                 FK282104
      IF(KOUT.NE.0) GO TO 63                                    FK282105
      J=J+1                                                     FK282106
      IF(J.GT.20) GO TO 63                                      FK282107
55    CONTINUE                                                  FK282108
      IF(KK-KJ)56,53,53                                         FK282109
56    NOMG=NOMG-IOMG                                            FK282110
      GO TO 54                                                  FK282111
63    CONTINUE                                                  FK282112
67    IF(NTIME.GT.4200) NTIME=4200                              FK282113
68    DO 71 J=1,NTIME                                           FK282114
71    T(J)=G(1,1)*R(1,1)                                        FK282115
72    TT=0.                                                     FK282116
      TB=0.                                                     FK282117
      CALL CLOCK(ITIME)                                         FK282118
73    J=1                                                       FK282119
74    ARG=TT*R(1,1)                                             FK282120
      CALL SCOSN (ARG,SS,CC)                                    FK282121
75    A=G(1,1)*CC-G(2,1)*SS                                     FK282122
76    L=2                                                       FK282123
77    B=TT*R(1,L)                                               FK282124
78    CALL SCOSN (B,SS,CC)                                      FK282125
      B=G(1,L)*CC-G(2,L)*SS                                     FK282126
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      T(J)=T(J)+(B+A)*(R(1,L)-R(1,L-1))/2.                              FK282127
      A=B                                                               FK282128
      L=L+1                                                             FK282129
      IF(L.LE.NOMG) GO TO 77                                            FK282130
      T(J)=T(J)/3.14159                                                 FK282131
      TB=TB+DELT                                                        FK282132
      TT=TB/6.28318                                                     FK282133
      J=J+1                                                             FK282134
      IF(J.LE.NTIME) GO TO 74                                           FK282135
 85   TOP=-9.E30                                                        FK282136
      BOT=9.E30                                                         FK282137
 87   CALL CLOCK(ITIME)                                                 FK282138
      TIME=ITIME                                                        FK282139
      TIME=TIME/60.                                                     FK282140
      WRITE (6,1005) TIME                                               FK282141
 1005 FORMAT(1H0,10X,18HINTEGRATION TIME =,F10.2,5H SEC.)               FK282142
      DO 93J=1,NTIME                                                    FK282143
      IF(T(J).GT.TOP) TOP=T(J)                                          FK282144
      IF(T(J).LT.BOT) BOT=T(J)                                          FK282145
 93   CONTINUE                                                          FK282146
 94   RAT=(TOP-BOT)/101.                                                FK282147
      WRITE(10,1006)KTEST,BOT,TOP,RAT                                   FK282148
 1006 FORMAT(1H1,50X,12HTEST NUMBER ,I6//10X,8HMINIMUM ,1PE12.5,10X,    FK282149
     18HMAXIMUM ,1PE12.5,10X,11HRESOLUTION ,1PE12.5//4X,4HTIME,9X,      FK282150
     24HF(T)//1H ,131(1H.))                                             FK282151
 1007 FORMAT(1H ,0PF12.4,1X,1PE12.5,2H..,100A1,2H..)                    FK282152
 96   DO 100 J=1,NTIME                                                  FK282153
      AJ=J                                                              FK282154
      TT=(AJ*DELT)-DELT                                                 FK282155
      DO 97 L=1,100                                                     FK282156
 97   ARRAY(L)=BLANK                                                    FK282157
      L=(T(J)-BOT)/RAT                                                  FK282158
      IF(L.LT.1)L=1                                                     FK282159
      IF(L.GT.100)L=100                                                 FK282160
      ARRAY(L)=STAR                                                     FK282161
 100  WRITE(10,1007)TT,T(J),(ARRAY(N),N=1,100)                          FK282162
      WRITE(10,1008)                                                    FK282163
      REWIND 4                                                          FK282164
      GO TO 45                                                          FK282165
 44   CALL WROUT (1,212)                                                FK282166
 45   CALL CARD                                                         FK282167
      GO TO 47                                                          FK282168
 1008 FORMAT(1H ,131(1H.))                                              FK282169
      END                                                               FK282170
```

```
$ORIGIN        K,CK2,NOREW                                                000
$IBFTC FK383   M94,FULIST,REF,XR6                                       FK383000
      SUBROUTINE SCANX                                                  FK383001
C               FOURIERTRAN SYSTEM CONTROL ROUTINE                      FK383002
      LOGICAL SWITCH                                                    FK383003
      LOGICAL ZERO,NZER,LIST,KIKOFF                                     FK383004
      COMPLEX F                                                         FK383005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          FK383006
      COMMON/PPCB/IPPCB(41,6),BOT(41),TOP(41)                           FK383007
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```
      COMMON /NUCLC/F(100,61)    ,DUM(123)                          FK383008
      COMMON/FUND/FUDAU(6,39)                                       FK383009
      DIMENSION TYPE(7)                                             FK383010
      DIMENSION ID(8)                                               FK383011
      DATA EOF/1HE/                                                 FK383012
      DATA REW/1HR/                                                 FK383013
       DATA IT/1HI/                                                 FK383014
      DATA (TYPE(J),J=1,7)/4HLOAD,4HPRIN,4HPLOT,4HTRAN,4HSAVE,      FK383015
     14HAVER,4HNUCL/,CHK,COMMA/1HC,1H,/                             FK383016
      DATA PAUS/4HPAUS/                                             FK383017
      DATA SLASH,RPRN,LPRN,USE/1H/,1H),1H(,3HUSE/                   FK383018
      DATA FUND,TEST/4HFUNC,4HTEST/,BLANK/1H /                      FK383019
      DATALOSAVE/1HL/                                               FK383020
 4    FORMAT (A6)                                                   FK383021
 5    FORMAT (I6)                                                   FK383022
      DO 10 I=1,6                                                   FK383023
      DO 10 J=1,39                                                  FK383024
 10   FUDAU(I,J)=BLANK                                              FK383025
 100  CALL CARD                                                     FK383026
 110  CONTINUE                                                      FK383027
 115  CALL PACK (2,5,WO,RA)                                         FK383028
 118  DO 120 J=1,6                                                  FK383029
      K=J                                                           FK383030
      IF(ZERO(WO,TYPE(J))) GO TO 130                                FK383031
 120  CONTINUE                                                      FK383032
      IF(ZERO(WO,TYPE(7))) GO TO 100                                FK383033
      IF(ZERO(WO,FUND)) GO TO 800                                   FK383034
      IF(ZERO(WO,TEST)) GO TO 810                                   FK383035
      RETURN                                                        FK383036
 130  GO TO (200,300,400,500,600,700),K                             FK383037
C200*****LOAD ENTRY POINT BETA                                      FK383038
 200  CALL LOAD (ILOAD,IJKLM)                                       FK383039
      ITEST=IJKLM                                                   FK383040
      GO TO 110                                                     FK383041
C300*****PRINT ENTRY POINT GAMMA                                    FK383042
 300  CALL PRPLEX (1,ITEST)                                         FK383043
      GO TO 110                                                     FK383044
C400*****PLOT ENTRY POINT DELTA                                     FK383045
 400  CALL PRPLEX (2,ITEST)                                         FK383046
      GO TO 110                                                     FK383047
C500*****FOURIERTRAN ENTRY POINT EPSILON                            FK383048
 500  CALL SCAN (ICD)                                               FK383049
      GO TO 100                                                     FK383050
C600*****SAVE ENTRY POINT                                           FK383051
 600  J=5                                                           FK383052
      ISWRT=1                                                       FK383053
 601  J=J+1                                                         FK383054
      IF(NZER(RA(J),COMMA)) GO TO 601                               FK383055
 602  IFNO=0                                                        FK383056
      K=0                                                           FK383057
      ID(1)=0                                                       FK383058
      ID(2)=0                                                       FK383059
      ID(3)=0                                                       FK383060
      ID(4)=0                                                       FK383061
 603  J=J+1                                                         FK383062
      IF(ZERO(RA(J),REW)) GO TO 650                                 FK383063
      IF(ZERO(RA(J),EOF)) GO TO 655                                 FK383064
      IF(ZERO(RA(J),LOSAVE)) GO TO 660                              FK383065
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      IF(NZER(RA(J),COMMA)) GO TO 605                                   FK383066
      IF(K+IFNC)604,100,604                                             FK383067
604   CALL SWTHON (15)                                                  FK383068
      CALL WROUT (2,213)                                                FK383069
      GO TO 100                                                         FK383070
605   IF(ZERO(RA(J),IT)) GO TO 620                                      FK383071
      IF(IFNO)604,606,604                                               FK383072
606   J=J+1                                                             FK383073
      IF(NZER(RA(J),SLASH)) GO TO 606                                   FK383074
      L1=J+1                                                            FK383075
607   J=J+1                                                             FK383076
      IF(NZER(RA(J),COMMA)) GO TO 607                                   FK383077
      L2=J-1                                                            FK383078
      CALL PACK (L1,L2,WO,RA)                                           FK383079
      CALL RITE31                                                       FK383080
      WRITE (31,4) WO                                                   FK383081
      CALL READ31                                                       FK383082
      READ (31,5) IFNO                                                  FK383083
      IF(K)640,603,640                                                  FK383084
620   IF(K)604,621,604                                                  FK383085
621   K=1                                                               FK383086
622   J=J+1                                                             FK383087
      IF(NZER(RA(J),LPRN)) GO TO 622                                    FK383088
      L1=J+1                                                            FK383089
623   J=J+1                                                             FK383090
      IF(ZERO(RA(J),COMMA)) GO TO 624                                   FK383091
      IF(NZER(RA(J),RPRN)) GO TO 623                                    FK383092
      IS=0                                                              FK383093
      GO TO 625                                                         FK383094
624   IS=1                                                              FK383095
625   L2=J-1                                                            FK383096
      CALL PACK (L1,L2,WO,RA)                                           FK383097
      CALL RITE31                                                       FK383098
      WRITE (31,4) WO                                                   FK383099
      CALL READ31                                                       FK383100
      READ (31,5) ID(K)                                                 FK383101
      IF(IS)626,627,626                                                 FK383102
626   K=K+1                                                             FK383103
      L1=J+1                                                            FK383104
      IF(ZERO(RA(L1),COMMA)) GO TO 604                                  FK383105
      GO TO 623                                                         FK383106
627   IF(IFNO)640,603,640                                               FK383107
640   IF(ISWRT.EQ.0) GO TO 670                                          FK383108
      WRITE (4) (IC(L),L=1,4)                                           FK383109
      WRITE (4) (F(I,IFNO),I=1,100)                                     FK383110
      CALL SWTHON (31)                                                  FK383111
      GO TO 601                                                         FK383112
650   REWIND 4                                                          FK383113
      CALL SWTHOF (15)                                                  FK383114
      GO TO 100                                                         FK383115
655   ENDFILE 4                                                         FK383116
      GO TO 100                                                         FK383117
660   ISWRT=0                                                           FK383118
665   J=J+1                                                             FK383119
      IF(NZER(RA(J),COMMA)) GO TO 665                                   FK383120
      J=J+1                                                             FK383121
      GO TO 605                                                         FK383122
670   REWIND 4                                                          FK383123
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```
      IF(SWITCH(1,15)) GO TO 690                                        FK383124
 675  READ (4) IC1,IC2,IC3,IC4                                          FK383125
      IF(((ID(1).NE.IC1).OR.(ID(2).NE.IC2)).OR.((ID(3).NE.IC3).OR.(ID(4)FK383126
     1.NE.IC4)))GO TO 680                                               FK383127
      READ (4) (F(I,IFNO),I=1,100)                                      FK383128
      GO TO 601                                                         FK383129
 680  READ (4) IC1                                                      FK383130
      GO TO 675                                                         FK383131
 690  CALL SWTHON (13)                                                  FK383132
      GO TO 601                                                         FK383133
C700*****AVERAGE ENTRY POINT                                            FK383134
 700  CALL AVERGE                                                       FK383135
      GO TO 115                                                         FK383136
 800  CALL FUNDE                                                        FK383137
      GO TO 115                                                         FK383138
 810  J=5                                                               FK383139
 811  J=J+1                                                             FK383140
      IF(NZER(RA(J),COMMA))GO TO 811                                    FK383141
      L1=J+1                                                            FK383142
 812  J=J+1                                                             FK383143
      IF(NZER(RA(J),COMMA))GO TO 812                                    FK383144
      L2=J-1                                                            FK383145
      IF(L2-L1-5)814,814,813                                            FK383146
 813  L2=L1+5                                                           FK383147
 814  CALL PACK (L1,L2,WO,RA)                                           FK383148
      CALL RITE31                                                       FK383149
      WRITE (31,4) WO                                                   FK383150
      CALL READ31                                                       FK383151
      READ (31,5) ITEST                                                 FK383152
      GO TO 100                                                         FK383153
      END                                                               FK383154
```

```
$ORIGIN        O,CK2,NOREW                                                000
$IBFTC FO184   M94,FULIST,REF,XR6                                       F0184000
      SUBROUTINE AVERGE                                                 F0184001
C               STATISTICAL TRANSFORM OPTION                            F0184002
      LOGICAL ZERO,NZER,SWITCH                                          F0184003
      COMPLEX F,SUM                                                     F0184004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          F0184005
      COMMON/NUCLC/F(100,61)                                            F0184006
      DIMENSION G(2,100,61),INX(40),RSUM(2,100),SUM(100)                F0184007
      EQUIVALENCE (F,G),(SUM,RSUM)                                      F0184008
 1    FORMAT (A6)                                                       F0184009
 2    FORMAT (I6)                                                       F0184010
 3    FORMAT (51H ***** THE ABOVE CASE HAS BEEN DELETED.  ANY PRINTS,   F0184011
     145H OR PLOTS OF THESE PARAMETERS ARE MEANINGLESS)                 F0184012
      IF(SWITCH(2,13,10)) GO TO 1000                                    F0184013
      DATA FT,ST,COMMA,SLASH,RPRN,LPRN/1HF,1HS,1H,,1H/,1H),1H(/,STAR/1H*F0184014
     1/,AVE/4HAVER/                                                     F0184015
      I=2                                                               F0184016
 90   J=5                                                               F0184017
 100  J=J+1                                                             F0184018
      IF(NZER(RA(J),COMMA)) GO TO 100                                   F0184019
      Q=RA(J+1)                                                         F0184020
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```
105   J=J+1                                                          F0184021
      IF(NZER(RA(J),SLASH)) GO TO 105                                F0184022
      IF(ZERO(Q,FT)) GO TO 200                                       F0184023
      L=J+1                                                          F0184024
110   J=J+1                                                          F0184025
      IF(NZER(RA(J),COMMA)) GO TO 110                                F0184026
      M=J-1                                                          F0184027
      I=I-1                                                          F0184028
      CALL PACK (L,M,WO,RA)                                          F0184029
      CALL RITE31                                                    F0184030
      WRITE (31,1) WO                                                F0184031
      CALL READ31                                                    F0184032
      READ (31,2) ISG                                                F0184033
      GO TO 300                                                      F0184034
200   L=J+1                                                          F0184035
205   J=J+1                                                          F0184036
      IF(NZER(RA(J),LPRN)) GO TO 205                                 F0184037
      M=J-1                                                          F0184038
      I=I-1                                                          F0184039
      CALL PACK (L,M,WO,RA)                                          F0184040
      CALL RITE31                                                    F0184041
      WRITE (31,1) WO                                                F0184042
      CALL READ31                                                    F0184043
      READ (31,2) IFN                                                F0184044
      K=1                                                            F0184045
      IS=0                                                           F0184046
210   L=J+1                                                          F0184047
215   J=J+1                                                          F0184048
      IF(ZERO(RA(J),COMMA)) GO TO 220                                F0184049
      IF(NZER(RA(J),RPRN)) GO TO 215                                 F0184050
      IS=1                                                           F0184051
220   M=J-1                                                          F0184052
      CALL PACK (L,M,WO,RA)                                          F0184053
      CALL RITE31                                                    F0184054
      WRITE (31,1) WO                                                F0184055
      CALL READ31                                                    F0184056
      READ (31,2) INX(K)                                             F0184057
      IF(IS.EQ.1) GO TO 300                                          F0184058
      K=K+1                                                          F0184059
      IF(NZER(RA(J+1),COMMA)) GO TO 210                              F0184060
      J=0                                                            F0184061
      CALL CARD                                                      F0184062
      IF(NZER(RA(1),STAR)) GO TO 210                                 F0184063
      CALL PACK (2,5,WO,RA)                                          F0184064
      IF(NZER(WO,AVE)) GO TO 900                                     F0184065
225   J=J+1                                                          F0184066
      IF(NZER(RA(J),COMMA)) GO TO 225                                F0184067
      IF(ZERO(RA(J+1),FT)) GO TO 900                                 F0184068
      IF(ZERO(RA(J+1),ST)) GO TO 900                                 F0184069
      GO TO 210                                                      F0184070
300   IF(I)400,400,305                                               F0184071
305   IF(ZERO(RA(J),COMMA)) GO TO 310                                F0184072
      J=J+1                                                          F0184073
      GO TO 305                                                      F0184074
310   IF(ZERO(RA(J+1),COMMA)) GO TO 320                              F0184075
      J=J-1                                                          F0184076
      GO TO 100                                                      F0184077
320   CALL CARD                                                      F0184078
```


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```
      IF(ZERO(RA(1),STAR)) GO TO 325                                    F0184079
      Q=RA(1)                                                           F0184080
      J=1                                                               F0184081
      GO TO 105                                                         F0184082
 325  CALL PACK (2,5,WO,RA)                                             F0184083
      IF(ZERO(WO,AVE)) GO TO 90                                         F0184084
      GO TO 900                                                         F0184085
 400  TN=K                                                              F0184086
      DO 405 I=1,NFREQ                                                  F0184087
 405  SUM(I)=(0.,0.)                                                    F0184088
      DO 415 I=1,NFREQ                                                  F0184089
      DO 410 L=1,K                                                      F0184090
      M=INX(L)                                                          F0184091
      SUM(I)=SUM(I)+F(I,M)                                              F0184092
 410  CONTINUE                                                          F0184093
      G(1,I,IFN)=RSUM(1,I)/TN                                           F0184094
      G(2,I,IFN)=RSUM(2,I)/TN                                           F0184095
 415  CONTINUE                                                          F0184096
      DO 420 I=1,NFREQ                                                  F0184097
 420  SUM(I)=(0.,0.)                                                    F0184098
      DO 430 I=1,NFREQ                                                  F0184099
      DO 425 L=1,K                                                      F0184100
      M=INX(L)                                                          F0184101
      A=G(1,I,M)-G(1,I,IFN)                                             F0184102
      B=G(2,I,M)-G(2,I,IFN)                                             F0184103
      RSUM(1,I)=A*A+B*B+RSUM(1,I)                                       F0184104
 425  CONTINUE                                                          F0184105
      G(1,I,ISG)=RSUM(1,I)/TN                                           F0184106
      G(2,I,ISG)=0.                                                     F0184107
 430  CONTINUE                                                          F0184108
 1000 CALL CARD                                                         F0184109
      IF(NZER(RA(1),STAR)) GO TO 1000                                   F0184110
      RETURN                                                            F0184111
 900  CALL WROUT (12,214)                                               F0184112
      WRITE (6,3)                                                       F0184113
      RETURN                                                            F0184114
      END                                                               F0184115
```

```
$ORIGIN          O,CK2,NOREW                                                 000
$IBFTC F0285     M94,FULIST,REF,XR6                                       F0285000
      SUBROUTINE LOAD (ILOAD,IJKLM)                                       F0285001
C                TRANSFORM LOAD OPTION                                    F0285002
      LOGICAL SWITCH                                                      F0285003
      COMPLEX F                                                           F0285004
      LOGICAL ZERO,NZER,LIST,KIKOFF                                       F0285005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR            F0285006
      COMMON/PPCB/IPPCB(41,5),BOT(41),TOP(41)                             F0285007
      COMMON /NUCLC/F(100,61),S(80),NT(40),NS,LIST,KIKOFF                 F0285008
      DIMENSION FBU(2,100),DEF(40,4),IDEF(40,4),IDCI(4),G(2,100,61)       F0285009
      EQUIVALENCE (IDEF,DEF)                                              F0285010
      EQUIVALENCE (G,F)                                                   F0285011
      DATA SLASH,TEST,COMMA,DEFI,CHK,TH,TL,TF/1H/,4HTEST,1H,,             F0285012
     14HDEFI,1HC,1HH,1HL,1HF/                                             F0285013
      DATA BLANK /1H /                                                    F0285014
```


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```
1     FORMAT (80A1)                                                    F0285015
2     FORMAT (1H ,80A1)                                                F0285016
3     FORMAT (A6)                                                      F0285017
4     FORMAT (I6)                                                      F0285018
5     FORMAT(1H0,6X,11H*LOAD,TEST/,I6)                                 F0285019
7     FORMAT (4A6)                                                     F0285020
8     FORMAT (2E12.0)                                                  F0285021
      NRWS=9                                                           F0285022
      CALL SWTHOF (13)                                                 F0285023
      DO 100 I=1,40                                                    F0285024
100   NT(I)=0                                                          F0285025
200   IF(ISWTCH(1)-9)201,204,201                                       F0285026
201   IF(SWITCH(1,2)) GO TO 2030                                       F0285027
      REWIND 1                                                         F0285028
      CALL SWTHON (28)                                                 F0285029
      READ (1)I,(FBU(1,J),J=1,100)                                     F0285030
      DO 203 J=1,NFREQ                                                 F0285031
      IF(ABS(FREQ(J)-FBU(1,J))-FREQ(J)*1.E-6)203,203,202               F0285032
202   CALL WROUT (21,215)                                              F0285033
      CALL SWTHON (13)                                                 F0285034
203   CONTINUE                                                         F0285035
2030  LAST=0                                                           F0285036
      NRWS=9                                                           F0285037
      ISWTCH(1)=9                                                      F0285038
      ISWTCH(4)=LAST                                                   F0285039
      ISWTCH(5)=NRWS                                                   F0285040
204   DO 205 I=1,40                                                    F0285041
      DO 205 J=1,4                                                     F0285042
      IDEF(I,J)=0                                                      F0285043
205   CONTINUE                                                         F0285044
      LAST=ISWTCH(4)                                                   F0285045
      NRWS=ISWTCH(5)                                                   F0285046
      I=1                                                              F0285047
      J=6                                                              F0285048
206   IF(ZERO(RA(J),SLASH)) GO TO 210                                  F0285049
      J=J+1                                                            F0285050
      IF(J-80)206,206,207                                              F0285051
207   CALL WROUT (12,216)                                              F0285052
      CALL SWTHON (13)                                                 F0285053
208   CALL CARD                                                        F0285054
      CALL PACK (2,5,WO,RA)                                            F0285055
      IF(ZERO(WO,DEFI)) GO TO 216                                      F0285056
      GO TO 1000                                                       F0285057
210   L1=J-4                                                           F0285058
      L2=J-1                                                           F0285059
      CALL PACK (L1,L2,WO,RA)                                          F0285060
      IF(ZERO(WO,TEST)) GO TO 211                                      F0285061
      CALL WROUT (11,217)                                              F0285062
      CALL SWTHON (13)                                                 F0285063
      GO TO 208                                                        F0285064
211   L1=J+1                                                           F0285065
212   J=J+1                                                            F0285066
      IF(NZER(RA(J),COMMA))GO TO 212                                   F0285067
      L2=J-1                                                           F0285068
      IF(L2-L1)207,213,213                                             F0285069
213   CALL PACK (L1,L2,WO,RA)                                          F0285070
      CALL RITE31                                                      F0285071
      WRITE (31,3)WO                                                   F0285072
```


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```
      CALL READ31                                                       F0285073
      READ (31,4)ITEST                                                  F0285074
      WRITE (10,5) ITEST                                                F0285075
  215 CALL CARD                                                         F0285076
  216 CALL PACK (2,5,WO,RA)                                             F0285077
      IF(NZER(WO,DEFI)) GO TO 235                                       F0285078
      J=6                                                               F0285079
  217 IF(ZERO(RA(J),SLASH))GO TO 219                                    F0285080
  218 J=J+1                                                             F0285081
      IF(J-80)217,217,215                                               F0285082
  219 KK=0                                                              F0285083
      IF(ZERO(RA(J-1),TH)) GO TO 222                                    F0285084
      IF(ZERO(RA(J-1),TL)) GO TO 220                                    F0285085
      IF(ZERO(RA(J-1),TF)) GO TO 221                                    F0285086
      CALL WROUT (11,218)                                               F0285087
      CALL SWTHON (13)                                                  F0285088
      GO TO 208                                                         F0285089
  220 KK=KK+1                                                           F0285090
  221 KK=KK+1                                                           F0285091
  222 KK=KK+1                                                           F0285092
      L1=J+1                                                            F0285093
  223 J=J+1                                                             F0285094
      IF(NZER(RA(J),COMMA))GO TO 223                                    F0285095
      L2=J-1                                                            F0285096
      IF(L2-L1)207,225,224                                              F0285097
  224 IF(L2-L1-6)225,226,226                                            F0285098
  225 CALL PACK (L1,L2,WO,RA)                                           F0285099
      WOO=BLANK                                                         F0285100
      GO TO 227                                                         F0285101
  226 L2=L1+5                                                           F0285102
      CALL PACK (L1,L2,WO,RA)                                           F0285103
      L1=L2+1                                                           F0285104
      L2=J-1                                                            F0285105
      CALL PACK (L1,L2,WOO,RA)                                          F0285106
  227 CALL RITE31                                                       F0285107
      WRITE (31,7) WO,WOO                                               F0285108
      CALL READ31                                                       F0285109
      GO TO (228,228,229),KK                                            F0285110
  228 READ (31,4) IDEF(I,KK)                                            F0285111
      GO TO 230                                                         F0285112
  229 READ (31,8) DEF(I,3)                                              F0285113
  230 IF(IDEF(I,1))231,234,231                                          F0285114
  231 IF(IDEF(I,2))232,234,232                                          F0285115
  232 IF(DEF(I,3))233,234,233                                           F0285116
  233 IDEF(I,4)=1                                                       F0285117
      I=I+1                                                             F0285118
  234 J=J+1                                                             F0285119
      IF(ZERO(RA(J),COMMA)) GO TO 215                                   F0285120
      GO TO 218                                                         F0285121
  235 I=I-1                                                             F0285122
      IF(IDEF(I,4))240,236,240                                          F0285123
  236 CALL WROUT (12,219)                                               F0285124
      GO TO 1000                                                        F0285125
  240 IF(SWITCH(2,2,13)) GO TO 1000                                     F0285126
      IF(LAST)243,243,241                                               F0285127
  241 IF(ITEST-LAST)242,242,243                                         F0285128
  242 IF(NRWS.EQ.0) GO TO 248                                           F0285129
      NRWS=0                                                            F0285130
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```
      REWIND 1                                                          F0285131
      READ (1)(FBU(1,J),J=1,100)                                        F0285132
 243  READ (1) IDCI                                                     F0285133
      IF(IDCI(1))242,242,244                                            F0285134
 244  READ (1) FBU                                                      F0285135
      IF(IDCI(1)-ITEST)245,250,245                                      F0285136
 245  READ (1) IDCI                                                     F0285137
      IF(IDCI(1))243,247,246                                            F0285138
 246  READ (1) FBU                                                      F0285139
      GO TO 245                                                         F0285140
 247  IF (NRWS)242,248,242                                              F0285141
 248  CALL WROUT (15,220)                                               F0285142
      GO TO 1000                                                        F0285143
 250  K=IDCI(2)                                                         F0285144
      DO 252 I=1,40                                                     F0285145
      IF(K-IDEF(I,1))252,251,252                                        F0285146
 251  IDEF(I,4)=0                                                       F0285147
      CAL=DEF(I,3)                                                      F0285148
      L=IDEF(I,2)                                                       F0285149
      GO TO 260                                                         F0285150
 252  CONTINUE                                                          F0285151
 253  READ (1) IDCI                                                     F0285152
      IF(IDCI(1))280,280,254                                            F0285153
 254  READ (1) FBU                                                      F0285154
      GO TO 250                                                         F0285155
 260  DO 265 I=1,NFREW                                                  F0285156
      G(1,I,L)=FBU(1,I)*CAL                                             F0285157
      G(2,I,L)=FBU(2,I)*CAL                                             F0285158
 265  CONTINUE                                                          F0285159
      GO TO 253                                                         F0285160
 280  DO 285 I=1,40                                                     F0285161
      IF(IDEF(I,4))281,285,281                                          F0285162
 281  CALL WROUT (13,221)                                               F0285163
      GO TO 1000                                                        F0285164
 285  CONTINUE                                                          F0285165
      ILOAD=0                                                           F0285166
      IJKLM=ITEST                                                       F0285167
 290  ISWTCH(5)=NRWS                                                    F0285168
      ISWTCH(4)=LAST                                                    F0285169
      RETURN                                                            F0285170
 1000 ILOAD=1                                                           F0285171
      CALL SWTHON (13)                                                  F0285172
      GO TO 290                                                         F0285173
      END                                                               F0285174
```

```
$ORIGIN        0,CK2,NOREW                                              000
$IBFTC F0386   M94,FULIST,REF,XR6                                     F0386000
      SUBROUTINE SCAN (ICD)                                             F0386001
C             PRE-TRANSLATOR SCAN ROUTINE                              F0386002
C     ICD  - CASE DELETE SWITCH                                        F0386003
C        =0 CASE O.K.                                                  F0386004
C        =1 DELETE CASE                                                F0386005
      LOGICAL SWITCH                                                    F0386006
      LOGICAL ZERO ,NZER                                                F0386007
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```
      LOGICAL SWON,SWOF,SLON,SLOF,LIST                                  F0386008
      INTEGER SYSCK1,SYSIN1,SYSOU1                                      F0386009
      COMPLEX F                                                         F0386010
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          F0386011
      COMMON /NUCLC/F(100,61),S(80),NT(40),NS,LIST,KIKOFF               F0386012
      COMMON /SCNUC/PA(80),AA(80),AZ(24),A,I,I1,ID,IE,IFC,IFE,IJ,IK,    F0386013
     1IOFO,IQQ,IS,IT,IZ,J,K,KJ,KK,KN,L                                  F0386014
     1,DUMY(411)                                                        F0386015
      DIMENSION G(2,100,61)                                             F0386016
      DIMENSION FO(6),        OFO(80),OPP(18),QQ(9),FIO(3),AFO(3)       F0386017
      EQUIVALENCE (F,G)                                                 F0386018
      DIMENSION CFUNC(9)                                                F0386019
      DATA(CFUNC(I),I=1,9)/4HCONJ,4HCMAG,4HCSIN,4HCCOS,4HCEXP,          F0386020
     14HCLOG,4HCATN,4HCSQT,4HCNRM/                                      F0386021
      DATA (FO(J),J=1,6)/3HA1,,3HA2,,3HA3,,3HA4,,3HA5,,3HA6,            F0386022
     1          /,OFO(1)/1H(/,OFE/3H1X)/,(FIO(J),J=1,3)/6H1X,I1,,       F0386023
     26H1X,I2,,6H1X,I3,/,AFO(1)/1H(/,(QQ(J),J=1,9)/1H1,1H2,1H3,1H4,     F0386024
     31H5,1H6,1H7,1H8,1H9/,          (OPP(J),J=1,18)/1H(,1H),1H-,1H+,   F0386025
     41H*,1H/,1HP,1HJ,1H=,1H$,1HC,1HW,1H,,1H ,1HK,1HE,1HF,1HN/          F0386026
     5                        ,FSE/3HF60/,COMMA/1H,/                    F0386027
      DATA ZER/1H0/                                                     F0386028
1     FORMAT (80A1)                                                     F0386029
2     FORMAT(1H ,80A1)                                                  F0386030
3     FORMAT(E12.0,E12.0)                                               F0386031
4     FORMAT (50X,3H F(I3,7H,61) = 1PE12.5,2H, ,1PE12.5)                F0386032
5     FORMAT(I3)                                                        F0386033
6     FORMAT(I2)                                                        F0386034
7     FORMAT(50X,9H LITERAL I2,3H = 1PE12.5,2H, ,1PE12.5)               F0386035
8     FORMAT (A1,I5)                                                    F0386036
9     FORMAT (6X,21A6/2H 1,4X,21A6/2H 2,4X,21A6)                        F0386037
11    FORMAT (51X,80A1)                                                 F0386038
14    FORMAT (1H1)                                                      F0386039
15    FORMAT (A6)                                                       F0386040
      CALL SWTHOF (10)                                                  F0386041
      S(1)=0.0                                                          F0386042
      ICD=0                                                             F0386043
      KIKOFF=0                                                          F0386044
      LIST=.TRUE.                                                       F0386045
      RA(81)=COMMA                                                      F0386046
      RA(82)=COMMA                                                      F0386047
100   IS=1                                                              F0386048
      I1=1                                                              F0386049
102   CALL CARD                                                         F0386050
108   I1=1                                                              F0386051
      IF(NZER(RA(1),OPP(5))) GO TO 110                                  F0386052
      LIST=.FALSE.                                                      F0386053
      GO TO 100                                                         F0386054
110   IF(ZERO(RA(I1),OPP(16))) GO TO 1000                               F0386055
      IE=0                                                              F0386056
      IOFO=2                                                            F0386057
      IQQ=1                                                             F0386058
      IFC=0                                                             F0386059
      IFE=0                                                             F0386060
120   IF(ZERO(RA(I1),OPP(15))) GO TO 400                                F0386061
      IF(ZERO(RA(I1),OPP(13))) GO TO 100                                F0386062
      IF(NZER(RA(I1),OPP(17))) GO TO 125                                F0386063
      IE=IE+1                                                           F0386064
      IFE=1                                                             F0386065
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```
      PA(IE)=RA(I1)                                                     F0386066
      IFC=1                                                             F0386067
      GO TO 200                                                         F0386068
125   IF(IFE)126,127,126                                                F0386069
126   IFE=-1                                                            F0386070
      GO TO 400                                                         F0386071
127   CALL WROUT (2,222)                                                F0386072
      CALL SWTHON (10)                                                  F0386073
      ICD=1                                                             F0386074
128   I1=I1+1                                                           F0386075
      IF(ZERO(RA(I1),OPP(13))) GO TO 129                                F0386076
      IF(NZER(RA(I1),OPP(16))) GO TO 128                                F0386077
      IF(NZER(RA(I1),OPP(18))) GO TO 128                                F0386078
      GO TO 1000                                                        F0386079
129   I1=I1+1                                                           F0386080
      GO TO 110                                                         F0386081
200   I1=I1+1                                                           F0386082
      DO 205 J=1,11                                                     F0386083
      IF(ZERO(RA(I1),OPP(J))) GO TO 209                                 F0386084
205   CONTINUE                                                          F0386085
      IF(ZERO(RA(I1),OPP(13))) GO TO 206                                F0386086
      IF(ZERO(RA(I1),OPP(12))) GO TO 240                                F0386087
      IE=IE+1                                                           F0386088
      PA(IE)=RA(I1)                                                     F0386089
      IFC=IFC+1                                                         F0386090
      GO TO 200                                                         F0386091
206   OFO(IOFO)=FO(IFC)                                                 F0386092
      IOFO=IOFO+1                                                       F0386093
      GO TO 300                                                         F0386094
209   IF(ZERO(RA(I1),OPP(11))) GO TO 220                                F0386095
      OFO(IOFO)=FO(IFC)                                                 F0386096
      IOFO=IOFO+1                                                       F0386097
210   IE=IE+1                                                           F0386098
      PA(IE)=RA(I1)                                                     F0386099
      OFO(IOFO)=FO(1)                                                   F0386100
      IOFO=IOFO+1                                                       F0386101
      I1=I1+1                                                           F0386102
212   DO 215 J=1,10                                                     F0386103
      IF(ZERO(RA(I1),OPP(J))) GO TO 210                                 F0386104
215   CONTINUE                                                          F0386105
      IF(ZERO(RA(I1),OPP(11))) GO TO 222                                F0386106
      IF(ZERO(RA(I1),OPP(12))) GO TO 245                                F0386107
      IF(ZERO(RA(I1),OPP(13))) GO TO 300                                F0386108
      GO TO 120                                                         F0386109
220   OFO(IOFO)=FO(IFC)                                                 F0386110
      IOFO=IOFO+1                                                       F0386111
222   IE=IE+1                                                           F0386112
      PA(IE)=RA(I1)                                                     F0386113
      LI1=I1                                                            F0386114
      I1=I1+3                                                           F0386115
      CALL PACK (LI1,I1,WO,RA)                                          F0386116
      IE=IE+1                                                           F0386117
      PA(IE)=OPP(14)                                                    F0386118
      IE=IE+1                                                           F0386119
      PA(IE)=OPP(14)                                                    F0386120
      OFO(IOFO)=FO(4)                                                   F0386121
      IOFO=IOFO+1                                                       F0386122
      I1=I1+1                                                           F0386123
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```
      DO 230 J=1,9                                                      F0386124
      IF(NZER(WO,CFUNC(J))) GO TO 230                                   F0386125
      IE=IE+1                                                           F0386126
      PA(IE)=QQ(J)                                                      F0386127
      GO TO 235                                                         F0386128
230   CONTINUE                                                          F0386129
      CALL WROUT (24,223)                                               F0386130
      CALL SWTHON (10)                                                  F0386131
      IE=IE+1                                                           F0386132
      PA(IE)=QQ(1)                                                      F0386133
235   IF(ZERO(RA(I1),OPP(10))) GO TO 212                                F0386134
      IE=IE+1                                                           F0386135
      PA(IE)=OPP(10)                                                    F0386136
      OFO(IOFO)=FO(1)                                                   F0386137
      IOFO=IOFO+1                                                       F0386138
      GO TO 212                                                         F0386139
240   OFO(IOFO)=FO(IFC)                                                 F0386140
      IOFO=IOFO+1                                                       F0386141
245   I1=I1+1                                                           F0386142
      IE=IE+1                                                           F0386143
      PA(IE)=OPP(17)                                                    F0386144
      IE=IE+1                                                           F0386145
      PA(IE)=QQ(4)                                                      F0386146
      IE=IE+1                                                           F0386147
      PA(IE)=ZER                                                        F0386148
      NT(40)=1                                                          F0386149
      DO 250 I=1,NFREQ                                                  F0386150
      G(1,I,40)=FREQ(I)*6.28318                                         F0386151
      G(2,I,40)=0.0                                                     F0386152
250   CONTINUE                                                          F0386153
      OFO(IOFO)=FO(3)                                                   F0386154
      IOFO=IOFO+1                                                       F0386155
      GO TO 212                                                         F0386156
300   OFO(IOFO)=OFE                                                     F0386157
      NS=IOFO-1                                                         F0386158
      CALL RITE31                                                       F0386159
      WRITE (31,1) (PA(J),J=1,IE)                                       F0386160
310   ID=0                                                              F0386161
      DO 315 J=1,IE                                                     F0386162
      IF(ZERO(PA(J),OPP(1))) GO TO 311                                  F0386163
      IF(NZER(PA(J),OPP(2))) GO TO 315                                  F0386164
      ID=ID-1                                                           F0386165
      GO TO 315                                                         F0386166
311   ID=ID+1                                                           F0386167
315   CONTINUE                                                          F0386168
      IF(ID)316,320,316                                                 F0386169
316   CALL WROUT (3,224)                                                F0386170
      CALL SWTHON (10)                                                  F0386171
      ICD=1                                                             F0386172
320   CONTINUE                                                          F0386173
      CALL READ31                                                       F0386174
      READ (31,OFO)(S(J),J=2,NS)                                        F0386175
322   IS=I1+1                                                           F0386176
      I1=IS                                                             F0386177
330   J=1                                                               F0386178
331   K=NS-J+1                                                          F0386179
      IF(NZER(S(K),OPP(3))) GO TO 334                                   F0386180
      IF(NZER(S(K-1),OPP(1))) GO TO 336                                 F0386181
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```
      L=K+1                                                             F0386182
      NS=NS+1                                                           F0386183
      DO 332 I=L,NS                                                     F0386184
      KK=NS+L-I-1                                                       F0386185
      KJ=KK+1                                                           F0386186
332   S(KJ)=S(KK)                                                       F0386187
      S(K)=FSE                                                          F0386188
      DO 333 I=1,100                                                    F0386189
333   F(I,60)=(0.0,0.0)                                                 F0386190
      GO TO 336                                                         F0386191
334   IF(NZER(S(K),OPP(4))) GO TO 336                                   F0386192
      IF(NZER(S(K-1),OPP(1))) GO TO 336                                 F0386193
      L=K                                                               F0386194
      NS=NS-1                                                           F0386195
      DO 335 I=L,NS                                                     F0386196
335   S(I)=S(I+1)                                                       F0386197
336   J=J+1                                                             F0386198
      IF(J-NS)331,331,350                                               F0386199
350   J=1                                                               F0386200
351   K=NS-J+1                                                          F0386201
      L=3                                                               F0386202
352   IF(ZERO(S(K),OPP(L))) GO TO 355                                   F0386203
      L=L+1                                                             F0386204
      IF(L-9)352,352,353                                                F0386205
353   IF(ZERO(S(K),OPP(L))) GO TO 358                                   F0386206
      L=L+1                                                             F0386207
354   IF(ZERO(S(K),OPP(L))) GO TO 361                                   F0386208
      L=L+1                                                             F0386209
      IF(L-12)354,354,375                                               F0386210
355   DO 356 KK=3,12                                                    F0386211
      IF(ZERO(S(K-1),OPP(KK))) GO TO 357                                F0386212
356   CONTINUE                                                          F0386213
      J=J+2                                                             F0386214
      GO TO 376                                                         F0386215
357   ICD=1                                                             F0386216
      CALL WROUT (4,225)                                                F0386217
      CALL SWTHON (10)                                                  F0386218
      J=J+1                                                             F0386219
      GO TO 376                                                         F0386220
358   CONTINUE                                                          F0386221
360   J=J+2                                                             F0386222
      GO TO 376                                                         F0386223
361   KK=K+1                                                            F0386224
      DO 362 I=KK,NS                                                    F0386225
      KN=NS+KK-I                                                        F0386226
      KJ=KN+1                                                           F0386227
362   S(KJ)=S(KN)                                                       F0386228
      NS=NS+1                                                           F0386229
      S(KK)=OPP(10)                                                     F0386230
      J=J+2                                                             F0386231
      GO TO 376                                                         F0386232
375   J=J+1                                                             F0386233
376   IF(J-NS)351,351,377                                               F0386234
377   IF(ICD)378,380,378                                                F0386235
378   NS=-NS                                                            F0386236
      GO TO 110                                                         F0386237
380   CONTINUE                                                          F0386238
      IF(ZERO(S(3),OPP(9))) GO TO 381                                   F0386239
```


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```
      ICD=1                                                             F0386240
      CALL WROUT (5,226)                                                F0386241
      CALL SWTHON (10)                                                  F0386242
      GO TO 378                                                         F0386243
381   CONTINUE                                                          F0386244
      CALL RITE31                                                       F0386245
      WRITE (31,15)S(2)                                                 F0386246
      CALL READ31                                                       F0386247
      READ (31,8)A,I                                                    F0386248
      IF(NZER(A,OPP(17)))GO TO 382                                      F0386249
      NT(I)=1                                                           F0386250
382   IF(KIKOFF)385,383,385                                             F0386251
383   CONTINUE                                                          F0386252
384   CALL XLATE                                                        F0386253
      IF(KIKOFF)391,385,391                                             F0386254
385   IF(NS)110,390,110                                                 F0386255
390   ICD=1                                                             F0386256
      CALL SWTHON (10)                                                  F0386257
      GO TO 110                                                         F0386258
391   CALL WROUT (6,227)                                                F0386259
      CALL SWTHON (10)                                                  F0386260
      GO TO 110                                                         F0386261
400   IT=IFE                                                            F0386262
      IFE=1                                                             F0386263
      IF(IT)401,500,600                                                 F0386264
401   IF(ZERO(PA(IE),OPP(7))) GO TO 420                                 F0386265
      IF(ZERO(PA(IE),OPP(8))) GO TO 420                                 F0386266
      J=IE-1                                                            F0386267
      IF(ZERO(PA(J),OPP(7))) GO TO 430                                  F0386268
      IF(ZERO(PA(J),OPP(8))) GO TO 430                                  F0386269
      IF(ZERO(PA(IE),OPP(3))) GO TO 440                                 F0386270
      IF(ZERO(PA(IE),OPP(4))) GO TO 440                                 F0386271
      GO TO 450                                                         F0386272
420   IE=IE+1                                                           F0386273
      PA(IE)=OPP(14)                                                    F0386274
      IFC=1                                                             F0386275
      I1=I1-1                                                           F0386276
      GO TO 200                                                         F0386277
430   IOFO=IOFO-1                                                       F0386278
      IJ=IE+1                                                           F0386279
      PA(IJ)=PA(IE)                                                     F0386280
      PA(IE)=OPP(14)                                                    F0386281
      IE=IE+2                                                           F0386282
      PA(IE)=RA(I1)                                                     F0386283
      IFC=3                                                             F0386284
      GO TO 200                                                         F0386285
440   IZ=1                                                              F0386286
      AZ(IZ)=PA(IE)                                                     F0386287
      IE=IE-1                                                           F0386288
      IOFO=IOFO-1                                                       F0386289
      IZ=IZ+1                                                           F0386290
      GO TO 451                                                         F0386291
450   IZ=1                                                              F0386292
451   OFO(IOFO)=FO(4)                                                   F0386293
      IOFO=IOFO+1                                                       F0386294
      IE=IE+1                                                           F0386295
      PA(IE)=OPP(17)                                                    F0386296
      IE=IE+1                                                           F0386297
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```
      PA(IE)=QQ(1)                                                      F0386298
      IE=IE+1                                                           F0386299
      PA(IE)=QQ(5)                                                      F0386300
      IE=IE+1                                                           F0386301
      PA(IE)=QQ(IQQ)                                                    F0386302
      T=OPP(13)                                                         F0386303
460   AZ(IZ)=RA(I1)                                                     F0386304
461   I1=I1+1                                                           F0386305
      IF(ZERO(RA(I1),T       )) GO TO 480                               F0386306
      IZ=IZ+1                                                           F0386307
      AZ(IZ)=RA(I1)                                                     F0386308
      IF(IZ-12)461,470,462                                              F0386309
462   IF(IZ-24)461,490,490                                              F0386310
470   I1=I1+1                                                           F0386311
      IF(ZERO(RA(I1),OPP(13))) GO TO 471                                F0386312
      GO TO 470                                                         F0386313
471   I1=I1+1                                                           F0386314
      IF(ZERO(RA(I1),OPP(2 ))) GO TO 472                                F0386315
      IZ=IZ+1                                                           F0386316
      T=OPP(2)                                                          F0386317
      GO TO 460                                                         F0386318
472   IZ=IZ+1                                                           F0386319
      AZ(IZ)=OPP(14)                                                    F0386320
      IF(IZ-24)472,490,490                                              F0386321
480   IF(IZ-12)481,482,482                                              F0386322
481   IZ=IZ+1                                                           F0386323
      AZ(IZ)=OPP(14)                                                    F0386324
      IF(IZ-12)481,471,471                                              F0386325
482   IZ=IZ+1                                                           F0386326
      AZ(IZ)=OPP(14)                                                    F0386327
      IF(IZ-24)482,490,490                                              F0386328
490   IF(ZERO(RA(I1),OPP(2 ))) GO TO 491                                F0386329
      I1=I1+1                                                           F0386330
      GO TO 490                                                         F0386331
491   CONTINUE                                                          F0386332
      CALL RITE31                                                       F0386333
      WRITE (31,1)(AZ(I),I=1,24)                                        F0386334
      J=90+IQQ                                                          F0386335
      CALL READ31                                                       F0386336
      READ (31,3)G(1,J,61),G(2,J,61)                                    F0386337
      IF(LIST) GO TO 493                                                F0386338
492   WRITE (6,7)IQQ,F(J,61)                                            F0386339
493   IQQ=IQQ+1                                                         F0386340
      GO TO 210                                                         F0386341
500   CONTINUE                                                          F0386342
      IFE=0                                                             F0386343
      IE=IE+1                                                           F0386344
      PA(IE)=RA(I1)                                                     F0386345
      IFC=1                                                             F0386346
501   I1=I1+1                                                           F0386347
      IF(ZERO(RA(I1),OPP(9 )))GO TO 505                                 F0386348
      IE=IE+1                                                           F0386349
      IFC=IFC+1                                                         F0386350
      PA(IE)=RA(I1)                                                     F0386351
      GO TO 501                                                         F0386352
505   CALL RITE31                                                       F0386353
      WRITE(31,1)(PA(J),J=1,IE)                                         F0386354
      IFC=IFC-1                                                         F0386355
```


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```
      OFO(2)=FIO(IFC)                                                   F0386356
      OFO(3)=OFE                                                        F0386357
      CALL READ31                                                       F0386358
      READ (31,OFO)IJ                                                   F0386359
      ID=-1                                                             F0386360
      IE=0                                                              F0386361
      IK=0                                                              F0386362
      T=OPP(13)                                                         F0386363
      I1=I1+1                                                           F0386364
510   I1=I1+1                                                           F0386365
      IF(ZERO(RA(I1),T       )) GO TO 540                               F0386366
520   IE=IE+1                                                           F0386367
      PA(IE)=RA(I1)                                                     F0386368
      IK=IK+1                                                           F0386369
      IF(IK-12)510,525,525                                              F0386370
525   ID=ID+1                                                           F0386371
526   I1=I1+1                                                           F0386372
      IF(ZERO(RA(I1),T       )) GO TO 530                               F0386373
      GO TO 526                                                         F0386374
530   IF(ID)531,531,560                                                 F0386375
531   I1=I1+1                                                           F0386376
      IK=0                                                              F0386377
      T=OPP(2)                                                          F0386378
      IF(ZERO(RA(I1),OPP(13))) GO TO 540                                F0386379
      GO TO 520                                                         F0386380
540   IE=IE+1                                                           F0386381
      PA(IE)=OPP(14)                                                    F0386382
      IK=IK+1                                                           F0386383
      IF(IK-12)540,541,541                                              F0386384
541   ID=ID+1                                                           F0386385
      GO TO 530                                                         F0386386
560   CONTINUE                                                          F0386387
      CALL RITE31                                                       F0386388
      WRITE (31,1)(PA(J),J=1,24)                                        F0386389
      CALL READ31                                                       F0386390
      READ (31,3)G(1,IJ,61),G(2,IJ,61)                                  F0386391
      IF(LIST) GO TO 562                                                F0386392
561   WRITE (6,11)(RA(J),J=IS,I1)                                       F0386393
      WRITE (6,4)IJ,F(IJ,61)                                            F0386394
562   IS=I1+2                                                           F0386395
      I1=IS                                                             F0386396
      GO TO 110                                                         F0386397
600   IZ=1                                                              F0386398
      AA(IZ)=RA(I1)                                                     F0386399
      IFC=1                                                             F0386400
603   I1=I1+1                                                           F0386401
      DO 605 J=1,8                                                      F0386402
      IF(ZERO(RA(I1),OPP(J))) GO TO 609                                 F0386403
605   CONTINUE                                                          F0386404
      IF(ZERO(RA(I1),OPP(13))) GO TO 606                                F0386405
      IZ=IZ+1                                                           F0386406
      AA(IZ)=RA(I1)                                                     F0386407
      IFC=IFC+1                                                         F0386408
      GO TO 603                                                         F0386409
606   ID=0                                                              F0386410
      GO TO 610                                                         F0386411
609   ID=1                                                              F0386412
610   CONTINUE                                                          F0386413
```


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```
      CALL RITE31                                                       F0386414
      WRITE (31,1)(AA(I),I=1,IZ)                                        F0386415
      IFC=IFC-1                                                         F0386416
      AFO(2)=FIO(IFC)                                                   F0386417
      AFO(3)=OFE                                                        F0386418
      CALL READ31                                                       F0386419
      READ (31,AFO)IJ                                                   F0386420
      IJ=IJ+60                                                          F0386421
      IF(IJ-100)611,612,612                                             F0386422
 611  CONTINUE                                                          F0386423
      CALL RITE31                                                       F0386424
      WRITE (31,6)IJ                                                    F0386425
      CALL READ31                                                       F0386426
      READ (31,1)(AZ(I),I=1,3)                                          F0386427
      IZ=4                                                              F0386428
      GO TO620                                                          F0386429
 612  CONTINUE                                                          F0386430
      CALL RITE31                                                       F0386431
      WRITE (31,5)IJ                                                    F0386432
      CALL READ31                                                       F0386433
      READ (31,1)(AZ(I),I=1,2)                                          F0386434
      IZ=3                                                              F0386435
      GO TO 620                                                         F0386436
 620  IE=IE+1                                                           F0386437
      PA(IE)=OPP(17)                                                    F0386438
      N=IZ-1                                                            F0386439
      DO 621 J=1,N                                                      F0386440
      IE=IE+1                                                           F0386441
 621  PA(IE)=AZ(J)                                                      F0386442
      OFO(IOFO)=FO(IZ)                                                  F0386443
      IOFO=IOFO+1                                                       F0386444
      IF(ID) 300,300,210                                                F0386445
 1000 RETURN                                                            F0386446
      END                                                               F0386447
```

```
$IBFTC F0387    M94,FULIST,REF,XR6                                      F0387000
      FUNCTION IPREC(S)                                                 F0387001
C                OPERATOR PRECEDENCE SCANNER                            F0387002
C     IPREC COMPUTES THE PRECEDENCE OF OPERATOR S                       F0387003
      LOGICAL ZERO                                                      F0387004
      LOGICAL SWON,SWOF,SLON,SLOF                                       F0387005
      DIMENSION OP(9),IP(9)                                             F0387006
      DATA ((OP(J),IP(J)),J=1,9)/1HJ,80,1HP,80,1H*,60,1H/,60,1H+,40,    F0387007
     11H-,40,1H$,120,1H=,1,0.,0/                                        F0387008
      DO 1 J=1,9                                                        F0387009
      IF(ZERO(S,OP(J))) GO TO 2                                         F0387010
 1    CONTINUE                                                          F0387011
      IPREC=0                                                           F0387012
      CALL SWTHON (27)                                                  F0387013
      CALL WROUT (1,228)                                                F0387014
      CALL SWTHON (10)                                                  F0387015
      GO TO 3                                                           F0387016
 2    IPREC=IP(J)                                                       F0387017
 3    RETURN                                                            F0387018
```


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```
      END                                                               F0387019


$IBFTC F0388   M94,FULIST,REF,XR6                                       F0388000
      SUBROUTINE COMOPS (I,A,JJ,B,KK)                                   F0388001
C               COMPLEX OPERATIONS ROUTINE                              F0388002
      LOGICAL ZERO,NZER                                                 F0388003
      COMPLEX CSIN,CCOS,CEXP,CLOG,CSQRT                                 F0388004
      LOGICAL SWITCH                                                    F0388005
      COMPLEX F                                                         F0388006
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          F0388007
      COMMON /NUCLC/F(100,61),S(80),NT(40),NS,LIST,KIKOFF               F0388008
      COMMON /SCNUC/DUM(204),KS1,KS2,KSS1,KSS2,LS1,LS2,OMG,TEMP         F0388009
     1,DUMY(403)                                                        F0388010
      EQUIVALENCE (F,G)                                                 F0388011
      DIMENSIONG(2,100,61)                                              F0388012
      DATASTAR,SLASH,PLUS,MINUS,P,EQUAL,AJ,DOLL,C,M/1H*,1H/,1H+,1H-,    F0388013
     11HP,1H=,1HJ,1H$,1HC,1HM/                                          F0388014
      IF(SWITCH(3,2,10,13)) GO TO 16                                    F0388015
      KS1=1                                                             F0388016
      KS2=1                                                             F0388017
      KSS1=JJ                                                           F0388018
      KSS2=KK                                                           F0388019
      IF(JJ.LE.60) GO TO 1                                              F0388020
      LS1=JJ-60                                                         F0388021
      KS1=2                                                             F0388022
      KSS1=61                                                           F0388023
 1    IF(KK.LE.60) GO TO 2                                              F0388024
      LS2=KK-60                                                         F0388025
      KS2=2                                                             F0388026
      KSS2=61                                                           F0388027
 2    DO 15 J=1,NFREQ                                                   F0388028
      IF(KS1.NE.2) LS1=J                                                F0388029
      IF(KS2.NE.2) LS2=J                                                F0388030
      IF(NZER (B,STAR)) GO TO 3                                         F0388031
      ANRM=0.                                                           F0388032
      F(J,I)=F(LS1,KSS1)*F(LS2,KSS2)                                    F0388033
      GO TO 15                                                          F0388034
 3    IF(NZER (B,SLASH)) GO TO 4                                        F0388035
      ANRM=0.                                                           F0388036
      F(J,I)=F(LS1,KSS1)/F(LS2,KSS2)                                    F0388037
      GO TO 15                                                          F0388038
 4    IF(NZER (B,PLUS)) GO TO 5                                         F0388039
      ANRM=0.                                                           F0388040
      F(J,I)=F(LS1,KSS1)+F(LS2,KSS2)                                    F0388041
      GO TO 15                                                          F0388042
 5    IF(NZER (B,MINUS)) GO TO 6                                        F0388043
      ANRM=0.                                                           F0388044
      F(J,I)=F(LS1,KSS1)-F(LS2,KSS2)                                    F0388045
      GO TO 15                                                          F0388046
 6    IF(NZER (B,P)) GO TO 7                                            F0388047
      ANRM=0.                                                           F0388048
      F(J,I)=F(LS1,KSS1)**KK                                            F0388049
      GO TO 15                                                          F0388050
 7    IF(NZER (B,EQUAL)) GO TO 8                                        F0388051
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```
      F(LS1,KSS1)=F(LS2,KSS2)                                           F0388052
      GO TO 15                                                          F0388053
8     IF(NZER (B,AJ))GO TO 12                                           F0388054
      ANRM=0.                                                           F0388055
      F(J,I)=F(LS1,KSS1)                                                F0388056
      OMG=6.283182*FREQ(J)                                              F0388057
      DO11L=1,KK                                                        F0388058
      IF(KK) 9,15,10                                                    F0388059
9     TEMP=G(2,J,I)/OMG                                                 F0388060
      G(2,J,I)=-G(1,J,I)/OMG                                            F0388061
      G(1,J,I)=TEMP                                                     F0388062
      GO TO 11                                                          F0388063
10    TEMP=-G(2,J,I)*OMG                                                F0388064
      G(2,J,I)=G(1,J,I)*OMG                                             F0388065
      G(1,J,I)=TEMP                                                     F0388066
11    CONTINUE                                                          F0388067
      GO TO 15                                                          F0388068
12    IF(ZERO(B,DOLL))GO TO 13                                          F0388069
      CALL WROUT (7,229)                                                F0388070
      CALL SWTHON (10)                                                  F0388071
      GO TO 16                                                          F0388072
13    GO TO (21,22,23,24,25,26,27,28,29),JJ                             F0388073
21    G(1,J,I)=G(1,LS2,KSS2)                                            F0388074
      G(2,J,I)=-G(2,LS2,KSS2)                                           F0388075
      ANRM=0.                                                           F0388076
      GO TO 15                                                          F0388077
22    F(  J,I)=CABS(F(LS2,KSS2))                                        F0388078
      G(2,J,I)=0.                                                       F0388079
      ANRM=0.                                                           F0388080
      GO TO 15                                                          F0388081
23    F(J,I)=CSIN(F(LS2,KSS2))                                          F0388082
      ANRM=0.                                                           F0388083
      GO TO 15                                                          F0388084
24    F(J,I)=CCOS(F(LS2,KSS2))                                          F0388085
      ANRM=0.                                                           F0388086
      GO TO 15                                                          F0388087
25    F(J,I)=CEXP(F(LS2,KSS2))                                          F0388088
      ANRM=0.                                                           F0388089
      GO TO 15                                                          F0388090
26    F(J,I)=CLOG(F(LS2,KSS2))                                          F0388091
      ANRM=0.                                                           F0388092
      GO TO 15                                                          F0388093
27    CALL ATAN(G(1,LS2,KSS2),G(2,LS2,KSS2),G(1,J,I))                   F0388094
      G(2,J,I)=0.                                                       F0388095
      ANRM=0.                                                           F0388096
      GO TO 15                                                          F0388097
28    F(J,I)=CSQRT(F(LS2,KSS2))                                         F0388098
      ANRM=0.                                                           F0388099
      GO TO 15                                                          F0388100
29    ANR=SQRT(G(1,LS2,KSS2)**2+G(2,LS2,KSS2)**2)                       F0388101
      IF(ANRM.GE.ANR) GO TO 15                                          F0388102
      DO 30 JIJ=1,NFREQ                                                 F0388103
      G(1,JIJ,I)=ANR                                                    F0388104
      G(2,JIJ,I)=0.0                                                    F0388105
30    CONTINUE                                                          F0388106
      ANRM=ANR                                                          F0388107
15    CONTINUE                                                          F0388108
16    RETURN                                                            F0388109
```


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```
      END                                                               F0388110


$IBFTC F0389   M94,FULIST,REF,XR6                                       F0389000
      SUBROUTINE XLATE                                                  F0389001
C               FOURIERTRAN TRANSLATOR                                  F0389002
      LOGICAL SWITCH                                                    F0389003
      LOGICAL ZERO,NZER,LIST                                            F0389004
      LOGICAL SWON,SWOF,SLON,SLOF                                       F0389005
      COMPLEX F                                                         F0389006
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          F0389007
      COMMON /NUCLC/F(100,61),S(80),NT(40),NS,LIST,KIKOFF               F0389008
      COMMON /SCNUC/DUM(212),PUSHDN(100),I,MAX,NSS,KOUNT,J,LT,K,KREV,   F0389009
     1AY(59,5)                                                          F0389010
      DIMENSION T(59),TS(40),OP(9)                                      F0389011
 100  FORMAT(4A6)                                                       F0389012
 101  FORMAT(100X,A6,6H=      ,3A6)                                     F0389013
 102  FORMAT (1X,I5,A1,I5,A1,6X,I5)                                     F0389014
 312  FORMAT(1H0)                                                       F0389015
      DATA (OP(J),J=1,9)/1HJ,1HP,1H*,1H/,1H+,1H-,1H$,1H=,0./,SYSOU1/6/  F0389016
      DATA (T(J),J=1,19)/3HF41,3HF42,3HF43,3HF44,3HF45,3HF46,3HF47,3HF48F0389017
     1,3HF49,3HF50,3HF51,3HF52,3HF53,3HF54,3HF55,3HF56,3HF57,3HF58,3HF59F0389018
     2      /,          BLANK/6H      /,PARL/1H(/,PARR/1H)/             F0389019
      DATA (TS(J),J=1,40)/ 3HF40,3HF39,3HF38,3HF37,3HF36,3HF35,3HF34,   F0389020
     13HF33,3HF32,3HF31,3HF30,3HF29,3HF28,3HF27,3HF26,3HF25,3HF24,3HF23,F0389021
     23HF22,3HF21,3HF20,3HF19,3HF18,3HF17,3HF16,3HF15,3HF14,3HF13,3HF12,F0389022
     33HF11,3HF10,2HF9,2HF8,2HF7,2HF6,2HF5,2HF4,2HF3,2HF2,2HF1/         F0389023
      S(1)=0.                                                           F0389024
      IF(LIST) GO TO 311                                                F0389025
      WRITE (6,312)                                                     F0389026
 311  I=20                                                              F0389027
      DO 31 J=1,40                                                      F0389028
      IF(NT(J))31,30,31                                                 F0389029
 30   T(I)=TS(J)                                                        F0389030
      I=I+1                                                             F0389031
 31   CONTINUE                                                          F0389032
      MAX=I-1                                                           F0389033
      NSS=NS                                                            F0389034
      DO 1 JJ=1,100                                                     F0389035
 1    PUSHDN(JJ)=0.                                                     F0389036
      KOUNT=0                                                           F0389037
      J=1                                                               F0389038
      I=0                                                               F0389039
      LT= IABS(NS)+1                                                    F0389040
      DO 20 KREV=1,NS                                                   F0389041
      K=LT-KREV                                                         F0389042
      IF(ZERO(S(K),BLANK)) GO TO 20                                     F0389043
 2    DO 3 L=1,9                                                        F0389044
      IF(ZERO(S(K),OP(L))) GO TO 11                                     F0389045
 3    CONTINUE                                                          F0389046
 4    IF(NZER(S(K),PARL)) GO TO 14                                      F0389047
 5    IF(ZERO(PUSHDN(J-1),PARR)) GO TO 16                               F0389048
 6    IF(SWITCH(1,27)) GO TO 140                                        F0389049
      I=I+1                                                             F0389050
      IF(I-MAX)7,7,70                                                   F0389051
```


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```
70    KIKOFF=1                                                          F0389052
      NSS=0                                                             F0389053
      GO TO 28                                                          F0389054
7     IF(SWITCH(1,10)) GO TO 71                                         F0389055
      CALL RITE31                                                       F0389056
      WRITE (31,100)T(I),PUSHDN(J),PUSHDN(J-1),PUSHDN(J-2)              F0389057
      CALL READ31                                                       F0389058
      READ (31,102) (AY(I,LL),LL=1,5)                                   F0389059
71    IF(LIST) GO TO 8                                                  F0389060
80    WRITE (6      ,101) T(I),PUSHDN(J),PUSHDN(J-1),PUSHDN(J-2)        F0389061
8     J=J-2                                                             F0389062
      KOUNT=KOUNT+1                                                     F0389063
9     PUSHDN(J)=T(I)                                                    F0389064
10    IF(ZERO(S(K),PARL)) GO TO 5                                       F0389065
11    IF(ZERO(PUSHDN(J-1),PARR)) GO TO 14                               F0389066
12    IF(IPREC(S(K)).LT.IPREC(PUSHDN(J-1))) GO TO 6                     F0389067
14    J=J+1                                                             F0389068
      IF(SWITCH(1,27)) GO TO 140                                        F0389069
      GO TO 15                                                          F0389070
140   NSS=0                                                             F0389071
      GO TO 28                                                          F0389072
15    PUSHDN(J)=S(K)                                                    F0389073
      GO TO 20                                                          F0389074
16    PUSHDN(J-1)=PUSHDN(J)                                             F0389075
17    J=J-1                                                             F0389076
20    CONTINUE                                                          F0389077
      IF(SWITCH(1,10)) GO TO 28                                         F0389078
      DO 25 J=1,KOUNT                                                   F0389079
      CALL COMCPS (AY(J,1),AY(J,2),AY(J,3),AY(J,4),AY(J,5))             F0389080
25    CONTINUE                                                          F0389081
28    NS=NSS                                                            F0389082
      RETURN                                                            F0389083
      END                                                               F0389084
```

```
$ORIGIN        0,CK2,NOREW                                                000
$IBFTC F0490   M94,FULIST,REF,XR6                                       F0490000
      SUBROUTINE FUNDE                                                  F0490001
C               FUNCTION DEFINITION OPTION ROUTINE                      F0490002
      LOGICAL ZERO,NZER,LIST,KIKOFF                                     F0490003
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR          F0490004
      COMMON IDMPIT                                                     F0490005
      COMMON/FUND/FUDAU(6,39)                                           F0490006
      DIMENSION SA(82)                                                  F0490007
      DATA NAME,CHK,COMMA,DOLAR,SLASH,FT,AS,UNIT/4HNAME,1HC,            F0490008
     11H,,1H$,1H/,1HF,1HA,1HU/,BLANK/1H /                               F0490009
      DATA PAUS/4HPAUS/                                                 F0490010
      DATA PAGE/4HPAGE/                                                 F0490011
1     FORMAT (80A1)                                                     F0490012
2     FORMAT (1H 80A1)                                                  F0490013
3     FORMAT (I6)                                                       F0490014
4     FORMAT (A6)                                                       F0490015
5     FORMAT (1H1)                                                      F0490016
      IF1=0                                                             F0490017
      IF2=0                                                             F0490018
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      IF3=0                                                             F0490019
100   READ (5,1)(RA(I),I=1,80)                                          F0490020
104   WRITE (6,2)(RA(I),I=1,80)                                         F0490021
      WRITE (10,2)(RA(I),I=1,80)                                        F0490022
      DO 101 J=1,82                                                     F0490023
101   SA(J)=RA(J)                                                       F0490024
      CALL SQUEEZ                                                       F0490025
      IDMPIT=1                                                          F0490026
      CALL CARD                                                         F0490027
      IDMPIT=0                                                          F0490028
      IF(ZERO(RA(1),CHK)) GO TO 100                                     F0490029
      IF(ZERO(RA(1),COMMA)) GO TO 100                                   F0490030
      CALL PACK (2,5,WO,RA)                                             F0490031
      IF(ZERO(WO,PAGE)) GO TO 120                                       F0490032
      IF(NZER(WO,PAUS)) GO TO 103                                       F0490033
      CALL MESAGE                                                       F0490034
      GO TO 104                                                         F0490035
103   IF(NZER(WO,NAME)) GO TO 1000                                      F0490036
      K=5                                                               F0490037
102   K=K+1                                                             F0490038
      IF(NZER(RA(K),COMMA)) GO TO 102                                   F0490039
      IF(ZERO(RA(K+1),COMMA)) GO TO 600                                 F0490040
      J=5                                                               F0490041
110   J=J+1                                                             F0490042
      IF(NZER(SA(J),COMMA)) GO TO 110                                   F0490043
112   J=J+1                                                             F0490044
      IF(ZERO(SA(J),BLANK)) GO TO 112                                   F0490045
113   Q=SA(J)                                                           F0490046
114   J=J+1                                                             F0490047
      IF(NZER(SA(J),SLASH))GO TO 114                                    F0490048
      IF(ZERO(Q,FT)) GO TO 200                                          F0490049
      IF(ZERO(Q,AS)) GO TO 300                                          F0490050
      IF(ZERO(Q,UNIT)) GO TO 400                                        F0490051
      CALL WROUT (1,230)                                                F0490052
      GO TO 100                                                         F0490053
120   WRITE (10,5)                                                      F0490054
      GO TO 100                                                         F0490055
200   J=J+1                                                             F0490056
      IF(ZERO(SA(J),BLANK))GO TO 200                                    F0490057
      L1=J                                                              F0490058
201   J=J+1                                                             F0490059
      IF(NZER(SA(J),COMMA))GO TO 201                                    F0490060
      L2=J-1                                                            F0490061
      CALL PACK (L1,L2,WO,SA)                                           F0490062
      CALL RITE31                                                       F0490063
      WRITE (31,4) WO                                                   F0490064
      CALL READ31                                                       F0490065
      READ (31,3) II                                                    F0490066
      IF1=1                                                             F0490067
      GO TO 500                                                         F0490068
300   IF2=1                                                             F0490069
      N=3                                                               F0490070
      I=1                                                               F0490071
310   J=J+1                                                             F0490072
      IF(NZER(SA(J),DOLAR)) GO TO 310                                   F0490073
      L1=J+1                                                            F0490074
301   J=J+1                                                             F0490075
      IF(NZER(SA(J),DOLAR)) GO TO 301                                   F0490076
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      L2=J-1                                                            F0490077
      IF(L2-L1)307,302,302                                              F0490078
  302 IF(L2-L1-5)303,303,304                                            F0490079
  303 CALL PACK (L1,L2,WO,SA)                                           F0490080
      FUDAU(I,II)=WO                                                    F0490081
      IF(I-N)306,500,500                                                F0490082
  304 K=L1+5                                                            F0490083
      CALL PACK (L1,K,WO,SA)                                            F0490084
      FUDAU(I,II)=WO                                                    F0490085
      I=I+1                                                             F0490086
      L1=K+1                                                            F0490087
      IF(I-N)302,302,305                                                F0490088
  305 CALL WROUT (1,231)                                                F0490089
      GO TO 500                                                         F0490090
  306 I=I+1                                                             F0490091
  307 DO 308 K=I,N                                                      F0490092
  308 FUDAU(K,II)=BLANK                                                 F0490093
      GO TO 500                                                         F0490094
  400 IF3=1                                                             F0490095
      N=6                                                               F0490096
      I=4                                                               F0490097
      GO TO 310                                                         F0490098
  500 IF(IF1)501,510,501                                                F0490099
  501 IF(IF2)502,510,502                                                F0490100
  502 IF(IF3)503,510,503                                                F0490101
  503 IF1=0                                                             F0490102
      IF2=0                                                             F0490103
      IF3=0                                                             F0490104
      IF(ZERO(SA(J),DOLAR)) GO TO 505                                   F0490105
  504 J=J+1                                                             F0490106
      IF(ZERO(SA(J),BLANK))GO TO 504                                    F0490107
      IF(ZERO(SA(J),COMMA))GO TO 100                                    F0490108
      GO TO 113                                                         F0490109
  505 J=J+1                                                             F0490110
      IF(NZER(SA(J),COMMA))GO TO 505                                    F0490111
      GO TO 504                                                         F0490112
  510 IF(ZERO(SA(J),COMMA))GO TO 511                                    F0490113
      J=J+1                                                             F0490114
      GO TO 510                                                         F0490115
  511 J=J+1                                                             F0490116
      IF(ZERO(SA(J),BLANK)) GO TO 511                                   F0490117
      IF(ZERO(SA(J),COMMA)) GO TO 100                                   F0490118
      GO TO 113                                                         F0490119
  600 DO 602 K=1,6                                                      F0490120
      DO 602 L=1,39                                                     F0490121
  602 FUDAU(K,L)=BLANK                                                  F0490122
      GO TO 100                                                         F0490123
 1000 RETURN                                                            F0490124
      END                                                               F0490125
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$ORIGIN        O,CK2,NOREW                                                  000
$IBFTC F0591   M94,FULIST,REF,XR6                                        F0591000
      SUBROUTINE PRPLEX (IXJY,ITEST)                                     F0591001
C               FOURIERTRAN PRINT-PLOT ROUTINE                           F0591002
      LOGICAL SWITCH                                                     F0591003
      LOGICAL ZERO,NZER,LIST,KIKOFF                                      F0591004
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           F0591005
      COMPLEX F                                                          F0591006
      COMMON/PPCB/IPPCB(41,6),BOT(41),TOP(41)                            F0591007
      COMMON /NUCLC/F(100,61)    ,DUM(123)                               F0591008
      COMMON/FUND/FUDAU(6,39)                                            F0591009
      DIMENSION QPPCB(41,6)                                              F0591010
      EQUIVALENCE (IPPCB,QPPCB)                                          F0591011
      DIMENSION G(2,100,61),TP(100),RAT(41),ID(5,3),ISB(5,100),CHAR(6),  F0591012
     1PTY(2,5),PA(125)                                                   F0591013
      DATA CHAR(6)/1HX/                                                  F0591014
      DATA COMMA,CHK,PRIN,SLASH,PLOT,BLANK/1H,,1HC,4HPRIN,1H/,           F0591015
     14HPLOT,1H /                                                        F0591016
      DATA IPAGE/55/                                                     F0591017
      DATA PTY(1,1)/                                                     F0591018
     160HMAGNITUDE   LOG MAG.    PHASE ANGLE REAL         IMAGINARY   /  F0591019
      DATA PLH1,PLH2,PLH3,PTYI/6H0....5,4H....,5H0...4,6H FUNC(/         F0591020
      EQUIVALENCE (G,F)                                                  F0591021
 1    FORMAT (80A1)                                                      F0591022
 2    FORMAT (1H ,80A1)                                                  F0591023
 3    FORMAT (A6)                                                        F0591024
 4    FORMAT (I6)                                                        F0591025
 5    FORMAT (1H1,9X,12HTEST NUMBER I6,9X,10HFUNCTION (I2,1H),           F0591026
     19X,3A6,   3A6,18X,3A3/                                             F0591027
     11H0,7X,4HREAL,12X,9HIMAGINARY,10X,9HMAGNITUDE,8X,                  F0591028
     213HLOG MAGNITUDE,7X,11HPHASE ANGLE,9X,9HFREQUENCY)                 F0591029
 6    FORMAT (6(3X,1PE13.5,3X),I3)                                       F0591030
 7    FORMAT (1H1)                                                       F0591031
 9    FORMAT (1X,I3,2H (,125A1,1H))                                      F0591032
 10   FORMAT (6X,12(A6,A4),A5)                                           F0591033
 11   FORMAT (16X,2(1H1,4X),2(1H2,4X),2(1H3,4X),2(1H4,4X),2(1H5,4X),     F0591034
     12(1H6,4X),2(1H7,4X),2(1H8,4X),1H9,4X,1H9,3X,2(2H10,3X),2(2H11,3X),F0591035
     22H12,2X,2H12)                                                      F0591036
 12   FORMAT (1H1,40X,12HTEST NUMBER I6,11X,11HPLOT NUMBER I2,           F0591037
     124X,A3,A3,A3/                                                      F0591038
     11H0,46X,38HTHE FREQUENCY CODE SCALE IS AS FOLLOWS/                 F0591039
     213X,5(15HCODE  FREQUENCY,7X))                                      F0591040
 13   FORMAT (14X,I2,2X,1PE12.5,6X,I2,2X,1PE12.5,6X,I2,2X,1PE12.5,       F0591041
     16X,I2,2X,1PE12.5,6X,I2,2X,1PE12.5)                                 F0591042
 14   FORMAT (5X,9HCHARACTER,6X,4HTYPE,62X,                              F0591043
     17HMINIMUM,9X,7HMAXIMUM,8X,10HRESOLUTION)                           F0591044
 15   FORMAT (9X,A1,7X,3A6,I2,1H),3X,3A6,   3A6,6X,1PE12.5,              F0591045
     14X,1PE12.5,4X,1PE12.5)                                             F0591046
 16   FORMAT (9X,1HX,7X,18HTRACE INTERSECTION)                           F0591047
 17   FORMAT (1H0,57X,16HPLOT DESCRIPTION)                               F0591048
      GO TO (300,400),IXJY                                               F0591049
 300  I=1                                                                F0591050
      J=6                                                                F0591051
 301  J=J+1                                                              F0591052
      IF(NZER(RA(J),COMMA)) GO TO 301                                    F0591053
      J=J+1                                                              F0591054
      IF(NZER(RA(J),COMMA)) GO TO 310                                    F0591055
      IF(IPPCB(1,1))350,305,350                                          F0591056
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305   CALL WROUT (14,232)                                          F0591057
      CALL SWTHON (11)                                             F0591058
      GO TO 321                                                    F0591059
110   WRITE (10,7)                                                 F0591060
      RETURN                                                       F0591061
310   CALL SWTHOF (11)                                             F0591062
      DO 311 K=1,41                                                F0591063
311   IPPCB(K,1)=0                                                 F0591064
315   I=I+1                                                        F0591065
      IPPCB(1,1)=I                                                 F0591066
316   J=J+1                                                        F0591067
      IF(NZER(RA(J),SLASH))GO TO 316                               F0591068
      L=J+1                                                        F0591069
317   J=J+1                                                        F0591070
      IF(NZER(RA(J),COMMA))GO TO 317                               F0591071
      LL=J-1                                                       F0591072
      CALL PACK (L,LL,WO,RA)                                       F0591073
      CALL RITE31                                                  F0591074
      WRITE (31,3)WO                                               F0591075
      CALL READ31                                                  F0591076
      READ (31,4) II                                               F0591077
      IPPCB(I,1)=II                                                F0591078
      J=J+1                                                        F0591079
320   IF(NZER(RA(J),COMMA))GO TO 315                               F0591080
321   CALL CARD                                                    F0591081
      CALL PACK (2,5,WO,RA)                                        F0591082
      IF(NZER(WO,PRIN)) GO TO 350                                  F0591083
      J=6                                                          F0591084
325   J=J+1                                                        F0591085
      IF(NZER(RA(J),COMMA))GO TO 325                               F0591086
      IF(NZER(RA(J+1),COMMA)) GO TO 315                            F0591087
      GO TO 321                                                    F0591088
350   IF(SWITCH(4,2,10,11,13)) GO TO 375                           F0591089
      I=IPPCB(1,1)                                                 F0591090
      DO 370 J=2,I                                                 F0591091
      K=IPPCB(J,1)                                                 F0591092
      L=IPAGE                                                      F0591093
355   WRITE (10,5) ITEST,K,(FUDAU(M,K),M=1,6),DAY,DON,YEAR         F0591094
      DO 365 N=1,NFREQ                                             F0591095
      A=SQRT(G(1,N,K)**2+G(2,N,K)**2)                              F0591096
      IF(A    )356,356,357                                         F0591097
356   B=0.0                                                        F0591098
      C=0.0                                                        F0591099
      GO TO 358                                                    F0591100
357   B=.43429448*ALOG(A)                                          F0591101
      CALL ATAN (G(1,N,K),G(2,N,K),C)                              F0591102
358   WRITE (10,6)G(1,N,K),G(2,N,K),A,B,C,FREQ(N),N                F0591103
      IF(N-L)365,360,360                                           F0591104
360   L=L+IPAGE                                                    F0591105
      WRITE (10,5) ITEST,K,(FUDAU(M,K),M=1,6),DAY,DON,YEAR         F0591106
365   CONTINUE                                                     F0591107
370   CONTINUE                                                     F0591108
      CALL PACK (2,5,WO,RA)                                        F0591109
      IF(NZER(WO,PRIN)) GO TO 110                                  F0591110
375   CALL CARD                                                    F0591111
      GO TO 110                                                    F0591112
400   I=1                                                          F0591113
      IPLTRA=1                                                     F0591114
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      J=5                                                               F0591115
401   J=J+1                                                             F0591116
      IF(NZERO(RA(J),COMMA))GO TO 401                                   F0591117
      J=J+1                                                             F0591118
      IF(NZERO(RA(J),COMMA))GO TO 403                                   F0591119
      CALL CARD                                                         F0591120
      IF(IPPCB(1,2)) 110,110,450                                        F0591121
403   CALL DCPLOT (J,IOUT)                                              F0591122
      IF(IOUT)110,110,450                                               F0591123
450   IF(SWITCH(4,2,10,12,13)) GO TO 110                                F0591124
      II=IPPCB(1,2)                                                     F0591125
      DO 468 I=2,II                                                     F0591126
      IF(IPPCB(I,5))456,467,451                                         F0591127
451   KK=2                                                              F0591128
      K=IPPCB(I,5)                                                      F0591129
452   IF(IPPCB(KK,4)-K)453,455,453                                      F0591130
453   KK=KK+1                                                           F0591131
      IF(KK-I)452,454,454                                               F0591132
454   CALL WROUT (16,233)                                               F0591133
      GO TO 456                                                         F0591134
455   TOP(I)=TOP(KK)                                                    F0591135
      BOT(I)=BOT(KK)                                                    F0591136
      GO TO 467                                                         F0591137
456   IP=IPPCB(I,3)                                                     F0591138
      K=IPPCB(I,4)                                                      F0591139
      DO 462 KK=1,NFREQ                                                 F0591140
      GO TO (457,458,461,4611,4612),IP                                  F0591141
457   TP(KK)=SQRT(G(1,KK,K)**2+G(2,KK,K)**2)                            F0591142
      GO TO 462                                                         F0591143
458   AO=SQRT(G(1,KK,K)**2+G(2,KK,K)**2)                                F0591144
      IF(AO    )460,460,459                                             F0591145
459   TP(KK)=.43429448*ALOG(AO)                                         F0591146
      GO TO 462                                                         F0591147
460   TP(KK)=0.                                                         F0591148
      GO TO 462                                                         F0591149
461   CALL ATAN (G(1,KK,K),G(2,KK,K),TP(KK))                            F0591150
      GO TO 462                                                         F0591151
4611  TP(KK)=G(1,KK,K)                                                  F0591152
      GO TO 462                                                         F0591153
4612  TP(KK)=G(2,KK,K)                                                  F0591154
462   CONTINUE                                                          F0591155
      TOP(I)=TP(1)                                                      F0591156
      BOT(I)=TP(1)                                                      F0591157
      DO 466 K=2,NFREQ                                                  F0591158
      IF(TOP(I)-TP(K))463,464,464                                       F0591159
463   TOP(I)=TP(K)                                                      F0591160
      GO TO 466                                                         F0591161
464   IF(BOT(I)-TP(K))466,466,465                                       F0591162
465   BOT(I)=TP(K)                                                      F0591163
466   CONTINUE                                                          F0591164
467   RAT(I)=124./(TOP(I)-BOT(I))                                       F0591165
468   CONTINUE                                                          F0591166
470   DO 495 K=2,II                                                     F0591167
      IF(IPPCB(K,2))495,495,471                                         F0591168
471   IPN=IPPCB(K,2)                                                    F0591169
      IPPCB(K,2)=-IPN                                                   F0591170
      J=K                                                               F0591171
      I=1                                                               F0591172
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472   ID(I,1)=IPPCB(J,3)                                                F0591173
      ID(I,2)=IPPCB(J,4)                                                F0591174
      JJ=ID(I,2)                                                        F0591175
      KK=ID(I,1)                                                        F0591176
      ID(I,3)=J                                                         F0591177
      CHAR(I)=QPPCB(J,6)                                                F0591178
      DO 481 M=1,NFREQ                                                  F0591179
473   GO TO (474,475,478,4801,4802),KK                                  F0591180
474   ISB(I,M)=(SQRT(G(1,M,JJ)**2+G(2,M,JJ)**2)-BOT(J))*RAT(J)+1.       F0591181
      GO TO 479                                                         F0591182
475   AO=SQRT(G(1,M,JJ)**2+G(2,M,JJ)**2)                                F0591183
      IF(AO    )476,476,477                                             F0591184
476   ISB(I,M)=1                                                        F0591185
      GO TO 479                                                         F0591186
477   ISB(I,M)=(.43429*ALOG  (AO)-BOT(J))*RAT(J)+1.                     F0591187
      GO TO 479                                                         F0591188
478   CALL ATAN (G(1,M,JJ),G(2,M,JJ),AO)                                F0591189
      ISB(I,M)=(AO-BOT(J))*RAT(J)+1.                                    F0591190
      GO TO 479                                                         F0591191
4801  ISB(I,M)=(G(1,M,JJ)-BOT(J))*RAT(J)+1.                             F0591192
      GO TO 479                                                         F0591193
4802  ISB(I,M)=(G(2,M,JJ)-BOT(J))*RAT(J)+1.                             F0591194
479   IF(ISB(I,M))480,480,481                                           F0591195
480   ISB(I,M)=1                                                        F0591196
481   CONTINUE                                                          F0591197
      IN=I                                                              F0591198
      I=I+1                                                             F0591199
      IF(I-5)482,482,485                                                F0591200
482   J=J+1                                                             F0591201
      IF(J-II)483,483,485                                               F0591202
483   IF(IPPCB(J,2)-IPN)482,484,482                                     F0591203
484   IPPCB(J,2)=-IPN                                                   F0591204
      GO TO 472                                                         F0591205
485   WRITE (10,12)ITEST,IPN,DAY,DON,YEAR                               F0591206
      WRITE (10,13)(I,FREQ(I),I=1,NFREQ)                                F0591207
      WRITE (10,17)                                                     F0591208
      WRITE (10,14)                                                     F0591209
      DO 486 L=1,IN                                                     F0591210
      IFU=ID(L,2)                                                       F0591211
      ITY=ID(L,1)                                                       F0591212
      IBTR=ID(L,3)                                                      F0591213
      RP=1./RAT(IBTR)                                                   F0591214
      WRITE (10,15)CHAR(L),(PTY(J,ITY),J=1,2),PTYI,IFU,                 F0591215
     1(FUDAU(M,IFU),M=1,6),BOT(IBTR),TOP(IBTR),RP                       F0591216
486   CONTINUE                                                          F0591217
      WRITE (10,16)                                                     F0591218
      WRITE (10,11)                                                     F0591219
      WRITE (10,10)(PLH1,PLH2,I=1,12),PLH3                              F0591220
      DO 490 KK=1,NFREQ                                                 F0591221
      DO 487 L=1,125                                                    F0591222
487   PA(L)=BLANK                                                       F0591223
      DO 489 J=1,IN                                                     F0591224
      L=ISB(J,KK)                                                       F0591225
      IF(L.LT.1) L=1                                                    F0591226
      IF(L.GT.125) L=125                                                F0591227
      IF(NZER(PA(L),BLANK))GO TO 488                                    F0591228
      PA(L)=CHAR(J)                                                     F0591229
      GO TO 489                                                         F0591230
```


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```
 488  PA(L)=CHAR(6)                                                    F0591231
 489  CONTINUE                                                         F0591232
      WRITE (10,9)KK,PA                                                F0591233
 490  CONTINUE                                                         F0591234
      WRITE (10,10)(PLH1,PLH2,I=1,12),PLH3                             F0591235
      WRITE (10,11)                                                    F0591236
 495  CONTINUE                                                         F0591237
      DO 499 K=2,II                                                    F0591238
      IPPCB(K,2)=-IPPCB(K,2)                                           F0591239
 499  CONTINUE                                                         F0591240
      GO TO 110                                                        F0591241
      END                                                              F0591242


$IBFTC F0592   M94,FULIST,REF,XR6                                      F0592000
      SUBROUTINE DCPLOT (IJKLM,IOUT)                                   F0592001
C               DECODE *PLOT CONTROL CARDS                             F0592002
      LOGICAL SWITCH                                                   F0592003
      LOGICAL ZERO,NZER,LIST,KIKOFF                                    F0592004
      COMPLEX F                                                        F0592005
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR         F0592006
      COMMON/PPCB/IPPCB(41,6),BOT(41),TOP(41)                          F0592007
      COMMON /NUCLC/F(100,61)    ,DUM(123)                             F0592008
      DIMENSION QPPCB(41,6)                                            F0592009
      EQUIVALENCE (IPPCB,QPPCB)                                        F0592010
      DIMENSION CHAR(6)                                                F0592011
      DIMENSION IFIELD(4)                                              F0592012
      DATA USE/1HU/                                                    F0592013
      DATA (CHAR(I),I=1,6)/1H*,1H.,1H+,1H',1H,,1HX/                    F0592014
      DATA TF,TL,TA,TN,TS,TR,SLASH,COMMA,PLOT,LPRN,RPRN,BLANK/         F0592015
     11HF,1HL,1HA,1HN,1HS,1HR,1H/,1H,,4HPLOT,1H(,1H),1H /              F0592016
      DATA TI/1HI/                                                     F0592017
      DATA TM/1HM/                                                     F0592018
 1    FORMAT (80A1)                                                    F0592019
 2    FORMAT (1H ,80A1)                                                F0592020
 3    FORMAT (A6)                                                      F0592021
 4    FORMAT (I6)                                                      F0592022
 7    FORMAT (4A6)                                                     F0592023
 8    FORMAT (2E12.0)                                                  F0592024
      CALL SWTHOF (12)                                                 F0592025
      J=IJKLM                                                          F0592026
      DO 401 K=2,41                                                    F0592027
 401  QPPCB(K,6)=BLANK                                                 F0592028
      IOUT=9                                                           F0592029
      I=1                                                              F0592030
      GO TO 403                                                        F0592031
 402  IOUT=-9                                                          F0592032
      CALL SWTHON (12)                                                 F0592033
      CALL WROUT (14,234)                                              F0592034
      GO TO 412                                                        F0592035
 403  DO 404 K=1,41                                                    F0592036
      DO 404 L=2,5                                                     F0592037
      IPPCB(K,L)=0                                                     F0592038
 404  CONTINUE                                                         F0592039
 405  I=I+1                                                            F0592040
```


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```
      IFIELD(1)=-1                                                      F0592041
      IFIELD(2)=-1                                                      F0592042
      IFIELD(3)=-1                                                      F0592043
      IFIELD(4)=-1                                                      F0592044
      IPPCB(1,2)=I                                                      F0592045
406   IF(ZERO(RA(J),TF)) GO TO 414                                      F0592046
      IF(ZERO(RA(J),TM)) GO TO 414                                      F0592047
      IF(ZERO(RA(J),TL)) GO TO 415                                      F0592048
      IF(ZERO(RA(J),TA)) GO TO 416                                      F0592049
      IF(ZERO(RA(J),TR)) GO TO 417                                      F0592050
      IF(ZERO(RA(J),TI)) GO TO 418                                      F0592051
      IF(ZERO(RA(J),TN)) GO TO 425                                      F0592052
      IF(ZERO(RA(J),USE)) GO TO 470                                     F0592053
      IF(NZER(RA(J),TS))GO TO 402                                       F0592054
407   J=J+1                                                             F0592055
      IF(NZER(RA(J),SLASH))GO TO 407                                    F0592056
      J=J+1                                                             F0592057
      IFIELD(3)=0                                                       F0592058
      IF(ZERO(RA(J),TA)) GO TO 430                                      F0592059
      IF(ZERO(RA(J),TR)) GO TO 426                                      F0592060
      IK=IK+1                                                           F0592061
      IPPCB(I,5)=-1                                                     F0592062
410   IF(ZERO(RA(J),COMMA))GO TO 411                                    F0592063
      J=J+1                                                             F0592064
      GO TO 410                                                         F0592065
411   J=J+1                                                             F0592066
      IF(ZERO(RA(J),COMMA)) GO TO 412                                   F0592067
      GO TO 460                                                         F0592068
412   CALL CARD                                                         F0592069
      CALL PACK (2,5,WO,RA)                                             F0592070
      IF(NZER(WO,PLOT)) GO TO 450                                       F0592071
      J=5                                                               F0592072
413   J=J+1                                                             F0592073
      IF(NZER(RA(J),COMMA))GO TO 413                                    F0592074
      J=J+1                                                             F0592075
      IF(ZERO(RA(J),COMMA)) GO TO 412                                   F0592076
      GO TO 460                                                         F0592077
414   IPPCB(I,3)=1                                                      F0592078
      GO TO 420                                                         F0592079
415   IPPCB(I,3)=2                                                      F0592080
      GO TO 420                                                         F0592081
416   IPPCB(I,3)=3                                                      F0592082
      GO TO 420                                                         F0592083
417   IPPCB(I,3)=4                                                      F0592084
      GO TO 420                                                         F0592085
418   IPPCB(I,3)=5                                                      F0592086
420   IQS=4                                                             F0592087
      IFIELD(1)=0                                                       F0592088
421   J=J+1                                                             F0592089
      IF(NZER(RA(J),SLASH)) GO TO 421                                   F0592090
      L1=J+1                                                            F0592091
422   J=J+1                                                             F0592092
      IF(NZER(RA(J),COMMA)) GO TO 422                                   F0592093
423   L2=J-1                                                            F0592094
      CALL PACK (L1,L2,AO,RA)                                           F0592095
      CALL RITE31                                                       F0592096
      WRITE (31,3)AO                                                    F0592097
      CALL READ31                                                       F0592098
```


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```
      READ (31,4)II                                                     F0592099
      IPPCB(I,IQS)=II                                                   F0592100
      GO TO 410                                                         F0592101
425   IQS=2                                                             F0592102
      IFIELD(2)=0                                                       F0592103
      GO TO 421                                                         F0592104
426   IQS=5                                                             F0592105
427   J=J+1                                                             F0592106
      IF(NZER(RA(J),LPRN))GO TO 427                                     F0592107
      L1=J+1                                                            F0592108
428   J=J+1                                                             F0592109
      IF(NZER(RA(J),RPRN))GO TO 428                                     F0592110
      GO TO 423                                                         F0592111
430   J=J+1                                                             F0592112
      IF(NZER(RA(J),LPRN)) GO TO 430                                    F0592113
      L1=J+1                                                            F0592114
      K1=-1                                                             F0592115
431   J=J+1                                                             F0592116
      K1=K1+1                                                           F0592117
      IF(NZER(RA(J),COMMA)) GO TO 431                                   F0592118
      IF(K1-6)432,432,435                                               F0592119
432   IF(K1)434,434,433                                                 F0592120
433   L2=J-1                                                            F0592121
      CALL PACK (L1,L2,AO,RA)                                           F0592122
      AOO=BLANK                                                         F0592123
      GO TO 436                                                         F0592124
434   AO=BLANK                                                          F0592125
      AOO=BLANK                                                         F0592126
      GO TO 436                                                         F0592127
435   L2=L1+5                                                           F0592128
      CALL PACK (L1,L2,AO,RA)                                           F0592129
      L1=L2+1                                                           F0592130
      L2=J-1                                                            F0592131
      CALL PACK(L1,L2,AOO,RA)                                           F0592132
436   L1=J+1                                                            F0592133
      K1=-1                                                             F0592134
437   J=J+1                                                             F0592135
      K1=K1+1                                                           F0592136
      IF(NZER(RA(J),RPRN)) GO TO 437                                    F0592137
      IF(K1-6)438,438,442                                               F0592138
438   IF(K1)439,439,441                                                 F0592139
439   BO=BLANK                                                          F0592140
440   BOO=BLANK                                                         F0592141
      GO TO 443                                                         F0592142
441   L2=J-1                                                            F0592143
      CALL PACK (L1,L2,BO,RA)                                           F0592144
      GO TO 440                                                         F0592145
442   L2=L1+5                                                           F0592146
      CALL PACK (L1,L2,BO,RA)                                           F0592147
      L1=L2+1                                                           F0592148
      L2=J-1                                                            F0592149
      CALL PACK (L1,L2,BOO,RA)                                          F0592150
443   CALL RITE31                                                       F0592151
      WRITE (31,7)AO,AOO,BO,BOO                                         F0592152
      CALL READ31                                                       F0592153
      READ (31,8)AO,BO                                                  F0592154
      BOT(I)=AO                                                         F0592155
      TOP(I)=BO                                                         F0592156
```


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```
      IK=IK+1                                                           F0592157
      GO TO 410                                                         F0592158
460   IF(IFIELD(1))406,461,406                                          F0592159
461   IF(IFIELD(2))406,462,406                                          F0592160
462   IF(IFIELD(3))406,463,406                                          F0592161
463   IF(IFIELD(4))464,405,464                                          F0592162
464   IF(NZER(RA(J),USE)) GO TO 405                                     F0592163
470   IFIELD(4)=0                                                       F0592164
471   J=J+1                                                             F0592165
      IF(NZER(RA(J),SLASH)) GO TO 471                                   F0592166
      J=J+1                                                             F0592167
      QPPCB(I,6)=RA(J)                                                  F0592168
      GO TO 410                                                         F0592169
450   KK=IPPCB(1,2)                                                     F0592170
      DO 455 K=2,KK                                                     F0592171
      IF(NZER(QPPCB(K,6),BLANK)) GO TO 455                              F0592172
      I=K                                                               F0592173
      J=0                                                               F0592174
      IPN=IPPCB(K,2)                                                    F0592175
      DO 454 L=I,KK                                                     F0592176
      IF(IPPCB(L,2)-IPN) 454,451,454                                    F0592177
451   J=J+1                                                             F0592178
      IF(J-5)453,453,452                                                F0592179
452   J=1                                                               F0592180
453   QPPCB(L,6)=CHAR(J)                                                F0592181
454   CONTINUE                                                          F0592182
455   CONTINUE                                                          F0592183
      CALL SWTHOF (12)                                                  F0592184
      RETURN                                                            F0592185
      END                                                               F0592186
```


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AUXILIARY SYSTEM

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```
$ORIGIN        A,CK2,NOREW                                                  000
$IBFTC AA893   M94,XR7,FULIST,REF                                        AA893000
      SUBROUTINE AUXILU (IRET)                                           AA893001
C               AUXILIARY SYSTEM MONITOR                                 AA893002
C     IRET=1  - A CARD WILL BE READ UPON RETURNING TO THE JOB MONITOR.   AA893003
C               THIS CARD MUST BE A *BEGIN CONTROL CARD OR ANY CARD      AA893004
C               OR SERIES OF CARDS WHICH ARE READ AND PROCESSED          AA893005
C               IN THE CARD ROUTINE AND ARE IN TURN                      AA893006
C               FOLLOWED BY A *BEGIN CONTROL CARD.                       AA893007
C     IRET=2  - A CALL TO THE CARD ROUTINE PRECEEDS THE RETURN.          AA893008
C               THIS SETS A *BEGIN, *JOB, OR *END CARD INTO THE          AA893009
C               CARD ARRAY TO BE PROCESSED BY THE JOB MONITOR.           AA893010
      COMMON NFREQ,DT,FREQ(100),RA(82),ISWTCH(10),DAY,DON,YEAR           AA893011
      LOGICAL SWITCH,ZERO,NZER                                           AA893012
C     THE REMAINING PORTION OF THE PROGRAM IS TO BE                      AA893013
C     WRITTEN BY THE USER                                                AA893014
C     THIS SYSTEM IS INCLUDED TO ENABLE A USER OF SYSTRAN                AA893015
C     TO UTILIZE THE DATA GENERATED BY THE SYSTEM IN                     AA893016
C     A SPECIALIZED MANNER WHICH THE USER DESIRES.                       AA893017
C     THE DATA LINKAGE BETWEEN THIS SYSTEM AND THE                       AA893018
C     OTHER SYSTEMS OF SYSTRAN MUST BE ACCOMPLISHED                      AA893019
C     THROUGH THE USE OF THE PROGRAM FILES.                              AA893020
C     40000 (OCTAL) CELLS ARE AVAILABLE FOR THIS SYSTEM                  AA893021
C     ANY OF THE ROUTINES PRESENT IN THE JOB MONITOR ARE                 AA893022
C     AVAILABLE FOR USE IN THIS SYSTEM.                                  AA893023
C     IN USING ANY PROGRAM FILES THE USER SHOULD                         AA893024
C     BE SURE AND CHECK THE PROPER SWITCHES TO SEE                       AA893025
C     IF THE FILE HAS BEEN GENERATED PROPERLY.                           AA893026
C***                                                                     AA893027
C***                                                                     AA893028
 1000 CALL CARD                                                          AA893029
      IRET=2                                                             AA893030
      RETURN                                                             AA893031
      END                                                                AA893032
```


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APPENDIX II

LOADING OF SYSTRAN

Loading of the SYSTRAN system is accomplished through the use of the IEDIT feature of IBSYS. This method of loading is used because of the physical size of the object (binary) program deck (about 4000 cards).

The mechanics involved in the usage of the IEDIT feature require a permanent external file which contains the object decks of all the routines which make up the SYSTRAN system and a load deck containing all necessary IBSYS and IBJOB control cards.

The permanent external file may be either a tape or disk file the only restriction being that it be in the same format as the normal system input file. An end of file mark must follow the last object deck on this file.

The load deck which is required contains all IBSYS and IBJOB control cards including those which are necessary for using the IEDIT feature and the ORIGIN cards which describe to the IBJOB system the OVERLAY specifications.

The following load deck will properly load the SYSTRAN system and allow the execution of any following data deck.

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As can be noted in the load deck each routine is represented by a $IBLDR control card. If it is necessary to replace, at load time, any routine contained on the permanent external file with a new routine, the new routine may be loaded in the following manner. Replace the $IBLDR card (in the load deck) of the deck which is to be replaced with the following deck of cards.

```
$IEDIT
 object or source deck of new routine
$IEDIT              SYSxxx,SRCH1
```

If two or more sequential ordered routines are to be replaced only one $IEDIT and one $IEDIT SYSxxx,SRCH1 card is necessary. Care must be exercised however to make sure that all necessary $ORIGIN cards are included in the newly inserted deck.

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APPENDIX II (CONT.)

```
$EXECUTE        IBJOB
$IBJOB SYSTRN   SOURCE,MAP,FILES,GO
$POOL           BLOCK=0015,BUFCT=002,-UNIT31-
$IEDIT          SYSLB2,SRCH1
$IBLDR J0001
$IBLDR J0002
$IBLDR J0003
$IBLDR J0004
$IBLDR J0005
$IBLDR J0006
$IBLDR J0007
$IBLDR J0008
$IBLDR J0009
$ORIGIN         A,CK2,NOREW
$IBLDR JA110
$IBLDR JA111
$ORIGIN         A,CK2,NOREW
$IBLDR TA212
$ORIGIN         B,CK2,NOREW
$IBLDR TB113
$IBLDR TB114
$ORIGIN         B,CK2,NOREW
$IBLDR TB215
$IBLDR TB216
$ORIGIN         B,CK2,NOREW
$IBLDR TB317
$IBLDR TB318
$ORIGIN         C,CK2,NOREW
$IBLDR TC119
$ORIGIN         C,CK2,NOREW
$IBLDR TC220
$IBLDR TC221
$ORIGIN         C,CK2,NOREW
$IBLDR TC322
$IBLDR TC323
$ORIGIN         C,CK2,NOREW
$IBLDR TC424
```


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APPENDIX II (CONT.)

```
$ORIGIN        B,CK2,NOREW
$IBLDR TB425
$IBLDR TB426
$ORIGIN        A,CK2,NOREW
$IBLDR RA428
$ORIGIN        D,CK2,NOREW
$IBLDR RD129
$IBLDR RD130
$IBLDR RD131
$ORIGIN        D,CK2,NOREW
$IBLDR RD232
$ORIGIN        E,CK2,NOREW
$IBLDR RE133
$ORIGIN        E,CK2,NOREW
$IBLDR RE234
$IBLDR RE235
$ORIGIN        E,CK2,NOREW
$IBLDR RE336
$IBLDR RE337
$IBLDR RE338
$IBLDR RE339
$ORIGIN        A,CK2,NOREW
$IBLDR UA540
$IBLDR UA541
$IBLDR UA542
$IBLDR UA543
$ORIGIN        F,CK2,NOREW
$IBLDR UF144
$ORIGIN        G,CK2,NOREW
$IBLDR UG145
$IBLDR UG146
$IBLDR UG147
$ORIGIN        G,CK2,NOREW
$IBLDR UG248
$ORIGIN        F,CK2,NOREW
$IBLDR UF249
$ORIGIN        F,CK2,NOREW
$IBLDR UF350
```


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APPENDIX II (CONT.)

```
$ORIGIN          A,CK2,NOREW
$IBLDR CA651
$IBLDR CA652
$ORIGIN          H,CK2,NOREW
$IBLDR CH153
$ORIGIN          I,CK2,NOREW
$IBLDR CI154
$ORIGIN          I,CK2,NOREW
$IBLDR CI255
$ORIGIN          H,CK2,NOREW
$IBLDR CH256
$IBLDR CH257
$IBLDR CH258
$ORIGIN          Z,CK2,NOREW
$IBLDR CZ257
$ORIGIN          Z,CK2,NOREW
$IBLDR CZ258
$ORIGIN          H,CK2,NOREW
$IBLDR CH359
$IBLDR CH360
$ORIGIN          H,CK2,NOREW
$IBLDR CH461
$ORIGIN          H,CK2,NOREW
$IBLDR CH562
$ORIGIN          J,CK2,NOREW
$IBLDR CJ163
$ORIGIN          J,CK2,NOREW
$IBLDR CJ264
$IBLDR CJ265
$ORIGIN          A,CK2,NOREW
$IBLDR FA766
$ORIGIN          K,CK2,NOREW
$IBLDR FK167
$ORIGIN          L,CK2,NOREW
$IBLDR FL168
$ORIGIN          L,CK2,NOREW
$IBLDR FL269
$IBLDR FL270
$IBLDR FL271
```


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```
$IBLDR FL272
$ORIGIN          M,CK2,NOREW
$IBLDR FM173
$ORIGIN          M,CK2,NOREW
$IBLDR FM274
$ORIGIN          L,CK2,NOREW
$IBLDR FL375
$IBLDR FL376
$IBLDR FL377
$ORIGIN          N,CK2,NOREW
$IBLDR FN178
$ORIGIN          N,CK2,NOREW
$IBLDR FN279
$IBLDR FN280
$IBLDR FN281
$ORIGIN          K,CK2,NOREW
$IBLDR FK282
$ORIGIN          K,CK2,NOREW
$IBLDR FK383
$ORIGIN          O,CK2,NOREW
$IBLDR FO184
$ORIGIN          O,CK2,NOREW
$IBLDR FO285
$ORIGIN          O,CK2,NOREW
$IBLDR FO386
$IBLDR FO387
$IBLDR FO388
$IBLDR FO389
$ORIGIN          O,CK2,NOREW
$IBLDR FO490
$ORIGIN          O,CK2,NOREW
$IBLDR FO591
$IBLDR FO592
$ORIGIN          A,CK2,NOREW
$IBLDR AA893
$IEDIT
$EOF
```

SYSTRAN DATA DECK

```
$EOF
```


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APPENDIX III

PROGRAM DIAGNOSTICS

THE STANDARD DIAGNOSTICS WRITTEN BY SYSTRAN APPEAR IN THE FOLLOWING FORMAT.

```
***** (DIAGNOSTIC STATEMENT) *****                    N
```

N IS AN ERROR CODE WHICH CAN BE USED IN CONJUNCTION WITH THE TABLE ON THE FOLLOWING PAGE TO LOCATE THE PROGRAM DECK FROM WHICH THE DIAGNOSTIC WAS WRITTEN.

THE FOLLOWING IS A LIST OF THE DIAGNOSTIC STATEMENTS WHICH ARE WRITTEN BY SYSTRAN

THE ABOVE CARD CONTAINS A FIELD WHICH IS INCORRECTLY WRITTEN
A FIELD ON THE ABOVE CARD HAS A PARENTHESIS ERROR
THE ABOVE CARD CONTAINS AN ILLEGITIMATE FIELD
A FIELD ON THE ABOVE CARD USES AN OPERATOR INCORRECTLY
IN A FIELD ON THE ABOVE CARD THE = IS NOT THE FIRST OPERATOR
TEMPORARY STORAGE EXCEEDED -- ERROR SCAN CONTINUES
THE OPERATIONS ROUTINE HAS ENCOUNTERED AN UNDEFINED OPERATOR
THE ABOVE CARD IS A REFERENCE TO AN UNDEFINED SYSTEM
THE DUMMY CENTER OF MASS ROUTINE HAS BEEN LOADED
THE PROGRAM WILL GO TO THE NEXT JOB OR TERMINATE WITH *END
THE ABOVE CARD CONTAINS AN UNDEFINED FIELD
A FIELD IS MISSING FROM THE ABOVE CARD
LOADING OF ALL CHANNELS IS NOT POSSIBLE FOR THIS TEST
AN ILLEGAL PRINT OR PLOT HAS BEEN SPECIFIED FOR THIS TEST
ATTEMPT TO LOAD A TEST WHICH IS NOT ON THE INPUT TAPE
(REF. SCALING) TO AN UNDEFINED PLOT (DYN. SCALING SUB.)
AN ATTEMPT TO OVERLOAD THE FREQUENCY ARRAY HAS BEEN MADE
THE ABOVE FREQUENCY DATA IS INCORRECTLY WRITTEN
AN ATTEMPT TO UNDERLOAD THE FREQUENCY ARRAY HAS BEEN MADE
THE PROGRAM EXPECTS A *END, *JOB, OR *BEGIN CONTROL CARD
THE FREQUENCIES ARE NOT THOSE USED DURING INTEGRATION
THE ABOVE EDIT CONTROL CARD IS INCORRECTLY WRITTEN
EDIT INPUT TAPE RECORD COUNT IS INCORRECT
FUNCTION MISSING FROM LIBRARY CANNOT PROCEED
PROGRAM EXPECTS A * INPUT CARD AT THIS POINT
MATRIX ON RIGHT OF = NOT DEFINED
MATRIX TO BE INVERTED IS NOT N X N
MORE THAN 25 MATRICES HAVE BEEN DEFINED
INSUFFICIENT STORAGE AVAILABLE FOR MATRIX
MATRIX ELEMENT ON LOAD FILE EXCEEDS DEFINED DIMENSIONS

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APPENDIX III (CONT.)

ERROR CODE LOCATION TABLE

ERROR CODE	DECK NAME	ROUTINE NAME	SYSTEM GROUP	SYSTEM
0 - 3	J0001	EXECUTIVE	JOB MONITOR	EXECUTIVE CONTROL SYSTEM
100 - 106	TB113	FRQTSZ	TIME	FREQUENCY ARRAY GENERATOR
107	TB215	CHCKD		DATA CHECK
108	TB317	EDIT		TIME DATA EDIT
109 - 110	TC119	IPDC		
111	TC322	EDITII		
112	TC424	EDITFI		
200 - 205	FL168	OPERAT	FREQUENCY	MATRIX
206	FL269	MALOAD		
207 - 208	FM173	LONE		
209 - 211	FM274	LTWO		
212	FK282	ANTI		INVERSE TRANSFORM
213	FK383	SCANX		FOURIERTRAN
214	FO184	AVERGE		
215 - 221	FO285	LOAD		
222 - 227	FO386	SCAN		
228	FO387	IPREC		
229	FO388	COMOPS		
230 - 231	FO490	FUNDE		
232 - 233	FO591	PRPLEX		
234	FO592	DCPLOT		
300 - 303	RD129	IBLOAD	REGRESSION	REGRESSION
400	CI154	DECO1	CORRELATION	CORRELATION
401	CI255	DECO2		
402	CJ163	DECPL		
403	CJ264	PLTT		
500	UA542	TESRT	UTILITY	DATA MERGE
501	UF350	WOTD		TIME DATA OUTPUT

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APPENDIX IV

Program Modifications and Restrictions Necessary for Using SYSTRAN on the 7044-7094 Direct Coupled System.

The primary modifications inserted into SYSTRAN to enable its utilization on the DCS were in the definitions of the various files used by the program. The following Table gives the file name modifications which were made.

7094 Stand Alone	7044-7094 DCS
UT1	A(1)
UT2	A(2)
UT3	A(3)
UT4	A(4)
UT5	B(1)
UT6	B(2)
UT7	B(3)
UT8	B(4)
CK1	C(1)

LB2 is still used as the Permanent external file for the IEDIT load of SYSTRAN.

CK2 is still used as the OVERLAY link file.

The DCS system required $SETUP control cards when using, binary tape input files, binary tape output files, and output files which are to be printed or punched. These $SETUP control cards should contain the 7044-7094 DCS file name as the UNITS field.

The OVERLAY link file does not need a $SETUP card.

The IEDIT file (LB2) needs a $SETUP and a $ASSIGN card for correct utilization.

The remaining modifications to SYSTRAN when operating on the 7044-7094 DCS System pertain to the use of the *PAUSE and the *UNLOAD, TAPE/N (UTILITY SYSTEM) control cards. These control cards will not perform the operations for which they were defined, instead they will be treated as comment cards and in no way influence the operation of the program.

A list of the $SETUP cards which are necessary for each of the individual operations on files which may be performed by SYSTRAN follows:

The SYSTRAN output file

Printing of the SYSTRAN output file immediately following execution when only one copy is desired.

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$SETUP C(1) DISK, PRINT

Printing of the SYSTRAN output file immediately following execution and saving this data on a tape which is in DCS Blocked format.

$SETUP C(1) TAPE, PRINT

Saving the SYSTRAN output file on tape in normal FORTRAN format.

$SETUP C(1) DISK, TAPE

The Primary Binary Data File

Assume the data file is tape number ident1

If tape ident1 is not DCS blocked

$SETUP A(3) ident2, TAPE
or
$SETUP A(3) ident1, DISK
or
$SETUP A(3) ident1, ident2

in the third case tape number ident 2 will be DCS blocked at the conclusion of the setup phase.

To use ident2 after it has been DCS blocked the setup card is

$SETUP A(3) ident2

The Binary Time Data File

To generate the Binary Time Data File on tape ident1 blocked in standard DCS format

$SETUP A(2) ident1

To generate this file on ident2 blocked in standard FORTRAN format.

$SETUP A(2) DISK, Ident2
or
$SETUP A(2) TAPE, Ident2

To use a Binary Time Data File present on Tape ident1 blocked in standard DCS format as input (generated previously).

$SETUP A(2) ident 2

To use a Binary Time Data File present on tape ident2 blocked in standard FORTRAN format, as input (generated previously).

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```
$SETUP A(2)    ident2,  TAPE
                or
$SETUP A(2)    ident2,  TAPE
```

The Binary Transform Data File

To generate the Binary Transform Data File on tape ident1 blocked 117 standard DCS format.

```
$SETUP A(1)    ident1
```

To generate this file on tape ident2 blocked in standard FORTRAN format.

```
$SETUP A(1)    DISK,ident2
                or
$SETUP A(1)    TAPE,ident2
```

To use ident1 as input for this file if it is blocked in standard DCS format.

```
$SETUP A(1)    ident1
```

To use ident2 as input for this file if it is blocked in standard FORTRAN format

```
$SETUP A(1)    ident2,  DISK
                or
$SETUP A(1)    ident2,  TAPE
                or
$SETUP A(1)    ident2,  ident3
```

in the latter case tape ident3 will be blocked in standard DCS format and may be used as ident1 was used in the input condition.

The Save File

No setups are necessary since this file is generated and used as input in the same run.

The Utility System Files

The use of a Binary Transform Data File as a Frequency Merge Update File.

Same as the Binary Transform Data File when used as input.

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The generation of the Frequency New Master File

```
$SETUP B(4)    ident1
        or
$SETUP B(4)    DISK,ident2
        or
$SETUP B(4)    TAPE,ident2
```

Tape ident1 will be blocked standard DCS format
Tape ident2 will be blocked standard FORTRAN format.

The use of a Frequency Old Master File if ident1 is blocked in standard DCS format and ident2 is blocked in standard FORTRAN format.

```
$SETUP B(1)    ident2
        or
$SETUP B(1)    ident2,DISK
        or
$SETUP B(1)    ident2,TAPE
        or
$SETUP B(1)    ident2,ident3
```

in the latter case ident3 may be used. The same as ident1 for any future run.

The use of a Binary Time Data File as a Time Merge Update File.

Same as the Binary Time Data File when used as input.

The generation of a Time New Master File

Same as the generation of the Frequency New Master File if B(4) is replaced by B(3)

The use of a Time Old Master File

Same as the use of a Frequency Old Master file if B(1) is replaced by B(2).

The use of a Time Master File as input to the Time Data Retrieval System or the Time Data Output System.

Ident1 is blocked in standard DCS format.
Ident2 is blocked in standard FORTRAN format.

```
$SETUP B(3)    ident1
        or
$SETUP B(3)    ident2,DISK
```


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```
          or
$SETUP B(3)    ident2,TAPE
          or
$SETUP B(3)    ident2,  ident3
```

Ident3 may be used in any future run as ident1 is used.

The use of a Frequency Master File as input to the Frequency Data Retrieval System.

Same as the Time Master File when used as input to the Time Data Retrieval or Output Systems if B(3) is replaced by B(4).

The setup for the output files of the Data Retrieval systems is the same as the setup for the generation of these files from normal input data.

The only restriction on the $SETUP control cards is that a unit designation may not appear on more than one $SETUP card for any one run.

The control cards necessary to setup the permanent external program file in order to use the IEDIT load are as follows:

```
$SETUP LB2     ident
$ASSIGN        SYSLB2
```

where ident is the permanent external program file blocked in standard DCS format.

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APPENDIX V

PROGRAM EXAMPLES

1 FOURIER TRANSFORM AND INVERSE TRANSFORM
2 CORRELATION SYSTEM
3 MATRIX SYSTEM
4 REGRESSION SYSTEM

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Contrails

```
***** JOB SEPARATICN *****

C       EXAMPLE OF THE FOURIER TRANSFORM AND THE INVERSE
C       TRANSFORM SYSTEMS USING AS THE INPUT TIME
C       FUNCTION  F(T) = SIN(6.28318T)  EVALUATED OVER THE INTERVAL
C       T=0,1 AT INCREMENTS OF .01,  F(T) = 0  OTHERWISE.
C       THIS FUNCTICN WAS EXTERNALLY GENERATED AS A BINARY
C       TIME DATA FILE OVER THE INTERVAL T=0,10 AT INCREMENTS
C       OF .01.  IT IS CHANNEL 1 OF TEST 1 ON THIS FILE.
*       BEGIN TIME SYSTEM,,TRANSFER CONTROL TO TIME SYSTEM MONITOR
*       DELTAT,.01,,SET TIME INCREMENT
*       FREQUENCY,COMPUTE/2,BASE/0.,NFREQ/90,DELTF/.022222
C       THE ABOVE CARD SETS THE FREQUENCY ARRAY
*       INTEGRATE,,ENTER THE TRANSFORM GENERATOR SYSTEM
*       SAMPLE,TEST/1,RATE/1,ZT/1,NT/100
C       COMPUTE THE FOURIER TRANSFORM OF THE TIME FUNCTION
C       USING EVERY POINT FROM POINT 1 TO POINT 101.
C       UNDER DCS MODE, THE FOLLOWING INTEGRATION TIMES WILL BE ZERO SINCE THE
C       7094 CANNOT ACCESS THE 7044 CLOCK
*       BEGIN FREQUENCY SYSTEM,,TRANSFER CONTROL TO THE FREQUENCY SYSTEM MONITOR
*       FOURIERTRAN,,TRANSFER CONTROL TO THE FOURIERTRAN SYSTEM
*       LOAD,TEST/1,,POSITION THE BINARY TRANSFORM DATA FILE FOR

        *LOAD,TEST/     1
C       THE LOADING CF THE TRANSFORMS OF TEST NUMBER 1.
*       DEFINE,F/1,CH/1,CAL/1.,,LOAC THE TRANSFORM OF CHANNEL 1 OF
C       TEST 1 MULTIPLIED BY 1. INTO F1
*       TRANSLATE,,ENTER THE FOURIERTRAN LANGUAGE TRANSLATOR OPTION
        F2=W*(0.,-1.),,GENERATE -JW.  THIS CARD ALSO SETS UP F40
C       AS THE FREQUENCY ARRAY FOR USE IN GENERATING THE SAVE
C       FILE FOR THE INVERSE TRANSFORM.
C       THE ANALYTIC EXPRESSION FOR THE TRANSFORM OF F(T) IS
C            T(F(T)) = (B*(1-EXP(-J*W*6.28318/B)))/(B*B-W*W)
C       WHERE  B = 6.28318   AND W IS THE FREQUENCY ARRAY*2(PI)
C       THE FOLLOWING CARDS GENERATE THIS TRANSFORM
        K1=(6.28318,0.),,SET THE CONSTANT B
        F3=K1*((1.,0.)-CEXP(F2))/(K1*K1-W*W),,GENERATE T(F(T))
        END,,TERMINATE THE TRANSLATOR OPTION
*       FUNCTION DEFINITIONS,,ENTER THE FUNCTION LABELING OPTION
*       NAME,F/1,AS/$GENERATED BY INTEG$,UNITS/$RATING F(T)$
*       NAME,F/3,AS/$GENERATED FROM THE$,UNITS/$ ANALYTIC T(F(T))$
*       PRINT,F/1,F/3,,PRINT BOTH FUNCTIONS
*       PLOT,N/1,MF/1,SCALED/ABS(-.52,.52),USE/*,,PLOT ON PLOT NUMBER 1 THE
```


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REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
-3.02522E-07	0.	3.02521E-07	-6.51924E 00	3.14159E 00	0.	1
1.54896E-03	2.21539E-02	2.22080E-02	-1.65349E 00	1.50040E 00	2.22220E-02	2
6.17551E-03	4.39412E-02	4.43730E-02	-1.35288E 00	1.43120E 00	4.44440E-02	3
1.38165E-02	6.50017E-02	6.64539E-02	-1.17748E 00	1.36189E 00	6.66660E-02	4
2.43682E-02	8.49828E-02	8.84075E-02	-1.05351E 00	1.29212E 00	8.88880E-02	5
3.76878E-02	1.03547E-01	1.10193E-01	-9.57848E-01	1.22202E 00	1.11110E-01	6
5.35947E-02	1.20376E-01	1.31768E-01	-8.80189E-01	1.15181E 00	1.33332E-01	7
7.18722E-02	1.35173E-01	1.53093E-01	-8.15045E-01	1.08168E 00	1.55554E-01	8
9.22723E-02	1.47668E-01	1.74127E-01	-7.59134E-01	1.01170E 00	1.77776E-01	9
1.14518E-01	1.57622E-01	1.94831E-01	-7.10342E-01	9.41912E-01	1.99998E-01	10
1.38305E-01	1.64827E-01	2.15166E-01	-6.67227E-01	8.72293E-01	2.22220E-01	11
1.63309E-01	1.69114E-01	2.35094E-01	-6.28758E-01	8.02777E-01	2.44442E-01	12
1.89189E-01	1.70348E-01	2.54580E-01	-5.94176E-01	7.33282E-01	2.66664E-01	13
2.15588E-01	1.68439E-01	2.73587E-01	-5.62905E-01	6.63724E-01	2.88886E-01	14
2.42145E-01	1.63332E-01	2.92081E-01	-5.34497E-01	5.94028E-01	3.11108E-01	15
2.68492E-01	1.55017E-01	3.10030E-01	-5.08597E-01	5.24146E-01	3.33330E-01	16
2.94265E-01	1.43526E-01	3.27401E-01	-4.84920E-01	4.54081E-01	3.55552E-01	17
3.19103E-01	1.28929E-01	3.44165E-01	-4.63234E-01	3.83890E-01	3.77774E-01	18
3.42657E-01	1.11340E-01	3.60292E-01	-4.43346E-01	3.13713E-01	3.99996E-01	19
3.64593E-01	9.09078E-02	3.75756E-01	-4.25094E-01	2.43751E-01	4.22218E-01	20
3.84598E-01	6.78195E-02	3.90532E-01	-4.08344E-01	1.74207E-01	4.44440E-01	21
4.02378E-01	4.22966E-02	4.04594E-01	-3.92980E-01	1.05058E-01	4.66662E-01	22
4.17668E-01	1.45910E-02	4.17923E-01	-3.78903E-01	3.53793E-02	4.88884E-01	23
4.30236E-01	-1.50184E-02	4.30498E-01	-3.66029E-01	6.24783E 00	5.11106E-01	24
4.39877E-01	-4.62265E-02	4.42300E-01	-3.54283E-01	6.17815E 00	5.33328E-01	25
4.46427E-01	-7.87098E-02	4.53313E-01	-3.43602E-01	6.10901E 00	5.55550E-01	26
4.49755E-01	-1.12129E-01	4.63522E-01	-3.33930E-01	6.03946E 00	5.77772E-01	27
4.49771E-01	-1.46131E-01	4.72915E-01	-3.25217E-01	5.96950E 00	5.99994E-01	28
4.46426E-01	-1.80358E-01	4.81482E-01	-3.17420E-01	5.89932E 00	6.22216E-01	29
4.39706E-01	-2.14449E-01	4.89213E-01	-3.10502E-01	5.82913E 00	6.44438E-01	30
4.29643E-01	-2.48044E-01	4.96104E-01	-3.04427E-01	5.75907E 00	6.66660E-01	31
4.16305E-01	-2.80789E-01	5.02148E-01	-2.99169E-01	5.68919E 00	6.88882E-01	32
3.99798E-01	-3.12344E-01	5.07343E-01	-2.94698E-01	5.61949E 00	7.11104E-01	33
3.80266E-01	-3.42379E-01	5.11689E-01	-2.90994E-01	5.54993E 00	7.33326E-01	34
3.57887E-01	-3.70587E-01	5.15187E-01	-2.88035E-01	5.48044E 00	7.55548E-01	35
3.32870E-01	-3.96681E-01	5.17840E-01	-2.85804E-01	5.41092E 00	7.77770E-01	36
3.05455E-01	-4.20402E-01	5.19654E-01	-2.84285E-01	5.34130E 00	7.99992E-01	37
2.75905E-01	-4.41519E-01	5.20636E-01	-2.83465E-01	5.27151E 00	8.22214E-01	38
2.44510E-01	-4.59830E-01	5.20796E-01	-2.83332E-01	5.20154E 00	8.44436E-01	39
2.11573E-01	-4.75169E-01	5.20143E-01	-2.83877E-01	5.13140E 00	8.66658E-01	40
1.77415E-01	-4.87406E-01	5.18691E-01	-2.85091E-01	5.06119E 00	8.88880E-01	41
1.42367E-01	-4.96444E-01	5.16454E-01	-2.86968E-01	4.99109E 00	9.11102E-01	42
1.06765E-01	-5.02225E-01	5.13448E-01	-2.89503E-01	4.92132E 00	9.33324E-01	43
7.09485E-02	-5.04729E-01	5.09691E-01	-2.92693E-01	4.85201E 00	9.55546E-01	44
3.52549E-02	-5.03971E-01	5.05202E-01	-2.96535E-01	4.78282E 00	9.77768E-01	45
1.42787E-05	-5.00002E-01	5.00002E-01	-3.01028E-01	4.71239E 00	9.99990E-01	46
-3.44537E-02	-4.92911E-01	4.94114E-01	-3.06173E-01	4.64202E 00	1.02221E 00	47
-6.78411E-02	-4.82817E-01	4.87560E-01	-3.11972E-01	4.57282E 00	1.04443E 00	48
-9.98593E-02	-4.69872E-01	4.80366E-01	-3.18428E-01	4.50351E 00	1.06666E 00	49
-1.30241E-01	-4.54256E-01	4.72558E-01	-3.25545E-01	4.43374E 00	1.08888E 00	50
-1.58739E-01	-4.36176E-01	4.64163E-01	-3.33329E-01	4.36364E 00	1.11110E 00	51
-1.85137E-01	-4.15860E-01	4.55209E-01	-3.41789E-01	4.29344E 00	1.13332E 00	52
-2.09243E-01	-3.93559E-01	4.45725E-01	-3.50933E-01	4.22330E 00	1.15554E 00	53
-2.30896E-01	-3.69538E-01	4.35742E-01	-3.60771E-01	4.15332E 00	1.17777E 00	54
-2.49967E-01	-3.44075E-01	4.25289E-01	-3.71315E-01	4.08353E 00	1.19999E 00	55

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REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
-2.66360E-01	-3.17457E-01	4.14399E-01	-3.82581E-01	4.01391E 00	1.22221E 00	56
-2.80009E-01	-2.89979E-01	4.03104E-01	-3.94583E-01	3.94440E 00	1.24443E 00	57
-2.90884E-01	-2.61932E-01	3.91436E-01	-4.07340E-01	3.87490E 00	1.26665E 00	58
-2.98984E-01	-2.33610E-01	3.79427E-01	-4.20871E-01	3.80535E 00	1.28888E 00	59
-3.04342E-01	-2.05298E-01	3.67112E-01	-4.35201E-01	3.73565E 00	1.31110E 00	60
-3.07019E-01	-1.77273E-01	3.54523E-01	-4.50355E-01	3.66577E 00	1.33332E 00	61
-3.07108E-01	-1.49801E-01	3.41695E-01	-4.66361E-01	3.59570E 00	1.35554E 00	62
-3.04723E-01	-1.23130E-01	3.28660E-01	-4.83253E-01	3.52551E 00	1.37776E 00	63
-3.00008E-01	-9.74916E-02	3.15452E-01	-5.01067E-01	3.45533E 00	1.39999E 00	64
-2.93127E-01	-7.30974E-02	3.02104E-01	-5.19843E-01	3.38537E 00	1.42221E 00	65
-2.84262E-01	-5.01353E-02	2.88650E-01	-5.39629E-01	3.31583E 00	1.44443E 00	66
-2.73613E-01	-2.87692E-02	2.75121E-01	-5.60475E-01	3.24668E 00	1.46665E 00	67
-2.61392E-01	-9.13915E-03	2.61552E-01	-5.82443E-01	3.17700E 00	1.48887E 00	68
-2.47821E-01	8.64337E-03	2.47972E-01	-6.05597E-01	3.10627E 00	1.51110E 00	69
-2.33130E-01	2.44928E-02	2.34413E-01	-6.30018E-01	3.03659E 00	1.53332E 00	70
-2.17552E-01	3.83504E-02	2.20906E-01	-6.55792E-01	2.96744E 00	1.55554E 00	71
-2.01321E-01	5.01853E-02	2.07482E-01	-6.83021E-01	2.89790E 00	1.57776E 00	72
-1.84666E-01	5.99924E-02	1.94166E-01	-7.11826E-01	2.82794E 00	1.59998E 00	73
-1.67814E-01	6.77925E-02	1.80990E-01	-7.42345E-01	2.75776E 00	1.62221E 00	74
-1.50982E-01	7.36304E-02	1.67979E-01	-7.74744E-01	2.68757E 00	1.64443E 00	75
-1.34377E-01	7.75740E-02	1.55161E-01	-8.09219E-01	2.61750E 00	1.66665E 00	76
-1.18190E-01	7.97121E-02	1.42559E-01	-8.46007E-01	2.54762E 00	1.68887E 00	77
-1.02601E-01	8.01524E-02	1.30197E-01	-8.85399E-01	2.47792E 00	1.71109E 00	78
-8.77687E-02	7.90195E-02	1.18099E-01	-9.27753E-01	2.40837E 00	1.73332E 00	79
-7.38366E-02	7.64524E-02	1.06286E-01	-9.73522E-01	2.33887E 00	1.75554E 00	80
-6.09261E-02	7.26017E-02	9.47787E-02	-1.02329E 00	2.26935E 00	1.77776E 00	81
-4.91396E-02	6.76277E-02	8.35955E-02	-1.07782E 00	2.19974E 00	1.79998E 00	82
-3.85571E-02	6.16971E-02	7.27543E-02	-1.13814E 00	2.12995E 00	1.82220E 00	83
-2.92374E-02	5.49807E-02	6.22712E-02	-1.20571E 00	2.05997E 00	1.84443E 00	84
-2.12186E-02	4.76509E-02	5.21617E-02	-1.28265E 00	1.98983E 00	1.86665E 00	85
-1.45172E-02	3.98789E-02	4.24391E-02	-1.37223E 00	1.91963E 00	1.88887E 00	86
-9.12956E-03	3.18320E-02	3.31153E-02	-1.47997E 00	1.84953E 00	1.91109E 00	87
-5.03316E-03	2.36725E-02	2.42016E-02	-1.61616E 00	1.77976E 00	1.93331E 00	88
-2.18689E-03	1.55542E-02	1.57071E-02	-1.80390E 00	1.71045E 00	1.95554E 00	89
-5.33340E-04	7.62102E-03	7.63966E-03	-2.11693E 00	1.64125E 00	1.97776E 00	90

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TEST NUMBER 1 FUNCTION (3) GENERATED FROM THE ANALYTIC T(F(T)) 21 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
1.18580E-09	0.	1.18580E-09	-8.92599E 00	0.	0.	1
1.54962E-03	2.21608E-02	2.22149E-02	-1.65336E 00	1.50040E 00	2.22220E-02	2
6.17747E-03	4.39554E-02	4.43874E-02	-1.35274E 00	1.43120E 00	4.44440E-02	3
1.38208E-02	6.50225E-02	6.64751E-02	-1.17734E 00	1.36189E 00	6.66660E-02	4
2.43760E-02	8.50102E-02	8.84360E-02	-1.05337E 00	1.29212E 00	8.88880E-02	5
3.76999E-02	1.03581E-01	1.10228E-01	-9.57707E-01	1.22202E 00	1.11110E-01	6
5.36115E-02	1.20415E-01	1.31810E-01	-8.80051E-01	1.15182E 00	1.33332E-01	7
7.18949E-02	1.35216E-01	1.53142E-01	-8.14907E-01	1.08168E 00	1.55554E-01	8
9.23015E-02	1.47715E-01	1.74182E-01	-7.58997E-01	1.01170E 00	1.77776E-01	9
1.14553E-01	1.57672E-01	1.94892E-01	-7.10207E-01	9.41915E-01	1.99998E-01	10
1.38348E-01	1.64879E-01	2.15233E-01	-6.67092E-01	8.72295E-01	2.22220E-01	11
1.63359E-01	1.69166E-01	2.35167E-01	-6.28624E-01	8.02779E-01	2.44442E-01	12
1.89246E-01	1.70401E-01	2.54657E-01	-5.94044E-01	7.33284E-01	2.66664E-01	13
2.15652E-01	1.68490E-01	2.73669E-01	-5.62774E-01	6.63726E-01	2.88886E-01	14
2.42216E-01	1.63381E-01	2.92168E-01	-5.34368E-01	5.94030E-01	3.11108E-01	15
2.68570E-01	1.55063E-01	3.10120E-01	-5.08470E-01	5.24149E-01	3.33330E-01	16
2.94348E-01	1.43568E-01	3.27495E-01	-4.84796E-01	4.54084E-01	3.55552E-01	17
3.19192E-01	1.28967E-01	3.44261E-01	-4.63112E-01	3.83894E-01	3.77774E-01	18
3.42751E-01	1.11372E-01	3.60391E-01	-4.43226E-01	3.13716E-01	3.99996E-01	19
3.64691E-01	9.09334E-02	3.75857E-01	-4.24977E-01	2.43754E-01	4.22218E-01	20
3.84699E-01	6.78388E-02	3.90634E-01	-4.08230E-01	1.74211E-01	4.44440E-01	21
4.02481E-01	4.23089E-02	4.04698E-01	-3.92868E-01	1.05061E-01	4.66662E-01	22
4.17773E-01	1.45960E-02	4.18028E-01	-3.78795E-01	3.53826E-02	4.88884E-01	23
4.30340E-01	-1.50203E-02	4.30602E-01	-3.65924E-01	6.24784E 00	5.11106E-01	24
4.39981E-01	-4.62357E-02	4.42404E-01	-3.54181E-01	6.17816E 00	5.33328E-01	25
4.46529E-01	-7.87263E-02	4.53416E-01	-3.43504E-01	6.10901E 00	5.55550E-01	26
4.49854E-01	-1.12152E-01	4.63623E-01	-3.33835E-01	6.03947E 00	5.77772E-01	27
4.49867E-01	-1.46160E-01	4.73015E-01	-3.25125E-01	5.96950E 00	5.99994E-01	28
4.46516E-01	-1.80393E-01	4.81579E-01	-3.17332E-01	5.89933E 00	6.22216E-01	29
4.39792E-01	-2.14489E-01	4.89308E-01	-3.10418E-01	5.82914E 00	6.44438E-01	30
4.29723E-01	-2.48088E-01	4.96195E-01	-3.04348E-01	5.75907E 00	6.66660E-01	31
4.16378E-01	-2.80836E-01	5.02235E-01	-2.99093E-01	5.68919E 00	6.88882E-01	32
3.99865E-01	-3.12393E-01	5.07426E-01	-2.94627E-01	5.61949E 00	7.11104E-01	33
3.80326E-01	-3.42430E-01	5.11768E-01	-2.90927E-01	5.54994E 00	7.33326E-01	34
3.57940E-01	-3.70638E-01	5.15261E-01	-2.87973E-01	5.48044E 00	7.55548E-01	35
3.32916E-01	-3.96732E-01	5.17909E-01	-2.85747E-01	5.41092E 00	7.77770E-01	36
3.05494E-01	-4.20452E-01	5.19718E-01	-2.84232E-01	5.34131E 00	7.99992E-01	37
2.75938E-01	-4.41566E-01	5.20694E-01	-2.83417E-01	5.27152E 00	8.22214E-01	38
2.44536E-01	-4.59874E-01	5.20848E-01	-2.83289E-01	5.20154E 00	8.44436E-01	39
2.11594E-01	-4.75210E-01	5.20189E-01	-2.83839E-01	5.13140E 00	8.66658E-01	40
1.77431E-01	-4.87442E-01	5.18730E-01	-2.85058E-01	5.06120E 00	8.88880E-01	41
1.42379E-01	-4.96475E-01	5.16487E-01	-2.86940E-01	4.99110E 00	9.11102E-01	42
1.06774E-01	-5.02252E-01	5.13476E-01	-2.89480E-01	4.92133E 00	9.33324E-01	43
7.09553E-02	-5.04752E-01	5.09715E-01	-2.92672E-01	4.85202E 00	9.55546E-01	44
3.52599E-02	-5.03997E-01	5.05229E-01	-2.96512E-01	4.78282E 00	9.77768E-01	45
5.86818E-05	-5.41780E-01	5.41780E-01	-2.66177E-01	4.71239E 00	9.99990E-01	46
-3.44485E-02	-4.92886E-01	4.94088E-01	-3.06196E-01	4.64202E 00	1.02221E 00	47
-6.78346E-02	-4.82794E-01	4.87537E-01	-3.11993E-01	4.57283E 00	1.04443E 00	48
-9.98508E-02	-4.69846E-01	4.80339E-01	-3.18452E-01	4.50352E 00	1.06666E 00	49
-1.30229E-01	-4.54225E-01	4.72525E-01	-3.25575E-01	4.43375E 00	1.08888E 00	50
-1.58723E-01	-4.36140E-01	4.64124E-01	-3.33366E-01	4.36365E 00	1.11110E 00	51
-1.85116E-01	-4.15820E-01	4.55164E-01	-3.41832E-01	4.29344E 00	1.13332E 00	52
-2.09216E-01	-3.93515E-01	4.45674E-01	-3.50982E-01	4.22330E 00	1.15554E 00	53
-2.30863E-01	-3.69491E-01	4.35685E-01	-3.60828E-01	4.15333E 00	1.17777E 00	54
-2.49928E-01	-3.44026E-01	4.25227E-01	-3.71379E-01	4.08354E 00	1.19999E 00	55

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TEST NUMBER 1 FUNCTION (3) GENERATED FROM THE ANALYTIC T(F(T)) 21 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
-2.66314E-01	-3.17407E-01	4.14331E-01	-3.82652E-01	4.01392E 00	1.22221E 00	56
-2.79956E-01	-2.89928E-01	4.03031E-01	-3.94662E-01	3.94441E 00	1.24443E 00	57
-2.90824E-01	-2.61882E-01	3.91358E-01	-4.07426E-01	3.87491E 00	1.26665E 00	58
-2.98917E-01	-2.33561E-01	3.79345E-01	-4.20966E-01	3.80535E 00	1.28888E 00	59
-3.04269E-01	-2.05252E-01	3.67025E-01	-4.35304E-01	3.73566E 00	1.31110E 00	60
-3.06940E-01	-1.77231E-01	3.54433E-01	-4.50466E-01	3.66578E 00	1.33332E 00	61
-3.07022E-01	-1.49762E-01	3.41601E-01	-4.66481E-01	3.59571E 00	1.35554E 00	62
-3.04633E-01	-1.23096E-01	3.28563E-01	-4.83381E-01	3.52552E 00	1.37776E 00	63
-2.99914E-01	-9.74638E-02	3.15353E-01	-5.01203E-01	3.45534E 00	1.39999E 00	64
-2.93029E-01	-7.30755E-02	3.02003E-01	-5.19988E-01	3.38538E 00	1.42221E 00	65
-2.84161E-01	-5.01199E-02	2.88548E-01	-5.39783E-01	3.31584E 00	1.44443E 00	66
-2.73510E-01	-2.87611E-02	2.75018E-01	-5.60638E-01	3.24669E 00	1.46665E 00	67
-2.61288E-01	-9.13781E-03	2.61448E-01	-5.82615E-01	3.17701E 00	1.48887E 00	68
-2.47718E-01	8.63759E-03	2.47868E-01	-6.05779E-01	3.10628E 00	1.51110E 00	69
-2.33028E-01	2.44798E-02	2.34310E-01	-6.30209E-01	3.03660E 00	1.53332E 00	70
-2.17452E-01	3.83307E-02	2.20805E-01	-6.55992E-01	2.96745E 00	1.55554E 00	71
-2.01224E-01	5.01591E-02	2.07381E-01	-6.83231E-01	2.89791E 00	1.57776E 00	72
-1.84573E-01	5.99602E-02	1.94068E-01	-7.12046E-01	2.82795E 00	1.59998E 00	73
-1.67726E-01	6.77549E-02	1.80894E-01	-7.42575E-01	2.75777E 00	1.62221E 00	74
-1.50900E-01	7.35882E-02	1.67887E-01	-7.74983E-01	2.68758E 00	1.64443E 00	75
-1.34300E-01	7.75280E-02	1.55071E-01	-8.09468E-01	2.61751E 00	1.66665E 00	76
-1.18120E-01	7.96631E-02	1.42473E-01	-8.46267E-01	2.54763E 00	1.68887E 00	77
-1.02538E-01	8.01015E-02	1.30116E-01	-8.85669E-01	2.47794E 00	1.71109E 00	78
-8.77129E-02	7.89675E-02	1.18023E-01	-9.28034E-01	2.40838E 00	1.73332E 00	79
-7.37878E-02	7.64003E-02	1.06215E-01	-9.73814E-01	2.33888E 00	1.75554E 00	80
-6.08848E-02	7.25506E-02	9.47130E-02	-1.02359E 00	2.26937E 00	1.77776E 00	81
-4.91051E-02	6.75786E-02	8.35355E-02	-1.07813E 00	2.19975E 00	1.79998E 00	82
-3.85291E-02	6.16509E-02	7.27003E-02	-1.13846E 00	2.12996E 00	1.82220E 00	83
-2.92157E-02	5.49384E-02	6.22237E-02	-1.20604E 00	2.05999E 00	1.84443E 00	84
-2.12024E-02	4.76132E-02	5.21206E-02	-1.28299E 00	1.98985E 00	1.86665E 00	85
-1.45058E-02	3.98464E-02	4.24047E-02	-1.37259E 00	1.91964E 00	1.88887E 00	86
-9.12237E-03	3.18056E-02	3.30880E-02	-1.48033E 00	1.84954E 00	1.91109E 00	87
-5.02915E-03	2.36525E-02	2.41813E-02	-1.61652E 00	1.77977E 00	1.93331E 00	88
-2.18522E-03	1.55410E-02	1.56939E-02	-1.80427E 00	1.71046E 00	1.95554E 00	89
-5.33021E-04	7.61510E-03	7.63373E-03	-2.11726E 00	1.64126E 00	1.97776E 00	90

```
C     MAGNITUDE OF F1, SCALED ABSOLUTELY FROM -.52 TO +.52, USING * AS THE
C     PLOT CHARACTER
*     PLOT,N/1,MF/3,SCALED/ABS(0.,1.04),USE/+,,PLOT ON PLOT NUMBER 1 THE
C     MAGNITUDE OF F3, SCALED ABSOLUTELY FROM 0 TO 1.04, USING + AS THE PLOT
C     CHARACTER
*     SAVE,REWIND,,REWIND THE SAVE FILE
```


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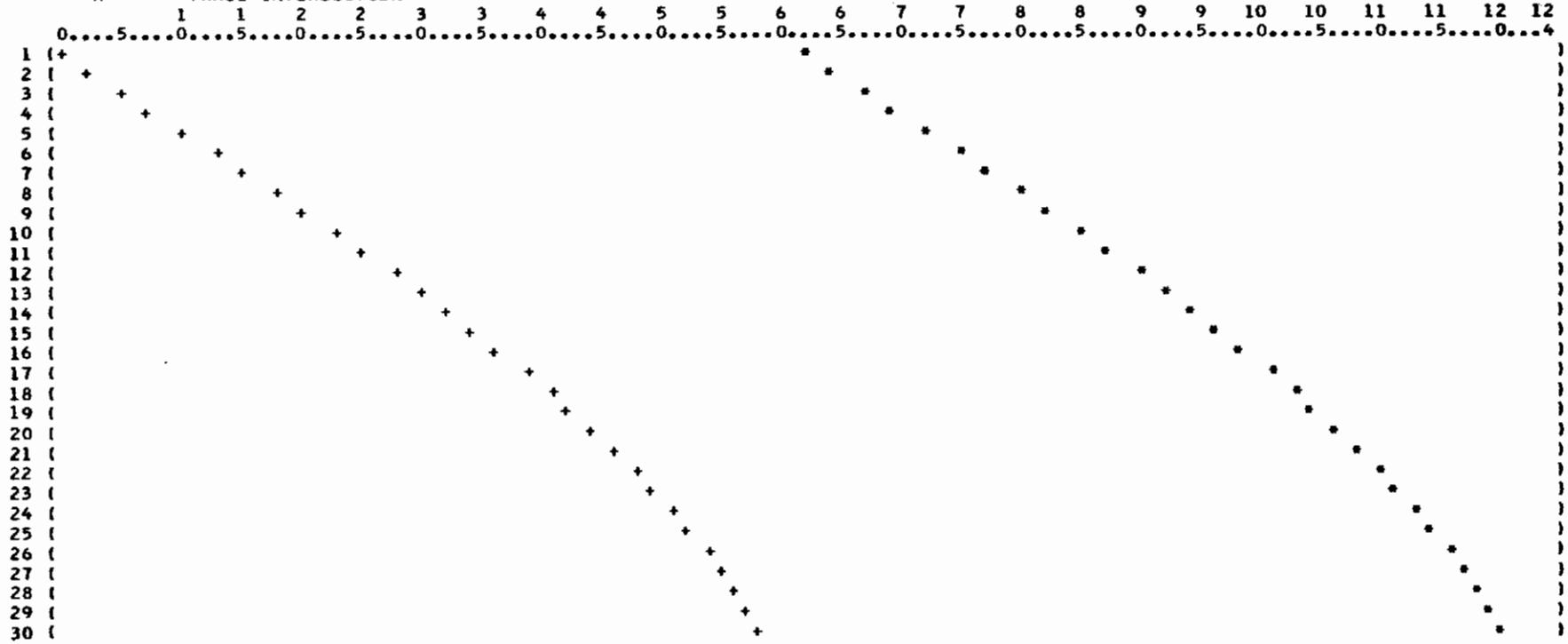
TEST NUMBER 1 PLOT NUMBER 1 21 MAY 65

THE FREQUENCY CODE SCALE IS AS FOLLOWS

CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY
1	0.	2	2.22220E-02	3	4.44440E-02	4	6.66660E-02	5	8.88880E-02
6	1.11110E-01	7	1.33332E-01	8	1.55554E-01	9	1.77776E-01	10	1.99998E-01
11	2.22220E-01	12	2.44442E-01	13	2.66664E-01	14	2.88886E-01	15	3.11108E-01
16	3.33330E-01	17	3.55552E-01	18	3.77774E-01	19	3.99996E-01	20	4.22218E-01
21	4.44440E-01	22	4.66662E-01	23	4.88884E-01	24	5.11106E-01	25	5.33328E-01
26	5.55550E-01	27	5.77772E-01	28	5.99994E-01	29	6.22216E-01	30	6.44438E-01
31	6.66660E-01	32	6.88882E-01	33	7.11104E-01	34	7.33326E-01	35	7.55548E-01
36	7.77770E-01	37	7.99992E-01	38	8.22214E-01	39	8.44436E-01	40	8.66658E-01
41	8.88880E-01	42	9.11102E-01	43	9.33324E-01	44	9.55546E-01	45	9.77768E-01
46	9.99990E-01	47	1.02221E 00	48	1.04443E 00	49	1.06666E 00	50	1.08888E 00
51	1.11110E 00	52	1.13332E 00	53	1.15554E 00	54	1.17777E 00	55	1.19999E 00
56	1.22221E 00	57	1.24443E 00	58	1.26665E 00	59	1.28888E 00	60	1.31110E 00
61	1.33332E 00	62	1.35554E 00	63	1.37776E 00	64	1.39999E 00	65	1.42221E 00
66	1.44443E 00	67	1.46665E 00	68	1.48887E 00	69	1.51110E 00	70	1.53332E 00
71	1.55554E 00	72	1.57776E 00	73	1.59998E 00	74	1.62221E 00	75	1.64443E 00
76	1.66665E 00	77	1.68887E 00	78	1.71109E 00	79	1.73332E 00	80	1.75554E 00
81	1.77776E 00	82	1.79998E 00	83	1.82220E 00	84	1.84443E 00	85	1.86665E 00
86	1.88887E 00	87	1.91109E 00	88	1.93331E 00	89	1.95554E 00	90	1.97776E 00

PLOT DESCRIPTION

CHARACTER	TYPE			MINIMUM	MAXIMUM	RESOLUTION
*	MAGNITUDE	FUNC(1)	GENERATED BY INTEGRATING F(T)	-5.20000E-01	5.20000E-01	8.38710E-03
+	MAGNITUDE	FUNC(3)	GENERATED FROM THE ANALYTIC T(F(T))	0.	1.04000E 00	8.38710E-03
X	TRACE INTERSECTION					



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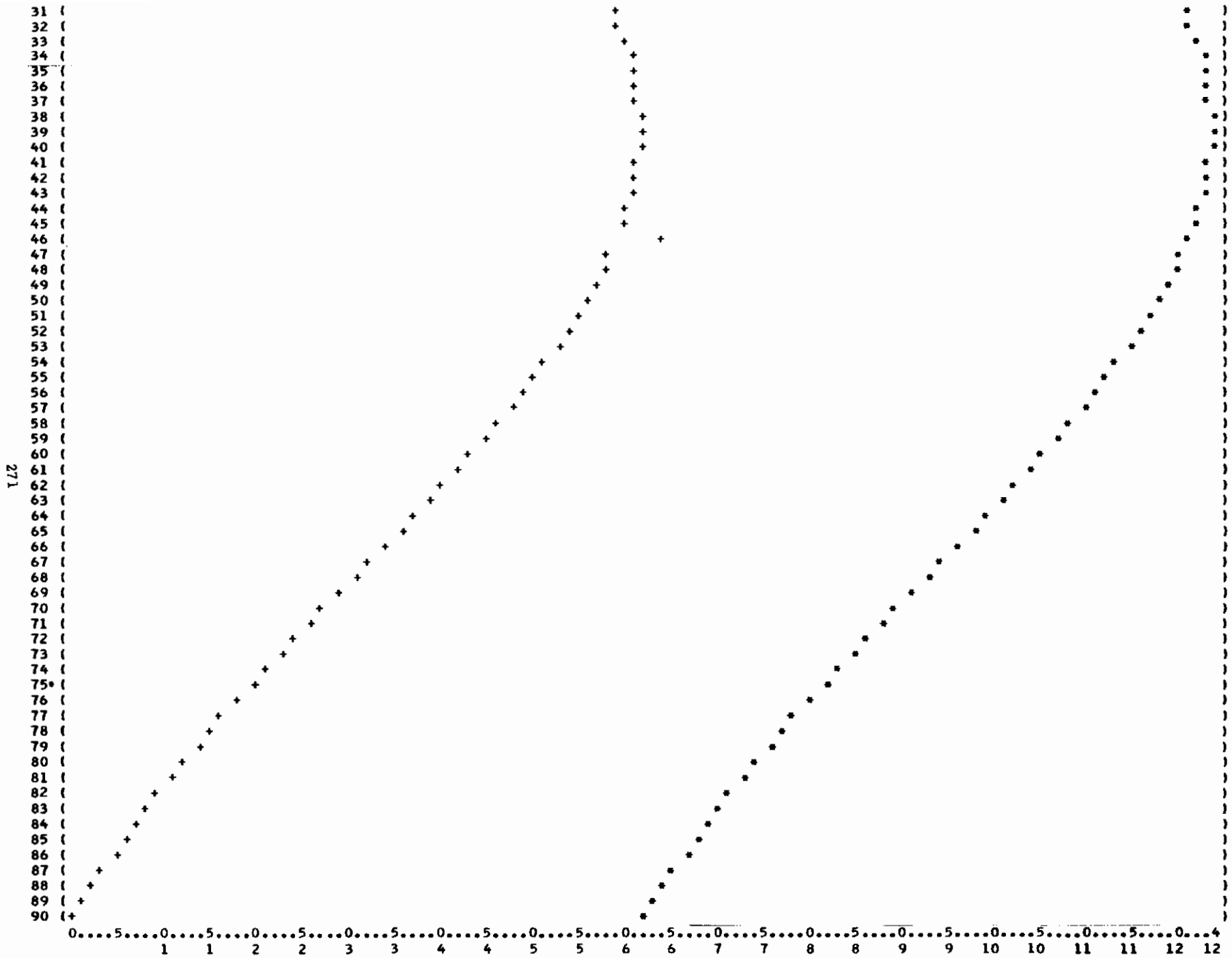

Contrails

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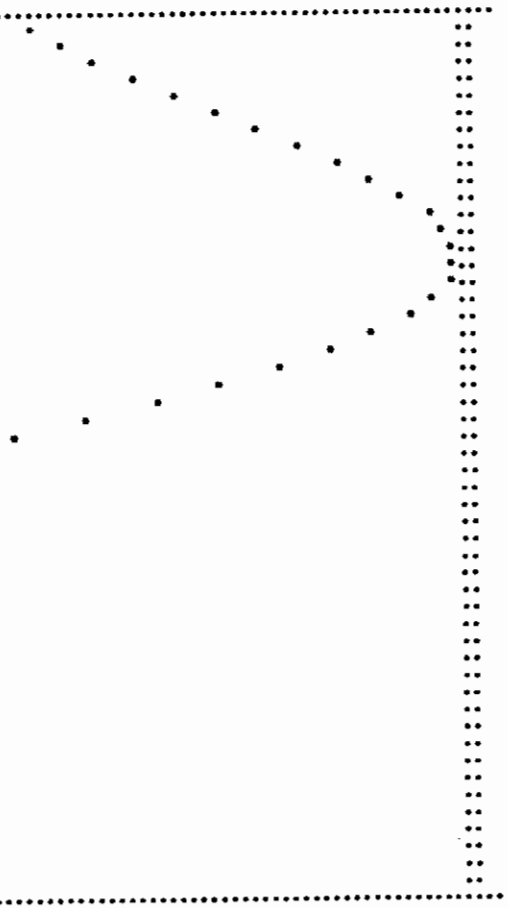
*     SAVE,F/40,ID(1,90,1,0),,WRITE THE FREQUENCY ARRAY ON THE SAVE
C     FILE PRECEEDED BY AN ID RECORD WHICH STATES THAT THIS IS
C     TEST NUMBER 1 FOR 90 FREQUENCY VALUES AND THAT THERE
C     WILL BE ONE F(W) SET FOLLOWING THESE RECORDS.
*     SAVE,F/1,ID(1,0,0,1),,WRITE F1 ON THE SAVE FILE PRECEEDED
C     BY AN ID RECORD WHICH STATES THAT THIS F(W),(F1),IS TO
C     BE USED FOR INVERSE/1 AND THAT IT IS THE LAST SET
C     TO BE USED
*     SAVE,ENDFILE,,WRITE AN END OF FILE MARK ON THE SAVE FILE
*     SAVE,REWIND,,REWIND THE SAVE FILE
*     INVERSE/1,,ENTER THE INVERSE TRANSFORM SYSTEM FOR THE
C     COMPUTATION OF F(T) FROM T(F(T)).
*     INFO,DTIME/.02,NTIME/51,,COMPUTE F(T) ON THE RANGE
```

TEST NUMBER 1

MINIMUM -9.89379E-01 MAXIMUM 9.89380E-01 RESOLUTION 1.95917E-02

TIME	F(T)
0.	1.71502E-01
0.0200	2.33808E-01
0.0400	3.02545E-01
0.0600	3.76512E-01
0.0800	4.54216E-01
0.1000	5.33900E-01
0.1200	6.13584E-01
0.1400	6.91122E-01
0.1600	7.64261E-01
0.1800	8.30712E-01
0.2000	8.88223E-01
0.2200	9.34656E-01
0.2400	9.68064E-01
0.2600	9.86758E-01
0.2800	9.89380E-01
0.3000	9.74953E-01
0.3200	9.42933E-01
0.3400	8.93234E-01
0.3600	8.26249E-01
0.3800	7.42851E-01
0.4000	6.44375E-01
0.4200	5.32592E-01
0.4400	4.09658E-01
0.4600	2.78059E-01
0.4800	1.40535E-01
0.5000	4.34938E-06
0.5200	-1.40527E-01
0.5400	-2.78051E-01
0.5600	-4.09651E-01
0.5800	-5.32585E-01
0.6000	-6.44368E-01
0.6200	-7.42845E-01
0.6400	-8.26245E-01
0.6600	-8.93231E-01
0.6800	-9.42931E-01
0.7000	-9.74952E-01
0.7200	-9.89379E-01
0.7400	-9.86758E-01
0.7600	-9.68065E-01
0.7800	-9.34659E-01
0.8000	-8.88226E-01
0.8200	-8.30716E-01
0.8400	-7.64265E-01
0.8600	-6.91126E-01
0.8800	-6.13589E-01
0.9000	-5.33905E-01
0.9200	-4.54221E-01
0.9400	-3.76517E-01
0.9600	-3.02549E-01
0.9800	-2.33812E-01
1.0000	-1.71506E-01



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C     T =       AT INCREMENTS OF .02.
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Contrails

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***** JOB SEPARATION *****

C       EXAMPLE OF THE CORRELATION SYSTEM USING AS THE INPUT TIME
C       FUNCTION  F(T) = SIN(6.28318T)  EVALUATED OVER THE INTERVAL
C       T=0,10  AT INCREMENTS OF .01, F(T)=0. OTHERWISE.
C       THIS FUNCTION WAS EXTERNALLY GENERATED AS A BINARY
C       TIME DATA FILE OVER THE INTERVAL T=0,10 AT INCREMENTS
C       OF .01.  IT IS CHANNEL 1 OF TEST 1 ON THIS FILE.
*       BEGIN TIME SYSTEM,,TRANSFER CONTROL TO TIME SYSTEM MONITOR
*       DELTAT,.01,,SET TIME INCREMENT
*       FREQUENCY,COMPUTE/2,BASE/0.,NFREQ/75,DELTF/.027027
C       THE ABOVE CARD SETS THE FREQUENCY ARRAY
*       BEGIN CORRELATION SYSTEM,,TRANSFER CONTROL TO THE
C       CORRELATION SYSTEM MONITOR
*       CRLOAD,TEST/1,CHANNEL/(1),CAL/(1.),SAMPLE/1,TZERO/1,NORMS()
        TMAX/1001,TAUZERO/0,NTAU/75,DELTATAU/2
*       COMPUTE,ID/11
*       CORRELATION FUNCTIONS,TAU(1),PHI(1,1),OUTPUT(2)
        LABELED$AUTOCORRELATION FUNCTION OF F(T)$,TPHI(1,1)
        OPTION(10),OUTPUT(3),TPHI(1,1),OPTION(1),OUTPUT(4)
C       COMPUTE THE AUTOCORRELATION FUNCTION,OF F(T)
C       MULTIPLIED BY 1. USING EVERY POINT OF F(T) FROM THE
C       FIRST TO THE 1001TH POINT FOR 90 VALUES OF TAU
C       OVER THE INTERVAL  TAU =0,1.8  AT INCREMENTS OF .02
C       OUTPUT THE TAU VALUES AS CHANNEL 1 OF TEST 11,
C       THE AUTOCORRELATION FUNCTION AS CHANNEL 2, AND THE
C       POWER DENSITY FUNCTION AS CHANNEL 3 FOR USE IN
C       THE FREQUENCY SYSTEM.  USE OPTION 10 FOR THE
C       COMPUTATION OF THE POWER DENSITY FUNCTION.  THIS
C       OPTION IS DEFINED AS MU(TAU) = 1  FOR ALL TAU.
C       ALSO COMPUTE THE AUTOCORRELATION FUNCTION, WITH THE
C       SAME SPECIFICATIONS, EXCEPT FOR THE USE OF OPTION
C       1 IN THE COMPUTATION OF THE POWER DENSITY
C       SPECTRUM. OUTPUT THIS AS CHANNEL 4
C       THIS OPTION IS DEFINED AS MU(TAU) = (3/2)(1-(TAU/TAUMAX)**2)
*       PRINT,PHI(1,1),,PRINT THE AUTOCORRELATION FUNCTION (UNNORMALIZED)
*       PLOT,PHI(1,1),SCALE/DYNAMIC,USE/A,END
```


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CORRELATION PARAMETER INPUT TEST 1 7 JUN 65

AUTO CORRELATION FUNCTION PHI(1, 1) OUTPUT TEST 11 OUTPUT CHANNEL Z

IDENTIFICATION AUTOCORRELATION FUNCTION OF F(T) TIME RANGE 10.00000E-03 TO 1.00100E 01

L	TAU(L)	PHI(TAU)	L	TAU(L)	PHI(TAU)
1	0.	4.99002E-01	39	7.60000E-01	2.10317E-02
2	2.00000E-02	4.95071E-01	40	7.80000E-01	7.84155E-02
3	4.00000E-02	4.83364E-01	41	8.00000E-01	1.34317E-01
4	6.00000E-02	4.64096E-01	42	8.20000E-01	1.87862E-01
5	8.00000E-02	4.37601E-01	43	8.40000E-01	2.38218E-01
6	10.00000E-02	4.04326E-01	44	8.60000E-01	2.84607E-01
7	1.20000E-01	3.64821E-01	45	8.80000E-01	3.26314E-01
8	1.40000E-01	3.19734E-01	46	9.00000E-01	3.62703E-01
9	1.60000E-01	2.69798E-01	47	9.20000E-01	3.93226E-01
10	1.80000E-01	2.15818E-01	48	9.40000E-01	4.17426E-01
11	2.00000E-01	1.58660E-01	49	9.60000E-01	4.34952E-01
12	2.20000E-01	9.92385E-02	50	9.80000E-01	4.45556E-01
13	2.40000E-01	3.84976E-02	51	10.00000E-01	4.49102E-01
14	2.60000E-01	-2.26008E-02	52	1.02000E 00	4.45565E-01
15	2.80000E-01	-8.30931E-02	53	1.04000E 00	4.35033E-01
16	3.00000E-01	-1.42029E-01	54	1.06000E 00	4.17702E-01
17	3.20000E-01	-1.98488E-01	55	1.08000E 00	3.93876E-01
18	3.40000E-01	-2.51589E-01	56	1.10000E 00	3.63959E-01
19	3.60000E-01	-3.00512E-01	57	1.12000E 00	3.28449E-01
20	3.80000E-01	-3.44503E-01	58	1.14000E 00	2.87931E-01
21	4.00000E-01	-3.82890E-01	59	1.16000E 00	2.43064E-01
22	4.20000E-01	-4.15091E-01	60	1.18000E 00	1.94575E-01
23	4.40000E-01	-4.40625E-01	61	1.20000E 00	1.43245E-01
24	4.60000E-01	-4.59119E-01	62	1.22000E 00	8.98929E-02
25	4.80000E-01	-4.70309E-01	63	1.24000E 00	3.53691E-02
26	5.00000E-01	-4.74052E-01	64	1.26000E 00	-1.94629E-02
27	5.20000E-01	-4.70318E-01	65	1.28000E 00	-7.37381E-02
28	5.40000E-01	-4.59198E-01	66	1.30000E 00	-1.26605E-01
29	5.60000E-01	-4.40899E-01	67	1.32000E 00	-1.77237E-01
30	5.80000E-01	-4.15739E-01	68	1.34000E 00	-2.24848E-01
31	6.00000E-01	-3.84142E-01	69	1.36000E 00	-2.68701E-01
32	6.20000E-01	-3.46635E-01	70	1.38000E 00	-3.08124E-01
33	6.40000E-01	-3.03832E-01	71	1.40000E 00	-3.42517E-01
34	6.60000E-01	-2.56431E-01	72	1.42000E 00	-3.71361E-01
35	6.80000E-01	-2.05197E-01	73	1.44000E 00	-3.94228E-01
36	7.00000E-01	-1.50953E-01	74	1.46000E 00	-4.10785E-01
37	7.20000E-01	-9.45658E-02	75	1.48000E 00	-4.20802E-01
38	7.40000E-01	-3.69334E-02	76	-8.58993E 07	0.

CONTINUE,,TERMINATE CORRELATION SYSTEM CONTROL CARD SET

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```
      F3=F3/F6,,NORMALIZE POWER DENSITY FUNCTION
      F4=F4/F6,,NORMALIZE THE SMOOTHED POWER DENSITY FUNCTION
      K1=(1.5,0.),, GENERATE THE CONSTANT 3/2
      K2=(1.,0.),, GENERATE THE CONSTANT 1
      K3=(1.48,0.),, GENERATE TAUMAX
      F7=K1*(K2-(F1/K3)P2),, GENERATE (3/2)(1-(TAU/TAUMAX)**2)
      F5=F2*F7,, GENERATE THE NORMALIZED, FILTERED AUTOCORRELATION FUNCTION
      END
C     THE FOLLOWING CARDS PROVIDE THE MEANS OF PRINTING
C     AND PLOTTING THE POWER DENSITY FUNCTIONS AND AUTOCORRELATION FUNCTIONS.
*     PRINT,F/3
*     PRINT,F/4
*     PRINT,F/5
*     PLOT,N/1,MF/4,SCALED/D,USE/P
```


Contrails

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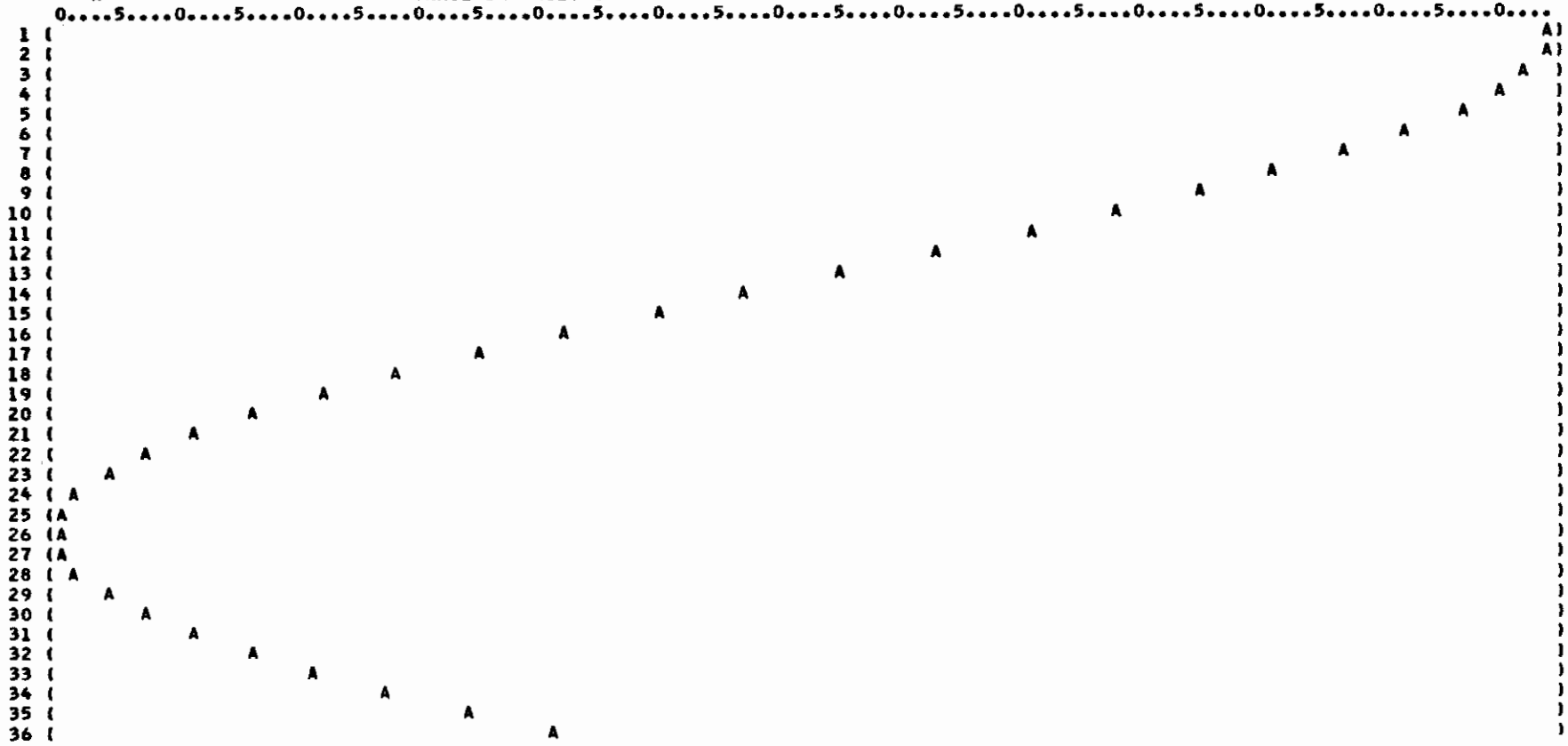
CORRELATION PARAMETER PLOTS 7 JUN 65

TEST INPUT 1 OUTPUT 11 TIME RANGE 0. TO 10.0000E 00

TAU VALUES

1	0.	16	3.00000E-01	31	6.00000E-01	46	9.00000E-01	61	1.20000E 00
2	2.00000E-02	17	3.20000E-01	32	6.20000E-01	47	9.20000E-01	62	1.22000E 00
3	4.00000E-02	18	3.40000E-01	33	6.40000E-01	48	9.40000E-01	63	1.24000E 00
4	6.00000E-02	19	3.60000E-01	34	6.60000E-01	49	9.60000E-01	64	1.26000E 00
5	8.00000E-02	20	3.80000E-01	35	6.80000E-01	50	9.80000E-01	65	1.28000E 00
6	10.00000E-02	21	4.00000E-01	36	7.00000E-01	51	10.00000E-01	66	1.30000E 00
7	1.20000E-01	22	4.20000E-01	37	7.20000E-01	52	1.02000E 00	67	1.32000E 00
8	1.40000E-01	23	4.40000E-01	38	7.40000E-01	53	1.04000E 00	68	1.34000E 00
9	1.60000E-01	24	4.60000E-01	39	7.60000E-01	54	1.06000E 00	69	1.36000E 00
10	1.80000E-01	25	4.80000E-01	40	7.80000E-01	55	1.08000E 00	70	1.38000E 00
11	2.00000E-01	26	5.00000E-01	41	8.00000E-01	56	1.10000E 00	71	1.40000E 00
12	2.20000E-01	27	5.20000E-01	42	8.20000E-01	57	1.12000E 00	72	1.42000E 00
13	2.40000E-01	28	5.40000E-01	43	8.40000E-01	58	1.14000E 00	73	1.44000E 00
14	2.60000E-01	29	5.60000E-01	44	8.60000E-01	59	1.16000E 00	74	1.46000E 00
15	2.80000E-01	30	5.80000E-01	45	8.80000E-01	60	1.18000E 00	75	1.48000E 00

CHARACTER	FUNCTION	IDENTIFICATION	MINIMUM	MAXIMUM	RESOLUTION
A	PHI(1, 1)	AUTOCORRELATION FUNCTION OF F(T)	-4.74052E-01	4.99002E-01	7.78443E-03
X		TRACE INTERSECTION			



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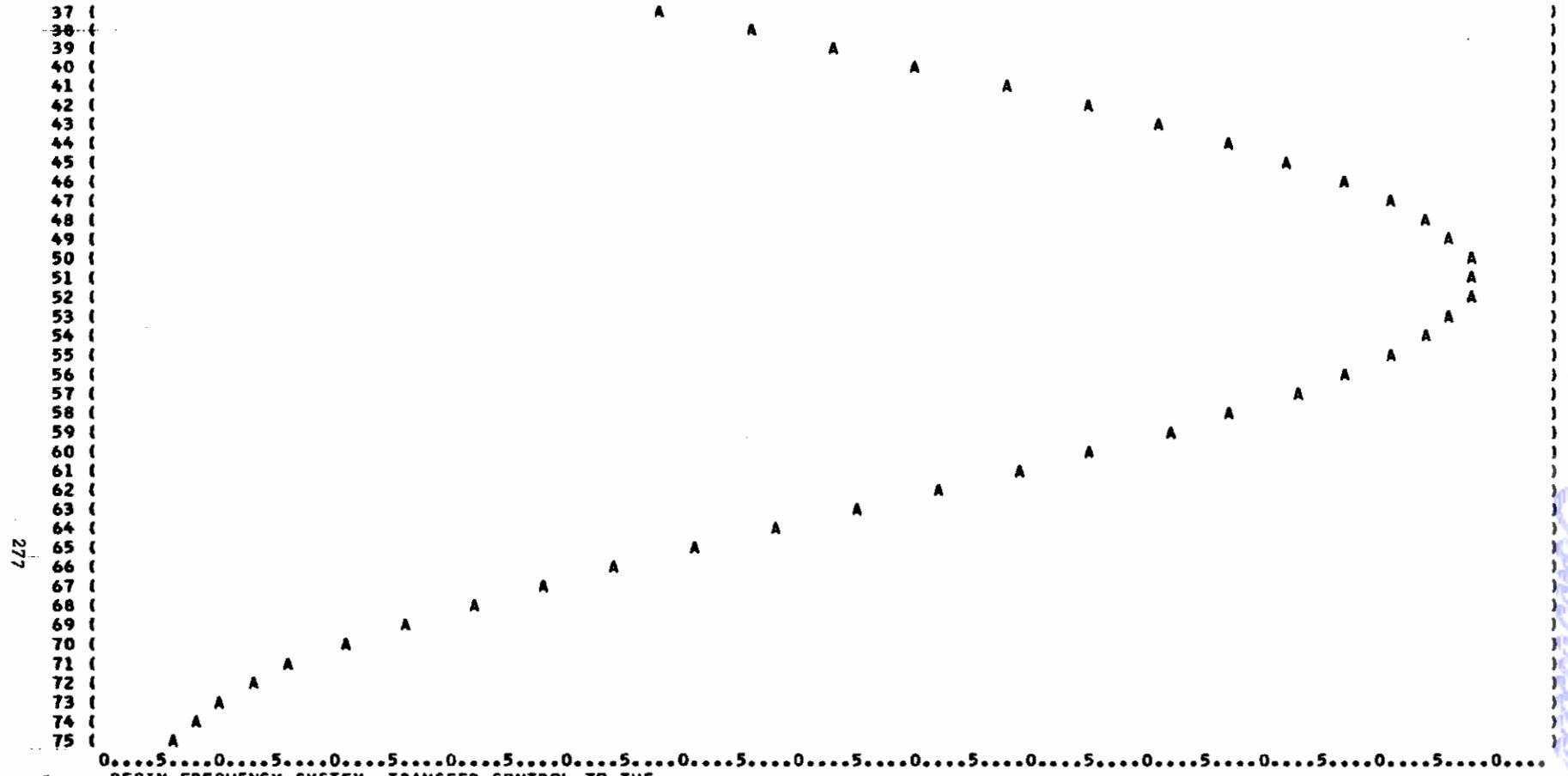


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*     BEGIN FREQUENCY SYSTEM,,TRANSFER CONTROL TO THE
C             FREQUENCY SYSTEM MONITOR
*     FOURIERTRAN,,TRANSFER CONTROL TO THE FOURIERTRAN SYSTEM
*     LOAD,TEST/11,,POSITION THE BINARY TRANSFORM DATA FILE FOR

      *LOAD,TEST/    11
C     THE LOADING OF THE CORRELATION FUNCTIONS GENERATED AS
C     TEST 11.
*     DEFINE,F/1,CH/1,CAL/1.,,LOAD TAU VALUES INTO F1
*     DEFINE,F/2,CH/2,CAL/1.,,LOAD AUTOCORRELATION FUNCTION INTO F2
*     DEFINE,F/3,CH/3,CAL/1.,,LOAD POWER DENSITY FUNCTION INTO F3
*     DEFINE,F/4,CH/4,CAL/1.,,LOAD SMOOTHED POWER DENSITY FUNCTION INTO F4
*     FUNCTION DEFINITIONS
*     NAME,F/1,AS/$TAU VALUES$
*     NAME,F/2,AS/$AUTOCORRELATION FU$,UNITS/$NCTION OF F(T)$
*     NAME,F/3,AS/$POWER DENSITY FUNC$,UNITS/$TION OF F(T)$
*     NAME,F/4,AS/$SMOOTHED POWER DEN$,UNITS/$SITY FUNCTION$
*     NAME,F/5,AS/$FILTERED AUTOCORRE$,UNITS/$LATION FUNCTION$
*     TRANSLATE,,ENTER THE FOURIERTRAN LANGUAGE TRANSLATOR OPTION
      F6=CNRM(F2),,GENERATE NORMALIZATION CONSTANT
      F2=F2/F6,,NORMALIZE AUTOCORRELATION FUNCTION
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TEST NUMBER 11 FUNCTION (3) POWER DENSITY FUNCTION OF F(T) 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
2.70606E-02	-0.	2.70606E-02	-1.56766E 00	6.28319E 00	0.	1
2.72957E-02	2.33874E-03	2.73957E-02	-1.56232E 00	8.59691E-02	2.70270E-02	2
2.79321E-02	4.35796E-03	2.82700E-02	-1.54867E 00	1.54597E-01	5.40540E-02	3
2.87691E-02	5.78334E-03	2.93447E-02	-1.53247E 00	1.97898E-01	8.10810E-02	4
2.94945E-02	6.42722E-03	3.01867E-02	-1.52018E 00	2.14007E-01	1.08108E-01	5
2.97148E-02	6.22331E-03	3.03595E-02	-1.51771E 00	2.05930E-01	1.35135E-01	6
2.89956E-02	5.25137E-03	2.94673E-02	-1.53066E 00	1.78797E-01	1.62162E-01	7
2.69081E-02	3.75003E-03	2.71682E-02	-1.56594E 00	1.38453E-01	1.89189E-01	8
2.30785E-02	2.11589E-03	2.31753E-02	-1.63497E 00	9.18752E-02	2.16216E-01	9
1.72362E-02	8.88949E-04	1.72591E-02	-1.76298E 00	5.21249E-02	2.43243E-01	10
9.25842E-03	7.24286E-04	9.28671E-03	-2.03214E 00	7.86175E-02	2.70270E-01	11
-7.94116E-04	2.35163E-03	2.48209E-03	-2.60518E 00	1.89606E 00	2.97297E-01	12
-1.26523E-02	6.52562E-03	1.42360E-02	-1.84661E 00	2.66503E 00	3.24324E-01	13
-2.58265E-02	1.39686E-02	2.93620E-02	-1.53221E 00	2.64533E 00	3.51351E-01	14
-3.96113E-02	2.53108E-02	4.70074E-02	-1.32783E 00	2.57240E 00	3.78378E-01	15
-5.31042E-02	4.10316E-02	6.71092E-02	-1.17322E 00	2.48324E 00	4.05405E-01	16
-6.52403E-02	6.14041E-02	8.95922E-02	-1.04773E 00	2.38634E 00	4.32432E-01	17
-7.48422E-02	8.64508E-02	1.14346E-01	-9.41778E-01	2.28466E 00	4.59459E-01	18
-8.06796E-02	1.15910E-01	1.41224E-01	-8.50091E-01	2.17947E 00	4.86486E-01	19
-8.15393E-02	1.49216E-01	1.70041E-01	-7.69446E-01	2.07138E 00	5.13513E-01	20
-7.62992E-02	1.85500E-01	2.00579E-01	-6.97715E-01	1.96096E 00	5.40540E-01	21
-6.40020E-02	2.23608E-01	2.32587E-01	-6.33414E-01	1.84899E 00	5.67567E-01	22
-4.39275E-02	2.62131E-01	2.65786E-01	-5.75468E-01	1.73656E 00	5.94594E-01	23
-1.56528E-02	2.99464E-01	2.99872E-01	-5.23064E-01	1.62362E 00	6.21621E-01	24
2.08957E-02	3.33867E-01	3.34520E-01	-4.75578E-01	1.50768E 00	6.48648E-01	25
6.54107E-02	3.63549E-01	3.69386E-01	-4.32519E-01	1.39314E 00	6.75675E-01	26
1.17187E-01	3.86753E-01	4.04117E-01	-3.93493E-01	1.27712E 00	7.02702E-01	27
1.75128E-01	4.01846E-01	4.38350E-01	-3.58179E-01	1.15974E 00	7.29729E-01	28
2.37771E-01	4.07408E-01	4.71717E-01	-3.26319E-01	1.04196E 00	7.56756E-01	29
3.03333E-01	4.02316E-01	5.03855E-01	-2.97695E-01	9.24227E-01	7.83783E-01	30
3.69778E-01	3.85815E-01	5.34405E-01	-2.72129E-01	8.06521E-01	8.10810E-01	31
4.34897E-01	3.57571E-01	5.63021E-01	-2.49476E-01	6.88543E-01	8.37837E-01	32
4.96402E-01	3.17714E-01	5.89370E-01	-2.29612E-01	5.69943E-01	8.64864E-01	33
5.52028E-01	2.66849E-01	6.13143E-01	-2.12439E-01	4.50547E-01	8.91891E-01	34
5.99634E-01	2.06053E-01	6.34050E-01	-1.97877E-01	3.30610E-01	9.18918E-01	35
6.37307E-01	1.36839E-01	6.51832E-01	-1.85864E-01	2.10963E-01	9.45945E-01	36
6.63454E-01	6.11105E-02	6.66262E-01	-1.76355E-01	9.22954E-02	9.72972E-01	37
6.76882E-01	-1.89171E-02	6.77147E-01	-1.69317E-01	6.25490E 00	9.99999E-01	38
6.76864E-01	-1.00804E-01	6.84329E-01	-1.64735E-01	6.13546E 00	1.02703E 00	39
6.63174E-01	-1.81987E-01	6.87691E-01	-1.62607E-01	6.01596E 00	1.05405E 00	40
6.36115E-01	-2.59890E-01	6.87157E-01	-1.62944E-01	5.89539E 00	1.08108E 00	41
5.96508E-01	-3.32038E-01	6.82694E-01	-1.65774E-01	5.77476E 00	1.10811E 00	42
5.45660E-01	-3.96164E-01	6.74308E-01	-1.71142E-01	5.65463E 00	1.13513E 00	43
4.85318E-01	-4.50309E-01	6.62052E-01	-1.79108E-01	5.53502E 00	1.16216E 00	44
4.17586E-01	-4.92910E-01	6.46017E-01	-1.89756E-01	5.41561E 00	1.18919E 00	45
3.44839E-01	-5.22864E-01	6.26339E-01	-2.03190E-01	5.29604E 00	1.21621E 00	46
2.69615E-01	-5.39581E-01	6.03192E-01	-2.19545E-01	5.17611E 00	1.24324E 00	47
1.94506E-01	-5.43000E-01	5.76786E-01	-2.38986E-01	5.05604E 00	1.27027E 00	48
1.22042E-01	-5.33589E-01	5.47367E-01	-2.61721E-01	4.93666E 00	1.29730E 00	49
5.45790E-02	-5.12317E-01	5.15216E-01	-2.88011E-01	4.81883E 00	1.32432E 00	50
-5.79943E-03	-4.80603E-01	4.80638E-01	-3.18182E-01	4.71239E 00	1.35135E 00	51
-5.73705E-02	-4.40245E-01	4.43967E-01	-3.52649E-01	4.58273E 00	1.37838E 00	52
-9.88432E-02	-3.93327E-01	4.05557E-01	-3.91948E-01	4.46679E 00	1.40540E 00	53
-1.29404E-01	-3.42124E-01	3.65779E-01	-4.36781E-01	4.35100E 00	1.43243E 00	54
-1.48741E-01	-2.88988E-01	3.25020E-01	-4.88090E-01	4.23667E 00	1.45946E 00	55

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TEST NUMBER 11 FUNCTION (3) POWER DENSITY FUNCTION OF F(T) 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
-1.57043E-01	-2.36239E-01	2.83675E-01	-5.47180E-01	4.12510E 00	1.48648E 00	56
-1.54973E-01	-1.86061E-01	2.42147E-01	-6.15921E-01	4.01751E 00	1.51351E 00	57
-1.43625E-01	-1.40402E-01	2.00850E-01	-6.97128E-01	3.91570E 00	1.54054E 00	58
-1.24451E-01	-1.00892E-01	1.60210E-01	-7.95311E-01	3.82326E 00	1.56757E 00	59
-9.91811E-02	-6.87762E-02	1.20694E-01	-9.18314E-01	3.74850E 00	1.59459E 00	60
-6.97277E-02	-4.48737E-02	8.29193E-02	-1.08134E 00	3.71403E 00	1.62162E 00	61
-3.80841E-02	-2.95518E-02	4.82049E-02	-1.31691E 00	3.80200E 00	1.64865E 00	62
-6.22257E-03	-2.27298E-02	2.35662E-02	-1.62771E 00	4.44577E 00	1.67567E 00	63
2.40025E-02	-2.39033E-02	3.38745E-02	-1.47013E 00	5.49985E 00	1.70270E 00	64
5.09442E-02	-3.21881E-02	6.02609E-02	-1.21996E 00	5.71909E 00	1.72973E 00	65
7.32374E-02	-4.63844E-02	8.66904E-02	-1.06203E 00	5.71801E 00	1.75675E 00	66
8.98556E-02	-6.50532E-02	1.10932E-01	-9.54942E-01	5.65598E 00	1.78378E 00	67
1.00149E-01	-8.66040E-02	1.32401E-01	-8.78107E-01	5.56987E 00	1.81081E 00	68
1.03862E-01	-1.09386E-01	1.50840E-01	-8.21483E-01	5.47201E 00	1.83784E 00	69
1.01126E-01	-1.31780E-01	1.66110E-01	-7.79604E-01	5.36744E 00	1.86486E 00	70
9.24352E-02	-1.52285E-01	1.78143E-01	-7.49231E-01	5.25851E 00	1.89189E 00	71
7.86011E-02	-1.69594E-01	1.86923E-01	-7.28337E-01	5.14657E 00	1.91892E 00	72
6.06945E-02	-1.82659E-01	1.92479E-01	-7.15616E-01	5.03277E 00	1.94594E 00	73
3.99720E-02	-1.90737E-01	1.94880E-01	-7.10232E-01	4.91844E 00	1.97297E 00	74
1.77969E-02	-1.93417E-01	1.94234E-01	-7.11674E-01	4.80459E 00	2.00000E 00	75

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Contrails

TEST NUMBER 11 . FUNCTION (4) SMOOTHED POWER DENSITY FUNCTION 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
5.20349E-02	0.	5.20349E-02	-1.28371E 00	0.	0.	1
5.07348E-02	-4.16951E-03	5.09058E-02	-1.29323E 00	6.20067E 00	2.70270E-02	2
4.68897E-02	-7.73881E-03	4.75241E-02	-1.32309E 00	6.11987E 00	5.40540E-02	3
4.06645E-02	-1.01259E-02	4.19062E-02	-1.37772E 00	6.03974E 00	8.10810E-02	4
3.23290E-02	-1.07845E-02	3.40804E-02	-1.46750E 00	5.96163E 00	1.08108E-01	5
2.22521E-02	-9.22117E-03	2.40870E-02	-1.61822E 00	5.89037E 00	1.35135E-01	6
1.08917E-02	-5.01163E-03	1.19894E-02	-1.92120E 00	5.85177E 00	1.62162E-01	7
-1.21571E-03	2.18485E-03	2.50031E-03	-2.60201E 00	2.07906E 00	1.89189E-01	8
-1.34704E-02	1.26124E-02	1.84533E-02	-1.73393E 00	2.38892E 00	2.16216E-01	9
-2.52243E-02	2.64081E-02	3.65192E-02	-1.43748E 00	2.33338E 00	2.43243E-01	10
-3.57991E-02	4.35924E-02	5.64081E-02	-1.24866E 00	2.25876E 00	2.70270E-01	11
-4.45064E-02	6.40647E-02	7.80071E-02	-1.10787E 00	2.17856E 00	2.97297E-01	12
-5.06668E-02	8.76006E-02	1.01198E-01	-9.94829E-01	2.09571E 00	3.24324E-01	13
-5.36323E-02	1.13851E-01	1.25851E-01	-9.00142E-01	2.01125E 00	3.51351E-01	14
-5.28067E-02	1.42350E-01	1.51829E-01	-8.18646E-01	1.92577E 00	3.78378E-01	15
-4.76671E-02	1.72517E-01	1.78981E-01	-7.47194E-01	1.83978E 00	4.05405E-01	16
-3.77834E-02	2.03673E-01	2.07148E-01	-6.83719E-01	1.75382E 00	4.32432E-01	17
-2.28366E-02	2.35055E-01	2.36162E-01	-6.26791E-01	1.66805E 00	4.59459E-01	18
-2.63388E-03	2.65832E-01	2.65845E-01	-5.75372E-01	1.57080E 00	4.86486E-01	19
2.28771E-02	2.95127E-01	2.96012E-01	-5.28691E-01	1.49288E 00	5.13513E-01	20
5.36000E-02	3.22042E-01	3.26472E-01	-4.86154E-01	1.40613E 00	5.40540E-01	21
8.92855E-02	3.45682E-01	3.57026E-01	-4.47300E-01	1.31864E 00	5.67567E-01	22
1.29527E-01	3.65183E-01	3.87474E-01	-4.11757E-01	1.23028E 00	5.94594E-01	23
1.73770E-01	3.79739E-01	4.17610E-01	-3.79229E-01	1.14148E 00	6.21621E-01	24
2.21316E-01	3.88628E-01	4.47228E-01	-3.49471E-01	1.05260E 00	6.48648E-01	25
2.71337E-01	3.91238E-01	4.76121E-01	-3.22283E-01	9.63824E-01	6.75675E-01	26
3.22899E-01	3.87089E-01	5.04085E-01	-2.97497E-01	8.75175E-01	7.02702E-01	27
3.74978E-01	3.75854E-01	5.30919E-01	-2.74972E-01	7.86560E-01	7.29729E-01	28
4.26488E-01	3.57376E-01	5.56426E-01	-2.54593E-01	6.97836E-01	7.56756E-01	29
4.76316E-01	3.31676E-01	5.80419E-01	-2.36259E-01	6.08860E-01	7.83783E-01	30
5.23343E-01	2.98961E-01	6.02715E-01	-2.19888E-01	5.19542E-01	8.10810E-01	31
5.66486E-01	2.59625E-01	6.23146E-01	-2.05410E-01	4.29905E-01	8.37837E-01	32
6.04727E-01	2.14238E-01	6.41555E-01	-1.92766E-01	3.40144E-01	8.64864E-01	33
6.37142E-01	1.63542E-01	6.57796E-01	-1.81909E-01	2.50649E-01	8.91891E-01	34
6.62933E-01	1.08429E-01	6.71741E-01	-1.72798E-01	1.61885E-01	9.18918E-01	35
6.81454E-01	4.99156E-02	6.83279E-01	-1.65402E-01	7.36913E-02	9.45945E-01	36
6.92231E-01	-1.08771E-02	6.92316E-01	-1.59696E-01	6.26744E 00	9.72972E-01	37
6.94978E-01	-7.27609E-02	6.98777E-01	-1.55662E-01	6.17854E 00	9.99999E-01	38
6.89611E-01	-1.34512E-01	7.02607E-01	-1.53288E-01	6.09100E 00	1.02703E 00	39
6.76245E-01	-1.94906E-01	7.03773E-01	-1.52568E-01	6.00314E 00	1.05405E 00	40
6.55201E-01	-2.52753E-01	7.02262E-01	-1.53501E-01	5.91519E 00	1.08108E 00	41
6.26987E-01	-3.06937E-01	6.98086E-01	-1.56091E-01	5.82765E 00	1.10811E 00	42
5.92291E-01	-3.56442E-01	6.91274E-01	-1.60350E-01	5.74087E 00	1.13513E 00	43
5.51956E-01	-4.00388E-01	6.81884E-01	-1.66290E-01	5.65504E 00	1.16216E 00	44
5.06950E-01	-4.38049E-01	6.69989E-01	-1.73932E-01	5.57025E 00	1.18919E 00	45
4.58345E-01	-4.68880E-01	6.55689E-01	-1.83302E-01	5.48648E 00	1.21621E 00	46
4.07274E-01	-4.92525E-01	6.39103E-01	-1.94429E-01	5.40373E 00	1.24324E 00	47
3.54900E-01	-5.08827E-01	6.20370E-01	-2.07349E-01	5.32202E 00	1.27027E 00	48
3.02382E-01	-5.17828E-01	5.99650E-01	-2.22102E-01	5.24147E 00	1.29730E 00	49
2.50834E-01	-5.19761E-01	5.77121E-01	-2.38733E-01	5.16228E 00	1.32432E 00	50
2.01295E-01	-5.15039E-01	5.52978E-01	-2.57292E-01	5.08481E 00	1.35135E 00	51
1.54704E-01	-5.04236E-01	5.27435E-01	-2.77831E-01	5.00956E 00	1.37838E 00	52
1.11864E-01	-4.88063E-01	5.00718E-01	-3.00406E-01	4.93712E 00	1.40540E 00	53
7.34308E-02	-4.67339E-01	4.73073E-01	-3.25072E-01	4.86806E 00	1.43243E 00	54
3.98941E-02	-4.42962E-01	4.44755E-01	-3.51879E-01	4.80267E 00	1.45946E 00	55

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TEST NUMBER 11 FUNCTION (4) SMOOTHED POWER DENSITY FUNCTION 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
1.15701E-02	-4.15877E-01	4.16038E-01	-3.80867E-01	4.74054E 00	1.48648E 00	56
-1.13999E-02	-3.87039E-01	3.87206E-01	-4.12057E-01	4.68257E 00	1.51351E 00	57
-2.90449E-02	-3.57384E-01	3.58562E-01	-4.45436E-01	4.63077E 00	1.54054E 00	58
-4.15542E-02	-3.27798E-01	3.30422E-01	-4.80931E-01	4.58619E 00	1.56757E 00	59
-4.92611E-02	-2.99091E-01	3.03121E-01	-5.18385E-01	4.54940E 00	1.59459E 00	60
-5.26223E-02	-2.71970E-01	2.77015E-01	-5.57497E-01	4.52171E 00	1.62162E 00	61
-5.21938E-02	-2.47026E-01	2.52480E-01	-5.97773E-01	4.50469E 00	1.64865E 00	62
-4.86045E-02	-2.24716E-01	2.29912E-01	-6.38437E-01	4.49992E 00	1.67567E 00	63
-4.25276E-02	-2.05360E-01	2.09717E-01	-6.78366E-01	4.50870E 00	1.70270E 00	64
-3.46527E-02	-1.89137E-01	1.92285E-01	-7.16054E-01	4.53157E 00	1.72973E 00	65
-2.56585E-02	-1.76090E-01	1.77950E-01	-7.49702E-01	4.56778E 00	1.75675E 00	66
-1.61878E-02	-1.66137E-01	1.66924E-01	-7.77482E-01	4.61486E 00	1.78378E 00	67
-6.82454E-03	-1.59081E-01	1.59227E-01	-7.97984E-01	4.66897E 00	1.81081E 00	68
1.92376E-03	-1.54629E-01	1.54641E-01	-8.10675E-01	4.71239E 00	1.83784E 00	69
9.64036E-03	-1.52417E-01	1.52721E-01	-8.16100E-01	4.77616E 00	1.86486E 00	70
1.60089E-02	-1.52024E-01	1.52864E-01	-8.15694E-01	4.81763E 00	1.89189E 00	71
2.08174E-02	-1.53000E-01	1.54410E-01	-8.11325E-01	4.84763E 00	1.91892E 00	72
2.39580E-02	-1.54889E-01	1.56731E-01	-8.04845E-01	4.86569E 00	1.94594E 00	73
2.54220E-02	-1.57247E-01	1.59289E-01	-7.97814E-01	4.87245E 00	1.97297E 00	74
2.52909E-02	-1.59664E-01	1.61655E-01	-7.91411E-01	4.86929E 00	2.00000E 00	75

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TEST NUMBER 11 FUNCTION (5) FILTERED AUTOCORRELATION FUNCTION 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
1.50000E 00	0.	1.50000E 00	1.76091E-01	0.	0.	1
1.48791E 00	0.	1.48791E 00	1.72577E-01	0.	2.70270E-02	2
1.45193E 00	0.	1.45193E 00	1.61946E-01	0.	5.40540E-02	3
1.39278E 00	0.	1.39278E 00	1.43883E-01	0.	8.10810E-02	4
1.31159E 00	0.	1.31159E 00	1.17797E-01	0.	1.08108E-01	5
1.20986E 00	0.	1.20986E 00	8.27337E-02	0.	1.35135E-01	6
1.08944E 00	0.	1.08944E 00	3.72048E-02	0.	1.62162E-01	7
9.52522E-01	0.	9.52522E-01	-2.11251E-02	0.	1.89189E-01	8
8.01534E-01	0.	8.01534E-01	-9.60780E-02	0.	2.16216E-01	9
6.39152E-01	0.	6.39152E-01	-1.94396E-01	0.	2.43243E-01	10
4.68223E-01	0.	4.68223E-01	-3.29547E-01	0.	2.70270E-01	11
2.91720E-01	0.	2.91720E-01	-5.35035E-01	0.	2.97297E-01	12
1.12681E-01	0.	1.12681E-01	-9.48151E-01	0.	3.24324E-01	13
-6.58415E-02	0.	6.58415E-02	-1.18150E 00	3.14159E 00	3.51351E-01	14
-2.40838E-01	0.	2.40838E-01	-6.18275E-01	3.14159E 00	3.78378E-01	15
-4.09398E-01	0.	4.09398E-01	-3.87854E-01	3.14159E 00	4.05405E-01	16
-5.68761E-01	0.	5.68761E-01	-2.45070E-01	3.14159E 00	4.32432E-01	17
-7.16365E-01	0.	7.16365E-01	-1.44866E-01	3.14159E 00	4.59459E-01	18
-8.49892E-01	0.	8.49892E-01	-7.06362E-02	3.14159E 00	4.86486E-01	19
-9.67307E-01	0.	9.67307E-01	-1.44356E-02	3.14159E 00	5.13513E-01	20
-1.06689E 00	0.	1.06689E 00	2.81210E-02	3.14159E 00	5.40540E-01	21
-1.14728E 00	0.	1.14728E 00	5.96683E-02	3.14159E 00	5.67567E-01	22
-1.20745E 00	0.	1.20745E 00	8.18697E-02	3.14159E 00	5.94594E-01	23
-1.24679E 00	0.	1.24679E 00	9.57926E-02	3.14159E 00	6.21621E-01	24
-1.26504E 00	0.	1.26504E 00	1.02106E-01	3.14159E 00	6.48648E-01	25
-1.26236E 00	0.	1.26236E 00	1.01183E-01	3.14159E 00	6.75675E-01	26
-1.23925E 00	0.	1.23925E 00	9.31585E-02	3.14159E 00	7.02702E-01	27
-1.19659E 00	0.	1.19659E 00	7.79453E-02	3.14159E 00	7.29729E-01	28
-1.13559E 00	0.	1.13559E 00	5.52229E-02	3.14159E 00	7.56756E-01	29
-1.05778E 00	0.	1.05778E 00	2.43960E-02	3.14159E 00	7.83783E-01	30
-9.64949E-01	0.	9.64949E-01	-1.54958E-02	3.14159E 00	8.10810E-01	31
-8.59125E-01	0.	8.59125E-01	-6.59437E-02	3.14159E 00	8.37837E-01	32
-7.42532E-01	0.	7.42532E-01	-1.29285E-01	3.14159E 00	8.64864E-01	33
-6.17539E-01	0.	6.17539E-01	-2.09336E-01	3.14159E 00	8.91891E-01	34
-4.86609E-01	0.	4.86609E-01	-3.12820E-01	3.14159E 00	9.18918E-01	35
-3.52255E-01	0.	3.52255E-01	-4.53143E-01	3.14159E 00	9.45945E-01	36
-2.16988E-01	0.	2.16988E-01	-6.63564E-01	3.14159E 00	9.72972E-01	37
-8.32665E-02	0.	8.32665E-02	-1.07953E 00	3.14159E 00	9.99999E-01	38
4.65502E-02	0.	4.65502E-02	-1.33208E 00	0.	1.02703E 00	39
1.70245E-01	0.	1.70245E-01	-7.68925E-01	0.	1.05405E 00	40
2.85786E-01	0.	2.85786E-01	-5.43959E-01	0.	1.08108E 00	41
3.91361E-01	0.	3.91361E-01	-4.07423E-01	0.	1.10811E 00	42
4.85411E-01	0.	4.85411E-01	-3.13891E-01	0.	1.13513E 00	43
5.66655E-01	0.	5.66655E-01	-2.46682E-01	0.	1.16216E 00	44
6.34109E-01	0.	6.34109E-01	-1.97836E-01	0.	1.18919E 00	45
6.87103E-01	0.	6.87103E-01	-1.62978E-01	0.	1.21621E 00	46
7.25282E-01	0.	7.25282E-01	-1.39493E-01	0.	1.24324E 00	47
7.48609E-01	0.	7.48609E-01	-1.25745E-01	0.	1.27027E 00	48
7.57356E-01	0.	7.57356E-01	-1.20700E-01	0.	1.29730E 00	49
7.52095E-01	0.	7.52095E-01	-1.23727E-01	0.	1.32432E 00	50
7.33674E-01	0.	7.33674E-01	-1.34497E-01	0.	1.35135E 00	51
7.03193E-01	0.	7.03193E-01	-1.52925E-01	0.	1.37838E 00	52
6.61974E-01	0.	6.61974E-01	-1.79159E-01	0.	1.40540E 00	53
6.11527E-01	0.	6.11527E-01	-2.13585E-01	0.	1.43243E 00	54
5.53510E-01	0.	5.53510E-01	-2.56875E-01	0.	1.45946E 00	55

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TEST NUMBER 11 FUNCTION (5) FILTERED AUTOCORRELATION FUNCTION 7 JUN 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
4.89690E-01	0.	4.89690E-01	-3.10079E-01	0.	1.48648E 00	56
4.21900E-01	0.	4.21900E-01	-3.74790E-01	0.	1.51351E 00	57
3.51993E-01	0.	3.51993E-01	-4.53466E-01	0.	1.54054E 00	58
2.81800E-01	0.	2.81800E-01	-5.50059E-01	0.	1.56757E 00	59
2.13087E-01	0.	2.13087E-01	-6.71443E-01	0.	1.59459E 00	60
1.47515E-01	0.	1.47515E-01	-8.31162E-01	0.	1.62162E 00	61
8.66021E-02	0.	8.66021E-02	-1.06247E 00	0.	1.64865E 00	62
3.16862E-02	0.	3.16862E-02	-1.49913E 00	0.	1.67567E 00	63
-1.61007E-02	0.	1.61007E-02	-1.79315E 00	3.14159E 00	1.70270E 00	64
-5.58595E-02	0.	5.58595E-02	-1.25290E 00	3.14159E 00	1.72973E 00	65
-8.69428E-02	0.	8.69428E-02	-1.06077E 00	3.14159E 00	1.75675E 00	66
-1.08968E-01	0.	1.08968E-01	-9.62702E-01	3.14159E 00	1.78378E 00	67
-1.21824E-01	0.	1.21824E-01	-9.14269E-01	3.14159E 00	1.81081E 00	68
-1.25671E-01	0.	1.25671E-01	-9.00765E-01	3.14159E 00	1.83784E 00	69
-1.20937E-01	0.	1.20937E-01	-9.17442E-01	3.14159E 00	1.86486E 00	70
-1.08300E-01	0.	1.08300E-01	-9.65370E-01	3.14159E 00	1.89189E 00	71
-8.86771E-02	0.	8.86771E-02	-1.05219E 00	3.14159E 00	1.91892E 00	72
-6.31911E-02	0.	6.31911E-02	-1.19934E 00	3.14159E 00	1.94594E 00	73
-3.31481E-02	0.	3.31481E-02	-1.47954E 00	3.14159E 00	1.97297E 00	74
-3.76979E-08	0.	3.76979E-08	-7.42368E 00	3.14159E 00	2.00000E 00	75

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*     PLOT,N/1,MF/5,SCALED/D,USE/A
*     PLOT,N/1,MF/2,SCALED/REF(5),USE/B
*     PLOT,N/1,MF/3,SCALED/REF(4),USE/Q
*     END,,TERMINATE THE COMPUTER RUN
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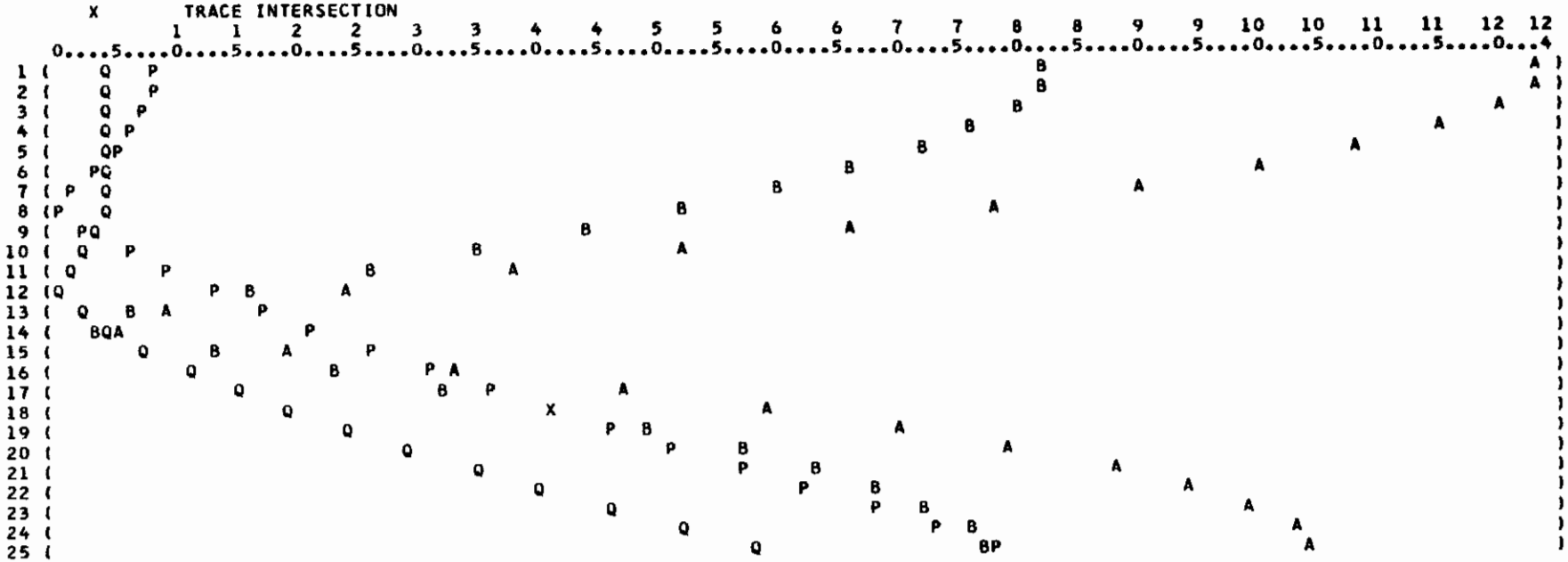
TEST NUMBER 11 PLOT NUMBER 1 7 JUN 65

THE FREQUENCY CODE SCALE IS AS FOLLOWS

CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY	CODE	FREQUENCY
1	0.	2	2.70270E-02	3	5.40540E-02	4	8.10810E-02	5	1.08108E-01
6	1.35135E-01	7	1.62162E-01	8	1.89189E-01	9	2.16216E-01	10	2.43243E-01
11	2.70270E-01	12	2.97297E-01	13	3.24324E-01	14	3.51351E-01	15	3.78378E-01
16	4.05405E-01	17	4.32432E-01	18	4.59459E-01	19	4.86486E-01	20	5.13513E-01
21	5.40540E-01	22	5.67567E-01	23	5.94594E-01	24	6.21621E-01	25	6.48648E-01
26	6.75675E-01	27	7.02702E-01	28	7.29729E-01	29	7.56756E-01	30	7.83783E-01
31	8.10810E-01	32	8.37837E-01	33	8.64864E-01	34	8.91891E-01	35	9.18918E-01
36	9.45945E-01	37	9.72972E-01	38	9.99999E-01	39	1.02703E 00	40	1.05405E 00
41	1.08108E 00	42	1.10811E 00	43	1.13513E 00	44	1.16216E 00	45	1.18919E 00
46	1.21621E 00	47	1.24324E 00	48	1.27027E 00	49	1.29730E 00	50	1.32432E 00
51	1.35135E 00	52	1.37838E 00	53	1.40540E 00	54	1.43243E 00	55	1.45946E 00
56	1.48648E 00	57	1.51351E 00	58	1.54054E 00	59	1.56757E 00	60	1.59459E 00
61	1.62162E 00	62	1.64865E 00	63	1.67567E 00	64	1.70270E 00	65	1.72973E 00
66	1.75675E 00	67	1.78378E 00	68	1.81081E 00	69	1.83784E 00	70	1.86486E 00
71	1.89189E 00	72	1.91892E 00	73	1.94594E 00	74	1.97297E 00	75	2.00000E 00

PLOT DESCRIPTION

CHARACTER	TYPE			MINIMUM	MAXIMUM	RESOLUTION
P	MAGNITUDE	FUNC(4)	SMOOTHED POWER DENSITY FUNCTION	2.50031E-03	7.03773E-01	5.65542E-03
A	MAGNITUDE	FUNC(5)	FILTERED AUTOCORRELATION FUNCTION	3.76979E-08	1.50000E 00	1.20968E-02
B	MAGNITUDE	FUNC(2)	AUTOCORRELATION FUNCTION OF F(T)	3.76979E-08	1.50000E 00	1.20968E-02
Q	MAGNITUDE	FUNC(3)	POWER DENSITY FUNCTION OF F(T)	2.50031E-03	7.03773E-01	5.65542E-03
X	TRACE INTERSECTION					



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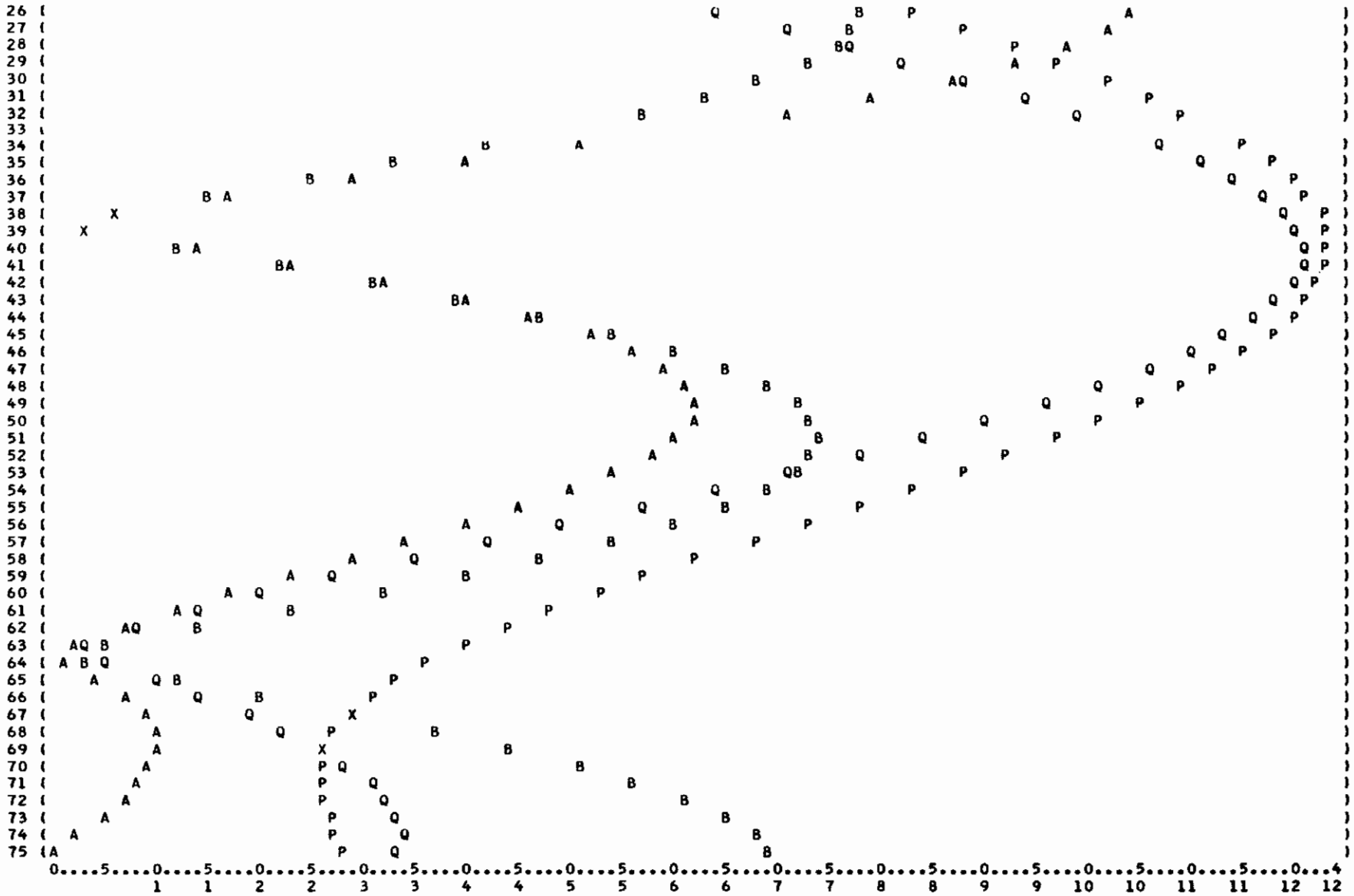

Contrails
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***** JOB SEPARATION *****

C       THE INPUT FUNCTIONS CONSIST OF TWO TIME DEPENDENT WAVE-
C       FORMS DEFINED AS FOLLOWS
C          VOLTAGE IN, V1 = 4 VOLTS    T=0,.025,.001
C                      V1 = -4 VOLTS    T=.026,.05,.001
C          CURRENT IN, I1 = (160 AMPERES/SEC.)*T    T=0,.025,.001
C                      I1 = 4 AMPERES - (160 AMPERES/SEC.)*(T - .025)
C                           T=.026,.05,.001
C          V1 = I1 = 0    T GREATER THAN .05
C       THESE INPUTS WERE GENERATED ON TAPE 858 SUCH THAT
C       V1 IS CHANNEL 1 AND I1 IS CHANNEL 2.
*       BEGIN TIME SYSTEM,,ENTER THE TIME SYSTEM IN ORDER
C       TO SET THE TIME INCREMENT, SET THE FREQUENCY ARRAY,
C       AND GENERATE FV1 AND FI1 WHERE
C          FV1 = FOURIER TRANSFORM OF V1
C          FI1 = FOURIER TRANSFORM OF I1
C       858 IS A BINARY TIME DATA FILE
*       DELTAT,.001,,SET TIME INCREMENT
*       FREQUENCY,COMPUTE/1,NFREQ/40,BASE/.001,DELT/.3122637
C       SET THE FREQUENCY ARRAY SO THAT F(1)=.001, F(40)=40. WHERE
C       THE SCALE IS LOGARITHMIC WITH BASE OF 10
*       INTEGRATE,,COMPUTE FV1 AND FI1
*       BEGIN FREQUENCY SYSTEM,,ENTER THE FREQUENCY SYSTEM
C       THE FOLLOWING CODE GENERATES THE ELEMENTS IN THE
C       TRANSFORMATION MATRIX FOR A **T** NETWORK WITH SERIES
C       ELEMENTS OF 1 HENRY EACH AND A SHUNT ELEMENT OF .2
C       FARADS.
C       THE TRANSFORMATION MATRIX IS AS FOLLOWS
C         WHERE
C          F11 = T(1,1),  F12 = T(1,2),
C          F21 = T(2,1),  F22 = T(2,2)
C         SUCH THAT
C          F11 = ((1./(.2*JW))+JW)/(1./(.2*JW))
C          F12 = (1./(.2*JW))-((JW+(1./(.2*JW)))**2)/(1./(.2*JW))
C          F21 = .2*JW
C          F22 = -(JW+1./(.2*JW))/(1./(.2*JW))
*       FOURIERTRAN,,ENTER THE FOURIERTRAN SYSTEM
*       TRANSLATE,,ENTER THE TRANSLATOR OPTION
        K1=(0.,1.),,GENERATE CONSTANT EQUAL TO J
        K2=(0.,.2),,GENERATE CONSTANT EQUAL TO 2.*J
        F1=K1*W,,GENERATE JW, THE SERIES ELEMENTS
        F2=(1.,0.)/(K2*W),,GENERATE 1./(.2*JW), THE SHUNT ELEMENT
        F11=(F2+F1)/F2,,T(1,1)
        F12=F2-((F1+F2)P2)/F2,,T(1,2)
        F21=K2*W,,T(2,1)
        F22=(-F11)
        END
C       THE T MATRIX HAS BEEN GENERATED.
C       THE FOLLOWING CODE WILL LOAD THE INPUT MATRIX
*       LOAD,TEST/1

        *LOAD,TEST/      1
*       DEFINE,F/1,CH/1,CAL/1.,,LOAD FV1 INTO F1
*       DEFINE,F/2,CH/2,CAL/1.,,LOAD FI1 INTO F2
*       FUNCTION DEFINITIONS
*       NAME,F/1,AS/$VOLTAGE IN$
*       NAME,F/2,AS/$CURRENT IN$
*       NAME,F/11,AS/$VOLTAGE TRANSFER R$,UNITS/$ATIO$
```


Contrails

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```
*     NAME,F/12,AS/$REVERSE TRANSFER I$,UNITS/$MPEDANCES
*     PRINT,F/1,F/2,F/11,F/12
C     ALL MATRIX ELEMENTS ARE NOW AVAILABLE.  THE SAVE FILE
C     MUST NOW BE GENERATED TO MAKE THESE ELEMENTS
C     AVAILABLE TO THE MATRIX SYSTEM
*     SAVE,REWIND,,REWIND THE SAVE FILE
```


Contrails

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TEST NUMBER 1 FUNCTION (1) VOLTAGE IN 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
6.70552E-09	1.57207E-05	1.57207E-05	-4.80353E 00	1.57080E 00	10.00000E-04	1
6.70552E-09	2.06381E-05	2.06381E-05	-4.68533E 00	1.57080E 00	1.31226E-03	2
6.70552E-09	2.71201E-05	2.71201E-05	-4.56671E 00	1.57080E 00	1.72204E-03	3
9.11951E-09	3.55393E-05	3.55393E-05	-4.44929E 00	1.57080E 00	2.25977E-03	4
2.12193E-08	4.66406E-05	4.66406E-05	-4.33124E 00	1.57080E 00	2.96541E-03	5
3.47197E-08	6.11692E-05	6.11692E-05	-4.21347E 00	1.57080E 00	3.89140E-03	6
3.94285E-08	8.02427E-05	8.02428E-05	-4.09559E 00	1.57080E 00	5.10654E-03	7
1.07199E-07	1.05277E-04	1.05277E-04	-3.97767E 00	1.57080E 00	6.70113E-03	8
1.87546E-07	1.38134E-04	1.38134E-04	-3.85970E 00	1.57080E 00	8.79364E-03	9
3.26037E-07	1.81272E-04	1.81273E-04	-3.74167E 00	1.57080E 00	1.15396E-02	10
5.62191E-07	2.37896E-04	2.37897E-04	-3.62361E 00	1.57080E 00	1.51430E-02	11
9.69857E-07	3.12178E-04	3.12179E-04	-3.50560E 00	1.57080E 00	1.98716E-02	12
1.69095E-06	4.09629E-04	4.09632E-04	-3.38761E 00	1.57080E 00	2.60767E-02	13
2.90367E-06	5.37550E-04	5.37558E-04	-3.26957E 00	1.57080E 00	3.42196E-02	14
5.04854E-06	7.05400E-04	7.05418E-04	-3.15155E 00	1.57080E 00	4.49051E-02	15
8.71369E-06	9.25612E-04	9.25653E-04	-3.03355E 00	1.57080E 00	5.89273E-02	16
1.50128E-05	1.21463E-03	1.21473E-03	-2.91552E 00	1.57080E 00	7.73282E-02	17
2.59054E-05	1.59373E-03	1.59394E-03	-2.79753E 00	1.57080E 00	1.01475E-01	18
4.46017E-05	2.09120E-03	2.09167E-03	-2.67951E 00	1.54927E 00	1.33162E-01	19
7.68163E-05	2.74362E-03	2.74470E-03	-2.56151E 00	1.54246E 00	1.74744E-01	20
1.32271E-04	3.59924E-03	3.60167E-03	-2.44350E 00	1.53358E 00	2.29310E-01	21
2.27751E-04	4.72043E-03	4.72592E-03	-2.32551E 00	1.52200E 00	3.00915E-01	22
3.92016E-04	6.18837E-03	6.20077E-03	-2.20755E 00	1.50693E 00	3.94879E-01	23
6.74625E-04	8.10717E-03	8.13519E-03	-2.08963E 00	1.48726E 00	5.18186E-01	24
1.16030E-03	1.06080E-02	1.06712E-02	-1.97179E 00	1.46157E 00	6.79997E-01	25
1.99391E-03	1.38511E-02	1.39939E-02	-1.85406E 00	1.42789E 00	8.92335E-01	26
3.42105E-03	1.80201E-02	1.83419E-02	-1.73655E 00	1.38361E 00	1.17098E 00	27
5.85431E-03	2.32962E-02	2.40205E-02	-1.61942E 00	1.32520E 00	1.53663E 00	28
9.97263E-03	2.97858E-02	3.14109E-02	-1.50292E 00	1.24813E 00	2.01647E 00	29
1.68546E-02	3.73435E-02	4.09709E-02	-1.38752E 00	1.14670E 00	2.64614E 00	30
2.80983E-02	4.51825E-02	5.32069E-02	-1.27403E 00	1.01384E 00	3.47243E 00	31
4.57353E-02	5.10965E-02	6.85753E-02	-1.16383E 00	8.40459E-01	4.55674E 00	32
7.13592E-02	5.01647E-02	8.72275E-02	-1.05935E 00	6.13322E-01	5.97965E 00	33
1.03146E-01	3.34460E-02	1.08433E-01	-9.64837E-01	3.13101E-01	7.84687E 00	34
1.29038E-01	-1.02190E-02	1.29442E-01	-8.87926E-01	6.20362E 00	1.02972E 01	35
1.19036E-01	-8.04293E-02	1.43661E-01	-8.42661E-01	5.68837E 00	1.35126E 01	36
4.11992E-02	-1.32934E-01	1.39172E-01	-8.56448E-01	5.01241E 00	1.77321E 01	37
-5.67223E-02	-8.53379E-02	1.02469E-01	-9.89406E-01	4.12515E 00	2.32692E 01	38
-3.76357E-02	6.84917E-03	3.82539E-02	-1.41732E 00	2.96195E 00	3.05353E 01	39
2.65151E-07	1.92828E-06	1.94642E-06	-5.71076E 00	1.43415E 00	4.00704E 01	40

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TEST NUMBER 1 FUNCTION (2) CURRENT IN 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
10.00000E-02	-1.57207E-05	10.00000E-02	-1.00000E 00	6.28303E 00	10.00000E-04	1
10.00000E-02	-2.06381E-05	10.00000E-02	-1.00000E 00	6.28298E 00	1.31226E-03	2
10.00000E-02	-2.71201E-05	10.00000E-02	-1.00000E 00	6.28291E 00	1.72204E-03	3
10.00000E-02	-3.55393E-05	10.00000E-02	-1.00000E 00	6.28283E 00	2.25977E-03	4
10.00000E-02	-4.66406E-05	10.00000E-02	-1.00000E 00	6.28272E 00	2.96541E-03	5
10.00000E-02	-6.11693E-05	10.00000E-02	-1.00000E 00	6.28257E 00	3.89140E-03	6
10.00000E-02	-8.02428E-05	1.00000E-01	-10.00000E-01	6.28238E 00	5.10654E-03	7
9.99999E-02	-1.05277E-04	10.00000E-02	-1.00000E 00	6.28213E 00	6.70113E-03	8
9.99999E-02	-1.38134E-04	10.00000E-02	-1.00000E 00	6.28180E 00	8.79364E-03	9
9.99998E-02	-1.81272E-04	10.00000E-02	-1.00000E 00	6.28137E 00	1.15396E-02	10
9.99997E-02	-2.37897E-04	10.00000E-02	-1.00000E 00	6.28081E 00	1.51430E-02	11
9.99994E-02	-3.12179E-04	9.99999E-02	-1.00000E 00	6.28006E 00	1.98716E-02	12
9.99990E-02	-4.09631E-04	9.99999E-02	-1.00000E 00	6.27909E 00	2.60767E-02	13
9.99983E-02	-5.37556E-04	9.99998E-02	-1.00000E 00	6.27781E 00	3.42196E-02	14
9.99971E-02	-7.05412E-04	9.99996E-02	-1.00000E 00	6.27613E 00	4.49051E-02	15
9.99950E-02	-9.25640E-04	9.99993E-02	-1.00000E 00	6.27393E 00	5.89273E-02	16
9.99914E-02	-1.21470E-03	9.99988E-02	-1.00001E 00	6.27112E 00	7.73282E-02	17
9.99852E-02	-1.59388E-03	9.99979E-02	-1.00001E 00	6.26720E 00	1.01475E-01	18
9.99745E-02	-2.09152E-03	9.99964E-02	-1.00002E 00	6.26208E 00	1.33162E-01	19
9.99561E-02	-2.74435E-03	9.99937E-02	-1.00003E 00	6.25540E 00	1.74744E-01	20
9.99244E-02	-3.60089E-03	9.99892E-02	-1.00005E 00	6.24669E 00	2.29310E-01	21
9.98697E-02	-4.72416E-03	9.99814E-02	-1.00008E 00	6.23534E 00	3.00915E-01	22
9.97758E-02	-6.19680E-03	9.99680E-02	-1.00014E 00	6.22055E 00	3.94879E-01	23
9.96140E-02	-8.12622E-03	9.99449E-02	-1.00024E 00	6.20126E 00	5.18186E-01	24
9.93358E-02	-1.06510E-02	9.99051E-02	-1.00041E 00	6.17607E 00	6.79997E-01	25
9.88575E-02	-1.39481E-02	9.98366E-02	-1.00071E 00	6.14305E 00	8.92335E-01	26
9.80367E-02	-1.82387E-02	9.97188E-02	-1.00122E 00	6.09965E 00	1.17098E 00	27
9.66313E-02	-2.37881E-02	9.95162E-02	-1.00211E 00	6.04242E 00	1.53663E 00	28
9.42348E-02	-3.08885E-02	9.91681E-02	-1.00363E 00	5.96688E 00	2.01647E 00	29
9.01777E-02	-3.98018E-02	9.85708E-02	-1.00625E 00	5.86744E 00	2.64614E 00	30
8.33942E-02	-5.06086E-02	9.75490E-02	-1.01078E 00	5.73716E 00	3.47243E 00	31
7.22965E-02	-6.28701E-02	9.58093E-02	-1.01859E 00	5.56710E 00	4.55674E 00	32
5.48285E-02	-7.49599E-02	9.28717E-02	-1.03212E 00	5.34447E 00	5.97965E 00	33
2.91923E-02	-8.29971E-02	8.79813E-02	-1.05561E 00	5.05026E 00	7.84687E 00	34
-3.73491E-03	-7.99538E-02	8.00410E-02	-1.09669E 00	4.66514E 00	1.02972E 01	35
-3.54892E-02	-5.76565E-02	6.77034E-02	-1.16939E 00	4.16004E 00	1.35126E 01	36
-4.68528E-02	-1.74348E-02	4.99916E-02	-1.30110E 00	3.49759E 00	1.77321E 01	37
-2.44403E-02	1.37842E-02	2.80595E-02	-1.55192E 00	2.62756E 00	2.32692E 01	38
6.70859E-04	7.95943E-03	7.98766E-03	-2.09758E 00	1.48620E 00	3.05353E 01	39
3.11147E-07	-6.13562E-11	3.11147E-07	-6.50703E 00	6.28299E 00	4.00704E 01	40

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TEST NUMBER 1 FUNCTION (11) VOLTAGE TRANSFER RATIO 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
9.99992E-01	0.	9.99992E-01	-3.43604E-06	0.	10.00000E-04	1
9.99986E-01	0.	9.99986E-01	-5.90991E-06	0.	1.31226E-03	2
9.99977E-01	0.	9.99977E-01	-1.01758E-05	0.	1.72204E-03	3
9.99960E-01	0.	9.99960E-01	-1.75166E-05	0.	2.25977E-03	4
9.99931E-01	0.	9.99931E-01	-3.01663E-05	0.	2.96541E-03	5
9.99880E-01	0.	9.99880E-01	-5.19399E-05	0.	3.89140E-03	6
9.99794E-01	0.	9.99794E-01	-8.94358E-05	0.	5.10654E-03	7
9.99645E-01	0.	9.99645E-01	-1.54019E-04	0.	6.70113E-03	8
9.99389E-01	0.	9.99389E-01	-2.65246E-04	0.	8.79364E-03	9
9.98949E-01	0.	9.98949E-01	-4.56870E-04	0.	1.15396E-02	10
9.98189E-01	0.	9.98189E-01	-7.87033E-04	0.	1.51430E-02	11
9.96882E-01	0.	9.96882E-01	-1.35619E-03	0.	1.98716E-02	12
9.94631E-01	0.	9.94631E-01	-2.33803E-03	0.	2.60767E-02	13
9.90754E-01	0.	9.90754E-01	-4.03402E-03	0.	3.42196E-02	14
9.84079E-01	0.	9.84079E-01	-6.97020E-03	0.	4.49051E-02	15
9.72583E-01	0.	9.72583E-01	-1.20734E-02	0.	5.89273E-02	16
9.52787E-01	0.	9.52787E-01	-2.10043E-02	0.	7.73282E-02	17
9.18697E-01	0.	9.18697E-01	-3.68277E-02	0.	1.01475E-01	18
8.59993E-01	0.	8.59993E-01	-6.55050E-02	0.	1.33162E-01	19
7.58903E-01	0.	7.58903E-01	-1.19814E-01	0.	1.74744E-01	20
5.84823E-01	0.	5.84823E-01	-2.32976E-01	0.	2.29310E-01	21
2.85050E-01	0.	2.85050E-01	-5.45079E-01	0.	3.00915E-01	22
-2.31170E-01	0.	2.31170E-01	-6.36069E-01	3.14159E 00	3.94879E-01	23
-1.12012E 00	0.	1.12012E 00	4.92640E-02	3.14159E 00	5.18186E-01	24
-2.65092E 00	0.	2.65092E 00	4.23397E-01	3.14159E 00	6.79997E-01	25
-5.28702E 00	0.	5.28702E 00	7.23211E-01	3.14159E 00	8.92335E-01	26
-9.82647E 00	0.	9.82647E 00	9.92397E-01	3.14159E 00	1.17098E 00	27
-1.76436E 01	0.	1.76436E 01	1.24659E 00	3.14159E 00	1.53663E 00	28
-3.11049E 01	0.	3.11049E 01	1.49283E 00	3.14159E 00	2.01647E 00	29
-5.42858E 01	0.	5.42858E 01	1.73469E 00	3.14159E 00	2.64614E 00	30
-9.42041E 01	0.	9.42041E 01	1.97407E 00	3.14159E 00	3.47243E 00	31
-1.62945E 02	0.	1.62945E 02	2.21204E 00	3.14159E 00	4.55674E 00	32
-2.81319E 02	0.	2.81319E 02	2.44920E 00	3.14159E 00	5.97965E 00	33
-4.85164E 02	0.	4.85164E 02	2.68589E 00	3.14159E 00	7.84687E 00	34
-8.36191E 02	0.	8.36191E 02	2.92231E 00	3.14159E 00	1.02972E 01	35
-1.44067E 03	0.	1.44067E 03	3.15857E 00	3.14159E 00	1.35126E 01	36
-2.48161E 03	0.	2.48161E 03	3.39473E 00	3.14159E 00	1.77321E 01	37
-4.27415E 03	0.	4.27415E 03	3.63085E 00	3.14159E 00	2.32692E 01	38
-7.36096E 03	0.	7.36096E 03	3.86693E 00	3.14159E 00	3.05353E 01	39
-1.26766E 04	0.	1.26766E 04	4.10300E 00	3.14159E 00	4.00704E 01	40

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TEST NUMBER 1 FUNCTION (12) REVERSE TRANSFER IMPEDANCE 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	
0.	-1.25885E-02	1.25885E-02	-1.90003E 00	4.71239E 00	10.00000E-04	1
0.	-1.65024E-02	1.65024E-02	-1.78245E 00	4.71239E 00	1.31226E-03	2
0.	-2.16484E-02	2.16484E-02	-1.66457E 00	4.71239E 00	1.72204E-03	3
0.	-2.84081E-02	2.84081E-02	-1.54656E 00	4.71239E 00	2.25977E-03	4
0.	-3.72734E-02	3.72734E-02	-1.42860E 00	4.71239E 00	2.96541E-03	5
0.	-4.89044E-02	4.89044E-02	-1.31065E 00	4.71239E 00	3.89140E-03	6
0.	-6.41670E-02	6.41670E-02	-1.19269E 00	4.71239E 00	5.10654E-03	7
0.	-8.41951E-02	8.41951E-02	-1.07471E 00	4.71239E 00	6.70113E-03	8
0.	-1.10471E-01	1.10471E-01	-9.56753E-01	4.71239E 00	8.79364E-03	9
0.	-1.44937E-01	1.44937E-01	-8.38822E-01	4.71239E 00	1.15396E-02	10
0.	-1.90121E-01	1.90121E-01	-7.20971E-01	4.71239E 00	1.51430E-02	11
0.	-2.49325E-01	2.49325E-01	-6.03235E-01	4.71239E 00	1.98716E-02	12
0.	-3.26811E-01	3.26811E-01	-4.85704E-01	4.71239E 00	2.60767E-02	13
0.	-4.28028E-01	4.28028E-01	-3.68528E-01	4.71239E 00	3.42196E-02	14
0.	-5.59802E-01	5.59802E-01	-2.51966E-01	4.71239E 00	4.49051E-02	15
0.	-7.30351E-01	7.30351E-01	-1.36468E-01	4.71239E 00	5.89273E-02	16
0.	-9.48794E-01	9.48794E-01	-2.28278E-02	4.71239E 00	7.73282E-02	17
0.	-1.22333E 00	1.22333E 00	8.75449E-02	4.71239E 00	1.01475E-01	18
0.	-1.55622E 00	1.55622E 00	1.92071E-01	4.71239E 00	1.33162E-01	19
0.	-1.93118E 00	1.93118E 00	2.85823E-01	4.71239E 00	1.74744E-01	20
0.	-2.28340E 00	2.28340E 00	3.58582E-01	4.71239E 00	2.29310E-01	21
0.	-2.42965E 00	2.42965E 00	3.85543E-01	4.71239E 00	3.00915E-01	22
0.	-1.90754E 00	1.90754E 00	2.80474E-01	4.71239E 00	3.94879E-01	23
0.	3.91089E-01	3.91089E-01	-4.07725E-01	1.57080E 00	5.18186E-01	24
0.	7.05362E 00	7.05362E 00	8.48412E-01	1.57080E 00	6.79997E-01	25
0.	2.40360E 01	2.40360E 01	1.38086E 00	1.57080E 00	8.92335E-01	26
0.	6.49405E 01	6.49405E 01	1.81252E 00	1.57080E 00	1.17098E 00	27
0.	1.60693E 02	1.60693E 02	2.20600E 00	1.57080E 00	1.53663E 00	28
0.	3.81424E 02	3.81424E 02	2.58141E 00	1.57080E 00	2.01647E 00	29
0.	8.85938E 02	8.85938E 02	2.94740E 00	1.57080E 00	2.64614E 00	30
0.	2.03352E 03	2.03352E 03	3.30825E 00	1.57080E 00	3.47243E 00	31
0.	4.63662E 03	4.63662E 03	3.66620E 00	1.57080E 00	4.55674E 00	32
0.	1.05319E 04	1.05319E 04	4.02251E 00	1.57080E 00	5.97965E 00	33
0.	2.38709E 04	2.38709E 04	4.37787E 00	1.57080E 00	7.84687E 00	34
0.	5.40360E 04	5.40360E 04	4.73268E 00	1.57080E 00	1.02972E 01	35
0.	1.22231E 05	1.22231E 05	5.08718E 00	1.57080E 00	1.35126E 01	36
0.	2.76375E 05	2.76375E 05	5.44150E 00	1.57080E 00	1.77321E 01	37
0.	6.24754E 05	6.24754E 05	5.79571E 00	1.57080E 00	2.32692E 01	38
0.	1.41207E 06	1.41207E 06	6.14986E 00	1.57080E 00	3.05353E 01	39
0.	3.19132E 06	3.19132E 06	6.50397E 00	1.57080E 00	4.00704E 01	40

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```
*     SAVE,F/1,ID/(1,1,1,0),,THE INPUT MATRIX LOAD KEY IS 1
*     SAVE,F/2,ID/(2,1,1,0)
*     SAVE,F/11,ID/(1,1,2,0),,THE T MATRIX LOAD KEY IS 2
*     SAVE,F/21,ID/(2,1,2,0),F/12,ID/(1,2,2,0),F/22,ID/(2,2,2,0)
*     SAVE,F/40,ID/(1,1,3,0),,SAVE THE FREQUENCY ARRAY FOR USE IN
C     THE INVERSE TRANSFORM SYSTEM
*     SAVE,ENDFILE
*     SAVE,REWIND
*     MATRIX,,ENTER THE MATRIX SYSTEM
C     THE MATRIX SYSTEM WILL BE USED TO COMPUTE THE
C     OUTPUT MATRIX FROM THE T MATRIX AND THE INPUT
C     MATRIX IN THE FOLLOWING MANNER
C          OUTPUT=T*INPUT
C     BECAUSE OF THE ABSENCE OF THE NFREQ FIELD ON
C     THE *MATRIX CARD THE ENTIRE FREQUENCY ARRAY WILL
C     BE USED.
*     MALOAD,INPUT(2,1)/1,T(2,2)/2,,LOAD THE MATRICES
*     MALOAD,FREQ(1,1)/3,,LOAD THE FREQUENCY ARRAY INTO MATRIX
C     FREQ SO THAT IT WILL BE AVAILABLE FOR THE GENERATION
C     OF THE SAVE FILE FOR THE INVERSE TRANSFORM SYSTEM.
*     OPERATE,OUTPUT=T*INPUT,,COMPUTE THE OUTPUT MATRIX
*     OUTPUT,PRINT/OUTPUT,ELEMENTS/ALL,,PRINT THE OUTPUT MATRIX
```


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OUTPUT (1, 1) 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	F-CODE
-1.91195E-07	-1.24313E-03	1.24313E-03	-2.90548E 00	3.14175E 00	10.00000E-04	1
-3.33872E-07	-1.62960E-03	1.62960E-03	-2.78792E 00	3.14180E 00	1.31226E-03	2
-5.80402E-07	-2.13772E-03	2.13772E-03	-2.67005E 00	3.14186E 00	1.72204E-03	3
-1.00048E-06	-2.80527E-03	2.80527E-03	-2.55203E 00	3.14195E 00	2.25977E-03	4
-1.71724E-06	-3.68070E-03	3.68070E-03	-2.43407E 00	3.14206E 00	2.96541E-03	5
-2.95673E-06	-4.82928E-03	4.82928E-03	-2.31612E 00	3.14220E 00	3.89140E-03	6
-5.10952E-06	-6.33647E-03	6.33648E-03	-2.19815E 00	3.14240E 00	5.10654E-03	7
-8.75662E-06	-8.31427E-03	8.31427E-03	-2.08018E 00	3.14265E 00	6.70113E-03	8
-1.50723E-05	-1.09090E-02	1.09090E-02	-1.96221E 00	3.14297E 00	8.79364E-03	9
-2.59473E-05	-1.43125E-02	1.43126E-02	-1.84429E 00	3.14341E 00	1.15396E-02	10
-4.46679E-05	-1.87745E-02	1.87746E-02	-1.72643E 00	3.14397E 00	1.51430E-02	11
-7.68670E-05	-2.46211E-02	2.46213E-02	-1.60869E 00	3.14471E 00	1.98716E-02	12
-1.32190E-04	-3.22733E-02	3.22736E-02	-1.49115E 00	3.14569E 00	2.60767E-02	13
-2.27212E-04	-4.22695E-02	4.22701E-02	-1.37397E 00	3.14697E 00	3.42196E-02	14
-3.89923E-04	-5.52844E-02	5.52858E-02	-1.25739E 00	3.14865E 00	4.49051E-02	15
-6.67568E-04	-7.21312E-02	7.21343E-02	-1.14186E 00	3.15085E 00	5.89273E-02	16
-1.13819E-03	-9.37140E-02	9.37209E-02	-1.02816E 00	3.15366E 00	7.73282E-02	17
-1.92604E-03	-1.20851E-01	1.20866E-01	-9.17694E-01	3.15757E 00	1.01475E-01	18
-3.21651E-03	-1.53784E-01	1.53817E-01	-8.12994E-01	3.16269E 00	1.33162E-01	19
-5.24154E-03	-1.90951E-01	1.91023E-01	-7.18915E-01	3.16937E 00	1.74744E-01	20
-8.14493E-03	-2.26063E-01	2.26209E-01	-6.45490E-01	3.17808E 00	2.29310E-01	21
-1.14131E-02	-2.41302E-01	2.41572E-01	-6.16953E-01	3.18943E 00	3.00915E-01	22
-1.19113E-02	-1.91757E-01	1.92127E-01	-7.16412E-01	3.20424E 00	3.94879E-01	23
2.42241E-03	2.98769E-02	2.99750E-02	-1.52324E 00	8.14314E-02	5.18186E-01	24
7.20520E-02	6.72556E-01	6.76405E-01	-1.69793E-01	1.07030E-01	6.79997E-01	25
3.24715E-01	2.30291E 00	2.32569E 00	3.66552E-01	1.40043E-01	8.92335E-01	26
1.15081E 00	6.18948E 00	6.29555E 00	7.99034E-01	1.83431E-01	1.17098E 00	27
3.71928E 00	1.51169E 01	1.55677E 01	1.19222E 00	2.40638E-01	1.53663E 00	28
1.14714E 01	3.50169E 01	3.68480E 01	1.56641E 00	3.16132E-01	2.01647E 00	29
3.43469E 01	7.78646E 01	8.51035E 01	1.92995E 00	4.15524E-01	2.64614E 00	30
1.00266E 02	1.65327E 02	1.93356E 02	2.28636E 00	5.45746E-01	3.47243E 00	31
2.84052E 02	3.26885E 02	4.33058E 02	2.63655E 00	7.15713E-01	4.55674E 00	32
7.69397E 02	5.63337E 02	9.53583E 02	2.97936E 00	9.38234E-01	5.97965E 00	33
1.93117E 03	6.80618E 02	2.04760E 03	3.31124E 00	1.23229E 00	7.84687E 00	34
4.21248E 03	-1.93274E 02	4.21692E 03	3.62499E 00	1.61721E 00	1.02972E 01	35
6.87594E 03	-4.22202E 03	8.06870E 03	3.90680E 00	2.12206E 00	1.35126E 01	36
4.71629E 03	-1.26191E 04	1.34716E 04	4.12942E 00	2.78416E 00	1.77321E 01	37
-8.36928E 03	-1.49044E 04	1.70935E 04	4.23283E 00	3.65375E 00	2.32692E 01	38
-1.09623E 04	8.96886E 02	1.09989E 04	4.04135E 00	4.79455E 00	3.05353E 01	39
-3.16540E-03	9.68526E-01	9.68531E-01	-1.38866E-02	6.27992E 00	4.00704E 01	40

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OUTPUT (2, 1) 19 MAY 65

REAL	IMAGINARY	MAGNITUDE	LOG MAGNITUDE	PHASE ANGLE	FREQUENCY	F-CODE
-9.99992E-02	1.57206E-05	9.99992E-02	-1.00000E 00	4.71239E 00	10.00000E-04	1
-9.99987E-02	2.06378E-05	9.99987E-02	-1.00001E 00	4.71239E 00	1.31226E-03	2
-9.99977E-02	2.71195E-05	9.99977E-02	-1.00001E 00	4.71239E 00	1.72204E-03	3
-9.99960E-02	3.55379E-05	9.99961E-02	-1.00002E 00	4.71239E 00	2.25977E-03	4
-9.99932E-02	4.66375E-05	9.99932E-02	-1.00003E 00	4.71239E 00	2.96541E-03	5
-9.99883E-02	6.11621E-05	9.99883E-02	-1.00005E 00	4.71239E 00	3.89140E-03	6
-9.99799E-02	8.02265E-05	9.99799E-02	-1.00009E 00	4.71239E 00	5.10654E-03	7
-9.99654E-02	1.05240E-04	9.99654E-02	-1.00015E 00	4.71239E 00	6.70113E-03	8
-9.99403E-02	1.38051E-04	9.99404E-02	-1.00026E 00	4.71239E 00	8.79364E-03	9
-9.98973E-02	1.81087E-04	9.98975E-02	-1.00045E 00	4.71239E 00	1.15396E-02	10
-9.98231E-02	2.37477E-04	9.98234E-02	-1.00077E 00	4.71239E 00	1.51430E-02	11
-9.96955E-02	3.11230E-04	9.96959E-02	-1.00132E 00	4.71239E 00	1.98716E-02	12
-9.94755E-02	4.07487E-04	9.94764E-02	-1.00228E 00	4.71239E 00	2.60767E-02	13
-9.90969E-02	5.32710E-04	9.90983E-02	-1.00393E 00	4.71239E 00	3.42196E-02	14
-9.84448E-02	6.94466E-04	9.84473E-02	-1.00680E 00	4.71239E 00	4.49051E-02	15
-9.73220E-02	9.00907E-04	9.73261E-02	-1.01177E 00	4.71239E 00	5.89273E-02	16
-9.53885E-02	1.15881E-03	9.53956E-02	-1.02047E 00	4.71239E 00	7.73282E-02	17
-9.20593E-02	1.46759E-03	9.20710E-02	-1.03588E 00	4.71239E 00	1.01475E-01	18
-8.63273E-02	1.80616E-03	8.63462E-02	-1.06376E 00	4.73349E 00	1.33162E-01	19
-7.64595E-02	2.09957E-03	7.64883E-02	-1.11641E 00	4.74018E 00	1.74744E-01	20
-5.94752E-02	2.14400E-03	5.95138E-02	-1.22538E 00	4.74890E 00	2.29310E-01	21
-3.02528E-02	1.43274E-03	3.02868E-02	-1.51875E 00	4.76029E 00	3.00915E-01	22
1.99944E-02	-1.23799E-03	2.00326E-02	-1.69826E 00	1.63324E 00	3.94879E-01	23
1.06300E-01	-8.66303E-03	1.06653E-01	-9.72028E-01	1.65264E 00	5.18186E-01	24
2.54267E-01	-2.72434E-02	2.55722E-01	-5.92232E-01	1.67784E 00	6.79997E-01	25
5.07129E-01	-7.15080E-02	5.12146E-01	-2.90606E-01	1.71084E 00	8.92335E-01	26
9.36838E-01	-1.74188E-01	9.52894E-01	-2.09553E-02	1.75423E 00	1.17098E 00	27
1.65994E 00	-4.08402E-01	1.70944E 00	2.32853E-01	1.81143E 00	1.53663E 00	28
2.85569E 00	-9.35514E-01	3.00502E 00	4.77847E-01	1.88693E 00	2.01647E 00	29
4.77119E 00	-2.10463E 00	5.21476E 00	7.17234E-01	1.98632E 00	2.64614E 00	30
7.65892E 00	-4.64493E 00	8.95736E 00	9.52180E-01	2.11654E 00	3.47243E 00	31
1.14878E 01	-9.98248E 00	1.52190E 01	1.18239E 00	2.28651E 00	4.55674E 00	32
1.50473E 01	-2.05514E 01	2.54712E 01	1.40605E 00	2.50903E 00	5.97965E 00	33
1.38332E 01	-3.92501E 01	4.16164E 01	1.61926E 00	2.80309E 00	7.84687E 00	34
-2.99086E 00	-6.51869E 01	6.52555E 01	1.81462E 00	3.18801E 00	1.02972E 01	35
-4.97626E 01	-8.10429E 01	9.51014E 01	1.97819E 00	3.69285E 00	1.35126E 01	36
-1.13308E 02	-4.23483E 01	1.20964E 02	2.08265E 00	4.35496E 00	1.77321E 01	37
-1.01966E 02	5.72571E 01	1.16942E 02	2.06797E 00	5.22455E 00	2.32692E 01	38
4.67535E 00	5.71449E 01	5.73359E 01	1.75843E 00	8.21576E-02	3.05353E 01	39
3.84718E-03	1.25736E-05	3.84720E-03	-2.41486E 00	1.57080E 00	4.00704E 01	40

```
*     OUTPUT,PLOT/OUTPUT,N/1,LE/1,1,SCALE/DYN,USE/*,
      PLOT/OUTPUT,N/1,AE/1,1,SCALE/ABS(0.,6.28318),USE/+,
      PLOT/OUTPUT,N/1,LE/2,1,SCALE/DYN,USE/.,
      PLOT/OUTPUT,N/1,AE/2,1,SCALE/ABS(0.,6.28318),USE/,,
C     THE OUTPUT MATRIX HAS BEEN COMPUTED, PRINTED, AND PLOTTED.
C     THE ELEMENTS MUST NOW BE SAVED FOR THE INVERSE
C     TRANSFORM SYSTEM.
*     MSAVE,REWIND,,REWIND THE MATRIX SAVE FILE
```


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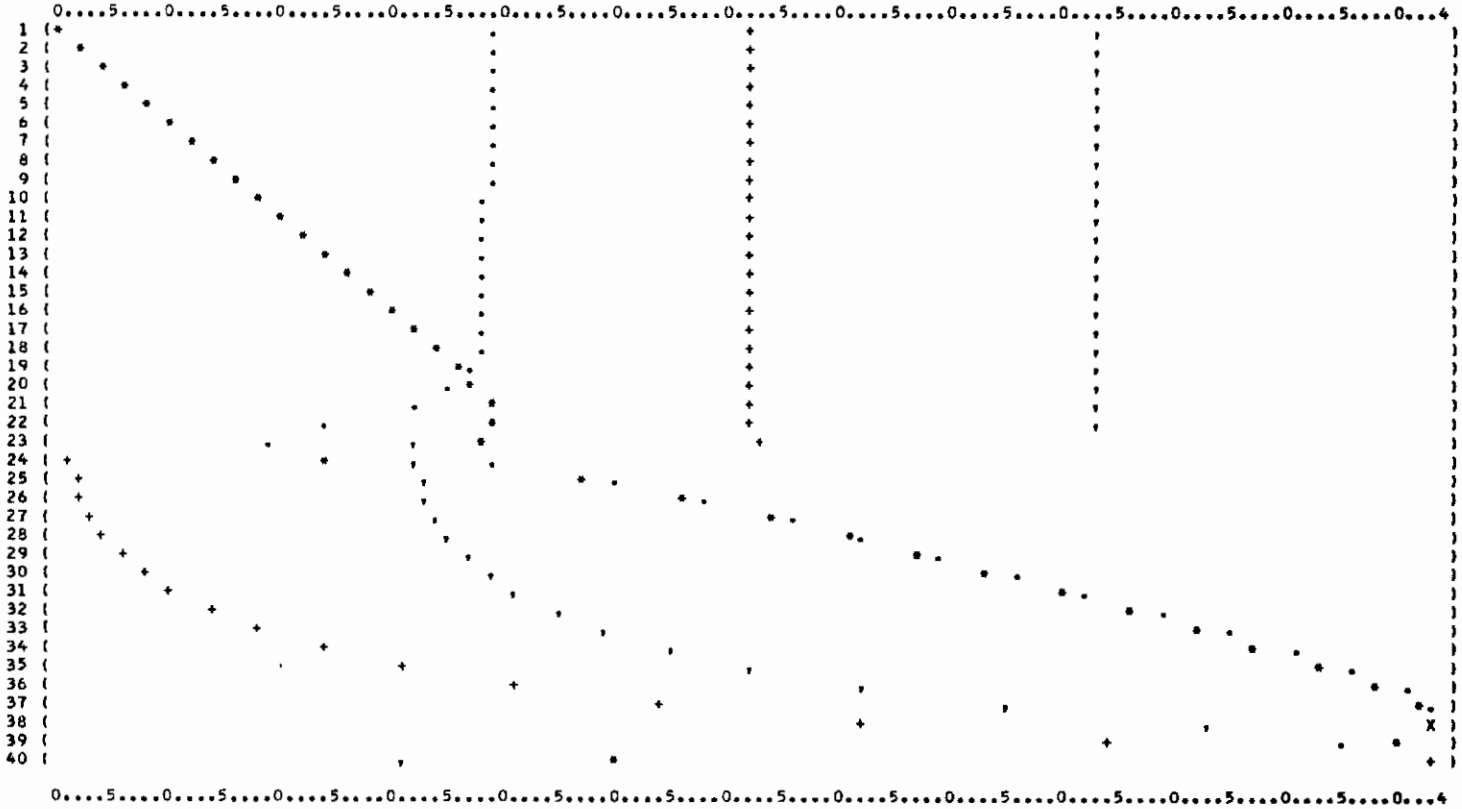
MATRIX PLOT NUMBER 1

1	10.00000E-04	2	1.31226E-03	3	1.72204E-03	4	2.25977E-03	5	2.96541E-03
6	3.89140E-03	7	5.10654E-03	8	6.70113E-03	9	8.79364E-03	10	1.15396E-02
11	1.51430E-02	12	1.98716E-02	13	2.60767E-02	14	3.42196E-02	15	4.49051E-02
16	5.89273E-02	17	7.73282E-02	18	1.01475E-01	19	1.33162E-01	20	1.74744E-01
21	2.29310E-01	22	3.00915E-01	23	3.94879E-01	24	5.18186E-01	25	6.79997E-01
26	8.92335E-01	27	1.17098E 00	28	1.53663E 00	29	2.01647E 00	30	2.64614E 00
31	3.47243E 00	32	4.55674E 00	33	5.97965E 00	34	7.84687E 00	35	1.02972E 01
36	1.35126E 01	37	1.77321E 01	38	2.32692E 01	39	3.05353E 01	40	4.00704E 01

PLOT DESCRIPTION

CHARACTER	TYPE	MATRIX ELEMENT	MINIMUM	MAXIMUM	RESOLUTION
*	LN MAGNITUDE	OUTPUT(1, 1)	-2.90548E 00	4.23283E 00	5.75671E-02
+	PHASE ANGLE	OUTPUT(1, 1)	0.	6.28318E 00	5.06708E-02
.	LN MAGNITUDE	OUTPUT(2, 1)	-2.41486E 00	2.08265E 00	3.62702E-02
,	PHASE ANGLE	OUTPUT(2, 1)	0.	6.28318E 00	5.06708E-02
X	TRACE INTERSECTION				



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*     MSAVE,FREQ(1,1),ID(1,50,2,0),OUTPUT(1,1),ID(1,0,0,1)
      OUTPUT(2,1),ID(2,0,0,1)
*     MSAVE,COPY,,COPY THE MATRIX SAVE FILE ONTO THE SAVE FILE
*     INVERSE/1,,ENTER THE INVERSE TRANSFORM SYSTEM
C     FOR COMPUTATION OF THE INVERSE OF OUTPUT(1,1)
*     INFO,DTIME/.001,NTIME/51
```

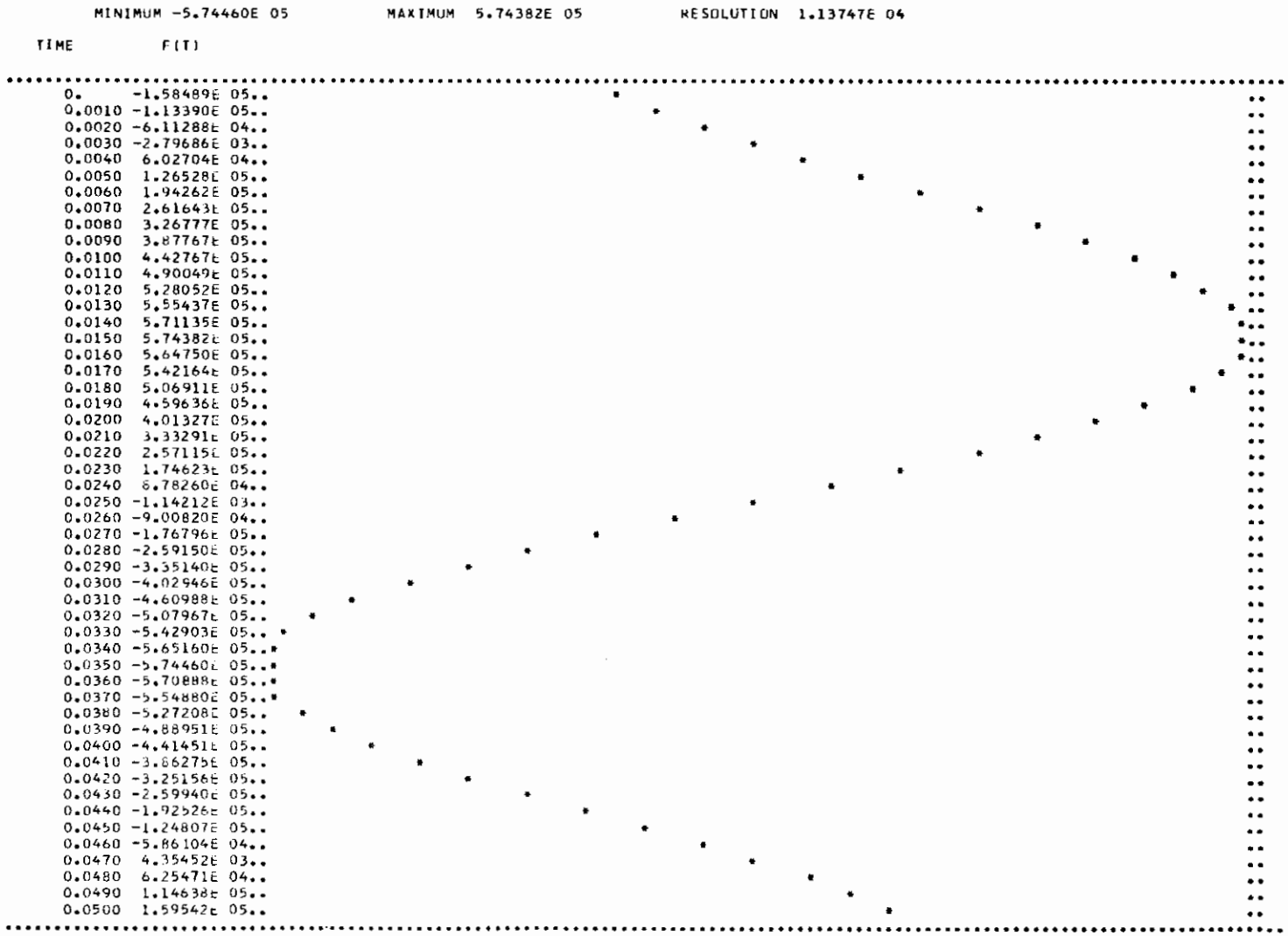

Contrails

Approved for Public Release

TEST NUMBER 1

MINIMUM -5.74460E 05 MAXIMUM 5.74382E 05 RESOLUTION 1.13747E 04

TIME	F(T)
0.	-1.58489E 05
0.0010	-1.13390E 05
0.0020	-6.11288E 04
0.0030	-2.79686E 03
0.0040	6.02704E 04
0.0050	1.26528E 05
0.0060	1.94262E 05
0.0070	2.61643E 05
0.0080	3.26777E 05
0.0090	3.87767E 05
0.0100	4.42767E 05
0.0110	4.90049E 05
0.0120	5.28052E 05
0.0130	5.55437E 05
0.0140	5.71135E 05
0.0150	5.74382E 05
0.0160	5.64750E 05
0.0170	5.42164E 05
0.0180	5.06911E 05
0.0190	4.59636E 05
0.0200	4.01327E 05
0.0210	3.33291E 05
0.0220	2.57115E 05
0.0230	1.74623E 05
0.0240	8.78260E 04
0.0250	-1.14212E 03
0.0260	-9.00820E 04
0.0270	-1.76796E 05
0.0280	-2.59150E 05
0.0290	-3.35140E 05
0.0300	-4.02946E 05
0.0310	-4.60988E 05
0.0320	-5.07967E 05
0.0330	-5.42903E 05
0.0340	-5.65160E 05
0.0350	-5.74460E 05
0.0360	-5.70888E 05
0.0370	-5.54880E 05
0.0380	-5.27208E 05
0.0390	-4.88951E 05
0.0400	-4.41451E 05
0.0410	-3.86275E 05
0.0420	-3.25156E 05
0.0430	-2.59940E 05
0.0440	-1.92526E 05
0.0450	-1.24807E 05
0.0460	-5.86104E 04
0.0470	4.35452E 03
0.0480	6.25471E 04
0.0490	1.14638E 05
0.0500	1.59542E 05



* INVERSE/2,,COMPUTE INVERSE OF OUTPUT(2,1)

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Contrails

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*       INFO,DTIME/.001,NTIME/51
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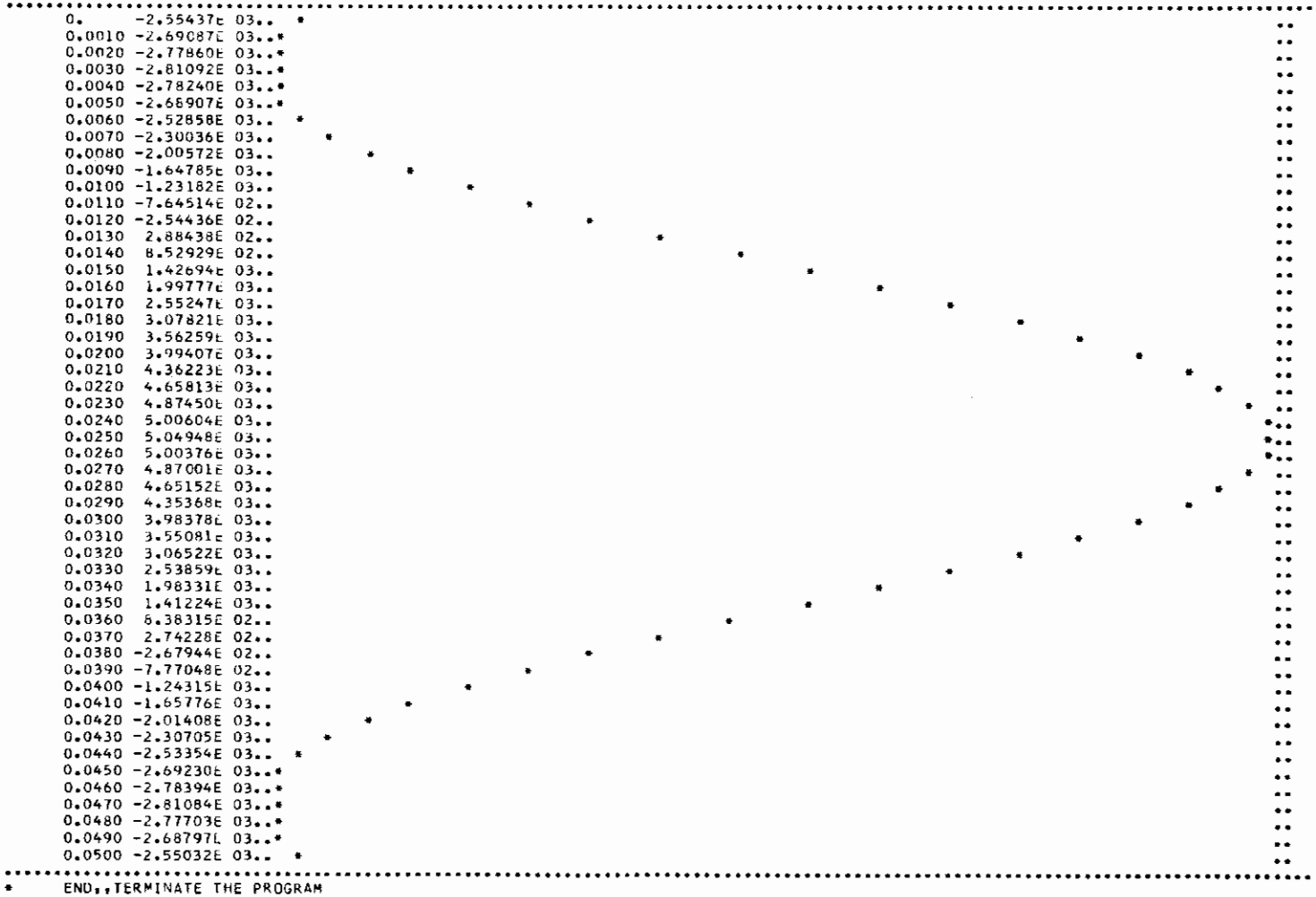
Approved for Public Release

TEST NUMBER 1

MINIMUM -2.81092E 03 MAXIMUM 5.04948E 03 RESOLUTION 7.78257E 01

TIME	F(T)
0.	-2.55437E 03
0.0010	-2.69087E 03
0.0020	-2.77860E 03
0.0030	-2.81092E 03
0.0040	-2.78240E 03
0.0050	-2.68907E 03
0.0060	-2.52858E 03
0.0070	-2.30036E 03
0.0080	-2.00572E 03
0.0090	-1.64785E 03
0.0100	-1.23182E 03
0.0110	-7.64514E 02
0.0120	-2.54436E 02
0.0130	2.88438E 02
0.0140	8.52929E 02
0.0150	1.42694E 03
0.0160	1.99777E 03
0.0170	2.55247E 03
0.0180	3.07821E 03
0.0190	3.56259E 03
0.0200	3.99407E 03
0.0210	4.36223E 03
0.0220	4.65813E 03
0.0230	4.87450E 03
0.0240	5.00604E 03
0.0250	5.04948E 03
0.0260	5.00376E 03
0.0270	4.87001E 03
0.0280	4.65152E 03
0.0290	4.35368E 03
0.0300	3.98378E 03
0.0310	3.55081E 03
0.0320	3.06522E 03
0.0330	2.53859E 03
0.0340	1.98331E 03
0.0350	1.41224E 03
0.0360	8.38315E 02
0.0370	2.74228E 02
0.0380	-2.67944E 02
0.0390	-7.77048E 02
0.0400	-1.24315E 03
0.0410	-1.65776E 03
0.0420	-2.01408E 03
0.0430	-2.30705E 03
0.0440	-2.53354E 03
0.0450	-2.69230E 03
0.0460	-2.78394E 03
0.0470	-2.81084E 03
0.0480	-2.77703E 03
0.0490	-2.68797E 03
0.0500	-2.55032E 03



* END,,TERMINATE THE PROGRAM

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```
***** JOB SEPARATION *****

*BEGIN TIME SYSTEM
*DELTAT,.01
*      BEGIN REGRESSION SYSTEM,,TRANSFER CONTROL TO THE
C      REGRESSION SYSTEM MONITOR
*      IBLOAD,TEST/1,CHANNEL/1(1),CAL/1(1.),ZTEST/1,VALUE/1.,FTYPE/2
       PHASE/1,POINTS/5(Z,50,P,50,T),PHASE/2,POINTS/5(L,50,P,50,T),
       PHASE/3,POINTS/5(L,50,P,50,T),PHASE/4,POINTS/5(L,50,P,50,T)
C      RUN THE REGRESSION SYSTEM ANALYSIS ON CHANNEL 1 OF
C      TEST 1 MULTIPLIED BY 1. OVER 4 PHASES WITH 5 POINTS EACH.
C      THE POINTS FOR THE FIRST PHASE BEING AT THE ZERO LEVEL, 50 PERCENT OF
C      THE WAY FROM THE ZERO TO THE PEAK, THE PEAK, 50 PERCENT OF THE WAY FROM
C      THE PEAK TO THE TROUGH AND THE TROUGH. THE POINTS FOR THE REST OF THE
C      PHASES BEGIN WITH THE LAST POINT OF THE PRECEEDING PHASE. THE REST OF
C      THE POINTS ARE DEFINED AS 50 PERCENT OF THE WAY FROM THE LAST POINT OF
C      THE PRECEEDING PHASE TO THE PEAK, THE PEAK, 50 PERCENT OF THE WAY FROM
C      THE PEAK TO THE TROUGH AND THE TROUGH
*END
```


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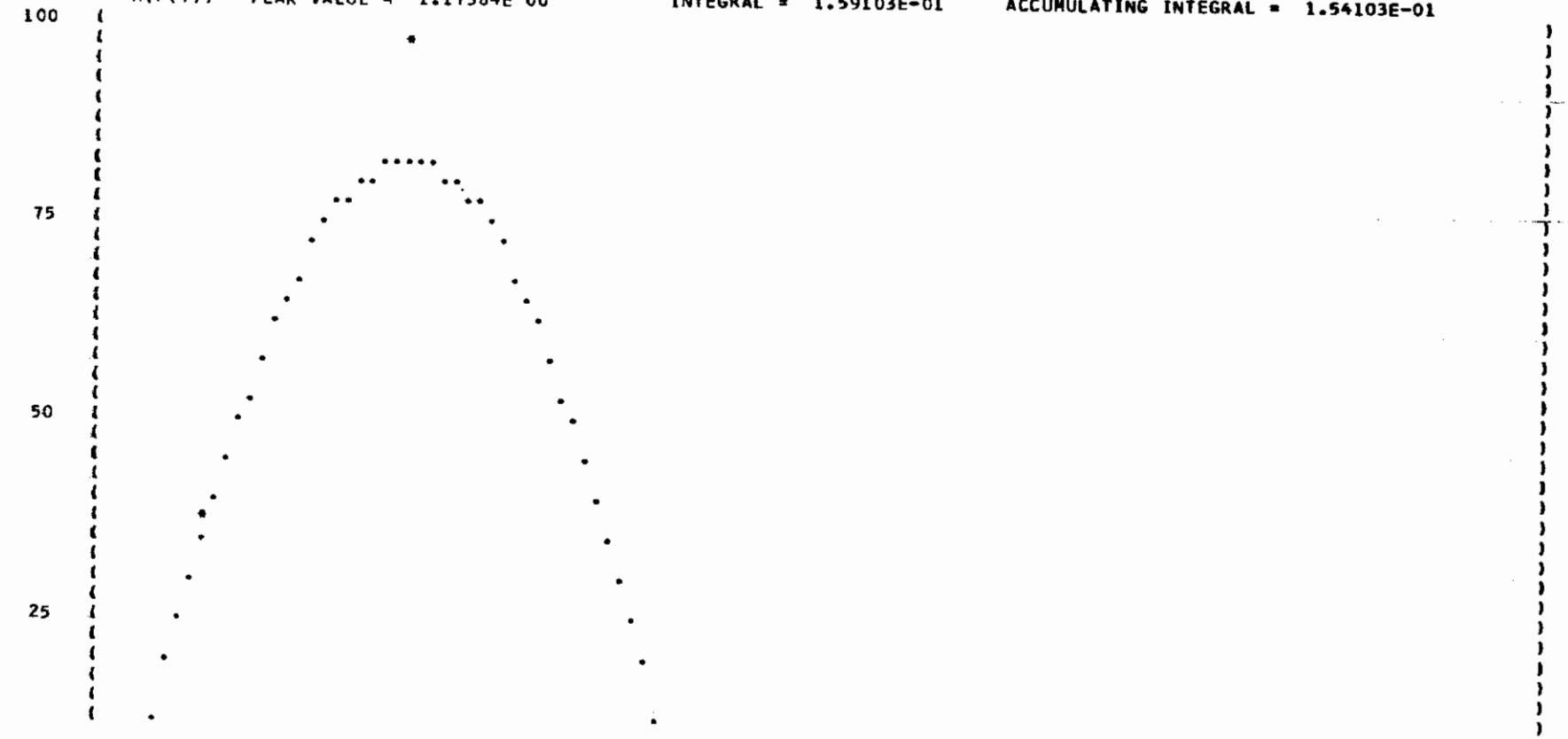
TEST 1 CHANNEL 1 PHASE 1 T = 0. TO 0.7500 SECS. DATE 9 JUN 65

APPROXIMATION VALUES (A(F(T)))

1	A(F(T)) = 6.44135E 00*T + -8.88564E-03	FOR	0.	.LE. T .LE.	0.0800
2	A(F(T)) = 3.92599E 00*T + 1.92343E-01	FOR	0.0800	.LE. T .LE.	0.2500
3	A(F(T)) = -4.67261E 00*T + 2.34199E 00	FOR	0.2500	.LE. T .LE.	0.5100
4	A(F(T)) = -4.89706E 00*T + 2.45646E 00	FOR	0.5100	.LE. T .LE.	0.7500

F(T) PEAK VALUE = 10.00000E-01 RESOLUTION = 2.71730E-02 G UNITS/PRINT LINE EVERY POINT PLOTTED

A(F(T)) PEAK VALUE = 1.17384E 00 INTEGRAL = 1.59103E-01 ACCUMULATING INTEGRAL = 1.54103E-01



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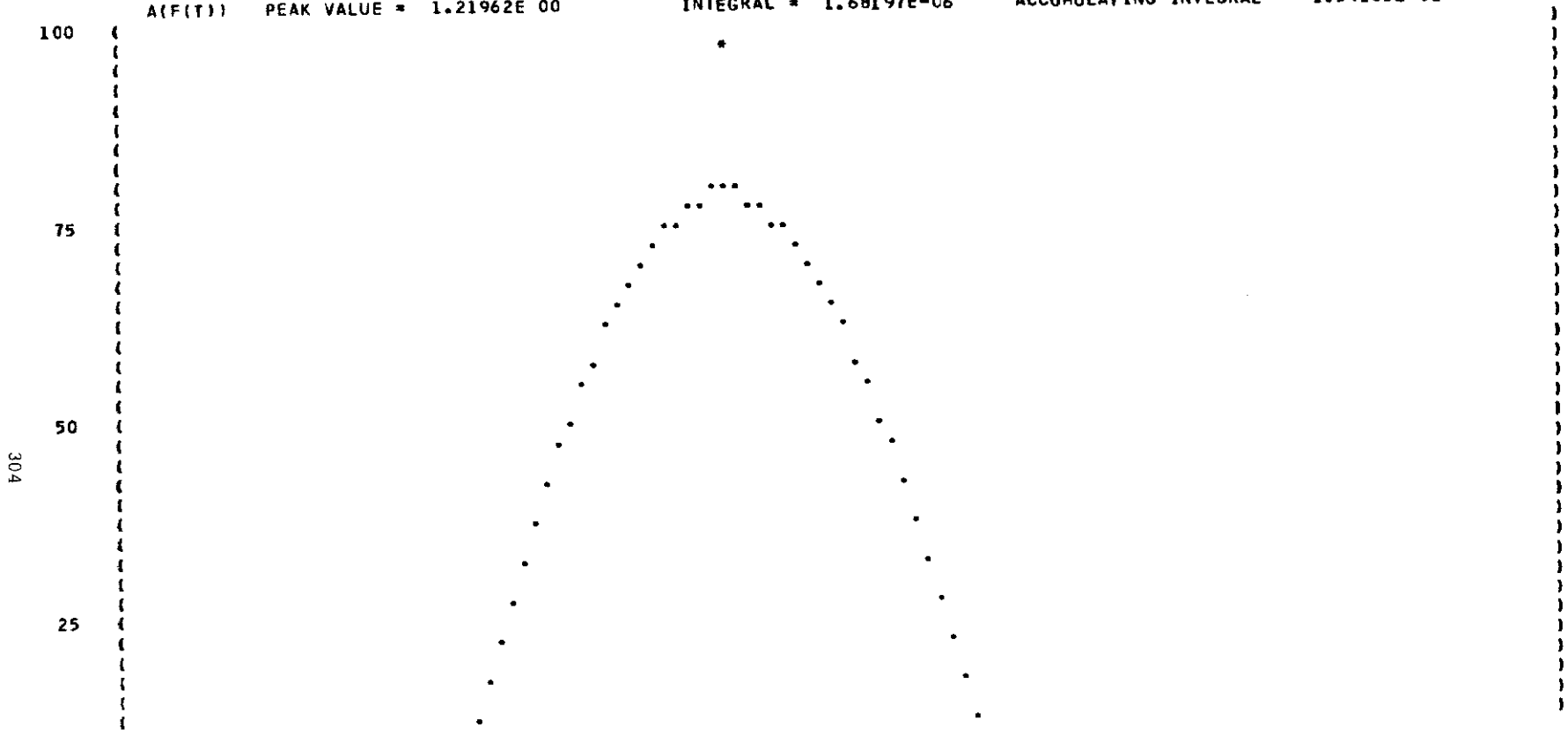
TEST 1 CHANNEL 1 PHASE 2 T = 0.7500 TO 1.7500 SECS. DATE 9 JUN 65

APPROXIMATION VALUES (A(F(T)))

1	A(F(T)) = 4.85922E 00*T + -4.86018E 00	FOR	0.7500 .LE. T .LE.	1.0000
2	A(F(T)) = 4.88235E 00*T + -4.88331E 00	FOR	1.0000 .LE. T .LE.	1.2500
3	A(F(T)) = -4.90067E 00*T + 7.34546E 00	FOR	1.2500 .LE. T .LE.	1.5100
4	A(F(T)) = -4.81251E 00*T + 7.21233E 00	FOR	1.5100 .LE. T .LE.	1.7500

F(T) PEAK VALUE = 10.00000E-01 RESOLUTION = 2.774528-02 G UNITS/PRINT LINE EVERY POINT PLOTTED

A(F(T)) PEAK VALUE = 1.21962E 00 INTEGRAL = 1.68197E-06 ACCUMULATING INTEGRAL = 1.54105E-01



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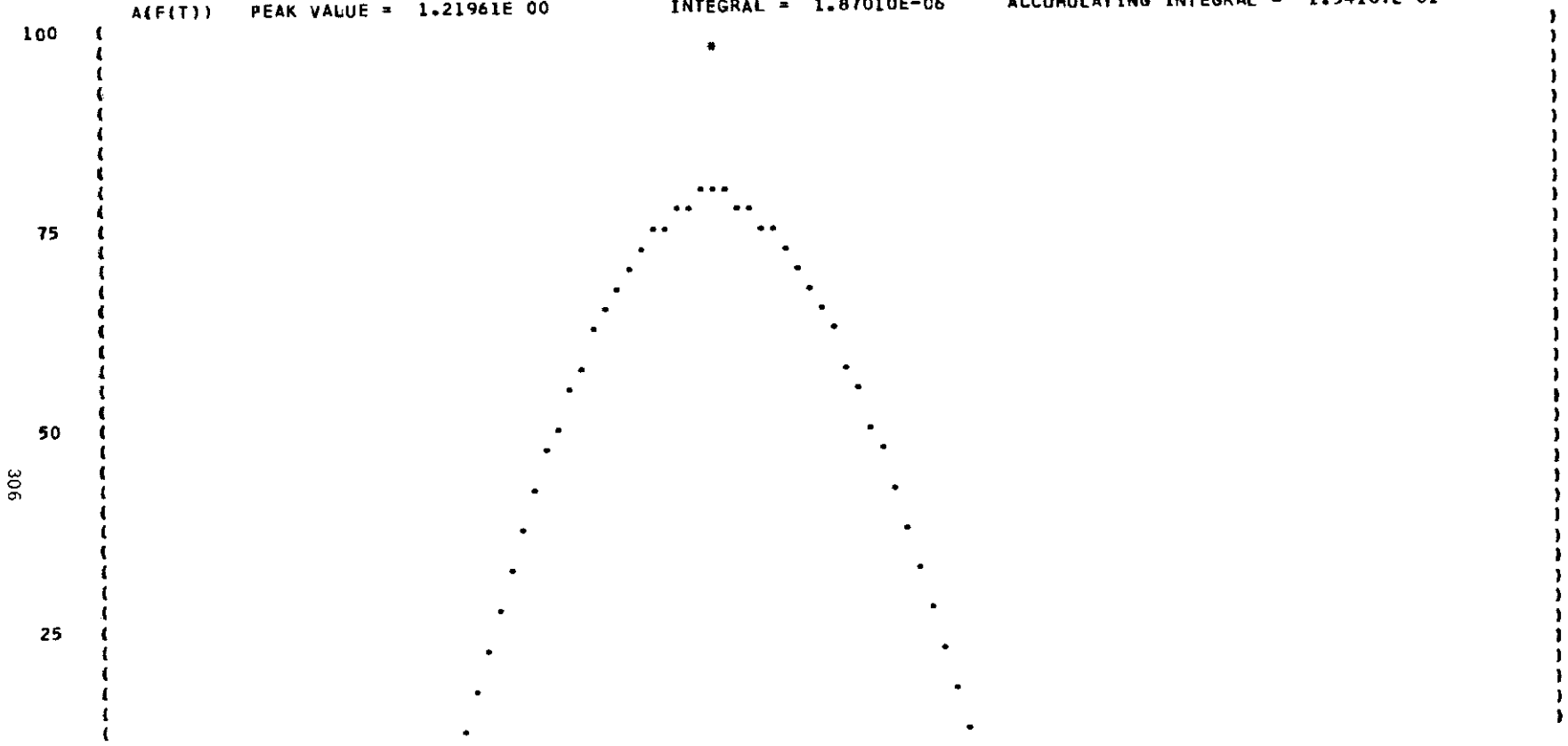
TEST 1 CHANNEL 1 PHASE 3 T = 1.7500 TO 2.7500 SECS. DATE 9 JUN 65

APPROXIMATION VALUES (A(F(T)))

1	A(F(T)) = 4.85927E 00*T + -9.71951E 00	FOR	1.7500	.LE. T .LE.	2.0000
2	A(F(T)) = 4.88233E 00*T + -9.76563E 00	FOR	2.0000	.LE. T .LE.	2.2500
3	A(F(T)) = -4.90058E 00*T + 1.22459E 01	FOR	2.2500	.LE. T .LE.	2.5100
4	A(F(T)) = -4.81264E 00*T + 1.20252E 01	FOR	2.5100	.LE. T .LE.	2.7500

F(T) PEAK VALUE = 10.00000E-01 RESOLUTION = 2.77452E-02 G UNITS/PRINT LINE EVERY POINT PLOTTED

A(F(T)) PEAK VALUE = 1.21961E 00 INTEGRAL = 1.87010E-06 ACCUMULATING INTEGRAL = 1.54107E-01



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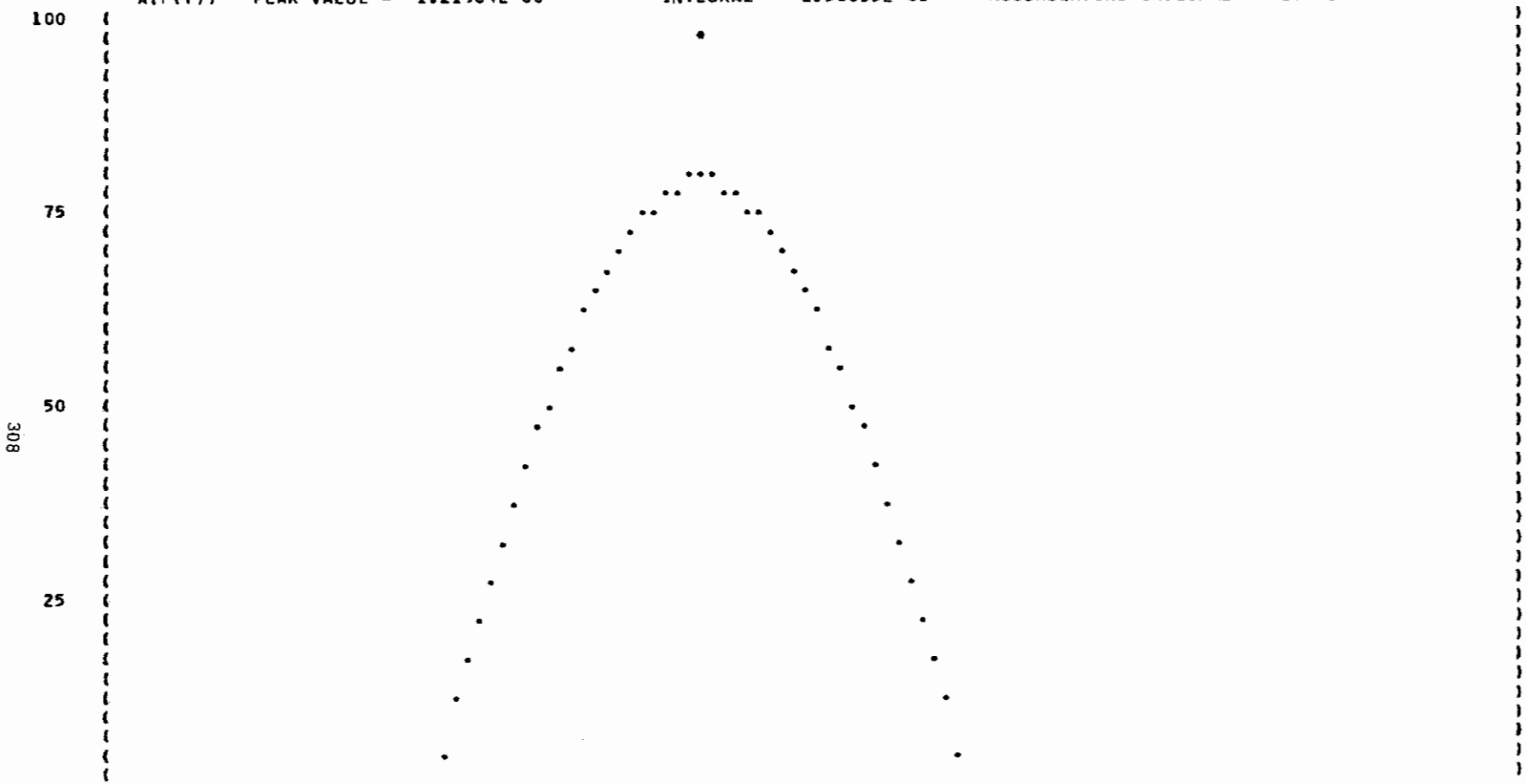
TEST 1 CHANNEL 1 PHASE 4 T = 2.7500 TO 3.7500 SECS. DATE 9 JUN 65

APPROXIMATION VALUES (A(F(T)))

1	A(F(T)) =	4.85862E 00*T +	-1.45769E 01	FOR	2.7500 .LE. T .LE.	3.0000
2	A(F(T)) =	4.88279E 00*T +	-1.46494E 01	FOR	3.0000 .LE. T .LE.	3.2500
3	A(F(T)) =	-4.90071E 00*T +	1.71469E 01	FOR	3.2500 .LE. T .LE.	3.5100
4	A(F(T)) =	-4.81241E 00*T +	1.68370E 01	FOR	3.5100 .LE. T .LE.	3.7500

F(T) PEAK VALUE = 10.00000E-01 RESOLUTION = 2.77455E-02 G UNITS/PRINT LINE EVERY POINT PLOTTED

A(F(T)) PEAK VALUE = 1.21964E 00 INTEGRAL = 1.56835E-06 ACCUMULATING INTEGRAL = 1.54109E-01



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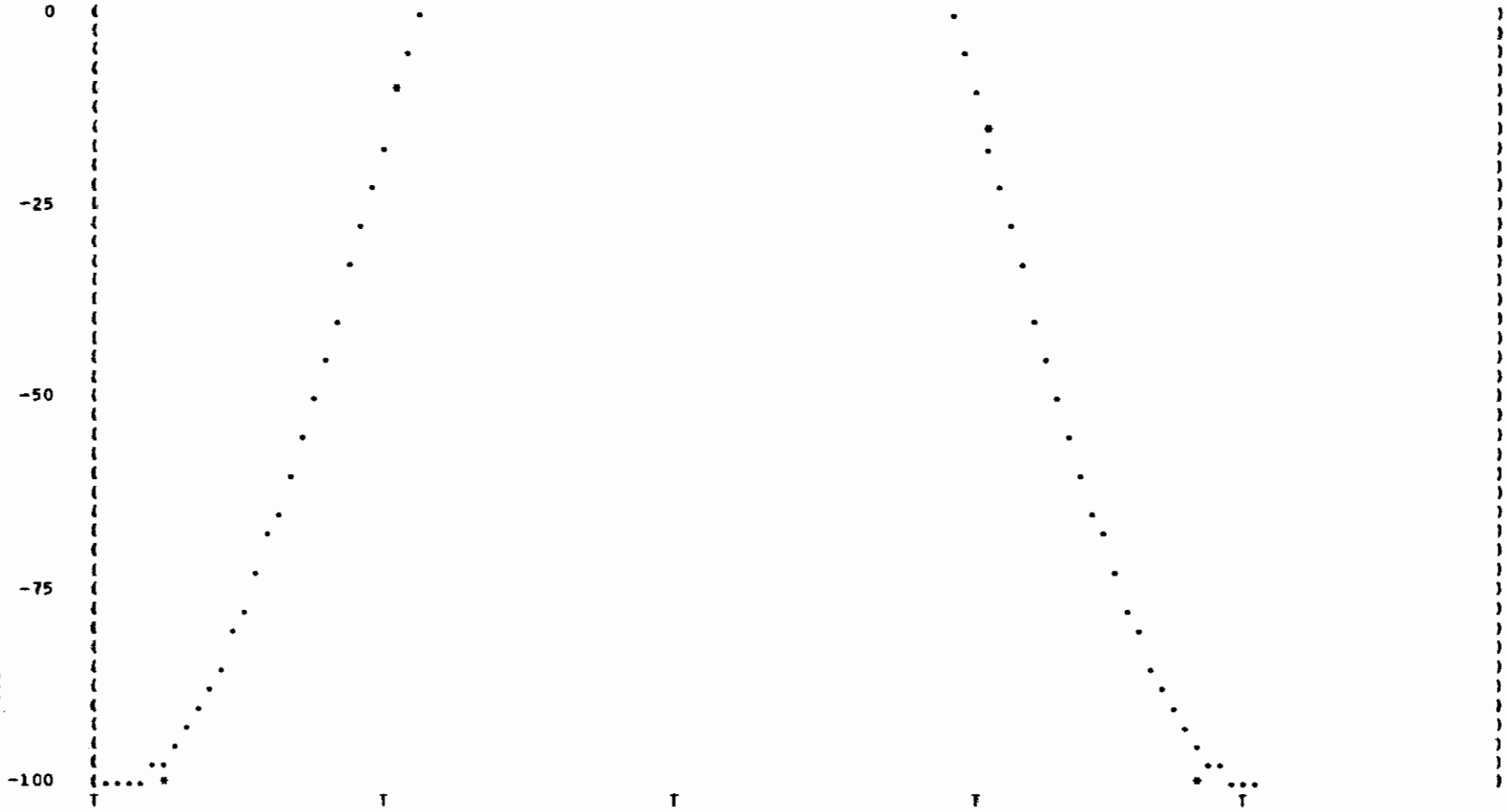

TEST 1
INTEGRAL VALUES

CHANNEL	1/2 ABS(F(T)) (T(0) TO T(END))	(F(T)) (T(3) TO T(END))	F(T) (T(0) TO T(END))	A(F(T)) (T(0) TO (END OF A))
1	3.81846E 00	-4.83962E-07	4.99972E-03	1.59109E-01

***** ***** ***** END OF TEST 1 ***** ***** *****

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The mechanics, mathematics, and usage of a program written in FORTRAN IV and MAP for the IBM 7094 are described. The program is called SYSTRAN (systems analysis translator) and it includes subroutines for most of the common tools for frequency domain analysis of linear systems (such as Fourier transforms and inverse Fourier transforms, complex algebra, and correlation functions). The report is essentially an instruction manual. It contains a discussion of all aspects of the program essential to competent usage.

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