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PROGRAM INSTAR:
AN INFORMATION STORAGE AND RETRIEVAL SYSTEM
USER'S MANUAL

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ABSTRACT

INSTAR is a storage and retrieval system for creating and maintaining large data banks consisting of data sets and copies of analyses performed on those data sets. INSTAR allows the retrieval of selected portions of a data set and the combination of several portions to form a new data set. File descriptions and data set abstracts are maintained with each data set in the bank.

The user's manual includes instructions for:

i. Reserving a data set,

ii. Describing a data set,

iii. Modifying a data set,

iv. Modifying a data set description,

v. Displaying a director of the data sets,

vi. Retrieving a data set description,

vii. Copying a data set,

viii. Selecting information from a data set, and

ix. Building a new data set from existing data.

Several examples are also listed and described.

INSTAR is written entirely in FORTRAN extended for use on the CDC 6400 computer system at Colorado State University.

INTRODUCTION

Program INSTAR has been designed as a data storage and retrieval system for the U.S. IBP Grassland Biome study. It is written in FORTRAN extended for use on the CDC 6400 computer system at Colorado State University. The purpose of INSTAR is to create and maintain large data banks consisting of data sets and copies of analyses performed on those data sets. It is also designed to facilitate the retrieval of information from the data bank.

Program INSTAR was developed as an alternative to using an existing program library system known as UPDATE, or purchasing the software for a more sophisticated information system. The UPDATE system was rejected for the following reasons:

i. The length of records was restricted to a maximum of 72 characters.

ii. Continuously incoming data could not easily be inserted at the end of a data set.

iii. The system offered no record-keeping capabilities for description of the data sets in the bank.

iv. Several users, attempting to change the data bank simultaneously, often destroyed each other's work.

v. Retrieval of information from the data bank was limited to copying entire data sets.

The purchase of a software system was rejected for two basic reasons: the price and the fact that the needs of the biome did not require the complexity offered by the systems. Consequently, program INSTAR was developed to do the same thing as the UPDATE system and yet bypass the major problems encountered. Since INSTAR lies within the median of storage and retrieval systems, its capabilities and limitations are listed. The capabilities of the program are:

i. It allows for the reservation of up to 500 data sets onto the data bank with no restrictions to the length of each data set.

ii. It allows for variable record length up to 133 characters.

iii. It allows easy insertion of incoming data onto the end of a data set.

iv. It permits easy modification of existing data.

v. It provides a data set description capability including a description of the format of the data set as well as an abstract description.

vi. It handles the rotation of master files automatically, preventing conflicts of users making simultaneous corrections.

vii. It allows the retrieval of entire data sets or any desired portion of a data set. Portions of different data sets may also be selected and combined.

The incapabilities of program INSTAR are:

i. It cannot handle the selective retrieval of hierarchically ordered data sets. (The format of each record in the data set must be identical to permit selective retrieval.)

ii. The retrieval language is not based on Boolean operations and consequently is not as versatile as languages which are.

iii. The system will not sort the data retrieved or perform analyses such as sums, means, standard deviations, etc.

1. GENERAL DESCRIPTION

Program INSTAR allows for the reservation of data sets with a simple three- to five-word command stating the name of the data set and, if desired, the location of the data set in the bank. A data set may be original input data, or it may consist of computer output generated from the analyses of the data.

Since many people may be using the data bank, a set of records referenced by a single name may not be very meaningful for others. For this reason a file description capability is offered which allows the user to:

i. Include an abstract description explaining the purpose of the data set, the type of data collected, the method of collection, the units of measurement used, etc.

ii. Record the length of the records.

iii. Record the number of header and trailer records.

iv. Define the location and format of fields within the records.

The data set descriptions may then be used as a bookkeeping system for explaining what is on the bank. They may also be used for retrieval of selected portions of the data set from the bank. The data sets from the bank may be corrected and updated by inserting records into the data set, deleting existing records from a data set, or restoring previously deleted records. Since many data sets are being collected on a continuous basis, special provisions are made to allow easy appending of incoming data onto the end of an existing data set. Data sets may also be removed from the bank if desired. The structure and organization of the data bank may be retrieved with the word DISPLAY. This generates a list of all data set names reserved on the bank and the locations of each.

The description of a data set or of all data sets may be retrieved with the word DESCRIBE which will generate the following information for each data set desired:

i. The location of the data set in the bank.

ii. The number of records in the data set.

iii. The length of the records.

iv. The number of corrections made to the data set.

v. The number of header and trailer records.

vi. A list of the defined fields within each record, including the location and format of each field.

vii. A copy of the abstract description.

An entire data set may be retrieved with the word COPY which will reproduce the data set exactly as it is reserved. A SELECT command allows for the retrieval of a portion of a data set rather than the entire file. This selection may be based on one of eight conditional relations between the given constant and one of the defined fields in the data set description. By using a series of the select command it is possible to create new data sets by combining information from several data sets.

Program INSTAR is oriented to the use of magnetic tapes and is consequently a sequential access system, i.e., the fifth record of a data set immediately follows the fourth record which immediately follows the third record. Since it is a sequential access system, each set of changes made to the bank involves recopying the entire bank to a new bank with the proper changes being made during the transfer. To allow this type of transfer, the system uses three master tape files on a rotational basis. One of the files contains the most current version of the bank. A second file contains the next most current version of the bank as a back-up, and the remaining file is used for the new version of the bank if any modifications are made. Program INSTAR handles all of the file rotational chores automatically.

2. DESCRIPTION OF DATA SETS FOR THE SAMPLE DATA BANK

The following pages contain a detailed users manual for program INSTAR. As each of the commands are explained, examples are also given. These examples are placed in boxes to separate them from the main text. They each refer back to the sample data bank described in this section, which consists of two data sets called WEATHER and PRECIP.

WEATHER is the standard weather observation data collected on the Pawnee Site beginning June 24, 1970 and continuing through August 8, 1970. Each record contains the date and time the observations were made, the minimum, maximum, and observed air temperatures, the minimum and maximum pan temperatures, the amount of evaporation from the pan, and a series of comments pertaining to the cloud cover, temperature, wind, and precipitation. This data set has 20 header records and 1 trailer record which supply additional information, but are not in the same format as the main data set.

PRECIP contains the precipitation data from the Central Plains Experimental Range at Nunn, Colorado. The precipitation is recorded daily in inches to the nearest .01 inch. The data exist for the entire year of 1970. It has no header or trailer records. The table below lists the record format for each file.

FORMAT FOR SAMPLE DATA SETS

DATA SET	FIELD NAME	LOCATION OF FIRST COLUMN	LOCATION OF LAST COLUMN	FORMAT
WEATHER	MONTH	1	2	(I2)
	DAY	3	4	(I2)
	YEAR	5	6	(I2)
	TIME	8	11	(I4)
	MAXAIRTEMP	13	15	(F3.0)
	MINAIRTEMP	16	18	(F3.0)
	OBSAIRTEMP	20	22	(F3.0)
	MAXPANTEMP	24	26	(F3.0)
	MINPANTEMP	27	29	(F3.0)
	EVAP	30	34	(F5.2)
	COMMENTS	35	80	(4A10,A6)
PRECIP	YEAR	1	2	(I2)
	MONTH	3	4	(I2)
	DAY	5	6	(I2)
	RAIN	11	15	(F5.2)

3. MASTER FILES, INPUT FILES, AND OUTPUT FILES

Master files. There are three master files which are used on a rotational basis to store the data bank. One of the files contains the most current version of the bank. A second file contains the next most current version as a back-up. The remaining file is to be used for the new version of the bank if any modifications are made. It is not important to the user which file is which because the system handles the rotation. It is only important that all three are available before executing the program bank. The default names of the master files are MF1, MF2, and MF3.

The master files are written by the I.O.C.S. system. The format for each logical record is:

Columns	Contents
1-133	Actual data
134-143	Data set or correction set identifier
144	Blank
145-149	Sequential record number
150	Status of the record

A directory file is also used in conjunction with the master files. It contains the number of the master file which is the most current version and the names and addresses of each data set in the bank. As with the master files, it is not important that the user knows what is on the directory file, but it must be retained and available before each execution. The default name of the file is DIR (see section 15).

Input files. The program assumes that all data will be input into the system through INPUT. However, if the record length is longer than 80

characters or if the data is already stored in the computer, it may be reserved by copying it to an alternate input file called COMMON before executing program INSTAR.

Output files. All data retrieved from the bank is stored into a disk file called DATA. This file is restricted to a maximum record length of 133 characters. It is rewound before execution of the program, but not after.

All data set descriptions and diagnostics are written onto OUTPUT.

Two SCRATCH files are used when the user is selecting portions of data sets and building his own data sets. The files are not available to the user. If he wants to use the data he has selected, he must copy it to the DATA file first (see section 11, Copying from SCRATCH). From the users viewpoint, these two files are considered as one file called SCRATCH. The record length is restricted to 133 characters.

4. DATA CARDS AND COMMAND CARDS

To distinguish command cards from data cards in the input deck, a restriction has been made that *all command cards will have an asterisk punched in column 1 and that no data cards will have an asterisk in column 1.*

Except for the asterisk in column 1, the format of the command card is fairly unrestricted. If a command is too long for one card, it may be continued to succeeding cards. (The asterisk is omitted on the continuation cards.) The program scans the word from left to right in search for one of five different possibilities: a *word*, an *integer number*, a *real number*, a *character string*, or a *format*. It prepares a list of these words, numbers, strings, and formats and then attempts to match this list to a predefined structure for each command.

Following is a brief description of each of the five command parts.

Words. A word is assumed if the first character encountered is a letter. The remaining characters may be either letters or numbers. The end of the word is assumed when a blank, comma, or period is encountered. The size of a word is restricted to a *maximum of 10 characters*.

Numbers. A number is assumed if the first character encountered is a number or a minus sign. The remaining characters must be either a number, a period, a blank, or a comma. The end of a number is assumed if a blank or comma is encountered. If there was no decimal point in the number it is assumed to be an integer number; otherwise it is assumed to be a real number. Integer numbers are limited to a maximum of 15 digits, and real numbers are limited to a maximum of 15 digits plus a maximum of 15 decimal digits.

Character strings. A character string is assumed if the first character encountered is a slash. The remaining characters are accepted as a part of a character string until another slash is encountered. A string cannot be continued from one card to the next. If there is not enough room on the remainder of the command card, it should begin on the next card (see section 12 for the use of a character string).

Formats. A format is assumed if the first character encountered is a left parenthesis. The remaining characters are accepted as part of the format until a right parenthesis is encountered. Any allowable FORTRAN format is acceptable, but the *length is restricted to 10 characters*. This is adequate for the purpose that they are used. As with strings, the format cannot be continued from one card to the next (see section 6 for the use of a format).

In the remaining sections, examples of the commands are given. In the examples *the capitalized words are necessary parts of the command*. The words

enclosed in quotation marks are defined by the user for each data set. Program INSTAR has a fairly restricted internal vocabulary. In order to improve that vocabulary for the user, a list of insignificant words are stored in memory. These words increase the readibility of the commands, but must be ignored by the system. Consequently, the words written in lower case may be used for clarity or they may be left out without affecting the operation of the program INSTAR.

5. RESERVING A DATA SET

At the end of the bank. A file may be reserved at the end of the bank by giving it a name of up to 10 characters and using the command:

*RESERVE as "file name".

"File name" is the name of the data set.

TO RESERVE THE SAMPLE DATA SET WEATHER, WE WOULD USE THE COMMAND:

*RESERVE AS WEATHER.

THE REDUCED FORM OF THE COMMAND WOULD BE:

*RESERVE WEATHER.

The data set to be reserved may immediately follow the command. If the data set is on the alternate input file, COMMON, the command,

*DATA is on COMMON

is needed. If a file description is to be included for the data set, it must be between the reserve command and the data or between the reserve

command and the *DATA is on COMMON command (see section 6 for the file description).

Specifying the location. If the location of the data set in the bank is important, the user may reserve the data set after any existing file on the data bank with the command:

*RESERVE as "file name" after "name of an existing file".

THE DATA SET PRECIP WOULD BE RESERVED AFTER THE WEATHER DATA SET WITH THE COMMAND:

*RESERVE AS PRECIP AFTER WEATHER,

OR IN REDUCED FORM:

*RESERVE PRECIP WEATHER.

6. DESCRIBING A DATA SET

The user may prepare a file description for each reservation. If he chooses not to, a partial description is assumed that the length of each record is 80 characters, and that there are no header records, trailer records, or defined fields within a record. To change this assumed description, the following descriptor commands are needed:

Recording the length of records. The length of each record in the data set is defined with the command,

*LENGTH is "number" characters,

where "number" is the length and cannot exceed 133. If this command is omitted from the description, the length is assumed to be 80 characters.

THE COMMAND FOR THE WEATHER DATA SET IS:

*LENGTH IS 80 CHARACTERS,

OR IN REDUCED FORM:

*LENGTH 80

Recording the number of header records. Most data sets contain some initial information at the front which does not follow the same format as the data. These records may be set apart from the data with the command:

*FIRST "number" records are header records.

If the "number" is omitted, one record is assumed.

TO RECORD THE HEADER RECORDS FOR WEATHER WE WOULD USE THE COMMAND:

*FIRST 20 RECORDS ARE HEADER RECORDS,

OR,

*FIRST 20

Recording the number of trailer records. Data sets are also often followed by extra informational records which do not have the same format as the data set. The records may be distinguished with the command:

*LAST "number" records are trailer records.

If the "number" is omitted, one record is assumed.

THE TRAILER RECORD FOR WEATHER COULD BE DEFINED WITH THE COMMAND:

*LAST RECORD IS A TRAILER RECORD,

OR,

*LAST

Labelling fields within records. The structure of each record may be defined by using the label command, which specifies the name of the field, the first and last characters of the field, and the format of the field. The structure of the command is:

*LABEL columns "number" to "number" as "field name"
type is "format"

A "format" is the FORTRAN format for that field and is enclosed in parentheses. For example, an integer number in columns 6 to 10 would be (I5), a real number with two decimal places would be (F5.2) or an alphanumeric field would be (A5). The "format" for an alphanumeric field in columns 11 to 35 would be (2A10, A5). The "format" may be omitted from the command if desired. This will cause the program to assume that the field is alphanumeric. If the field is composed of only one column, the structure of the command will be:

*LABEL column "number" as "field name" type is "format".

Here the format must be (A1), (I1), (F1.0), or blank.

THE FOLLOWING COMMANDS WOULD RECORD THE FORMAT FOR THE PRECIP FILE:

```
*LABEL COLUMNS 1 TO 2 AS YEAR TYPE IS (I2)
*LABEL COLUMNS 3 TO 4 AS MONTH TYPE IS (I2)
*LABEL COLUMNS 5 TO 6 AS DAY TYPE IS (I2)
*LABEL COLUMNS 11 TO 15 AS RAIN TYPE IS (F5.2)
```

THE REDUCED FORM OF THE COMMANDS ARE:

*LABEL 1, 2 YEAR (I2)

*LABEL 3, 4 MONTH (I2)

*LABEL 5, 6 DAY (I2)

*LABEL 11, 15 RAIN (F5.2)

Overlapping of fields is permitted. For example, if for each record of a data set, columns 1 to 2 include the day, 4 to 5 include the month, and 7 to 8 include the year, the structure of the records may be defined as:

*LABEL 1 TO 2 AS DAY TYPE IS (I2)

*LABEL 4 TO 5 AS MONTH TYPE IS (I2)

*LABEL 7 TO 8 AS YEAR TYPE IS (I2)

*LABEL 1 TO 8 AS DATE TYPE IS (A8)

Overlapping of this type becomes very useful when using the select commands (see section 13).

Including an abstract. An abstract or a verbal description of the data set may be included with the file description by the use of the command.

*NOTE

All information which follows the word NOTE is accepted as a part of the abstract for the data set. The abstract continues until a card is encountered with an asterisk in column 1, signifying a new command. The abstract will normally include information pertaining to the source of the data, the method of collection of the data, the intended purpose of the data, the analyses performed on the data, and the location of a "hard" copy of the data.

If the *NOTE command is the last command in the description and the data set follows the description, an additional command is needed to differentiate between the end of the abstract and the beginning of the data set. Consequently the command

*DATA follows

must be inserted at that spot.

7. MODIFYING A DATA SET

Once a data set has been reserved in the bank, it may be modified or changed by inserting records into the data set, by deleting or deactivating the status of records in the data set, or by restoring or reactivating the status of records in the data set.

When a data set is reserved on the bank, the data set name is used as a data set identifier. Each record in the data set is also assigned a sequential record number. These two values are combined to form a unique record identification for each record in the set. The format of the record identification is the data set identifier, followed by a period, followed by the sequential record number. Examples are WEATHER.135 and PRECIP.14. If insertions are made into the data set, the records are given a correction set identifier in the place of the data set identifier. This identifier is CORECO0001 for the first set of changes to the data set, CORECO0002 for the second set of changes and so on. Examples are CORECO0004.7 and CORECO0037.1435.

When a record is stored into the bank, it is displayed on OUTPUT along with its record identification. Additional listings of the records and record identifications may be obtained by using the *COPY INCLUDING command (see section 11).

When making changes to the data bank, it is important for efficient running time to keep the order of the changes the same as the order that they will occur in the data bank. If changes are made to the third data set in the bank, the program will first transfer the first two data sets to the new file and then transfer the third set, making the necessary corrections. If the next command encountered calls for a change in one of the first two files, then the program must transfer the rest of the bank to the new master file, rotate the master files, and start all over. This necessitates copying the entire bank twice and results in a great loss of time.

Changes to records within a file must also be listed in the same order that the records occur on the file. Failure to do this will result in a fatal error, stating that the record identification cannot be located in the file.

Removing a data set from the bank. A data set may be removed from the bank with the command:

*DESTROY "file name"

This will remove the file name from the directory and will remove all records in that file from the bank.

THE PRECIP FILE WOULD BE REMOVED FROM THE BANK WITH THE COMMAND,

*DESTROY PRECIP

Inserting records into a data set. New records may be inserted immediately after any record in the data by the command:

*INSERT in "file name" after "record id"

The program will then insert all records which follow until another command in encountered or until an end-of-file on INPUT is encountered.

TO INSERT A SET OF RECORDS INTO THE PRECIP DATA SET AFTER THE RECORD WITH A RECORD IDENTIFICATION OF PRECIP.14, WE WOULD USE THE COMMAND:

*INSERT IN PRECIP AFTER PRECIP.14

THE SHORTENED VERSION IS,

*INSERT PRECIP PRECIP.14

If the new records are to be inserted at the end of the data set, the "record id" may be omitted as below:

*INSERT in "file name".

INSERTING THE 1971 PRECIPITATION DATA INTO THE END OF PRECIP, WILL REQUIRE THE COMMAND,

*INSERT IN PRECIP,

OR,

*INSERT PRECIP.

The alternate input file may be used by following the insert command with the command:

*DATA is on COMMON

The program will then read and insert all records on the COMMON file until an end-of-file is encountered. The user does not need to respecify the length of records when making insertions. The length of the records which are inserted will be assumed to be the same as is declared on the file description.

IF THE SAME DATA ABOVE WERE ON TAPE RATHER THAN PUNCHED CARDS, THEY COULD BE INSERTED BY REFERENCING THE TAPE TO COMMON AND USING THE COMMANDS:

```
*INSERT IN PRECIP
*DATA IS ON COMMON,
```

OR THE REDUCED FORM,

```
*INSERT PRECIP
*DATA COMMON
```

Deleting records from a data set. A record may be deleted from the data set with the command:

*DELETE in "file name" "record id"

This command does not actually remove the record from the bank. It simply deactivates the status of the record so that it will be ignored by the copy and select commands. A series of records may be deactivated by the command:

*DELETE in "file name" from "record id" to "record id"

This will deactivate the two records specified plus all records which are between the two.

EXAMPLE COMMANDS WOULD BE:

```
*DELETE IN WEATHER WEATHER.15
*DELETE IN WEATHER FROM WEATHER.20 TO CORECO0001.1
```

THE SHORTENED FORMS OF THESE COMMANDS ARE:

```
*DELETE WEATHER WEATHER.15
*DELETE WEATHER WEATHER.20, CORECO0001.1
```

Restoring records. A previously deleted record may be reactivated by the command:

*RESTORE in "file name" "record id"

A series of records may be reactivated by the command:

*RESTORE in "file name" from "record id" to "record id"

This command is simply the reverse of the DELETE command.

```
     THE RECORDS DELETED ABOVE COULD BE REACTIVATED WITH
THE COMMANDS:
 *RESTORE IN WEATHER WEATHER.15
 *RESTORE IN WEATHER FROM WEATHER.20 TO CORECO0001.1
OR,
      *RESTORE WEATHER WEATHER.15
      *RESTORE WEATHER WEATHER.20, CORECO0001.1
```

8. MODIFYING A FILE DESCRIPTION

Inserting descriptor commands. New descriptor commands may be inserted into a file description with the command:

*INSERT in "file name" as DESCRIPTOR records

The program will then accept all descriptor commands which follow and insert them at the front of the file description.

ASSUME THAT THE FOLLOWING COMMANDS WERE USED WHEN THE PRECIP FILE WAS RESERVED:

```
*RESERVE AS PRECIP
*LABEL 1, 2 AS YEAR (I2)
*LABEL 3, 4 AS MONTH (I2)
*LABEL 5, 6 AS DAY (I2)
*LABEL 11, 16 AS RAIN (F5.2)
```

ASSUME ALSO THAT WE WANT TO RECORD COLUMNS 1 THRU 6 AS DATE AND INCLUDE AN ABSTRACT DESCRIPTION. THE FOLLOWING COMMANDS ARE REQUIRED:

```
*INSERT IN PRECIP AS DESCRIPTOR RECORDS
*LABEL 1, 6 AS DATE TYPE IS (I6)
*NOTE PRECIP CONTAINS THE PRECIPITATION
 DATA FROM THE CENTRAL PLAINS EXPERIMENTAL
 RANGE AT NUNN, COLORADO. THE DATA IS
 RECORDED DAILY IN INCHES.
```

THE ABBREVIATED VERSION OF THE FIRST COMMAND WOULD BE:

```
*INSERT PRECIP DESCRIPTOR
```

Deleting descriptor commands. Descriptor records are assigned a record identification in the same way that the data is assigned. Consequently they may be deleted and restored in the same way with the commands:

```
*DELETE in "file name" "record id"
*DELETE in "file name" from "record id" to "record id"
*RESTORE in "file name" "record id"
*RESTORE in "file name" from "record id" to "record id"
```

Changing an abstract. Inserting records into an abstract depends on where they are inserted. If they are to be inserted in the middle or at the end of an abstract, the command is the same as for inserting data:

*INSERT in "file name" after "record id"

TO ADD TO THE DATA SET DESCRIPTION FOR PRECIP, THE FOLLOWING COMMANDS COULD BE USED. (THIS ASSUMES THAT THE LAST RECORD FOR THE CURRENT ABSTRACT HAS THE RECORD IDENTIFICATION OF CORECO001.4.)

*INSERT IN PRECIP AFTER CORECO0001.4
THE DATA EXISTS FOR THE ENTIRE YEAR OF 1970
AND WAS RESERVED ON JANUARY 15, 1971.

If they are to be inserted at the front of the abstract, they must be inserted as a new NOTE command with the command:

*INSERT in "file name" as DESCRIPTOR records

Deleting records from the abstract is the same as deleting data with the regular DELETE commands.

The file description commands are stored in the bank in the same form as they are on the command cards. Consequently, care must be taken so that if a *NOTE command is inserted, the abstract is followed by another command before the data is encountered. This will occur only if there was no original file description and if the only descriptor inserted was an abstract. In this case the command *DATA FOLLOWS should be inserted after the abstract.

9. DISPLAYING A DIRECTORY OF THE DATA SETS

A list of all the files reserved on the bank and their corresponding addresses may be retrieved by the command:

*DISPLAY all files on the directory

The address shown will be the address of the last record in the data set.

10. RETRIEVING A DESCRIPTION OF A DATA SET

A brief description of the data set structure and a copy of the abstract may be retrieved by the command:

*DESCRIBE "file name"

The description will include:

i. The location of the file in the bank.

ii. The total number of records including descriptor commands and deactivated records.

iii. The length of each record.

iv. The number of corrections made to the data set.

v. The number of header records in the data set.

vi. The number of trailer records in the data set.

vii. A list of all the defined fields with their locations within the record and their formats.

viii. A copy of the abstract.

A file description for each of the data sets in the bank may be retrieved with the command:

*DESCRIBE ALL files

THE TWO DATA SETS IN THE EXAMPLE DATA BANK COULD BE DESCRIBED WITH THE COMMANDS,

```
*DESCRIBE WEATHER
*DESCRIBE PRECIP,
```

OR WITH THE COMMAND

```
*DESCRIBE ALL
```

11. COPYING INFORMATION ONTO THE DATA FILE

A disk file called DATA is provided to contain all the data created by program BANK. This DATA file is created by copying from one of four different sources. The DATA file is rewound only at the beginning of the program. The data retrieved by a second copy command will follow the data from the first command.

Retrieving a data set from the bank. Entire data sets may be fetched and copied onto DATA with the command:

```
*COPY "file name"
```

This will generate a file including only the activated records of the data set. Record identifications will also be omitted.

THE SAMPLE DATA SET, WEATHER, COULD BE RETRIEVED WITH THE COMMAND,

```
*COPY WEATHER
```

A listing of all deactivated and activated records including the file description records and record identifications may be otained with the command:

*COPY "file name" INCLUDING everything

A LISTING OF THE ENTIRE CONTENTS OF THE PRECIP FILE COULD BE OBTAINED WITH,

*COPY PRECIP INCLUDING

A specified sequence of records within a file may be copied to the DATA file with the use of the sequential record identifications. The form of the command is:

*COPY "file name" from "record id" to "record id"

All activated records between and including the two specified are copied to DATA along with the record identification for each. This command is somewhat restricted in that only a maximum of 115 characters per record will be printed out.

AN EXAMPLE OF THIS TYPE OF COMMAND WOULD BE,

*COPY WEATHER FROM WEATHER.50 TO WEATHER.81

OR,

*COPY WEATHER WEATHER.50, WEATHER.81

Copying from INPUT. Cards may be copied directly from the INPUT file to DATA with the command

*COPY INPUT

All records which follow the command will be copied from INPUT to the DATA file until a new command or an end-of-file is encountered.

Copying from COMMON. Records may be copied directly from the alternate input file, COMMON, to DATA with the command:

*COPY COMMON

All records on the disk file COMMON will be copied to DATA.

Copying from SCRATCH. Using the select commands only stores the data onto one of the SCRATCH files. The user cannot use the data he has created until it is copied to DATA with the command:

*COPY SCRATCH

This will copy all records from the last SCRATCH file created and will also erase or destroy all the information on the SCRATCH files.

12. SELECTING INFORMATION FROM A DATA SET

Information may be retrieved from any part or parts of a data set by the use of a select command. The user may select entire records from a file, defined fields within a record, or specified columns within a record. He may select the desired information on an unconditional basis or on a conditional basis. He may also combine selected information with other selected information to create his own data set.

Selecting information on a conditional basis depends on the value of a specified field within the record. The condition is specified as one of seven different relations between the field and a constant or constants. If the relation holds true for a record, the information will be selected. If the relation is false, the information will be ignored. The following list of relations may be used as the condition for the field:

i. EQUAL to "constant"

ii. NOT EQUAL to "constant"

iii. GREATER than "constant"

iv. LESS than "constant"

v. GREATER than or EQUAL to "constant"

vi. LESS than or EQUAL to "constant"

vii. BETWEEN "constant" and "constant"

A "constant" may be an integer number, a real number (decimal point included), or a string of characters (see section 4). If the constant is a character string, the comparisons will be on an alphabetic basis, i.e., the comparison for a field greater than a constant will hold true if the field alphabetically follows the constant.

Selecting records. Any number of records may be selected from a file with the command:

*SELECT from "file name" "number" RECORDS

The specified number of records, beginning immediately after the last header card, will be copied from the data set to the SCRATCH file.

THE FIRST 31 RECORDS FROM PRECIP COULD BE RETRIEVED WITH,

*SELECT FROM PRECIP 31 RECORDS

OR,

*SELECT PRECIP 31 RECORDS

The entire data set may be copied to the SCRATCH file with the command:

*SELECT from "file name" ALL RECORDS

This will transfer only the actual data records; the header and trailer records will be omitted.

THE ACTUAL DATA FROM WEATHER CAN BE RETRIEVED WITH THE COMMAND,

*SELECT FROM WEATHER ALL RECORDS

OR,

*SELECT WEATHER ALL RECORDS

The records may be selected on a conditional basis, depending on the value of a defined field within the record. The appropriate command is:

*SELECT from "file name" "number" RECORDS for which values of "field name" are "relation"

The word ALL may be substituted for the "number" if desired. The SCRATCH file will then contain only the records for which the relation was true. The "field name" must be a defined field in the file description.

RETRIEVING THE PRECIP RECORDS FOR THE MONTH OF JULY WOULD REQUIRE THE COMMAND,

*SELECT FROM PRECIP ALL RECORDS FOR WHICH VALUES OF MONTH ARE EQUAL TO 7

THE ABBREVIATED VERSION OF THE SAME COMMAND IS:

*SELECT PRECIP ALL RECORDS MONTH EQUAL 7

Selecting fields. If a field is defined in the file description, its contents may be selected in three different ways: unconditionally, conditionally depending upon its own value, or conditionally depending on the value of another field.

For an unconditional selection, the form of the command is:

*SELECT from "file name" "number" values of "field name"
for columns "number" to "number".

The specified number of values would be selected from the first of the data set and stored in the specified columns of the SCRATCH file. If the user desires all of the values in the file, the word ALL may be substituted for the first "number".

```
      THE OBSERVED AIR-TEMPERATURE FROM THE WEATHER FILE
MAY BE RETRIEVED WITH THE COMMAND,
   *SELECT FROM WEATHER ALL VALUES OF OBSAIRTEMP
    FOR COLUMNS 10 TO 20,
OR,
        *SELECT WEATHER ALL OBSAIRTEMP 10, 20
```

For a conditional selection of a field depending on its own value, the command is:

*SELECT from "file name" "number" values of "field name"
which are "relation" for columns "number" to "number".

The specified columns of the SCRATCH file will contain only the values of the field for which the relation holds true.

```
     ALL MAXIMUM TEMPERATURES WHICH EXCEEDED 90° MAY BE
RETRIEVED FROM WEATHER WITH,
          *SELECT FROM WEATHER ALL VALUES OF
           MAXAIRTEMP WHICH ARE GREATER THAN OR EQUAL
           TO 90.0 FOR COLUMNS 20 TO 30,
OR,
          *SELECT WEATHER ALL MAXAIRTEMP GREATER EQUAL
           90.0 20, 30
```

For a conditional selection depending on the values of another field, the command is:

*SELECT from "file name" "number" values of "field name"
for which values of "field name" are "relation" for
columns "number" to "number".

The contents of the second field will be fetched and compared for each record. If the relation holds true, the contents of the first field will be stored into the appropriate columns of the SCRATCH file. If all the values are desired, the word ALL may be substituted for the first "number".

```
     IF THE RESULTS FROM THE ABOVE EXAMPLE SEEM RATHER
MEANINGLESS, THE DATES FOR WHICH THE TEMPERATURE ROSE
TO 90 OR ABOVE MAY BE RETRIEVED WITH,
     *SELECT FROM WEATHER ALL VALUES OF DATE FOR
      WHICH VALUES OF MAXAIRTEMP ARE GREATER THAN
      OR EQUAL TO 90.0 FOR COLUMNS 10 TO 20
OR,
     *SELECT WEATHER ALL DATE MAXAIRTEMP GREATER
      EQUAL 90.0 10, 20
```

Selecting columns or portions of a record. If more than one field is to be selected, it will be easier to select certain columns of information. This may be done either unconditionally or conditionally, depending on the value of a defined field.

For an unconditional selection the command is:

*SELECT from "file name" "number" values of columns "number" to "number" for columns "number" to "number".

The appropriate columns will be fetched from the data set and stored in the specified columns of the SCRATCH file. ALL may be substituted for the first "number" if desired.

TO RETRIEVE THE DATES, TIMES, AND THE THREE AIR TEMPERATURE READINGS FROM THE WEATHER FILE, WE COULD USE

*SELECT FROM WEATHER ALL VALUES OF COLUMNS 1 TO 20 FOR COLUMNS 1 TO 20.

THE SHORTENED FORM IS,

*SELECT WEATHER ALL 1, 20, 1, 20.

For a conditional selection, the command is:

*SELECT from "file name" "number" values of columns "number" to "number" for which values of "field name" are "relation" for columns "number" to "number".

For each record the contents of the field will be fetched and compared. If the relation holds true, the information will be selected and stored

into the appropriate columns of the SCRATCH file. ALL may be used for the first number if desired.

```
     THE SAME 20 COLUMNS OF INFORMATION COULD BE
RETRIEVED FOR THE MONTHS OF JUNE THROUGH AUGUST
WITH THE COMMAND,
     *SELECT FROM WEATHER ALL VALUES OF COLUMNS
      1 TO 20 FOR WHICH MONTH IS BETWEEN 6 AND
      8 FOR COLUMNS 21 TO 40,
OR IN REDUCED FORM,
       *SELECT WEATHER ALL 1, 20 MONTH BETWEEN
        6, 8, 21, 40.
```

13. BUILDING A DATA SET

Section 12 explained the procedures for selecting one type of information based on one condition. A series of select commands may be used to select information based on several conditions or to combine several types of information into one data set.

Selecting information based on several conditions. Information of this type is retrieved by selecting all records which agree with the first condition from the data set. Then all records which agree with the second condition may be selected from the SCRATCH file. The remaining conditions are selected from the SCRATCH file until all conditions are satisfied. Suppose, for example, that the sample data set, WEATHER, now contains daily temperature data from the years 1967 through 1971 (see section 2 for an example of the file description). It is desired that we know the days during April and May of 1970 for which the temperature was below the freezing point. There are consequently three conditions for the

selection: the year must be 1970, the month must be April or May, and the minimum air temperature must be below 32°F. The following commands would be used for this selection:

```
*SELECT FROM WEATHER ALL RECORDS FOR WHICH YEAR IS
 EQUAL TO 70

*SELECT FROM SCRATCH ALL RECORDS FOR WHICH MONTH IS
 BETWEEN 4 and 5

*SELECT FROM SCRATCH ALL VALUES OF COLUMNS 1 TO 12
 FOR WHICH MINAIRTEMP IS LESS THAN OR EQUAL TO 32
 FOR COLUMNS 2 TO 13

*COPY SCRATCH
```

Note that entire records are selected until the last condition is imposed. This is so that the records on the SCRATCH file will have the same format as the data set and the fields for the remaining conditions are where the file description says they are.

THE ABBREVIATED FORMS OF THE ABOVE COMMANDS WOULD BE:

```
*SELECT WEATHER ALL RECORDS YEAR EQUAL 70

*SELECT SCRATCH ALL RECORDS MONTH BETWEEN 4, 5

*SELECT SCRATCH ALL 1, 12 MINAIRTEMP
 LESS EQUAL 32, 2, 13

*COPY SCRATCH
```

Combining types of information. Information from one data set may be combined with information from another data set with the same method. Suppose, for example, that in addition to the WEATHER file the PRECIP file also is reserved for the same period, and we want to combine the two for 1970 (see section 2). The appropriate commands will be:

```
*SELECT FROM WEATHER ALL OF COLUMNS 1 TO 22 FOR WHICH YEAR IS
 EQUAL TO 70 FOR COLUMNS 1 TO 22

*SELECT FROM PRECIP ALL VALUES OF RAIN FOR WHICH VALUES
 OF YEAR ARE EQUAL TO 70 FOR COLUMNS 26 TO 30

*COPY SCRATCH
```

If the number of selections differ, the actual length of the SCRATCH file will be equal to the maximum number of selections made. For example, if 365 selections were made for the first command and only 360 selections were made for the second command, the length of the SCRATCH file would be 365 records and columns 26 to 30 would be blank for records 361 through 365.

THE ABBREVIATED FORMS FOR THE ABOVE COMMANDS ARE,

```
*SELECT WEATHER ALL 1, 22 YEAR EQUAL 70, 1, 22
*SELECT PRECIP ALL RAIN YEAR EQUAL 70, 26, 30
*COPY SCRATCH
```

14. ERROR MESSAGES AND DIAGNOSTICS

Error messages are given in Fig. 1.

Diagnostics. The system prints two informative diagnostics which tell the user the location of the most current version of the bank. The first message comes at the start of the program to explain that "MF_ has been selected as the most current version of the bank." When all modifications have been made an additional message explains that "All previous changes have been made permanent. MF_ is now the most current version of the bank." This message also occurs when modifications to the files are not in the proper order, because the entire bank must be transferred and the files rotated.

Figure 1. List of Error Messages

Error Number	Message	Status
1	The contents of the directory file are meaningless. Recheck your control cards.	Fatal
2	The master file which has been declared as the most current version is empty. Recheck your control cards.	Fatal
3	The directory is empty implying the creation of a new bank. But the bank will not be created unless MF1, MF2, and MF3 are also empty. Recheck your control cards.	Fatal
4	A command was expected but not found. Error occurred at column _____.	Fatal
5	An illegal symbol has been encountered. Error occurred at column _____.	Fatal
6	A word or format has been encountered which is more than 10 characters.	Fatal
7	A string or format cannot be continued from one card to the next. Error occurred at column _____.	Fatal
8	The second significant word in a length command should be an integer number. Trouble encountered at the word _____.	Fatal
9	The length of records exceeds 133. Trouble encountered at the number _____.	Fatal
10	The second significant word of a label command should be the beginning column for that field. Trouble encountered at the word _____.	Fatal
11	The last column precedes the first column for the field being defined. Trouble encountered at the word _____.	Fatal
12	This command is not understood as a file descriptor. Trouble encountered at the word _____.	Fatal
13	An end of file on input has been encountered while reading in the file description. The location of the data has never been specified.	Fatal
14	The columns that the selected field is to be stored in are not correctly specified. Trouble encountered at the word _____.	Fatal
15	The file name cannot be located in the directory. Trouble encountered at the word _____.	Fatal
16	The field name cannot be located in the file description. Trouble encountered at the word _____.	Fatal
17	A relation identifier (EQUAL, NOT EQUAL, GREATER, LESS, or BETWEEN) was expected here. Trouble encountered at the word _____.	Fatal
18	Either a number or a string was expected here but not found. Trouble encountered at the word _____.	Fatal
20	This command is not understood. Trouble encountered at the word _____.	Fatal
21	The program is unable to determine whether records or fields are to be selected. Trouble encountered at the word _____.	Fatal
22	The program is either unable to locate the field specified or it is unable to determine the relation. Trouble encountered at the word _____.	Fatal
23	The user has requested that the SCRATCH file be duplicated.	Fatal
24	The record id _____ cannot be located in the file.	Fatal
25-30	A programming error has occurred in _____. Please take your output to Bob Robinson for correction.	Fatal
31	The record id _____ is improperly specified.	Fatal
32	This file name has already been reserved on the bank. Trouble encountered at the word _____.	Fatal
33	_____ records were encountered which did not agree with the format in the file description.	Non-fatal
34	The columns specified are less than the field size. The field is truncated.	Non-fatal

Another informative diagnostic is printed after each select command to show the number of selections that were made. If several select commands are used in a series, the length of the SCRATCH file will be equal to the maximum number of records that were selected.

Non-fatal error messages. The program also lists two non-fatal error messages when making selections. The first error message occurs if records were encountered for which a field doesn't fit the format that was defined for that field on the label command. This occurs only when the field is used as a basis for a conditional selection. If it does occur the record will not be selected.

An error occurs if a field is to be selected and not enough columns are allowed on the SCRATCH file for the field. For this case the rightmost columns of the field will be truncated and execution will continue.

Fatal error messages. Several user errors may occur which make it impossible or hazardous for the program to continue. For these a message is printed explaining the type of error made and the point in the command at which the error was encountered. The program will prevent the rotation of master files and execution will be halted by a call to the computer system to abort routine. The computer system dump can be suppressed with the command

```
*SUPPRESS ABORT.
```

Program errors. Since program INSTAR has been developed by mere human hands, there is a strong chance that the program is not logically perfect. Most of the logical errors will result in a conflict between the directory

and the master files. If this happens, a message will be printed out stating that: "A programming error has occurred in _____. Please take your output to Bob Robinson for correction."

Since the program should have complete control over aborting the job, all computer system dumps should be prevented also. If a user receives a computer system dump for anything other than an exceeded time limit or page limit, he should also take his output to Bob Robinson at GERL for correction of the program. A programming reference manual is also available for assistance in debugging logical errors in the system.

15. SETTING UP THE CONTROL CARDS

The execution card. The program is stored as a permanent binary file called BANK. The control card for executing the program is in the form:

$$\text{BANK}(p_1,p_2,p_3,p_4,p_5,p_6,p_7,p_8),$$

where:

p_1 is MF1 or the first master file,

p_2 is MF2 or the second master file,

p_3 is MF3 or the third master file,

p_4 is DIR or the directory file,

p_5 is DATA or the file generated by the COPY commands,

p_6 is COMMON or the alternate input file,

p_7 is INPUT or the source file containing the input commands, and

p_8 is OUTPUT or the listing file for all diagnostics and descriptions.

The names (e.g., MF1, DATA, etc.) given above are assumed names of the files. However, any disk file name may be substituted in the control card. For

example, if I elect to use S1, S2, S3, and SD as my master files and directory and MYOWN as the alternate input file, the control cards are punched as follows:

```
JLIMITS.
COMMON(S1)
COMMON(S2)
COMMON(S3)
COMMON(SD)
COMMON(MYOWN)
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK(S1,S2,S3,SD,,MYOWN)
```

Since a new name for the data file is not given, the name DATA will be assumed. INPUT and OUTPUT are also assumed for p_7 and p_8. To alleviate the conflict of users choosing the same names for common files, it is suggested that *no user declare the names MF1, MF2, MF3, DIR, DATA, or COMMON as common files.*

Time and page requirements. The time required by the program depends on the type of operations being performed as listed below.

i. Inserting or reserving records is accomplished at the rate of 125 records per second.

ii. Transferring records from master file to master file is accomplished at the rate of 875 records per second.

iii. Records are copied from a master file to the DATA file at the rate of 385 records per second.

iv. Skipping to a data set in the master file is 1200 records per second.

v. Selecting records unconditionally is 385 records per second.

vi. Selecting records conditionally is 300 records per second.

vii. Selecting fields unconditionally is 325 records per second.

viii. Selecting fields conditionally is 275 records per second.

As an example, if 1000 records were to be inserted and 5000 records were already in the bank, the time required would be approximately 1000/125 plus 5000/875 or 14 seconds. Or if a conditional selection of fields were to be made and there were 500 records in the data set and 8000 records preceding the data set, the time required would be 8000/1200 plus 500/275 or 9 seconds.

The page requirements depend on the number of records to be inserted, reserved, or deleted and the number of file descriptions requested. If file descriptions are requested, they will be printed one per page. All records which are reserved, inserted, or deleted are also printed onto the OUTPUT file. If this is not desired, the command:

*SUPPRESS LISTING

may be used before the RESERVE or INSERT command. This will halt the printing of reserved or inserted records onto OUTPUT for the remainder of the program.

16. KEEPING THE BANK ON PERMANENT FILES

The recent conversion to the Scope 3.3 operating system at the CSU Computer Center has eliminated the use of common disk files. Permanent disk files are available, but for security reasons, it is impossible to change the contents of a permanent file once it is cataloged. To avoid these problems, two additional commands have been added to the system. The first is,

*CATALOG as "permanent file name" for "user's identification".

This command is required only once when the bank is first created. It must be the first command in the input deck.

```
     THE COMMAND:

          *CATALOG AS TESTBANK FOR ROBINSON

WILL ACCOMPLISH THE SAME AS THE FOLLOWING FOUR CONTROL
CARDS.

     CATALOG(MF1,TESTBANK,CY=1,ID=ROBINSON,RP=999)

     CATALOG(MF2,TESTBANK,CY=2,ID=ROBINSON,RP=999)

     CATALOG(MF3,TESTBANK,CY=3,ID=ROBINSON,RP=999)

     CATALOG(DIR,TESTBANK,CY=4,ID=ROBINSON,RP=999)

THE ABBREVIATED COMMAND IS

               *CATALOG TESTBANK ROBINSON
```

The "permanent file name" must be 1 to 10 characters and the "user's identification" must be 1 to 9 characters. There will be no passwords associated with the files, and the retention period will be infinite or 999. The files MF1, MF2, MF3, and DIR will be cataloged as cycles 1, 2, 3, 4.

Subsequent runs which require the bank after it has been cataloged must have *as the first command*,

*BANK is on "permanent file name" for "user's identification".

Program INSTAR will then attach, purge, and recatalog the master files as it needs them.

```
     THE COMMAND,

          *BANK IS ON TESTBANK FOR ROBINSON

WILL ATTACH ALL 4 CYCLES FOR TESTBANK AS MF1, MF2, MF3,

AND DIR.
```

If the user catalogs the bank with control cards, he must not use any passwords. This will make it impossible for program INSTAR to change their contents.

A word of caution is needed to inform the user that permanent files are not very permanent. To provide a little extra security, the bank should also be copied to magnetic tape periodically.

```
     THE FOLLOWING CONTROL CARDS WILL COPY THE SAMPLE

"TESTBANK" ONTO THE MAGNETIC TAPE #F162:

          ATTACH(MF1,TESTBANK,ID=ROBINSON,CY=1)

          ATTACH(MF2,TESTBANK,ID=ROBINSON,CY=2)

          ATTACH(MF3,TESTBANK,ID=ROBINSON,CY=3)

          ATTACH(DIR,TESTBANK,ID=ROBINSON,CY=4)

          REQUEST,TAPE1,HY,ID-F162,WRITE.SWIFT.

          REWIND(TAPE1,MF1,MF2,MF3,DIR)

          COPYBF(MF1,TAPE1)

          COPYBF(MF2,TAPE1)

          COPYBF(MF3,TAPE1)

          COPYBF(DIR,TAPE1)

          REWIND(TAPE1)
```

17. SAMPLE INPUT PROBLEMS

The first run of the sample problem initializes the bank by reserving four data sets onto the bank. The first data set is a file of weather data with 20 header records and one trailer record. Fields within each record are defined and an abstract is included. The second data set is a file of daily precipitation records. They are input by using the alternate input file, COMMON. The third file is a list of institutions involved in the Grassland Biome. The file description is omitted for this set. The last file contains a set of hawk growth data. After the data sets are reserved, the display and describe commands are used to insure that the files are reserved properly. The input deck for this run is:

```
TA000,CM47000,...
FTN(R=0,OPT=2)
LGO.
RFL(47000)
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK(MF1,MF2,MF3,DIR,DATA,PRECIP)
7-8-9
 (FORTRAN program to create file PRECIP)
7-8-9
 (data for FORTRAN program)
7-8-9
*CATALOG AS TESTBANK FOR ROBINSON
*RESERVE AS WEATHER
*LENGTH IS 80 COLUMNS
*FIRST 20 RECORDS ARE HEADER RECORDS
*LAST RECORD IS A TRAILER CARD
*LABEL 1,2 AS MONTH TYPE IS (I2)
*LABEL 3,4 AS DAY TYPE IS (I2)
*LABEL 5 TO 6 AS YEAR TYPE IS (I2)
*LABEL 8 11 AS TIME TYPE IS (I4)
*LABEL 13 , 15 AS MAXAIRTEMP TYPE IS (F3.0)
*LABEL 16 , 18 AS MINAIRTEMP TYPE IS (F3.0)
*LABEL 20,22 OBSAIRTEMP (F3.0)
*LABEL 24,26 AS MAXPANTEMP TYPE IS (F3.0)
*LABEL 27,29 AS MINPANTEMP TYPE IS (F3.0)
*LABEL 30,34 AS EVAP TYPE IS (F5.2)
*LABEL 35,80 AS COMMENTS
*NOTE      THIS IS THE STANDARD WEATHER OBSERVATION DATA COLLECTED ON THE
PAWNEE SITE BEGINNING JUNE 24, 1970 AND CONTINUING DAILY.  EACH RECORD CONTAINS
THE DATE AND TIME THE OBSERVATIONS WERE MADE, THE MINIMUM, MAXIMUM AND
OBSERVED AIR TEMPERATURES, THE MINIMUM AND MAXIMUM PAN TEMPERATURES, THE AMOUNT
OF EVAPORATION FROM THE PAN, AND A SERIES OF COMMENTS PERTAINING TO THE SKY,
TEMPERATURE, WIND, AND PRECIPITATION.  AT THE END OF EACH MONTH THE DATA SHEETS
ARE SENT TO GERL TO BE STORED IN THE DATA BANK.  SEE FREEMAN SMITH FOR DETAILS
*DATA FOLLOWS
(data to be reserved)
*RESERVE AS PRECIP
*NOTE  PRECIP CONTAINS THE PRECIPITATION DATA AT THE CENTRAL PLAINS EXPERIMENTAL
RANGE, NUNN, COLORADO.  THE PRECIPITATION IS RECORDED DAILY IN INCHES.
*LABEL COLUMNS 1 TO 2 AS YEAR TYPE IS (I2)
*LABEL 5,6 AS DAY TYPE IS (I2)
*LABEL 11 TO 15 AS RAIN TYPE IS (I2)
*DATA IS ON COMMON
*RESERVE AS BUDGET01
(data to be reserved)
*RESERVE AS HAWKDATA
*LABEL 1,2 AS PARAMETER TYPE (A2)
*LABEL 4,5 AS SPECIES TYPE (A2)
*LABEL 7,8 AS DAY TYPE IS (I2)
*LABEL 9,16 AS BIRD1 TYPE IS (F8.1)
*LABEL 17,24 AS BIRD2 TYPE IS (F8.1)
*LABEL 25,32 AS BIRD3 TYPE IS (F8.1)
*LABEL 33,40 AS BIRD4 TYPE IS (F8.1)
*LABEL 41,48 AS BIRD5 TYPE IS (F8.1)
*LABEL 49,56 AS BIRD6 TYPE IS (F8.1)
*LABEL 57,64 AS BIRD7 TYPE IS (F8.1)
*LABEL 1,5 AS ID TYPE IS (A5)
*LABEL 9,64 AS BIRDS TYPE IS (/F8.1)
(data to be reserved)
*DISPLAY FILE NAMES ON DIRECTORY
*DESCRIBE WEATHER
*DESCRIBE PRECIP
*DESCRIBE BUDGET01
*DESCRIBE HAWKDATA

6-7-8-9
```

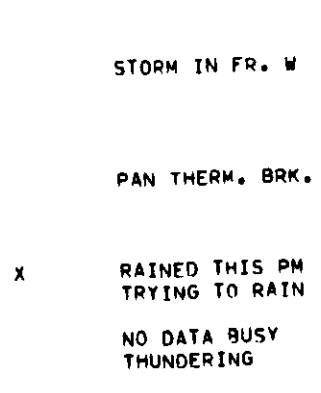
```
                                                                                                  000100    040357    032074    006263
CORE MAP  12.52.31.  NORMAL                    CONTROL                                                                                 
      ---TIME---LOAD MODE --L1--L2-----TYPE--------------USER---+---CALL-------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
      FWA LOADER  042756  FWA TABLES  036324
                                                --LABELED---COMMON--
      -PROGRAM----ADDRESS-
      BANK          000100
      INITIAL       010322
      COMMAND       010642
      WORD          011212
      ROWRMF        011620
      SKIPMF        011754
      COPDFDF       012067
      COPMFMF       012155
      COPDFMF       012252
      COPMFDF       012513
      CHECKIT       012725
      DESCRIB       013004
      DICTION       013671
      FINAL         014077
      ERRMESS       014471
      LOCATE        015705
      RELATE        016076
      FETCH         016452
      MATCH         016625
      STORE         017032
      READSF        017074
      PERMY         017160                          IOCS          017400
      OPNIN         017547                          IOCS          017400
      GET           020050                          IOCS          017400
      PUT           020457                          IOCS          017400
      CLOSE         020777                          IOCS          017400
      RDERR         021225
      TAPEIO        021262
      CHARS         022143
      NUM           022265
      CMPRF         022376
      EXAM          022437
      BYTES         022462
      SYSTEM$       022563
      ACGOER$       023566
      ENDFIL$       023601
      IFENDF$       023647
      INPUTB$       023726
      INPUTC$       024210
      INPUTS$       024334
      KRAKER$       024411
      OUTPTB$       026136
      OUTPTC$       026410
      REWINM$       026504
      CPC           026554
      KODER$        027024
      GETBA         030447
      SIO$          030466                          REFERENCES
      ----UNSATISFIED EXTERNALS-----                  007215
      ABORT

MF3 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK
```

1.) This is the execution for the first run on the sample input problem. The order of the input deck is:

```
TA000,CM47000,...
FTN(R=0,OPT=2)
LGO.
RFL(47000)
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK(MF1,MF2,MF3,DIR,DATA,PRECIP)
789
  FORTRAN program to create file PRECIP
789
  data for FORTRAN program
789
  data and commands for program BANK
6789
```

2.) This message is printed by the program. Since this run is the creation of the data bank, MF3 will be empty. The new version of the data bank will be on MF1.

```
*CA   OG AS TESTBANK FOR ROBINSON

*RESERVE AS WEATHER
   WEATHER
*LENGTH IS 80 COLUMNS
*FIRST 20 RECORDS ARE HEADER RECORDS
*LAST RECORD IS A TRAILER CARD
*LABEL 1,2 AS MONTH TYPE IS (I2)
*LABEL 3,4 AS DAY TYPE IS (I2)
*LABEL 5 TO 6 AS YEAR TYPE IS (I2)
*LABEL 8 11 AS TIME TYPE IS (I4)
*LABEL 13 , 15 AS MAXAIRTEMP TYPE IS (F3.0)
*LABEL 16 , 18 AS MINAIRTEMP TYPE IS (F3.0)
*LABEL 20,22 OBSAIRTEMP (F3.0)
*LABEL 24,26 AS MAXPANTEMP TYPE IS (F3.0)
*LABEL 27,29 AS MINPANTEMP TYPE IS (F3.0)
*LABEL 30,34 AS EVAP TYPE IS (F5.2)
*LABEL 35,80 AS COMMENTS
*NOTE      THIS IS THE STANDARD WEATHER OBSERVATION DATA COLLECTED ON THE
PAWNEE SITE BEGINNING JUNE 24, 1970 AND CONTINUING DAILY .  EACH RECORD CONTAINS
THE DATE AND TIME THE OBSERVATIONS WERE MADE, THE THE MINIMUM, MAXIMUM AND
OBSERVED AIR TEMPERATURES, THE MINIMUM AND MAXIMUM PAN TEMPERATURES, THE AMOUNT
OF EVAPORATION FROM THE PAN, AND A SERIES OF COMMENTS PERTAINING TO THE SKY,
TEMPERATURE, WIND, AND PRECIPITATION.  AT THE END OF EACH MONTH THE DATA SHEETS
ARE SENT TO  GERL  TO BE STORED IN THE DATA BANK.  SEE FREEMAN SMITH FOR DETAILS
*DATA FOLLOWS
CLEAR
HAZY
OVERCAST
SCATTERED
THUNDERHEADS
HOT
WARM
CHILLY
COLD
LT. WIND
STRONG
GUSTY
BLIZZARD
GENTLE RAIN
THUNDER SHOWER
HAIL (PEA)
HAIL (MARBLE)
HAIL (GOLFBALL)
LT. SNOW
DRIFTED SNOW
062470 1935 088 50 074 086 55 -.52
062570 1900 089 57 079 085 57 -.49
062670 1520 089 52 090 085 57 -.36
062770 1730 097 50 080 085 47 -.51
062870 1730 094 55 083 087 57 -.54
062970 1900 087 54 074 085 57 -.44
063070 1525 086 51 085 082 56 -.42
070170 1800 085 49 080 086 56 -.45
070270 1800 093 51 089        -.45
070370 1815 090 58 079        -.48
070470 1745 087 53 085        -.45
070570 1730 090 54 079        -.36
070670 1745 089 55 078        -.30
070770 1745 083 58 070        -.36
070870 1745 087 54 083        -.34
070970
071070 1745 091 55 085        -.67
```



```
STORM IN FR. W

PAN THERM. BRK.

RAINED THIS PM
TRYING TO RAIN

NO DATA BUSY
THUNDERING
```

3.) The catalog command informs the system that the bank is to be put onto permanent files.

4.) These are the actual input commands used to reserve the data set and define the data set description.

5.) The command *DATA FOLLOWS is used to denote the end of the abstract and the beginning of the data set.

6.) The reserved records are printed by the program along with the record identification. if this is not desired, the command *SUPPRESS LISTING should be placed before the command *RESERVE AS WEATHER.

```
WEATHER 00001A
WEATHER 00002A
WEATHER 00003A
WEATHER 00004A
WEATHER 00005A
WEATHER 00006A
WEATHER 00007A
WEATHER 00008A
WEATHER 00009A
WEATHER 00010A
WEATHER 00011A
WEATHER 00012A
WEATHER 00013A
WEATHER 00014A
WEATHER 00015A
WEATHER 00016A
WEATHER 00017A
WEATHER 00018A
WEATHER 00019A
WEATHER 00020A
WEATHER 00021A
WEATHER 00022A
WEATHER 00023A
WEATHER 00024A
WEATHER 00025A
WEATHER 00026A
WEATHER 00027A
WEATHER 00028A
WEATHER 00029A
WEATHER 00030A
WEATHER 00031A
WEATHER 00032A
WEATHER 00033A
WEATHER 00034A
WEATHER 00035A
WEATHER 00036A
WEATHER 00037A
WEATHER 00038A
WEATHER 00039A
WEATHER 00040A
WEATHER 00041A
WEATHER 00042A
WEATHER 00043A
WEATHER 00044A
WEATHER 00045A
WEATHER 00046A
WEATHER 00047A
WEATHER 00048A
WEATHER 00049A
WEATHER 00050A
WEATHER 00051A
WEATHER 00052A
WEATHER 00053A
WEATHER 00054A
WEATHER 00055A
WEATHER 00056A
WEATHER 00057A
WEATHER 00058A
WEATHER 00059A
WEATHER 00060A
```

```
071170 1840 091 56 069      -.39        X    X       X          RAINED
071270 1745 085 54 070      -.21      X    X                                  WEATHER 00061A
071370 1730 088 53 087      -.28      X    X      X  X                        WEATHER 00062A
071470 1715 091 58 080      -.45       X    X    X                            WEATHER 00063A
071570 1700 083 47 082      -.36      X    X      X          COOLER TODAY     WEATHER 00064A
071670 1800 093 52 085      -.54         X  X    X           CALM BREEZE      WEATHER 00065A
071770 1800 092 55 085      -.29         X  X      X                          WEATHER 00066A
071870 1730 091 61 086      -.40         X  X      X                          WEATHER 00067A
071970 1730 086 45 072      -.40          X  X   X           COOL BRZ. -RAIN  WEATHER 00068A
072070 1710 085 57 076      +.01         X   X     X                          WEATHER 00069A
072170 1650 085 58 084      -.30        X   X      X                          WEATHER 00070A
072270 1800 085 58 068      -.15        X    X   X           LGT. SPRINKLE    WEATHER 00071A
072370 1715 083 58 075      -.45         X   X     X                          WEATHER 00072A
072470 1750 084 49 080      -.40        X     X   X           LOOKS RAINY      WEATHER 00073A
072570 1730 090 50 080      -.39         X   X                                WEATHER 00074A
072670 1730 085 28 068      -.12        X     X  X    X                        WEATHER 00075A
072770 1815 083 57 075                  X     X   X                            WEATHER 00076A
072870 1715 085 53 080      -.15         X  X    X                            WEATHER 00077A
072970 1730 090 54 082      -.42         X  X    X                            WEATHER 00078A
073070 2010 090 54 069      -.41         X    X  X                            WEATHER 00079A
073170 1730 087 40 084      -.30      X     X    X                            WEATHER 00080A
080170 1745 097 25 090      -.45         X  X    X                            WEATHER 00081A
080270 1800 096 54 083      -.15        X   X    X                            WEATHER 00082A
080370 1730 082 60 076      -.30        X    X   X           RAIN-1400 HRS.   WEATHER 00083A
080470 1740 091 56 083      -.28        X    X     X                          WEATHER 00084A
080570 1745 093 65 079      -.34        X    X     X         LOOKS RAINY      WEATHER 00085A
080670 1735 095 60 080      -.43        X    X     X         STORM CLOUDS-W.  WEATHER 00086A
080770 1700 084 69 083      -.34        X   X    X           STORM CLOUDS-W.  WEATHER 00087A
080870 1945 091 54 071      -.42        X    X   X    X      STORM CLOUDS-W.  WEATHER 00088A
99                                                          LIGHT RAIN 1600  WEATHER 00089A
                                                                             WEATHER 00090A
```

```
*RESERVE AS PRECIP
    PRECIP
*NOTE  PRECIP CONTAINS THE PRECIPITATION DATA AT THE CENTRAL PLAINS EXPERIMENTAL
RANGE, NUNN, COLORADO.  THE PRECIPITATION IS RECORDED DAILY IN INCHES.
*LABEL COLUMNS 1 TO 2 AS YEAR TYPE IS (I2)
*LABEL COLUMNS 3,4 AS MONTH TYPE IS (I2)
*LABEL 5,6 AS DAY TYPE IS (I2)
*LABEL 11 TO 15 AS RAIN TYPE IS (F5.2)
*DATA IS ON COMMON
70 1 1      0.00
70 1 2      0.00
70 1 3      0.00
70 1 4      0.00
70 1 5      0.00
70 1 6       .03
70 1 7      0.00
70 1 8      0.00
70 1 9      0.00
70 110      0.00
70 111      0.00
70 112      0.00
70 113      0.00
70 114      0.00
70 115      0.00
70 116       .34
70 117      0.00
70 118       .46
70 119       .05
70 120      0.00
70 121      0.00
70 122      0.00
70 123      0.00
```

7.) This data set was on the alternate input file. The entire listing of the file is omitted from this example.

```
PRECIP 00001A
PRECIP 00002A
PRECIP 00003A
PRECIP 00004A
PRECIP 00005A
PRECIP 00006A
PRECIP 00007A
PRECIP 00008A
PRECIP 00009A
PRECIP 00010A
PRECIP 00011A
PRECIP 00012A
PRECIP 00013A
PRECIP 00014A
PRECIP 00015A
PRECIP 00016A
PRECIP 00017A
PRECIP 00018A
PRECIP 00019A
PRECIP 00020A
PRECIP 00021A
PRECIP 00022A
PRECIP 00023A
PRECIP 00024A
PRECIP 00025A
PRECIP 00026A
PRECIP 00027A
PRECIP 00028A
PRECIP 00029A
PRECIP 00030A
PRECIP 00031A
PRECIP 00032A
PRECIP 00033A
```

```
701223      0.00
701         0.00
701.        0.00
701226      0.00
701227      0.00
701228      0.00
701229      0.00
701230      0.00
701231      0.00

*RESERVE AS BUDGET01
  BUDGET01
CSU ANIMAL SCIENCE
CSU ATMOSPHERIC SCIENCE
CSU BOT. AND PLT. PATH.
CSU ENTOMOLOGY
CSU FISH AND WILDLIFE
CSU MICROBIOLOGY
CSU RANGE SCIENCE
CSU RECR. AND WATERSHED
CSU ZOOLOGY
CSU COOP. WILDLIFE RES.
CSU AGRONOMY
CSU ENGINEERING RES. LAB
CSU RADIATION BIOLOGY
UNIV. OF LOUISVILLE
UNIV. OF NORTHERN COLO.
FT. HAYS KANSAS ST. COL.
KANSAS STATE UNIVERSITY
MONTANA STATE UNIVERSITY
NEW MEXICO ST. UNIV.
NO. DAKOTA ST. UNIV.
SO. DAKOTA ST. UNIV.
SO. COLORADO ST. COL.
UNIVERSITY OF COLORADO
UNIVERSITY OF DENVER
UNIVERSITY OF OKLAHOMA
UNIVERSITY OF WYOMING
TEXAS TECH
OREGON STATE UNIVERSITY
UNIV. OF CAL. AT BERKLEY
UNIVERSITY OF MISSOURI
UNIVERSITY OF KANSAS
UNIVERSITY OF MONTANA
UNIVERSITY OF GEORGIA
BATELLE MEMORIAL LAB
NORTH DAKOTA UNIVERSITY
UNIVERSITY OF ILLINOIS
LAWRENCE RADIATION LAB
UTAH STATE UNIVERSITY
CSU NAT. RES. ECOL. LAB.

*RESERVE AS HAWKDATA
  HAWKDATA
*LABEL 1,2 AS PARAMETER TYPE (A2)
*LABEL 4,5 AS SPECIES TYPE (A2)
*LABEL 7,8 AS DAY TYPE IS (I2)
*LABEL 9,16 AS BIRD1 TYPE IS (F8.1)
*LABEL 17,24 AS BIRD2 TYPE IS (F8.1)
*LABEL 25,32 AS BIRD3 TYPE IS (F8.1)
*LABEL 33,40 AS BIRD4 TYPE IS (F8.1)
*LABEL 41,48 AS BIRD5 TYPE IS (F8.1)
*LABEL 49 56 AS BIRD6 TYPE IS (F8.1)
*LABEL 57,64 AS BIRD7 TYPE IS (F8.1)
*LABEL 1,5 AS ID TYPE IS (A5)
*LABEL 9,64 AS BIRDS TYPE IS (7F8.1)
```

```
PRECIP 00365A
PRECIP 00366A
PRECIP 00367A
PRECIP 00368A
PRECIP 00369A
PRECIP 00370A
PRECIP 00371A
PRECIP 00372A
PRECIP 00373A
```

8.) No file description was used for this reservation. Note that without a file description the actual data begins with record number two. This makes it possible to insert records at the front of the data set with the command: INSERT IN BUDGET01 AFTER BUDGET01.
The first record always contains the file name and the number of corrections made to the data set.

```
BUDGET01 00001A
BUDGET01 00002A
BUDGET01 00003A
BUDGET01 00004A
BUDGET01 00005A
BUDGET01 00006A
BUDGET01 00007A
BUDGET01 00008A
BUDGET01 00009A
BUDGET01 00010A
BUDGET01 00011A
BUDGET01 00012A
BUDGET01 00013A
BUDGET01 00014A
BUDGET01 00015A
BUDGET01 00016A
BUDGET01 00017A
BUDGET01 00018A
BUDGET01 00019A
BUDGET01 00020A
BUDGET01 00021A
BUDGET01 00022A
BUDGET01 00023A
BUDGET01 00024A
BUDGET01 00025A
BUDGET01 00026A
BUDGET01 00027A
BUDGET01 00028A
BUDGET01 00029A
BUDGET01 00030A
BUDGET01 00031A
BUDGET01 00032A
BUDGET01 00033A
BUDGET01 00034A
BUDGET01 00035A
BUDGET01 00036A
BUDGET01 00037A
BUDGET01 00038A
BUDGET01 00039A
BUDGET01 00040A
```

```
HAWKDATA 00001A
HAWKDATA 00002A
HAWKDATA 00003A
HAWKDATA 00004A
HAWKDATA 00005A
HAWKDATA 00006A
HAWKDATA 00007A
HAWKDATA 00008A
HAWKDATA 00009A
HAWKDATA 00010A
HAWKDATA 00011A
HAWKDATA 00012A
HAWKDATA 00013A
```

6F RT 10	4.8			5.5	3.2	2.3
6F RT 11	7.3			8.5	6.1	2.4
6F RT 12	10.8	8.8	2.0			
6F RT 13	15.9	13.3	2.6	17.0	14.3	2.7
6F RT 14	22.0	19.1	2.9			
6F RT 15	28.1	22.5	5.6	29.1	20.8	8.3
6F RT 16	35.8	28.8	7.0			
6F RT 17	43.0	33.5	9.5	41.4	30.2	11.2
6F RT 18	49.6	37.6	12.0			
6F RT 19	58.3	41.4	16.9	55.5	41.1	14.4
6F RT 21	74.6	54.3	20.3	66.1	37.1	29.0
6F RT 22	80.7	49.4	31.3			
6F RT 23				80.9	46.2	34.7
6F RT 24	96.3	57.2	39.1			
6F RT 25				98.3	54.4	43.9
6F RT 26	111.8	52.9	58.9			
6F RT 28	127.4	61.0	66.4	116.2	49.0	67.2
6F RT 30	145.4	62.2	83.2			
6F RT 31				145.2	53.5	91.7
6F RT 32	156.7	57.4	99.3			
6F RT 34	168.4	67.4	101.0	161.8	58.0	103.8
6F RT 36	184.4	62.4	122.0			
6F RT 39	201.1	51.6	149.5	198.8	57.8	141.0
6F RT 40						
6F RT 42	207.7	32.2	175.5	220.4	45.6	174.8
6F RT 46	230.6	35.7	194.9			

```
HAWKDATA 00014A
HAWKDATA 00015A
HAWKDATA 00016A
HAWKDATA 00017A
HAWKDATA 00018A
HAWKDATA 00019A
HAWKDATA 00020A
HAWKDATA 00021A
HAWKDATA 00022A
HAWKDATA 00023A
HAWKDATA 00024A
HAWKDATA 00025A
HAWKDATA 00026A
HAWKDATA 00027A
HAWKDATA 00028A
HAWKDATA 00029A
HAWKDATA 00030A
HAWKDATA 00031A
HAWKDATA 00032A
HAWKDATA 00033A
HAWKDATA 00034A
HAWKDATA 00035A
HAWKDATA 00036A
HAWKDATA 00037A
HAWKDATA 00038A
HAWKDATA 00039A
```

```
*DISPLAY FILE NAMES ON DIRECTORY

ALL PREVIOUS CHANGES HAVE BEEN MADE PERMANENT
MF1 IS NOW THE MOST CURRENT VERSION OF THE BANK

LIST OF FILES LOCATED ON UNIT  1
      NAME  ADDRESS OF LAST RECORD

    WEATHER          90
     PRECIP         463
  BUDGET01          503
  HAWKDATA          542
```

9.) At this point the rest of the old bank is transferred to the new bank and the master files are rotated. This message is printed each time the master files are rotated.

10.) This is a copy of the directory generated by the *DISPLAY command.

```
*DE'  'BE WEATHER
  W  /HER
        THIS IS THE STANDARD WEATHER OBSERVATION DATA COLLECTED ON THE
     PAWNEE SITE BEGINNING JUNE 24, 1970 AND CONTINUING DAILY .  EACH RECORD CONTAINS
     THE DATE AND TIME THE OBSERVATIONS WERE MADE, THE THE MINIMUM, MAXIMUM AND
     OBSERVED AIR TEMPERATURES, THE MINIMUM AND MAXIMUM PAN TEMPERATURES, THE AMOUNT
     OF EVAPORATION FROM THE PAN, AND A SERIES OF COMMENTS PERTAINING TO THE SKY,
     TEMPERATURE, WIND, AND PRECIPITATION.  AT THE END OF EACH MONTH THE DATA SHEETS
     ARE SENT TO  GERL  TO BE STORED IN THE DATA BANK.  SEE FREEMAN SMITH FOR DETAILS

 WEATHER IS FILE NUMBER    1 CONSISTING OF      90 RECORDS  WITH  80 CHARACTERS EACH

              0 CORRECTIONS.        20 HEADER RECORDS.          1 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

                MONTH       1-  2          (I2)
                  DAY       3-  4          (I2)
                 YEAR       5-  6          (I2)
                 TIME       8- 11          (I4)
            MAXAIRTEMP     13- 15         (F3.0)
            MINAIRTEMP     16- 18         (F3.0)
            OBSAIRTEMP     20- 22         (F3.0)
            MAXPANTEMP     24- 26         (F3.0)
            MINPANTEMP     27- 29         (F3.0)
                 EVAP      30- 34         (F5.2)
              COMMENTS     35- 80
```

11.) This is a file description generated by the *DESCRIBE command.

```
*DESCRIBE PRECIP
   PRECIP
        PRECIP CONTAINS THE PRECIPITATION DATA AT THE CENTRAL PLAINS EXPERIMENTAL
     RANGE, NUNN, COLORADO.  THE PRECIPITATION IS RECORDED DAILY IN INCHES.

   PRECIP IS FILE NUMBER    2 CONSISTING OF     373 RECORDS  WITH  80 CHARACTERS EACH

              0 CORRECTIONS.        0 HEADER RECORDS.          0 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

                 YEAR       1-  2          (I2)
                MONTH       3-  4          (I2)
                  DAY       5-  6          (I2)
                 RAIN      11- 15         (F5.2)
```

```
*DESCRIBE BUDGET01
  BUDGET01

  BUDGET01 IS FILE NUMBER    3 CONSISTING OF      40 RECORDS  WITH  80 CHARACTERS EACH

              0 CORRECTIONS.        0 HEADER RECORDS.          0 TRAILER RECORDS.
```

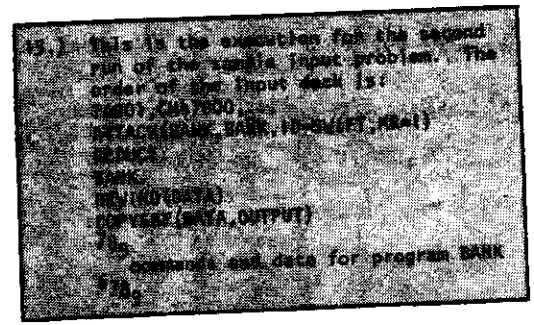
12.) This is the file description that is assumed if there is no description defined.

```
*DESCRIBE HAWKDATA
 HAWKDATA

 HAWKDATA IS FILE NUMBER     4 CONSISTING OF      39 RECORDS  WITH  80 CHARACTERS EACH

                  0 CORRECTIONS.          0 HEADER RECORDS.          0 TRAILER RECORDS.

          DEFINED FIELDS      LOCATION          TYPE

               PARAMETER          1- 2          (A2)
                 SPECIES          4- 5          (A2)
                     DAY          7- 8          (I2)
                   BIRD1         9- 16       (F8.1)
                   BIRD2        17- 24       (F8.1)
                   BIRD3        25- 32       (F8.1)
                   BIRD4        33- 40       (F8.1)
                   BIRD5        41- 48       (F8.1)
                   BIRD6        49- 56       (F8.1)
                   BIRD7        57- 64       (F8.1)
                      ID          1- 5          (A5)
                   BIRDS         9- 64      (7F8.1)
```

The second run of the sample problem modifies the bank by inserting descriptor records into the description for WEATHER, reserving a new data set after WEATHER, inserting descriptor records and data records into BUDGET01, deleting records from BUDGET01, and inserting more data onto the end of HAWKDATA. The files are then displayed and described and a data file is generated with the copy commands. The first copy command is to fetch only the activated records from the WEATHER data set. The second command retrieves the entire file of BUDGET01 including descriptor records, deactivated records and the record id's for each. The input deck is:

```
TA001,CM47000,...
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK.
REWIND(DATA)
COPYSBF(DATA,OUTPUT)
7-8-9
*BANK IS ON TESTBANK FOR ROBINSON
*INSERT IN WEATHER AS DESCRIPTOR RECORD
*LABEL 1 TO 6 AS DATE TYPE IS (I6)
*RESERVE AS NEWFILE AFTER PRECIP
 (data to be reserved)
*INSERT IN BUDGET01 AS DESCRIPTOR RECORDS
*NOTE  BUDGET01 IS A LIST OF THE INSTITUTIONS INVOLVED IN THE GRASSLANDS BIOME
OF THE INTERNATIONAL BIOLOGICAL PROGRAM AS OF FISCAL YEAR 1971
*DATA
*INSERT IN BUDGET01 AFTER BUDGET01.24
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO
*DELETE IN BUDGET01 BUDGET01.27
*DELETE IN BUDGET01 BUDGET01.32 TO BUDGET01.34
*INSERT IN HAWKDATA
 (data to be inserted)
*DISPLAY
*DESCRIBE ALL FILES
*COPY WEATHER
*COPY BUDGET01 INCLUDING EVERYTHING
6-7-8-9
```

```
                                                                                                  000100    040357    032074    006263
CORE MAP  12.52.55.  NORMAL                CONTROL
        ---TIME---LOAD MODE --L1--L2-----TYPE--------------USER---++---CALL-------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
        FWA LOADER  042756  FWA TABLES  036324
        -PROGRAM----ADDRESS-                    --LABELED---COMMON--
        BANK        000100
        INITIAL     010322
        COMMAND     010642
        WORD        011212
        RDWRMF      011620
        SKIPMF      011754
        COPDFDF     012067
        COPMFMF     012155
        COPDFMF     012252
        COPMFDF     012513
        CHECKIT     012725
        DESCRIB     013004
        DICTION     013671
        FINAL       014077
        ERRMESS     014471
        LOCATE      015705
        RELATE      016076
        FETCH       016452
        MATCH       016625
        STORE       017032
        READSF      017074
        PERMY       017160                                  IOCS        017400
        OPNIN       017547                                  IOCS        017400
        GET         020050                                  IOCS        017400
        PUT         020457                                  IOCS        017400
        CLOSE       020777                                  IOCS        017400
        RDERR       021225
        TAPEIO      021262
        CHARS       022143
        NUM         022265
        CMPRF       022376
        EXAM        022437
        BYTES       022462
        SYSTEM$     022563
        ACGOER$     023566
        ENDFIL$     023601
        IFENDF$     023647
        INPUTB$     023726
        INPUTC$     024210
        INPUTS$     024334
        KRAKER$     024411
        OUTPTB$     026136
        OUTPTC$     026410
        REWINM$     026504
        CPC         026554
        KODER$      027024
        GETBA       030447
        SIO$        030466                                  REFERENCES
        ----UNSATISFIED EXTERNALS-----                        007215
        ABORT

MF1 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK
```



15.) This is the execution for the second run of the sample input problem. The order of the input deck is:

```
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
```

commands and data for program BANK

[illegible]

```
*BANK IS ON TESTBANK FOR ROBINSON

MF1 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK

*INSERT IN WEATHER AS DESCRIPTOR RECORD
*LABEL 1 TO 6 AS DATE TYPE IS (I6)

*RESERVE AS NEWFILE AFTER PRECIP

*RESERVE AS NEWFILE AFTER PRECIP
   NEWFILE
        EXPONENTIAL FIT FOR A HORIZONS OF ALL MICRO-WATERSHEDS
      47.8        0.0
      27.7        0.1
      15.3        0.3
      11.2        1.0
       8.2        3.0
       6.0       15.0
       4.0       30.0
                    2
        EXPONENTIAL FIT FOR B HORIZONS OF MICRO-WATERSHEDS 2, 3, AND 8
      54.3        0.0
      37.7        0.1
      28.2        0.3
      23.0        1.0
      18.2        3.0
      13.6       15.0
       9.0       30.0
                    2
        EXPONENTIAL FIT FOR B HORIZONS OF MICROWATERSHEDS 1, 4, AND 7
      50.5        0.0
      30.7        0.1
      20.5        0.3
      16.0        1.0
      12.3        3.0
       9.6       15.0
       7.0       30.0
                    2
        EXPONENTIAL FIT FOR C HORIZONS OF MICROWATERSHEDS 2, 3, AND 7
      54.4        0.0
      38.0        0.1
      28.6        0.3
      21.8        1.0
      17.1        3.0
      12.0       15.0
       9.0       30.0
                    2
        EXPONENTIAL FIT FOR C HORIZONS OF MICROWATERSHEDS 1, 4, AND 6
      49.2        0.0
      30.3        0.1
      18.4        0.3
      14.5        1.0
      11.2        3.0
       8.9       15.0
       7.0       30.0
                    2
        EXPONENTIAL FIT FOR C HORIZON OF MICROWATERSHED 8
      60.9        0.0
      44.5        0.1
      36.5        0.3
      29.0        1.0
      22.5        3.0
      17.6       15.0
```

(4.) When the *BANK command is encountered, the files are attached and the most current version of the master files is relocated.

(5.) Descriptor records are always inserted at the front of the date set description.

```
COREC00001 00001A

NEWFILE 00001A
NEWFILE 00002A
NEWFILE 00003A
NEWFILE 00004A
NEWFILE 00005A
NEWFILE 00006A
NEWFILE 00007A
NEWFILE 00008A
NEWFILE 00009A
NEWFILE 00010A
NEWFILE 00011A
NEWFILE 00012A
NEWFILE 00013A
NEWFILE 00014A
NEWFILE 00015A
NEWFILE 00016A
NEWFILE 00017A
NEWFILE 00018A
NEWFILE 00019A
NEWFILE 00020A
NEWFILE 00021A
NEWFILE 00022A
NEWFILE 00023A
NEWFILE 00024A
NEWFILE 00025A
NEWFILE 00026A
NEWFILE 00027A
NEWFILE 00028A
NEWFILE 00029A
NEWFILE 00030A
NEWFILE 00031A
NEWFILE 00032A
NEWFILE 00033A
NEWFILE 00034A
NEWFILE 00035A
NEWFILE 00036A
NEWFILE 00037A
NEWFILE 00038A
NEWFILE 00039A
NEWFILE 00040A
NEWFILE 00041A
NEWFILE 00042A
NEWFILE 00043A
NEWFILE 00044A
NEWFILE 00045A
NEWFILE 00046A
NEWFILE 00047A
NEWFILE 00048A
NEWFILE 00049A
NEWFILE 00050A
NEWFILE 00051A
NEWFILE 00052A
NEWFILE 00053A
```

```
     13.0       30.0
                  4

*INSERT IN BUDGET01 AS DESCRIPTOR RECORDS
*NOTE  BUDGET01 IS A LIST OF THE INSTITUTIONS INVOLVED IN THE GRASSLANDS BIOME
OF THE INTERNATIONAL BIOLOGICAL PROGRAM AS OF FISCAL YEAR 1971
*DATA

*INSERT IN BUDGET01 AFTER BUDGET01.24
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO

*DELETE IN BUDGET01 BUDGET01.27
UNIVERSITY OF WYOMING

*DELETE IN BUDGET01 BUDGET01.32 TO BUDGET01.34
UNIVERSITY OF KANSAS
UNIVERSITY OF MONTANA
UNIVERSITY OF GEORGIA

*INSERT IN HAWKDATA
6F FH 12      5.2      3.5      1.7        6.2      3.8      2.4
6F FH 14     11.8      8.8      3.0       14.6     11.3      3.3
6F FH 16     22.9     17.9      5.0       26.0     18.8      7.2
6F FH 18     37.7     31.8      5.9       39.4     16.8     12.6
6F FH 20     50.8     36.6     14.2       54.4     38.5     15.9
6F FH 22     66.4     46.4     20.0       67.5     46.3     21.2
6F FH 24     84.3     48.4     35.9
6F FH 25                                   93.5     51.4     42.1
6F FH 26    100.1     51.4     48.7
6F FH 28                                  122.8     55.1     67.7
6F FH 29    121.5     54.4     67.1
6F FH 31                                  143.6     60.8     82.8
6F FH 32    145.2     64.3     80.9
6F FH 35    169.0     70.9     98.1
6F FH 38                                  192.3     63.0    129.3
6F FH 41    209.2     58.6    150.6
6F FH 46    218.1     38.0    180.1       238.0     33.6    204.4

*DISPLAY

ALL PREVIOUS CHANGES HAVE BEEN MADE PERMANENT
MF2 IS NOW THE MOST CURRENT VERSION OF THE BANK

LIST OF FILES LOCATED ON UNIT  2
      NAME  ADDRESS OF LAST RECORD

    WEATHER          91
     PRECIP         464
    NEWFILE         519
   BUDGET01         564
   HAWKDATA         620
```

```
NEWFILE 00054A
NEWFILE 00055A
```

16.) Since there was no previous description for BUDGET01, the command *DATA must also be inserted to denote the end of the abstract and the beginning of the data. (See p. 14)

```
CORECO0001 00001A
CORECO0001 00002A
CORECO0001 00003A

CORECO0001 00004A
CORECO0001 00005A
```

17.) Each deleted record is printed by the program.

18.) These records are inserted at the end of the data set since no location is specified.

```
CORECO0001 00001A
CORECO0001 00002A
CORECO0001 00003A
CORECO0001 00004A
CORECO0001 00005A
CORECO0001 00006A
CORECO0001 00007A
CORECO0001 00008A
CORECO0001 00009A
CORECO0001 00010A
CORECO0001 00011A
CORECO0001 00012A
CORECO0001 00013A
CORECO0001 00014A
CORECO0001 00015A
CORECO0001 00016A
CORECO0001 00017A
```

```
*DESCRIBE ALL FILES
  WEATHER
          THIS IS THE STANDARD WEATHER OBSERVATION DATA COLLECTED ON THE
      PAWNEE SITE BEGINNING JUNE 24, 1970 AND CONTINUING DAILY .  EACH RECORD CONTAINS
      THE DATE AND TIME THE OBSERVATIONS WERE MADE, THE THE MINIMUM, MAXIMUM AND
      OBSERVED AIR TEMPERATURES, THE MINIMUM AND MAXIMUM PAN TEMPERATURES, THE AMOUNT
      OF EVAPORATION FROM THE PAN, AND A SERIES OF COMMENTS PERTAINING TO THE SKY,
      TEMPERATURE, WIND, AND PRECIPITATION.  AT THE END OF EACH MONTH THE DATA SHEETS
      ARE SENT TO  GERL  TO BE STORED IN THE DATA BANK.  SEE FREEMAN SMITH FOR DETAILS

  WEATHER IS FILE NUMBER    1 CONSISTING OF      91 RECORDS  WITH  80 CHARACTERS EACH

                1 CORRECTIONS.        20 HEADER RECORDS.          1 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

            DATE          1- 6           (I6)
           MONTH          1- 2           (I2)
             DAY          3- 4           (I2)
            YEAR          5- 6           (I2)
            TIME          8- 11          (I4)
      MAXAIRTEMP         13- 15          (F3.0)
      MINAIRTEMP         16- 18          (F3.0)
      OBSAIRTEMP         20- 22          (F3.0)
      MAXPANTEMP         24- 26          (F3.0)
      MINPANTEMP         27- 29          (F3.0)
             EVAP        30- 34          (F5.2)
        COMMENTS         35- 80

  PRECIP
        PRECIP CONTAINS THE PRECIPITATION DATA AT THE CENTRAL PLAINS EXPERIMENTAL
      RANGE, NUNN, COLORADO.  THE PRECIPITATION IS RECORDED DAILY IN INCHES.

  PRECIP IS FILE NUMBER    2 CONSISTING OF     373 RECORDS  WITH  80 CHARACTERS EACH

                0 CORRECTIONS.        0 HEADER RECORDS.           0 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

            YEAR          1- 2           (I2)
           MONTH          3- 4           (I2)
             DAY          5- 6           (I2)
            RAIN         11- 15          (F5.2)

  NEWFILE

  NEWFILE IS FILE NUMBER    3 CONSISTING OF      55 RECORDS  WITH  80 CHARACTERS EACH

                0 CORRECTIONS.        0 HEADER RECORDS.           0 TRAILER RECORDS.
```

```
BUDGET01
        BUDGET01 IS A LIST OF THE INSTITUTIONS INVOLVED IN THE GRASSLANDS BIOME
      OF THE INTERNATIONAL BIOLOGICAL PROGRAM AS OF FISCAL YEAR 1971

BUDGET01 IS FILE NUMBER     4 CONSISTING OF      45 RECORDS  WITH  80 CHARACTERS EACH

                 1 CORRECTIONS.          0 HEADER RECORDS.          0 TRAILER RECORDS.
```

```
HAWKDATA

HAWKDATA IS FILE NUMBER     5 CONSISTING OF      56 RECORDS  WITH  80 CHARACTERS EACH

                 1 CORRECTIONS.          0 HEADER RECORDS.          0 TRAILER RECORDS.
```

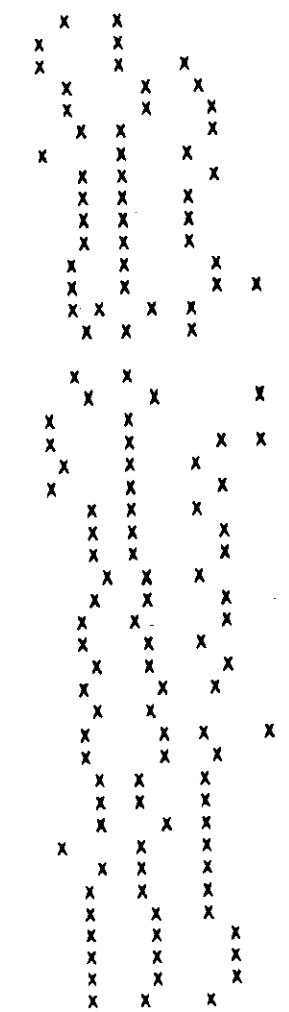
DEFINED FIELDS	LOCATION	TYPE
PARAMETER	1- 2	(A2)
SPECIES	4- 5	(A2)
DAY	7- 8	(I2)
BIRD1	9- 16	(F8.1)
BIRD2	17- 24	(F8.1)
BIRD3	25- 32	(F8.1)
BIRD4	33- 40	(F8.1)
BIRD5	41- 48	(F8.1)
BIRD6	49- 56	(F8.1)
BIRD7	57- 64	(F8.1)
ID	1- 5	(A5)
BIRDS	9- 64	(7F8.1)

```
*COPY WEATHER

*COPY BUDGET01 INCLUDING EVERYTHING
```

19.) The *COPY commands will create the DATA file. All activated records will be printed from the data set WEATHER. All activated and deactivated records from BUDGET01 will be printed including the descriptor records and the record identification.

20.) This is a listing of the DATA file generated by the *COPY commands.

```
CLEAR
HAZY
OVERCAST
SCATTERED
THUNDERHEADS
HOT
WARM
CHILLY
COLD
LT. WIND
STRONG
GUSTY
BLIZZARD
GENTLE RAIN
THUNDER SHOWER
HAIL (PEA)
HAIL (MARBLE)
HAIL (GOLFBALL)
LT. SNOW
DRIFTED SNOW
062470 1935 088 50 074 086 55 -.52
062570 1900 089 57 079 085 57 -.49
062670 1520 089 52 090 085 57 -.36
062770 1730 097 50 080 085 47 -.51
062870 1730 094 55 083 087 57 -.54
062970 1900 087 54 074 085 57 -.44
063070 1525 086 51 085 082 56 -.42
070170 1800 085 49 080 086 56 -.45
070270 1800 093 51 089       -.45
070370 1815 090 58 079       -.48
070470 1745 087 53 085       -.45
070570 1730 090 54 079       -.36
070670 1745 089 55 078       -.30
070770 1745 083 58 070       -.36
070870 1745 087 54 083       -.34
070970
071070 1745 091 55 085       -.67
071170 1840 091 56 069       -.39
071270 1745 085 54 070       -.21
071370 1730 088 53 087       -.28
071470 1715 091 58 080       -.45
071570 1700 083 47 082       -.36
071670 1800 093 52 085       -.54
071770 1800 092 55 085       -.29
071870 1730 091 61 086       -.40
071970 1730 086 45 072       -.40
072070 1710 085 57 076       +.01
072170 1650 085 58 084       -.30
072270 1800 085 58 068       -.15
072370 1715 083 58 075       -.45
072470 1750 084 49 080       -.40
072570 1730 090 50 080       -.39
072670 1730 085 28 068       -.12
072770 1815 083 57 075
072870 1715 085 53 080       -.15
072970 1730 090 54 082       -.42
073070 2010 090 54 069       -.41
073170 1730 087 40 084       -.30
080170 1745 097 25 090       -.45
080270 1800 096 54 083       -.15
080370 1730 082 60 076       -.30
080470 1740 091 56 083       -.28
080570 1745 093 65 079       -.34
080670 1735 095 60 080       -.43
```



STORM IN FR. W

PAN THERM. BRK.

RAINED THIS PM
TRYING TO RAIN

NO DATA BUSY
THUNDERING

RAINED

COOLER TODAY
CALM BREEZE

COOL BRZ. -RAIN

LGT. SPRINKLE

LOOKS RAINY

RAIN-1400 HRS.

LOOKS RAINY
STORM CLOUDS-W.
STORM CLOUDS-W.
STORM CLOUDS-W.

```
080870 1945 091 54 071        -.42        X   X   X   X       LIGHT RAIN 1600
99
  BUDGET01          A
*NOTE  BUDGET01 IS A LIST OF THE INSTITUTIONS INVOLVED IN THE GRASSLANDS BIOME
OF THE INTERNATIONAL BIOLOGICAL PROGRAM AS OF FISCAL YEAR 1971
*DATA
CSU ANIMAL SCIENCE
CSU ATMOSPHERIC SCIENCE
CSU BOT. AND PLT. PATH.
CSU ENTOMOLOGY
CSU FISH AND WILDLIFE
CSU MICROBIOLOGY
CSU RANGE SCIENCE
CSU RECR. AND WATERSHED
CSU ZOOLOGY
CSU COOP. WILDLIFE RES.
CSU AGRONOMY
CSU ENGINEERING RES. LAB
CSU RADIATION BIOLOGY
UNIV. OF LOUISVILLE
UNIV. OF NORTHERN COLO.
FT. HAYS KANSAS ST. COL.
KANSAS STATE UNIVERSITY
MONTANA STATE UNIVERSITY
NEW MEXICO ST. UNIV.
NO. DAKOTA ST. UNIV.
SO. DAKOTA ST. UNIV.
SO. COLORADO ST. COL.
UNIVERSITY OF COLORADO
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO
  THESE TWO CARDS ARE TO COME AFTER THE UNIVERSITY OF COLORADO
UNIVERSITY OF DENVER
UNIVERSITY OF OKLAHOMA
UNIVERSITY OF WYOMING
TEXAS TECH
OREGON STATE UNIVERSITY
UNIV. OF CAL. AT BERKLEY
UNIVERSITY OF MISSOURI
UNIVERSITY OF KANSAS
UNIVERSITY OF MONTANA
UNIVERSITY OF GEORGIA
BATELLE MEMORIAL LAB
NORTH DAKOTA UNIVERSITY
UNIVERSITY OF ILLINOIS
LAWRENCE RADIATION LAB
UTAH STATE UNIVERSITY
CSU NAT. RES. ECOL. LAB.
```

```
  BUDGET01 00001A
COREC00001 00001A
COREC00001 00002A
COREC00001 00003A
  BUDGET01 00002A
  BUDGET01 00003A
  BUDGET01 00004A
  BUDGET01 00005A
  BUDGET01 00006A
  BUDGET01 00007A
  BUDGET01 00008A
  BUDGET01 00009A
  BUDGET01 00010A
  BUDGET01 00011A
  BUDGET01 00012A
  BUDGET01 00013A
  BUDGET01 00014A
  BUDGET01 00015A
  BUDGET01 00016A
  BUDGET01 00017A
  BUDGET01 00018A
  BUDGET01 00019A
  BUDGET01 00020A
  BUDGET01 00021A
  BUDGET01 00022A
  BUDGET01 00023A
  BUDGET01 00024A
COREC00001 00004A
COREC00001 00005A
  BUDGET01 00025A
  BUDGET01 00026A
  BUDGET01 00027D
  BUDGET01 00028A
  BUDGET01 00029A
  BUDGET01 00030A
  BUDGET01 00031A
  BUDGET01 00032D
  BUDGET01 00033D
  BUDGET01 00034D
  BUDGET01 00035A
  BUDGET01 00036A
  BUDGET01 00037A
  BUDGET01 00038A
  BUDGET01 00039A
  BUDGET01 00040A
```

The third sample run destroys the file BUDGET01 and reserves a new file BUDGET02, which is an output file from a FORTRAN program. Since the length of records in BUDGET02 is variable, the length is set to the maximum of 133 characters. An abstract is also inserted into the file description for HAWKDATA. The copy command is used to reproduce the FORTRAN output file from BUDGET02. The files on the bank are also displayed and described. The input deck is:

```
TA003,CM47000,....
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
FTN(R=0,OPT=2)
LOG.
RFL(47000)
REDUCE.
BANK(,,,,,TAPE6)
REWIND(DATA)
COPYCF(DATA,OUTPUT)
7-8-9
 (FORTRAN program to generate output on TAPE6)
7-8-9
 (data for FORTRAN program)
7-8-9
*BANK IS ON TESTBANK FOR ROBINSON
*DESTROY BUDGET01
*RESERVE AS BUDGET02
*LENGTH IS 133
*FIRST 10 RECORDS ARE HEADER RECORDS
*LABEL 2,3 NUMBER (I2)
*LABEL 5,34 INST (3A10)
*LABEL 35,37 CODE (I3)
*LABEL 38,49 BENEFITS (F12.4)
*LABEL 50,63 OVERHEAD (F14.4)
*LABEL 72,74 BASIS (A3)
*NOTE  BUDGET02 INCLUDES A LIST OF ALL INSTITUTIONS INVOLVED IN THE GRASSLANDS
BIOME OF THE INTERNATIONAL BIOLOGICAL PROGRAM.  WITH EACH INSTITUTION IS THE
CODE NUMBER, THE BENEFIT AND OVERHEAD RATE, AND THE BASIS FOR CALCULATING THE
OVERHEAD.  THESE VALUES ARE USED BY THE BUDGET PROGRAM IN PREPARING THE BUDGET
FOR EACH FISCAL YEAR.  BUDGET02 IS PRODUCED BY A FORTRAN PROGRAM CALLED LISTER
INSTITUTIONS AND RATES ARE CORRECT AS OF FEBR. 14, 1971.  SEE BOB ROBINSON AT
GERL FOR FURTHER INFORMATION.
*DATA IS ON COMMON
*INSERT IN WEATHER AFTER WEATHER.21
ARE SENT TO GERL TO BE PUNCHED AND STORED IN THE DATA BANK.  THE SHEETS ARE THEN
RETURNED TO THE PAWNEE SITE.  SEE FREEMAN SMITH FOR DETAILS.
*DELETE IN WEATHER WEATHER.22
*INSERT IN HAWKDATA AS DESCRIPTOR
*NOTE  THIS IS THE CUMULATIVE HAWK GROWTH DATA FROM BUTCH OLENDORFFS RESEARCH
THE DATA WAS COLLECTED FROM 3 DIFFERENT SPECIES OF HAWKS AND 7 BIRDS PER SPECIES
THE MEASUREMENTS WERE TAKEN DURING THE FIRST 50 DAYS OF GROWTH FOR EACH BIRD.
EACH DATA CARD INCLUDES THE SPECIES THE MEASUREMENTS WERE RECORDED FROM, THE
TYPE OF MEASUREMENT, THE AGE IN DAYS OF THE BIRDS AND THE RECORDINGS FOR EACH OF
THE 7 BIRDS OF THE SPECIES.  IF THE MEASUREMENT WAS NOT TAKEN FOR ONE OF THE
BIRDS OF THAT SPECIES FOR THAT DAY, THE CORRESPONDING FIELD WILL BE BLANK.
BELOW IS A LIST OF THE CODES USED FOR EACH OF THE MEASUREMENTS AND EACH OF THE
SPECIES.

    SPECIES CODES

RT   RED-TAILED HAWKS
FH   FERRUGINOUS HAWKS
SH   SWAINSONS HAWKS

    PARAMETER CODES

6F   6TH PRIMARY FEATHER LENGTH
BW   BODY WEIGHT
FL   FEMUR LENGTH
CL   CRUS LENGTH
LT   LENGTH OF TARSUS AND TOE
LL   LENGTH OF LEG
TL   TARSAL LENGTH
L3   LENGTH OF 3RD TOE
HL   HUMERUS LENGTH
AL   ANTEBRACHIUM LENGTH
ML   MANUS LENGTH
WL   LENGTH OF WING
BD   BILL DEPTH
1C   LENGTH OF 1ST CLAW
2C   LENGTH OF 2ND CLAW
BL   BILL LENGTH
WB   WIDTH OF THE BEAD
*COPY BUDGET02
*DISPLAY
*DESCRIBE ALL
6-7-8-9
```

```
CORE MAP  12.54.32.  NORMAL                CONTROL                                                  000100    040357    032074    006263
        ---TIME---LOAD MODE --L1--L2-----TYPE---------------USER---+----CALL-------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
        FWA LOADER  042756  FWA TABLES  036324
        -PROGRAM----ADDRESS-                    --LABELED---COMMON--
        BANK        000100
        INITIAL     010322
        COMMAND     010642
        WORD        011212
        RDWRMF      011620
        SKIPMF      011754
        COPDFDF     012067
        COPMFMF     012155
        COPDFMF     012252
        COPMFDF     012513
        CHECKIT     012725
        DESCRIB     013004
        DICTION     013671
        FINAL       014077
        ERRMESS     014471
        LOCATE      015705
        RELATE      016076
        FETCH       016452
        MATCH       016625
        STORE       017032
        READSF      017074
        PERMY       017160
        OPNIN       017547                          IOCS        017400
        GET         020050                          IOCS        017400
        PUT         020457                          IOCS        017400
        CLOSE       020777                          IOCS        017400
        RDERR       021225                          IOCS        017400
        TAPEIO      021262
        CHARS       022143
        NUM         022265
        CMPRF       022376
        EXAM        022437
        BYTES       022462
        SYSTEM$     022563
        ACGOER$     023566
        ENDFIL$     023601
        IFENDF$     023647
        INPUTB$     023726
        INPUTC$     024210
        INPUTS$     024334
        KRAKER$     024411
        OUTPTB$     026136
        OUTPTC$     026410
        REWINM$     026504
        CPC         026554
        KODER$      027024
        GETBA       030447
        SIO$        030466
        ----UNSATISFIED EXTERNALS-----                                  REFERENCES
        ABORT                                                             007215
```

21.) This is the execution for the third run of the sample input problem. The order of the input deck is:

```
TA001,CM47000,...
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
FTN(R=0,OPT=2)
LGO.
RFL(47000)
REDUCE.
BANK(,,,,,TAPE6)
REWIND(DATA)
COPYCF(DATA,OUTPUT)
789
   FORTRAN program for generating output on TAPE6
789
   data for the FORTRAN program
789
   command cards and data for program BANK
6789
```

MF2 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK

```
*BANK IS ON TESTBANK FOR ROBINSON

MF2 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK

*DESTROY BUDGET01

*RESERVE AS BUDGET02
  BUDGET02
*LENGTH IS 133
*FIRST 10 RECORDS ARE HEADER RECORDS
*LABEL 2,3 NUMBER (I2)
*LABEL 5,34 INST (3A10)
*LABEL 35,37 CODE (I3)
*LABEL 38,49 BENEFITS (F12.4)
*LABEL 50,63 OVERHEAD (F14.4)
*LABEL 72,74 BASIS (A3)
*NOTE  BUDGET02 INCLUDES A LIST OF ALL INSTITUTIONS INVOLVED IN THE GRASSLANDS
BIOME OF THE INTERNATIONAL BIOLOGICAL PROGRAM.  WITH EACH INSTITUTION IS THE
CODE NUMBER, THE BENEFIT AND OVERHEAD RATE, AND THE BASIS FOR CALCULATING THE
OVERHEAD.  THESE VALUES ARE USED BY THE BUDGET PROGRAM IN PREPARING THE BUDGET
FOR EACH FISCAL YEAR.  BUDGET02 IS PRODUCED BY A FORTRAN PROGRAM CALLED LISTER
INSTITUTIONS AND RATES ARE CORRECT AS OF FEBR. 14, 1971.  SEE BOB ROBINSON AT
GERL FOR FURTHER INFORMATION.
*DATA IS ON COMMON
1
```

22.) The *DESTROY command removes the data set from the bank. All records are destroyed.

```
BUDGET02 00001A
BUDGET02 00002A
BUDGET02 00003A
BUDGET02 00004A
BUDGET02 00005A
BUDGET02 00006A
BUDGET02 00007A
BUDGET02 00008A
BUDGET02 00009A
BUDGET02 00010A
BUDGET02 00011A
BUDGET02 00012A
BUDGET02 00013A
BUDGET02 00014A
BUDGET02 00015A
BUDGET02 00016A
BUDGET02 00017A
BUDGET02 00018A
BUDGET02 00019A
==========================================================================================================
BUDGET02 00020A
IBP--GRASSLANDS BIOME                    BILLING INSTITUTIONS
BUDGET02 00021A
BUDGET02 00022A
                                         BENEFIT       OVERHEAD       BASIS FOR
BUDGET02 00023A
   UNIVERSITY                    CODE     RATE          RATE          OVERHEAD
BUDGET02 00024A
==========================================================================================================
BUDGET02 00025A
BUDGET02 00026A
BUDGET02 00027A
 1 CSU ANIMAL SCIENCE             0       .0825         .5500         SWB
BUDGET02 00028A
 2 CSU ATMOSPHERIC SCIENCE        1       .0825         .5500         SWB
BUDGET02 00029A
 3 CSU BOT. AND PLT. PATH.        2       .0825         .5500         SWB
BUDGET02 00030A
 4 CSU ENTOMOLOGY                 3       .0825         .5500         SWB
BUDGET02 00031A
 5 CSU FISH AND WILDLIFE          4       .0825         .5500         SWB
BUDGET02 00032A
 6 CSU MICROBIOLOGY               5       .0825         .5500         SWB
BUDGET02 00033A
 7 CSU RANGE SCIENCE              6       .0825         .5500         SWB
BUDGET02 00034A
 8 CSU RECR. AND WATERSHED        7       .0825         .5500         SWB
BUDGET02 00035A
 9 CSU ZOOLOGY                    8       .0825         .5500         SWB
BUDGET02 00036A
```

11	CSU AGRONOMY	10	.0825	.5500	SWB
12	CSU ENGINEERING RES. LAB	11	.0825	.5500	SWB
13	CSU RADIATION BIOLOGY	12	.0825	.5500	SWB
14	UNIV. OF LOUISVILLE	51	.0700	.5000	SW
15	UNIV. OF NORTHERN COLO.	52	.0750	.2888	SW
16	FT. HAYS KANSAS ST. COL.	53	.1000	.2830	SW
17	KANSAS STATE UNIVERSITY	54	.0980	.5110	SWB
18	MONTANA STATE UNIVERSITY	55	.0850	.4814	SWB
19	NEW MEXICO ST. UNIV.	56	.0500	.4100	SW
20	NO. DAKOTA ST. UNIV.	57	.1200	.2332	SW
21	SO. DAKOTA ST. UNIV.	58	.0830	.4406	SW
22	SO. COLORADO ST. COL.	59	.0700	.3020	SW
23	UNIVERSITY OF COLORADO	60	.0700	.4400	SW
24	UNIVERSITY OF DENVER	61	.0700	.6400	SWB
25	UNIVERSITY OF OKLAHOMA	62	.0700	.5670	SW
26	UNIVERSITY OF WYOMING	63	.0980	.4808	SW
27	TEXAS TECH	64	.0480	.3760	SW
28	OREGON STATE UNIVERSITY	65	.0700	.3849	SW
29	UNIV. OF CAL. AT BERKLEY	66	.1000	.4700	SW
30	UNIVERSITY OF MISSOURI	67	.0700	.5817	SW
31	UNIVERSITY OF KANSAS	68	.0700	.5282	SW
32	UNIVERSITY OF MONTANA	69	.0700	.4313	SWB
33	UNIVERSITY OF GEORGIA	70	.0700	.4530	SW
34	BATELLE MEMORIAL LAB	71	.0700	.7100	SWB
35	NORTH DAKOTA UNIVERSITY	72	.1200	.5405	SW
36	UNIVERSITY OF ILLINOIS	73	.0700	.5900	SW
37	LAWRENCE RADIATION LAB	74	.0825	.5500	SWB
38	UTAH STATE UNIVERSITY	75	.1000	.5500	SWB
39	CSU NAT. RES. ECOL. LAB.	99	.0825	.5500	SWB

*INSERT IN WEATHER AFTER WEATHER.21

ALL PREVIOUS CHANGES HAVE BEEN MADE PERMANENT
MF3 IS NOW THE MOST CURRENT VERSION OF THE BANK
ARE SENT TO GERI TO BE PUNCHED AND STORED IN THE DATA BANK; THE SHEETS ARE THEN

BUDGET02 00037A
BUDGET02 00038A
BUDGET02 00039A
BUDGET02 00040A
BUDGET02 00041A
BUDGET02 00042A
BUDGET02 00043A
BUDGET02 00044A
BUDGET02 00045A
BUDGET02 00046A
BUDGET02 00047A
BUDGET02 00048A
BUDGET02 00049A
BUDGET02 00050A
BUDGET02 00051A
BUDGET02 00052A
BUDGET02 00053A
BUDGET02 00054A
BUDGET02 00055A
BUDGET02 00056A
BUDGET02 00057A
BUDGET02 00058A
BUDGET02 00059A
BUDGET02 00060A
BUDGET02 00061A
BUDGET02 00062A
BUDGET02 00063A
BUDGET02 00064A
BUDGET02 00065A
BUDGET02 00066A

23.) The master files are rotated because the input commands are out of order. These commands are used to change the abstract for WEATHER.

COREC00002 00001A
COREC00002 00002A

```
*DELETE IN WEATHER WEATHER.22
ARE SENT TO  GERL  TO BE STORED IN THE DATA BANK.  SEE FREEMAN SMITH FOR DETAILS

*INSERT IN HAWKDATA AS DESCRIPTOR
*NOTE    THIS IS THE CUMULATIVE HAWK GROWTH DATA FROM BUTCH OLENDORFFS RESEARCH
THE DATA WAS COLLECTED FROM 3 DIFFERENT SPECIES OF HAWKS AND 7 BIRDS PER SPECIES
THE MEASUREMENTS WERE TAKEN DURING THE FIRST 50 DAYS OF GROWTH FOR EACH BIRD.
EACH DATA CARD INCLUDES THE SPECIES THE MEASUREMENTS WERE RECORDED FROM, THE
TYPE OF MEASUREMENT, THE AGE IN DAYS OF THE BIRDS AND THE RECORDINGS FOR EACH OF
THE 7 BIRDS OF THE SPECIES.  IF THE MEASUREMENT WAS NOT TAKEN FOR ONE OF THE
BIRDS OF THAT SPECIES FOR THAT DAY, THE CORRESPONDING FIELD WILL BE BLANK.
BELOW IS A LIST OF THE CODES USED FOR EACH OF THE MEASUREMENTS AND EACH OF THE
SPECIES.

      SPECIES CODES

RT    RED-TAILED HAWKS
FH    FERRUGINOUS HAWKS
SH    SWAINSONS HAWKS


     PARAMETER CODES

6F    6TH PRIMARY FEATHER LENGTH
BW    BODY WEIGHT
FL    FEMUR LENGTH
CL    CRUS LENGTH
LT    LENGTH OF TARSUS AND TOE
LL    LENGTH OF LEG
TL    TARSAL LENGTH
L3    LENGTH OF 3RD TOE
HL    HUMERUS LENGTH
AL    ANTEBROCHIUM LENGTH
ML    MANUS LENGTH
WL    LENGTH OF WING
BD    BILL DEPTH
1C    LENGTH OF 1ST CLAW
2C    LENGTH OF 2ND CLAW
BL    BILL LENGTH
WH    WIDTH OF THE HEAD

*DISPLAY



*DISPLAY

ALL PREVIOUS CHANGES HAVE BEEN MADE PERMANENT
MFI IS NOW THE MOST CURRENT VERSION OF THE BANK

LIST OF FILES LOCATED ON UNIT  1
      NAME  ADDRESS OF LAST RECORD


   WEATHER          93
    PRECIP         466
   NEWFILE         521
  HAWKDATA         613
  BUDGET02         679
```

```
COREC00002 00001A
COREC00002 00002A
COREC00002 00003A
COREC00002 00004A
COREC00002 00005A
COREC00002 00006A
COREC00002 00007A
COREC00002 00008A
COREC00002 00009A
COREC00002 00010A
COREC00002 00011A
COREC00002 00012A
COREC00002 00013A
COREC00002 00014A
COREC00002 00015A
COREC00002 00016A
COREC00002 00017A
COREC00002 00018A
COREC00002 00019A
COREC00002 00020A
COREC00002 00021A
COREC00002 00022A
COREC00002 00023A
COREC00002 00024A
COREC00002 00025A
COREC00002 00026A
COREC00002 00027A
COREC00002 00028A
COREC00002 00029A
COREC00002 00030A
COREC00002 00031A
COREC00002 00032A
COREC00002 00033A
COREC00002 00034A
COREC00002 00035A
COREC00002 00036A
```

```
*DESCRIBE ALL
  WEATHER
          THIS IS THE STANDARD WEATHER OBSERVATION DATA COLLECTED ON THE
      PAWNEE SITE BEGINNING JUNE 24, 1970 AND CONTINUING DAILY .  EACH RECORD CONTAINS
      THE DATE AND TIME THE OBSERVATIONS WERE MADE, THE THE MINIMUM, MAXIMUM AND
      OBSERVED AIR TEMPERATURES, THE MINIMUM AND MAXIMUM PAN TEMPERATURES, THE AMOUNT
      OF EVAPORATION FROM THE PAN, AND A SERIES OF COMMENTS PERTAINING TO THE SKY,
      TEMPERATURE, WIND, AND PRECIPITATION.  AT THE END OF EACH MONTH THE DATA SHEETS
      ARE SENT TO GERL TO BE PUNCHED AND STORED IN THE DATA BANK, THE SHEETS ARE THEN
      RETURNED TO THE PAWNEE SITE.  SEE FREEMAN SMITH FOR DETAILS.

  WEATHER IS FILE NUMBER    1 CONSISTING OF     93 RECORDS  WITH  80 CHARACTERS EACH

              2 CORRECTIONS.        20 HEADER RECORDS.        1 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

                DATE        1- 6          (I6)
               MONTH        1- 2          (I2)
                 DAY        3- 4          (I2)
                YEAR        5- 6          (I2)
                TIME        8- 11         (I4)
          MAXAIRTEMP       13- 15         (F3.0)
          MINAIRTEMP       16- 18         (F3.0)
          OBSAIRTEMP       20- 22         (F3.0)
          MAXPANTEMP       24- 26         (F3.0)
          MINPANTEMP       27- 29         (F3.0)
                EVAP       30- 34         (F5.2)
            COMMENTS       35- 80

  PRECIP
       PRECIP CONTAINS THE PRECIPITATION DATA AT THE CENTRAL PLAINS EXPERIMENTAL
     RANGE, NUNN, COLORADO.  THE PRECIPITATION IS RECORDED DAILY IN INCHES.

  PRECIP IS FILE NUMBER     2 CONSISTING OF     373 RECORDS  WITH  80 CHARACTERS EACH

              0 CORRECTIONS.         0 HEADER RECORDS.        0 TRAILER RECORDS.

      DEFINED FIELDS     LOCATION          TYPE

                YEAR        1- 2          (I2)
               MONTH        3- 4          (I2)
                 DAY        5- 6          (I2)
                RAIN       11- 15         (F5.2)

  NEWFILE

  NEWFILE IS FILE NUMBER    3 CONSISTING OF      55 RECORDS  WITH  80 CHARACTERS EACH

              0 CORRECTIONS.         0 HEADER RECORDS.        0 TRAILER RECORDS.
```

HAWKDATA

THIS IS THE CUMULATIVE HAWK GROWTH DATA FROM BUTCH OLENDORFFS RESEARCH THE DATA WAS COLLECTED FROM 3 DIFFERENT SPECIES OF HAWKS AND 7 BIRDS PER SPECIES THE MEASUREMENTS WERE TAKEN DURING THE FIRST 50 DAYS OF GROWTH FOR EACH BIRD. EACH DATA CARD INCLUDES THE SPECIES THE MEASUREMENTS WERE RECORDED FROM, THE TYPE OF MEASUREMENT, THE AGE IN DAYS OF THE BIRDS AND THE RECORDINGS FOR EACH OF THE 7 BIRDS OF THE SPECIES. IF THE MEASUREMENT WAS NOT TAKEN FOR ONE OF THE BIRDS OF THAT SPECIES FOR THAT DAY, THE CORRESPONDING FIELD WILL BE BLANK. BELOW IS A LIST OF THE CODES USED FOR EACH OF THE MEASUREMENTS AND EACH OF THE SPECIES.

SPECIES CODES

RT	RED-TAILED HAWKS
FH	FERRUGINOUS HAWKS
SH	SWAINSONS HAWKS

PARAMETER CODES

6F	6TH PRIMARY FEATHER LENGTH
BW	BODY WEIGHT
FL	FEMUR LENGTH
CL	CRUS LENGTH
LT	LENGTH OF TARSUS AND TOE
LL	LENGTH OF LEG
TL	TARSAL LENGTH
L3	LENGTH OF 3RD TOE
HL	HUMERUS LENGTH
AL	ANTEBROCHIUM LENGTH
ML	MANUS LENGTH
WL	LENGTH OF WING
BD	BILL DEPTH
1C	LENGTH OF 1ST CLAW
2C	LENGTH OF 2ND CLAW
BL	BILL LENGTH
WH	WIDTH OF THE HEAD

HAWKDATA IS FILE NUMBER 4 CONSISTING OF 92 RECORDS WITH 80 CHARACTERS EACH

2 CORRECTIONS. 0 HEADER RECORDS. 0 TRAILER RECORDS.

DEFINED FIELDS	LOCATION	TYPE
PARAMETER	1- 2	(A2)
SPECIES	4- 5	(A2)
DAY	7- 8	(I2)
BIRD1	9- 16	(F8.1)
BIRD2	17- 24	(F8.1)
BIRD3	25- 32	(F8.1)
BIRD4	33- 40	(F8.1)
BIRD5	41- 48	(F8.1)
BIRD6	49- 56	(F8.1)
BIRD7	57- 64	(F8.1)
ID	1- 5	(A5)
BIRDS	9- 64	(7F8.1)

BUDGET02

BUDGET02 INCLUDES A LIST OF ALL INSTITUTIONS INVOLVED IN THE GRASSLANDS BIOME OF THE INTERNATIONAL BIOLOGICAL PROGRAM. WITH EACH INSTITUTION IS THE CODE NUMBER, THE BENEFIT AND OVERHEAD RATE, AND THE BASIS FOR CALCULATING THE OVERHEAD. THESE VALUES ARE USED BY THE BUDGET PROGRAM IN PREPARING THE BUDGET FOR EACH FISCAL YEAR. BUDGET02 IS PRODUCED BY A FORTRAN PROGRAM CALLED LISTER INSTITUTIONS AND RATES ARE CORRECT AS OF FEBR. 14, 1971. SEE BOB ROBINSON AT GERL FOR FURTHER INFORMATION.

BUDGET02 IS FILE NUMBER 5 CONSISTING OF 66 RECORDS WITH 133 CHARACTERS EACH

0 CORRECTIONS. 10 HEADER RECORDS. 0 TRAILER RECORDS.

DEFINED FIELDS	LOCATION	TYPE
NUMBER	2- 3	(I2)
INST	5- 34	(3A10)
CODE	35- 37	(I3)
BENEFITS	38- 49	(F12.4)
OVERHEAD	50- 63	(F14.4)
BASIS	72- 74	(A3)

*COPY BUDGET02

IBP--GRASSLANDS BIOME

BILLING INSTITUTIONS

UNIVERSITY	CODE	BENEFIT RATE	OVERHEAD RATE	BASIS FOR OVERHEAD
1 CSU ANIMAL SCIENCE	0	.0825	.5500	SWB
2 CSU ATMOSPHERIC SCIENCE	1	.0825	.5500	SWB
3 CSU BOT. AND PLT. PATH.	2	.0825	.5500	SWB
4 CSU ENTOMOLOGY	3	.0825	.5500	SWB
5 CSU FISH AND WILDLIFE	4	.0825	.5500	SWB
6 CSU MICROBIOLOGY	5	.0825	.5500	SWB
7 CSU RANGE SCIENCE	6	.0825	.5500	SWB
8 CSU RECR. AND WATERSHED	7	.0825	.5500	SWB
9 CSU ZOOLOGY	8	.0825	.5500	SWB
10 CSU COOP. WILDLIFE RES.	9	.0825	.5500	SWB
11 CSU AGRONOMY	10	.0825	.5500	SWB
12 CSU ENGINEERING RES. LAB	11	.0825	.5500	SWB
13 CSU RADIATION BIOLOGY	12	.0825	.5500	SWB
14 UNIV. OF LOUISVILLE	51	.0700	.5000	SW
15 UNIV. OF NORTHERN COLO.	52	.0750	.2888	SW
16 FT. HAYS KANSAS ST. COL.	53	.1000	.2830	SW
17 KANSAS STATE UNIVERSITY	54	.0980	.5110	SWB
18 MONTANA STATE UNIVERSITY	55	.0850	.4814	SWB
19 NEW MEXICO ST. UNIV.	56	.0500	.4100	SW
20 NO. DAKOTA ST. UNIV.	57	.1200	.2332	SW
21 SO. DAKOTA ST. UNIV.	58	.0830	.4406	SW
22 SO. COLORADO ST. COL.	59	.0700	.3020	SW
23 UNIVERSITY OF COLORADO	60	.0700	.4400	SW
24 UNIVERSITY OF DENVER	61	.0700	.6400	SWB
25 UNIVERSITY OF OKLAHOMA	62	.0700	.5670	SW
26 UNIVERSITY OF WYOMING	63	.0980	.4808	SW
27 TEXAS TECH	64	.0480	.3760	SW
28 OREGON STATE UNIVERSITY	65	.0700	.3849	SW
29 UNIV. OF CAL. AT BERKLEY	66	.1000	.4700	SW
30 UNIVERSITY OF MISSOURI	67	.0700	.5817	SW
31 UNIVERSITY OF KANSAS	68	.0700	.5282	SW
32 UNIVERSITY OF MONTANA	69	.0700	.4313	SWB
33 UNIVERSITY OF GEORGIA	70	.0700	.4530	SW
34 BATELLE MEMORIAL LAB	71	.0700	.7100	SWB
35 NORTH DAKOTA UNIVERSITY	72	.1200	.5405	SW
36 UNIVERSITY OF ILLINOIS	73	.0700	.5900	SW
37 LAWRENCE RADIATION LAB	74	.0825	.5500	SWB
38 UTAH STATE UNIVERSITY	75	.1000	.5500	SWB
39 CSU NAT. RES. ECOL. LAB.	99	.0825	.5500	SWB

2k.) This is a listing of the DATA file created by the *COPY command which is a reproduction of the output of the FORTRAN program.

The fourth run for the sample problem displays six different examples for the use of the select commands. The *COPY INPUT commands are used to prepare header records onto the DATA file for each of the six examples, and the *COPY SCRATCH commands are used to store the selected information onto the DATA file. The input deck is:

```
TA001,CM47000,...
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK(,,,,MYFILE)
REWIND(MYFILE)
COPYCF(MYFILE,OUTPUT)
7-8-9
*BANK IS ON TESTBANK FOR ROBINSON
*COPY INPUT
1  THE FIRST SELECTION WILL BE FOR 10 RECORDS FROM THE WEATHER FILE

*SELECT FROM WEATHER 10 RECORDS
*COPY SCRATCH
*COPY INPUT
1  THE SECOND SELECTION IS FOR ALL WEATHER RECORDS FOR THE MONTH OF JULY

*SELECT FROM WEATHER ALL RECORDS FOR WHICH MONTH IS EQUAL TO 7
*COPY SCRATCH
*COPY INPUT
1  THE THIRD SELECTION IS FOR ALL DATES THAT THE TEMPERATURE EXCEEDED 90 DEGREES

*SELECT FROM WEATHER ALL VALUES OF DATE FOR WHICH MAXAIRTEMP IS GREATER THAN 90
FOR COLUMNS 2 TO 9
*COPY SCRATCH
*COPY INPUT
1  THE FOURTH SELECTION IS FOR THE DATES DURING NOVEMBER AND DECEMBER THAT
 THERE WAS A RAIN

*SELECT FROM PRECIP ALL RECORDS FOR WHICH MONTH IS BETWEEN 11 AND 12
*SELECT FROM SCRATCH ALL OF COLUMNS 1 TO 6 FOR WHICH RAIN IS GREATER THAN 0.0
FOR COLUMNS 10,20
*COPY SCRATCH
*COPY INPUT
1  THE FIFTH SELECTION WILL BE FOR ALL NON-CSU INSTITUTIONS WHICH CALCULATE
 OVERHEAD ON THE BASIS OF SALARIES WAGES AND BENEFITS.

*SELECT FROM BUDGET02 ALL RECORDS FOR WHICH CODE IS BETWEEN 13 AND 98
*SELECT FROM SCRATCH ALL INST FOR WHICH BASIS IS EQUAL TO /SWB/ FOR COLUMNS 2 TO
31
*COPY SCRATCH
*COPY INPUT
1  THE SIXTH SELECTION WILL COMBINE THE TEMPERATURE RECORDS FROM WEATHER WITH
 THE RAINFALL RECORDS FROM PRECIP FOR THE MONTH OF JULY

*SELECT FROM WEATHER ALL VALUES OF COLUMNS 1 TO 22 FOR WHICH MONTH IS EQUAL
TO 7 FOR COLUMNS 2 TO 23
*SELECT FROM PRECIP ALL VALUES OF RAIN FOR WHICH MONTH IS EQUAL TO 7
FOR COLUMNS 30 TO 40
*COPY SCRATCH
6-7-8-9
```

```
                                                                                                                  000100    040357    032074    006263
CORE MAP  12.55.16.  NORMAL                CONTROL
        ---TIME---LOAD MODE --L1--L2-----TYPE--------------USER---++---CALL------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
        FWA LOADER  042756  FWA TABLES  036324
        -PROGRAM----ADDRESS-                    --LABELED---COMMON--
        BANK        000100
        INITIAL     010322
        COMMAND     010642
        WORD        011212
        RDWRMF      011620
        SKIPMF      011754
        COPDFDF     012067
        COPMFMF     012155
        COPDFMF     012252
        COPMFDF     012513
        CHECKIT     012725
        DESCRIB     013004
        DICTION     013671
        FINAL       014077
        ERRMESS     014471
        LOCATE      015705
        RELATE      016076
        FETCH       016452
        MATCH       016625
        STORE       017032
        READSF      017074
        PERMY       017160
        OPNIN       017547                          IOCS        017400
        GET         020050                          IOCS        017400
        PUT         020457                          IOCS        017400
        CLOSE       020777                          IOCS        017400
        RDERR       021225                          IOCS        017400
        TAPEIO      021262
        CHARS       022143
        NUM         022265
        CMPRF       022376
        EXAM        022437
        BYTES       022462
        SYSTEM$     022563
        ACGOER$     023566
        ENDFIL$     023601
        IFENDF$     023647
        INPUTB$     023726
        INPUTC$     024210
        INPUTS$     024334
        KRAKER$     024411
        OUTPTB$     026136
        OUTPTC$     026410
        REWINM$     026504
        CPC         026554
        KODER$      027024
        GETBA       030447
        SIO$        030466
        ----UNSATISFIED EXTERNALS-----                                  REFERENCES
        ABORT                                                             007215

MF1 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK
```

25.) This is the execution for the fourth run of the sample input problem. The order of the input deck is:

```
TABOT,CHA/DDD,...
ATTACH(BANK,BANK,ID=SWIFT,MR=1)
REDUCE.
BANK(...,MYFILE)
REWIND(MYFILE)
COPYCF(MYFILE,OUTPUT)
7/8/9
    commands for program BANK
6/7/8/9
```

```
*BANK IS ON TESTBANK FOR ROBINSON
MF1 HAS BEEN SELECTED AS THE MOST CURRENT VERSION OF THE BANK
*COPY INPUT
*SELECT FROM WEATHER 10 RECORDS
        10 RECORDS WERE SELECTED
*COPY SCRATCH
*COPY INPUT
*SELECT FROM WEATHER ALL RECORDS FOR WHICH MONTH IS EQUAL TO 7
        31 RECORDS WERE SELECTED
*COPY SCRATCH
*COPY INPUT
*SELECT FROM WEATHER ALL VALUES OF DATE FOR WHICH MAXAIRTEMP IS GREATER THAN 90
FOR COLUMNS 2 TO 9
        15 RECORDS WERE SELECTED
*COPY SCRATCH
*COPY INPUT
*SELECT FROM PRECIP ALL RECORDS FOR WHICH MONTH IS BETWEEN 11 AND 12
        61 RECORDS WERE SELECTED
*SELECT FROM SCRATCH ALL OF COLUMNS 1 TO 6 FOR WHICH RAIN IS GREATER THAN 0.0
FOR COLUMNS 10,20
         4 RECORDS WERE SELECTED
*COPY SCRATCH
*COPY INPUT
*SELECT FROM BUDGET02 ALL RECORDS FOR WHICH CODE IS BETWEEN 13 AND 98
        25 RECORDS WERE SELECTED
*SELECT FROM SCRATCH ALL INST FOR WHICH BASIS IS EQUAL TO /SWA/ FOR COLUMNS 2 TO
31
         7 RECORDS WERE SELECTED
*COPY SCRATCH
*COPY INPUT
*SELECT FROM WEATHER ALL VALUES OF COLUMNS 1 TO 22 FOR WHICH MONTH IS EQUAL
TO 7 FOR COLUMNS 2 TO 23
```

26.) *COPY INPUT copies header records from the input deck to the DATA file

27.) The program prints the number of records selected for each SELECT command.

28.) *COPY SCRATCH will transfer the selected information from the SCRATCH file to the DATA file.

31 RECORDS WERE SELECTED

*SELECT FROM PRECIP ALL VALUES OF RAIN FOR WHICH MONTH IS EQUAL TO 7

FOR COLUMNS 30 TO 40

31 RECORDS WERE SELECTED

*COPY SCRATCH

THE FIRST SELECTION WILL BE FOR 10 RECORDS FROM THE WEATHER FILE

23.) These pages display the listing of the DATA file which contains the information generated by the *SELECT and *COPY commands.

62470	1935	088	50	074	086	55	-.52		X	X	
62570	1900	089	57	079	085	57	-.49	X		X	
62670	1520	089	52	090	085	57	-.36	X		X	X
62770	1730	097	50	080	085	47	-.51		X	X	X
62870	1730	094	55	083	087	57	-.54		X	X	X
62970	1900	087	54	074	085	57	-.44		X	X	X
63070	1525	086	51	085	082	56	-.42	X		X	X
70170	1800	085	49	080	086	56	-.45		X	X	X
70270	1800	093	51	089			-.45		X	X	X
70370	1815	090	58	079			-.48		X	X	X

STORM IN FR. W

PAN THERM. BRK.

THE SECOND SELECTION IS FOR ALL WEATHER RECORDS FROM THE MONTH OF JULY

70170 1800 085 49 080 086 56	-.45	x x x	
70270 1800 093 51 089	-.45	x x x	PAN THERM. BRK.
70370 1815 090 58 079	-.48	x x x	
70470 1745 087 53 085	-.45	x x x	
70570 1730 090 54 079	-.36	x x x	
70670 1745 089 55 078	-.30	x x x x	RAINED THIS PM
70770 1745 083 58 070	-.36	x x x x	TRYING TO RAIN
70870 1745 087 54 083	-.34	x x x	
70970			NO DATA BUSY
71070 1745 091 55 085	-.67	x x	THUNDERING
71170 1840 091 56 069	-.39	x x x	
71270 1745 085 54 070	-.21	x x	RAINED
71370 1730 088 53 087	-.28	x x x x	
71470 1715 091 58 080	-.45	x x x	
71570 1700 083 47 082	-.36	x x x	COOLER TODAY
71670 1800 093 52 085	-.54	x x x	CALM BREEZE
71770 1800 092 55 085	-.29	x x x	
71870 1730 091 61 086	-.40	x x x	
71970 1730 086 45 072	-.40	x x x	COOL BRZ. -RAIN
72070 1710 085 57 076	+.01	x x x	
72170 1650 085 58 084	-.30	x x x	
72270 1800 085 58 068	-.15	x x x	LGT. SPRINKLE
72370 1715 083 58 075	-.45	x x x	
72470 1750 084 49 080	-.40	x x x	LOOKS RAINY
72570 1730 090 50 080	-.39	x x	
72670 1730 085 28 068	-.12	x x x x	
72770 1815 083 57 075		x x x	
72870 1715 085 53 080	-.15	x x x	
72970 1730 090 54 082	-.42	x x x	
73070 2010 090 54 069	-.41	x x x	
[illegible]	-.30	x x x	

THE THIRD SELECTION IS FOR ALL DATES THAT THE TEMPERATURE EXCEEDED 90 DEGREES

062770
062870
070270
071070
071170
071470
071670
071770
071870
080170
080270
080470
080570
080670
080870

THE FOURTH SELECTION IS FOR THE DATES DURING NOVEMBER AND DECEMBER THAT THERE WAS A RAIN

7011 6
7012 3
7012 5
701211

THE FIFTH SELECTION WILL BE FOR ALL NON-CSU INSTITUTIONS WHICH CALCULATE OVERHEAD ON THE BASIS OF SALARIES WAGES AND BENEFITS.

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THE SIXTH SELECTION WILL COMBINE THE TEMPERATURE RECORDS FROM WEATHER WITH
HE RAINFALL RECORDS FROM PRECIP FOR THE MONTH OF JULY

070170	1800	085	49	080	0.00
070270	1800	093	51	089	0.00
070370	1815	090	58	079	.18
070470	1745	087	53	085	0.00
070570	1730	090	54	079	0.00
070670	1745	089	55	078	0.00
070770	1745	083	58	070	0.00
070870	1745	087	54	083	0.00
070970					0.00
071070	1745	091	55	085	0.00
071170	1840	091	56	069	0.00
071270	1745	085	54	070	0.00
071370	1730	088	53	087	0.00
071470	1715	091	58	080	.20
071570	1700	083	47	082	0.00
071670	1800	093	52	085	.07
071770	1800	092	55	085	0.00
071870	1730	091	61	086	0.00
071970	1730	086	45	072	0.00
072070	1710	085	57	076	0.00
072170	1650	085	58	084	0.00
072270	1800	085	58	068	.74
072370	1715	083	58	075	0.00
072470	1750	084	49	080	0.00
072570	1730	090	50	080	.29
072670	1730	085	28	068	0.00
072770	1815	083	57	075	0.00
072870	1715	085	53	080	0.00
072970	1730	090	54	082	0.00
073070	2010	090	54	069	0.00
073170	1730	087	40	084	-0.00

List of Example Commands Accepted by INSTAR.

Maintenance commands.

```
*RESERVE AS FILEA
*RESERVE AS FILEB AFTER FILEA
*INSERT IN FILEA
*INSERT IN FILEA AFTER FILEA.123
*DELETE IN FILEA FILEA.12
*DELETE IN FILEA FROM FILEA.33 TO FILEA.162
*RESTORE IN FILEA FILEA.63
*RESTORE IN FILEA FROM FILEA.78 TO FILEA.172
*DESTROY FILEA
```

Descriptor commands

```
*LABEL COLUMN 4 AS FIELD1
*LABEL COLUMN 5 AS FILED2 TYPE IS (I1)
*LABEL COLUMNS 6 TO 10 AS FIELD3
*LABEL COLUMNS 11 TO 30 AS FIELD4 TYPE IS (2A10)
*FIRST RECORD IS A HEADER RECORD
*FIRST 10 RECORDS ARE HEADER RECORDS
*LAST RECORD IS A TRAILER RECORD
*LAST 35 RECORDS ARE TRAILER RECORDS
*NOTE
*DATA FOLLOWS
*DATA IS ON COMMON
```

Retrieval commands

```
*DISPLAY
*DESCRIBE FILEA
*DESCRIBE ALL FILES
*COPY INPUT
*COPY COMMON
*COPY SCRATCH
*COPY FILEA
*COPY FILEA FROM FILEA.1 TO FILEA.67
*SELECT FROM FILEA ALL RECORDS
*SELECT FROM FILEA 17 RECORDS
*SELECT FROM FILEA ALL RECORDS FOR WHICH FIELD1 IS EQUAL TO 123.67
*SELECT FROM FILEA 10 RECORDS FOR WHICH FIELD2 IS NOT EQUAL TO /BISON/
*SELECT FROM FILEA ALL VALUES OF FIELD1 FOR COLUMNS 1 TO 10
*SELECT FROM FILEA 10 VALUES OF FIELD1 WHICH ARE GREATER THAN 0.0
 FOR COLUMNS 11 TO 20
*SELECT FROM FILEA ALL VALUES OF FIELD1 FOR WHICH FIELD2 IS GREATER
 THAN OR EQUAL TO /MONTANA  / FOR COLUMNS 21 TO 30
*SELECT FROM SCRATCH ALL VALUES OF COLUMNS 31 TO 40 FOR COLUMNS 1 TO 10
*SELECT FROM FILEA 100 VALUES OF COLUMNS 31 TO 40 FOR WHICH FIELD2 IS
 BETWEEN /AAA/ and /MZZ/ FOR COLUMNS 11 TO 20
```

Miscellaneous Commands

```
*SUPPRESS LISTING
*SUPPRESS ABORT
*BANK IS ON BANKNAME FOR MYNAME
*CATALOG AS BANKNAME FOR MYNAME
```