T.A.B.S.

(TERMINAL ACCESSIBLE B.A.R.S.)

SYSTEM & PROGRAM DOCUMENTATION

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INTRODUCTION

The B.A.R.S. (Business Analysis & Research System) data base provides Marketing Research analysts in Bell Canada with a centralized source of data on all 500,000 business customers of Bell Canada. With increasing external pressure for competition in telecommunications, market research analysis of BARS data takes on added importance and urgency. Thus, the demand for analysis of BARS data has been requiring increasing Corporate System manpower to custom program the required retrievals and analysis, with turnaround acceptable to the end-users.

In an attempt to reverse the trend of allocating additional programmers for BARS analysis, TABS (Terminal Accessible BARS) was developed to give end-users of BARS direct access to the data.

TABS accomplishes this by allowing retrieval of customer data based on specific value ranges, input on-line by the end user, of most data items carried in the BARS data record. Simple logical expressions may also be specified to select individual customers based on equipment carried. The selected accounts can optionally be stored in a format accessible by SPSS, a standard statistical analysis package. Three standard reports can also be generated for any set of customers, to determine market characteristics. In this way, market segments of interest can be quickly isolated through TABS and analysed through the 3 standard reports and/or SPSS, to yield valuable market research information.

TABS is currently operational on the BNR computer facility (IBM 3033 with VM/370 and CP/CMS), and is written in FORTRAN. Total development costs for TABS were approximately twelve man months. During the first five months of availability, a total of approximately thirty five retrievals were performed by end-users through TABS, requiring approximately thirty five man-hours of end user effort (one hour per retrieval).

Using custom programming, the cost of these retrievals would be a minimum of thirty five man-weeks of programmer time (one week per retrieval).

While these thirty five retrievals represent relatively 'simple' BARS analysis, they still account for 15 - 20% of all analysis of BARS data. Thus, TABS development costs will be recovered during the first year of operation, while providing end-users with immediate turn-around for BARS Analysis for many applications.

To assist in reading the ensuing material, the report structure is indicated below:

Chapter 1, System Overview, is intended as a manager's summary, and gives two examples of how TABS is used to formulate and process two typical Market research analysis.

Chapter 2, System Description, is written for the System Analyst, and includes data base design considerations and a functional description of the system at the module level.

Chapters 3 and 4, Program Descriptions, are written for the maintenance programmer, and provide detailed descriptions at the program level.

Chapter 5, User Guide, is a self contained document intended for the end-user, and describes how each module of the System is invoked and what output to expect at each stage.

1.1 System Content

The BARS master file contains the following three groups of data for each of the approximately 500,000 business customers of Bell Canada:

i) Customer identification (telephone number, name and address) and related attributes (Long Distance Billing, Service and Equipment Billing, Type of Business, etc.).

ii) Description (Type of Service and size indicators) for the main system and for each secondary system rented by the customer.

iii) Descriptions (code, quantity and charge) for each piece of terminal equipment (USOC) which make up the the systems above.

Analysis of this data usually proceeds in two stages:

i) RETRIEVAL: Selection of customers based on, typically:
- Billing bands
- Type of business
- Type of systems
- Type of terminal equiment (type of USOC)

ii) REPORTING: Developing descriptive statistical profiles (histogram type of output) of the selected customers, or printing all information stored for each selected customer. These profiles and print-outs are particularly useful in determing existing market characteristics, and for tracking market penetration of specific services or equipment over time.

1.1 System Content (Cont'd)

In the next section we give two examples of BARS data analysis using TABS. Example One involves selection of customers based on type of equipment rented, and outputs all information stored for each customer. Example Two involves selection of customers based on main system type of service (type of system), and outputs a histogram type of report, plotting the number of customers in various categories, for the selected customers.

1.2 Two Typical BARS Analysis using TABS

Market Research Analysts request data retrieval and report generation from the BARS files to give them an accurate picture of the existing market, assist in sales promotions, etc. Two typical analysis are:

i) What are the business categories i.e. UCB codes (are they doctors, bakers, etc.) of customers in Toronto area who rent BELL-BOY (a paging device) equipment; and what other equipment do they rent?

ii) How many customers use "push-button" services, and what is the distribution of their monthly service and equpiment billing?

Using custom programming, each of these retrievals would take one to two weeks to complete, from end-user's inception to developing and implementing the programs and delivering the results back to the end-user. Approx. 20-30% of this time would be administrative overhead. Using TABS, however, the end-user could formulate his query within minutes, and receive his results the next day at the latest. Let us now see how an end-user would use TABS to implement each of the above two analysis.

1.2.1 Example 1

What is the business category i.e. UCB code of customers in Toronto Area who rent BELL-BOY equipment; and what other equipment do they rent?

The end-user would use three modules of TABS to implement this retrieval. First the SELECT module defines the customers he wishes to select (BELL-BOY users in Toronto). Then, the EXTRACT module extracts, from a master file, the customers defined in SELECT. Lastly, the PRINT module prints all the extracted customers. The print-out would include the UCB code (representing the business category) and detailed descriptions of all equipment for each customer.

To use these three modules of TABS the end-user executes the following sequence of steps:

i) Logs on to the BNR computer.

ii) Enters the command LINKTABS to link to the TABS programs and data.

iii) Enters the command SELECT to invoke the SELECT module and initiate this selection process. A menu of twelve keywords appears on the screen. Each of the keyword represents a data item for which he can specify values based on which customers are to be selected. Here, he enters the keyword USOC (to select cutomers who rent specific equipment). The program prompts him for a boolean expression of USOC codes. Since BELL-BOY equipment is represented by the three different codes BB4X1, BB4X5 and BB4X7, he enters the expression (BB4X1 or BB4X5 or BB4X7).

- The menu of keywords reappears on the screen.

1.2.1 Example 1 (Cont'd)

- He enters the keyword AREA, and when prompted further, enters the numeric code for Toronto Area.

  (Note: The keywords USOC and AREA could have been selected in any order. All keywords selected are applied conjunctively to select customers).

- The menu of keywords reappears on the screen.

- Since no further selection is required, the user enters the keyword END.

- The specified criteria are now automatically saved in a disk file with a user selected name (e.g. RUN1). He may use these criteria immediately or anytime in the future for the succeeding EXTRACT phase.

iv) Enters the command EXTRACT to invoke the EXTRACT module, and is prompted for:

- The name of the file containing his selection criteria (RUN1).

- The name of the master file from which he wants customers extracted (e.g. DEC75MASTER).

- A name for the file where the extracted customers are to be saved (e.g. CUST1).

The program then transfers execution of the job to the batch monitor and instructs the user to sign on later in the day to determine if his job has been processed. On job completion, all Toronto

1.2.1 Example 1 (Cont'd)

customers of BELL-BOY equipment will be saved in file CUST1.

v) Logs on later in the day, and if the job has been processed, re-enters the command LINKTABS.

vi) Enters the command PRTTAB to invoke the PRINT utility, and is prompted for:

- The name of the file he wants printed (CUST1).

vii) All customers in file CUST1 (i.e. Toronto customers of BELL-BOY equipment) are accordingly printed. The computer center staff mails the print-out directly to the user. The print-out contains the business category (UCB code) and descriptions of all equipment for each customer in CUST1. Barring computer facility breakdowns, the user completes his retrieval in a maximum of two days elapsed time, with less than one man-hour effort.

1.2.2 Example 2

How many customers use 'push button' services, and what is the distribtion of their monthly service and equipment billing?

Here again the end-user would use three modules of TABS to implement his retrieval. First, the SELECT module defines the customers he wishes to select ('push button users'). Then, the EXTRACT module extracts, from a master file, the customers defined in SELECT. Lastly, the STATS module plots number of customers in various categories, including bands of monthly service and equipment billing. This report gives him an accurate

1.2.2 Example 2 (Cont'd)

picture of the existing 'push-button' market. To use these three modules, he executes the following sequence of steps:

i) Logs on to the BNR computer.

ii) Enters the command LINKTABS.

iii) Enters the command SELECT to invoke the SELECT module.

- A menu of twelve keywords appears on the screen.

- Since 'push-button' users are identified by the Main System Type of Service data field, he enters the keyword TYPSERV. When prompted further, he enters the numeric range 190-192, which identifies 'push-button' customers.

- The menu of keywords reappears, and he enters the keyword END.

- The selection criteria are once again automatically saved in a disk file with a user selected name (e.g. RUN2).

iv) Enters the command EXTRACT, and as in Example 1, is prompted for:

- The name of the file where his selection criteria are saved (RUN2).

- The name of the master file from which customers are to be extracted (e.g. JUNE78MASTER).

1.2 Two Typical BARS Analysis using TABS (Cont'd)

1.2.2 Example 2 (Cont'd)

- A name for the file where the extracted customers will be saved (e.g. CUST2).

v) As in Example 1, on completion of job EXTRACT, all selected customers ('push-button' users) will be saved in file CUST2.

vi) Enters the command STATS to invoke the STATS module, and is prompted for:

- The name of the file where the selected customers have been saved (CUST2).

vii) A histogram type report describing 'push-button' customers is accordingly printed and mailed by the Computer Centre directly to the end-user. Once again, the end-user has the desired information in a maximum of two days elapsed time, with less than one man-hour of effort.

1.3 Additional Features of TABS

Occassionally, end-users may have a need to do more complex statistical analysis of selected market segments (customers saved in files CUST1 or CUST2 in our two examples). TABS incorporates two modules that convert any set of customers (CUST1 or CUST2) into a format accessible by SPSS, a standard statistical analysis package, which may then be used to further analyse the data. The essential requirement of this conversion process is a method to convert the variable length information content of a BARS record (customer), to a fixed length format, which then makes the data accessible to SPSS.

1.3 Additional Features of TABS (Cont'd)

Module SELSPSS (SELECT SPSS) assists (by prompting) the user in specifying this conversion method; and module EXTSPSS (EXTRACT SPSS) processes the data records to convert them to fixed length format, using paramters supplied in SELSPSS. Some loss of customer information does occur in this conversion, but a fair amount of complex statistical analysis can still be done accurately, should the need arise. In the first five months of TABS availability, users have generaly stayed away from this feature, primarily for three reasons:

- The PRINT and STATS modules usually provide all the information needed.
- SPSS is relatively complex to use.
- A high level of statistical knowledge is required to correctly interpret most SPSS output.

However, the capability exists, and can be used to good advantage when required.

1.4 Data Base Techniques

Two different techniques of data representation are briefly discussed here: Hierarchical and Relational.

The Hierarchical approach is an historically popular one, and the data model in this approach closely resembles the hierarchical 'real world' it seeks to represent. Consider a BARS customer record in hierarchical form:

Cust. I.D.		System		USOC (Equipment)	
Tel. No.	Name & Address	Sys. No.	Sys. Type	Code	Qty
487-3072	Al's Bakery	1	200	A11	2
				A12	3
	Mtl.	2	150	A21	5

In this hierarchical representation, as in the real-world, USOC's are owned by systems, and systems are owned by customers. This information about the data structure is stored as part of the data on secondary storage. The main drawback of the hierarchical approach is the unnecessary complexity involved in retrieving or updating the data.

The relational approach is relatively recent (1970), and is based on the mathematical theory of relations. This provides a sound theoretical foundation and allows the direct application of all the results of relational theory to, for example, the problems of data retrieval specificaton. Central to the relational approach is the concept of normalization of the data base. This essentially involves casting the data into a tabular form. Data can be normalized to three different levels: 1NF (First Normal Form), 2NF (Second Normal Form) and 3NF (Third Normal Form). The previous example, in 1NF, would look as follows.

Cust. I.D.		System		USOC (Equipment)	
Tel. No.	Name & Address	Sys. No.	Sys. Type	Code	Qty
487-3072	Al's Bakery	1	200	Null	Null
487-3072	Al's Bakery	1	Null	A11	2
487-3072	Al's Bakery	1	Null	A12	3
487-3072	Al's Bakery	2	150	Null	Null
487-3072	Al's Bakery	2	Null	A21	5

3NF essentially involves factoring out the repeating groups of data (systems and USOC's) into separate relations (tables), and provides the advantages of increased simplicity for both data retrieval and data updates. The above data, in 3NF, would look as follows:

Relation CUST

Tel. No.	Name & Address
487-3072	Al's Bakery, Mtl

Relation SYSTEM

Tel. No.	Sys. No.	Sys. Type
487-3072	1	200
487-3072	2	150

Relation USOC

Tel. No.	Sys. No.	USOC Code	USOC Qty
487-3072	1	A11	2
487-3072	1	A12	3
487-3072	2	A21	5

Two of three data bases available through TABS utilize 3NF representation of data.

CHAPTER 2. SYSTEM DESCRIPTION

2.1 OBJECTIVES

TABS is designed to allow end-users of BARS data to have direct access to the BARS data base. The objectives of TABS were:

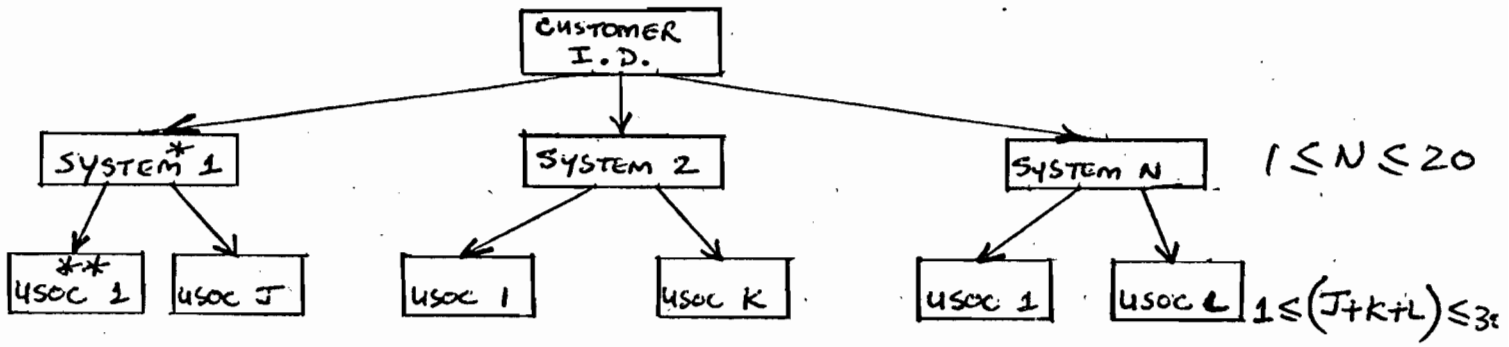
1. Allow end-users to isolate market segments (ie. extract sub-sets of BARS Accounts) of interest to a specific analysis.

2. Store the extracted accounts in a format accessible by SPSS, a standard statistical analysis package.

3. Provide the capability to produce three pre-defined standard reports to assist the user in examining and analysing the extracted accounts.

2.2 FILE REQUIREMENTS AND DESIGN CONSIDERATIONS:

The BARS master file contains data (identification, billing information and equipment descriptions) for each of the 500,000 business customers of BELL CANADA. The data structure describing each customer is:



* SYSTEM: An entity describing a collection of equipment (e.g. PBX System) (System 1 is designated as the customer's main system. Others are secondary systems).

** USOC: Universal Service Order Code. A standard industry alphanumeric (5-digits) code representing a piece of terminal equipment (e.g. Contempra phone).

The approach prior to TABS has been to store this data in one hierarchical file, with one logical record (data for one customer) equivalent to one physical record (variable length). The hierarchical record contains three types of information:

i) Customer I.D. and attributes related to the whole customer.

ii) Repeating groups of System descriptions.

iii) Repeating groups of USOC data.

Apart from the complexity inherent in a physical hierarchical representation (pointers to data), the main drawback is that each program accessing this file must scan all the data pertaining to each customer, regardless of the data requirements of the retrieval. This drawback motivated the design of a relational BARS data base for TABS. Four relations in 3NF were designed to take advantage of the partial data access requirements of most retrievals.

Since the BARS master file is recreated each quarter from other mechanized sources, no updating of existing files is required. Future introduction of error-correction routines for existing data files will exploit all the advantages of the 3NF approach. For the present, increased simplicity and the advantages of accessing only that data relevant to each retrieval are considered sufficient to justify the use of relational concepts.

Four files were created to implement the four relations that describe each customer (primary keys underlined):

2.2 FILE REQUIREMENTS AND DESIGN CONSIDERATIONS: (Cont'd)

i) File ACCT:
Relation ACCT (Tel. No., S&E Bill, LD Bill, Related Data)

ii) File CUST:
Relation CUST (Tel. No., Name and address)

iii) File SYS:
Relation SYS (Tel. No., Sys. No., Type of Service, Related data)

iv) File USOC:
Relation USOC (Tel. No., Sys. No., USOC code, USOC qty, Related data)

Note that Relation CUST could have been merged with Relation ACCT with no loss of normalization. However, since customer name and address is accessed infrequently, it was decided to store it independantly.

Due to the following computer centre hardware resource and operating system (CP/CMS) limitations:

- max. two tape drives per job
- limited disk space per data file

only two subsets of BARS data are stored (separately) on disk, using 3NF. The two subsets are:

i) A 5% uniform random sample of all business customers (approx. 25,000 accounts), regenerated every quarter.

ii) Accounts representing the PBX market (approx. 22,000 accounts). These are accounts whose main system Type of Service value lies in the range 1 to 178 (which identifies a PBX customer). Since PBX

2.2 FILE REQUIREMENTS AND DESIGN CONSIDERATIONS: (Cont'd)

ii) (Cont'd)
users are usually 'big business' customers, they are likely to be of more frequent interest for market analysis.

An example of the record contents of the 3NF files, which applies to both the above bases, is given below:

Relation ACCT (Tel. No., S&E Bill, LD Bill, Related data)

ACCT

TEL. NO.	S&E BILL	LD BILL	RELATED DATA
514-282-6610	10	15	- - -
514-487-3072	25	50	- - -

Relation CUST (Tel. No., Name and address)

CUST

TEL. NO	NAME & ADDRESS
514-282-6610	AL's BAKERY, MTL.
514-487-3072	THE SPORT SHOPPE, MTL.

Relation SYS (Tel. No., Sys. No., Type of Service, Related data)

SYS

TEL. NO.	SYS. NO.	TYPE OF SERVICE	RELATED DATA
514-282-6610	1	122	- - -
514-282-6610	2	205	- - -
514-487-3072	1	194	- - -

Relation USOC (Tel. No., Sys. No. USOC code, USOC qty, Related data)

USOC

TEL. NO.	SYS. NO	USOC CODE	USOC QTY	RELATED DATA
514-282-6610	1	U11	2	- - -
514-282-6610	1	U12	3	- - -
514-282-6610	1	U13	1	- - -
514-282-6610	2	U21	4	- - -
514-487-3072	1	UU11	5	- - -
514-487-3072	1	UU12	2	- - -

Detailed Record Layouts are attached in Appendix 2.

The full BARS file (approx. 500,000 accounts) is available on magnetic tapes for access through TABS, but uses a different file format. This results in three distinct data bases (5% sample, PBX, Full base) being available for access through TABS each quarter. The full BARS base merges the four relations described earlier onto one file. Tuples for each customer from relations ACCT, CUST, SYS and USOC are stored sequentially, in that order. A Record Type field is added to each tuple so that programs accessing the data can correctly interpret the record format.

Record contents in the full BARS base format, for the above 3NF example, are as follows:

	TEL. NO.	RECORD TYPE				
	514 282-6610	A	10	15	---	
	514 282-6610	C	AL's BAKERY, MTL			
CUSTOMER	514 282-6610	S	1	122	---	
1	514 282-6610	S	2	205	---	
	514 282-6610	U	1	411	2	---
	514 282-6610	U	1	412	3	---

	TEL. NO.	RECORD TYPE				
CUSTOMER 1	514 282-6610	U	1	U13	1	
(Cont'd)	514 282-6610	U	2	U21	4	
CUSTOMER 2	514 487-3072	A	25	50	---	
	514 487-3072	C	THE SPORT SHOPPE, MTL.			
	514 487-3072	S	1	194	---	
	514 487-3072	U	1	UU11	5	---
	514 487-3072	U	1	UU12	2	---

NOTE: Record Type 'A' denotes a tuple from Relation ACCT
Record Type 'C' denotes a tuple from Relation CUST
Record Type 'S' denotes a tuple from Relation SYS
Record Type 'U' denotes a tuple from Relation USOC

Detailed Record Layouts are attached in Appendix 3.

Each of the three data bases (5% sample, PBX, Full base) are regenerated each quarter and given distinct names. The list of names of the Data bases available for data retrieval is made available interactively to the end-user. He selects the data base he wishes to retrieve customers from by indicating the appropriate name, when prompted for it by Module Extract (Section 2.3.2).

Since the data-bases available through TABS use two different formats (3NF for 5% sample and PBX; merged records for the full BARS file), two sets of programs are used to access the data bases. However, the functions performed by each module of TABS are identical for both sets of programs. In the next section, System Functions, we will discuss the functions performed by each module, and this applies to both sets of programs.

Detailed program descriptions are given in Chapters 3 (3NF format) and 4 (full BARS format).

2.3 SYSTEM FUNCTIONS

TABS is composed of seven modules (or phases). The seven modules are: SELECT, EXTRACT, STATS, PRTTAB, FREQ, SELSPSS and EXTSPSS. Figure 1 is an overall System Diagram that depicts the interaction between modules SELECT, EXTRACT, SELSPSS and EXTSPSS. The functions performed by each of these modules are now discussed. Modules STATS, PRTTAB and FREQ are utility modules, and their functions are also described below.

2.3.1 SELECT

This is an interactive program invoked by entering the command SELECT. It presents the user with a menu of twelve keywords. Each keyword represents a BARS data item for which value ranges may be selected to define customers to be retrieved. User selection of a keyword initiates a specific prompting sequence which helps the user enter the appropriate value ranges. The twelve keywords supported are classified below by relation and the corresponding data item (refer BARS Data Dictionary, Appendix 1) is also given:

RELATION	KEYWORD	CORRESONDING DATA ITEM
ACCT	NPANNX	NPA-NNX
	TELNOS	NPA-NNX-LINE NO.
	SEBILL	Service & Equipment Bill
	LDBILL	Long Distance Bill
	UCB	Universal Classification of Business
	NOSYS	No. of Systems
	AREA	Area
	SAMPLE	- (Uniform random sampling)
CUST	NAME	Name and address
SYS	TYPSER	Main System Type of Service
	LINES	14 Line Size values
USOC	USOCS	USOC code and quantity

SYSTEM FLOW CHART

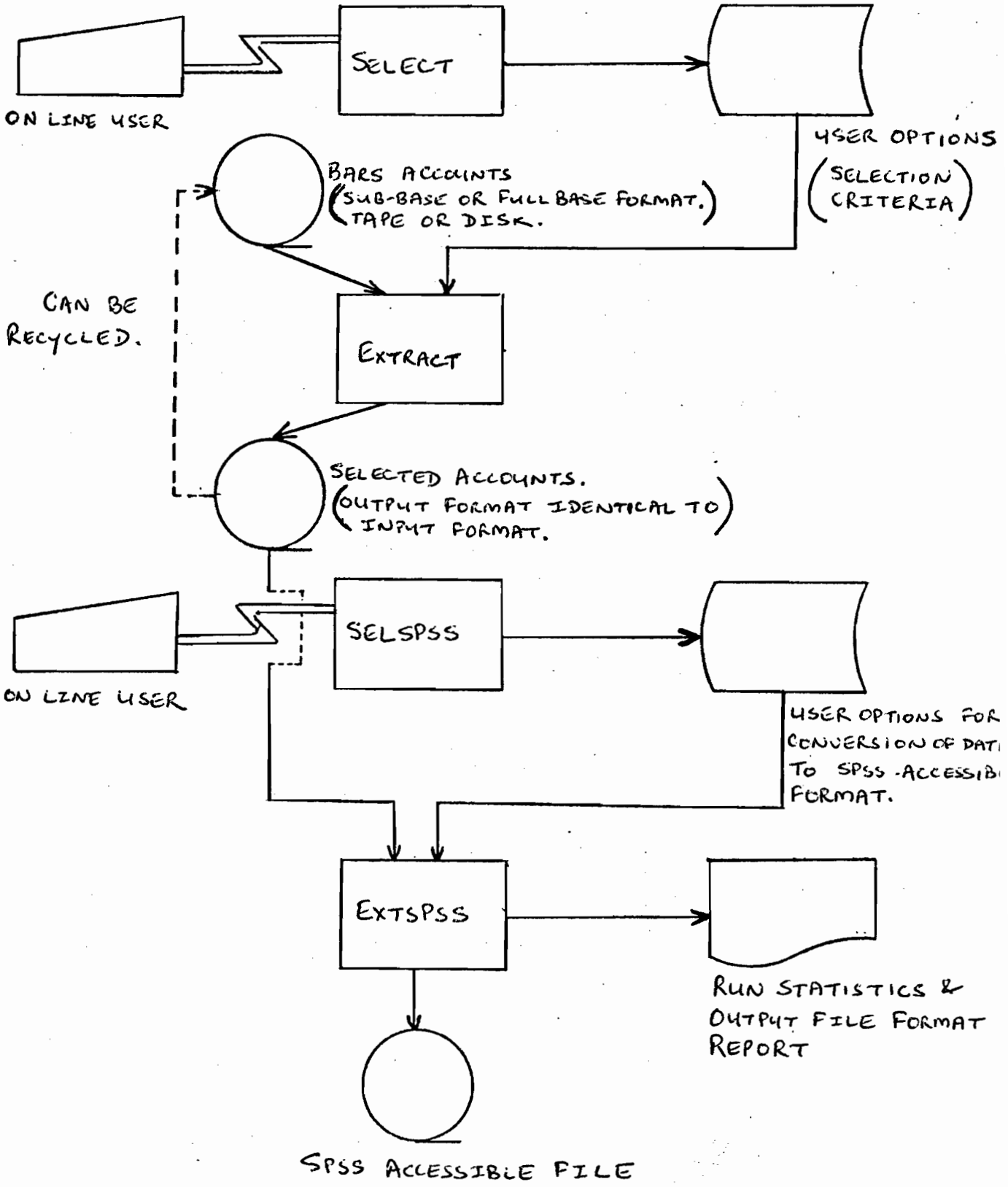


FIGURE 1

2.3.1 SELECT (Cont'd)

Two special keywords, HELP and END, are used, respectively, to ask for more detailed prompting; and to terminate a selection session.

Any combination of the above twelve keywords may be used. They are applied conjunctively to retrieve customers in the succeeding EXTRACT phase. The output of the SELECT phase is a disk file containing the user selected keywords and the corresponding value ranges selected. Refer to the two examples in section 1.2 for a description of how SELECT is used.

2.3.2 EXTRACT

This module is invoked by entering the command EXTRACT. It prompts the user for

- The name of the file where the selection criteria are saved.
- The name of the master file from which customers are to be retrieved.
- A name for the file where the retrieved customers are to be saved.

Customers meeting all selection criteria are accordingly retrieved and saved in exactly the same format as the input master file. This allows the user to 'recycle' selected customers, i.e. he can apply a new set of selection criteria to a subset of customers produced by a previous EXTRACT.

Refer to Section 1.2 for an example of how EXTRACT is used.

2.3.3 STATS

This module is invoked by entering the command STATS. It is a specialised histogram module which plots the number of customers in various categories, and provides other descriptive statistics for any given set of customers. The user is prompted fo the name of the filer where his customers are saved, and the report is accordingly printed. A sample report is attached in Appendix 4. An example of STATS usage is given in Section 1.2.2

2.3.4 PRTTAB

Another utility module, invoked by entering the command PRTTAB. It functions as a print utility, which prints all data items for each customer in a user specified file. The user is prompted for the name of the file he wants printed. Sample output is attached in Appendix 5. An example of PRTTAB usage is given in Section 1.2.1.

2.3.5 FREQ

A third utility module, invoked by entering the command FREQ. It prints a report containing the frequency of occurrence (customer tally) for each unique USOC code found in a user specified file, and also gives the total quantity (across customers) of each USOC code. This report assists the user in identifying relative usage of different terminal equipment; and also in tracking usage of given equipment over time.

As for the other two utility modules, STATS and PRTTAB, this module also prompts the user for the name of the file where his customers are saved, and the report is accordingly printed. A sample report is attached in Appendix 6.

2.3.6 SELSPSS

As discussed earlier, each BARS customer is represented by a variable amount of information. This consists of fixed length information (Relation ACCT), system descriptions of a variable no. of systems (Relation SYS), and USOC descriptions of a variable no. of USOCS (Relation USOC). (Relation CUST i.e. name and address, is of no interest to SPSS analysis, and thus not discussed here).

SPSS can only access and analyse data where each customer (case) has data of identical format and lenght. Thus, the user requires some means of translating the variable length customer information into fixed length information. Module SELSPSS assists him in specifying the parameters required for this conversion. To do this, it requires two parameters from the user:

One, a list of USOC code for which he wants information carried over to the SPSS accessible data file; Two, whether he wants to retain system descriptions of only the 'main system', or 'main system' plus an aggregate description of any 'secondary systems' for each customer. The fixed length portion of each customer's data (Relation ACCT) is always carried over to (is retained in) the SPSS accessible data file.

The two parameters above allow the construction of an equal number of fixed length records for each customer (case), and thus makes the data available for SPSS analysis. The output of SELSPSS is a disk file containing the user specified values of these two parameters.

To continue the example of Section 1.2.2, our user has saved all 'push-button' customers in file CUST2. He now wishes to analyse this data using SPSS. He

2.3.6 SELSPSS (Cont'd)

enters the command SELPSS; is prompted for a list of USOC codes and responds (for example) with the list U1, U2, U3. He is then prompted for the system descriptions he wishes to retain and responds with 'main system'. (i.e. he does not wish to analyze any secondary system data).

These value selections imply that the SPSS accessible data file (to be created by the next module, EXTSPSS), will contain, for each customer:

- One record containing all domains of Relation ACCT.
- One record containing quantities and charges for the USOC codes U1, U2 and U3, in that order (data taken from Relation USOC).
- One record containing a description (Relation Sys) of the 'main system'.

The values selected for the two parameters are automatically saved in a disk file with a user selected name (e.g. RUN3). The next module, EXTSPSS, will use this option file (RUN3), and the data file (CUST2), to construct SPSS accessible data records for 'push-button' customers.

2.3.7 EXTSPSS

To continue our example of SELSPSS above, the user invokes this module by entering the command EXTSPSS, and is prompted for:

2.3.7 EXTSPSS (Cont'd)

- The name of the file where his options are stored (RUN3).

- The name of the file containing the customer data to be converted to an SPSS accessible format (CUST2).

- A name for the file where the SPSS accessible data records are to be saved (e.g. CUST2SPSS).

Data on all 'push-button' customers (i.e. file CUST2) is accordingly converted to an SPSS accessible format and saved in file CUST2SPSS. Each customer is represented in file CUST2SPSS by three fixed length records, as indicated in SELSPSS above. Two reports are also produced for the user; one contains a few processing statistics (no. of accounts input and output (always equal) and options in effect). The other describes the format of the output file (CUST2SPSS) in a manner convenient for translation into SPSS data definition control cards.

At this stage i.e. after EXTSPSS, the user exits the TABS environment. He now has the desired subset of BARS customers in a format accessible by SPSS, which he now uses for statistical analysis of the data.

Each of the above seven modules is interactive. Each is invoked by entering the appropriate name, and the programs prompt the user for the relevant parameters, data file names and I/O devices, etc. The user is also instructed at the end of each module how to proceed to the next module, making TABS 'easy-to-learn', without the cost of formal instruction.

CHAPTER 3. PROGRAM DESCRIPTIONS - SUB BASE ACCESS

This chapter describes the TABS programs which are used to access the BARS data stored in sub-base format (3NF). The programs are classified here by the TABS phase which they belong to. (The 7 phases of TABS are described in Chapter 2, System Descriptions.) The programs are described here, by phase, in the following standard format:

(i) List of programs comprising the phase

(ii) Schematic showing Input & Output files

(iii) Description of Input Files

(iv) Description of Output Files

(v) Program Descriptions (Narrative).

3.1 SELECT

3.1.1 This phase is comprised of the following program and subroutines.

(i) SELECT EXEC
(ii) NEGIN EXEC
(iii) TABSEL FORTRAN (MAIN)
(iv) SUBROUTINE REVIEW
(v) SUBROUTINE TRANS
(vi) SUBROUTINE NPANNX
(vii) SUBROUTINE NOSYS
(viii) SUBROUTINE AREA
(ix) SUBROUTINE UCB
(x) SUBROUTINE LDBILL
(xi) SUBROUTINE SEBILL
(xii) SUBROUTINE SYSTYP
(xiii) SUBROUTINE LINES
(xiv) SUBROUTINE USOCS

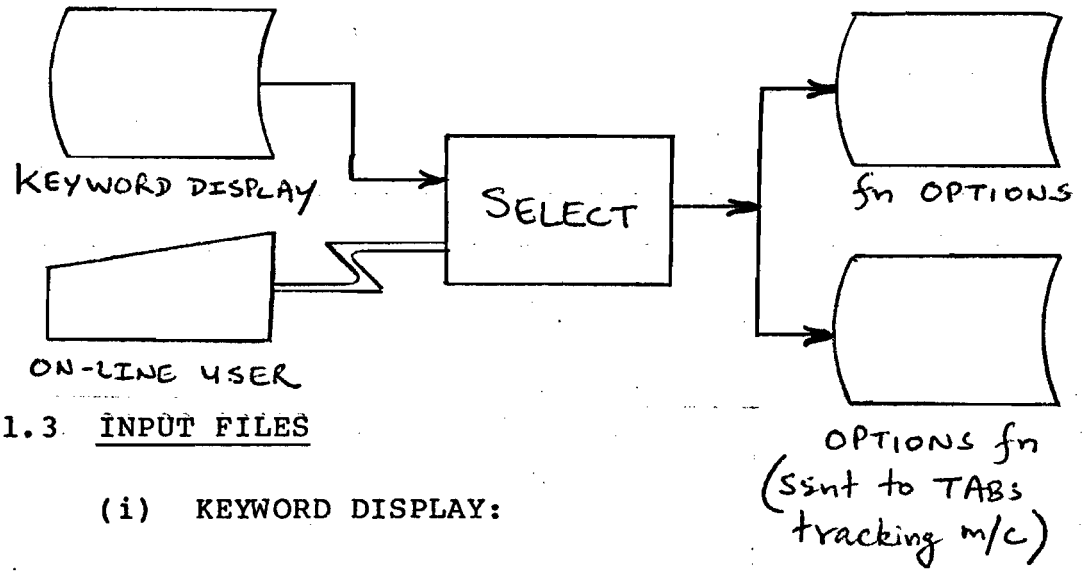
3.1 SELECT (Cont'd)

3.1.1 (Cont'd)

(xv) SUBROUTINE TELNOS
(xvi) SUBROUTINE NAME
(xvii) SUBROUTINE SAMPLE
(xviii) SUBROUTINE DESCRP
(xix) SUBROUTINE SECUR
(xx) SUBROUTINE TEMOPT

A chart showing the calling sequence is attached overleaf.

3.1.2 SCHEMATIC SHOWING INPUT & OUTPUT FILES FOR PHASE SELECT

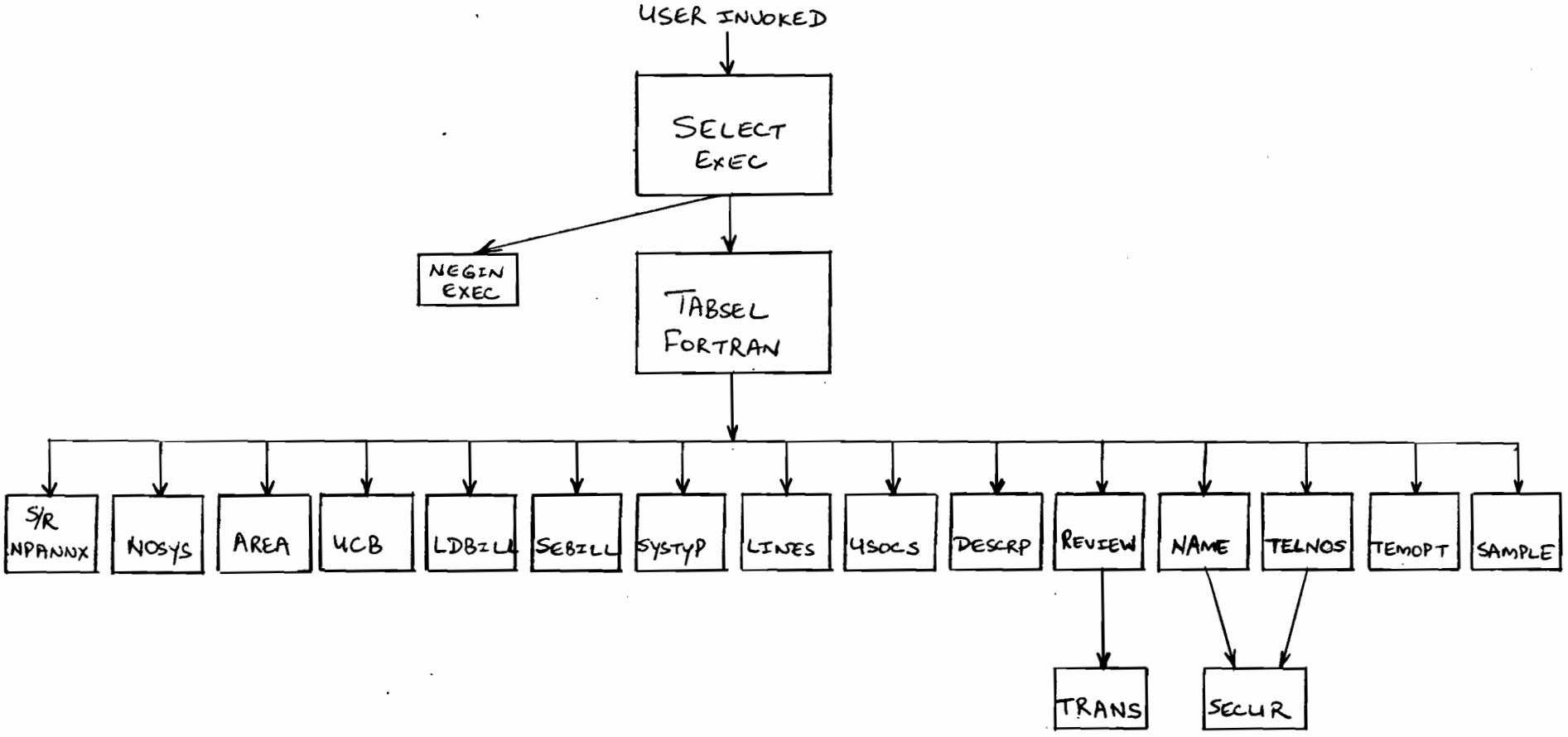


2.1.3 INPUT FILES

(i) KEYWORD DISPLAY:

LRECL = 80
RECFM = F
DSORG = SEQUENTIAL
LOCATION: CBS02 191 (A-DISK)

This file contains descriptive text for each of the 10 keywords for which the TABS user can enter selection criteria. It is useful for new users to ask for descriptions of the keywords before he specifies selection criteria. The descriptions are taken from this file.



MODULE SELECT: PROGRAM STRUCTURE CHART

3.1.3 INPUT FILES (Cont'd)

File Format

Col 1 - 2 : Numeric identifier of keyword
Col 3 - 80: Descriptive text.

Numeric identifiers are assigned as follows:

Numeric Identifier	Keyword
01	NPANNX
02	SEBILL
03	LDBILL
04	UCB
05	NOSYS
06	SYSTYPE
07	LINES
08	USOC
09	AREA
10	SAMPLE

A keyword may have any number of lines of text associated with it as long as the first 2 columns contain the correct numeric identifier. The file is sorted in order of numeric identifiers.

3.1 SELECT (Cont'd)

3.1.4 OUTPUT FILES

(i) OPTIONS fn.

fn above is replaced by a user supplied name for the option file.

LRECL = 80
RECFM = F
DSORG = SEQUENTIAL
LOCATION = USER'S 191 (A-DISK)

This file is a readable report of the option (selection criteria) selected by the user. It is sent to a central tracking machine (CBS01) for TABS usage tracking purposes and erased from the user's A-disk.

3.1 SELECT (Cont'd)

3.1.4 OUTPUT FILES

(ii) fn OPTIONS.

fn above is again replaced by a user supplied name for the option file.

LRECL = 80
RECFM = F
DSORG = SEQUENTIAL
LOCATION = USER'S 191 (A-DISK)

This is a coded version of the selection criteria entered by the user. It will be used by the EXTRACT phase later to extract accounts from specified data files. It contains exactly the same information as the file OPTIONS fn described on the previous page.

3.1.5 PROGRAM DESCRIPTIONS

3.1.5.1 SELECT EXEC

(i) Prompt user for option file name.
(ii) Invoke NEGIN EXEC to determine if user entered a negative number. If yes, then exit process; else continue with step (iii).
(iii) LOAD & execute Program TABSEL.
(iv) SEND file OPTIONS for to CBS01 for Tracking purposes.
(v) EXIT.

2.1.5.2 NEGIN EXEC

The EXEC is called by many other EXEC's besides SELECT to determine if a user has entered a negative number in response to a

3.1.5.2 NEGIN EXEC (Cont'd)

prompt. (This would indicate that he wished to ABORT or EXIT the process). It implements the following logic:

(i) Read user response from input stack. (It must be placed there by the calling EXEC).
(ii) Determine Data type of user response.
(iii) If datatype is CHARACTER, place the number 1 in the input stack (for the calling EXEC) & return control to the calling EXEC.
(iv) If datatype is NUMERIC, determine if it is LT ZERO.
(v) If LT ZERO, place the number zero in the input stack, issue a message to the user that he is existing from the process, & return control to the calling EXEC.
(vi) If GR ZERO, place the number one in the input stack (indicates that processing is to continue) & return control to the calling EXEC.

3.1.5.3 TABSEL FORTRAN

This is the main FORTRAN program of the SELECT phase. It is interactive and implements the following algorithm:

(i) Prompt & validate user I.D.
(ii) If i.d. is invalid, then print message & terminate execution, else continue.

(iii) Prompt user for option. The option can be one of 12 keywords commands; one of 10 display keyword commands; one of 11 change keyword commands; HELP; REVIEW; or END.

(iv) If option is invalid, issue message & go to step (iii).

(v) If option is END, go to step (xi).

(vi) If option is REVIEW, call subroutine REVIEW to list (at the terminal) the selection criteria that the user has specified thus far in the session and go to step (iii).

(vii) If option is HELP, then issue detailed instructions to user indicating what he is to do next and go to step (iii).

(viii) If option is a display keyword command, call Subroutine DESCRP to display textual information about the specified keyword. Then go to step (iii).

(ix) If option is a valid keyword command, invoke the appropriate keyword subroutine to prompt the user for his selection criteria for that keyword. (Each keyword subroutine is described briefly later in this chapter). Then go to step (iii). (Note: Keywords TELNOS & NAME, when entered, will be followed by a prompt for a special password for security

(ix) (Cont'd)
reasons. This password is JOLLY. Also, keyword TELNOS can only be specified in conjunction with keyword NAME or as a stand-alone option only).

(x) If option is a valid change keyword command, invoke the appropriate keyword subroutine as in step (ix) above. That is, the C keyword command is simply an overwrite feature; previous criteria for the specified keyword are deleted and the user enters new criteria. The same subroutines are used for keyword and C keyword processing. Go to step (iii).

(xi) User has selected the END option indicating he has completed his selection session. Write options selected in this session to 2 files: one file to be routed (by SELECT EXEC) to the Tracking Machine (CBS01) and the other to be used later in the EXTRACT phase.

(xii) Remind user of his option file name and EXIT from process.

The rest of this chapter will briefly describe the FORTRAN subroutines of the SELECT phase. The calling hierarchy is depicted in the attached diagram.

3.1.5 PROGRAM DESCRIPTIONS (Cont'd)

3.1.5.4 SUBROUTINE REVIEW

Purpose: To list (at the terminal) the selection criteria entered thus by the user. This function is useful to check if you are entering your criteria the way you intended to. This subroutine is invoked whenever the user enters the REVIEW option. He may do this any number of times during a SELECT session.

3.1.5.5 SUBROUTINE TRANS

Called by SUBROUTINE REVIEW to prepare readable output for the USOC expression selected, if necessary.

3.1.5.6 SUBROUTINE NPANNX

Purpose: Prompt, input & validate NPA-NNX selections. The user is allowed to enter upto 5 combinations of specific NPA-NNX range selections. e.g.

514 100, 900
613 200, 400

are 2 valid combinations.

3.1.5.7 SUBROUTINE NOSYS

Purpose: Prompt, input & validate Number of systems range. The user may enter only one range. Valid no. of systems is 1 to 127.

3.1.5 PROGRAM DESCRIPTIONS (Cont'd)

3.1.5.8 SUBROUTINE AREA

Purpose: Prompt, input & validate area selection. The user may enter any one combination of the 5 areas by using numeric codes. The numeric codes are: MTL = 1; QPA = 2; NEA = 3; TOR = 4; SWA = 5.

3.1.5.9 SUBROUTINE UCB

Purpose: Prompt, input & validate UCB (major) group selection. The user may select any one combination of the 17 major UCB classifications.

3.1.5.10 SUBROUTINE LDBILL

Purpose: Prompt, input & validate monthly Long Distance Billing selection. The user may select upto 5 ranges of Long Distance Billing.

3.1.5.11 SUBROUTINE SEBILL

Purpose: Prompt, input & validate monthly Service & Equipment Billing selection. The user may select upto 5 ranges of S&E Billing.

3.1.5.12 SUBROUTINE SYSTYP

Purpose: Prompt, input & validate Main System Type of service selection. The user may select upto 5 ranges of Main System Type of service.

3.1.5 PROGRAM DESCRIPTIONS (Cont'd)

3.1.5.13 SUBROUTINE LINES

Purpose: Prompt, input & validate one value range for any combination of the 14 line size descriptions of the major system.

3.1.5.14 SUBROUTINE USOCS

Purpose: Prompt, input & validate a boolean expression of USOC codes and optionally one quantity range for each USOC code selected.

The user may select upto 2 lists (List 1 & List 2) of USOC codes. Each list may contain upto 10 USOC codes each. The USOCs in List 1 are joined by a common logical operator; 'OR' or 'AND' (selected by user). The user similarly selects a logical connector for List 2. List 1 & List 2 are also connected by 'OR' or 'AND'. In this way, the user may construct simple boolean expressions to select customers based on equipment carried. Some examples:

(i) (A) AND (B)
(ii) (A AND B) OR (C)
(iii) (A AND D) AND (B OR C)
etc.

3.1.5 PROGRAM DESCRIPTIONS (Cont'd)

3.1.5.15 SUBROUTINE TELNOS

Purpose: Prompt, input & validate specific telephone numbers that the user wishes to select. He may choose upto 100 specific telephone numbers.

3.1.5.16 SUBROUTINE NAME

Called by program TABSEL when keyword NAME is invoked. Sets a switch to indicate that Name & address is to be output for the selected accounts and gives a confirmation message to the user.

3.1.5.17 SUBROUTINE SAMPLE

Purpose: Prompt, input & validate a sample size. Sampling will be done on accounts that meet all other criteria specified in the current session.

3.1.5.18 SUBROUTINE DESCRP

Purpose: Display textual information for specified keyword. This subroutine accesses the input file KEYWORD DISPLAY to obtain the description for the specified keyword.

3.1.5.19 SUBROUTINE SECUR

Called by the main program TABSEL when the user enters the keyword NAME or TELNOS. Prompts the user for a special password required for using either of these keywords.

3.1.5 PROGRAM DESCRIPTIONS (Cont'd)

3.1.5.20 SUBROUTINE TEMOPT

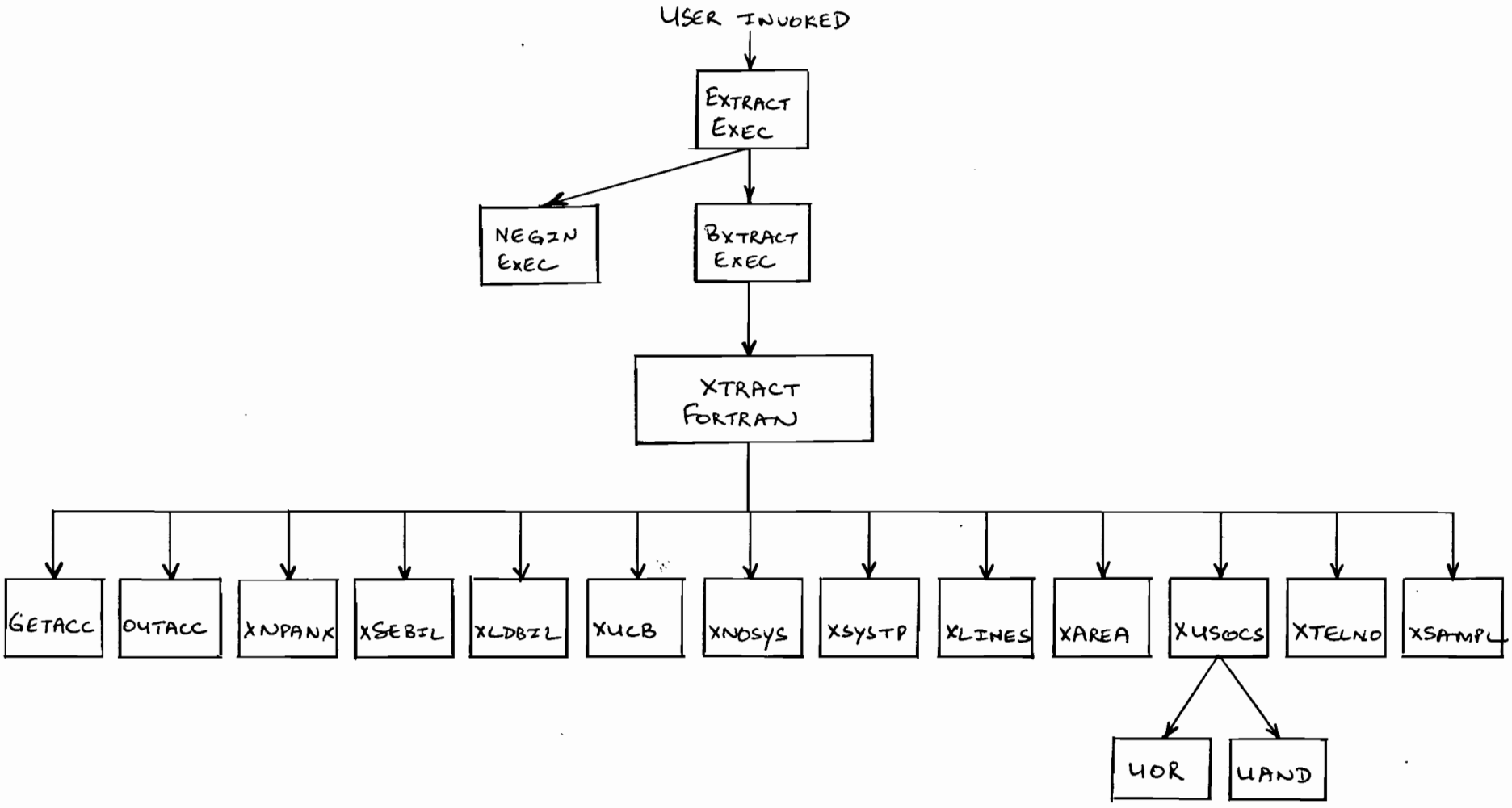
Called by the main program TABSEL when the user enters the END option, indicating that he wishes to terminate the current SELECT session. This subroutine writes the options selected in this session to a disk file (LU = 8). This file will be used in the EXTRACT phase of TABS.

3.2 EXTRACT

3.2.1 This phase is comprised of the following programs and subroutines:

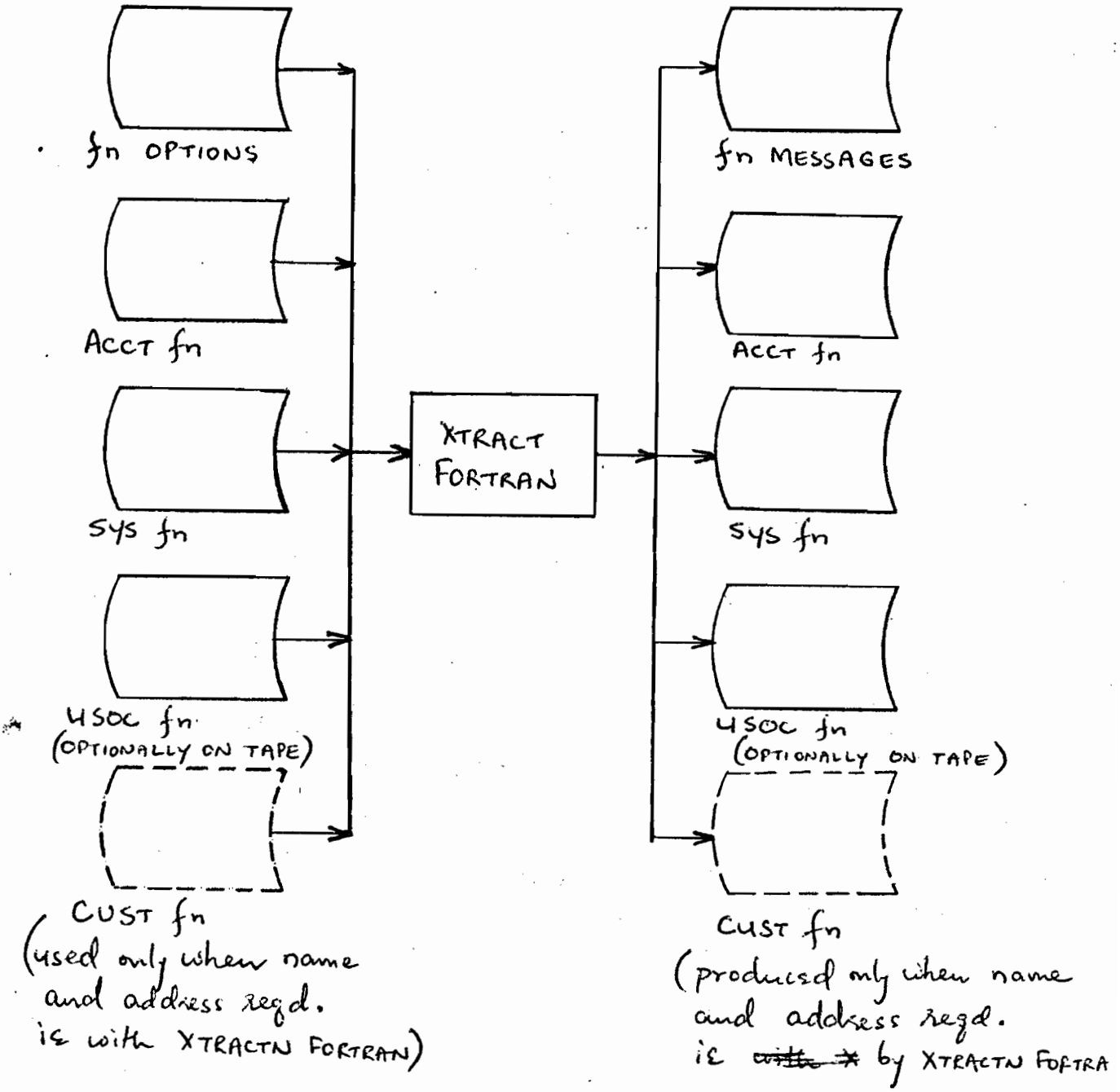
(i)	EXTRACT EXEC	(& EXTRACTN EXEC)
(ii)	NEGIN EXEC	
(iii)	BXTRACT EXEC	(& BXTRACTN EXEC)
(iv)	XTRACT FORTRAN (MAIN)	(& XTRACTN FORTRAN)
(v)	SUBROUTINE GETACC	
(vi)	SUBROUTINE OUTACC	
(vii)	SUBROUTINE XNPANX	
(viii)	SUBROUTINE XSEBIL	
(ix)	SUBROUTINE XLDBIL	
(x)	SUBROUTINE XUCB	
(xi)	SUBROUTINE XNOSYS	
(xii)	SUBROUTINE XSYSTP	
(xiii)	SUBROUTINE XLINES	
(xiv)	SUBROUTINE XAREA	
(xv)	SUBROUTINE XTELNO	
(xvi)	SUBROUTINE XSAMPL	
(xvii)	SUBROUTINE XUSOCS	
(xviii)	SUBROUTINE UOR	
(xix)	SUBROUTINE UAND	

A chart showing the program calling sequence is attached overleaf.



MODULE EXTRACT : PROGRAM STRUCTURE CHART

3.2.2 SCHEMATIC SHOWING INPUT & OUTPUT FILES FOR PHASE EXTRACT



3.2 EXTRACT (Cont'd)

3.2.3 INPUT FILES

(i) fn OPTIONS

This is the option file produced by the SELECT phase (Section 2.1.4) fn above is replaced by a user supplied name.

(ii) ACCT fn

fn is replaced by a user supplied name.

LRECL = 55
RECFM = FB
BLOCK = 550
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(iii) SYS fn

fn is replaced by a user supplied name.

LRECL = 78
RECFM = FB
BLOCK = 780
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(iv) USOC fn

fn is replaced by a user supplied name.

LRECL = 28
RECFM = FB
BLOCK = 560
DSORG = SEQUENTIAL

3.2.3 INPUT FILES (Cont'd)

(iv) USOC fn (Cont'd)

The above parameters apply when the USOC file is on disk. It can optionally be on tape, where the following parameters apply:

LRECL = 28
RECFM = FB
BLOCK = 5600
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(v) CUST fn

fn is replaced by a user supplied name.

LRECL = 109
RECFM = FB
BLOCK = 1090
DSORG = SEQUENTIAL

This file is only used when the name and address is required. (i.e. the keyword NAME has been specified in phase SELECT and phase EXTRACTN is invoked).

Record layout attached in Appendix 2.

3.2 EXTRACT (Cont'd)

3.2.4 OUTPUT FILES

(i) fn MESSAGES

fn is replaced by a user supplied name. Messages file containing number of accounts input, number of accounts selected, & instructions to the user as to what TABS command he can now use.

(ii) ACCT fn

fn is replaced by a user supplied name. Identical format to input files. Contains information pertaining to the selected accounts.

(iii) SYS fn

fn is replaced by a user supplied name. Identical format to input files. Contains information pertaining to the selected accounts.

(iv) USOC fn

fn is replaced by a user supplied name. Identical format to input files. Contains information pertaining to the selected accounts.

(v) CUST fn

fn is replaced by a user supplied name. Identical format to input files. Contains information pertaining to the selected accounts.

3.2.5 PROGRAM DESCRIPTIONS

3.2.5.1 EXTRACT EXEC (& EXTRACTN EXEC)

EXTRACTN EXEC is to be used when the user has specified keyword NAME (i.e. requested Name & Address to be output) in the SELECT Phase. The program logic is identical to EXTRACT EXEC, which is described below.

(i) Prompt user for option file name & verify that it exists. If not, issue message and EXIT.

(ii) Prompt for input data files name, & verify that they exist. If not, issue message and EXIT.

(iii) Prompt for location of USOC data (Tape or Disk). If TAPE, prompt for tape number else use name specified in step (ii).

(iv) Prompt for output file name.

(v) Prompt for output device for USOC data (Tape or Disk). If TAPE, prompt for tape number. If DISK, use name specified in step (iv).

(vi) Send job to batch machine for execution by invoking procedure BXTRACT (EXTRACTN invokes BXTRACTN) and issue informative messages for user.

2.2.5.2 BEGIN EXEC

As for phase SELECT, Section 2.1.5.2.

3.2.5 PROGRAM DESCRIPTIONS (Cont'd)

3.2.5.3 BXTRACT EXEC (& BXTRACTN EXEC)

These procedures are identical except BXTRACTN EXEC uses the CUST file for I/O as well.

(i) Define files
(ii) LOAD & EXECUTE program XTRACT (XTRACTN).

3.2.5.4 XTRACT FORTRAN (& XTRACTN FORTRAN)

This is the main FORTRAN program of the EXTRACT phase. It's function is to read the specified data, apply the specified selection criteria, and output the selected accounts in a format identical to that of the input data.

(i) Read the option file created during the SELECT phase.
(ii) Get next account from specified input file. On end of data, go to step (iv).
(iii) Apply each select criteria to the account. If the account meets all criteria, then output it. (by invoking subroutine OUTACC). If the account fails to meet any one of the criteria, then reject it. Go to step (ii).
(iv) Issue MESSAGE file for user, indicating the number of accounts input, number of accounts selected and instructions for executing subsequent phases of TABS.

3.2.5 PROGRAM DESCRIPTIONS (Cont'd)

3.2.5.5 SUBROUTINE GETACC

Called by XTRACT. Gets next account from input data files.

3.2.5.6 SUBROUTINE OUTACC

Called by XTRACT, only when the account has met all the specified criteria. Writes the account to output data files in exactly the same format as the input files.

3.2.5.7 SUBROUTINE XNPANX

Called by XTRACT if NPA-NNX selection required. Determines if the account meets the specified criteria.

3.2.5.8 SUBROUTINE XSEBIL

Called by XTRACT if S&E Billing selection required. Determines if the account meets the specified criteria.

3.2.5.9 SUBROUTINE XLDBIL

Called by XTRACT, if LD Billing selection required. Determines if the account meets the specified criteria.

3.2.5.10 SUBROUTINE XUCB

Called by XTRACT, if UCB selection required. Determines if the account meets the specified criteria.

3.2.5 PROGRAM DESCRIPTIONS (Cont'd)

3.2.5.11 SUBROUTINE XNOSYS

Called by XTRACT, if Number of system selection required. Determines if the account meets the specified criteria.

3.2.5.12 SUBROUTINE XSYSTP

Called by XTRACT, if selection required on Main System Type of Service. Determines if the account meets the specified criteria.

3.2.5.13 SUBROUTINE XLINES

Called by XTRACT if selection required on Main System Line sizes. Determines if the account meets the specified criteria.

3.2.5.14 SUBROUTINE XAREA

Called by XTRACT if Area selection required. Determines if the account meets the specified criteria.

3.2.5.15 SUBROUTINE XTELNO

Called by XTRACT if specific telephone numbers have been specified. Determines if the account is one of the telephone numbers that are to be selected.

3.2.5 PROGRAM DESCRIPTIONS (Cont'd)

3.2.5.16 SUBROUTINE XSAMPL

Called by XTRACT if sampling requested. Only accounts that meet all other specified criteria will be sampled. Thus, this subroutine is the last one to be called by XTRACT.

3.2.5.17 SUBROUTINE XUSOCS

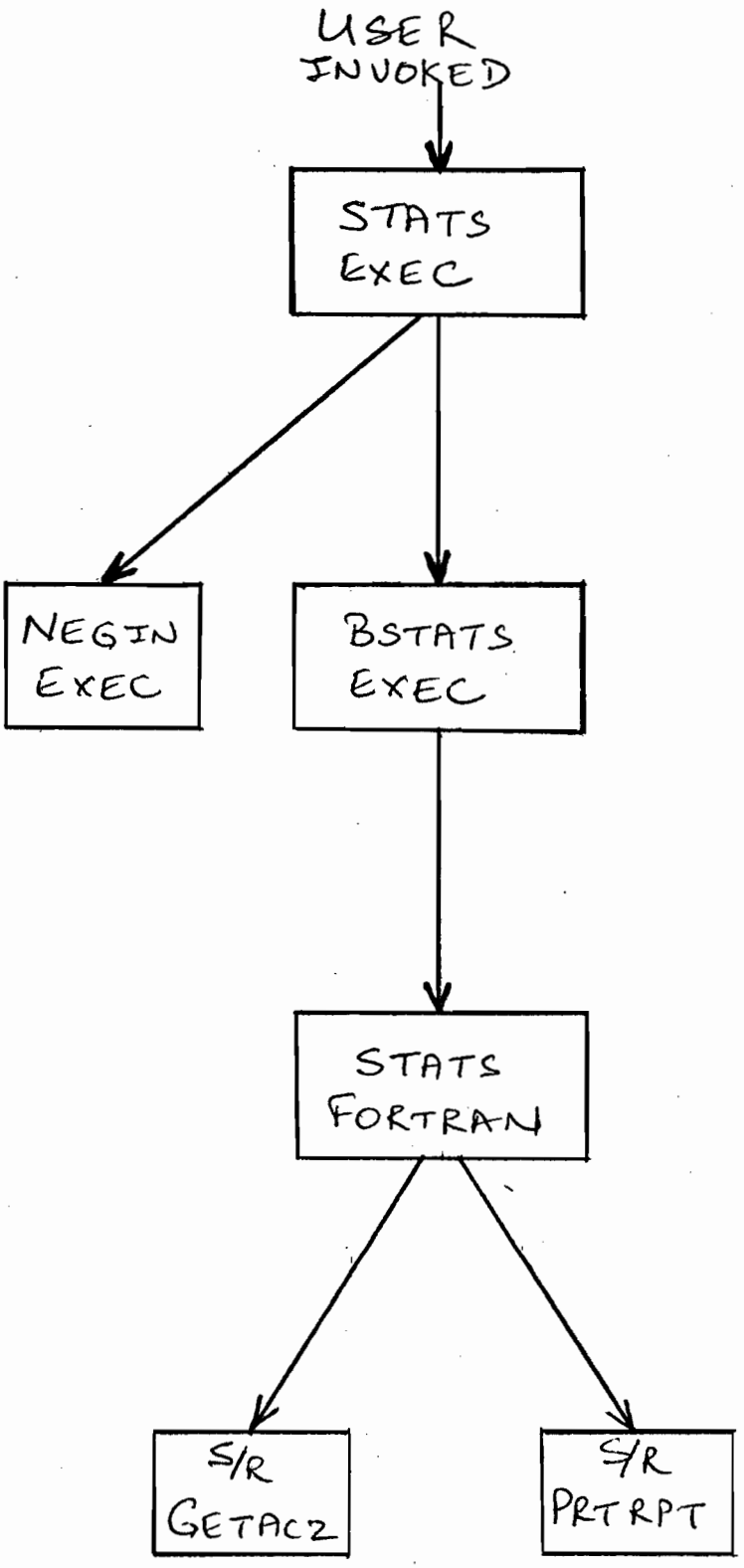
Called by XTRACT if a USOC expression has been specified by the user. Determines if the account satisfies the specified expression. Quantity selection is also performed if specified.

3.2.5.18 SUBROUTINE UOR

Called by XUSOCS to process boolean OR selection if required.

3.2.5.19 SUBROUTINE UAND

Called by XUSOCS to process boolean AND selection if required.



MODULE STATS: PROGRAM STRUCTURE CHART

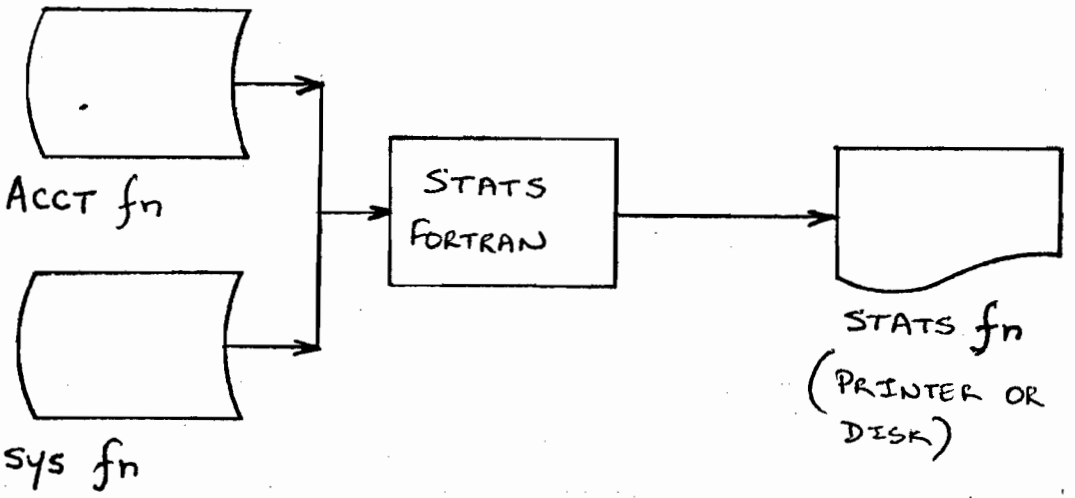
3.3 STATS (Cont'd)

3.3.1 This phase is comprised of the following programs and subroutines:

(i) STATS EXEC
(ii) NEGIN EXEC
(iii) BSTATS EXEC
(iv) STATS FORTRAN
(v) GETAC2 FORTRAN (SUBROUTINE)
(vi) PRTRPT FORTRAN (SUBROUTINE)
(vii) BLOCK DATA (SUBROUTINE)

A chart showing the program calling sequence is attached overleaf.

3.3.2 SHEMATIC SHOWING I/O FILES



3.3 STATS (Cont'd)

3.3.3 INPUT FILES

(i) ACCT fn

fn is replaced by a user supplied name.

LRECL = 55
RECFM = FB
BLOCK = 550
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(ii) SYS fn

fn is replaced by a user supplied name.

LRECL = 78
RECFM = FB
BLOCK = 780
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

3.3.4 OUTPUT FILES

(i) STATS fn

fn is replaced by a user supplied name.

This is a printed report containing descriptive statistics on the specified data. It can optionally be routed to disk or offline printer. Sample attached.

3.3 STATS (Cont'd)

3.3.5 PROGRAM DESCRIPTIONS

2.3.5.1 STATS EXEC

(i) Prompt user for input file name.
(ii) Verify that data files exist. If not, print message and terminate execution.
(iii) Prompt user for batch or interactive execution.
(iv) Prompt user for output device (disk or printer) and output file name.
(v) If interactive execution requested, invoke and execute program BSTATS EXEC and EXIT on completion. If batch execution requested, send job BSTATS EXEC to batch machine (stream L), print informative message and EXIT.

3.3.5.2 NEGIN EXEC

As for phase SELECT, Section 2.1.5.2.

3.3.5.3 BSTATS EXEC

(i) Define files.
(ii) Load & execute program STATS.

3.3.5.4 STATS FORTRAN

This is the main FORTRAN program of the STATS phase.

(i) Initialize values.
(ii) Get next account (by calling S/R GATAC2). On end of data go to step (iv).

3.3.5.4 STATS FORTRAN (Cont'd)

(iii) Update the various descriptive statistics and go to step (ii).

(iv) Call subroutine PRTRPT to print report.

3.3.5.5 SUBROUTINE GETAC2

Called by STATS FORTRAN.

Purpose: Get next BARS account from input data files ACCT and SYS and return control to STATS.

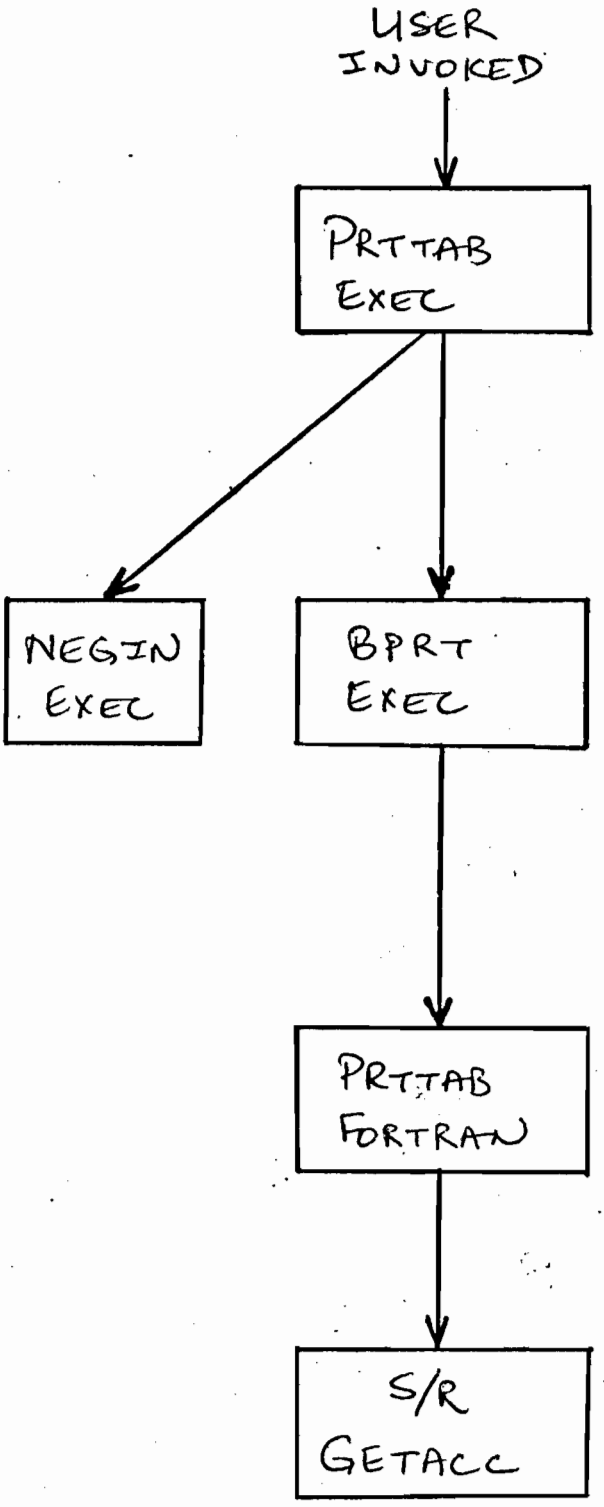
3.3.5.6 SUBROUTINE PRTRPT

Call by STATS FORTRAN.

Purpose: Print the descriptive statistics, computed in the main program, to an output report.

3.3.5.7 BLOCK DATA

Purpose: Initialize tables, header values etc.



MODULE PRTTAB: PROGRAM STRUCTURE CHART

3.4 PRTTAB (Cont'd)

3.4.3 INPUT FILES

(i) ACCT fn

fn is replaced by a user supplied name.

LRECL = 55
RECFM = FB
BLOCK = 550
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(ii) SYS fn

fn is replaced by a user supplied name.

LRECL = 78
RECFM = FB
BLOCK = 780
DSORG = SEQUENTIAL

Record layout attached in Appendix 2.

(iii) USOC fn

fn is replaced by a user supplied name.

LRECL = 28
RECFM = FB
BLOCK = 560
DSORG = SEQUENTIAL

When this file is on tape, the Blocksize = 5600.

Record Format attached in Appendix 2.

3.4 PRTTAB (Cont'd)

3.4.3 INPUT FILES (Cont'd)

(iv) CUST fn

fn is replaced by a user supplied name.

LRECL = 109
RECFM = FB
BLOCK = 1090
DSORG = SEQUENTIAL

This file is only used when the name and address is required. (i.e. when EXTRACTN has been used to extract the BARS accounts being printed, and PRTTABN is used). Record layout attached in Appendix 2.

3.4.4 OUTPUT FILES

(i) SUBSET fn

fn is replaced by a user supplied name. Routed optionally to DISK or offline printer. Contains the print-out of each account in the input file. Sample attached overleaf.

3.4.5 PROGRAM DESCRIPTIONS

3.4.5.1 PRTTAB EXEC (& PRTTABN EXEC)

These 2 EXEC's are identical except that PRTTABN is used when name & address is also required to be printed and thus it accesses the CUST file as well.

(i) Prompt user for input file name & verify that data files exist. If they do not exist, print message and EXIT.

3.4.5 PROGRAM DESCRIPTIONS (Cont'd)

3.4.5.1 PRTTAB EXEC (& PRTTABN EXEC) (Cont'd)

(ii) Prompt user for output device (DISK or PRINTER) and output file name.

(iii) Send job (BPRT EXEC) to batch machine for execution. (PRTTABN uses BPRTN EXEC).

(iv) Issue message for user and EXIT.

3.4.5.2 NEGIN EXEC

As for phase SELECT, Section 2.1.5.2.

3.4.5.3 BPRT EXEC (& BPRTN EXEC)

(i) Define files.

(ii) Load and execute program PRTTAB FORTRAN.
(BPRTN executes PRTTABN).

The two EXECS are identical except that BPRTN defines the CUST (name & address) file as well.

3.4.5.4 PRTTAB FORTRAN (& PRTTABN FORTRAN)

This is the main FORTRAN program of phase PRTTAB.

(i) Get next account (by calling S/R GETACC). On end of data EXIT.

(ii) Print account in standard format.

PRTTAB & PRTTABN FORTRAN are identical except for the value of variable SWNAME.
(SWNAME = 0 in PRTTAB FORTRAN
SWNAME = 1 in PRTTABN FORTRAN).

3.4 PRTTAB (Cont'd)

3.4.5 PROGRAM DESCRIPTIONS (Cont'd)

3.4.5.4 PRTTAB FORTRAN (& PRTTABN FORTRAN) (Cont'd)

This variable specifies whether subroutine GETACC is to access the CUST file (name & address).

3.4.5.5 SUBROUTINE GETACC

Called by PRTTAB FORTRAN.
Purpose: Get next account from specified data files.

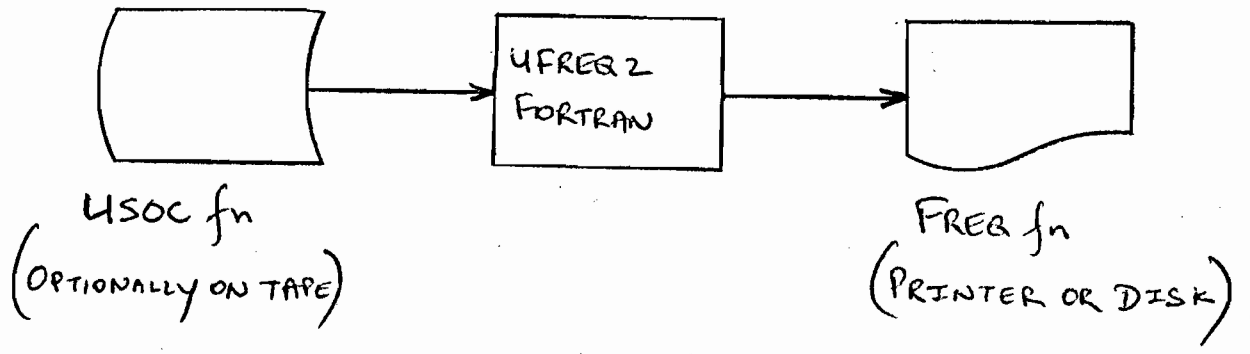
3.5 FREQ

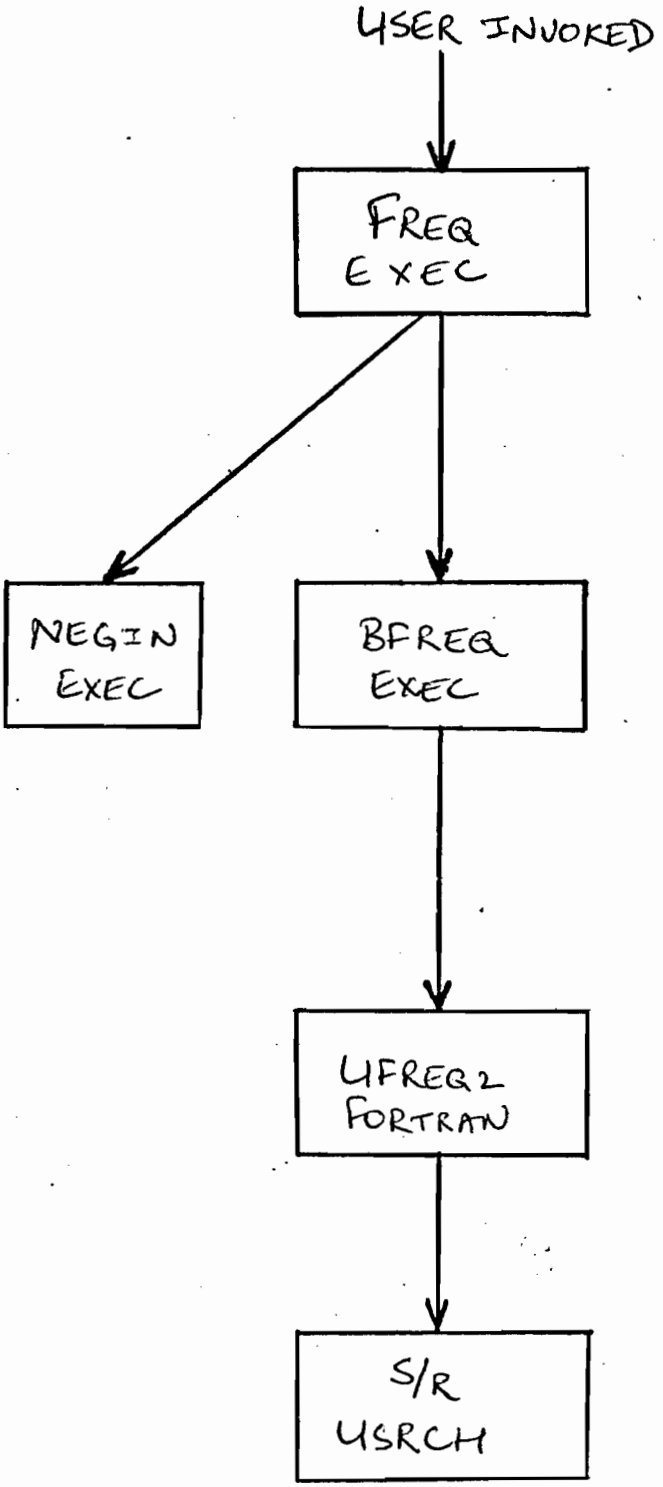
3.5.1 This phase is comprised of the following programs and subroutines:

(i) FREQ EXEC
(ii) NEGIN EXEC
(iii) BFREQ EXEC
(iv) UFREQ2 FORTRAN (MAIN)
(v) USRCH FORTRAN (SUBROUTINE)

A chart showing the program calling sequence is attached overleaf.

3.5.2 SCHEMATIC SHOWING I/O FILES





MODULE FREQ : PROGRAM STRUCTURE CHART

3.5 FREQ (Cont'd)

3.5.3 INPUT FILES

(i) USOC fn

fn is replaced by a user supplied name.

LRECL = 28
RECFM = FB
BLOCK = 560
DSORG = SEQUENTIAL

When this file is on tape, the Blocksize = 5600. Record layout attached in Appendix 2.

3.5.4 OUTPUT FILES

(i) FREQ fn

fn is replaced by a user supplied name. This is the output report containing the USOC frequency table. Sample attached overleaf. This report can be optionally routed to DISK or the offline printer.

3.5.5 PROGRAM DESCRIPTIONS

3.5.5.1 FREQ EXEC

(i) Prompt user for input file device (TAPE or DISK) and i.d. (file anme or tape number).
(ii) Prompt for interactive or batch execution.
(iii) Prompt for output device (DISK or PRINTER) and output file name.
(iv) If interactive execution requested, call BFREQ EXEC and EXIT when processing finished.

3.5 FREQ (Cont'd)

3.5.5 PROGRAM DESCRIPTIONS (Cont'd)

3.5.5.1 FREQ EXEC (Cont'd)

(v) If batch execution requested, send job BFREQ EXEC to batch machine (stream L), issue message for user and EXIT.

3.5.5.2 NEGIN EXEC

As for phase SELECT, Section 2.1.5.2.

3.5.5.3 BFREQ EXEC

(i) Define files.
(ii) Load and execute program UFREQ2.

3.5.5.4 UFREQ2 FORTRAN

This is the MAIN FORTRAN program of phase FREQ.

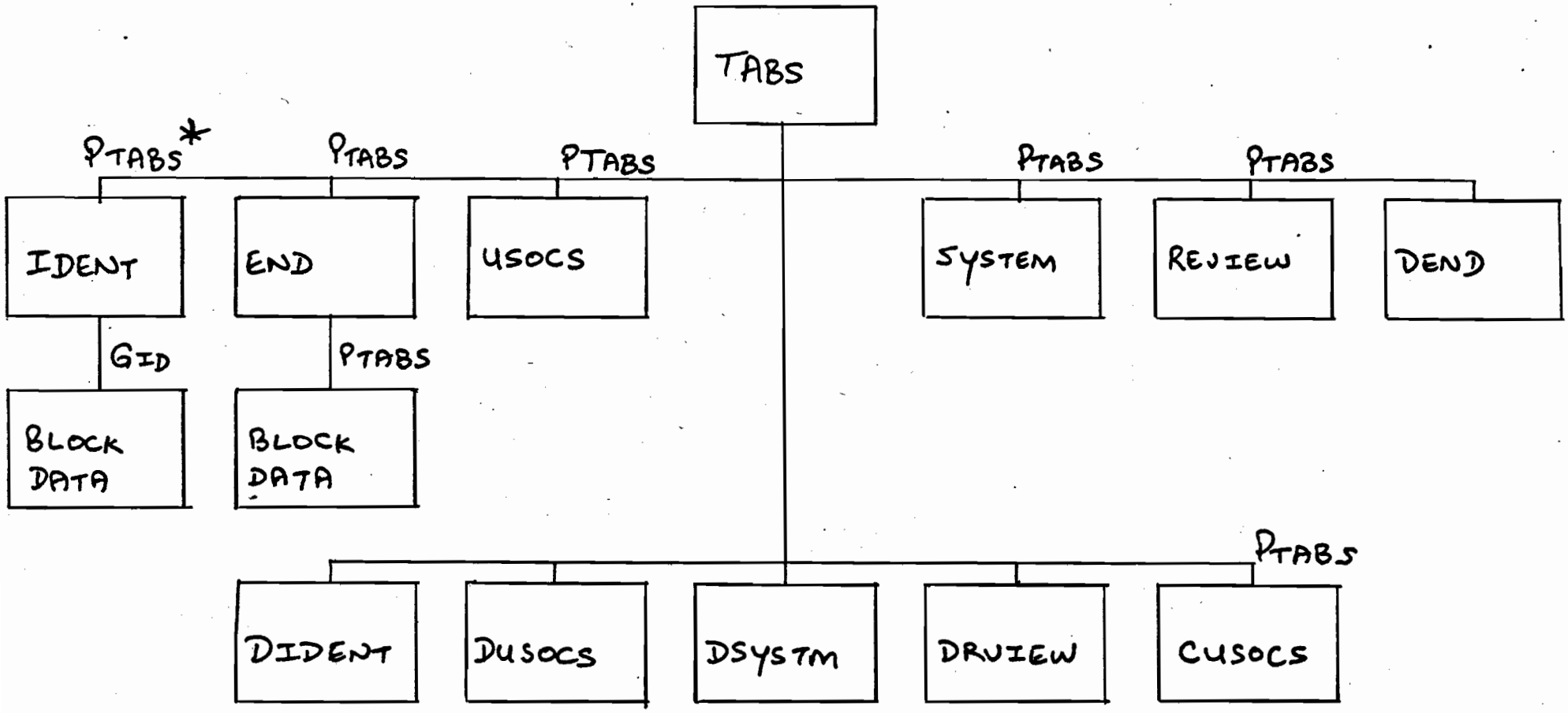
(i) Get next USOC record from input flat file USOC. On end of data go to step (iv).
(ii) Call subroutine USRCH to update Frequency and quantity tables.
(iii) Go to step (i).
(iv) Print USOC Frequency report and STOP.

3.5.5.5 SUBROUTINE USRCH

Called by UFREQ2.
Purpose: Search for specified USOC code in USOC table. If not found, insert in place and make corresponding entry in Quantity and Frequency table. If found, update appropriate quantity and frequency values.
Method: Binary search.

3.6 SELSPSS

This phase is documented in a different format than the previous 5 phases. See attached pages.



* DATA INTERFACE (COMMON BLOCK)

MODULE SELSPSS : PROGRAM STRUCTURE CHART

3.6 SELSPSS (Cont'd)

Module descriptions (refers to program structure chart)

TABS: Communicates with terminal on receiving control from CMS exec.

IDENT: Requests and validates user id.

END: Produces option file.

USOCS: Requests USOCS and inserts them in option table.

SYSTEM: Requests system inclusion option and inserts in option table.

REVIEW: Lists options selected so far as well as any default values.

DEND: Prints description of END keyword.

DIDENT: Prints description of IDENT keyword.

DUSOCS: Prints description of USOCS keyword.

DSYSTM: Prints description of SYSTEM keyword.

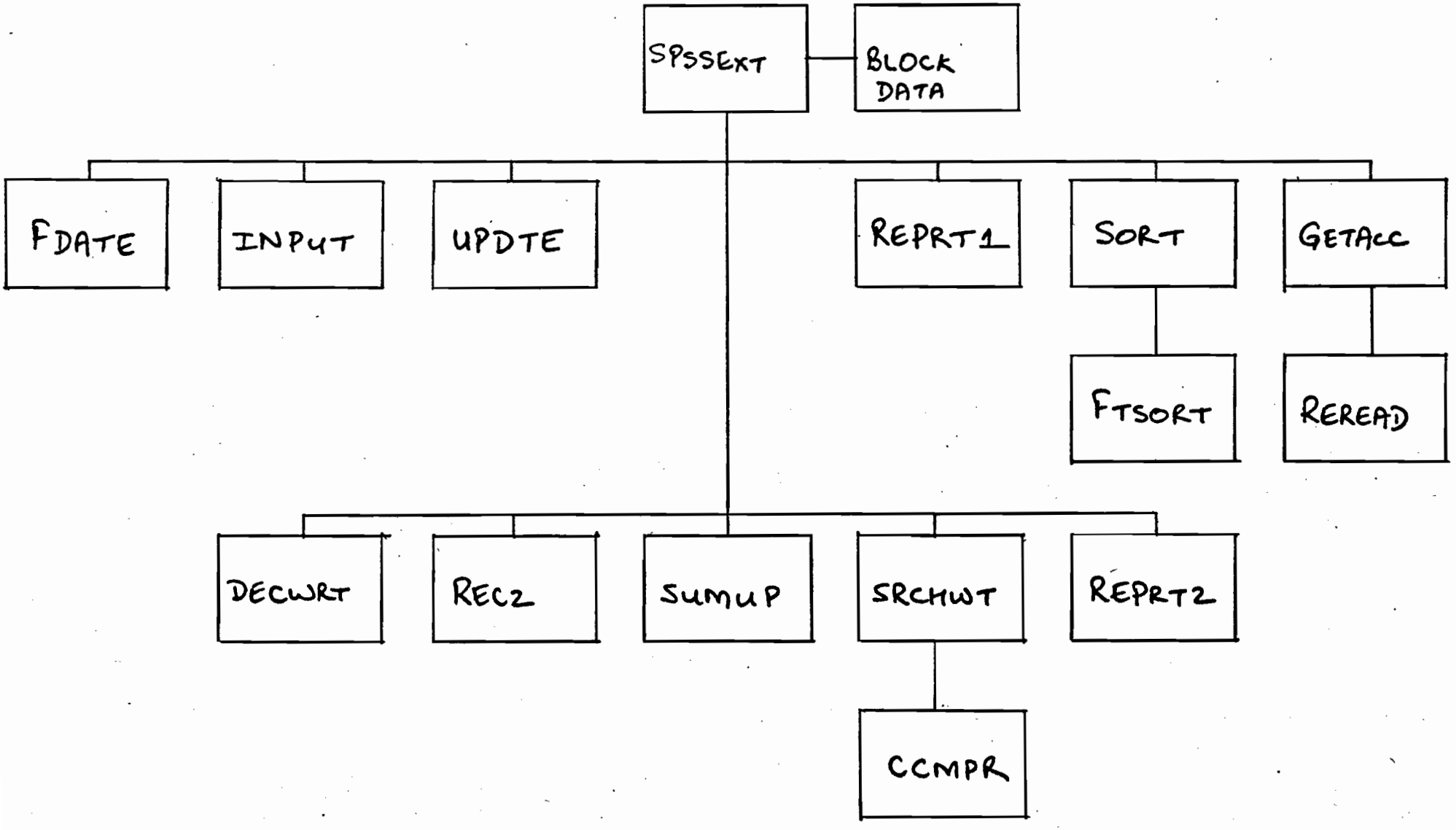
DRVIEW: Prints description of REVIEW keyword.

CUSOCS: Accepts additions or changes to USOC list and inserts in option table.

BLOCK DATA: Initializes certain variables.

3.7 EXTSPSS

This phase is documented in a format similar to SELSPSS. See attached pages.



MODULE EXTSPSS : PROGRAM STRUCTURE CHART

Module descriptions (refers to program structure chart):

SPSSEXT: Refers to options and calls subroutines to do appropriate processing.

BLOCK DATA: Initializes certain variables.

FDATE (BNT FORTRAN SUBROUTINE): Accesses system date and time.

INPUT: Reads option file, verifies option, and stores them.
Terminates if:
Option file missing or empty.
More than 300 USOCs specified.
User ID invalid.

UPDTE: Produces updated tracking file.

REPRT1: Produces file description and layout report.

SORT: Sorts list of USOCs from USOC option.

FTSORT (BNR FORTRAN SUBROUTINE): Sort subroutine.

GETACC: Reads tabs file and synthesizes hierarchical BARS account record.

REREAD (BNR FORTRAN SUBROUTINE): In-memory read; similar to CDC fortran code.

DECWRT: Expands NPA to 3 digits.
Produces account record.

REC2: Produces system records.

SUMUP: Summarizes data for secondary systems.

3.7 EXTSPSS (Cont'd)

SRCHWT: Extracts data re USOCs that were specified in user's option file.
Produces USOC records.

CCMPR (BNR FORTRAN SUBROUTINE): Perform logical comparisons of variable-length data items.

The TABS phases for Full Base access are identical in number and functions to the sub-base access modules. Even the individual program functions are identical. The only difference is the file format for I/O of the BARS account data. Whereas the sub-base format utilizes 4 flat files (in 3NF) to store the data for each account, the full base format merges the records from these four flat files into one physical file.

Record layout is attached in Appendix 3. Thus the only change to the programs are for the I/O routines responsible for I/O of the BARS accounts.

This chapter will only list each of the programs that comprise each of the seven phases relevant to full-base access.

4.1 SELECT

The set of programs comprising phase SELECT for full base access is identical to the sub-base access programs, because there is no processing of BARS accounts involved in this phase.

4.2 XTRACTFB

This is the EXTRACT phase for full base access. It is comprised of the following programs and subroutines:

(i) XTRACTFB EXEC
(ii) NEGIN EXEC
(iii) BEXTFB EXEC
(iv) XTRACTFB FORTRAN (MAIN)
(v) SUBROUTINE GETACC
(vi) SUBROUTINE OUTACC
(vii) SUBROUTINE XNPANNX
(viii) SUBROUTINE XSEBIL
(ix) SUBROUTINE XLDBIL
(x) SUBROUTINE XUCB

4.2 XTRACTFB (Cont'd)

(xi) SUBROUTINE XNOSYS
(xii) SUBROUTINE XSYSTP
(xiii) SUBROUTINE XLINES
(xiv) SUBROUTINE XAREA
(xv) SUBROUTINE XTELNO
(xvi) SUBROUTINE XSAMPL
(xvii) SUBROUTINE XUSOCS
(xviii) SUBROUTINE UOR
(xix) SUBROUTINE UAND

The program description and function are identical to the sub-base access programs except for minor changes to (reasons in parenthesis):

XTRACTFB EXEC (I/O definitions)
BEXTFB EXEC (I/O definitions)
SUBROUTINE GETACC (Input routine for BARS accounts)
SUBROUTINE OUTACC (Output routine for selected accounts).

4.3 STATSFB

Comprised of the following programs and subroutines:

(i) STATSFB EXEC
(ii) NEGIN EXEC
(iii) BSTATSFB EXEC
(iv) STATSFB FORTRAN
(v) GETAC2 FORTRAN
(vi) PRTRPT FORTRAN
(vii) BLOCK DATA

4.4 PRTFB

Comprised of the following programs and subroutines:

(i) PRTFB EXEC
(ii) NEGIN EXEC
(iii) BPRTFB EXEC

4.4 PRTFB (Cont'd)

(iv) PRTFB FORTRAN (& PRTFBN FORTRAN)
(v) GETACC FORTRAN (SUBROUTINE)

4.5 FREQFB

Comprised of the following programs and subroutines:

(i) FREQFB EXEC
(ii) NEGIN EXEC
(iii) BFREQFB EXEC
(iv) UFREQFB3 FORTRAN
(v) USRCH FORTRAN (SUBROUTINE)

4.6 SELSPSSF

Identical to sub-base access module SELSPSS, except the JCL procedure SELSPSS EXEC (sub-base access) is here renamed SELSPSSF EXEC with minor modifications. The FORTRAN programs and subroutines are the same ones used in SELSPSS.

4.7 EXTSPSSF

Identical to sub-base access module EXTSPSS, except the JCL procedures EXTSPSS EXEC, BATSPSS EXEC and EXSPSSRN EXEC (for sub-base access) are renamed here to EXTSPSSF EXEC, BATSPSSF EXEC and EXSPSSRF EXEC, respectively, with minor modifications to the code. The FORTRAN programs and subroutines are stored under file name SPSSXFB FORTRAN (sub-base programs are stored under SPSSEXT FORTRAN). All routines are identical, except subroutine GETACC, which accesses the BARS accounts.

5.1 RETRIEVAL FROM SUB-BASES

5.1.1 GENERAL

Users may access TABS from their own virtual machines. Each time you log on and wish to Access TABS, you must issue the command

LINKTABS

Where LINKTABS is an EXEC file which you must have on your A-disk, and which contains the following CMS commands:

```
&CONTROL OFF
CP LINK CBS02 191 200 RR PASS= PASS1
ACC 200 E/A
CP LINK CBS02 193 199 RR PASS= PASS2
ACC 199 C/A
```

5.1.2 COMMANDS TO ACCESS THE 7 PHASES OF TABS (SUB-BASE ACCESS)

(i)	SELECT	to initiate the selection session. (Note: The special password req'd to use keywords TELNOS & NAME is JOLLY).
(ii)	EXTRACT	to apply the select criteria to specified data files. (Note: When you have specified keyword NAME above, then use EXTRACTN here).
(iii)	STATS	to get a statistical summary of specified data files.

5.1 RETRIEVAL FROM SUB-BASES (Cont'd)

5.1.2 COMMANDS TO ACCESS THE 7 PHASES OF TABS (SUB-BASE ACCESS) (Cont'd)

(iv)	PRTTAB	to get a print out of specified data files. (Note: When you have used EXTRACTN in (ii) above, use PRTTABN here).
(v)	FREQ	to get a USOC frequency distribution of a specified data file.
(vi)	SELSPSS	to initiate SPSS specification session.
(vii)	EXTSPSS	to apply a previously created SPSS - option file to specified data files.

5.1.3 OUTPUT FILES FROM EACH OF THE 7 PHASES OF TABS

5.1.3.1 SELECT

This program executes interactively and writes the options file directly to your A-Disk. The file name is:

fn OPTIONS

where 'fn' is the user supplied name. You will always need to refer to this file by 'fn' only.

5.1.3.2 EXTRACT

This program will always be executed by the batch machine (stream L), which will place the following output files in your virtual reader:

5.1.3.2 EXTRACT (Cont'd)

	File Name	Comments
(i)	ACCT fn	Contains billing information indicator.
(ii)	SYS fn	Contains system descriptions.
(iii)	CUST fn	Contains Name & Address. Produced only when Name & Address requested.
(iv)	USOC fn	Contains USOC information. If TAPE had been specified, this file will be written directly to the specified tape volume, and will not appear on your reader.
(v)	fn MESSAGES	Message file indicating number of accounts input & output.

'fn' in all 5 cases above is the user supplied output file name. You will always need to refer to these files by 'fn' only.

(vi)	BSNnnnnn CONSOLE	This is the batch machines log of your program execution. (similar to CDC day file). Will always appear on your reader.

nnnnn above is the job no. given to your job by the batch monitor.

5.1.3.3 STATS

This program will always be executed by the batch machine, which will place the following output files in your virtual reader:

	File Name	Comments
(i)	STATS fn	Contains statistical summary of specified data. If you had specified PRINTER, this file will go directly to the offline PRINTER and will not appear in your reader.

fn above is the user supplied file name.

(ii)	BSNnnnnn CONSOLE	As for program EXTRACT (See 5.1.3.2) will always appear in your reader.

5.1.3.4 PRTTAB

This program will always be executed by the batch machine, which will place the following output files in your reader:

	File Name	Comments
(i)	SUBSET fn	Contains detailed print-out of specified data. If you had specified PRINTER, this file will go directly to the offline PRINTER and will not appear in your reader.

fn above is the user supplied file name.

(ii)	BSNnnnnn CONSOLE	As for program EXTRACT (See 5.1.3.2) will always appear in your reader.

5.1.3.5 FREQ

This program will always be executed by the batch machine, which will place the following output files in your reader:

	File Name	Comments
(i)	FREQ fn	Contains the USOC frequency table of the specified data. If you had specified PRINTER, this file will go directly to the offline PRINTER and will not appear in your reader.

fn above is the user supplied file name.

(ii)	BSNnnnnn CONSOLE	As for program EXTRACT (See 5.1.3.2) will always appear in your reader.

5.1.3 OUTPUT FILES FROM EACH OF THE 7 PHASES OF TABS (Cont'd)

5.1.3.6 SELSPSS

Program SELSPSS executes interactively and will write the options file directly to the user's A-Disk with the name

EXSPSSOP fn

where 'fn' above is the user supplied name for this file. You will always need to refer to this file by 'fn' only.

During the SELSPSS session, you will be asked if you want to execute the extract SPSS phase as well. If you answer YES, then all the files described in the next sub-section (EXTSPSS) will be placed in your virtual reader after the job is processed by the batch machine. If you answer NO, then you may later execute the extract-SPSS phase by issuing EXTSPSS and, again, all output files listed in the next sub-section (EXTSPSS) will be placed in your virtual reader.

5.1.3.7 EXTSPSS

This program will always be executed by the batch machine, which will place the following files in your virtual reader.

5.1.3.7 EXTSPSS (Cont'd)

	File Name	Comments
(i)	REPORTS fn	If you had specified PRINTER, this file will go directly to the offline printer and will not appear in your reader.
(ii)	SPSSFILE fn	If you had specified TAPE, this file will be written directly to the specified tape and will not appear in your reader.

'fn' in the 2 cases above is replaced by a user supplied name.

(iii)	BSNnnnnn CONSOLE	Same as for program EXTRACT (See Section 5.1.3.2). This file will always appear in your reader.

nnnnn above is your job number.

5.2 RETRIEVAL FROM FULL BASE

5.2.1 GENERAL

Because the full base utilizes a different file design than the sub-base files, a separate set of programs is used to access the FULL BASE data. As for the sub-base access, you may access the Full base data & programs from your own virtual machine, once you have issued the LINKTABS command.

5.2.2 COMMANDS TO ACCESS THE 7 PHASES COMPRISING TABS (FULL BASE ACCESS)

(i)	SELECT	Exactly as for sub-base access.
(ii)	XTRACTFB	applies selection criteria to full base format files. (Name & Address will be automatically extracted if specified in SELECT. No separate EXEC here as for sub-base access).
(iii)	STATSFB	
(iv)	PRTFB (Name & Address inclusion will be prompted for. No separate EXEC here as for sub-base access)	Exactly as for sub-base access (Section 5.1.2)
(v)	FREQFB	
(vi)	SELSPSSF	
(vii)	EXTSPSSF	

5.2 RETRIEVAL FROM FULL BASE (Cont'd)

5.2.3 OUTPUT FILES FROM EACH PROGRAM

5.2.3.1 SELECT

Identical to sub-base processing (Section 5.1.3.1).

5.2.3.2 XTRACTFB

This program will be executed by the batch machine, which will place the following output files in your reader:

	File Name	Comments
(i)	FULLBASE fn	Extracted subset of data. If you had specified TAPE as your output device, this file will be written directly to the specified tape volume and will not appear in your reader.
(ii)	fn MESSAGES	Message file indicating number of accounts input & output.

'fn' above is the user supplied output file name. You will always need to refer to these files by 'fn' (or appropriate tape no.) only.

(iii)	BSNnnnnn CONSOLE	Identical to program EXTRACT. (Section 5.1.3.2).

5.2 RETRIEVAL FROM FULL BASE (Cont'd)

5.2.3 OUTPUT FILES FROM EACH PROGRAM (Cont'd)

5.2.3.3 STATSFB

Identical to sub-base access STATS
(Section 5.1.3.3)

5.2.3.4 PRTFB

Identical to sub-base access PRTTAB
(Section 5.1.3.4)

5.2.3.5 FREQFB

Identical to sub-base access FREQ
(Section 5.1.3.5)

5.2.3.6 SELSPSSF

Identical to sub-base access SELSPSS
(Section 5.1.3.6)

5.2.3.7 EXTSPSSF

Identical to sub-base access EXTSPSS
(Section 5.1.3.7)

5.3 NOTES ON HOW TO TRANSFER FILES FROM YOUR READER TO YOUR A-DISK

5.3.1 Because most TABS programs will place some output files in your reader, you need to know how to transfer these files from your reader to your A-Disk. Each time you execute a TABS program that places some output in your reader, you must transfer all the files to your A-Disk, because subsequent phases of TABS will expect all data to be on the A-Disk.

5.3.2 Issue the CMS command
Q RDR ALL
This will list & describe (at the terminal) all the files currently in your virtual reader. The last column of the description will be labelled 'TYPE'. The 'TYPE' value of each file will determine which of 2 CMS commands you are to use to transfer the file from reader to A-Disk.

The 2 CMS commands are:

DISK LOAD and
READ CON FILE.

If the 'TYPE' of a file is CONSOLE, then use the READ CON FILE command to transfer it to your A-Disk.

If the 'TYPE' is not CONSOLE, (can be anything else), use the DISK LOAD command to transfer it to your A-Disk.

Files are transferred from reader to A-Disk in the order in which they appear in response to your Q RDR ALL query. (i.e. like a pop-up stack). Therefore, ensure that you issue the proper sequence of DISK LOAD's and READ CON FILE's to transfer all files to your A-Disk. Issuing a

5.3 NOTES ON HOW TO TRANSFER FILES FROM YOUR READER TO YOUR A-DISK (Cont'd)

5.3.2 (Cont'd)

READ CON FILE for a non CONSOLE TYPE file will mess up your data and will require a re-run of the program.

Also, you should issue TYPE CON FILE immediately after any READ CON FILE to get a hardcopy of CON FILE. Subsequent READ CON FILE's will overlay and destroy any previous CON FILE's transferred.

5.4 TERMINAL SESSIONS FOR THE TWO EXAMPLES OF SECTION 1.2

Copies of the terminal sessions for Examples 1 and 2 of Section 1.2 are attached.

In the attached print-outs, user responses follow the prompt character '.', and are highlighted.

EXAMPLE 1.

MODULE SELECT.

```
LINKTABS
E (200) R/O
C (199) R/O
R; T=0.01/0.04 11:50:47
.
SELECT
TABS 2.0 MODULE: SELECT
 Enter a name ( max. 8 chars ) for the file where your
 options are to be stored at the end of this session.
 ( Any name meaningful to you will do ! )
.RUN1
EXECUTION BEGINS...

Enter your 4 character TABS user I.D.
(Start in col. 1)
.PS01

Hit RETURN to obtain the introduction
or enter the letter C to continue
with the selection process
.C

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.AREA

You will be prompted for up to 5 area codes
Valid area codes are :
MTL=1  QUE PROV=2  NORTH EAST=3  TOR=4  SOUTH WEST=5
Enter no. of areas (min. 1  max. 5)
?
.1
Enter  1 area code(s)
?
.4

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.USOCS
You will be prompted for up to 2 lists of USOC codes
The 2 lists may be joined by either an OR or an AND.
Each list may contain up to 10 USOC codes
connected by a common logical operator, either OR or AND.
In addition, you may specify a quantity range
for any USOC code selected above

Enter no. of USOC lists to be selected (1 or 2)
?
.1
Enter no. of USOC codes to be selected in list1 (min 1 max 10)
?
.3
Enter logical operator code for list1 (OR=1,AND=2)
?
.1
Enter  3 USOC code(s) & quantity ranges for list1
Enter each (USOC code & qty range) combination on a separate line
```

```
Col 1-5   : USOC code (start in col 1).  col 6 : blank
Col 7-11  : low end of USOC qty range (must end in col 11)
Col 12    : blank
Col 13-17 : high end of USOC qty range (must end in col 17)
If you do not want to select on qty for any USOC code
leave the range selection blank.
To assist you in entering your data, some cols are given below
 1    5 7  11    17
.BB4X1
.BB4X5
.BB4X7

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.REVIEW

 1. AREA SELECTION
    --------------
     1 AREA(S) SELECTED :
    TORONTO

 2. USOC CODES SELECTION
    --------------------
    USOC EXPRESSION SELECTED IS :
    (NOTE : + = OR    & = AND)
(BB4X1)+(BB4X5)+(BB4X7)

    USOC QUANTITY SELECTION :
    NO USOC QUANTITY SELECTION SPECIFIED

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.END

KEYWORD(S) selected in this run are :
AREA    USOCS

The options that you specified in this
session have been stored in coded format
on a disk file with name RUN1
To apply these options to the data files, issue the command
EXTRACT
when program SELECT terminates.
You are advised to note down the name of your option
file, as program EXTRACT will prompt you for it.
```

EXAMPLE 1.
MODULE SELECT
(CONT'D).

EXAMPLE 1.

MODULE EXTRACT.

```
EXTRACT
TABS 2.0 MODULE: EXTRACT
What is the name of your option file ?
.RUN1
Enter name of input data file
( Hit RETURN to obtain a list of current master files )
.PBX1277
USOC data on TAPE or DISK ?
 ( note : current PBX1277, PBX0678 & PBX1278 USOC data is on tape.
          So if you are extracting from one of these files,
          enter TAPE )
.TAPE
 Enter the tape no. of the tape containing the USOC data
 (note: tape nos. for the USOC data for the DEC. 77, JUNE 78 & DEC. 78 subsets

 are:
                DEC. 1977    JUNE 1978      DEC. 1978
 1. PBX           1483          424            7650

.1483
Enter a file name for your output data ( max 8 chars )
( note down this name on paper -- you will need it later ! )
CUST1
USOC data to be output to TAPE or DISK ?
( NOTE : if you expect more than approx. 2000 accounts
to be output, enter TAPE. If you are not sure, enter TAPE )
.DISK
Since your job requires tape drives, it is being
sent to the batch machine (stream L) for processing
after 1900 hrs. Log on tomorrow morning to
query the status of your extract
 On Job completion, a brief message indicating number of accounts
 input & output and/or any error messages will be written to a
 disk file with name
CUST1 MESSAGES
 This file will be spooled to your virtual reader by the batch machine.
 Disk Load this file (see TABS USER MANUAL) and then issue the command
TYPE CUST1 MESSAGES
 to list this file at your terminal & determine
 whether your Job completed successfully.
 When you are certain that your EXTRACT has been completed,
 you may issue any one of the following 4 commands
 to execute a subsequent phase of TABS. The 4 commands are :
 1.  STATS       ( to obtain a descriptive statistical profile of your subset)
 2.  FREQ        ( to obtain a table of USOC occurences in your subset )
 3.  PRTTAB      ( to obtain a printout of your subset )
 4.  SELSPSS     ( to invoke the SPSS conversion phase of TABS )
JOB '87830' RECEIVED: POSITION 017
TERM 0 DISK 1.
TERM 0 DISK 2.
R; T=0.09/0.26 11:57:54
.
```

EXAMPLE 1.

MODULE PRTTAB.

```
linktabs
E (200) R/O
C (199) R/O
R; T=0.01/0.03 12:48:53
.

prttab
TABS 2.0 MODULE: PRTTAB
Enter name of input data file ( max 8 chars )
.cust1
Input data on TAPE or DISK ?
.disk
Output to DISK or PRINTER ?
.disk
Enter output file name ( max 8 chars )
.cust1
Your Job is beins sent to the batch machine (stream L)
for processing. It's scheduling will depend on the
current load for that machine. Log on later today
to query the status of your Job.
On Job completion, your output will be written to the file
SUBSET CUST1
 This file will be spooled to your virtual reader
 by the batch machine.  Disk Load this file (see
 the TABS User Manual) and then issue the command
TYPE SUBSET CUST1
JOB '88464' RECEIVED: POSITION 001
to list the output at your terminal
TERM 0 DISK 1.
TERM 0 DISK 2.
R; T=0.08/0.18 12:49:30
.
```

```
Q RDR ALL
FILE FORM RECDS CPY DEV HOLD ORIGIN   DATE  TIME  DIST     NAME     TYPE
4621 A    000864 01 PUN NONE BATCHL   07/13 19:05 MTL3$HF  SUBSET   CUST1
4620 LW1T 000028 01 CON NONE BATCHL   07/13 19:05 MTL3$HF  BSN90859 CONSOLE
R; T=0.01/0.01 13:27:44
.
```

EXAMPLE 1.

RECEIVING THE OUTPUT OF MODULE PRTTAB FROM THE BATCH MACHINE VIA THE VIRTUAL READER.

```
DISK LOAD

SUBSET   CUST1     A1
R; T=0.03/0.09 13:27:57
.

T SUBSET CUST1

1 I.D.       : 819[redacted] Area: N EAST   Ucb:77411 Ucb Group:10  Type: 4
   ----
                [redacted]

   BILLING    : Long Distance:       17   Serv & Equip:       21
   -------
   INDICATORS: Tot Resp:    R1050:0  Sp Serv: FFFFFFFFFF
   ----------
   SYSTEMS    : No. of systems :  1
   -------
                System  1  Sys No.:  1  Type :205  Qty of 'type' usoc :    1
                The 14 Line Size values are (in order) :
                    0    0    0    0    0    0    0
                    0    0    0    0    1    2    3
   USOCS      : No. of USOCS :   4  USOC codes,qty & charges (cents) are :
   -----
                EXT      2      530  RLT      1       95  1FB      1     2280
                1LLBM    1      230

2 I.D.       : 819[redacted] Area: N EAST   Ucb:93100 Ucb Group:16  Type: 4
   ----
                [redacted]

   BILLING    : Long Distance:       13   Serv & Equip:       15
   -------
   INDICATORS: Tot Resp:    R1050:1  Sp Serv: FFFFFFFFFF
   ----------
   SYSTEMS    : No. of systems :  1
   -------
                System  1  Sys No.:  1  Type :205  Qty of 'type' usoc :    1
                The 14 Line Size values are (in order) :
                    0    0    0    0    0    0    0
                    0    0    0    0    1    0    1
   USOCS      : No. of USOCS :   2  USOC codes,qty & charges (cents) are :
   -----
                RDK      1      270  1FB      1     1275
```

EXAMPLE 2.
MODULE SELECT.

```
SELECT
TABS 2.0 MODULE: SELECT
Enter a name ( max. 8 chars ) for the file where your
options are to be stored at the end of this session.
( A name meaningful to you will do ! )
.RUN2
EXECUTION BEGINS...

Enter your 4 character TABS user I.D.
(Start in col. 1)
.PS01

Hit RETURN to obtain the introduction
or enter the letter C to continue
with the selection process
.C

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.SYSTYP

You will be prompted for up to 5 main system TYPE OF SERVICE ranges
Enter each range as a pair of numbers :  LOTYPE,HITYPE
E.G.  10,99 indicates 'SELECT ACCOUNTS WITH MAIN SYSTEM 'TYPE OF SERVICE'  10 TO
Enter no. of main system TYPE OF SERVICE ranges to be  selected (min. 1 max. 5)
?
.1
Enter range  1 (min. 1 max. 256)
?
.190,192

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.REVIEW

 1. MAIN SYSTEM TYPE OF SERVICE SELECTION
    -------------------------------------

     1 RANGE(S) SELECTED :
    190 - 192

Valid keywords are :
NPANNX,SEBILL,LDBILL,UCB,NOSYS,SYSTYP,LINES,USOCS,AREA,SAMPLE
Enter appropriate option or enter HELP
.END

KEYWORD(S) selected in this run are :
SYSTYP

The options that you specified in this
session have been stored in coded format
in a disk file with name RUN2
To apply these options to the data files, issue the command
EXTRACT
when program SELECT terminates.
You are advised to note down the name of your option
file, as program EXTRACT will prompt you for it.
```

EXAMPLE 2.

MODULE EXTRACT.

(DATA IN 'FULL BARS' FORMAT)

```
.XTRACTFB
TABS 2.0 MODULE: XTRACTFB
What is the name of your option file ?
.RUN2
Is input data on TAPE or DISK ?
( Hit RETURN to obtain a list of current master files )
.
The full Dec. 1977 ,June 1978 & DEC. 1978 BARS data bases are available for
retrieval on an area basis.  The tape nos. for the 5 areas are :

                    DEC. 1977    JUNE 1978    DEC. 1978
1.  QP AREA    :       2096         4377         6831
2.  MTL AREA   :       2931         4457         7382
3.  NE AREA    :       2113         5131         1480
4.  TOR AREA   :       3803         4582         7856
5.  SW AREA    :       2908         4615         2621
Is input data on TAPE or DISK ?
( Hit RETURN to obtain a list of current master files )
.TAPE
Enter the tape no. of the input file
.2096
Do you want the output data to be on TAPE or DISK ?
.DISK
Enter a name for your output file ( max 8 letters )
.CUST2
Since your job requires tape drives, it is being
sent to the batch machine (stream L) for processing
after 1900 hrs. Log on tomorrow morning to
query the status of your extract
 On Job completion, a brief message indicating number of accounts
 input & output and/or any error messages will be written to a
 disk file with name
RUN2 MESSAGES
 This file will be spooled to your virtual reader by the batch machine.
 Disk Load this file (see TABS USER MANUAL) and then issue the command
TYPE RUN2 MESSAGES
 to list this file at your terminal & determine
 whether your job completed successfully.
 When you are certain that your EXTRACT has been completed,
 you may issue any one of the following 4 commands
 to execute a subsequent phase of TABS. The 4 commands are :
 1.  STATSFB     ( to obtain a descriptive statistical profile of your subset)
 2.  FREQFB      ( to obtain a table of USOC occurences in your subset )
 3.  PRTFB       ( to obtain a printout of your subset )
JOB '87832' RECEIVED: POSITION 018
 4.  SELSPSSF    ( to invoke the SPSS conversion phase of TABS )
TERM 0 DISK 1.
TERM 0 DISK 2.
R; T=0.09/0.25 12:00:07
.
```

EXAMPLE 2.
MODULE STATS.
(DATA IN 'FULL BARS' FORMAT)

```
linktabs
E (200) R/O
C (199) R/O
R; T=0.01/0.05 15:52:54

statsfb
TABS 2.0 MODULE: STATSFB
Input data on TAPE or DISK ?
.disk
What is the name of the input file ?
.cust2
Do you want the output to be on DISK or PRINTER ?
.disk
Enter a name for your output file ( max. 8 letters )
.cust2
Your job is being sent to the batch machine (stream L)
for processing. It's scheduling will depend on the
current load for that machine. Log on later today
to query the status of your job.
On job completion, your output will be written to the file
STATS CUST2
 This file will be spooled to your virtual reader
 by the batch machine.  Disk Load this file (see
 the TABS User Manual) and then issue the command
TYPE STATS CUST2
to list the output at your terminal
TERM 0 DISK 1.
?SPOOL
.end
TERM 0 DISK 0.
TERM 0 DISK 2.
R; T=0.08/0.21 15:53:47
.
```

```
Q RDR ALL

FILE FORM RECDS CPY DEV HOLD ORIGIN   DATE  TIME  DIST      NAME      TYPE
4615 A    000228 01 PUN NONE BATCHL   07/13 19:05 MTL3$HF   STATS     CUST2
4614 LW1T 000028 01 CON NONE BATCHL   07/13 19:05 MTL3$HF   BSN90858  CONSOLE
4621 A    000864 01 PUN NONE BATCHL   07/13 19:05 MTL3$HF   SUBSET    CUST1
4620 LW1T 000028 01 CON NONE BATCHL   07/13 19:05 MTL3$HF   BSN90859  CONSOLE
R; T=0.01/0.01 13:25:40
.
DISK LOAD

STATS    CUST2    A1
R; T=0.01/0.03 13:25:53
.
T STATS CUST2

1
```

EXAMPLE 2.

RECEIVING THE OUTPUT OF MODULE STATSFB FROM THE BATCH MACHINE VIA THE VIRTUAL READER.

CUSTOMER ACCOUNT STATISTICS FRI JUL 13, 1979

1. GENERAL INFORMATION

TOTAL NO. OF ACCOUNTS	=	20
NO. OF OTS ACCOUNTS (TYPES 1 & 3)	=	0
NO. OF NON OTS ACCOUNTS (TYPES 2 & 4)	=	20
NO. OF ACCOUNTS WITH TYPE OF ACCT 0	=	0
NO. OF PBX ACCOUNTS (TYPE OF SERV 1 TO 179)	=	0
NO. OF NON PBX-PB ACCOUNTS (TYPE OF SERV 180 TO 200)	=	3
NO. OF NON PBX-NON PB ACCOUNTS (TYPE OF SERV 205 TO 234)	=	17
AVERAGE NO. OF USOC TYPES PER ACCOUNT	=	4.6
LARGEST NO. OF USOC TYPES FOR AN ACCOUNT (ACCOUNT I.D. : 819 242 2708 TYPE = 4)	=	16
LARGEST SERV & EQUIP BILLING (ACCOUNT I.D. : 819 242 2708 TYPE = 4)	=	155
LARGEST LONG DISTANCE BILLING (ACCOUNT I.D. : 819 242 2708 TYPE = 4)	=	222
LARGEST 'QTY OF TYPE USOC' (ACCOUNT I.D. : 819 242 2708 TYPE = 4)	=	6
LARGEST LINE SIZE VALUE (MAIN SYSTEM) (ACCOUNT I.D. : 819 242 2611 TYPE = 4)	=	9

2. INFORMATION SPECIFIC TO PBX ACCOUNTS (TYPE OF SERVICE 1 TO 179)

SAMPLE OUTPUT ATTACHED IN APPENDIX 4.

AVERAGE NO. OF PBX SYSTEMS PER ACCOUNT	=	0.0
LARGEST NO. OF PBX SYSTEMS FOR A PBX ACCOUNT	=	0
AVERAGE NO. OF USOC TYPES PER ACCOUNT	=	0.0
AVG NO. OF LINE SIZE VALUES PER MAIN PBX SYSTEM	=	0.0
LARGEST NO. OF LINE SIZE VALUES FOR A MAIN PBX SYS	=	0

APPENDIX 1

DATA BASE DICTIONARY

The BARS master file contains the following data items for each of the approx. 500,000 business customers of Bell Canada:

	DATA ITEM	DESCRIPTION
i)	NPA-NNX-Line number	Customer's telephone no. (e.g. 514-282-6815)
ii)	Name & Address	Customer's Name and billing address
iii)	UCB CODE	Universal Classification of Business Code. A five digit numeric code identifying the customer's business type (e.g. doctor, baker)
iv)	S&E Billing	Monthly Service and Equipment Billing
v)	LD Billing	Monthly Long Distance Billing
vi)	No. of Systems	A System is an entity describing a collection of equipment e.g. a PBX system. This data item records the no. of system's the customer rents.
vii)	No. of USOCs (NOUSOC)	A USOC (Universal Service Order Code) is a 5 digit alphanumeric code identifying a piece of terminal equipment (e.g. a CONTEMPRA phone). This item records the no. of USOCs the customer rents.
viii)	Special Service Indicators	12 indicators (flags) for market research purposes.

	DATA ITEM	DESCRIPTION
ix)	AREA	A one character code representing the administrative area the customer belongs to. ('Q' for Quebec Provincial, 'M' for Montreal, 'N' for North East, 'T' for Toronto, 'S' for South-West)

For each System, the following information is recorded (i.e. the following group of data items repeat NOSYS times).

	DATA ITEM	DESCRIPTION
x)	System no.	A random number identifying each system
xi)	Type of service	A number between 1 and 256 indicating the type of service which the system represents (e.g. PBX, MANUAL)
xii)	Qty of Serving Vehicle	The quantity of the type of equipment that determines the TYPE OF SERVICE
xiii)	14 Line Size Values	14 numeric values representing the size of 14 standard descriptors of a system

For each USOC, the following information is recorded (i.e. the following group of data items repeat NOUSOC times).

	DATA ITEM	DESCRIPTION
xiv)	USOC code	A 5 digit alphanumeric code identifying the terminal equipment
xv)	System no.	The identication of the System to which this USOC belongs
xvi)	USOC Qty.	The quantity (number) of this USOC
xvii)	USOC Charge	The total monthly rental charge for this USOC.

APPENDIX 2.

SUB-BASE FORMAT RECORD LAYOUTS (3NF)

FNAME ACCT	LIBNAME	FILETYPE	MODE										P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	EDIT FL	EDIT TL	EDIT L
NPA			1	I	1		NPA									
NNX			2	I	3		NNX									
LINE			5	I	4		Line No.									
AREA			9	A	1		Area									
SEBILL			10	I	7		Monthly Service & Equip Bill									
LDBILL			17	I	7		Monthly Long Distance Bill									
UCB			24	I	5		Universal Classification of Business									
NØSYS			29	I	2		No. of Systems									
NØUSØC			31	I	4		No. of USOCS									
ACTYPE			35	I	1		Type of Account									
TOTRESP			36	A	2											
MKTRES			38	A	2											
FX			40	I	1											
IX			41	I	1											
DATA			42	I	1		12 SPECIAL PURPOSE									
TELPAK			43	I	1		MARKET RESEARCH									
SPLDGR			44	I	1		INDICATORS.									
WATS			45	I	1											
TTY			46	I	1											
MOBILE			47	I	1											
SPLTBL			48	I	1											
R1050			49	I	1											

FNAME CUST	LIBNAME	FILETYPE	MODE		P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	FL	TL	LI
NPA			1	I	1		NPA									
NNX			2	I	3		NNX									
LINE			5	I	4		Line No.									
AREA			9	A	1		Area									
CUSTID			10	A	96		CUSTOMER NAME & ADDRESS									

FNAME SYS | LIBNAME | FILETYPE | MODE | P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	FL	TL	LI
NPA			1	I	1		NPA									
NNX			2	I	3		NNX									
LINE			5	I	4		Line No.									
SYSNØ			9	I	2		System No.									
TYPSERV			11	I	3		Type of Service									
SERV QTY			14	I	4		Qty. of serving vehicle									
LSZ1			18	I	4											
LSZ2			22	I	4											
LSZ3			26	I	4											
LSZ4			30	I	4											
LSZ5			34	I	4											
LSZ6			38	I	4		VALUES OF 14 STANDARD									
LSZ7			42	I	4											
LSZ8			46	I	4		SYSTEM DESCRIPTORS (LINE									
LSZ9			50	I	4		SIZES)									
LSZ10			54	I	4											
LSZ11			58	I	4											
LSZ12			62	I	4											
LSZ13			66	I	4											
LSZ14			70	I	4											
AREA			74	A	1		Area									

FNAME USOC | LIBNAME | FILETYPE | MODE | P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	EDIT FL	EDIT TL	EDIT LN
NPA			1	I	1		NPA									
NNX			2	I	3		NNX									
LINE			5	I	4		Line No.									
SYSNO			9	I	2		System No. of Parent System.									
USOCCD			11	A	5		USOC CODE									
USOC QTY			16	I	4		USOC QUANTITY									
USOC CHG			20	I	7		USOC CHARGE (MONTHLY)									
AREA			27	A	1		Area									

APPENDIX 3.

FULL-BASE FORMAT RECORD LAYOUTS
(MERGED RECORDS)

FNAME: FULLBASE	LIBNAME	FILETYPE	MODE		P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	EDIT FL	EDIT TL	EDIT L
RECTYPE			1	A	1		Type of Record ('A')									
NPA			2	I	1		NPA									
NNX			3	I	3		NNX									
LINE			6	I	4		Line No.									
AREA			10	A	1		Area									
SEBILL			11	I	7		Monthly Service & Equip Bill									
LDBILL			18	I	7		Monthly Long Distance Bill									
UCB			25	I	5		Universal Classification of Business									
NØSYS			30	I	2		No. of Systems									
NØUSØC			32	I	4		No. of USOCS									
ACTYPE			36	I	1		Type of Account									
TOTRESP			37	A	2											
MKTRES			39	A	2											
FX			41	I	1											
IX			42	I	1											
DATA			43	I	1		12 SPECIAL PURPOSE									
TELPAK			44	I	1		MARKET RESEARCH									
SPLDGR			45	I	1		INDICATORS.									
WATS			46	I	1											
TTY			47	I	1											
MOBILE			48	I	1											
SPLTBL			49	I	1											
R1050			50	I	1											

FNAME: ALLBASE	LIBNAME	FILETYPE	MODE		P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	EDIT FL	EDIT TL	EDIT L
RECTYPE			1	A	1		Type of Record ('C')									
NPA			2	I	1		NPA									
NNX			3	I	3		NNX									
LINE			6	I	4		Line No.									
AREA			10	A	1		Area									
CUSTID			11	A	96		CUSTOMER NAME & ADDRESS									

FNAME: 4LCBASE | LIBNAME: | FILETYPE: | MODE: | P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	FL	TL	I
RECTYPE			1	A	1		Type of Record ('1')									
NPA			2	I	1		NPA									
NNX			3	I	3		NNX									
LINE			6	I	4		Line No.									
SYSNØ			10	I	2		System No.									
TYPSERV			12	I	3		Type of Service									
SERV QTY			15	I	4		Qty. of serving vehicle									
LSZ1			19	I	4											
LSZ2			23	I	4											
LSZ3			27	I	4											
LSZ4			31	I	4											
LSZ5			35	I	4											
LSZ6			39	I	4		VALUES OF 14 STANDARD									
LSZ7			43	I	4											
LSZ8			47	I	4		SYSTEM DESCRIPTORS (LINE SIZES)									
LSZ9			51	I	4											
LSZ10			55	I	4											
LSZ11			59	I	4											
LSZ12			63	I	4											
LSZ13			67	I	4											
LSZ14			71	I	4											
AREA			75	A	1		Area									

FNAME	LLLBASE	LIBNAME	FILETYPE	MODE		P OF

FIELD NAME	SEG	LVL	FIELD LOC	TYP	FIELD LEN	DEC	HEADING	KEY	SEG OCCUR	OWN	MAX OCCUR	COUNT FIELD NAME	EDIT FT	EDIT FL	EDIT TL	EDIT I
RECTYPE			1	A	1		Type of Record ('4')									
NPA			2	I	1		NPA									
NNX			3	I	3		NNX									
LINE			6	I	4		Line No.									
SYSNO			10	I	2		System No. of Parent System.									
USOCCD			12	A	5		USOC CODE									
USOC QTY			17	I	4		USOC QUANTITY									
USOC CHG			21	I	7		USOC CHARGE (MONTHLY)									
AREA			28	A	1		Area									

APPENDIX 4.

SAMPLE OUTPUT OF MODULE STATS

CUSTOMER ACCOUNT STATISTICS TUE MAY 29, 1979

1. GENERAL INFORMATION

TOTAL NO. OF ACCOUNTS	=	21151
NO. OF OTS ACCOUNTS (TYPES 1 & 3)	=	48
NO. OF NON OTS ACCOUNTS (TYPES 2 & 4)	=	18708
NO. OF ACCOUNTS WITH TYPE OF ACCT 0	=	2395
NO. OF PBX ACCOUNTS (TYPE OF SERV 1 TO 179)	=	21151
NO. OF NON PBX-PB ACCOUNTS (TYPE OF SERV 180 TO 200)	=	0
NO. OF NON PBX-NON PB ACCOUNTS (TYPE OF SERV 205 TO 234)	=	0
AVERAGE NO. OF USOC TYPES PER ACCOUNT	=	21.2
LARGEST NO. OF USOC TYPES FOR AN ACCOUNT (ACCOUNT I.D. : 416 111 4602 TYPE = 2)	=	224
LARGEST SERV & EQUIP BILLING (ACCOUNT I.D. : 514 151 3813 TYPE = 2)	=	93588
LARGEST LONG DISTANCE BILLING (ACCOUNT I.D. : 416 138 8504 TYPE = 4)	=	95971
LARGEST 'QTY OF TYPE USOC' (ACCOUNT I.D. : 416 190 3792 TYPE = 4)	=	21
LARGEST LINE SIZE VALUE (MAIN SYSTEM) (ACCOUNT I.D. : 514 157 3770 TYPE = 4)	=	4486

2. INFORMATION SPECIFIC TO PBX ACCOUNTS (TYPE OF SERVICE 1 TO 179)

AVERAGE NO. OF PBX SYSTEMS PER ACCOUNT	=	1.0
LARGEST NO. OF PBX SYSTEMS FOR A PBX ACCOUNT	=	9
AVERAGE NO. OF USOC TYPES PER ACCOUNT	=	21.2
AVG NO. OF LINE SIZE VALUES PER MAIN PBX SYSTEM	=	3.3
LARGEST NO. OF LINE SIZE VALUES FOR A MAIN PBX SYS	=	9

3. INFORMATION SPECIFIC TO NON-PBX ACCOUNTS (TYPE OF SERVICE 180 AND ABOVE)

AVERAGE NO. OF SYSTEMS PER ACCOUNT	=	0.0
LARGEST NO. OF SYSTEMS FOR AN ACCOUNT	=	0
AVERAGE NO. OF USOC TYPES FOR AN ACCOUNT	=	0.0
AVERAGE NO. OF LINE SIZE VALUES PER MAIN SYSTEM	=	0.0
LARGEST NO. OF LINE SIZE VALUES FOR A MAIN SYSTEM	=	0

4. DISTRIBUTION OF ACCOUNTS BY NO. OF USOC TYPES

NO. OF USOC TYPES	NO. OF ACCOUNTS	PERCENTAGE
1	434	2.05%
2	1388	6.56%
3	1231	5.82%
4	915	4.33%
5	671	3.17%
6	565	2.67%
7	648	3.06%
8	669	3.16%
9	594	2.81%
10	558	2.64%
11 +	13478	63.72%

5. DISTRIBUTION OF PBX ACCOUNTS BY NO. OF SYSTEMS

NO. OF SYSTEMS	NO. OF ACCOUNTS	PERCENTAGE
1	21034	99.45%
2	89	0.42%
3	18	0.09%
4	8	0.04%
5	1	0.00%
6 +	1	0.00%

6. NO. OF ACCOUNTS IN EACH NPA

NPA	NO. OF ACCOUNTS
819	846
613	2001
514	5469
705	806
416	8064
807	96
418	1196
519	2673

7. DISTRIBUTION OF ACCOUNTS BY S&E BILLING BANDS

S & E BILLING	NO. OF ACCOUNTS	PERCENTAGE
0- 10	346	1.64 %
11- 20	334	1.58 %
21- 30	184	0.87 %
31- 40	246	1.16 %
41- 50	320	1.51 %
51- 60	250	1.18 %
61- 70	189	0.89 %
71- 80	244	1.15 %
81- 90	360	1.70 %
91- 100	254	1.20 %
101- 200	2060	9.74 %
201- 300	1400	6.62 %
301- 400	1219	5.76 %
401- 500	871	4.12 %
501- 600	834	3.94 %
601- 700	893	4.22 %
701- 800	1019	4.82 %
801- 900	913	4.32 %
901- 1000	822	3.89 %
1001- 5000	7381	34.90 %
5001-10000	662	3.13 %
10001 +	350	1.65 %

8. DISTRIBUTION OF ACCOUNTS BY LD BILLING BANDS

LD BILLING	NO. OF ACCOUNTS	PERCENTAGE
0- 10	4534	21.44 %
11- 20	902	4.26 %
21- 30	633	2.99 %
31- 40	558	2.64 %
41- 50	492	2.33 %
51- 60	416	1.97 %
61- 70	358	1.69 %
71- 80	330	1.56 %
81- 90	340	1.61 %
91- 100	309	1.46 %
101- 200	2298	10.86 %
201- 300	1539	7.28 %
301- 400	1124	5.31 %
401- 500	875	4.14 %
501- 600	708	3.35 %
601- 700	558	2.64 %
701- 800	484	2.29 %
801- 900	399	1.89 %
901- 1000	391	1.85 %
1001- 5000	3438	16.25 %
5001-10000	311	1.47 %
10001 +	154	0.73 %

9. DISTRIBUTION OF ACCOUNTS BY MAJOR UCB GROUP

UCB GROUP	NO. OF ACCOUNTS	PERCENTAGE
1	214	1.01 %
2	1879	8.88 %
3	214	1.01 %
4	3379	15.98 %
5	129	0.61 %
6	1921	9.08 %
7	1942	9.18 %
8	521	2.46 %
9	1300	6.15 %
10	439	2.08 %
11	1283	6.07 %
12	1321	6.25 %
13	144	0.68 %
14	2524	11.93 %
15	1402	6.63 %
16	2390	11.30 %
17	149	0.70 %

10. NO. OF ACCOUNTS BY MAIN SYSTEM TYPE OF SERVICE

(NOTE : TYPES OF SERV NOT LISTED BELOW HAVE 0 ACCOUNTS)

MAIN SYS TYPE OF SERV	NO. OF ACCOUNTS	PERCENTAGE
1	87	0.41%
2	999	4.72%
3	52	0.25%
5	9	0.04%
6	3	0.01%
7	129	0.61%
9	1	0.00%
10	653	3.09%
11	1146	5.42%
12	593	2.80%
13	152	0.72%
14	42	0.20%
15	32	0.15%
16	17	0.08%
17	15	0.07%
18	12	0.06%
19	15	0.07%
20	4	0.02%
22	1	0.00%
24	2	0.01%
25	3	0.01%
26	11	0.05%
27	10	0.05%
28	6	0.03%
29	3	0.01%
30	3	0.01%
35	1	0.00%
37	1	0.00%
47	1	0.00%
63	213	1.01%
64	112	0.53%
65	59	0.28%
66	144	0.68%
67	16	0.08%
68	36	0.17%
69	4	0.02%
71	253	1.20%
72	1090	5.15%
73	56	0.26%
74	549	2.60%
75	350	1.65%
76	46	0.22%
77	112	0.53%
78	780	3.69%
79	88	0.42%
80	1	0.00%
81	4	0.02%
82	52	0.25%
83	2	0.01%
84	2	0.01%
85	1	0.00%
87	2	0.01%
90	46	0.22%

94	159	0.75%
95	801	3.79%
96	98	0.46%
97	2	0.01%
98	10	0.05%
99	102	0.48%
100	21	0.10%
101	32	0.15%
102	10	0.05%
104	20	0.09%
105	37	0.17%
106	11	0.05%
107	1	0.00%
108	6	0.03%
109	18	0.09%
110	3	0.01%
116	2	0.01%
117	2	0.01%
122	228	1.08%
123	2	0.01%
124	2	0.01%
126	68	0.32%
127	10	0.05%
128	26	0.12%
129	17	0.08%
130	2	0.01%
131	757	3.58%
132	135	0.64%
133	1	0.00%
136	7	0.03%
137	2026	9.58%
139	523	2.47%
140	1561	7.38%
141	80	0.38%
142	1008	4.77%
148	164	0.78%
155	27	0.13%
162	4	0.02%
163	59	0.28%
165	12	0.06%
167	177	0.84%
168	3	0.01%
170	2	0.01%
171	3	0.01%
172	5	0.02%
174	3677	17.38%

TOTAL NO. OF ACCOUNTS INPUT = 21151

Job completed
You may issue any of the following 3 commands
to execute a subsequent phase of TABS. The 3 commands are:

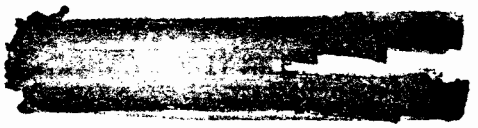
1. PRTTAB (To obtain a print out of your subset)
2. FREQ (To obtain a usoc frequency table of your subset)
3. SELSPSS (To invoke the spss conversion phase of TABS)

Alternatively, you may wish to further reduce your current
subset of data. To do this, use the SELECT phase
of TABS followed by the EXTRACT phase of TABS.

APPENDIX 5.

SAMPLE OUTPUT OF MODULE PRTTAB

1 I.D. : 819 [redacted] Area: N EAST Ucb:77411 Ucb Group:10 Type:



BILLING : Long Distance: 17 Serv & Equip: 21

INDICATORS: Tot Resp: R1050:0 Sp Serv: FFFFFFFFFF

SYSTEMS : No. of systems : 1

System 1 Sys No.: 1 Type :205 Qty of 'type' usoc :
The 14 Line Size values are (in order) :
0 0 0 0 0 0 0
0 0 0 0 1 2 3

USOCS : No. of USOCS : 4 USOC codes,qty & charges (cents) are :

EXT	2	530	RLT	1	95	1FB	1	2280
1LLBM	1	230						

2 I.D. : 819 [redacted] Area: N EAST Ucb:93100 Ucb Group:16 Type:

BILLING : Long Distance: 13 Serv & Equip: 15

INDICATORS: Tot Resp: R1050:1 Sp Serv: FFFFFFFFFF

SYSTEMS : No. of systems : 1

System 1 Sys No.: 1 Type :205 Qty of 'type' usoc :
The 14 Line Size values are (in order) :
0 0 0 0 0 0 0
0 0 0 0 1 0 1

USOCS : No. of USOCS : 2 USOC codes,qty & charges (cents) are :

RDK	1	270	1FB	1	1275

3 I.D. : 819 [redacted] Area: N EAST Ucb:76010 Ucb Group: 9 Type:

BILLING : Long Distance: 4 Serv & Equip: 20

INDICATORS: Tot Resp: R1050:0 Sp Serv: FFFFFFFFFF

SYSTEMS : No. of systems : 1

System 1 Sys No.: 1 Type :205 Qty of 'type' usoc :
The 14 Line Size values are (in order) :
0 0 0 0 0 0 0
0 0 0 0 1 2 3

USOCS : No. of USOCS : 3 USOC codes,qty & charges (cents) are :

EXT	2	530	RLT	4	380	1FB	1	2280

APPENDIX 6.

SAMPLE OUTPUT OF MODULE FREQ

NO. OF USOC CODES OUTPUT = 1884

NO.	USOC CODE	NO. OF ACCOUNTS OCCURRED IN	TOTAL QUANTITY
1	AAA	2	2
2	AAR	13	13
3	ACF	5	5
4	ACG	5	85
5	ACJ	1	1
6	ACL	1	117
7	ACM	1	10
8	ACR	1	1
9	AC2	4	4
10	AC2XX	1	1
11	ADM	79	100
12	ADM2T	1	1
13	ADR	20	31
14	ADX	4	6
15	AMP	17	22
16	AMU	4	6
17	ASN	11	27
18	ASU	55	65
19	ATB	5	5
20	ATC	41	45
21	ATH	225	402
22	ATM	15	19
23	ATN	528	554
24	ATT	45	55
25	ATW	70	125
26	ATX	214	538
27	ATY	24	39
28	AZZ	9	14
29	A72	79	5800
30	A722T	1	37
31	A89	3	3
32	A9W	4	4
33	A9X	4	4
34	BBC	1	2
35	BBS	2	2
36	BBW	4	12
37	BBWHX	4	17
38	BBWSX	2	6
39	BB4X4	2	2
40	BB4X6	366	637
41	BB4X7	133	216
42	BCA	1	1
43	BCD	20	54
44	BEC	1196	1469
45	BEL	40	44
46	BFY	330	649
47	BFZ	2	5
48	BFZCC	1	2
49	BGD	3	16
50	BGG	381	785
51	BGGCC	5	62
52	BGH	88	143
53	BGN	134	180
54	BGNCC	6	17
55	BJK	1	1

94	159	0.75%
95	801	3.79%
96	98	0.46%
97	2	0.01%
98	10	0.05%
99	102	0.48%
100	21	0.10%
101	32	0.15%
102	10	0.05%
104	20	0.09%
105	37	0.17%
106	11	0.05%
107	1	0.00%
108	6	0.03%
109	18	0.09%
110	3	0.01%
116	2	0.01%
117	2	0.01%
122	228	1.08%
123	2	0.01%
124	2	0.01%
126	68	0.32%
127	10	0.05%
128	26	0.12%
129	17	0.08%
130	2	0.01%
131	757	3.58%
132	135	0.64%
133	1	0.00%
136	7	0.03%
137	2026	9.58%
139	523	2.47%
140	1561	7.38%
141	80	0.38%
142	1008	4.77%
148	164	0.78%
155	27	0.13%
162	4	0.02%
163	59	0.28%
165	12	0.06%
167	177	0.84%
168	3	0.01%
170	2	0.01%
171	3	0.01%
172	5	0.02%
174	3677	17.38%

TOTAL NO. OF ACCOUNTS INPUT = 21151

Job completed
You may issue any of the following 3 commands
to execute a subsequent phase of TABS. The 3 commands are:

1. PRTTAB (To obtain a print out of your subset)
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