JAERI-M
93-182

AN NRTA DATA PROCESSING SYSTEM

— PROMAC-J —

September 1993

Koji IKAWA, Hitoshi IHARA and Hideo NISHIMURA

日本原子力研究所
Japan Atomic Energy Research Institute

JAERI-Mレポートは，日本原子力研究所が不定期に公刊している研究報告書です。
入手の問合わせは，日本原子力研究所技術情報部情報資料課（〒319-11茨城県那珂郡東海村）あて，お申しこしください。なお，このほかに財団法人原子力弘済会資料センター（〒319-11 茨城県那珂郡東海村日本原子力研究所内）で複写による実費頒布をおこなっております。

JAERI-M reports are issued irregularly.
Inquiries about availability of the reports should be addressed to Information Division Department of Technical Information, Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki-ken 319-11, Japan.

編集兼発行　日本原子力研究所
印　　刷　いばらき印刷㈱

JAERI-M 93-182

An NRTA Data Processing System
- PROMAC-J -

Koji IKAWA, Hitoshi IHARA and Hideo NISHIMURA

Department of Fuel Cycle Safety Research
Tokai Research Establishment
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken

(Received August 30, 1993)

Study of the application of Near-Real-Time Materials Accountancy has been done as an advanced safeguards measure for a spent nuclear fuel reprocessing plant. Also, from the viewpoint of practical application of NRTA concept to a real plant, a data processing system for the NRTA has been developed in consideration of effectiveness and promptness of data processing of NRTA data obtained in the field, so that a user can easily handle the analysis of time sequential MUF data based on the decision analyses in the field. The NRTA data processing system was used for processes and analyses of the NRTA data obtained during the period from September to December, 1985, a full scale field test of the proposed NRTA model for the PNC Tokai reprocessing plant. The result of this field test showed that the NRTA data processing system would be useful to provide sufficient information under the real plant circumstance. The data processing system was improved reflecting the experiences obtained in the field test.

This report describes hardwares and softwares of the JAERI NRTA data processing system that was developed as an improvement of the previous system that had been developed and transferred to the PNC Tokai reprocessing plant. Improvements were made on both hardware components and softwares.

Keywords: NRTA, Advanced Safeguards, PNC Reprocessing Plant, NRTA Field Test, NRTA Data Processing Test

JAERI-M 93-182

ＮＲＴＡデータ処理システム
── ＰＲＯＭＡＣ－Ｊ ──

日本原子力研究所東海研究所燃料サイクル安全工学部
猪川　浩次・井原　　均・西村　秀夫

（1993年８月30日受理）

再処理工場に適用する保障措置の有効性を高めることを目的に，近実時間計量管理（ＮＲＴＡ）の適用化研究を行なってきた。その中で，このＮＲＴＡの実用化を進めるために，実プラント用のＮＲＴＡデータ処理システムを開発した。これは，施設において採用されたＮＲＴＡのデータを効率よく，かつ，迅速に処理し，得られた時系列ＭＵＦデータの統計解析を現場で簡単に実行できるようにしたものである。このＮＲＴＡデータ処理システムは，東海再処理工場で実施されたＮＲＴＡの実証試験（1985年９月～12月）において用いられた結果，有用かつ実用的であり，定常業務に使用できることが確認された。また，実証試験の経験に基づき，よりよいシステムへの改良も行なった。

本報告書は，当研究室で保有するＮＲＴＡデータ処理システムのハードウェア及びソフトウェアについて記述する。このシステムは，東海再処理工場用に開発し，その後同工場に移転された旧システムの改良システムとして開発されたものである。改良は処理装置，周辺機器及びソフトウェアについて行なわれている。

東海研究所：〒319-11　茨城県那珂郡東海村白方字白根２－４

Contents

目　　次

1. INTRODUCTION

1.1 Background of JASPAS Task 'JB-1'

When the Task JB-1 was initiated in 1982, the problems that had been experienced by the Japan National System of Safeguards in the area of material balance measurements and evaluation of inspection data were almost identical to those of the IAEA inspectorate. Common areas that had needed further study and improvement were as follows:

1) Improvement of procedure for measurement of nuclear material, particularly at the primary input/output KMP's of bulk handling MBA's in order to maintain good control over measurement bias and imprecision that are a primary cause of significant MUF and differences between operator/inspector measurements. This includes inspection measurements as well as the facility measurements.

2) Improvement of inspection data collection procedures with the aim of improving timeliness and accuracy of data transfer from facility records and measurement equipment (NDA) to the inspectors and onward to headquarters groups that are responsible for maintaining central information systems and data evaluation functions.

3) Better coordination in the use of small computers for data collection, processing and evaluation with particular emphasis on compatibility of hardware, data transfer standards and, to the extent possible, software.

4) Improved software for data reduction and evaluation with distinctions between software designed for the field and headquarters use; particular emphasis should be placed on ease of use by inspection personnel and data evaluation officers.

5) Refinement of the existing statistical methods and procedures with emphasis on more simple procedures for data evaluation in the field and more complex evaluations at headquarters where experienced statisticians, chemists, physicists and NDA specialists are available as part of the evaluation team.

To cope with these problem areas a TASK JB-1 was initiated under the

Japan Support Program for Agency Safeguards (JASPAS). Proposed solution in this Task was as follows:

1) To establish an effective procedure for the operator to record, treat and evaluate source data using a facility's field computer.

2) To exchange the IAEA inspector's data-collection procedure that was used at that time, i.e., tabulating operator's data in working papers, to a new procedure; that is, the facility operator provides a cassette tape or a floppy disk to which operator's source data relevant to material accountancy were transferred from his field computer, and hands it to the inspector in timely manner. This new procedure should be designed from the view point of avoiding missing data elements and ensuring rapid dispatch of the data to the Agency headquarters evaluation teams.

3) Development of the coordinated use of computers for data collection, transfer, processing and software systems, basing on a study which will be performed by an IAEA/Japan study team.

1.2 Accomplishments of JB-1

Under the Task JB-1, several activities have been carried out reflecting issues in relation to improvement of safeguards approaches for a reprocessing plant and advancement of computer technology. In the course of proceeding of the task JB-1, it had been divided into two sub-tasks, i.e.,

(1) to improve computer programs that were used in the Agency headquarters
and
(2) to develop a data collection and analysis system that can be used at Tokai Reprocessing Plant.

The latter had two purposes, i.e.,

(1) to develop such a system for the use in the conventional material accountancy coping with proposed solution as described in Section 1.1, and
(2) to develop a data collection and analysis system to implement

near-real-time material accountancy model specifically proposed for the Tokai Reprocessing Plant under the Task F of the TASTEX Program that had been carried out before starting up of JASPAS Task JB-1. (TASTEX Task F and its follow-up had been carried out under a contract between JAERI and PNC with collaboration of IAEA specialists.)

Sub-Task(1): Improvement of the Agency's software
(carried out by Nuclear Material Control Center)

One of sub-task was to improve a set of computer programs that were used in the Agency headquarters for the purpose of evaluating material accountancy data statistically with data collected by the inspectorate in the field. The major targets of improvement of the computer programs were (1) to review all the programs to check their consistency and compatibility and to re-write them in a single software system by using a single computer language, since the original programs were written in several different languages, and (2) to add graphic presentation function to the software system.

A set of programs to be improved had been transferred from IAEA to the Nuclear Material Control Center (NMCC), where these jobs were carried out. One of NMCC staff brought the resulting software to Vienna and tried to operate it on the Agency Computer under the collaboration with the Agency staffs of the Computer section. However, the graphic function could not work on the Agency computer system because its operating system (OS) was not compatible with that of NMCC computer system on which the graphic function had been developed. This sub-task was terminated when it had been found that the circumstance to modify the graphic tool so as to operate on the Agency computer system was unavailable to the NMCC in Japan.

Sub-Task(2): A Data Collection and Analysis System for Tokai Reprocessing Plant
(carried out by Japan Atomic Energy Research Institute)

Under the Task JB-1, the following have been carried out.

1) The JAERI developed a software system 'PROMAC-C' for data collection and analysis for possible implementation of the near-real-time material accountancy at Tokai Reprocessing Plant. The system could also be

used for the purpose of conventional material accountancy.

2) The software system was transferred to the material accounting team of the PNC Reprocessing Plant. A hardware system that had been used to develop 'PROMAC-C' and would be used for the operation of 'PROMAC-C' were also transferred to the PNC in 1986.

3) The system, 'PROMAC-C', was used in a full scale field test of the proposed NRTA model. The field test was conducted under another JASPAS task with the participation of IAEA staff members, and the result of the test was reported in References [1-5]. The 'PROMAC-C' showed that it can be used as a practical tool to implement near-real-time material accountancy, if it was carried out at the PNC Reprocessing Plant.

4) An improved system, 'PROMAC-J', was developed.

This report will describe on the content of 'PROMAC-J' and its user's manual.

1.3 History of 'PROMAC-J'

The original data processing system, 'PROMAC', was developed to be used for the evaluation of the effectiveness of the NRTA model proposed for Tokai Reprocessing Plant, mainly concentrating on the simulation of nuclear flow and inventory in the process of the plant, the simulation of measurements at key measurement points, and decision analyses to evaluate detection capability as a measure of safeguards effectiveness based on the material balance data. To cope with the collection of actual NRTA data, a database system was established and the data analysis system was combined with this database system. Since in the PNC Tokai Works a large scale computer was used for storing and analyzing most of material accountancy data, it was assumed that the NRTA data processing system would also be used on such a large scale computer. Therefore, the NRTA data processing system was specifically developed for the use on such a computer.

In the course of NRTA application study, many commercial mini-computers have been developed throughout the world. A mini-computer have in general more appropriate functions than a large scale computer when it was

assumed to be used for an NRTA data processing system in the field, and the cost were considered reasonable. From these reasons, the original data processing system , i.e., 'PROMAC', was modified for the use on a mini-computer system. The modified version was named as 'PROMAC-C'. The word 'C' means 'conversation'.

It was assumed that the system 'PROMAC-C' would be jointly used by three users, i.e., the plant operator, the national inspector and the IAEA inspector. The system 'PROMAC-C' was used for partial and a full scale field tests of the NRTA model for Tokai Reprocessing Plant. Full member of participants expected to implement the NRTA, i.e., PNC staffs as the operator, JAERI staffs as acting STA inspectors and an IAEA staff of the Development Division as an Agency inspector, participated in this test. The results of these field test were reported in references [1-5].

With the completion of the field test of an NRTA model and of 'PROMAC-C', the Task JB-1 accomplished its major objectives. JAERI, however, have continued improvement of the software system in order to take the experiences of the field test and advancement of mini-computer technology into account. An improved system, 'PROMAC-J', has been developed as an almost final version of the data collection and analysis system for near-real-time material accountancy. The new system has been so programmed that it can be used not only for the Tokai Reprocessing Plant but also for other reprocessing plants.

2. NRTA DATA PROCESSING SYSTEM

2.1 General Description

A data processing system, 'PROMAC-C', for Near-Real-Time Material Accountancy (NRTA) was developed in consideration of the system being used in the field. The hardware system to operate it was designed based on a mini-computer, VSX-800 (EWS: Engineering Work Station) with peripheral devices such as DSCAN for color graphic display, personal computers, etc. It has three input terminals, each of which is exclusively used by one of the parties involved, i.e., the IAEA, the Science and Technology Agency (STA) of the Government of Japan and the plant operator, the Power Reactor and Nuclear Fuel Development Corporation (PNC). There is a memory capacity of sufficient size for the system to operate in a simultaneous use by the three organizations. While each organization can make access through the common software to a common data base file in which the fundamental NRTA data such as input and output accountancy data and in-process inventories are stored, it can exclusively use a specific data base file which has been developed for its own purpose.

All software, which was developed to process NRTA data on a large scale computer, has been converted to the software which can be used in the mini-computer, VSX-800. For the operating system (OS) of the mini-computer, UNIX was adopted. The system can handle several users and several tasks simultaneously, which is a desirable characteristics for a computer system that will be used in the field by safeguards relevant parties. This OS also can support computer languages, FORTRAN 77 and C, and also control a graphic processing package such as PLOT10 and CALCOMP plotter library. The major part of data processing software was programmed with FORTRAN 77, while some of the control programs were coded using C language.

The principal items that have been considered important in developing data processing system are as follows:

(1) Plant operators collect all of the NRTA data, store them in relevant files which are managed only by the operator, while inspectors collect their data, store them in files assigned for them and manage the files by themselves. Access by the plant operator to these inspector's files are allowed only when the relevant inspector gave permission to the operator.

(2) The IAEA inspector as well as the national inspector can operate the

system independently.

(3) The system can work as a backup system for 'PROMAC-C' that had been developed by JAERI and transferred to PNC.

(4) Data protection and encryption functions should be available.

Basing on these basic concept, an improved software system of PROMAC-C, i.e., PROMAC-J has been developed.

2.2 Hardware Components designed for the Use of 'PROMAC-J'

The hardware configuration of the data processing system is shown in Fig.2.1. For a central processing unit (CPU), a Motorola's MC 68020 MPU (32 bit CPU, clock frequency of 16.67 MHz) is used. A dynamic memory of 8 MByte capacity is installed into the mainframe of the system, and data transmission between the CPU and the dynamic memory is done through a local bus with no wait. As for input/out (I/O) bus, VME-bus, a general purpose bus for 32 bit machine, is used. Through this I/O bus, the CPU is connected with two units of Winchester disk of 100 MBytes capacity and a cartridge magnetic tape (MT) of 140 MByte capacity as built-in devices, and a magnet optical disk of 600 MByte capacity and an 8 inch floppy disk of 1 MByte capacity as outside devices. The capacity of the dynamic memory can be extended to 16 MBytes.

As I/O devices, a system console and an input terminal (ANRITSU DDY-881) are connected with the CPU via two RS232C ports that are directly connected with the CPU. Other devices such as two input terminals, a graphic terminals and modems for telecommunication are connected with the CPU via eight serial interface RS232C ports, and a page printer via a parallel interface board.

Following is outline of specification of the hardware system.

(1) Computer system (3 MIPS: ASR K.K.)

. CPU	: MC68020 (16.67 MHz)
. Co-Processor	: MC68881 (16.67 MHz)
. Main Memory	: 8 MBytes
. Disk Capacity	: 100 MBytes (2 Units)
. Cartridge MT	: 140 MBytes

. Magnet Optical Disk : 600 MBytes (300 MBytes for one side)
. Floppy Disk : 1 MByte (8 inches)

(2) Input/output terminals
. VDT-100 : Compatible with VT-100 (Itochu Electronics Co. Ltd.)
. DDY-881 : Kanji terminal (Anritsu Electric Co. Ltd.)
. YGT-100 : Compatible with VT-100 (Nihon Gakki Co. Ltd.)

(3) Color Graphic Display devices(Seiko Electronics Industry Co.Ltd.)
(GR-2401 DSCAN)
. 20 inch high resolution CRT
. 1024 x 1024 dots
. 8 color simultaneous display
. Tektronix 4014 emulate function
. ASCII type key board configuration
. Data transmission speed ; 9600 BPS

(CH-5202 Color hard copy device)
. Paper Size ; A4

(4) Printer (Page printer LCS-2400)(CASIO Calculator Co.Ltd.)
. Speed ; 8 pages / minute
. Connection with the computer: Sentronics terminal

(5) Modem for data transmission (MD2400H; 2 units)(Omron Co.Ltd.)
. CCITT V22 bis (all duplicated 2400 bps)
. CCITT V22 BELL 212A (all duplicated 1200 bps)
. CCITT V21 BELL 103 (all duplicated 300 bps)

(6) Personal computer(NEC; Nippon Electric Company Ltd.)
. PC-9801UV2

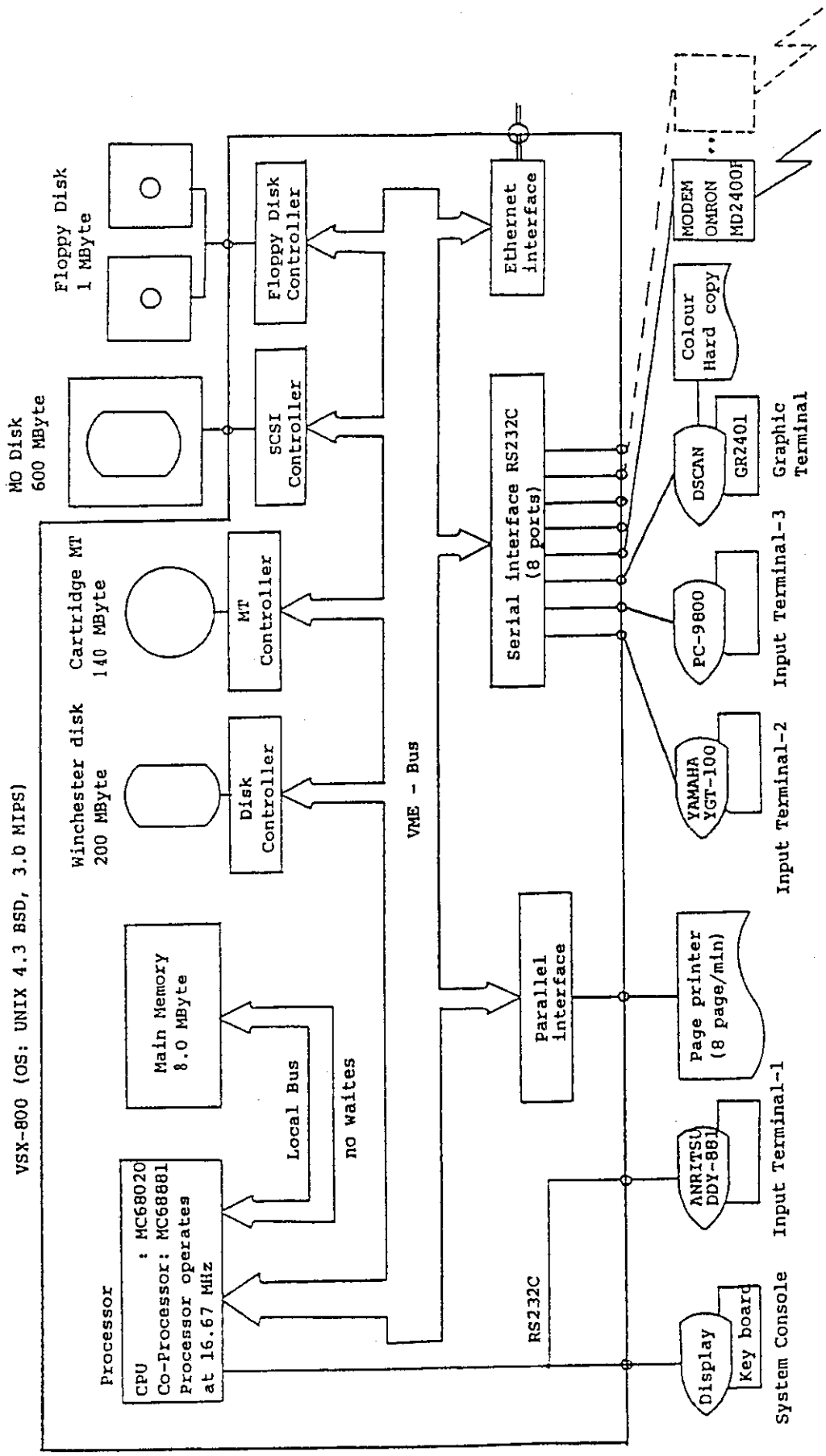

Fig. 2.1 Hardware Configuration of the Data Processing System for Near-Real-Time Materials Accountancy

3. OPERATING SYSTEM OF PROMAC-J

The data processing system is operated by the UNIX Operating System (OS), that is used as an almost standard OS for mini-computers and engineering work stations. The version of this OS is 4.3 BSD that was developed by Berkeley School of the University of California. There are many publications on the UNIX, but the following description may be useful for a user of PROMAC-J to understand features of this OS from the viewpoint of material accountancy.

(1) File structure and file protection

Fig. 3.1 shows the data file structure of PROMAC-J under UNIX Operating System. As shown in this figure, there is a hierarchical structure of programs and data files, i.e., some groups of data files or programs are placed under several specific directories, and some of directories are grouped again and placed under another higher directory. Users of this system can access to these directories or data files according to their individual qualifications given in advance. Qualification of individual person is given by a personal data consisting of combination of his name, his password, etc., and recorded on each of directories, data files and computer programs. For each directory and each file, those access to the file with the purpose such as 'writing in', 'reading out' or 'executing a program' may be restricted to the owner of the file, members of participating organization or other authorized persons. If such a restriction is applied, a user who wish to use data or computer programs stored in a file can use it only when he gave the computer a correct password and his ID name. Naturally, data change in a file and data addition to a file are allowed only for an authorized person. For the protection of data in a file, the data can be encrypted as a whole, if so desired. These access authorization, data encryption and defining the names and structure of directories can be performed by the owner of the file. This can be done easily by using UNIX commands. This way of protection of data files and programs is not specifically developed for PROMAC-J but a built-in function of the UNIX system. Figure 3.1 shows the file structure of 'PROMAC-J' under UNIX operating system.

(2) Handling I/O Devices

I/O devices may be handled like a file. Data can be supplied

through a file as well as by a keyboard. An output can be given on a CRT screen, a printer or a file depending on the user's assignment. Various kinds of I/O devices including a terminal device that are available at suitable market can be incorporated into the system with a lot of flexibility. Communication between the CPU and I/O terminals is of a dual system, that is input and output processing is carried out in parallel if UNIX commands are given in a suitable combination.

Using UNIX commands,it is possible to connect the system with a measurement instrument and to control a timing of receiving / sending I/O signals depending on a result of data processing. Interface software to realize such functions can easily be developed by using various modular type functional routines written in C language.

(3) Communication between two systems

It is easy to construct a communication network among the systems which are controlled by UNIX, since UNIX has functions for file transmission, remote job treatment, automatic information sending and receiving, and electronic mailing. In case of electronic mailing, UNIX has a function of encryption so that the mail can be protected against its leakage and misuse. If the communication line is disconnected during communication, the text under sending is automatically saved, and it will be recovered if re-connected. Since it is easy to remotely monitor processes through a public line or an exclusive line as well as to transmit files and to carry out data processing, UNIX could flexibly respond to the development of safeguards technologies with a proper interface software being provided.

(4) Standard Operating System (OS)

The UNIX system has been used since 1970. The system can be said to be reliable based on a long term experience of its usage. A lot of software has been accumulated so far in the world, especially in the United States. Almost all parts of the system were programmed by the C language so that it is able to transfer the software from one computer system to another. UNIX has been made available for a variety of computers from personal computer like PC-9800 to a super computer of vector type like CRAY-2. It means that UNIX is a universal OS independent from computer types. Therefore, it would be possible to improve an efficiency in the software developments if UNIX is utilized as a common OS for a computer since such OS makes conversions of files and codes unnecessary.

The computer could be chosen based on a capability required for data processing and an amount of data to be handled.

(5) Utility

In the UNIX system, a variety of programming languages and tools for software developments are available for various levels of users from the beginners to the experts of the system: as a language, C, FORTRAN 77, RATFOR (Rational FORTRAN), BASIC: in some cases, PASCAL, LISP, or, PROLOG; as a tool, a line editor and a graph editor (ed, ex, vi, English word processing and processing of tables and mathematical formulas (nroff, roff, tbl, eqn, etc.), English spelling check (spell, spellin, spellout), text and manual(learn, man).

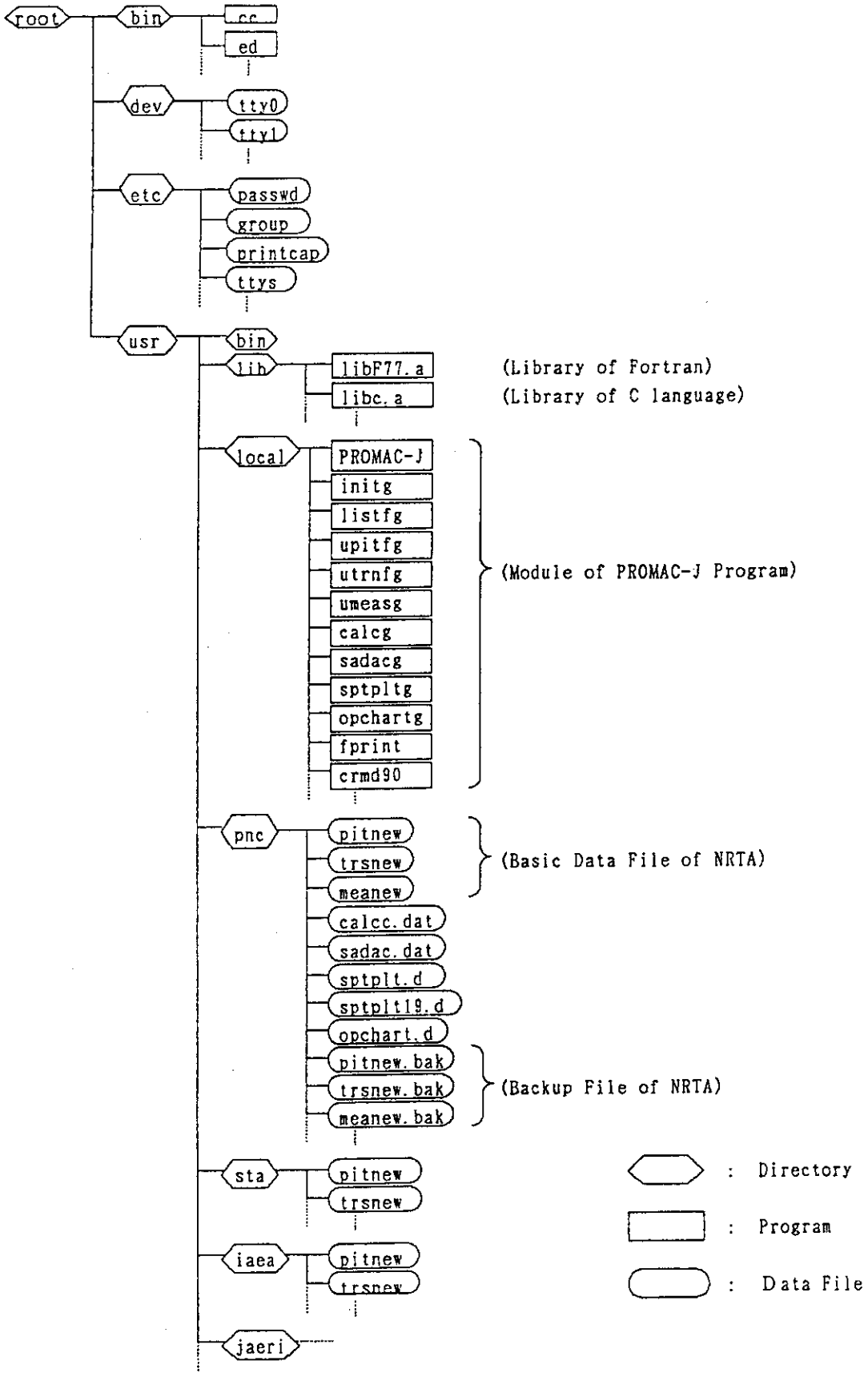

Fig. 3.1 Data File Structure of PROMAC-J under UNIX Operating System

4. SOFTWARE OF THE NRTA DATA PROCESSING SYSTEM : PROMAC-J

4.1 Main Features of the System

The system consists of two parts; one is written in Fortran language of about 15,000 steps and the other is written in C language of about 1,000 steps. All programs written in Fortran are grouped into five modules according to their functions and controlled by a control program, PROMAC-J, that is written in C language. These five modules have following functions:

(1) I/O Module that contains following 6 sub-modules:

- INITG : initializes data files for PITs and transfers.
- LISTFG : lists the data stored in PIT and transfer data files.
- UPITFG : updates PIT data files.
- UTRNFG : updates transfer data files.
- UMEASG : updates measurement error data files.
- CALSADG : produces input data for modules CALCG and SADACG.

(2) MUF Calculation Module

- CALCG : calculates MUFs, CUMUFs and their variances for each material balance period.

(3) Statistical Decision Analysis Module

- SADACG : makes statistical decision analyses based on values of MUFs, CUMUFs and their distributions obtained by CALCG module.

(4) Graphic Output Module I

- SPTPLTG : to produce graphic output based on the results obtained by SADACG module.

(5) Graphic Output Module II

- OPCHARTG : produces a graphic figure of operation time history using PIT and Transfer data files.

4.2 Structure of the System

Fig.4.1 shows functional modules and their functions. Programs

contained in each functional module and its sub-module are shown in Figs. 4.2 to 4.6. A brief description of the function of each program is given in the following table.

4.2.1 Data Base System Module

4.2.1.1 Sub-Module 'INITG'

-- initialize a PIT data file and/or a Transfer data file --

Routines	Function
INIT	: initializes PIT and Transfer data files.
DISERA	: makes CRT screen clear and return the cursor to the home position.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.

4.2.1.2 Sub-Module 'LISTFG'

-- list the data in PIT and Transfer data files --

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
DDATE	: transfers an input character into separated values for month, day, hour and minute.
DISERA	: makes CRT screen clear and return the cursor to the home position.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
CVALUE	: assigns character data to a variable.
DATE	: gives the date of today.
TIME	: gives the present time.
TIMEC	: decomposes a date data (YYMMDD) and time data (HHMM) into year (YY), month (MM), day (DD), hour (HH),and minute (MM).
DVALUE	: assigns a double precision value to the variable.
LIST	: controls a printer, calculates a data area needed, and

assign an address to each variable.

SIZE : checks whether a data area needed is available or not.

FLSTP1 : controls print-out of names of KMPs, dates of measurements and measurement data that are recorded in a D-PIT (in-process inventory taking) data file.

FMFEED : provides a new page for a printer.

FLSTT1 : controls print-out of names of KMPs, dates of measurements and measurement data that are recorded in a transfers data file.

FLISTP : gives D-PIT data to an output device.

MBLST1 : calculates a data area for an output of material balance data, and assigns an address to each variable.

COUNT : calculates a total amount and the number of measurements for transfers during a material balance period.

MBLST2 : gives an output of material balance data for a given period of time.

INTRS : reads in data from the Transfer data file.

INVLST : gives an output of the beginning and ending inventory listings.

PDATE : transfers an input integer into separated values for month, day, hour and minute.

PICKU1 : searches dates of transfer measurements that have been carried out within a given time period.

4.2.1.3 Sub-Module 'UPITFG'

---- update the PIT data files ----

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
DISERA	: makes CRT screen clear and returns the cursor to the home position.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
WORD	: transfers figures of calendar data (year, month, day,

hour and minute) into a character type data.

CVALUE	: assigns character data to a variable.
DATE	: requests today's date.
TIME	: requests the present time.
NUMO2	: transfers an input data of character type into an integer number
TIMEC	: decomposes a date data (YYMMDD) and time data (HHMM) into year(YY), month(MM), day(DD), hour(HH),and minute (MM).
NUMDO2	: transfers an input data of character type into a real number.
UPIT	: controls updating PIT data, calculates an area needed, and assigns an address to each variable.
UNITCN	: changes unit number of file for reading the latest data.
SIZE	: checks whether a data area needed is available or not.
UPIT1	: updates names assigned for I-KMPs.
FLSTP1	: controls an output of the name, date of measurement and measured data for each KMP set up for D-PITs.
FMFEED	: provides a new page for a printer.
DBCHK1	: checks whether the same name has already been registered for I-KMP.
UPIT2	: updates the date of measurement for I-KMPs.
DBCHK2	: checks whether the date and time of measurement for an I-KMP has already been registered or not.
SORTND	: sorts a date of measurement for I-KMPs in an ascending order.
UPIT3	: updates measurement data for D-PITs.

4.2.1.4 Sub-Module 'UTRNFG'

---- update the transfer data files ----

Routines	Function
UTRNF	: controls updating of transfer data, calculates an area needed, and assigns an address to each variable.
UNITCN	: changes unit number of file for reading the latest data.
SIZE	: checks whether a data area needed is available or not.
UTRNF1	: updates names assigned for F-KMPs.
FLSTT1	: controls an output of the name, date of measurement and measured data for each KMP set up for D-PITs.

FMFEED	: provides a new page for a printer.
DBCHK1	: checks whether the same name has already been registered for I-KMP.
UTRNF2	: updates the date of measurement for F-KMPs.
UTRN21	: reads data from the transfer data file.
SORTD	: sorts measurement data of F-KMPs for assigned date of transfer measurement.
COPY	: takes a copy of input file onto a work file.

4.2.1.5 Sub-Module 'UMEASG'

---- update the measurement error data files ----

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
DISERA	: makes CRT screen clear and returns the cursor to the home position.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
IVALUE	: assigns an integer number to a variable.
NUMO2	: transfers an input data of character type into an integer number
NUMDO2	: transfers an input data of character type into a real number.
UMEAS	: controls updating of measurement error data, calculates a needed area and assigns an address number to each variable.
FILECK	: checks consistency between the name of the owner of the file and the name of user who wishes to access to it.
INITM	: initializes a measurement error data file.
WORD	: transfers figures of calendar data (year, month, day, hour and minute) into a character type data.
SIZE	: checks whether a data area needed is available or not.
INPTM	: reads in data from the PIT, Transfer and measurement error data files.

UMEA2 : updates measurement error data files for volume measurement, sampling and analysis.

UMEA21 : updates measurement error data.

UMEA3 : controls specification of or correction to error data for an I-KMP or F-KMP.

NMCHK : confirms there is no difference between the name of KMP registered in the measurement error data file and those of the PIT and Transfer data files.

UMEAD : deletes a measurement error table for I-KMP.

(UMEAD1) : deletes a measurement error table for F-KMP.

UMEAC : corrects a measurement error table for I-KMP.

(UMEAC1) : corrects a measurement error table for F-KMP.

UMEAA : adds a measurement error table for I-KMP.

(UNEAA1) : adds a measurement error table for F-KMP.

CHK1 : checks the correspondence of data numbers between the measurement error data file and the measurement method table.

SORT : sorts measurement methods in correspondence with the order of KMP names in the PIT data file.

SORST1 : sorts measurement methods in correspondence with the order of KMP names in the Transfer data file.

WRITM : outputs measurement error data and the table of measurement methods onto a file for long storage.

LISTM : outputs the data relating measurement errors onto a CRT or a printer.

FMFEED : provides a new page for a printer.

4.2.1.6 Sub-module for making input data for CALCG and SADACG Modules

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
NUMO2	: transfers an input data of character type into an integer number.

IVALUE	: assigns an integer number to a variable.
CALSAD	: calculates an area needed to prepare input data for CALCG Module and assigns an address to each variable.
SIZE	: checks whether a data area needed is available or not.
CALSD1	: produces input data to carry out CALCG Module.
PERID	: defines a material balance period for the CALCg Module.
TIMEC	: decomposes a date data (YYMMDD) and time data (HHMM) into year (YY), month (MM), day (DD), hour (HH),and minute (MM).
ERCHK	: checks the data No. and the name of KMP in the measurement error data file with those of other files.
FCALC	: provides an input data for the CALCG Module onto a file.

4.2.2 Module For Calculation Of Material Balance and Its Variance --- CALCG Module ----

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
RVALUE	: assigns an integer number to a variable.
DISERA	: makes CRT screen clear and returns the cursor to the home position.
CALC	: calculates a working area to be used and assigns an address to each variable.
CALC1	: calculates a working area to be used and assigns an address to each variable.
COUNT	: calculates the number of transfer measurements within a period covered by the computer run.
SIZE	: checks whether a data area needed is available or not.
IDAY	: converts a calendar data(year,month,day) into a number of days.
INPUT	: reads in measurement error data, PIT data and Transfer data.
ERIN1	: reads in measurement error data.
INPIT	: reads in PIT data.
INTRS	: reads in Transfer data.

CALCON	: controls calculation routines for material balances, CUMUFs and their variances.
MATTR	: calculates material balances and CUMUFs.
VARCL	: controls calculation routines for variances depending on measurement methods.
VAINV	: calculates variances of inventory measurements.
ICALBF	: calculates a calibration period.
VART1	: calculates variances for transfer measurements.
PRINT1	: controls printing of variance calculations.
PDATE	: decomposes a month-day and an hour-minute into month, day, hour and minute.
PDET2	: controls output of detailed calculation of variances.
PDET1	: provides output of detailed calculation of variances.
WRIT	: prepares an input file for the SADAC Module.
LASL1	: controls calculation of variances based on a simple method developed by Loss Alamos National Laboratory.
VARCA1	: calculates variances in accordance with a method developed by LANL.
COV1	: calculates an average covariance over a calibration period.
BALPRT	: outputs material balance data and their variances.

4.2.3 Module For Decision Analysis
--- SADACG ----

Routines	Function
MAIN	: Main routine
UMAIN	: opens and closes data files, calculates a working area to be used, and assigns an address to each variable.
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
CVALUE	: assigns a character type data to a variable.
CHGTIT	: reads in a job title being input from the terminal.
UPCASE	: transfers a string of small characters into one of large characters.
IDAT	: stores an input data on a disk.

SIZE	: checks whether a data area needed is available or not.
CONTL1	: reads in data from the SADAC input data file.
CONTL	: controls types of decision analyses.
MUF	: calculates alarm levels or detection power levels.
LMAP	: prints a table of alarm levels or detection power levels.
KALMF	: carries out a decision analysis based on the One State Kalman filter method.
ALARM	: produces an alarm level table.
CUSUME	: carries out a decision analysis based on the CUMUF method.
KALMF2	: carries out a decision analysis based on the Two State Kalman filter method.
WILC	: carries out a decision analysis based on the Wilcoxon Rank Sum method.
CUSUMV	: carries out a decision analysis based on the CUSUM Method taking account of the correlation of errors between adjacent material balances.
SMOOTH	: carries out a decision analysis based on the Smooth Kalman filter method.
SVTEST	: carries out a sequential variance test over a whole period neglecting appearance of a termination symbol 'T'.
SVTES1	: carries out a sequential variance test until a termination symbol 'T' appears.

4.2.4 Module For Graphic Output Of Each Decision Analysis

---- SPTPLTG Module ----

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
ERASE	: makes CRT screen clear.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
UPCASE	: changes small characters of input to the corresponding capitals.

IVALUE : assigns an integer number to a variable.

UMAIN : calculates area to be used for batch mode calculations, and assigns an address to each variable.

screen : stores an input data on a disk, and displays them on a screen.

DEFDEV : assigns a device for graphic output.

PLOTSW : initializes an area for a graphic output.

SKIP : skips reading of a block data (i.e., records shown in Chapter 4.4.4.2) that specify types of charts to be produced.

AREA : confirms whether a sufficient area is available.

TABC : reads input data and outputs them onto a working file.

EDIT1 : reads the data on the file, which stores the results of decision analyses, according to the block data for the type number of figures indicated.

DESET1 : sets up one dimensional data.

DESET2 : sets up two dimensional data.

P123 : sets up a pen as indicated.

CBLK : calculates the number of characters from the top of the character string.

GPL1 : controls output of graphic figures.

SET1 : plots the figure title and titles of X and Y axes.

BOX : plots a rectangular box surrounding the figure.

SCXY : sets up scalings of X and Y axes.

GRXY : plots X and Y axes.

LINTYP : plots a line connecting two points with an indicated type of line.

FGRI : plots the scale of axes.

DNOR : normalizes data to be plotted.

LPLT : plots MUF and CUMUF graphic figures.

CHPLT : plots alarm sequence charts when NFC is not equal to 0.

CHPLT2 : plots alarm sequence charts when NFC = 0.

UMAIN1 : calculates an area to be used in the conversational mode, and assigns an address to a variable, when plotting data are being produced.

SPTPLT : reads in a title of the graphic figure and prepares an input data file.

UMAIN2 : calculates an area to be used in the conversational mode, and assigns an address to a variable, when plotting data

are being processed.

4.2.5 Module For Graphic Output Of Plant Operation Sequence Chart
---- OPCHRTG Module ----

Routines	Function
MAIN	: Main routine
IARGC	: returns the index of the last command line argument to the routine that called IARGC.
GETARG	: returns the data file name of the last command line argument to the routine that called GETARG.
RVALUE	: assigns a real type data to a variable.
IVALUE	: assigns an integer number to a variable.
UPCASE	: transfers an input of small character to the corresponding capitals.
ERASE	: makes CRT screen clear.
RONEN	: checks input data on a character basis.
RYORN	: changes "y" or "n" to "Y" or "N", respectively.
IDAT	: stores an input data on a disk.
UMAIN	: calculates an area to be used for batch mode calculations, and assigns an address to each variable.
SIZE	: checks whether a data area needed is available or not.
EDIT1	: reads the data on the file, which stores the results of decision analyses, according to the block data for the type number of figures indicated.
EDIT2	: reads in necessary data from the PIT and Transfer data files.
EDIT3	: reads in the data of batch transfers from the transfer data file, and outputs them onto a plotting file.
PLOT1	: controls output of plant operation charts by reading the title and the sub-title from the plotting data file.
DEFDEV	: assigns a device for graphic output.
PLOTSW	: initializes an area for a graphic output.
MTIT	: plots the main title and the sub-title.
P123	: sets up a pen as indicated.
BOX	: plots a rectangular box which surrounds the figure.
CBLK	: calculates the number of characters from the top of the character string.

AROHDD : plots an arrow.
PLOT2 : controls outputs of graphic figures by reading the data from the plotting data file.
GRIDD : plots a grid.
PERIOD : calculates the number of days of a period indicated.
LINTYP : plots a line connecting two points with an indicated type of line.
WAVE : plots a short cut symbol.
PLOTP : plots positions of D-PITs and C-PITs.
POINT : calculates positions of transfer batches.
POINT3 : plots names of transfer batches.
CHART : prepares input data to control output of the plant operation charts.
UMAIN1 : calculates an area to be used in the conversational mode, and assigns an address to a variable, when plotting data are being produced.
UMAIN2 : calculates an area to be used in the conversational mode, and assigns an address to a variable, when plotting data are being processed.

4.3 Data Files in Each Module

In this section, contents and formats of data files in each module are described. When a logical unit number is given not by an integer number but by a variable name, a specific integer number should be given to the variable as the input data. In all modules except OPCHARTG, Unit No. 5 and 6 are assigned for input and output, respectively, at the current terminal.

4.3.1 Data files for Data Base System Module

4.3.1.1 Sub-Module 'INITG'

Unit No.	File Name	Content of File
10	pitnew or trasnew	PIT data or Transfer data.

4.3.1.2 Sub-Module 'LISTFG'

Unit No.	File Name	Content of File
7	listf.lst	Result of LISTF.
10	pitnew	PIT data.
11	trsnew	Transfer data.

4.3.1.3 Sub-Module 'UPITFG'

Unit No.	File Name	Content of File
4		A working file.
10	pitnew	Input of PIT data.
11	pit1.tmp	A working file for processing of PIT data file (1).
12	pit2.tmp	Ditto (2).
13	pittmp	Output of PIT data.

4.3.1.4 Sub-Module 'UTRNFG'

Unit No.	File Name	Content of File
4		A working file.
10	trsnew	Input of Transfer data.
11	trs1.tmp	A working file for processing Transfer data file (1)
12	trs2.tmp	Ditto (2).
13	trstmp	Output of Transfer data.

4.3.1.5 Sub-Module 'UMEASG'

Unit No.	File Name	Content of File
7	umeas.lst	Updated measurement error data.
10	pitnew	Input of PIT data.
11	trsnew	Input of Transfer data file.
12	meanew	Input of measurement error data.
13	meas.tmp	A working file for processing measurement error data file.
14	meatmp	Output of measurement error data.

4.3.1.6 Sub-Module 'CALSADG'

Unit No.	File Name	Content of File
7	calsad.lst	Result of calculation.
10	pitnew	Input of PIT data.
11	tranew	Input of Transfer data.
12	measnew	Input of measurement error data.
13	calcc.dat	Input for 'CALC'

4.3.2 Module 'CALCG'

Unit No.	File Name	Content of File
10	calcc.dat	Input data.
7	calc.lst	Output data.
NIN1	(pitnew)	Input of PIT data.
NIN2	(trsnew)	Input of Transfer data.
NOUT	calc	Material balance data.

4.3.3 Module 'SADACG'

Unit No.	File Name	Content of File
15	sadac.dat	Input data.
16	sadac.lst	Output data.
10		A working file.
NIN	calc	Material balance data.
NOUT	sptplt	Results of decision analyses.

4.3.4 Module 'SPTPLTG'

Unit No.	File Name	Content of File
3		A working file.
4	sptplt.d	Control data for graphic output.
7	sptplt.lst	Output data.
NIN	sptplt	Results of decision analyses.
17	(user's def.*)	Graphic data.
	* define by "Name of Graphic Data File" in 'PROMAC-J Data PROCESSING procedure (33)'.	
18		A working file.
19	sptplt19.d	Graphic figure specification data.

4.3.5 Module 'OPCHARTG'

Unit No.	File Name	Content of File
3		A working file
15	opchart.d	Input data.
7	opchart.lst	Output data.
NF1	trsnew	Transfer data.
NF2	pitnew	PIT data file.
19	(user's def.)	Graphic figure data.

4.4 Definition Of Variables And Formats Of Data Files

4.4.1 Data Files for PIT

-- 'pitnew', 'pit1.tmp', 'pit2.tmp' and 'pittmp'---

4.4.1.1 Definition of Variables of PIT Data File

Variables	Description
MAXIP	Number of inventory measurement points.
NDMBP	Number of inventory measurements.
VESNAM(*,J)	Name of the J-th inventory measurement point.
ITDATE(1,K)	Date of measurements at the K-th inventory measurement point (YYMMDD).
ITDATE(2,K)	Time of measurements at the K-th inventory measurement point (HHMM).
NMES(J)	Measurement basis of the J-th inventory measurement: NMES(J) = ' ' : Measured. NMES(J) = 'N' : Tag data.
VALM(1,J)	Volume (L) at the J-th inventory measurement point.
VALM(2,J)	Pu concentration (g/L) at the J-th inventory measurement point.
VALM(3,J)	U concentration (g/L) at the J-th inventory measurement point.
PASS	NAME of person who is responsible for the latest updating, and its date and time.

4.4.1.2 Format of PIT Data File

Record	Variables
1	MAXIP,NDMBP,((VESNAM(I,J),I=1,2),J=1,MAXIP),
	((ITDATE(I,K),I=1,2),K=1,NDMBP), (PASS(I),I=1,5)
2*	(NMES(J),(VACM(I,J),I=1,3), J=1,MAXIP), (PASS(I),I=1,5)

* Note: Repeat NDMBP times.

4.4.2 Transfer Data Files

--- 'trsnew', 'trs1.tmp', 'trs2.tmp', and 'trstmp'---

4.4.2.1 Definition of Variables of TRANSFER Data File

Variables	Description
MAXTR	Number of transfer measurement points.
FLOWN(*,J)	Name of the J-th transfer measurement point.
NOTRSF(J)	Number of transfers at the J-th transfer measurement point.
ITIME(1)	Date of transfer measurement point (YYMMDD).
ITIME(2)	Time of transfer measurement point (HHMM).
BATCH	Batch name
NMEAS	Measurement basis for the transfer measurement: NMEAS(J) = ' ' : Measured. NMEAS(J) = 'N' : Tag data.
VALM(1,J)	Volume (L) at the J-th transfer measurement point.
VALM(2,J)	Pu concentration (g/L) at the J-th transfer measurement point.
VALM(3,J)	U concentration (g/L) at the J-th transfer measurement point.
PASS	NAME of person who is responsible for the latest updating, and its date and time.

4.4.2.2 Format of TRANSFER Data File

Record	Variables
1	MAXTR,((FLOWM(I,J),I=1,6),J=1,MAXTR),
	(NOTRSF(J),J=1,MAXTR), (PASS(I),I=1,5)
2*	(ITIME(I),I=1,2),(BATCH(I),I=1,2),NMEAS,
	(VALM(I),I=1,3), (PASS(I),I=1,5)

* Note: Repeat NOTRSF(J) times for the J-th transfer measurement

point.

4.4.3 Measurement Error Data Files
--- 'measnew', 'meas.tmp' and 'meatmp----

4.4.3.1 Definition of Variables of Measurement Error Data File

Variables	Description
MAXB	Number of volume measurement devices.
MAXES	Number of sampling methods to determine element factors.
MAXEA	Number of analysis methods to determine element factors.
MAXIS	Number of sampling methods to determine isotopic factors. (not used)
MAXIA	Number of analysis methods to determine isotopic factors. (not used)
MAXIPM	Number of I-KMPs in the measurement error data file.
MAXTRM	Number of F-KMPs in the measurement error data file.
MNOB(J)	Measurement method No. of the J-th volume measurement.
ERCONB(1,J)	Random error of the J-th volume measurement device.
ERCONB(2,J)	Long-term systematic error of the J-th volume measurement device.
ERCONB(3,J)	Re-calibration option (not used) for the J-th volume measurement device.
EROONB(4,J)	Short-term systematic error of the J-th volume measurement device.
MNOES(J)	Measurement method No. of the J-th sampling method.
ERCNES(1,J)	Random error of the J-th sampling method.
ERCNES(2,J)	Long-term systematic error of the J-th sampling method.
ERCNES(3,J)	Re-calibration option (not used) of the J-th sampling method.
ERCNES(4,J)	Short-term systematic error of the J-th sampling method.
MNOEA(J)	Measurement method No. of the J-th analysis method.
ERCNEA(1,J)	Random error of the J-th analysis method.
ERCNEA(2,J)	Long-term systematic error of the J-th analysis method.
ERONEA(3,J)	Re-calibration option (not used) of the J-th analysis method.
ERCNEA(4,J)	Short-term systematic error of the J-th analysis

	method.
IKMPN(J)	Name of the J-th inventory measurement point.
FKMPN(J)	Name of the J-th transfer measurement point.
SGN(J)	Receipt or shipment at the J-th transfer measurement point: SGN(J) = 1.0 : receipt, SGN(J) = -1.0 : shipment.
NTAB(1,J)	Volume measurement method No. at the J-th measurement point.
NTAB(2,J)	Sampling method No. at the J-th measurement point.
NTAB(3,J)	Number of samples at the J-th measurement point.
NTAB(4,J)	Analysis method No. at the J-th measurement point.
NTAB(5,J)	Number of analyses at the J-th measurement point.
NTAB(6,J)	Not used.
NTAB(7,J)	Not used.
NTAB(8,J)	Not used.
NTAB(9,J)	Not used.
PASS	Name of person who is responsible for the latest updating, and its date and time.

4.4.3.2 Format of Measurement Error Data File

Record	Variables
1	MAXB,MAXES,MAXEA,MAXIS,MAXIA,MAXIPM,MAXTRM,(PASS(I),I=1,5)
2	(MNOB(J),(ERCONB(I,J),I=1,4),J=1,MAXB),(PASS(I),I=1,5)
3	(MNOES(J),(ERCNES(I,J),I=1,4),J=1,MAXES),(PASS(I),I=1,5)
4	(MNOEA(J),(ERCNEA(I,J),I=1,4),J=1,MAXEA),(PASS(I),I=1,5)
5	(IKMPN(J),(NTAB(I,J),I=1,9),J=1,MAXIPM),(PASS(I),I=1,5)
6	(FKMPN(J),SGN(J),(NTAB(I,J),I=1,4),J=1,MAXIPM), (PASS(I),I=1,5)

4.4.4 Data File Storing Results of Material Balance Calculations
--- 'calc' ----

4.4.4.1 Definition of Variables of File 'calc'.

Variables	Description
KMAX	Number of material balances.

KMX1	KMAX + 1.
KMAY	KMAX*KMX1/2.
XMB	MUF values.
XST	Standard deviations of XMB.
CUS(I)	CUMUFs (Cumulative MUFs accumulated from the MUF of the first material balance period to the MUF of the I-th material balance period.)
CST	Standard deviations of CUS.
PIN	Inventory values.
VST	Standard deviations of PIN.
PTR	Transfer values.
TST	Standard deviations of PTR.
AM	Alarm symbols given by decision analysis of LEMUF method.
CMB	MUF values estimated by Kalman filter using MUFs as state variables.
STD	Standard deviations of CMB.
AA	Alarm symbols given by decision analysis for CMB.
CM1(I)	CUMUFs without consideration of any correlation between MUFs. MUF values of a half matrix for I=1, KMAY are contained.
ST1	Standard deviations of CM1.
A1	Alarm symbols given by decision analysis for CM1.
BI1	Inventories estimated by Kalman filter using MUFs and inventories as state variables.
SD1	Standard deviations of BI1.
CM2	MUFs estimated by Kalman filter using MUFs and inventories as state variables.
ST2	Standard deviations of CM2.
A2	Alarm symbols given by decision analyses for CM2.
CM3	Wilcoxon rank sum.
ST3	Standard deviation of CM3.
A3	Alarm symbols given by decision analyses for CM3.
CM4	CUMUFs with correlation between MUFs (Half matrix).
ST4	Standard deviations of CM4.
A4	Alarm symbols given by decision analyses for CM4.
CM5	MUFs estimated by Smoothed Material Balance Method.
ST5	Standard deviations of CM5.
A5	Alarm symbols given by decision analyses for CM5.
CM6	CUMUFs estimated Smoothed CUMUF method.

ST6	Standard deviation of CM6.
A6	Alarm symbols given by decision analyses for CM6.
BI2	MUFs estimated by Kalman filter for a whole period. Termination symbols are neglected in the course of decision analyses.
SD2	Standard deviations of BI2.
A7	Alarm symbols given by decision analyses based on the likelihood ratios.
BI3	MUFs estimated by Kalman filter assuming losses or gains. Termination symbol 'T' is neglected in the course of decision analyses.
SD3	Standard deviation of BI3.
A8	Alarm symbols given by decision analyses based on likelihood ratios.

4.4.4.2 Format of Material Balance Data File

Record	Variables
1	KMAX,KMX1,
2	(XMB(I),I=1,KMAX),(XST(I),I=1,KMAX),(CUS(I),I=1,KMAX), (CST(I),I=1,KMAX),(PIN(J),J=1,KMX1),(VST(J),J=1,KMX1), (PTR(I),I=1,KMAX),(TST(I),I=1,KMAX), ((AM(K,I),K=1,KMAX),I=1,KMAX)
3	(CMB(L),L=1,KMAY),(STD(L),L=1,KMAY), ((AA(K,I),K=1,KMAX),I=1,KMAX)
4	(CM1(L),L=1,KMAY),(ST1(L),L=1,KMAY), ((A1(K,I),K=1,KMAX),I=1,KMAX)
5	(BI1(L),L=1,KMAY),(SD1(L),L=1,KMAY)
6	(CM2(L),L=1,KMAY),(ST2(L),L=1,KMAY), ((A2(K,I),K=1,KMAX),I=1,KMAX)
7	(CM3(L),L=1,KMAY),(ST3(L),L=1,KMAY), ((A3(K,I),K=1,KMAX),I=1,KMAX)
8	(CM4(L),L=1,KMAY),(ST4(L),L=1,KMAY), ((A4(K,I),K=1,KMAX),I=1,KMAX)
9	(CM5(L),L=1,KMAY),(ST5(L),L=1,KMAY), ((A5(K,I),K=1,KMAX),I=1,KMAX)
10	(CM6(L),L=1,KMAY),(ST6(L),L=1,KMAY), ((A6(K,I),K=1,KMAX),I=1,KMAX)
11	(BI2(L),L=1,KMAY),(SD2(L),L=1,KMAY)

```
12          ((A7(K,I),K=1,KMAX),I=1,KMAX)
13          (BI3(L),L=1,KMAY),(SD3(L),L=1,KMAY),
14          ((A8(K,I),K=1,KMAX),I=1,KMAX)
```

4.4.5 Data File Storing MUF and Variance Calculation Conditions ---- 'calcc.dat' -----

Data files shown in Chapter 4.4.5 to Chapter 4.4.8 have a card image.

4.4.5.1 Record No.1 (12I6):

Variables	Description
NIN1	Unit No. for the PIT data file.
NIN2	Unit No. for the Transfer data file.
NOUT	Unit No. for an output of material balance data.
IS(1)	Beginning date (YYMMDD) of a period covered by a calculation run.
IS(2)	Starting time (HHMM) in the beginning date of the period.
IE(1)	Ending date (YYMMDD) of the period covered by the calculation run.
IE(2)	Ending time (HHMM) in the ending date of the period.
MAXB	Number of volume measurement devices.
MAXES	Number of sampling methods to determine element factors.
NAXEA	Number of analytical methods to determine element factors.
MAXIS	Number of sampling methods to determine isotope factors.
MAXIA	Number of analytical methods to determine isotope factors.

4.4.5.2 Record No.2 (12I6):

Variables	Description
MXSUM	Frequency of re-calibration of a measurement devices.
IDETL	Output option for a breakdown of variances: = 0 for No, = 1 for Yes.
IEST	Input option for an unmeasured inventory:

= 0 for No,

= 1 for Yes.

IJOB Option for updating the PIT or Transfer data file:

= 0 for Update as a batch job,

= 1 for Update in a conversational mode.

IDTL2 Output option for calculation results:

= 0 for Material balance table only,

= 1 for Full output list.

4.4.5.3 Record No.3 (I6,6X,5F12.0):

Variables	Description
MNO	Measurement method No.
ERCON(1)	Random error.
ERCON(2)	Long-term systematic error.
ERCON(3)	Short-term systematic error.
ERCON(4)	= − N: N is the number of re-calibrations within a period given by IS and IE.

4.4.5.4 Record No.3.1 (12I6) :

(If ERCON(4) is a negative number N, repeat Record No.3.1 N times.)

Variables	Description
MCTIM(1,I)	Date of the I-th re-calibration.
MCTIM(2,I)	Time of the I-th re-calibration.

Note: A pair of Record 3 and Record 3.1 should be repeated for MAXB, MAXES, MAXEA, MAXIS and MAXIA, in this order.

4.4.5.5 Record No.4 (6X,9I6) :

Variables	Description
NTAB(1)	Volume measurement method No.
NTAB(2)	Sampling method No. to determine element factors.
NTAB(3)	Number of samples to determine element factors.
NTAB(4)	Analysis method No. to determine element factors.
NTAB(5)	Number of analyses to determine element factors.
NTAB(6)	Sampling method No. to determine isotope factors.
NTAB(7)	Number of samples to determine isotope factors.

NTAB(8)	Analysis method No. to determine isotope factors
NTAB(9)	Number of analyses to determine isotope factors.

Note: Repeat record 4 for each inventory measurement point.

4.4.5.6 Record No.5 (F6.0,9I6) :

Variables	Description
SGN	Data to distinguish between receipt and shipment for transfer data: = 1.0 for receipt, = -1.0 for shipment.
NTAB(1)	Volume measurement method No.
NTAB(2)	Sampling method No. to determine element factors.
NTAB(3)	Number of samples to determine element factors.
NTAB(4)	Analysis method No. to determine element factors.
NTAB(5)	Number of analyses to determine element factors.
NTAB(6)	Sampling method No. to determine isotope factors.
NTAB(7)	Number of samples to determine isotope factors.
NTAB(8)	Analysis method No. to determine isotope factors
NTAB(9)	Number of analyses to determine isotope factors.

Note: Repeat record 4 for each transfer measurement point.

4.4.6 Data File Storing Calculation Conditions for Statistical Decision Analyses

---- sadac.dat ----

The Data file defined in this section (4.4.6) should be prepared together with data files defined in sections 4.4.7 and 4.4.8 before starting "PROMAC-J Data Processing Procedure (1)" that will be described in Chaper 6.

4.4.6.1 Record No.1 (20A4) :

Variables	Description
TITL	Job title, up to 80 characters.

4.4.6.2 Record No.2 (7I6,10I3) :

Variables	Description
NIN	Unit No. for the material balance data file.
NOUT	Unit No. for a working file.
JMAX	Number of material balances.
NL	Number of alarm levels.
INTP	Output option: Output starts from the INTP-th data. In an alarm chart mapping, the INTP-th data is the first available data on the chart.
IDR	Option for statistical inference for negative MUF: = 0 for positive and negative MUF, = 1 for positive MUF only.
IALT	Option for inference after occurrence of terminator symbol 'T' in an alarm chart. = 0 to continue inference neglecting 'T', = 1 to cease inference
IP(1)	Output option for material balance calculations: = 0 : Title, numerical results and alarm sequence chart. = 1 : Title and alarm sequence chart. = 2 : Title and numerical results; = -N : Numerical results only.
IP(2)	Output option for the calculation of One-state Kalman Filter: Same as IP(1).
IP(3)	Output option for the calculation of cumulative MUFs with no correlation between MUFs. Same as IP(1).
IP(4)	Output option for the calculation of Two-state Kalman Filter: Same as IP(1).
IP(5)	Output option for the calculation of Wilcoxon Rank Sum test: Same as IP(1).
IP(6)	Output option for CUMUF calculations with correlations between MUFs.
IP(7)	Output option for smoothed MUF calculations: Same as IP(1)
IP(8)	Output option for smoothed CUMUF calculations:

Same as IP(1).

IP(9) Output option for a sequential Variance test of an exact calculation model:
Same as IP(1).

IP(10) Output option for a sequential variance test of a simplified calculation model:
Same as IP(1).

4.4.6.3 Record No.3 (12F6.0) :

Variables	Description
PM	Miss probability.
A(41)	False alarm probabilities. Give the boundary values in an decreasing order. An example is: 0.5, 0.01, 0.005, 0.001, 0.0005, 0.0001, 0.00005, 0.00001
A(40+NL)	Symbols corresponding to the boundary values of false alarms defined above. An example corresponding to the above example is: T, A, B, C, D, E, F, G

4.4.6.4 Record No.4 (A4) :

Variables	Description
LA	Give 'END' to indicate the end of input data.

4.4.7 Data File for Graphic Output Control
---- sptplt.d ----

The Data file defined in this section (4.4.7) should be prepared together with data files defined in sections 4.4.6 and 4.4.8 before starting "PROMAC-J Data Processing Procedure (1)" that will be described in Chaper 6.

4.4.7.1 Record No.1 (3I6) :

Variables	Description
IOPT	Not used.
KMAX	Number of material balances.

IDOUB	Not used.

4.4.7.2 Record No.2 (I6) :

Variables	Description
NPL	=1 (Number of sheets for a batch mode calculation)

4.4.7.3 Record No.3 (I4,17A4) :

Variables	Description
ITAB	(Temporally used parameter)
TTM	A title commonly applied to figures given on a screen. It is written at the bottom of the screen.

4.4.7.4 Record No.4 (3I6,2F12.0) :

Variables	Description
IT	= 0. If sub-title is needed, enter the number of records each of which indicates a sub-title of a chart. The order of charts that appear on a screen is shown in Figure 4.7.
NIN1	Not used.
IOT	Option to indicate the starting position (X,Y) for plotting a sub-title for a chart that is given in a box. X and Y are in millimeters. = 0 ; (X,Y)=(BX1,BY1). BX1 and BY1 are given later. = 1 ; (X,Y)=(5.0, YT-3.8); YT = Y value of the top end of a box. = 2 ; (X,Y)=(5.0, YB+3.8); YB = Y value of the bottom end of the box. = 3 ; (X,Y)=(40.0, YT-3.8) = 4 ; (X,Y)=(40.0, YB+3.8)
BX1	X-value of starting position for the sub-title.
BY1	Y-value of starting position for the sub-title.

4.4.7.5 Record No.5 (18A4) :

Variables	Description
TI	Sub-title

Repeat record No.5 IT times.
(IT is given by Record No.3)
(Note: In case of a batch mode calculation, Records No.3 to 5 should be repeated for NPL sheets.--not used in PROMAC-J--)

4.4.8 Data File Storing Specifications for Output Charts
---- stplt19.d ----

The Data file defined in this section (4.4.8) should be prepared together with data files defined in sections 4.4.6 and 4.4.7 before starting "PROMAC-J Data Processing Procedure (1)" that will be described in Chaper 6.

4.4.8.1 Record No.1 (6F12.0) :

Variables	Description
SLX	Length of a screen in X-axis. (unit: cm)
SLY	Length of a screen in Y-axis. (unit: cm)
SI1	Size (height) of one character in a common title for a screen. (cm).
SI2	Size (height) of one character in a caption of X-axis of a chart. (cm)
SI3	Ditto of Y-axis.

4.4.8.2 Record No.2 (2I6) :

Variables	Description
NBLX	Number of charts in X-direction of a screen.
NBLY	Number of charts in Y-direction of a screen.

4.4.8.3 Record No.3 (6I6) :

Variables	Description
NIN	Logical Unit No. to which a data file for plotting charts is loaded.
NCH	Specification number for output charts which are shown in the following table.

Contents of Chart	Material Balance Chart No.	Alarm Sequence Chart No.
MUF	1	101
CUMUF	2	0
Inventory	3	0
Net Transfer	4	0
One-state Kalman filter	5	105
CUMUF without correlation	6	106
Inventory estimated by Two-state Kalman filter	7	0
Two-state Kalman filter	8	108
Wilcoxon Rank Sum	9	109
CUMUF with correlation	10	110
MUF estimated by Smoothed Kalman filter	11	111
CUMUF estimated by Smoothed Kalman filter	12	112
Sequential Variance test	13	113

NLX	Material Balance No. from which plotting of MUF begins.
NSTP	Material Balance No. from which plotting of CUMUF begins.
NENP	The last Material Balance No. for plotting.
INTP	not used.

Record No.3 should be repeated (NBLX*NBLY) times for every chart according to the output order.

(Note: In case of the batch mode calculation, a set of Record No.1 to Record No.3 should be input for each of NPL sheets.)

4.5 Examples Of Data Files For Section 4.4.5 to Section 4.4.8

Examples of data files for 'calcc.dat', 'sadac.dat', 'sptplt.d' and 'sptplt9.d' are shown by Tables 4.1 to 4.4. Each data entry is written in 80 columns.

Table 4.1 Sample Data of calcc.dat File in CALCG Module

```
Seq.     ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
000001       18     19      3850331       0851210  1000     18     18     18      0      0
000002       50      0      0      1      0
000003        1         4.00000E-03 0.00000E+00 3.00000E-03 0.00000E+00
000004        2         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000005        3         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000006        4         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000007        5         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000008        6         3.00000E-03 0.00000E+00 2.00000E-03 0.00000E+00
000009        7         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000010        8         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000011        9         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000012       10         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000013       11         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000014       12         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000015       13         6.20000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000016       14         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000017       15         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000018       16         5.00000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000019       17         2.00000E-02 0.00000E+00 3.00000E-02 0.00000E+00
000020       18         6.20000E-02 0.00000E+00 0.00000E+00 0.00000E+00
000021        1         3.00000E-03 0.00000E+00 2.00000E-03 0.00000E+00
000022        2         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000023        3         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000024        4         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000025        5         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000026        6         5.00000E-03 0.00000E+00 2.00000E-03 0.00000E+00
000027        7         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000028        8         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000029        9         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000030       10         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000031       11         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000032       12         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000033       13         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000034       14         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000035       15         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000036       16         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000037       17         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000038       18         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000039        1         1.00000E-02 0.00000E+00 4.00000E-03 0.00000E+00
000040        2         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000041        3         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000042        4         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000043        5         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000044        6         1.00000E-02 0.00000E+00 3.00000E-03 0.00000E+00
000045        7         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000046        8         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000047        9         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000048       10         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000049       11         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000050       12         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000051       13         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000052       14         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000053       15         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000054       16         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000055       17         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000056       18         0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
000057           10     10     2     10     2     0     0     0     0
000058            2      2     2      2     2     0     0     0     0
000059            3      3     2      3     2     0     0     0     0
000060            4      4     2      4     2     0     0     0     0
000061            5      5     2      5     2     0     0     0     0
000062           11     11     2     11     2     0     0     0     0
000063            8      8     2      8     2     0     0     0     0
000064            9      9     2      9     2     0     0     0     0
000065           12     12     2     12     2     0     0     0     0
000066           16     16     2     16     2     0     0     0     0
000067           14     14     2     14     2     0     0     0     0
000068           15     15     2     15     2     0     0     0     0
000069    1.      1      1     2      1     2     0     0     0     0
000070   -1.      6      6     2      6     2     0     0     0     0
```

Table 4.2 Sample Data of sadac.dat File in SADACG Module

```
Seq.    ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
000001  SAMPLE OUTPUT
000002        1      2     35      7      0      0      0  1  1  1  1  1  1  1  1  1
000003   0.025    0.5   0.01 0.005 0.001 5.E-4 1.E-4 1.E-5
000004  END
000005
```

Table 4.3 Sample Data of sptplt.d File in SPTPLTG Module

```
Seq.    ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
000001        0     28      0
000002        1
000003       1SAMPLE OUTPUT
000004        0     10      0      0.            0.
000005        0     10      0      0.            0.
000006        0     10      0      0.            0.
000007        0     10      0      0.            0.
000008        0     10      0      0.            0.
000009        0     10      0      0.            0.
000010  END
```

Table 4.4 Sample Data of sptplt19.d File in SPTPLTG Module

```
Seq.    ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
000001   27.0        27.0          0.2          0.2          0.2
000002        2      3
000003        1      1
000004        1    101
000005        1     10
000006        1    110
000007        1      8
000008        1    108
```

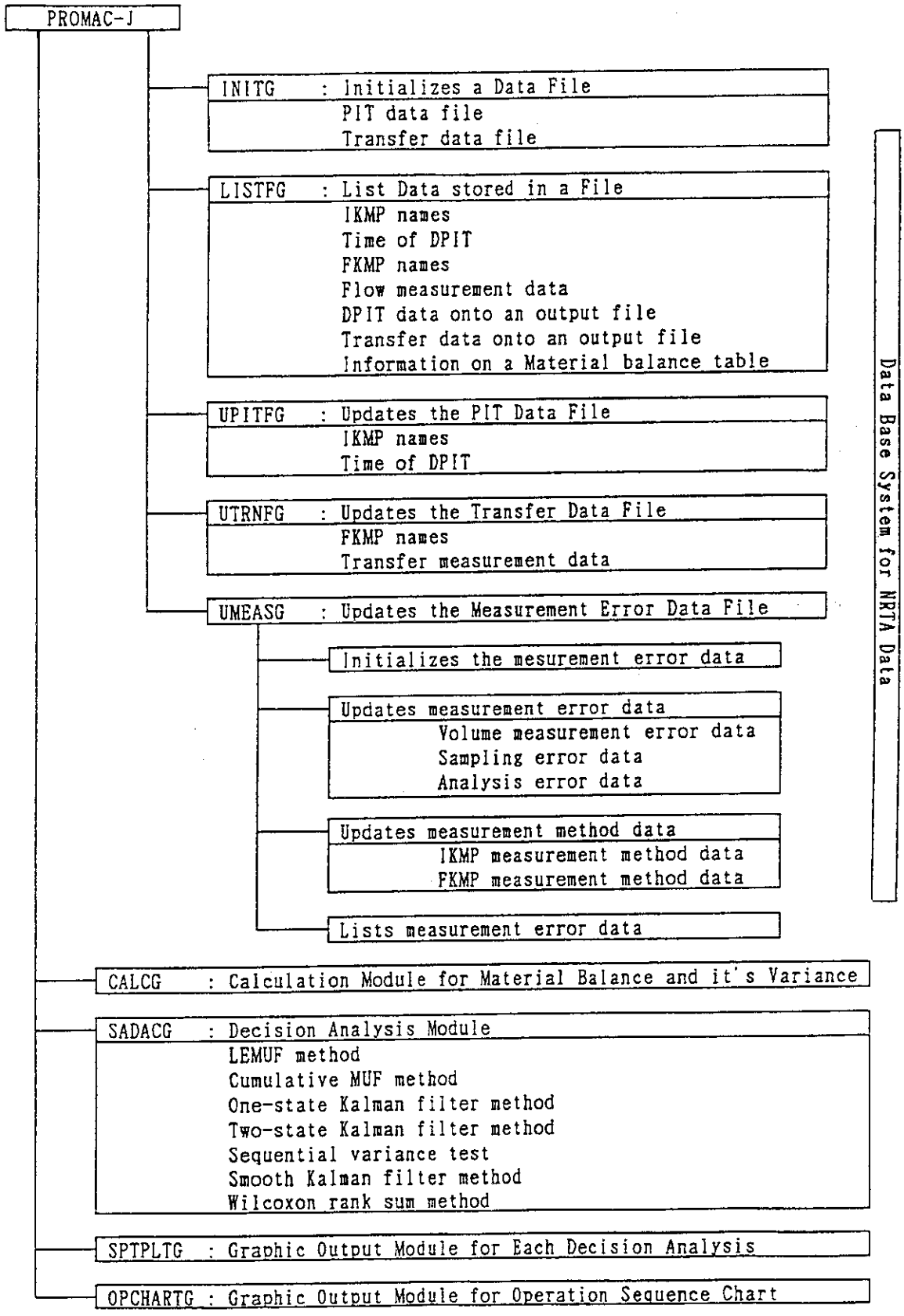

Fig. 4.1 Function Module of PROMAC-J Program

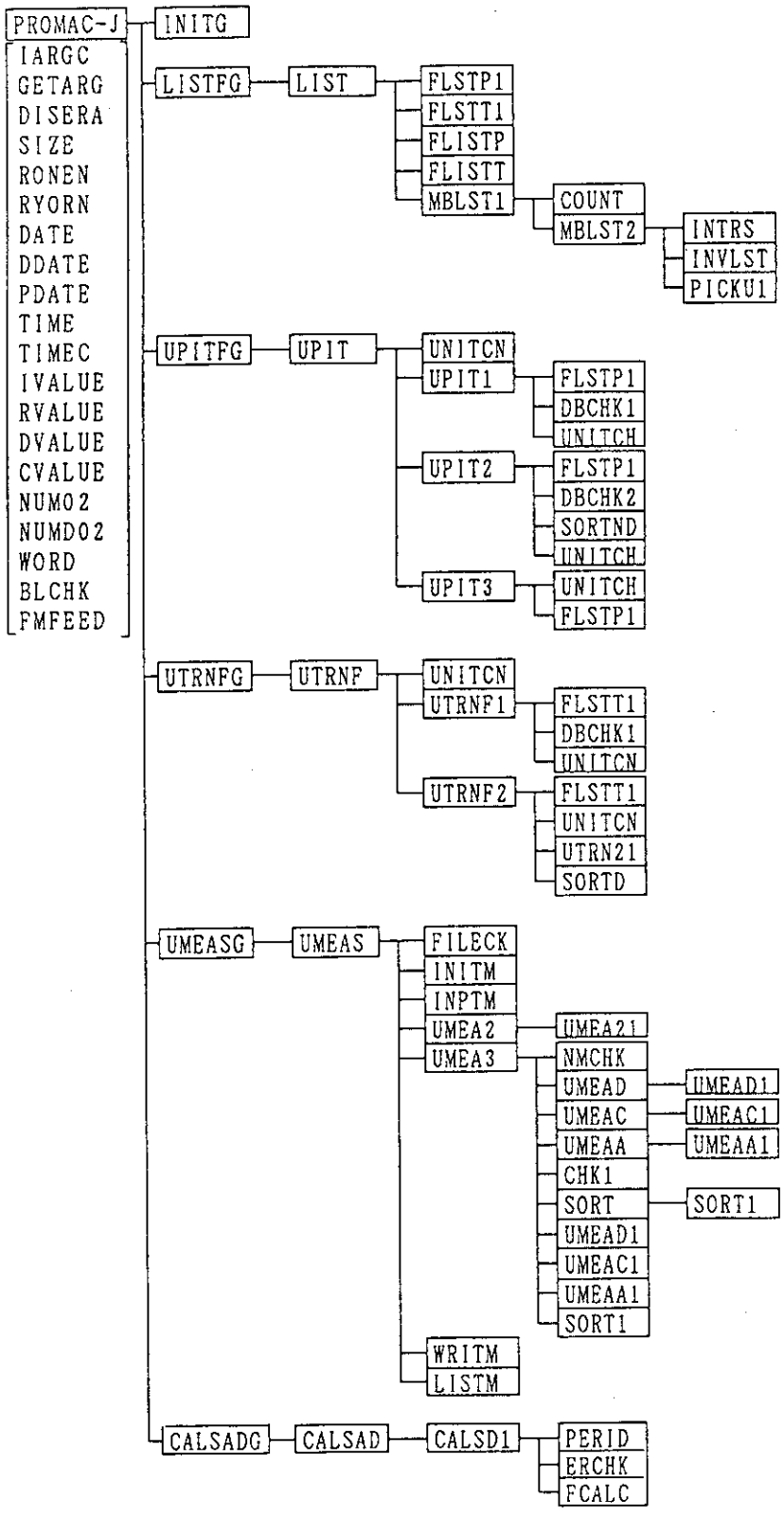

Fig. 4.2 Structure of Data Base System of PROMAC-J Program

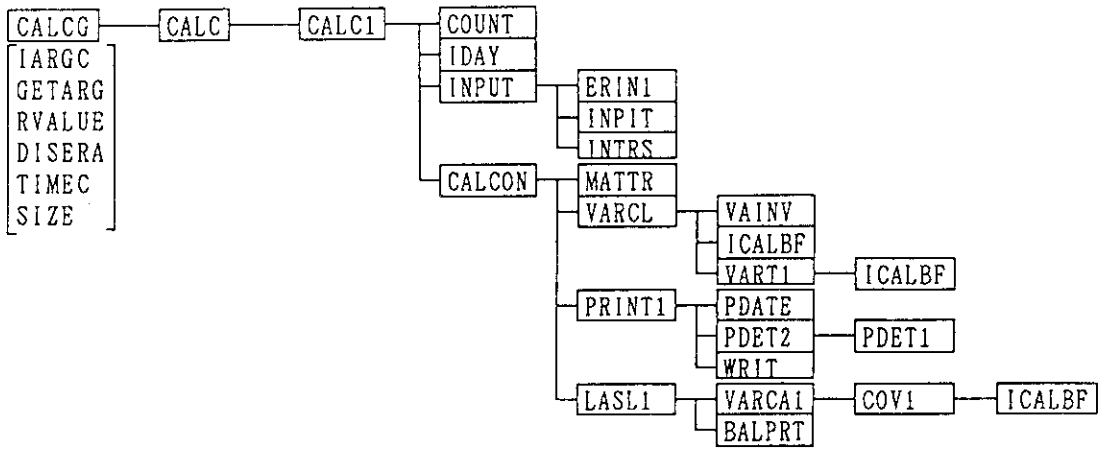

Fig. 4.3 Structure of CALCG Module

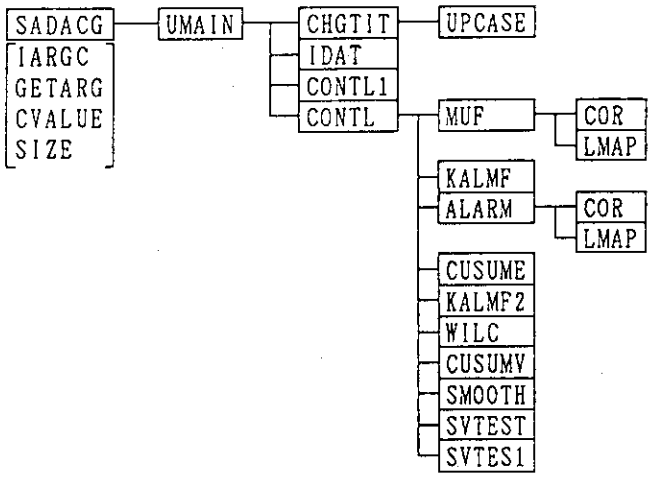

Fig. 4.4 Structure of SADACG Module

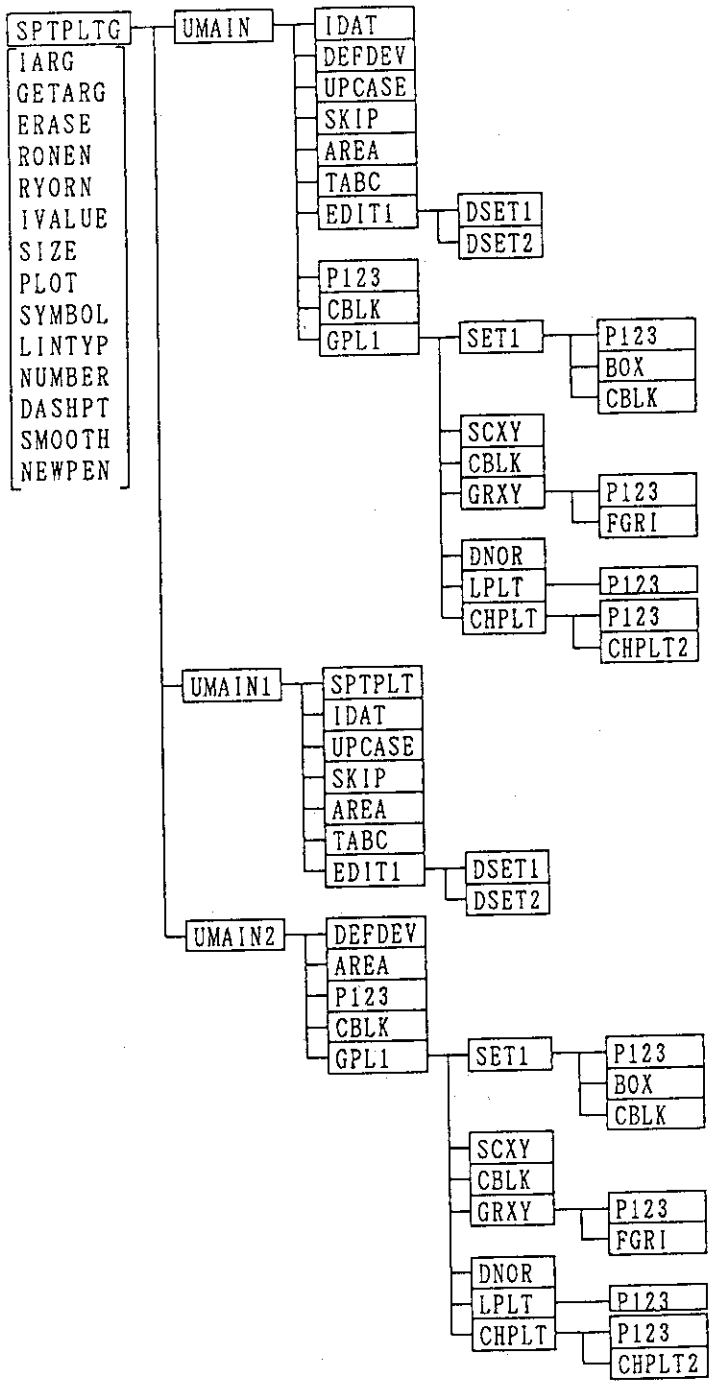

Fig. 4.5 Structure of SPTPLTG Module

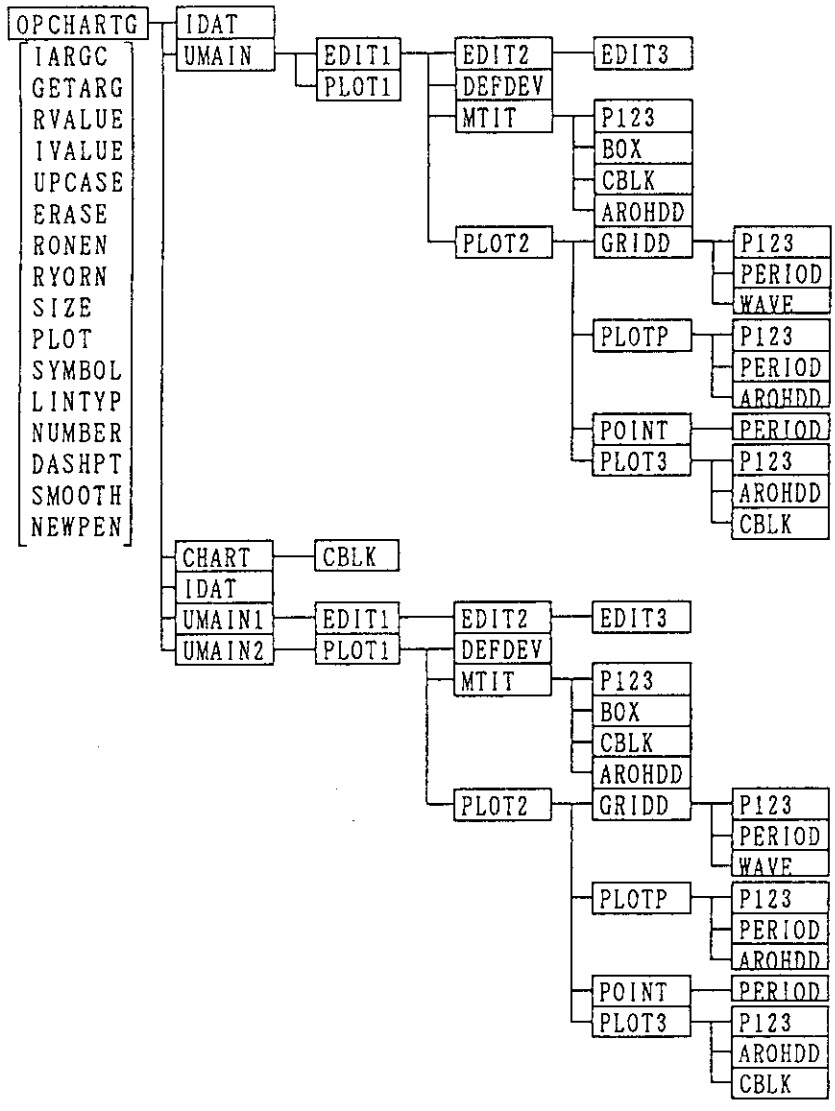

Fig. 4.6 Structure of OPCHARTG Module

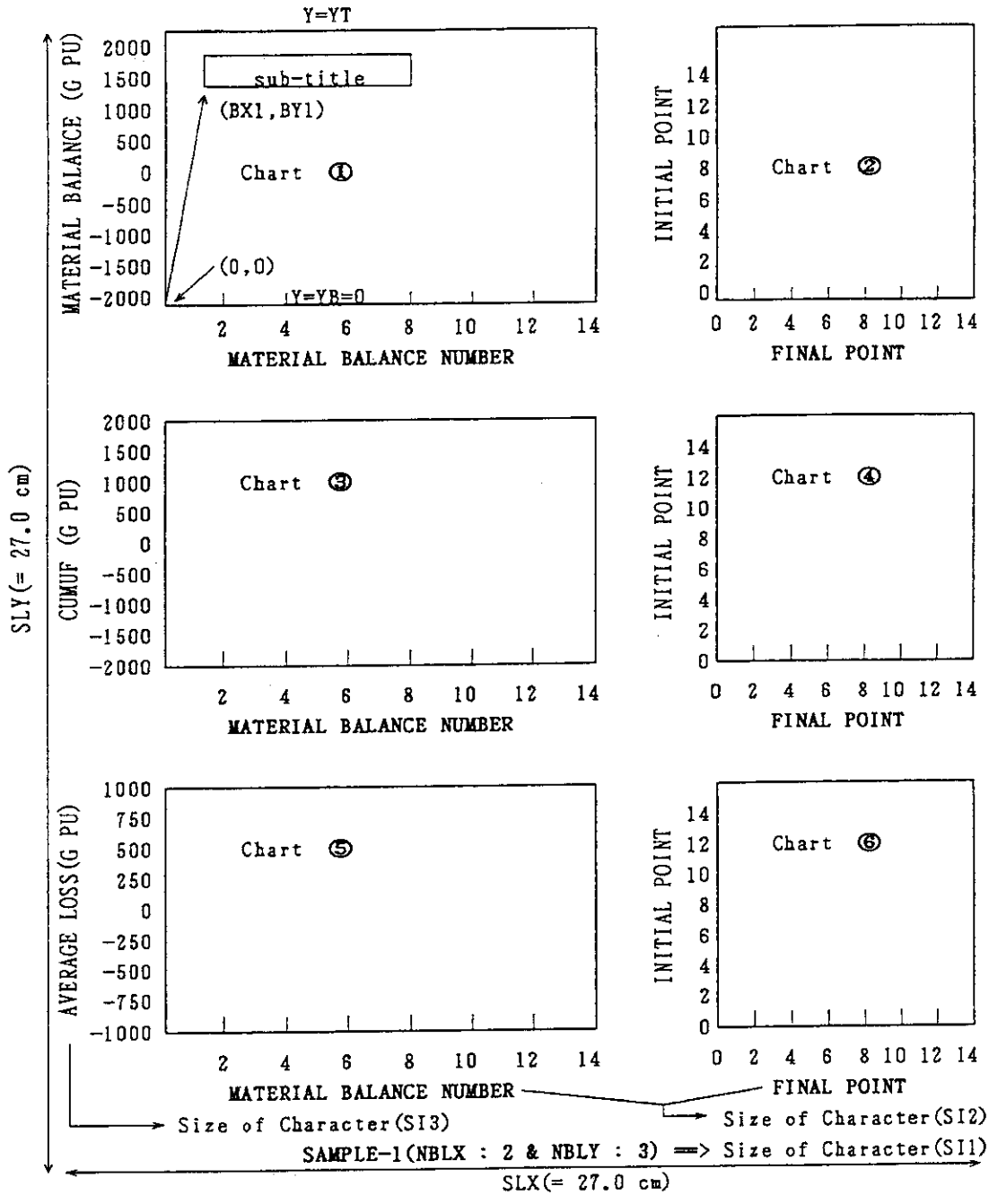

Fig. 4.7 Guide for preparation of input data for producing output charts (Chapter 4.4.8)

5. NRTA DATA ANALYSIS METHOD

The error propagation models used in PROMAC-J are identical to those developed by J. Jaech [6]. For reader's convenience, the following description were made based on this reference.

5.1 Measurement Error Model

The amount of nuclear material in a given tank (or a container) is assumed to be determined by the volume times density method. A bulk determination gives a volume of solution in the tank or a net weight of the content in the container. This is, then, multiplied by an element factor to give the total amount of element. To give the total amount of isotope such as U-235 or Pu-239, this product is multiplied by an isotope factor. The element factor is the ratio of the amount of element to the total contents in the tank or container, and the isotope ratio is the ratio of the total amount of isotope to the amount of element.

In PROMAC-J, following five measurement operations are considered.

(1) Bulk measurement (weighing or volume)
(2) Sampling for element factor determination
(3) Analysis for element factor determination
(4) Sampling for isotope factor determination
(5) Analysis for isotope factor determination

Each measurement operation associates following three types of measurement errors.

(1) Random error
An error that affects only a single member of a given data set.
(2) Short-term systematic error
An error that affects some, but not all, members of a data set.
(3) Long-term systematic error or bias
An error that affects all members of a data set.

The element factor is given as an average of values obtained on m samples and d total analyses. The m samples may be drawn from one container or may be drawn from several nominally similar containers. The element factor will be assigned to all of these containers.

The short-term systematic error due to sampling for the element factor will be determined by s_i samples, which are drawn under short-term sampling conditions i; $i = 1,2,\ldots,S$, with

$$\sum_{i=1}^{S} s_i = m$$

The short-term systematic error due to element factor analysis will be determined by a_i analyses, which are carried out under analytical short-term conditions i; i =1,2,....,A, with

$$\sum_{i=1}^{A} a_i = d$$

The short-term systematic error due to sampling for the isotope factor will be determined by r_i samples, which are drawn under short-term sampling conditions i; i = 1,2,...,R, with

$$\sum_{i=1}^{R} r_i = p$$

The short-term systematic analysis due to isotope factor analysis will be determined by b_i analyses, which are performed under short-term analytical conditions i; i =1,2,...,B, with

$$\sum_{i=1}^{B} b_i = k$$

The standard deviations are defined in Table 5.1 with the number of measurements.

Table 5.1 Definition of Standard Deviations [6]

Operation	Long-term systematic	Short-term systematic	Random
Bulk measurement	σ_δ	σ_ϕ	σ_ε
Sampling, element	σ_Δ	σ_ψ	σ_η
Analysis, element	σ_θ	σ_β	σ_ω
Sampling, isotope	σ_λ	σ_π	σ_μ
Analysis, isotope	σ_γ	σ_α	σ_ν

5.2 Variance Calculation Model

The variance associated with the calculated amount of element and isotope in the container in question can be drawn by defining the variables shown below.

In PROMAC-J the multiplicative model (relative error model) are used.

This means that the standard deviations defined in Table 5.1, are all expressed on a relative basis. In addition to this Table, following variables are used to calculate the variances.

w = observed net weight (or volume) of container contents

$\bar{p}$ = element factor applied to the contents

$\bar{t}$ = isotope factor applied to the contents

$\bar{m}$ = number of samples on which $\bar{p}$ is based

d = number of analytical determinations on which $\bar{p}$ is based

s_i = number of samples drawn under condition i for element analysis, with

$$\sum_{i=1}^{S} s_i = m$$

a_i = number of element analyses made under condition i, with

$$\sum_{i=1}^{A} a_i = d$$

p = number of samples on which $\bar{t}$ is based

$\bar{k}$ = number of analytical determinations on which $\bar{t}$ is based

r_i = number of samples drawn under condition i for isotope analysis, with

$$\sum_{i=1}^{R} r_i = p$$

b_i = number of isotope analyses made under condition i, with

$$\sum_{i=1}^{B} b_i = k$$

The variance of the calculated element weight for the container in question, V_E, is given by the following equation.

$$V_E = (\bar{wp})^2 \left(\sigma_\delta^2 + \sigma_\Delta^2 + \sigma_\theta^2 + \sigma_\phi^2 + \sigma_\psi^2 + c_0\sigma_\beta^2 + c_1\sigma_\varepsilon^2 + \frac{\sigma_\eta^2}{m} + \frac{\sigma_\omega^2}{d} \right)$$

where

$$c_0 = \sum_{i=1}^{S} s_i^2 / m^2$$

and

$$c_1 = \sum_{i=1}^{A} a_i^2 \ / \ d^2$$

$$V_I = (\overline{wpt})^2 (\ \sigma_\delta^2 + \sigma_\Delta^2 + \sigma_\theta^2 + \sigma_\lambda^2 + \sigma_\gamma^2 + \sigma_\phi^2 + c_0\sigma_\psi^2 + c_1\sigma_\beta^2 + g_0\sigma_\pi^2 + g_1\sigma_\alpha^2$$
$$+ \sigma_\varepsilon^2 + \frac{\sigma_\eta^2}{m} + \frac{\sigma_\omega^2}{d} + \frac{\sigma_\mu^2}{p} + \frac{\sigma_\nu^2}{k} \ )$$

where

$$g_0 = \sum_{i=1}^{R} r_i^2 \ / \ p^2$$

$$g_1 = \sum_{i=1}^{B} b_i^2 \ / \ k^2$$

5.3 Decision Analysis Models for Material Accounting

In a given material balance area (MBA) for a material balance period i, the material balance is given by the following equation.

$$MUF_i = I_{i-1} + R_i - S_i - I_i \qquad (i = 1,2,3,.....)$$

Where

I_{i-1} = inventory of the MBA at the beginning of period i
R_i = receipt of the MBA during the period i
S_i = shipment from the MBA during the period i
I_i = inventory of the MBA at the end of period i

If all material defined above have been measured, and if there have been no diversion, then a non-zero MUF_i should have been caused only by measurement uncertainty. If there have been a diversion or a part of material have not been measured, then the MUF_i will appear as a nonzero positive value which include the sum of the amounts of diverted and unmeasured nuclear materials. To determine whether the MUF_i is caused by measurement uncertainty or MUF_i is caused by in-correct measurements or a diversion, hypothesis testings for the sequence of MUF_j is carried out.

There have been several techniques internationally suggested for this purpose [7-14]. Most of these techniques are programmed in PROMAC-J, therefore any user can apply these techniques to a sequence of MUF data they collected. We have not tried to develop a new technique for this purpose

but have endeavored to develop computer programs for these existing techniques in order to evaluate their capabilities for the near-real-time material accountancy. The results of our studies have been published in the references [16-21].

It is not the purpose of this paper, however, to evaluate or compare these different techniques nor to describe details of these techniques. This paper will provide an outline of these statistical techniques for reader's references. The references [7,8] is used as the background of this chapter.

In PROMAC-J, the programs to perform following statistical analyses are installed, and the user can choose any one of these by indicating his option in the input data.

For Small-Sample Evaluation Techniques (SSET):

1) MUF test (LEMUF method)

For Large-Sample Evaluation Techniques (LSETs):

-- Sequential Probability Ratio Tests (SPRT) --

2) CUMUF test (Correlation between MUFs are taken into account.)
3) CUMUF test (No correlation between MUFs are taken into account.)
4) One state Kalman filter (Correlation between MUFs is taken into account.)
5) One state Kalman filter (No correlation between MUFs is taken into account.)
6) Two state Kalman filter (Correlation between MUFs is taken into account.)
7) Two state Kalman filter (No Correlation between MUFs is taken into account.)
8) Sequential Variance test
9) Smoothed Kalman filter
10) Wilcoxon Rank Sum test

5.3.1 LEMUF Test

The small sample evaluation technique uses one or a few data points of material balance. This test is carried out basing upon only the statistical properties of the data points under consideration and other data sets are usually ignored. As a method of this type, a commonly used method is the LEMUF test.

Assuming a Gaussian distribution for the material balance uncertainty, MUF, "Limit of Error of MUF (LEMUF)" is given by

$$LEMUF = Z_{1-\alpha/2}\,\sigma_{MUF}$$

where $Z_{1-\alpha/2}$ is the standard normal variable with $100(1-\alpha)\%$ confidence. For α = 5 %,

$$LEMUF = 1.96\,\sigma_{MUF} \cong 2\,\sigma_{MUF}$$

This means that true MUF, MUF_t, will be in the interval MUF $\pm$ LEMUF with 95% probability. In other word, any MUF more than LEMUF is an out-of limit condition.

5.3.2 Sequential Probability Ratio Test (SPRT)

The sequential probability tests have been developed as effective methods to be applied for many material balance data points that are generally sequentially correlated. These techniques are also called the Large-Sample Evaluation Techniques (LSETs). The purpose of the test is to find out "signals" contained in "observations".

Consider a sequence of "observations, Z" of "signal, X", that is given as

$$Z(k)=\{z(1),z(2),.....z(k)\}.$$

In material accountancy, Z(k) may be MUF at time interval k. The signals X's can not be observed directly, but only through observation Z(k). Therefore the problem is to decide which of two "signal" sequences,

$$X_0(k) = \{x_0(1),x_0(2),.....x_0(k)\}$$

or

$$X_1(K) = \{x_1(1),x_1(2),.....x_1(k)\}$$

is contained in Z(k).

In material accountancy, $X_0(k)$ may represent a k-length sequence of true material balance values for which there have been no diversion. On the other hand, $X_1(k)$ may represent a k-sequence of true material balance values for which there have been either a diversion or unmeasured nuclear material or both. Therefore each $x_0(k)$ will be equal to the amount of un-

measured nuclear material during a time interval k, and $x_1(k)$ will be equal to the sum of the amounts of diverted material and unmeasured material during the time interval k.

The hypothesis that X_0 has occurred during the period k is designated as the null hypothesis and represented by H_0, while the hypothesis that X_1 has occurred is designated as the alternative hypothesis and represented by H_1. Then the problem is which hypothesis H_0 or H_1 should be accepted.

$$H_0: \quad z(k) = h(k)x_0(k) + \varepsilon(k)$$
$$H_1: \quad z(k) = h(k)x_1(k) + \varepsilon(k)$$

With regard to the decision, there are two types of errors we may commit. The first type of error is to decide H_1 is true when H_0 is true. The probability to commit the first type error is called the probability of a false alarm and, in general, expressed by a symbol α or P_F. The second type of errors is to decide H_0 is true when H_1 is true. The probability to commit the second type of error is called the miss probability, and expressed by β or P_M. These are written as follows:

$$\alpha = P_F(k) = \int_{-\infty}^{Z_T} P_{z|H}\,[\,A(k)|H_0]\,dA(k)$$

$$\beta = P_M(k) = \int_{Z_T}^{\infty} P_{z|H}\,[\,A(k)|H_1]\,dA(k)$$

where $P_{z|H}\,[\,A(k)|H_i]$ is the probability density function and sometimes called the likelihood function for the hypothesis H_i that express a measure of the probability that the particular observation set A(k) could have occurred if H_i were true, and Z_T is the boundary between the acceptance regions for H_0 and H_1 in k-observation space.

There are several decision algorithms derived from different concerning to the selection of P_F and P_M. One of the criteria is to fix P_F and minimize P_M, which is called the Neyman-Pearson criterion. Another method known as the Bayes risk criterion is to assign costs to incorrect decisions and minimize the expected value of the total cost of a decision. In the latter case, estimates of the prior probabilities that H_0 and H_1 are true is required. Regardless the criteria chosen, the decision test is to compare

the likelihood ratio to a threshold. The likelihood ratio is defined as

$$L[A(k)] = \frac{P_{Z|H}\,[A(k)|H_1]}{P_{Z|H}\,[A(k)|H_0]} \quad ,$$

and the decision test for a fixed k is defined as

$$\begin{cases} \text{accept } H_0 \text{ if } L[A(k)] < \tau \\ \text{accept } H_1 \text{ if } L[A(k)] \geq \tau \,. \end{cases}$$

For sequential decision making, i.e., not for a fixed number of observations, however, there may be a situation in which it is desirable to make no decision but collect another observation. In this case there are two thresholds, $\tau_0(k)$ and $\tau_1(k)$.

$$\begin{cases} \text{accept } H_0 \text{ if } L[A(k)] \leq \tau_0 \\ \text{accept } H_1 \text{ if } L[A(k)] \geq \tau_1 \\ \text{otherwise, continue observations.} \end{cases}$$

The thresholds τ_0 and τ_1 can be defined as follows.

If hypothesis H_1 is accepted at k=K, where $L[(A(K)] = \tau_1(K)$, then we have

$$L[A(K)] = \frac{P_{Z|H}\,[A(K)|H_1]}{P_{Z|H}\,[A(K)|H_0]} = \tau_1(K),$$

Integration of the equation over the acceptance region for H_1,

$$\int_{Z_T}^{\infty} P_{z|H}\,[\,A(K)|H_1]\,dA(K) = \int_{Z_T}^{\infty} P_{z|H}\,[\,A(K)|H_0]\,dA(K)$$

The above equation is equivalent to the following equation expressed in terms of false-alarm and miss probabilities.

$$1 - P_M(K) = \tau_1(K) P_F(K).$$

Similarly if H_0 is accepted at k=K, where $L[A(K)] = \tau_0$, then we have

$$L[A(K)] = \frac{P_{Z|H}\,[A(K)|H_1]}{P_{Z|H}\,[A(K)|H_0]} = \tau_0(K),$$

Integrating the equation over the acceptance region for H_0, we have

$$\int_{-\infty}^{Z_T} P_{z|H}\ [\ A(K)|H_1]\ dA(K) = \int_{-\infty}^{Z_T} P_{z|H}\ [\ A(K)|H_0]\ dA(K)$$

This is equivalent to

$$P_M(K) = \tau_0[1 - P_F(K)].$$

In summary, thresholds values can therefore be given by the following equations.

$$\tau_0 = \frac{P_M(K)}{1 - P_F(K)} ,$$

$$\tau_1 = \frac{1 - P_M(K)}{P_F(K)} .$$

5.3.3 CUMUF Test

A cumulative MUF, CUMUF, is defined by

$$CUMUF_{ij} = \sum_{n=i}^{j} MUF_n$$

$$= I_{i-1} + \sum_{p=i}^{j} R_p - \sum_{q=i}^{j} S_q - I_j$$

and the variance of the CUMUF is given by

$$\sigma^2(CUMUF_{ij}) = \sigma(I_{i-1},I_{i-1}) + \sum_{p=i}^{j}\sum_{v=i}^{j} \sigma(R_p,R_v) + \sum_{q=i}^{j}\sum_{w=i}^{j} \sigma(S_q,S_w)$$

$$+ \sigma(I_j,I_j) + 2\{\sum_{p=i}^{j} \sigma(I_{i-1},R_p) - \sum_{q=i}^{j} \sigma(I_{i-1},S_q)$$

$$- \sigma(I_{i-1},I_i)) - \sum_{p=i}^{j}\sum_{q=i}^{j} \sigma(R_p,S_q) - \sum_{p=i}^{j} \sigma(R_p,I_j)$$

$$+ \sum_{q=i}^{j} \sigma(S_q,I_j)\}$$

The equation above mentioned for CUMUF variance is a strict formula

that takes all measurement error propagations into account correctly, i.e., all correlations among any MUFs are taken into consideration. PROMAC-J has also a function to calculate CUMUF variance neglecting these correlations. This means that in such calculation the systematic error propagation will be neglected. This option is given for the user's convenience to analyze the effect of the systematic error propagation.

The hypothesis testing for CUMUFs is given by

$$\begin{cases} \text{accept } H_0 \quad \text{if} \quad \dfrac{CUMUF_{ij}}{\sigma(CUMUF_{ij})} \leq -(2|\log \tau_0|)^{1/2} \\ \text{accept } H_1 \quad \text{if} \quad \dfrac{CUMUF_{ij}}{\sigma(CUMUF_{ij})} \geq +(2|\log \tau_1|)^{1/2} \\ \text{continue observations otherwise.} \end{cases}$$

5.3.4 One-state Kalman Filter Test

When likelihood functions contain an unknown parameter m, e.g., the unknown mean value of the observations, we can not proceed with the decision because the likelihood ratio can not be calculated without a value for m. In such case, we use estimates for m under the corresponding hypotheses instead of the actual (unknown) m and proceed with the tests. The most common estimate is the maximum likelihood estimate that is given by maximizing the likelihood function with respect to the unknown parameter. Thus the generalized likelihood ratio defined in those cases is given by

$$L[A(K)] = \frac{\underset{m_1}{\text{Max}}\ P_{z|H}[A(K)|H_1,m]}{\underset{m_0}{\text{Max}}\ P_{z|H}[A(K)|H_0,m]} \quad ,$$

where m_0, and m_1 are the spaces of allowable values for m under the hypotheses H_0 and H_1, respectively.

Assume that the hypotheses are represented by

$$H_0: \quad M(k) = M_0 + \varepsilon_M(k), \qquad M_0 \leq 0$$

$$H_1: \quad M(k) = M_1 + \varepsilon_M(k), \qquad M_1 \geq 0$$

$$k=1,2,3,.....$$

where $\varepsilon_M(k)$ is the measurement error for the k-th time interval, i.e., the

material balance. Then, the likelihood functions at any time k can be represented by

$$P_{Z|H}[A(k)|H_0] = p[M(1),M(2),M(3),....,M(k)|H_0]$$

$$= \prod_{i=1}^{k} [2\pi \cdot \sigma_M^2(i)]^{-1/2} \exp - \frac{[M(i) - M_0]^2}{2\sigma_M^2(i)} ,$$

$$P_{Z|H}[A(k)|H_1] = p[M(1),M(2),M(3),....,M(k)|H_1]$$

$$= \prod_{i=1}^{k} [2\pi \cdot \sigma_M^2(i)]^{-1/2} \exp - \frac{[M(i) - M_1]^2}{2\sigma_M^2(i)} ,$$

where $\varepsilon_M(i)$ is the error variance for the i-th material balance, M(i).
The above two likelihood functions include two unknown parameters, M_0 and M_1. From the hypothesis statements, M_0 should be less than or equal to 0 and M_1 should be greater than or equal to 0. Therefore, the maximum likelihood estimates in question are given by

$$\hat{M}_0(k) = \text{Min } \{0,\hat{M}(k)\},$$

$$\hat{M}_1(K) = \text{Max } \{0,\hat{M}(k)\},$$

where $\hat{M}(k)$ is the one-state Kalman filter estimate for the material balance at the time interval k, and can be calculated by the following equations.

$$\hat{M}(k) = \hat{M}(k-1) + B(k)[\hat{M}(k) - \hat{M}(k-1)]$$

$$B(k) = \frac{\sigma^2(k-1)}{\sigma^2(k-1) + \sigma_M^2(k),}$$

$$\sigma^2(k) = [1 - B(k)]\sigma^2(k-1),$$

where B(k) is called the Kalman filter gain, and $\sigma^2(k-1)$ is the variance of the error in the estimate $\hat{M}(k-1)$. These equations are recursive formula with initial conditions

$$\hat{M}(0) = 0, \quad \text{and} \quad \sigma^2(0) = \infty.$$

Thus, we can perform the decision test by the following way.

- Accept H_0 if $\hat{M}(k)/\sigma(k) \leq - (2|\ln \tau_0|)^{1/2}$,
- Accept H_1 if $\hat{M}(k)/\sigma(k) \geq + (2|\ln \tau_1|)^{1/2}$,
- otherwise, continue observations.

The test is performed sequentially for all k and for all possible starting points. The $\hat{M}(k)$ will be an estimate of the average amount of loss or gain of material per material balance and optimal when the inventory measurement errors are small compared to those of the transfers.

5.3.5 Two-State Kalman Filter Test

If the inventory measurement errors are not small compared to those of the transfer measurements, the two-state Kalman filter will give a material balance estimate of smaller variance than the one-state Kalman filter. In the two-state Kalman filter devised by Pike et. al., both the material balance and the inventory are treated as state variables and the estimates of these variables are calculated. The recursive formula to calculate these estimates are

$$\hat{I}(k) = \hat{I}(k|k-1) + B_1(k)[I(k) - \hat{I}(k|k-1)],$$

$$\hat{M}(k) = \hat{M}(k-1) + B_2(k)[I(k) - \hat{I}(k|k-1)],$$

$$\hat{I}(k|k-1) = \hat{I}(k-1) + T(k-1) - \hat{M}(k-1),$$

where I(k) and M(k) are the inventory and material balance estimates, respectively, at the time interval k. The Kalman filter gains B_1 and B_2 are, respectively, given by

$$B_1(k) = \frac{\sigma^2_{\hat{I}}(k)}{\sigma^2_{\hat{I}}(k)} \quad , \quad \text{and} \quad B_2 = \frac{\sigma_{\hat{I}\hat{M}}(k)}{\sigma^2_I(k)}$$

and

$$\sigma^2_{\hat{I}}(k) = \frac{\sigma^2_{\hat{I}}(k|k-1)\sigma^2_I(k)}{\sigma^2_{\hat{I}}(k|k-1) + \sigma^2_I(k)} \ ,$$

$$\sigma_{\hat{I}\hat{M}}(k) = \frac{\sigma_{\hat{I}\hat{M}}(k|k-1)\sigma^2_I(k)}{\sigma^2_{\hat{I}}(k|k-1) + \sigma^2_I(k)} \ ,$$

with

$$\sigma^2_I(k|k-1) = \sigma^2_{\hat{I}}(k-1) - 2\sigma_{\hat{I}\hat{M}}(k-1) + \sigma^2_{\hat{M}}(k-1) + \sigma^2_T(k-1) \ ,$$

$$\sigma_{\hat{I}\hat{M}}(k|k-1) = \sigma_{\hat{I}\hat{M}}(k-1) - \sigma^2_{\hat{M}}(k-1).$$

$$\sigma^2_{\hat{M}}(k) = \sigma^2_{\hat{M}}(k-1) - \frac{\sigma^2_{\hat{I}\hat{M}}(k|k-1)}{\sigma^2_{\hat{I}}(k|k-1) + \sigma^2_{I}(k)} .$$

The initial conditions are

$$\hat{I}(0) = I(0), \qquad \sigma^2_{\hat{I}}(0) = \sigma^2_{I}(0), \quad \hat{M}(0) = 0, \quad \sigma^2_{M}(0) = \infty.$$

The decision test is written as follows:

- Accept H_0 if $\hat{M}(k)/\sigma_{\hat{M}}(k) \leq -(2|\ln \tau_0|)^{1/2}$,
- Accept H_1 if $\hat{M}(k)/\sigma_{\hat{M}}(k) \geq +(2|\ln \tau_1|)^{1/2}$,
- otherwise, continue observations.

Similar to the one-state Kalman filter, the test is performed sequentially for all k's and for all possible starting points.

6. OPERATION MANUAL

6.1 STARTING-UP PROCESS

Figures 6.1 and 6.2 show the constituents of the calculation menu of the PROMAC-J and their procedures by defining specific steps for each procedure. Details of operations in each step are described, starting from "PROMAC-J Data Processing Procedure (1)" . A page of an even number shows a screen on the display, and the consecutive next page of an odd number shows how to operate according to the indication appeared on the screen.

Step 1 : Start up.

Step 2 : Select a data processing module.

Step 2.0

0	Initialize

Step 2.0.X

0	D-PIT file
1	Transfer file
2	Return to Step 2

Step 2.1

1	List

Step 2.1.X

1	I-KMP names
2	D-PIT time
3	D-PIT measurement data
4	F-KMP names
5	Transfer measurement data
6	Provide D-PIT data onto an output file
7	Provide transfer data onto an output file
8	Provide a material balance table onto an output file
9	Return to Step 2

Step 2.2

2	Update the D-PIT data

Step 2.2.X

1	I-KMP name
2	D-PIT time
3	D-PIT measurement data
4	Return to step 2

Step 2.2.X.X

1	Add or Insert
2	Change
3	Delete
4	Return to Step 2.2

Step 2.3

3	Update the Transfer data

Step 2.3.X

1	F-KMP name
2	Transfer measurement data
3	Return to Step 2

Step 2.3.X.X

1	Add or Insert
2	Change
3	Delete
4	Return to Step 2.3

Fig. 6.1 Processing menu of PROMAC-J program(1)

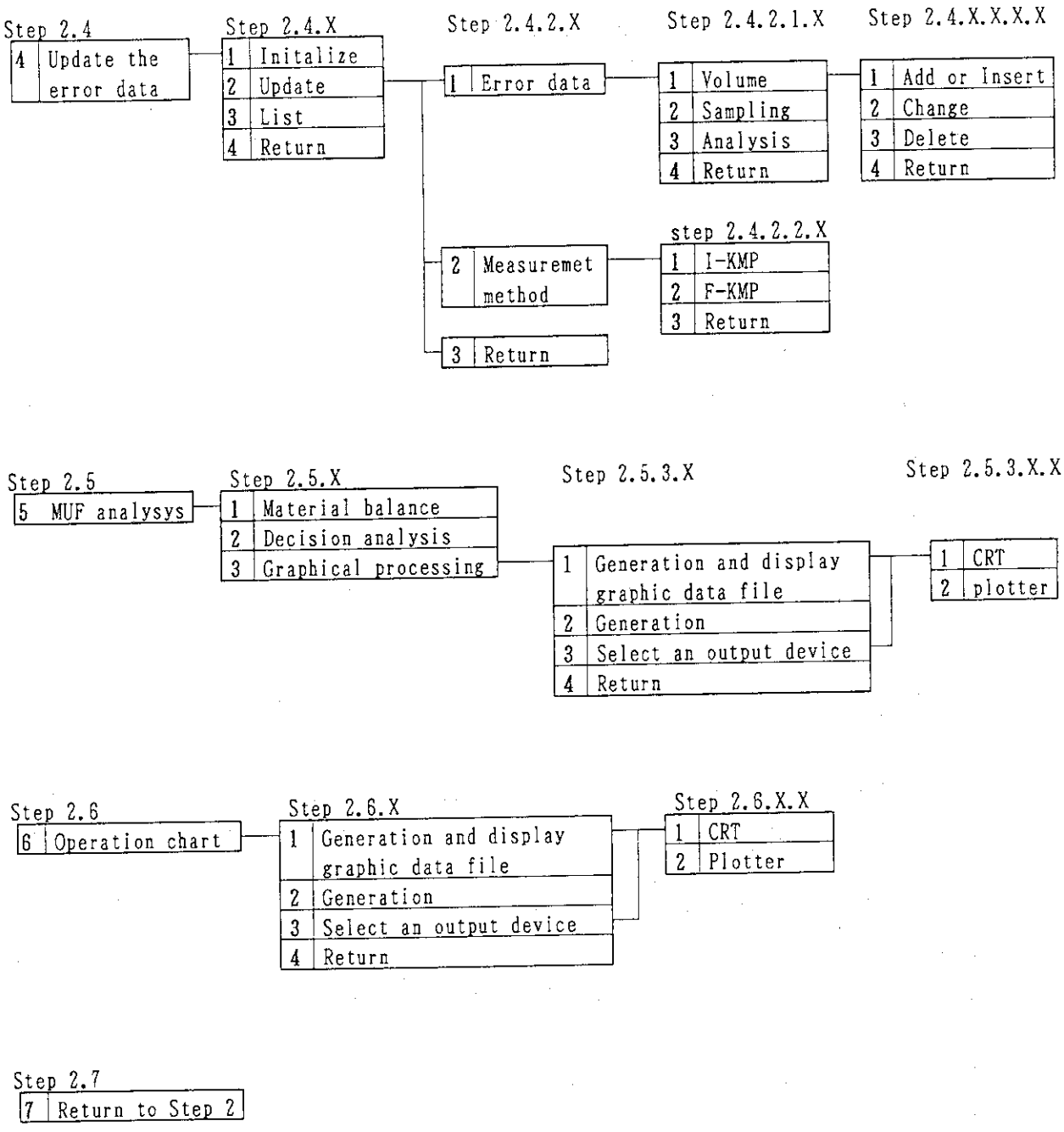

Fig. 6.2 Processing menu of PROMAC-J program(2)

6.2 Preparation Before Starting-up

Preparation Process before starting PROMAC-J

```
IS68K 4.3 BSD UNIX (vsx800) (ttyh4) (6:16pm on Fri, 9 Feb 1990)

login:pnc
Password:
IS68K 4.3BSD UNIX: 5.1.5 #1: JAERI_20(root@vsx800):12/12/89 23:49
Erase is Delete
Kill is Ctrl-U
Interrupt is Ctrl-C
  [1]
```

```
  [1] vi sadac.c
```

```
    1 ■
~
~
.
.
~
"sadac. c"   [New file]
```

```
    1  SAMPLE OUTPUT
    2       1     2    35     7 ・・・・・ 1  1  1
    3   0.025   0.5  0.01 0.005 ・・・・・
    4  END ■
~           └→(write out "sadac.c" data file using either ZZ or :wCR.)
.
.
~
"sadac. c"   [New file]    4 lines, XXX characters.
[2]
```

```
  [2] vi sptplt.d   (same procedure as "sadac.c" data file)
    .
    .
```

```
  [3] vi sptplt19.d (same procedure as "sadac.c" data file)
    .
    .
```

Preparation Process before starting PROMAC-J

Sample Input	Explanation
	Step 1 : Make access to the data processing device.
pnc (CR)	User's name such as pnc, iaea, sta.
pnc?????	User's passward.
vi sadac.d (CR)	Preparation of "sadac.d" data file using vi editor.
	The screen should clear and the text of sadac.d file should appear on the screen.
SAMPLE OUTPUT (CR)	Give sadac.d data(See Section 4.4.6)
1 2 • • (CR) 0.025 0.5 • • (CR)	
END (ZZ)	(ZZ) : write out "sadac.d" data file using either ZZ or :w(CR).
vi sptplt.d (CR)	Preparation of "sptplt.d" data file using vi editor. Same procedure as "sadac.d" data file. Give sptplt.d data(See Section 4.4.7).
vi sptplt19.d (CR)	Preparation of "sptplt19.d" data file using vi editor. Same procedure as "sadac.d" data file. Give sptplt19.d data(See Section 4.4.8).

6.3 PROMAC-J Data Processing Procedure

PROMAC-J Data Processing Procedure (1)

Step 1 : Make access to the data processing device, and start up the promacc module.

```
IS68K 4.3 BSD UNIX (vsx800) (ttyh4) (6:16pm on Fri, 9 Feb 1990)

login: pnc
Password:
IS68K 4.3BSD UNIX: 5.1.5 #1: JAERI_20(root@vsx800):12/12/89 23:49
Erase is Delete
Kill is Ctrl-U
Interrupt is Ctrl-C
 [1]
```

```
 [1] promacc
 ENTER THE USER-ID OR PASSWORD <8-CHARACTER> =====>pnc
 ENTER THE OWNER NAME OF D-PIT DATA FILE =========>pnc
 ALLOCATION FILE ================================>(/usr/pnc/pitnew)
 ENTER THE OWNER NAME OF TRANSFER DATA FILE ======>pnc
 ALLOCATION FILE ================================>(/usr/pnc/trsnew)
 ENTER THE OWNER NAME OF MEASUREMENT DATA FILE ===>pnc
 ALLOCATION FILE ================================>(/usr/pnc/meanew)
```

Step 2 : Select a processing step from the following menu.

```
********    PROCESS  MENU    ********

     0 : INITIALIZATION OF DATA FILE
     1 : LIST DATA STORED IN A FILE
     2 : UPDATE A D-PIT DATA FILE
     3 : UPDATE A TRANSFER DATA FILE
     4 : UPDATE A MEASUREMENT ERROR DATA FILE
     5 : CALCULATE A MATERIAL BALANCE AND ITS VARIANCE,
         CARRY OUT A DECISION ANALYSIS AND ALARM CHART
     6 : OPERATION SEQUENCE CHART
     7 : EXIT FROM PROCESS

  Enter the number of your choice(0-6/7).        : 0
```

PROMAC-J Data Processing Procedure (1)

Sample Input	Explanation
	Step 1 : Make access to the data processing device, and start up the promacj module.
pnc (CR)	User's name such as pnc, iaea, sta.
pnc?????	User's passward.
promacj (CR)	Start up the promacj module.
pnc????? (CR)	User's ID name.
pnc (CR)	Owner's name of PIT file. Responding to this input, the system displays a name of the file to be used.
pnc (CR)	Owner's name of the Transfer file. Responding to this input, the system displays a name of the file to be used.
pnc (CR)	Owner's name of the measurement error data file. Responding to this input, the system displays a name of the file to be used.
	Step 2 : Select a processing step from the following menu:
	Selecting one from the following menu: 0 : Initialize the data files to be used; 1 : Give an output of the data in a file 2 : Update the DPIT data file; 3 : Update the Transfer data file; 4 : Update the Measurement error data file; 5 : Calculate a material balance and its variance, carry out the decision analyses and alarm chart; 6 : Process the operation chart; 7 : End the job; give its number, 0, 1, ..., or 7
0 (CR)	Select Menu 0 in Step 2.

PROMAC-J Data Processing Procedure (2)

Step 2.0 : Initialize data files to be used, if Menu 0 is selected in Step 2.

```
********  INITIALIZATION  MENU  ********

    0 : PIT DATA FILE
    1 : TRANSFER DATA FILE
    2 : EXIT FROM INITIALIZATION

  Enter the number of your choice(0/1/2).       : 0


 Status of pittmp1  file to be initialized(y/n=old/new)    : n
```

Step 2.1 : Assign an output data type, if Menu 1 is selected in Step 2.

```
*************    LISTING  MENU    *************


     1 : I-KMP NAME
     2 : D-PIT TIME
     3 : MEASUREMENT DATA OF D-PIT
     4 : F-KMP NAME
     5 : MEASUREMENT DATA OF TRANSFER
     6 : D-PIT DATA TO LIST·FILE
     7 : TRANSFER DATA TO LIST FILE
     8 : MATERIAL BALANCE DATA TO LIST FILE
     9 : EXIT FROM LISTING


   Enter the Number of your choice(0-8/9).      : 1
   Would You print out from LIST FILE(Y/N).     : n
```

PROMAC-J Data Processing Procedure (2)

Sample Input	Explanation
	Step 2.0 : Initialize data files to be used, if Menu 0 is selected in Step 2.
	Selecting one from the following menu: 0 : Initialize the PIT data file; 1 : Initialize the Transfer file; 2 : Return to Step 2; give its number, 0, 1 or 2.
0 (CR)	Select Menu 0 in Step 2.0.
	Step 2.0.0 : Initialize the PIT data file, if Menu 0 is selected in Step 2.0.
n (CR)	Indicate whether the file 'xx..x' to be initialized is old or new.
	Step 2.0.1 : Initialize the Transfer data file, if Menu 1 is selected in Step 2.0. The same as Step 2.0.0.
	Step 2.1 : Assign an output data type, if Menu 1 is selected in Step 2.
	Selecting one from the following menu: 1 : List the I-KMP names; 2 : List the times when D-PITs were carried out; 3 : List the D-PIT measurement data; 4 : List the F-KMP names; 5 : List the Transfer measurement data; 6 : Provide the D-PIT data on an output file; 7 : Provide the Transfer data on an output file; 8 : Provide the material balance table on an output file; 9 : Return to Step 2; give its number, 1, 2..., or 9.
1 (CR)	Select Menu 1 in Step 2.
n (CR)	y : Provide I-KMP name on an output file. n : Do not provide the output file.

PROMAC-J Data Processing Procedure (3)

Sample output in Step 2.1.1 : List the I-KMP names, if Menu 1 is selected in Step 2.1.

```
              INVENTORY  TAKING  POINT  NAME  LIST
              ------------------------------------

LAST UPDATE NAME :                                    DATE  90/ 2/ 9
LAST UPDATE DATE :   Y  M  D  H  M                    TIME  18:22:58

     NO.          NAME              NO.          NAME
    -----      ----------          -----      ----------
        1        IMP001                2        IMP002
        3        IMP003                4        IMP004
        5        IMP005                6        IMP006
        7        IMP007                8        IMP008
        9        IMP009               10        OTH-1
       11        OTH-2                12        OTH-3

   Would you like to continue(Y/N)?        : n
```

Sample output in Step 2.1.2 : List the time of PIT, if Menu 2 is selected in Step 2.1.

```
                  INVENTORY  TAKING  TIME  LIST
                  ----------------------------

LAST UPDATE NAME :                                    DATE  90/ 2/ 9
LAST UPDATE DATE :   Y  M  D  H  M                    TIME  18:22:58

 NO.       DATE        HOUR            NO.       DATE        HOUR
-----   ----------   -------          -----   ----------   -------
   1     85/ 8/20      0: 0              2     85/ 9/16     12:30
   3     85/ 9/17     22:27              4     85/ 9/19      5:59
   5     85/ 9/20      6:59              6     85/ 9/22      1:46
   7     85/ 9/23     10:54              8     85/ 9/24     19:43
   9     85/ 9/26      3: 0             10     85/ 9/27     11:45
  11     85/ 9/28     23:35             12     85/10/ 5      1:30
  13     85/10/ 6      9:55             14     85/10/ 7     17:45
  15     85/10/ 9      5:15             16     85/10/13      7:35
  17     85/10/14     22:22             18     85/10/16     10:35
  19     85/10/19     10:25             20     85/10/20     18:30
  21     85/10/22      2: 0             22     85/10/29      6:40
  23     85/11/ 6      9:25             24     85/11/ 7     18:35
  25     85/11/ 9      9: 0             26     85/11/11      6:38
  27     85/11/13      2:30             28     85/11/14      9:45
  29     85/11/15     17:48             30     85/11/17      5:20
  31     85/11/18     15:10             32     85/11/21      5: 5
  33     85/11/22      0:59             34     85/11/23     15:41
  35     85/11/26     17:49             36     85/12/10     10: 0

   Would you like to continue(Y/N)?        : n
```

PROMAC-J Data Processing Procedure (3)

Sample Input	Explanation
	Step 2.1.1 : List the I-KMP names, if Menu 1 is selected in Step 2.1. (Sample of the I-KMP name list)
n (CR)	n : Return to Step 2.1; y : Continue listing for the next data.
	Step 2.1.2 : List the time of PIT, if Menu 2 is selected in Step 2.1. (Sample of the time of PIT list)
n (CR)	y : Continue listing for the next data; n : Return to Step 2.1.

PROMAC-J Data Processing Procedure (4)

Sample output in Step 2.1.3 : List the PIT measurement data, if Menu 3 is selected in Step 2.1.

```
          ENTER THE LISTING MODULE FOR D-PIT MEASUREMENT DATA
          LISTING OF DPIT DATA (ALL/PART=0/1)     : 0


                  INVENTORY  TAKING  DATA  LIST (ALL)        DATE  90/ 2/ 9
                  ----------------------------------        TIME  18/22/58
                                                        ---- LAST UPDATE ----
                  DPIT NO.   ===>                 1       NAME:
                  DPIT TIME ===> 85/ 8/20   0: 0          DATE:          :
```

IKMP	VOLUME(L)	PU-CONC.(G/L)	PU-WEIGHT(G)	U-CONC.(G/L)	U-WEIGHT(G)
IMP001	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP002	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP003	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP004	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP005	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP006	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP007	3.25000E+02	5.58000E+00	1.81350E+03	0.00000E+00	0.00000E+00
IMP008	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
IMP009	3.83400E+02	3.40000E-01	1.30356E+02	0.00000E+00	0.00000E+00
OTH-1	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
OTH-2	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
OTH-3	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
TOTAL			1.94386E+03		0.00000E+00

```
          Would you like to continue(Y/N)?        : n
```

Sample output in Step 2.1.4 : List the F-kmp names, if Menu 4 is selected in Step 2.1.

```
              TRANSFER  DATA  MEASUREMENT  POINT  NAME  LIST
              ------------------------------------------

             LAST UPDATE NAME :                              DATE  90/ 2/ 9
             LAST UPDATE DATE :   Y  M  D  H  M              TIME  18:22:58
```

NO.	NAME	NUMBER OF TRANS. DATA
1	INPUT ACCOUNTABILITY VES	430
2	OUTPUT ACCOUNTABILITY VE	180

```
          Would you like to continue(Y/N)?        : n
```

PROMAC-J Data Processing Procedure (4)

Sample Input	Explanation
	Step 2.1.3 : List the D-PIT measurement data, if Menu 3 is selected in Step 2.1. (Sample of the D-PIT measurement data)
0 (CR)	0 : All data are listed; 1 : Data which belong to a period to be given are listed.
	A sample display for the D-PIT measurement data:
n (CR)	y : Continue listing for the next data; n : Return to Step 2.1.
	Step 2.1.4 : List the F-KMP names, if Menu 4 is selected in Step 2.1. (Sample of the F-KMP names list)
	A sample display for the F-KMP names:
n (CR)	y : Continue listing for the next data; n : Return to Step 2.1.

PROMAC-J Data Processing Procedure (5)

Sample output in Step 2.1.5 : List the Transfer measurement data, if Menu 5 is selected in Step 2.1

```
        Enter the Number of your choice(0-8/9). : 5
        Would you print out from LIST FILE(Y/N) : n

ENTER THE LISTING MODULE FOR TRANSFER MEASUREMENT DATA
Enter the P-KMP NO. of your choice(0/N=ALL/N-th)?: 1
P-KMP NAME is now.                              : (INPUT ACCOUNTABILITY VES)
NUMBER OF DATA                                  : (  430)
Enter "N" to change, or "Y" to leave unchanged  : y
Enter the PERIOD of listing
STARTING DATE (YYMMDD),
or "0" to listing of ALL DATA                   : 0
```

```
                TRANSFER  MEASUREMENT  DATA  LIST (ALL)
                ---------------------------------------

                  KMP NAME : INPUT ACCOUNTABILITY VES      DATE  90/ 2/ 9
                                                           TIME  18:22:58

                    BATCH    VOLUME   ----- PLUTONIUM -----  ------ URANIUM ------
NO.  DATE  HOUR     NAME       (L)    CONC.(G/L)  WEIGHT(G) CONC.(G/L)  WEIGHT(G)
--- ------ ---- -------- ---------- ---------- ---------- ---------- ----------
  1 85 4 7  7 0 SH1-100F  1.721E+03  1.146E+00  1.972E+03  1.656E+02  2.850E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  2 85 4 7  8 0 SH1-100H -7.310E+00  1.146E+00 -8.377E+00  1.656E+02 -1.211E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  3 85 4 8  7 0 SH1-101F  2.201E+03  1.190E+00  2.619E+03  1.745E+02  3.840E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  4 85 4 8  8 0 SH1-101H -7.290E+00  1.190E+00 -8.675E+00  1.745E+02 -1.272E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  5 85 4 9  8 0 SH1-102F  2.079E+03  1.168E+00  2.428E+03  1.813E+02  3.769E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  6 85 4 9  9 0 SH1-102H -7.330E+00  1.168E+00 -8.561E+00  1.813E+02 -1.329E+03
                        ( LAST UPDATE DATE :            :    NAME :          )

        Would you like to continue(Y/N)?        : n

         MEASUREMENT DATA OF TRANSFER        ENDED
```

Step 2.1.6 : Provide the PIT data on an output file, if Menu 6 is selected in Step 2.1.

```
        Enter the Number of your choice(0-8/9). : 6
        ENTER THE PERIOD OF LISTING
        STARTING DATE (YYMMDD)                  : 850820
        ENDED    DATA (YYMMDD)                  : 851210

        ENTER THE LISTING MODULE FOR D-PIT DATA TO LIST FILE
```

PROMAC-J Data Processing Procedure (5)

Sample Input	Explanation
	Step 2.1.5 : List the Transfer measurement data, if Menu 5 is selected in Step 2.1.(Sample of the Transfer measurement data)
5 (CR)	Select Menu 5 in Step 2.1(See Step 2.1).
n (CR)	y : Provide the Transfer measurement data on an output file. n : Do not provide the output file.
1 (CR)	0 : For all F-KMPs, their names and numbers of data are listed; N : Select a specific F-KMP by its number and give this number, then the system returns back its name and the number of data. The selection process will be iterated;
y (CR)	y : Continue the listing procedure; n : F-KMP number is incorrect. Try again. (Enter the period of listing)
0 (CR)	YYMMDD : Data which belong to this date or later than this data are listed. 0 : Data over all periods are listed.
	A display sample for the Transfer measurement data:
n (CR)	y : Continue listing for the next data; n : Return to Step 2.1.
	Step 2.1.6 : Provide the PIT data on an output file, if Menu 6 is selected in Step 2.1.
6 (CR)	Select Menu 6 in Step 2.1(See Step 2.1).
850820 (CR)	YYMMDD : Starting date of the period covered by the listing;
851210 (CR)	YYMMDD : End date of the period covered by the listing.
	This shows that the processing is under way.

PROMAC-J Data Processing Procedure (6)

Step 2.1.7 : Provide the Transfer data on an output file, if Menu 7 is selected in Step 2.1.

```
          Enter the Number of your choice(0-8/9). : 7
          ENTER THE PERIOD OF LISTING
          STARTING DATE (YYMMDD)                  : 850820
          ENDED    DATA (YYMMDD)                  : 851210

          ENTER THE LISTING MODULE FOR TRANSFER DATA TO LIST FILE

          TRANSFER DATA TO LIST FILE          ENDED
```

Step 2.1.8 : Provide the material balance table on an output file, if Menu 8 is selected in Step 2.1.

```
          Enter the Number of your choice(0-8/9). : 8
          ENTER THE PERIOD OF LISTING
          STARTING DATE (YYMMDD)                  : 850820
          ENDED    DATA (YYMMDD)                  : 851210

          ENTER THE LISTING MODULE FOR MATERIAL BALANCE DATA TO LIST FILE

          MATERIAL BALANCE DATA TO LIST FILE  ENDED
```

Step 2.1.9 : Exit from list module, if Menu 9 is selected in Step 2.1.

```
          Enter the Number of your choice(0-8/9). : 9
          LIST MODULE ENDED
          Provide an output for the LIST module(Y/N): n
```

Step 2.2 : Update the PIT data file, if Menu 2 is selected in Step 2.

```
          Enter the number of your choice(0-6/7). : 2

          UPDATE THE D-PIT DATA FILE.

 ***** D-PIT DATA FILE UPDATE MENU *****

       1 : I-KMP NAME UPDATE
       2 : D-PIT TIME UPDATE
       3 : D-PIT MEASUREMENT DATA UPDATE
       4 : EXIT FROM UPDATE PROCEDURE.

 Enter the number of your choice(1/2/3/4).        : 1

 Do you want to display list the old data(Y/N).   : n
```

PROMAC-J Data Processing Procedure (6)

Sample Input	Explanation
	Step 2.1.7 : Provide the Transfer data on an output file, if Menu 7 is selected in Step 2.1.
7 (CR)	Select Menu 7 in Step 2.1(See Step 2.1).
850820 (CR)	YYMMDD : Starting date of the period covered by the listing;
851210 (CR)	YYMMDD : End date of the period covered by the listing.
	This shows that the processing is under way.
	Step 2.1.8 : Provide the material balance table on an output file, if Menu 8 is selected in Step 2.1.
8 (CR)	Select Menu 8 in Step 2.1(See Step 2.1).
850820 (CR)	YYMMDD : Starting date of the period covered by the listing;
851210 (CR)	YYMMDD : End date of the period covered by the listing.
	This shows that the processing is under way.
	Step 2.1.9 : Exit from list module, if Menu 9 is selected in Step 2.1.
9 (CR)	Select Menu 9 in Step 2.1(See Step 2.1).
n (CR)	y : provide an output for the printer file;
	n : Do not provide an output.
	Step 2.2 : Update the PIT data file, if Menu 2 is selected in Step 2.
	Selecting one from the following menu:
	1 : Update the IKMP name;
	2 : Update the time of PIT;
	3 : Update the PIT measurement data;
	4 : Return to Step 2;
	give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.2.
n (CR)	y : List the old data;
	n : Do not list the old data.

PROMAC-J Data Processing Procedure (7)

Step 2.2.1 : Update the I-KMP name, if Menu 1 is selected in Step 2.2.
Selecting one from the following menu.

<< ADD >> Sample of an addition of I-KMP data:

```
****** I-KMP DATA UPDATE PROCEDURE ******

  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 1

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : 0
I-KMP NAME( < 8 Characters )                     : name 1

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : 0
I-KMP NAME( < 8 Characters )                     : name 2

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : end
```

<< CHANGE >> Sample of a change of I-KMP data:

```
****** I-KMP DATA UPDATE PROCEDURE ******

  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 2

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : 13
Old I-KMP NAME                                   : name 1
Are you sure(Y/N)?                               : y
Enter the new I-KMP NAME                         : (name01  )

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : 14
Old I-KMP NAME                                   : name 2
Are you sure(Y/N)?                               : y
Enter the new I-KMP NAME                         : (name02  )

Enter the I-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : end
```

PROMAC-J Data Processing Procedure (7)

Sample Input	Explanation
	Step 2.2.1 : Update the I-KMP name, if Menu 1 is selected in Step 2.2.
	Step 2.2.1.1 : Add data, if Menu 1 is selected in step 2.2.1. (Sample of an addition of I-KMP data)
	Selecting one from the following menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.2.1.
0 (CR)	0 : Add a new data to the old ones at their end; N : Add a new data to the old ones after the N-th one; end : End the 'ADD' procedure and return to Step 2.2.1.
name 1 (CR)	name 1 : This data addes the old one.
0 (CR)	0 : Add a new data to the old ones at their end; N : Add a new data to the old ones after the N-th one; end : End the 'ADD' procedure and return to Step 2.2.1.
name 2 (CR)	name 2 : This data addes the old one.
end (CR)	end : End the 'ADD' procedure and return to Step 2.2.1.
	Step 2.2.1.2 : Change data, if Menu 2 is selected in Step 2.2.1. (Sample of a change of I-KMP data)
	Selecting one from the following menu. 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
2 (CR)	Seletc Menu 2 in Step 2.2.1.
13 (CR)	Give the number n if the N-th data should be changed. 0 : Add a new data to the old ones at their end; N : change a new data at the N-th old ones; end : End the 'CHANGE' procedure and return to Step 2.2.1. The system returns back the old data, in this case, name 1.
y (CR)	y : Change the data; n : Do not change the data.
name01 (CR)	name01 : This data replaces the old one.
14 (CR)	Give the number N if the N-th data should be changed. The system returns back the old data, in this case, name 2.
y (CR)	y : Change the data; n : Do not change the data.
name02 (CR)	name02 : This data replaces the old one.
end (CR)	end : End the 'CHANGE' procedure and return to Step 2.2.1.

PROMAC-J Data Processing Procedure (8)

<< DELETE >> Sample of a deletion of I-KMP data:

```
****** I-KMP DATA UPDATE PROCEDURE ******

  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).          : 3
Enter the I-KMP No.(N/end=N-th/return to UPDATE).: 13
I-KMP NAME of deletion is now .                    : (name01  )
If this is correct, enter Y. If not, enter N.      : y
Enter the I-KMP No.(N/end=N-th/return to UPDATE).: 14
I-KMP NAME of deletion is now.                     : (name02  )
If this is correct, enter Y. If not, enter N.      : y
Enter the I-KMP No.(N/end=N-th/return to UPDATE).: end
```

<< EXIT >>

```
****** I-KMP DATA UPDATE PROCEDURE ******

  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).          : 4
Do you want to display list the new data(Y/N).     : n
```

Step 2.2.2 : Update the time of PIT, if Menu 2 is selected in Step 2.2.

```
Enter the number of your choice(1/2/3/4).          : 2

Do you want to display list the old data(Y/N)      : n
```

Selecting one from the following menu.

<< ADD >> Sample of an addition of D-PIT TIME data:

```
***** D-PIT TIME DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).          : 1
Enter the NEW D-PIT DATE and TIME (YYMMDD,HHMM)
  NEW D-PIT DATE (YYMMDD)                          : 851215
  NEW D-PIT TIME (HHMM)                            : 0930
D-PIT TIME is now.                                 : (85/12/15  9:30)
If this is correct, enter Y. If not, enter N.      : y
Enter the NEW D-PIT DATE and TIME (YYMMDD,HHMM)
  NEW D-PIT DATE (YYMMDD)                          : end
```

PROMAC-J Data Processing Procedure (8)

Sample Input	Explanation
	Step 2.2.1.3 : Delete data, if Menu 3 is selected in Step 2.2.1.
	(Sample of a deletion of I-KMP data)
	Selecting one from the following menu.
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	Give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.2.1.
13 (CR)	Give the number n if the N-th data should be deleted.
	The system returns back the old data, in this case, name01.
y (CR)	y : Delete the data;
	N : Do not delete the data.
14 (CR)	Give the number N if the N-th data should be deleted.
y (CR)	y : Delete the data;
	N : Do not delete the data.
end (CR)	end : End the 'DELETE' procedure and return to Step 2.2.1.
	Step 2.2.1.4 : Exit from Step 2.2.1, if Menu 4 is selected in Step 2.2.1.
	Selecting one from the following menu.
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	Give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.2.1.
n (CR)	y : List the updated I-KMP names;
	n : Do not list the updated I-KMP names. Then it returns to Step 2.2.
	Step 2.2.2 : Update the time of D-PIT, if Menu 2 is selected in Step 2.2.
2 (CR)	Select Menu 2 in Step 2.2.
n (CR)	y : List the old data;
	n : Do not list the old data.
	Step 2.2.2.1 : Add data, if menu 1 is selected in Step 2.2.2.
	(Sample of an addition of D-PIT time data)
	Selecting one from the following menu.
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	Give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.2.2.
851118 (CR)	YYMMDD : D-PIT date to be added.
0930 (CR)	HHMM : Time of the D-PIT to be added.
	The system returns the date time.
y (CR)	y : Add these data;
	n : Do not add these data.
end (CR)	end : End the 'ADD' procedure and return to Step 2.2.2.

PROMAC-J Data Processing Procedure (9)

```
   << CHANGE >>    Sample of a change of D-PIT TIME data:
***** D-PIT TIME DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 2
Enter the D-PIT TIME No.
(0/N/"end"=re-enter/N-th/return to UPDATE menu). : 37
D-PIT TIME of UPDATE is now.                     : (85/12/15  9:30)
If this is correct, enter Y. If not, enter N.    : y
Enter the NEW D-PIT DATE and TIME (YYMMDD,HHMM)
  NEW D-PIT DATE (YYMMDD)                        : 851215
  NEW D-PIT TIME (HHMM)                          : 931
D-PIT TIME is now.                               : (85/12/15  9:31)
If this is correct, enter Y. If not, enter N.    : y
Enter the D-PIT TIME No.
(0/N/"end"=re-enter/N-th/return to UPDATE menu). : end
```

```
   << DELETE >>    Sample of a deletion of D-PIT TIME data:
***** D-PIT TIME DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 3
Enter the D-PIT TIME No.
(0/N/"end"=re-enter/N-th/return to UPDATE menu)  : 37
D-PIT TIME of UPDATE is now.                     : (85/12/15  9:31)
If this is correct, enter Y. If not, enter N.    : n
Enter the D-PIT TIME No.
(0/N/"end"=re-enter/N-th/return to UPDATE menu)  : end
```

```
   << EXIT >>
***** D-PIT TIME DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 4
Do you want to display list the new data(Y/N).   : n
```

PROMAC-J Data Processing Procedure (9)

Sample Input	Explanation
	Step 2.2.2.2 : Change data, if Menu 2 is selected in Step 2.2.2. (Sample of a chage of D-PIT time data) Select one from the following Menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'Exit' procedure; give its number, 1, 2, 3 or 4.
2 (CR)	Selection Menu 2 in Step 2.2.2.
37 (CR)	Give the number N if the N-th data should be changed. The system returns back the old data, in this case,(85/12/15 9:30).
y (CR)	y : Change the data; n : Do not change the. Go to the next change processing.
851215 (CR)	YYMMDD : D-PIT date to be changed.
0931 (CR)	HHMM : Time of the D-PIT to be changed. The system returns the data and time.
y (CR)	y : These data replace the old ones; n : Do not change the old data.
end (CR)	end : End the 'CHANGE' procedure and return to Step 2.2.2.
	Step 2.2.2.3 : Delete data, if Menu 3 is seslected in Step 2.2.2. (Sample of a deletion of D-PIT time data) Select one from the following Menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.2.2.
37 (CR)	Give the number N if the N-th data should be deleted. The system returns back the old data, in this case,(85/12/15 9:31).
y (CR)	y : Delete the data; n : Do not delete the data.
end (CR)	end : End the 'DELETE' procedure and return to Step 2.2.2.
	Step 2.2.2.4 Exit from Step 2.2.2, if Menu 4 is selected in Step 2.2.2. Select one from the following Menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.2.2.
n (CR)	y : List the updated PIT dates and time; n : Do not list the updated data. Then it returns to Step 2.2.

PROMAC-J Data Processing Procedure (10)

Step 2.2.3 : Update the PIT measurement data, if Menu 3 is selected in Step 2.2.

<< ADD >>　　Sample of an addition of D-PIT measurement data:

```
***** D-PIT MEASUREMENT DATA UPDATE PROCEDURE *****
      1  :  ADD
      2  :  CHANGE
      3  :  EXIT FROM UPDATE
Enter the number of your choice(1/2/3).          : 1
Enter the D-PIT No. for update procedure.        : 37
D-PIT DATE of addition is now.                   : ( 85/12/15  9:31 )
If this is correct, enter Y. If not, enter N.    : y
```

```
Enter the VOLUME(L) AND CONCENTRATION (G/L)

 I-KMP      VOLUME      PU CONC.      U CONC.    date 85/12/15
--------- ------------ ------------ ------------ time     9:31
IMP001   0.0          0.0          0.0
IMP002
  .
  .
OTH-2
OTH-3
Do you want to display list the new data(Y/N).   : y
LISTING OF DPIT DATA (ALL/PART=0/1).             : 0
```

```
                                                    ---- LAST UPDATE ----
                DPIT NO.  ===>              1       NAME:
                DPIT TIME ===> 85/ 8/20   0: 0       DATE:          :

   IKMP     VOLUME(L)  PU-CONC.(G/L)  PU-WEIGHT(G)  U-CONC.(G/L)   U-WEIGHT(G)
-------- ------------ ------------ ------------ ------------ ------------
IMP001   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP002   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP003   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP004   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP005   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP006   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP007   3.25000E+02  5.58000E+00  1.81350E+03  0.00000E+00  0.00000E+00
IMP008   0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
IMP009   3.83400E+02  3.40000E-01  1.30356E+02  0.00000E+00  0.00000E+00
OTH-1    0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
OTH-2    0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
OTH-3    0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00
-------- ------------ ------------ ------------ ------------ ------------
  TOTAL                            1.94386E+03                0.00000E+00

        Would you like to continue(Y/N)?        : n
```

PROMAC-J Data Processing Procedure (10)

Sample Input	Explanation
	Step 2.2.3 : Update the PIT measurement data, if Menu 3 is selected in Step 2.2.
	Step 2.2.3.1 : Add data, if Menu 1 is selected in Step 2.2.3. (Sample of an addition of D-PIT measurement data)
	Selecting one from the follwing menu:
	1 : 'ADD' procedure; 2 : 'CHANGE' procedure;
	3 : 'EXIT' procedure;
	Give its number, 1, 2 or 3.
1 (CR)	Select menu 1 in Step 2.2.3.
37 (CR)	N : Add D-PIT data as the N-th data.
	The system returns the date and time of the N-th D-PIT.
y (CR)	y : Add D-PIT data;
	n : Do not add D-PIT data.
IMP001...CR	Give D-PIT data for each I-KMP.
.	
.	
.	
end (CR)	end : End the 'ADD' procedure.
y (CR)	y : Display an updated D-PIT data table;
	n : Do not display an updated D-PIT data table.
0 (CR)	0 : Display all D-PIT data;
	1 : Display D-PIT data to be designated by input.
	A display sample for the table of D-PIT data:
n (CR)	y : Continue listing for the next data.
	n : Return to Step 2.2.3.

PROMAC-J Data Processing Procedure (11)

<< CHANGE >> Sample of change of D-PIT measurement data:

```
***** D-PIT MEASUREMENT DATA UPDATE PROCEDURE *****
      1  :  ADD
      2  :  CHANGE
      3  :  EXIT FROM UPDATE

 Enter the number of your choice(1/2/3).          : 2
 Enter the D-PIT No. for update procedure.        : 37
 Enter the I-KMP No. for update procedure.        : 1
 I-KMP NAME for change is now.                    : ( IMP001   )
 D-PIT TIME for change is now.                    : ( 85/12/15  9:31 )
 If this is correct, enter Y. If not, enter N.    : y
```

<< PIT data to be changed >>

```
 Enter the VOLUME(L) AND CONCENTRATION (G/L)

  I-KMP      VOLUME       PU CONC.       U CONC.    date 85/12/15
 -------- ------------ ------------ ------------ time     9:31
 IMP001    0.00000E+00  0.00000E+00  0.00000E+00 old-data
 IMP001   2000.0        1.5
 Do you want to display list the new data(Y/N).   : y
 LISTING OF DPIT DATA (ALL/PART=0/1).             : 0
```

<< EXIT >>

```
***** D-PIT MEASUREMENT DATA UPDATE PROCEDURE *****
      1  :  ADD
      2  :  CHANGE
      3  :  EXIT FROM UPDATE

 Enter the number of your choice(1/2/3).          : 3
```

Step 2.3 : Update the Transfer data file, if Menu 3 is selected in Step 2.

```
 UPDATE THE TRANSFER DATA FILE.

 ***** TRANSFER DATA FILE UPDATE MENU *****

      1 : F-KMP NAME UPDATE
      2 : TRANSFER MEASUREMENT DATA UPDATE
      3 : EXIT FROM UPDATE PROCEDURE.

 Enter the number of your choice(1/2/3).          : 1

 Do you want to display list the old data(Y/N)    : n
```

PROMAC-J Data Processing Procedure (11)

Sample Input	Explanation
	Step 2.2.3.2 : Change data, if Menu 2 is selected in Step 2.2.3. (Sample of a change of D-PIT measurement data) Selecting one from the follwing menu: 1 : 'ADD' procedure; 2 : 'CHANGE' procedure; 3 : 'EXIT' procedure; give its number, 1, 2 or 3.
2 (CR)	Select Menu 2 in step 2.2.3.
37 (CR)	N : Change data at the N-th D-PIT.
1 (CR)	M : Change data in the M-th I-KMP. The system returns the name of the M-th I-KMP and time of the N-th D-PIT.
y (CR)	y : Change D-PIT data; n : Do not change D-PIT data.
2000.0 1.5 (CR)	Give D-PIT data to be changed. (Volume : 0.0 --> 2000, Pu concentration : 0.0 --> 1.5)
y (CR)	y : Display an updated D-PIT data table; n : Do not display an updated D-PIT data table.
0 (CR)	0 : Display all D-PIT data; 1 : Display D-PIT data to be designated by input. Sample output of a table of D-PIT data is not shown.
	Step 2.2.3.3 : Exit from Step 2.2.3, if Menu 3 is selected in Step 2.2.3. Selecting one from the follwing menu: 1 : 'ADD' procedure; 2 : 'CHANGE' procedure; 3 : 'EXIT' procedure; give its number, 1, 2 or 3.
3 (CR)	Select Menu 3 in Step 2.2.3. Return to Step 2.2.
	Step 2.3 : Update the Transfer data file, if Menu 3 is selected in Step 2.
	Step 2.3.1 : Update the F-KMP name, if Menu 1 is selected in Step 2.3.
	Selecting one from the following menu: 1 : Update the F-KMP name; 2 : Update the transfer measurement data; 3 : Return to step 2; give its number, 1, 2 or 3.
1 (CR)	Select Menu 1 in Step 2.3.1.
n (CR)	y : List the old data; n : Do not list the old data.

PROMAC-J Data Processing Procedure (12)

Step 2.3.1 : Update the F-KMP name, if Menu 1 is selected in Step 2.3.
Selecting one from the following menu :

<< ADD >> Sample of an addition of F-KMP data:

```
****** F-KMP DATA UPDATE PROCEDURE ******
  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 1

Enter the F-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : 0
F-KMP NAME( < 24 Characters ).                   : add 1

Enter the F-KMP No.
(0/N/"end"=new/N-th/return to UPDATE menu).      : end
```

<< CHANGE >> Sample of a change of F-KMP data:

```
****** F-KMP DATA UPDATE PROCEDURE ******
  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 2

Enter the F-KMP No.
(N/"end"=new/N-th/return to UPDATE menu).        : 3
Old F-KMP NAME                                   : (add01  )
Are you sure(Y/N)?                               : y
Enter the New F-KMP NAME                         : add 1

Enter the F-KMP No.
(N/"end"=new/N-th/return to UPDATE menu).        : end
```

<< DELETE >> Sample of a deletion of F-KMP data:

```
****** F-KMP DATA UPDATE PROCEDURE ******
  1 : ADD        3 : DELETE
  2 : CHANGE     4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 3
Enter the F-KMP No.
(N/"end"=N-th/return to UPDATE)                  : 3
F-KMP NAME of deletion is now.                   : (add01  )
If this is correct, enter Y. If not, enter N.    : y
Enter the F-KMP No.
(N/"end"=N-th/return to UPDATE)                  : end
```

PROMAC-J Data Processing Procedure (12)

Sample Input	Explanation
	Step 2.3.1 : Update the F-KMP name, if Menu 1 is selected in Step 2.3.
	Step 2.3.1.1 : Add data, if Menu 1 is selected in Step 2.3.1. (Sample of an addition of F-KMP data) Selecting one from the following menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.3.1.
0 (CR)	0 : Add a new data to the old ones at their end; N : Add a new data to the old ones after the N-th one;
add 1 (CR)	add 1 : F-KMP name to be added.
end (CR)	end : End the 'ADD' procedure and return to Step 2.3.1.
	Step 2.3.1.2 : Change data, if Menu 2 is selected in Step 2.3.1. (Sample of a chage of F-KMP data) Selecting one from the following menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
2 (CR)	Select Menu 2 in Step 2.3.1.
3 (CR)	Give the number N if the N-th data should be changed. The system returns back the old data, in this case, add01.
y (CR)	y : Change the data; n : Do not change the data.
add 1 (CR)	add 1 : This data replaces the old one.
end (CR)	end : End the 'CHANGE' procedure and return to Step 2.3.1.
	Step 2.3.1.3 : Delete the data, if Menu 3 is selected in Step 2.3.1. (Sample of a deletion of F-KMP data) Selecting one from the following menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.3.1.
3 (CR)	Give the number N if the N-th data should be deleted. The system returns back the old data, in this case, add01.
y (CR)	y : Delete the data; n : Do not delete the data.
end (CR)	end : End the 'DELETE' procedure and return to Step 2.3.1.

PROMAC-J Data Processing Procedure (13)

```
  << EXIT >>
****** F-KMP DATA UPDATE PROCEDURE ******
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 4
Do you want to display list the new data(Y/N).   : y
```

Sample output of FKMP name list:

```
 TRANSFER  DATA  MEASUREMENT  POINT  NAME  LIST
 ------------------------------------------

LAST UPDATE NAME : pnc                          DATE  90/ 2/ 7
LAST UPDATE DATE : 90Y02M07D17H03M              TIME  17: 3:40

                                  NUMBER OF
 NO.              NAME            TRANS. DATA
-----   -------------------------  -----------
   1     INPUT ACCOUNTABILITY VES          430
   2     OUTPUT ACCOUNTABILITY VE          180

Would you like to continue(Y/N)?                : n
```

Step 2.3.2 : Update the Transfer·measurement data, if Menu 2 is selected in Step 2.3.

```
UPDATE THE TRANSFER DATA FILE.

***** TRANSFER DATA FILE UPDATE MENU *****

      1 : F-KMP NAME UPDATE
      2 : TRANSFER MEASUREMENT DATA UPDATE
      3 : EXIT FROM UPDATE PROCEDURE.

Enter the number of your choice(1/2/3).          : 2

Do you want to display list the old data(Y/N)?   : y
```

Sample output of listing the old data:

```
Enter the F-KMP NO. of your choice(ALL/N=0/N)    : 1
F-KMP NAME is INPUT ACCOUNTABILITY VES
NUMBER OF DATA                                     430
Enter "N" to change, or "Y" to unchanged         : y
Enter the PERIOD of listing
STARTING DATE (YYMMDD),
or "0" to listing of ALL DATA                    : 0
```

PROMAC-J Data Processing Procedure (13)

Sample Input	Explanation
	Step 2.3.1.4 : Exit from Step 2.3.1, if Menu 4 is selected in Step 2.3.1.
	Selecting one from the following menu:
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.3.1.
y (CR)	y : List the updated F-KMP names;
	n : Do not list the updated F-KMP names.
	Then it returns to Step 2.2.
	A display sample for the F-KMP name list:
n (CR)	y : Continue listing;
	n : Return to Step 2.3.
	Step 2.3.2 : Update the Transfer measurement data, if Menu 2 is selected in Step 2.3.
	Selecting one from the following menu:
	1 : Update the F-KMP name;
	2 : Update the transfer measurement data;
	3 : Return to step 2;
	give its number, 1, 2 or 3.
2 (CR)	Select Menu 2 in Step 2.3.
y (CR)	y : List the old data;
	n : Do not list the old data.
	A display sample for the Transfer measurement data befor updating:
1 (CR)	0 : All data are listed;
	N : Data of the N-th F-KMP are listed.
	The system returns the name of the N-th F-KMP and the number of data.
y (CR)	y : List the data;
	n : Do not list the data.
0 (CR)	0 : List data over all periods;
	YYMMDD : List data for a period starting from this date.
	YYMMDD : List data for a period which ends in this data.
	If the beginning date is given, then the end date is requested.

PROMAC-J Data Processing Procedure (14)

Sample output of Transfer data before updateing:

```
                TRANSFER  MEASUREMENT  DATA  LIST (ALL)
                ------------------------------------

                  KMP NAME : INPUT ACCOUNTABILITY VES      DATE  90/ 2/ 7
                                                           TIME  17: 3:40
                   BATCH    VOLUME   ----- PLUTONIUM -----  ------ URANIUM ------
NO.  DATE  HOUR    NAME      (L)     CONC.(G/L)  WEIGHT(G) CONC.(G/L)  WEIGHT(G)
--- ------ ---- -------- ---------- ---------- ---------- ---------- ----------
  1 85 4 7  7 0 SH1-100F  1.721E+03  1.146E+00  1.972E+03  1.656E+02  2.850E+05
                         ( LAST UPDATE DATE :           :    NAME :          )
  2 85 4 7  8 0 SH1-100H -7.310E+00  1.146E+00 -8.377E+00  1.656E+02 -1.211E+03
                         ( LAST UPDATE DATE :           :    NAME :          )
  3 85 4 8  7 0 SH1-101F  2.201E+03  1.190E+00  2.619E+03  1.745E+02  3.840E+05
                         ( LAST UPDATE DATE :           :    NAME :          )
  4 85 4 8  8 0 SH1-101H -7.290E+00  1.190E+00 -8.675E+00  1.745E+02 -1.272E+03
                         ( LAST UPDATE DATE :           :    NAME :          )
  5 85 4 9  8 0 SH1-102F  2.079E+03  1.168E+00  2.428E+03  1.813E+02  3.769E+05
                         ( LAST UPDATE DATE :           :    NAME :          )
  6 85 4 9  9 0 SH1-102H -7.330E+00  1.168E+00 -8.561E+00  1.813E+02 -1.329E+03
                         ( LAST UPDATE DATE :           :    NAME :          )

Would you like to continue(Y/N)?                  : n
```

<< ADD >> Sample of an addition of Transfer data:

```
***** TRANSFER MEASUREMENT DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).         : 1
Enter the F-KMP No. for  ADD   procedure.
(0/N/"end"=new/N-th/return to UPDATE menu)        : 1
F-KMP NAME of update is now.                      : (INPUT ACCOUNTABILITY VES)
If this is correct, enter Y. If not, enter N.     : y
Enter the NEW DATA under the following line

  BATCH                 VOLUME    PU-CONCENTR- U-CONCENTR-
  NAME    DATE  TIME     (L)      ATION (G/L)  ATION (G /L)
-------- ------ ---- ------------ ------------ -------------
add001   85 4 5  9 0   1000.        0.0          0.0
end
Enter the F-KMP No. for  ADD   procedure.
(0/N/"end"=new/N-th/return to UPDATE menu)        : end
```

PROMAC-J Data Processing Procedure (14)

Sample Input	Explanation
	A display sample for the Transfer data before updating:
n (CR)	n : Go to the procedure selection menu; y : Continue listing for the next date.
	Step 2.3.2.1 : Add data, if Menu 1 is selected in Step 2.3.2. (Sample of an addition of Transfer data) Selecting one from the following menu: 1 : 'ADD' procedure; 3 : 'DELETE' procedure; 2 : 'CHANGE' procedure; 4 : 'EXIT' procedure; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.3.2.
1 (CR)	0 : Add a new data to the old ones at their end; N : Add a new data to the old ones after the N-th one; end : End the 'ADD' procedure and return to Step 2.3.2. The system returns the N-th F-KMP name.
y (CR)	y : Add data; n : Do not add data.
add001 85 ...	Give Transfer data to be added.
end (CR)	end : End the 'ADD' procedure of the N-th F-KMP.
end (CR)	end : End the 'ADD' procedure and return to Step 2.3.2.

PROMAC-J Data Processing Procedure (15)

Menu for listing the updated Transfer data:

```
Do you want to display list the new data(Y/N).    : y
Enter the F-KMP NO. of your choice(ALL/N=0/N).    : 1
F-KMP NAME is now.                                : (INPUT ACCOUNTABILITY VES)
NUMBER OF DATA                                      431
Enter "N" to change, or "Y" to unchanged          : y
Enter the PERIOD of listing
STARTING DATE (YYMMDD).
or "0" to listing of ALL DATA                     : 0
```

```
                TRANSFER  MEASUREMENT  DATA  LIST (ALL)
                ------------------------------------

                  KMP NAME : INPUT ACCOUNTABILITY VES      DATE  90/ 2/ 7
                                                           TIME  17: 3:40
                     BATCH    VOLUME   ----- PLUTONIUM -----  ------ URANIUM ------
NO.  DATE  HOUR      NAME       (L)    CONC.(G/L)  WEIGHT(G) CONC.(G/L)  WEIGHT(G)
--- ------ ---- -------- ---------- ---------- ---------- ---------- ----------
  1 85 4 5  9 0 ADD001    1.000E+03  0.000E+00  0.000E+00  0.000E+00  0.000E+00
                        ( LAST UPDATE DATE : 90020717 03:    NAME : pnc      )
  2 85 4 7  7 0 SH1-100F  1.721E+03  1.146E+00  1.972E+03  1.656E+02  2.850E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  3 85 4 7  8 0 SH1-100H -7.310E+00  1.146E+00 -8.377E+00  1.656E+02 -1.211E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  4 85 4 8  7 0 SH1-101F  2.201E+03  1.190E+00  2.619E+03  1.745E+02  3.840E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  5 85 4 8  8 0 SH1-101H -7.290E+00  1.190E+00 -8.675E+00  1.745E+02 -1.272E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  6 85 4 9  8 0 SH1-102F  2.079E+03  1.168E+00  2.428E+03  1.813E+02  3.769E+05
                        ( LAST UPDATE DATE :            :    NAME :          )

Would you like to continue(Y/N).                  : n
```

PROMAC-J Data Processing Procedure (15)

Sample Input	Explanation
	Menu for listing the updated Transfer data: (Input is the same as for listing the old data)
y (CR)	y : Display an updated Transfer data; n : Do not display an updated Transfer data.
1 (CR)	0 : Display all F-KMP data; N : Display a N-th F-KMP data. The system returns the name of F-KMP and number of data.
y (CR)	y : Continue the listing procedure; n : F-KMP number is incorrected. Try again.
0 (CR)	YYMMDD : Starting date of the period coverd by the listing; 0 : Data over all periods are listing.
	A display sample for the updated transfer data:
n (CR)	y : Continue listing for the next date;. n : Return to Step 2.3.2.

PROMAC-J Data Processing Procedure (16)

<< CHANGE >> Sample of a change of Transfer data:

```
***** TRANSFER MEASUREMENT DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 2
Enter the F-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             : 1
F-KMP NAME of update is now.                     : (INPUT ACCOUNTABILITY VES)
If this is correct, enter Y. If not, enter N.    : y
Enter the transfer data No. for update procedure.
(0/N=re-enter/N-th)                              : 1
YOUR REQUESTED DATA IS FOLLOWINGS

  BATCH                  VOLUME    PU-CONCENTR- U-CONCENTR-
  NAME    DATE  TIME      (L)      ATION (G/L)  ATION (G/L)
-------- ------ ---- ------------ ------------ ------------
ADD001   850405  900  1.00000E+03  0.00000E+00  0.00000E+00

  Y : Continue of this procedure.
  N : Data No. is incorrect. Try again.

Enter the letter of your choice(Y/N).            : y
Enter the NEW DATA under the following line

  BATCH                  VOLUME    PU-CONCENTR- U-CONCENTR-
  NAME    DATE  TIME      (L)      ATION (G/L)  ATION (G /L)
-------- ------ ---- ------------ ------------ -------------
ADD001   850405  900 1000.0       0.0           0.0

Enter the F-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             :end
Do you want to display list the new data(Y/N).   : y
Enter the F-KMP NO. of your choice(ALL/N=0/N).   : 1
F-KMP NAME is now.                               : (INPUT ACCOUNTABILITY VES)
NUMBER OF DATA                                     431
Enter "N" to change, or "Y" to unchanged         : y
Enter the PERIOD of listing
STARTING DATE (YYMMDD),
or "0" to listing of ALL DATA                    : 0
```

PROMAC-J Data Processing Procedure (16)

Sample Input	Explanation
	Step 2.3.2.2 : Change of Transfer data, if Menu 2 is selected in Step 2.3.2.
	(Sample of a change of Transfer data)
	Selecting one from the following menu:
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	give its number, 1, 2, 3 or 4.
2 (CR)	Select Menu 2 in Step 2.3.2.
1 (CR)	N : Change data in the N-th F-KMP name;
	end : Return to Step 2.3.2.
	The system returns the N-th F-KMP name.
y (CR)	y : Continue the change procedure;
	n : F-KMP number is incorrect. Try again.
1 (CR)	M : Change data at the M-th Transfer data;
	0 : Re-enter the F-KMP number.
	The system returns the old transfer data.
y (CR)	y : Continue the change procedure;
	n : Do not list the updated data.
ADD001 850405.. (CR)	Give Transfer data to be changed.
end (CR)	N : Change data in the N-th F-KMP name;
	end : End the 'CHANGE' procedure and return to Step 2.3.2.
y (CR)	y : List the updated data;
	n : Do not list the updated data.
1 (CR)	0 : List the data for all F-KMPs;
	N : List the data for the N-th F-KMP.
	The system returns the name of the N-th F-KMP and the number of data.
y (CR)	y : Continue the listing procedure;
	n : FKMP No. is incorrect. Try again.
0 (CR)	0 : List the data over all periods;
	YYMMDD : List the data over a period starting from this date.
	YYMMDD : List the data over a period which ends in this date.
	If the beginning date is given, then the end date is required.

PROMAC-J Data Processing Procedure (17)

Sample output of updated transfer data:

```
                TRANSFER  MEASUREMENT  DATA  LIST (ALL)
                ----------------------------------------

                  KMP NAME : INPUT ACCOUNTABILITY VES      DATE  90/ 2/ 7
                                                           TIME  17: 3:40
                    BATCH    VOLUME   ----- PLUTONIUM -----  ------ URANIUM ------
NO.  DATE  HOUR     NAME       (L)    CONC.(G/L)  WEIGHT(G) CONC.(G/L)  WEIGHT(G)
--- ------ ---- -------- ---------- ---------- ---------- ---------- ----------
  1 85 4 5  9 0 ADD001    1.000E+03  0.000E+00  0.000E+00  0.000E+00  0.000E+00
                        ( LAST UPDATE DATE : 90020717 03:    NAME : pnc      )
  2 85 4 7  7 0 SH1-100F  1.721E+03  1.146E+00  1.972E+03  1.656E+02  2.850E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  3 85 4 7  8 0 SH1-100H -7.310E+00  1.146E+00 -8.377E+00  1.656E+02 -1.211E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  4 85 4 8  7 0 SH1-101F  2.201E+03  1.190E+00  2.619E+03  1.745E+02  3.840E+05
                        ( LAST UPDATE DATE :            :    NAME :          )
  5 85 4 8  8 0 SH1-101H -7.290E+00  1.190E+00 -8.675E+00  1.745E+02 -1.272E+03
                        ( LAST UPDATE DATE :            :    NAME :          )
  6 85 4 9  8 0 SH1-102F  2.079E+03  1.168E+00  2.428E+03  1.813E+02  3.769E+05
                        ( LAST UPDATE DATE :            :    NAME :          )

Would you like to continue(Y/N)                  : n
```

PROMAC-J Data Processing Procedure (17)

Sample Input	Explanation
	A display sample for the updated Transfer data:
n (CR)	y : Continue listing for the next date; n : Return to Step 2.3.2.

PROMAC-J Data Processing Procedure (18)

<< DELETE >> Sample of a deletion of Transfer data:

```
***** TRANSFER MEASUREMENT DATA UPDATE PROCEDURE *****
  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).          : 3
Enter the F-KMP No. for DELETE procedure.
(N/"end"=N-th/return to UPDATE menu)               : 1
F-KMP NAME of update is now.                       : (INPUT ACCOUNTABILITY YES).
If this is correct, enter Y. If not, enter N.      : y
Enter the transfer data No. for update procedure.
(0/N=re-enter/N-th)                                : 1
YOUR REQUESTED DATA IS FOLLOWINGS

  BATCH                  VOLUME    PU-CONCENTR- U-CONCENTR-
  NAME    DATE  TIME      (L)      ATION (G/L)  ATION (G/L)
-------- ------ ---- ------------ ------------ ------------
ADD001   850405  900  1.00000E+03  0.00000E+00  0.00000E+00

  Y : Continue of this procedure.
  N : Data No. is incorrect. Try again.

Enter the letter of your choice(Y/N).              : y
Enter the F-KMP No. for DELETE procedure.
(N/"end"=N-th/return to UPDATE menu)               : end
Do you want to display list the new data(Y/N).     : y
Enter the F-KMP NO. of your choice(ALL/N=0/N).     : 1
F-KMP NAME is now.                                 : (INPUT ACCOUNTABILITY YES)
NUMBER OF DATA                                       430
Enter "N" to change, or "Y" to unchanged           : y
Enter the PERIOD of listing
STARTING DATE (YYMMDD),
or "0" to listing of ALL DATA                      : 0
```

PROMAC-J Data Processing Procedure (18)

Sample Input	Explanation
	Step 2.3.2.3 : Delete data, if Menu 3 is selected in Step 2.3.2.
	(sample of a deletion of Transfer data)
	Selecting one from the following menu:
	1 : 'ADD' procedure; 3 : 'DELETE' procedure;
	2 : 'CHANGE' procedure; 4 : 'EXIT' procedure;
	give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.3.2.
1 (CR)	N : Delete data in the N-th F-KMP.
	The system returns the N-th F-KMP name.
y (CR)	y : Continue the deletion procedure;
	n : F-KMP number is incorrect. Try again.
1 (CR)	N : Delete data at the N-th Transfer data;
	0 : Re-enter the F-KMP number.
	The system returns the old transfer data.
y (CR)	y : Continue the deletion procedure;
	n : Data number is incorrect. Try again.
end (CR)	end : End the 'DELETE' procedure and return to Step 2.3.2.
y (CR)	y : List the updated data;
	n : Do not list the updated data.
1 (CR)	0 : List the data for all F-KMPs;
	N : List data for the N-th F-KMP.
	The system returns the name of the F-KMP and the number of data.
y (CR)	y : Continue the listing procedure;
	n : F-KMP number is incorrect. Try again.
0 (CR)	0 : List the data over all periods;
	YYMMDD : List the data over a period starting from this data.
	YYMMDD : List the data over a period which ends in this data.
	If the beginning date is given, then the end date is required.

PROMAC-J Data Processing Procedure (19)

Sample output of updated Transfer data:

```
                TRANSFER  MEASUREMENT  DATA  LIST (ALL)
                ------------------------------------

                  KMP NAME : INPUT ACCOUNTABILITY YES      DATE  90/ 2/ 7
                                                           TIME  17: 3:40
                    BATCH    VOLUME   ----- PLUTONIUM -----  ------ URANIUM ------
NO.   DATE  HOUR    NAME       (L)    CONC.(G/L)  WEIGHT(G) CONC.(G/L)  WEIGHT(G)
--- ------ ---- -------- ---------- ---------- ---------- ---------- ----------
  1 85 4 7  7 0 SH1-100F  1.721E+03  1.146E+00  1.972E+03  1.656E+02  2.850E+05
                         ( LAST UPDATE DATE :            :    NAME :          )
  2 85 4 7  8 0 SH1-100H -7.310E+00  1.146E+00 -8.377E+00  1.656E+02 -1.211E+03
                         ( LAST UPDATE DATE :            :    NAME :          )
  3 85 4 8  7 0 SH1-101F  2.201E+03  1.190E+00  2.619E+03  1.745E+02  3.840E+05
                         ( LAST UPDATE DATE :            :    NAME :          )
  4 85 4 8  8 0 SH1-101H -7.290E+00  1.190E+00 -8.675E+00  1.745E+02 -1.272E+03
                         ( LAST UPDATE DATE :            :    NAME :          )
  5 85 4 9  8 0 SH1-102F  2.079E+03  1.168E+00  2.428E+03  1.813E+02  3.769E+05
                         ( LAST UPDATE DATE :            :    NAME :          )
  6 85 4 9  9 0 SH1-102H -7.330E+00  1.168E+00 -8.561E+00  1.813E+02 -1.329E+03
                         ( LAST UPDATE DATE :            :    NAME :          )

Would you like to continue(Y/N)?                  : n
```

PROMAC-J Data Processing Procedure (19)

Sample Input	Explanation
	A display sample for the updated Transfer data:
n (CR)	y : Continue listing for the next date; n : Return to Step 2.3.2.

PROMAC-J Data Processing Procedure (20)

Step 2.4 : Update the measurement error data file, if Menu 4 is selected in Step 2.

```
MEASUREMENT ERROR DATA FILE CREATION AND LIST MODULE ENTERED.


***** ERROR DATA FILE PROCESSING MENU *****


      1 : INTIALIZE
      2 : UPDATE
      3 : LIST
      4 : EXIT FROME PROCESSING

Enter the number of your choice(1/2/3/4).        : 1
Enter the type of ERROR DATA FILE(OLD/NEW=0/1). : 1
```

Step 2.4.2 : Update the mesurement error information, if Menu 2 is selected in Step 2.4

```
***** MEASUREMENT ERROR INFORMATION UPDATE MENU *****

      1 : MEASUREMENT ERROR DATA
      2 : MEASUREMENT POINT DATA
      3 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3).          : 1
```

Step 2.4.2.1 : Update the mesurement error data, if Menu 1 is selected in Step 2.4.2.

```
*****  ERROR DATA UPDATE MENU  *****

  1 : VOLUME MEASUREMENT DATA
  2 : SAMPLING DATA
  3 : ANALYSIS DATA
  4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 3
```

<< ADD > Sample of an addition of ANALYSYS error data:

```
***** MEASUREMENT ERROR UPDATE PROCEDURE *****

  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 1
```

PROMAC-J Data Processing Procedure (20)

Sample Input	Explanation
	Step 2.4 : Update the measurement error data file, if Menu 4 is selected in Step 2.
	Step 2.4.1 : Initialize the measurement error data file, if Menu 1 is selected in Step 2.4.
	Selecting one from the following menu: 1 : Initialize the measurement error data file; 2 : Update; 3 : List; 4 : Exit from processing; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.4.
1 (CR)	0 : Initialize the existing measurement error data file; 1 : Initialize a new file and return to Step 2.4.
	Step 2.4.2 : Update the measurement error information, if Menu 2 is selected in Step 2.4.
	Step 2.4.2.1 : Update the measurement error data, if Menu 1 is selected in Step 2.4.2 Selecting one from the following menu: 1 : Update measurement error data; 2 : Update measurement methods; 3 : Return to Step 2.4; give its number, 1, 2 or 3.
1 (CR)	Select Menu 1 in Step 2.4.2.
	Step 2.4.2.1.3 : Update analysis data, if Menu 3 is selected in Step 2.4.2.1. Selecting one from the following menu; 1 : Update volume measurement errors; 2 : Update sampling errors; 3 : Update analysis errors; 4 : Return to Step 2.4.2; give its number, 1, 2, 3 or 4.
3 (CR)	select Menu 3 in Step 2.4.2.1.
	Step 2.4.2.1.3.1 : Add analysis data, if Menu 1 is selected in Step 2.4.2.1.3. (Sample of an addition of ANALYSYS error data)
	Selecting one from the following menu; 1 : Add analysis errors; 3 : Delete analysis; 2 : Change analysis errors; 4 : Return to Step 2.4.2.1; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.4.2.1.3.

PROMAC-J Data Processing Procedure (21)

```
  << ADD >        Continued:
Enter the ANALYSIS error data under the following line.
(N/"end"=N-th method/return to UPDATE procedure)  :
         RANDOM       LONG-TERM    SHORT-TERM
 METHOD   ERROR         ERROR        ERROR
 ------ ------------ ------------ ------------
 20     0.001        0.0          0.0005
 end
```

```
  << CHANGE >>    Sample of a change of ANALYSYS error data:
```

```
***** MEASUREMENT ERROR UPDATE PROCEDURE *****

  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 2
```

```
Enter the method No. for CHANGE procedure.
(N/"end"=N-th method/return to UPDATE menu)      : 20

YOUR REQUESTED DATA IS FOLLOWING

         RANDOM       LONG-TERM    SHORT-TERM
 METHOD   ERROR         ERROR        ERROR
 ------ ------------ ------------ ------------
     20  1.00000E-03  0.00000E+00  5.00000E-04

  Y : Continue the UPDATE procedure.
  N : Method No. is incorrect. Try again.

 Enter the letter of your choice(Y/N).           : y

Enter the new ERROR DATA under the following line.
(N/"end"=N-th method/return to UPDATE menu)

         RANDOM       LONG-TERM    SHORT-TERM
 METHOD   ERROR         ERROR        ERROR
 ------ ------------ ------------ ------------
     20 0.001        0.0          0.0005


Enter the method No. for CHANGE procedure.
(N/"end"=N-th method/return to UPDATE menu)      : end
```

PROMAC-J Data Processing Procedure (21)

Sample Input	Explanation
	Step 2.4.2.1.3.1 : continued.
20 0.001..(CR)	Give analysis error data to be added.
end (CR)	end : End the 'ADD' procedure. Return to Step 2.4.2.1.3.
	Step 2.4.2.1.3.2 : Change analysis errors, if Menu 2 is selected in Step 2.4.2.1.3.
	Selecting one from the following menu; 1 : Add analysis errors; 3 : Delete analysis; 2 : Change analysis errors; 4 : Return to Step 2.4.2.1; give its number, 1, 2, 3 or 4.
2 (CR)	Select Menu 2 in Step 2.4.2.1.3.
20 (CR)	N : Change analysis errors of the N-th analysis method. end : End the 'CHANGE' procedure. Return to Step 2.4.2.1.3.
	The system returns the old data to be changed.
y (CR)	y : Continue the change procedure; n : Analysis method number is incorrect. Try again.
20 0.001...(CR)	Give the analysis error data to be changed.
end (CR)	end : End the 'CHANGE' procedure. Return to Step 2.4.2.1.3.

PROMAC-J Data Processing Procedure (22)

<< DELETE >> Sample of a deletion of ANALYSIS error data:

```
***** MEASUREMENT ERROR UPDATE PROCEDURE *****

  1 : ADD          3 : DELETE
  2 : CHANGE       4 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3/4).        : 3
```

```
Enter the method No. for DELETE procedure.
(N/"end"=N-th method/return to UPDATE menu).     : 20

YOUR REQUESTED DATA IS FOLLOWING

          RANDOM        LONG-TERM     SHORT-TERM
 METHOD    ERROR          ERROR         ERROR
 ------ ------------ ------------ ------------
     20  1.00000E-03  0.00000E+00  5.00000E-04

  Y : Continue the UPDATE procedure.
  N : Method No. is incorrect. Try again.

 Enter the letter of your choice(Y/N).           : y

Enter the method No. for DELETE procedure.
(N/"end"=N-th method/return to UPDATE menu)      : end
```

PROMAC-J Data Processing Procedure (22)

Sample Input	Explanation
	Step 2.4.2.1.3.3 : Delete analysis error data, if Menu 2 is selected in Step 2.4.2.1.3. (Sample of a deletion of ANALYSIS error data) Updata menu of Analysis error data 1 : 'Add' procedure 3 : 'Delete' procedure 2 : 'Change' procedure 4 : 'Exit' procedure give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.4.2.1.3
20 (CR)	N : Delete analysis errors of the N-th analysis method. end : End the 'DELETE' procedure. Return to Step 2.4.2.1.3. The system returns the old data to be deleted. Display an old analysis data to be deleted.
y (CR)	y : Continue the deletion procedure; n : Analysis method number is incorrect. Try again.
end (CR)	end : End the 'DELETE' procedure. Return to Step 2.4.2.1.3

PROMAC-J Data Processing Procedure (23)

Step 2.4.2.2 : Update the mesurement point data, if Menu 2 is selected in Step 2.4.2.

```
***** MEASUREMENT ERROR INFORMATION UPDATE MENU *****

      1 : MEASUREMENT ERROR DATA
      2 : MEASUREMENT POINT DATA
      3 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3).          : 2
```

```
***** MEASUREMENT POINT DATA UPDATE MENU *****

   1 : I-KMP DATA
   2 : F-KMP DATA
   3 : EXIT FROM UPDATE PROCEDURE

Enter the number of your choice(1/2/3).          : 1
```

<< CHANGE >> Sample of a change of I-KMP data:

```
Enter the I-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             : 1

YOUR REQUESTED DATA IS FOLLOWING

           VOLUME        SAMPLING                ANALYSIS
  I-KMP   METHOD NO. METHOD NO. NO. OF SAMPLE METHOD NO. NO. OF ANALYSIS
-------- ---------- ---------- ------------ ---------- ---------------
251V10           10         10            2         10               2

  Y : Continue the UPDATE procedure.
  N : Method No. is incorrect. Try again.

 Enter the letter of your choice(Y/N).           : y

Enter the new I-KMP DATA under the following line.

           VOLUME        SAMPLING                ANALYSIS
  I-KMP   METHOD NO. METHOD NO. NO. OF SAMPLE METHOD NO. NO. OF ANALYSIS
-------- ---------- ---------- ------------ ---------- ---------------
251V10   10           10         2            10               2


Enter the I-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             : end
```

PROMAC-J Data Processing Procedure (23)

Sample Input	Explanation
	Step 2.4.2.2 : Update the measurement point data, if Menu 2 is selected in Step 2.4.2.
	Selecting one from the following menu: 1 : Measurement error data; 2 : Measurement point data; 3 : Return to Step 2.4; give its number, 1, 2 or 3.
2 (CR)	Select Menu 2 in Step 2.4.2.
	Step 2.4.2.2.1 : Update the I-KMP data, if Menu 1 is selected in Step 2.4.2. (Sample of a change of I-KMP data)
	Selecting one from the following menu: 1 : Update I-KMP date; 2 : Update F-KMP data; 3 : Return to Step 2.4.2. give its number, 1, 2 or 3.
1 (CR)	Select Menu 1 in Step 2.4.2.2.
1 (CR)	N : Continue the change procedure; end : End the 'DELETE' procedure. Return to Step 2.4.2.2.
	The system returns the old dta to be changed.
	Display a I-KMP point data to be updated.
y (CR)	y : Continue the change procedure; n : I-KMP number is incorrect. Try again.
251V10.. (CR)	Give I-KMP point data for each I-KMP
end (CR)	end : End the 'CHANGE' procedure. Return to Step 2.4.2.2.

PROMAC-J Data Processing Procedure (24)

Step 2.4.2.2 : Update the mesurement point data, if Menu 2 is selected in Step 2.4.2.

```
***** MEASUREMENT ERROR INFORMATION UPDATE MENU *****

      1 : MEASUREMENT ERROR DATA
      2 : MEASUREMENT POINT DATA
      3 : EXIT FROM UPDATE

Enter the number of your choice(1/2/3).          : 2
```

```
***** MEASUREMENT POINT DATA UPDATE MENU *****

   1 : I-KMP DATA
   2 : F-KMP DATA
   3 : EXIT FROM UPDATE PROCEDURE

Enter the number of your choice(1/2/3).          : 2
```

<< CHANGE >> Sample of a change of F-KMP data:

```
Enter the F-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             : 1

YOUR REQUESTED DATA IS FOLLOWING

                              VOLUME   SAMPLING       ANALYSIS
                              METHOD METHOD NO. OF METHOD  NO. OF
    F-KMP                I/O    NO.     NO. SAMPLE    NO. ANALYSIS
----------------------- --- ------ ------ ------ ------ --------
INPUT ACCOUNTABILITY VES  IN      1      1      2      1        2

  Y : Continue the UPDATE procedure.
  N : Method No. is incorrect. Try again.

 Enter the letter of your choice(Y/N).           : y

Enter the new F-KMP DATA under the following line.

                              VOLUME   SAMPLING       ANALYSIS
                              METHOD METHOD NO. OF METHOD  NO. OF
    F-KMP                I/O    NO.     NO. SAMPLE    NO. ANALYSIS
----------------------- --- ------ ------ ------ ------ --------
INPUT ACCOUNTABILITY VES in     1      1      2      1        2


Enter the F-KMP No. for CHANGE procedure.
(N/"end"=N-th/return to UPDATE menu)             : end
```

PROMAC-J Data Processing Procedure (24)

Sample Input	Explanation
	Step 2.4.2.2 : Update the measurement point data, if Menu 2 is selected in Step 2.4.2.
	Selecting one from the following menu: 1 : Update measurement error data; 2 : Update measurement methods; 3 : Return to Step 2.4.2; give its number, 1, 2 or 3.
2 (CR)	Select Menu 2 in Step 2.4.2.
	Selecting one from the following menu: 1 : Update I-KMP data; 2 : Update F-KMP data; 3 : Return to Step 2.4.2; give its number, 1, 2 or 3.
2 (CR)	Select Menu 2 in Step 2.4.2.2.
	Sample of a Change of F-KMP data.
1 (CR)	N : Change data of the N-th F-KMP. end : End the 'CHANGE' procedure and return to Step 2.4.2.2. The system returns the old data to be changed.
	Display a F-KMP point data to be changed.
y (CR)	y : Continue the change procedure; n : F-KMP number is incorrect. Try again.
in 1 1 2...(CR)	Give measurement point data to be changed.
end (CR)	N : Change data of the N-th F-KMP. end : End the 'CHANGE' procedure and return to Step 2.4.2.2.

PROMAC-J Data Processing Procedure (25)

Step 2.4.3 : List measurement error data, if Menu 3 is selected in Step 2.4.

```
MEASUREMENT ERROR DATA FILE CREATION AND LIST MODULE ENTERED.

***** ERROR DATA FILE PROCESSING MENU *****

      1 : INTIALIZE
      2 : UPDATE
      3 : LIST
      4 : EXIT FROME PROCESSING

Enter the number of your choice(1/2/3/4).       : 3
Choose output device for list(crt/lp=y/n)?      : y
```

```
       ERROR COMPONENT OF VOLUME MEASUREMENT

         LAST UPDATE NAME : IHARA
         LAST UPDATE TIME : 87Y07M08D21H39M

          RANDOM       LONG-TERM     SHORT-TERM
METHOD     ERROR         ERROR         ERROR
------ ------------ ------------ ------------
     1  4.00000E-03  0.00000E+00  3.00000E-03
     2  5.00000E-02  0.00000E+00  0.00000E+00
     3  5.00000E-02  0.00000E+00  0.00000E+00
     4  5.00000E-02  0.00000E+00  0.00000E+00
     5  5.00000E-02  0.00000E+00  0.00000E+00
     6  3.00000E-03  0.00000E+00  2.00000E-03
     7  5.00000E-02  0.00000E+00  0.00000E+00
     8  5.00000E-02  0.00000E+00  0.00000E+00
     9  5.00000E-02  0.00000E+00  0.00000E+00
    10  5.00000E-02  0.00000E+00  0.00000E+00
    11  5.00000E-02  0.00000E+00  0.00000E+00
    12  5.00000E-02  0.00000E+00  0.00000E+00
    13  6.20000E-02  0.00000E+00  0.00000E+00

Would you like to continue(Y/N)?                : n
```

PROMAC-J Data Processing Procedure (25)

Sample Input	Explanation
	Step 2.4.3 : List measurement error data, if Menu 3 is selected in Step 2.4.
	Selecting one from the following menu: 1 : Initialize the measurement error data file; 2 : Update; 3 : List; 4 : Exit from processing; give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.4.3.
y (CR)	y : Display the list on the CRT screen. n : Print the list on a sheet of a printer.
	A display sample for volume measurement errors:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.

PROMAC-J Data Processing Procedure (26)

A sample output for the sampling errors:

```
        ERROR COMPONENT OF SAMPLING MEASUREMENT

          LAST UPDATE NAME : PNC8707
          LAST UPDATE TIME : 87Y07M23D10H56M

            RANDOM       LONG-TERM     SHORT-TERM
 METHOD      ERROR         ERROR         ERROR
 ------ ------------ ------------ ------------
      1  3.00000E-03  0.00000E+00  2.00000E-03
      2  0.00000E+00  0.00000E+00  0.00000E+00
      3  0.00000E+00  0.00000E+00  0.00000E+00
      4  0.00000E+00  0.00000E+00  0.00000E+00
      5  0.00000E+00  0.00000E+00  0.00000E+00
      6  5.00000E-03  0.00000E+00  2.00000E-03
      7  0.00000E+00  0.00000E+00  0.00000E+00
      8  0.00000E+00  0.00000E+00  0.00000E+00
      9  0.00000E+00  0.00000E+00  0.00000E+00
     10  0.00000E+00  0.00000E+00  0.00000E+00
     11  0.00000E+00  0.00000E+00  0.00000E+00
     12  0.00000E+00  0.00000E+00  0.00000E+00
     13  0.00000E+00  0.00000E+00  0.00000E+00

Would you like to continue(Y/N)?                : n
```

PROMAC-J Data Processing Procedure (26)

Sample Input	Explanation
	A display sample for the sampling errors:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.

PROMAC-J Data Processing Procedure (27)

A sample output for the analysis errors:

```
        ERROR COMPONENT OF ANALYSIS MEASUREMENT

          LAST UPDATE NAME : pnc
          LAST UPDATE TIME : 90Y02M07D17H49M

            RANDOM       LONG-TERM     SHORT-TERM
 METHOD      ERROR         ERROR         ERROR
 ------ ------------ ------------ ------------
      1  1.00000E-02  0.00000E+00  4.00000E-03
      2  0.00000E+00  0.00000E+00  0.00000E+00
      3  0.00000E+00  0.00000E+00  0.00000E+00
      4  0.00000E+00  0.00000E+00  0.00000E+00
      5  0.00000E+00  0.00000E+00  0.00000E+00
      6  1.00000E-02  0.00000E+00  3.00000E-03
      7  0.00000E+00  0.00000E+00  0.00000E+00
      8  0.00000E+00  0.00000E+00  0.00000E+00
      9  0.00000E+00  0.00000E+00  0.00000E+00
     10  0.00000E+00  0.00000E+00  0.00000E+00
     11  0.00000E+00  0.00000E+00  0.00000E+00
     12  0.00000E+00  0.00000E+00  0.00000E+00
     13  0.00000E+00  0.00000E+00  0.00000E+00

 Would you like to continue(Y/N)?                : n
```

A sample output for the measurement methods at I-KMPs:

```
          LAST UPDATE NAME : pnc
          LAST UPDATE TIME : 90Y02M07D17H49M

             VOLUME          SAMPLING                ANALYSIS
   I-KMP  METHOD NO.  METHOD NO.  NO. OF SAMPLE  METHOD NO.  NO. OF ANALYSIS
 -------- ---------- ---------- ------------- ---------- ---------------
 IMP001           10         10             2         10               2
 IMP002            2          2             2          2               2
 IMP003            3          3             2          3               2
 IMP004            4          4             2          4               2
 IMP005            5          5             2          5               2
 IMP006           11         11             2         11               2
 IMP007            8          8             2          8               2
 IMP008            9          9             2          9               2
 IMP009           12         12             2         12               2
 OTH-1            16         16             2         16               2
 OTH-2            14         14             2         14               2
 OTH-3            15         15             2         15               2

 Would you like to continue(Y/N)?                : n
```

PROMAC-J Data Processing Procedure(27)

Sample Input	Explanation
	A display sample for the analysis errors:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.
	A display sample for the measurement methods at I-KMPs:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.

PROMAC-J Data Processing Procedure (28)

A sample output for the measurement errors at I-KMPs:

```
          LAST UPDATE NAME : pncmiura
          LAST UPDATE TIME : 90Y02M07D17H49M

                          NO. OF          RANDOM       LONG-TERM   SHORT-TERM
  I-KMP                    A/S  METHOD     ERROR         ERROR       ERROR
 --------                 ------ ------ ------------ ------------ ------------
          VOLUME                  10  5.00000E-02  0.00000E+00  0.00000E+00
 IMP001   SAMPLING          2      10  0.00000E+00  0.00000E+00  0.00000E+00
          ANALYSIS         2      10  0.00000E+00  0.00000E+00  0.00000E+00
          VOLUME                   2  5.00000E-02  0.00000E+00  0.00000E+00
 IMP002   SAMPLING          2       2  0.00000E+00  0.00000E+00  0.00000E+00
          ANALYSIS         2       2  0.00000E+00  0.00000E+00  0.00000E+00
          VOLUME                   3  5.00000E-02  0.00000E+00  0.00000E+00
 IMP003   SAMPLING          2       3  0.00000E+00  0.00000E+00  0.00000E+00
          ANALYSIS         2       3  0.00000E+00  0.00000E+00  0.00000E+00
          VOLUME                   4  5.00000E-02  0.00000E+00  0.00000E+00
 IMP004   SAMPLING          2       4  0.00000E+00  0.00000E+00  0.00000E+00
          ANALYSIS         2       4  0.00000E+00  0.00000E+00  0.00000E+00
          VOLUME                   5  5.00000E-02  0.00000E+00  0.00000E+00
 IMP005   SAMPLING          2       5  0.00000E+00  0.00000E+00  0.00000E+00
          ANALYSIS         2       5  0.00000E+00  0.00000E+00  0.00000E+00

Would you like to continue(Y/N)?                    : n
```

PROMAC-J Data Processing Procedure(28)

Sample Input	Explanation
	A display sample for the measurement errors at I-KMPs:

n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.

PROMAC-J Data Processing Procedure (29)

A sample output for the measurement methods at F-KMPs:

```
        LAST UPDATE NAME : pncmiura
        LAST UPDATE TIME : 90Y02M07D17H49M

                VOLUME          SAMPLING                ANALYSIS
  F-KMP  I/O  METHOD NO.  METHOD NO.  NO. OF SAMPLE  METHOD NO.  NO. OF ANALYSIS
 -------- ---  ---------- ---------- -------------- ---------- ---------------
 INPUT AC  IN          1          1              2          1               2
 OUTPUT A OUT          6          6              2          6               2

 Would you like to continue(Y/N)?                 : n
```

A sample output for the measurement errors at F-KMPs:

```
        LAST UPDATE NAME : pncmiura
        LAST UPDATE TIME : 90Y02M07D17H49M

                          NO. OF          RANDOM       LONG-TERM   SHORT-TERM
  F-KMP  I/O                A/S  METHOD    ERROR         ERROR       ERROR
 -------- ---            ------ ------ ------------ ------------ ------------
              VOLUME                1  4.00000E-03  0.00000E+00  3.00000E-03
 INPUT AC  IN SAMPLING      2       1  3.00000E-03  0.00000E+00  2.00000E-03
              ANALYSIS      2       1  1.00000E-02  0.00000E+00  4.00000E-03
              VOLUME                6  3.00000E-03  0.00000E+00  2.00000E-03
 OUTPUT A OUT SAMPLING      2       6  5.00000E-03  0.00000E+00  2.00000E-03
              ANALYSIS      2       6  1.00000E-02  0.00000E+00  3.00000E-03

 Would you like to continue(Y/N)?                 : n
```

PROMAC-J Data Processing Procedure (29)

Sample Input	Explanation
	A display sample for the measurement methods at F-KMPs:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.
	A display sample for the measurement errors at F-KMPs:
n (CR)	y : Continue listing for the next date; n : Go to the procedure selection menu.

PROMAC-J Data Processing Procedure (30)

Step 2.4.4 : Exit from updating procedure of measurement error, if Menu 4 is selected in Step 2.4.

```
<< EXIT >>
MEASUREMENT ERROR DATA FILE CREATION AND LIST MODULE ENTERED.

***** ERROR DATA FILE PROCESSING MENU *****

      1 : INTIALIZE
      2 : UPDATE
      3 : LIST
      4 : EXIT FROME PROCESSING

Enter the number of your choice(1/2/3/4).       : 4
Provide an output for the UMEAS  module (Y/N).  : n
```

Step 2.5 : Calculate a material balance and its variance, and carry out the decision analyses, if Menu 5 is selected in Step 2.

```
********    PROCESS  MENU    ********

     0 : INITIALIZATION OF DATA FILE
     1 : LIST DATA STORED IN A FILE
     2 : UPDATE A D-PIT DATA FILE
     3 : UPDATE A TRANSFER DATA FILE
     4 : UPDATE A MEASUREMENT ERROR DATA FILE
     5 : CALCULATE A MATERIAL BALANCE AND ITS VARIANCE,
         CARRY OUT A DECISION ANALYSIS AND ALARM CHART
     6 : OPERATION SEQUENCE CHART
     7 : EXIT FROM PROCESS

  Enter the number of your choice(0-6/7).        : 5
Carry out the CALC and SADAC module (Y/N).       : y
Carry out the DECISION ANALYSIS (Y/N).           : y
Carry out the chart of MUF, CUMUF and ALARM(Y/N).: y

Provide an output for the material balance calculation(Y/N).: y
Provide an output for the DECISION ANALYSIS(Y/N).           : n
```

PROMAC-J Data Processing Procedure (30)

Sample Input	Explanation
	Step 2.4.4 : Exit from updating procedure of measurement error, if Menu 4 is selected in Step 2.4.
	Selecting one from the following menu: 1 : Initialize the error data file; 2 : Update; 3 : List; 4 : Exit from processing; give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.4.
n (CR)	y : Provide an output for the measurement errors data; n : Do not provide the output.
	Step 2.5 : Calculate a material balance and its variance, and carry out the decision analyses, if Menu 5 is selected in Step 2.
	Selecting one from the following menu: 0 : Initialize the data files to be used; 1 : Give an output of the data in a file; 2 : Update the DPIT data file; 3 : Update the Transfer data file; 4 : Update the Measurement error data file; 5 : Calculate a material balance and its variance; carry out the decision analyses and alarm chart; 6 : Process the operation chart; 7 : End the job; give its number, 0, 1, ..., or 7
5 (CR)	Select Menu 5 in Step 2.
y (CR)	y : Calculate the material balance and its variance; n : Do not calculate the material balance.
y (CR)	y : Carry out the decision analyses; n : Do not carry out the decision analyses.
y (CR)	y : Carry out the chart of MUF, CUMUF and Alarm; n : Do not carry out the chart of MUF, CUMUF and Alarm.
y (CR)	y : Provide an output for the material balance calculation; n : Do not provide the output.
n (CR)	y : Provide an output for the decision analyses; n : Do not provide the output.

PROMAC-J Data Processing Procedure (31)

```
  CALSAD MODULE ENTERED

 Enter the periods for a material balance calculation.
 (Y/N=using the data over all periods/enter the periods)      : y
 Enter the calibration data in the calculation period
 ( 85/ 8/20  0: 0 -> 85/12/10 10: 0 ).
 Enter "Y" to input, or "N" to ignore.              : y
 Enter the D-PIT No. including calibration date.    : 1
 Calibration date is now.                           : ( 85/ 8/20  0: 0 )
 If this is correct, enter Y. If not, enter N.      : y
 Enter the D-PIT No. including calibration date.    : 36
 Calibration date is now.                           : ( 85/12/10 10: 0 )
 If this is correct, enter Y. If not, enter N.      : y
 Enter the D-PIT No. including calibration date     : end

  CALSAD MODULE ENDED
```

Step 2.5.1 : Material balance and CUMUF calculation.

```
  EXECUTING FOR << CALC >>
```

Sample output for the material balance and CUMUF table:

```
          ***** MATERIAL BALANCE AND CUMUF TABLE LIST *****

               PERIOD OF MATERIAL BALANCE =         2698 (HOURS)

DMBP      INVENTORY          TRANSFER                                    S.D.
 NO.    DATE    INVENT.   INPUT   OUTPUT  OTHERS   MUF   S.D.MUF  CUMUF  CUMUF
---- -------- ------- ------- ------- ------- ------- ------- ------- -------
     85/ 8/20   1944.
  1                    13715.      6.      0.   2782.    391.   2782.    391.
     85/ 9/16  12870.
  2                     8522.   5726.      0.    925.    576.   3707.    468.
     85/ 9/17  14743.
  3                     5840.   6587.     -0.   -381.    622.   3326.    487.
     85/ 9/19  14377.
  4                     6178.   7379.      0.     78.    603.   3404.    481.
     85/ 9/20  13098.
  5                     7820.   6906.      0.    435.    578.   3839.    507.
     85/ 9/22  13576.
  6                     7883.   6585.      0.    -10.    600.   3829.    564.
:(CR)
```

```
  << CALC >> NORMAL END
```

PROMAC-J Data Processing Procedure (31)

Sample Input	Explanation
	Execution of the CALSAD module starts.
y (CR)	y : Calculate using the data over all periods. n : Calculate using the data over a specific period. The system returns the period of calculation.
y (CR)	y : Enter the calibration data. n : Do not enter the calibration data.
1 (CR)	N : Calibration data is N-th D-PIT. end : Do not include the calibration data in the calculation period. The system returns the calibration date.
y (CR)	y : Continue the procedure; n : Calibration date is incorrect. Try again.
36 (CR)	N : Next calibration date is N-th D-PIT. end : Do not include the calibration data in the calculation period.
y (CR)	y : Continue the procedure; n : Calibration date is incorrect. Try again.
end (CR)	N : Next calibration date is N-th D-PIT. end : Do not include the calibration data in the calculation period.
	Execution of the CALSAD module ends.

Step 2.5.1 : Material balance and CUMUF calculation.

Execution of the CALC module starts.

A display sample for the material balance and CUMUF table.

(CR)	(CR) : Continue the procedure.
	Execution of the CALC module ends.

PROMAC-J Data Processing Procedure (32)

Step 2.5.2 : Decision analysis.

```
   EXECUTING FOR << SADAC >>
   KEY IN JOB TITLE :sample calc.
   << SADAC >> NORMAL END
```

Step 2.5.3 : Graphical processing for Decision analysis.
Selecting one from the following menu:

Sample of a generation of graphic data and graphic out:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 1
ENTER MAIN TITLE ==========>sample calc.
Change plotting start point (current data <1> )  : 1

   SPTPLTN : PLOTTING DATA CREATE NORMAL END
```

```
***** OUTPUT SELECT MENU ******

  1.  DISPLAY
  2.  PLOTTER

Enter the number of your choice(1/2).            : 1

   SPTPLTN : PLOTTING  NORMAL END

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : n
Do you want to output when creates Plot Data?
Enter the letter of your choice (y/n=out/no).    : n
```

PROMAC-J Data Processing Procedure (32)

Sample Input	Explanation
	Step 2.5.2 : Decision analysis.
	Execution of the SADAC module starts.
sample calc. (CR)	Give a title of the decision analyses.
	Execution of the SADAC module ends.
	Step 2.5.3 : Graphical processing for decision analyses.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.5.3.
sample calc. (CR)	Give a title for the graphical processing.
1 (CR)	Give the number N if the N-th MBP should be started at plot.
	Execucution of the ploting data create in the SPTPLTN module ends.
	Device selection for plot the figure of the decision analyses.
	Selecting one from the following menu: 1 : Graphic display; 2 : Plotter; give its number 1 or 2.
1 (CR)	Select Menu 1 in Device selection menu.
	Execution of the SPTPLTN module ends.
n (CR)	y : Save the plot data file; n : Do not save the plot data file.
n (CR)	y : Provide an output for the graphical processing; n : Do not provide the output.

PROMAC-J Data Processing Procedure (33)

Sample of a generation of graphic data:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 2
ENTER MAIN TITLE ==========>sample calc.
Change plotting start point (current data <1> ). : 1

   SPTPLTN : PLOTTING DATA CREATE NORMAL END

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : y
ENTER THE NAME OF GRAPHIC DATA FILE              : sample.spt
Do you want to output when creates Plot Data?
Enter the letter of your choice (y/n=out/no).    : n
```

Sample of a display of the graphic file:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 3
ENTER THE NAME OF PLOT DATA FILE                 : sample.spt
***** OUTPUT SELECT MENU ******
         1 : DISPLAY
         2 : PLOTTER
Enter the number of your choice(1/2).            : 1

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : n
```

<< EXIT >>

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 4
```

PROMAC-J Data Processing Procedure(33)

Sample Input	Explanation
	Step 2.5.3.2 : Generation of graphic data for decision analyses, if Menu 2 is selected in Step 2.5.3.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
2 (CR)	Select Menu 2 in Step 2.5.3.
sample calc. (CR)	Give a title of a graphical processing.
1 (CR)	Give the number N if the N-th MBP should be started at plot.
	Execution of the SPTPLTN module ends.
y (CR)	y : Save the plot data file; n : Do not save the plot data file.
sample.spt (CR)	Give a plot data file name.
n (CR)	y : Provide an output for the graphical processing; n : Do not provide the output.
	Step 2.5.3.3 : Display of graphic data for decision analyses, if Menu 3 is selected in Step 2.5.3.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.5.3.
sample.spt (CR)	Give a plot data file.
	Device selection for plot the figure of the decision analyses.
	Selecting one from the following menu: 1 : Graphic display; 2 : Plotter; give its number 1 or 2.
1 (CR)	Select Menu 1 in Device selection menu.
n (CR)	y : Save the plot data file; n : Do not save the plot data file.
	Step 2.5.3.4 : Exit from graphical processing for decision analyses, if Menu 4 is selected in Step 2.5.3.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.5.3. Return to Step 2.5.

PROMAC-J Data Processing Procedure (34)

Step 2.6 : Draw the Operation sequence chart, if Menu 6 is selected in step 2.

```
********    PROCESS  MENU    ********

      0 : INITIALIZATION OF DATA FILE
      1 : LIST DATA STORED IN A FILE
      2 : UPDATE A D-PIT DATA FILE
      3 : UPDATE A TRANSFER DATA FILE
      4 : UPDATE A MEASUREMENT ERROR DATA FILE
      5 : CALCULATE A MATERIAL BALANCE AND ITS VARIANCE,
          CARRY OUT A DECISION ANALYSIS AND ALARM CHART
      6 : OPERATION SEQUENCE CHART
      7 : EXIT FROM PROCESS

   Enter the number of your choice(0-6/7). : 6
```

Selecting one from the following menu:
Sample of a generation of graphic data and graphic out:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 1
ENTER THE OWNER NAME OF D-PIT DATA FILE          : pnc
ENTER THE OWNER NAME OF TRANSFER DATA FILE       : pnc
ENTER MAIN TITLE FOR PLOT =>sample calc.
ENTER START DATE FOR PLOT (YYMMDD).              : 850901
ENTER END   DATE FOR PLOT (YYMMDD).              : 850930

  OPERATION CHART DATA CREATE
```

```
***** OUTPUT SELECT MENU ******
        1 : DISPLAY
        2 : PLOTTER
Enter the number of your choice(1/2).            : 1

  OPERATION CHART PLOT END

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : n
Do you want to output when creates Plot Data?
Enter the letter of your choice (y/n=out/no).    : n
```

PROMAC-J Data Processing Procedure (34)

Sample Input	Explanation
	Step 2.6 : Draw the operation sequence chart, if Menu 6 is selected in Step 2.
	Selecting one from the following menu: 0 : Initialize the data files to be used; 1 : Give an output of the data in a file; 2 : Update the DPIT data file; 3 : Update the Transfer data file; 4 : Update the Measurement error data file; 5 : Calculate a material balance and its variance, carry out the decision analyses and alarm chart; 6 : Process the operation chart; 7 : End the job; give its number, 0, 1, ..., or 7
6 (CR)	Select Menu 6 in Step 2.
	Step 2.6.1 : Generation of graphic data and graphic out, if Menu 1 is selected in Step 2.6.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
1 (CR)	Select Menu 1 in Step 2.6.
pnc (CR)	Owner's name of D-PIT data file.
pnc (CR)	Owner7s name of Transfer data file.
sample calc. (CR)	Give a title for the graphical processing.
850901 (CR)	Starting date of the period covered by the plotting.
850930 (CR)	End date of the period covered by the plotting.
	Execution of the plotting data create in the OPCHAR module ends.
	Device selection for plot the figure of the decision analyses. Selecting one from the following menu: 1 : Graphic display; 2 : Plotter; give its number 1 or 2.
1 (CR)	Select Menu 1 in Device selection menu.
	Execution of the OPCHAR module ends.
n (CR)	y : Save the plot data file; n : Do not save the plot data file.
n (CR)	y : Provide an output for the graphical processing; n : Do not provide the output.

PROMAC-J Data Processing Procedure (35)

Sample of a generation of graphic data:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 2
ENTER THE OWNER NAME OF D-PIT DATA FILE          : pnc
ENTER THE OWNER NAME OF TRANSFER DATA FILE       : pnc
ENTER MAIN TITLE FOR PLOT =>sample calc.
ENTER START DATE FOR PLOT (YYMMDD).              : 850901
ENTER END   DATE FOR PLOT (YYMMDD).              : 850930

  OPERATION CHART DATA CREATE

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : y
ENTER THE NAME OF PLOT DATA FILE                 : sample.opt
Do you want to output when creates Plot Data?
Enter the letter of your choice (y/n=out/no).    : n
```

Sample of a display of the graphic file:

```
**********  GRAPHIC OUTPUT MENU  **********

   1 : GRAPHIC DATA GENERATION AND GRAPHIC OUT
   2 : GRAPHIC DATA GENERATION
   3 : GRAPHIC OUT
   4 : EXIT FROM GRAPHICAL PROCESSING

Enter the number of your choice(1/2/3/4).        : 3
ENTER THE NAME OF PLOT DATA FILE                 : sample.opt
```

```
***** OUTPUT SELECT MENU ******
        1 : DISPLAY
        2 : PLOTTER
Enter the number of your choice(1/2).            : 1

  OPERATION CHART PLOT END

Do you want to save Plot Data File?
Enter the letter of your choice (y/n=save/no).   : n
```

PROMAC-J Data Processing Proedure (35)

Sample Input	Explanation
	Step 2.6.2 : Generation of graphic data, if Menu 2 is selected in Step 2.6.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the decision analyses; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
2 (CR)	Select Menu 2 in Step 2.6.
pnc (CR)	Owner's name of D-PIT data file.
pnc (CR)	Owner7s name of Transfer data file.
sample calc. (CR)	Give a title for the graphical processing.
850901 (CR)	Starting date of the period covered by the plotting.
850930 (CR)	End date of the period covered by the plotting.
	Execution of the plotting data create in the OPCHAR module ends.
y (CR)	y : Save the plot data file; n : Do not save the plot data file.
sample.opt (CR)	Give a plot data file name.
n (CR)	y : Provide an output for the graphical processing; n : Do not provide the output.
	Step 2.6.3 : Display of graphic data for operation chart, if Menu 3 is selected in Step 2.6.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the operation chart; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
3 (CR)	Select Menu 3 in Step 2.6.
sample.opt (CR)	Give a plot data file.
	Device selection for plot the figure of the operation chart. Selecting one from the following menu: 1 : Graphic display; 2 : Plotter; give its number 1 or 2.
1 (CR)	Select Menu 1 in Device selection menu.
	Execution of the OPCHAR module ends.
n (CR)	y : Save the plot data file; n : Do not save the plot data file.

PROMAC-J Data Processing Procedure (36)

```
    << EXIT >>
 **********  GRAPHIC OUTPUT MENU  **********

    1 : DATA CREATION AND GRAPHIC OUT
    2 : DATA CREATION
    3 : GRAPHIC Out
    4 : EXIT FROM GRAPHICAL PROCESSING

 Enter the number of your choice(1/2/3/4).        : 4
```

Step 2.7 : Exit from PROMACC program, if Menu 7 is selected in step 2.

```
    << EXIT >>
   ********    PROCESS  MENU    ********

       0 : INITIALIZATION OF DATA FILE
       1 : LIST DATA STORED IN A FILE
       2 : UPDATE A D-PIT DATA FILE
       3 : UPDATE A TRANSFER DATA FILE
       4 : UPDATE A MEASUREMENT ERROR DATA FILE
       5 : CALCULATE A MATERIAL BALANCE AND ITS VARIANCE,
           CARRY OUT A DECISION ANALYSIS AND ALARM CHART
       6 : OPERATION SEQUENCE CHART
       7 : EXIT FROM PROCESS

   Enter the number of your choice(0-6/7).        : 7
   Save the new file of D-PIT,TRANSFER,MEASUREMENT: n
rm: pittmp
rm: trstmp
rm: meatmp
 [5]
```

PROMAC-J Data Processing Procedure(36)

Sample Input	Explanation
	Step 2.6.4 : Exit from graphical processing for operation chart, if Menu 4 is selected in Step 2.6.
	Selecting one from the following menu: 1 : Create the plot data file and plot the figure; 2 : Create the plot data file; 3 : Plot the figure of the operation chart; 4 : Exit from graphical processing; give its number, 1, 2, 3 or 4.
4 (CR)	Select Menu 4 in Step 2.6. Return to Step 2.
	Step 2.7 : Exit from PROMAC-J progam, if Menu 7 is selected in Step 2.
	Selecting one from the following menu: 0 : Initialize the data files to be used; 1 : Give an output of the data in a file; 2 : Update the DPIT data file; 3 : Update the Transfer data file; 4 : Update the Measurement error data file; 5 : Calculate a material balance and its variance, carry out the decision analyses and alarm chart; 6 : Process the operation chart; 7 : End the job; give its number, 0, 1, ..., or 7
7 (CR)	Select Menu 7 in Step 2.
n (CR)	y : Save the new D-PIT, Transfer and Measurement data file; n : Do not save the data file.
rm: pittmp	The system returns back deleted temporary D-PIT data file.
rm: trstmp	The system returns back deleted temporary Transfer data file.
rm: meatmp	The system returns back deleted temporary Measurement data file.
[5]	The system is waiting for the next job.

7. OUTPUT EXAMPLES

Table 7.1 : Sample Output of PIT List generated by LISTFG Module
— Step 2.1.6 —

The Q1 and Q9 means key measurement points for the conventional material accountancy, and the D1 to D4 and OTHERS means measurement points for near-real-time material accountancy. The inventory of Q1 is zero except during transfer from Q1 to D1.

Table 7.2 : Sample Output Data of Plant-Input Batch Data List generated by LISTFG Module
— Step 2.1.7 —

Listed in this sample are the volume of solution just after completion of the receiving of the solution, the volume of heel after transfer of the solution, the plutonium concentration of the solution, weight of plutonium received from the front process (indicated by 'Gross'), total weight of plutonium that is the summation of the amount of plutonium of the receipt from the front process and that of the heel of the previous batch in the vessel (indicated as 'net weight 1), and the net weight of plutonium that transferred to the next process (indicated as 'net weight 2').

Table 7.3 : Sample Output of Product Batch Data List generated by LISTFG Module
—— Step 2.1.7 ——

Similar quantities as in Table 7.2 are shown for the key measurement point at the product accounting vessel.

Table 7.4 : Sample Output of Material Balance Table generated by LISTFG Module
—— Step 2.1.8 ——

All of the major data necessary to calculate a MUF data for the NRTA are shown in this list.

Table 7.5 : Sample Output of Measurement Error Data for Each KMP generated by UMEASG Module
—— Step 2.4.3 ——

Measurement errors associated with volume measurement, sampling and analysis are listed for each KMP including the measurement points for the NRTA. Input values for random errors, short-term systematic errors and long-term systematic errors are presented in the relative error model.

Table 7.6 : Sample output of Material Balance and Cumulative MUF Table generated by CALCG Module
—— Step 2.5 ——

Beginning and ending inventories of each material balance period for NRTA, input and output transfers of the time period, the resulting MUF and its standard deviation, the cumulative MUF (CUMUF) through the periods and its standard deviation are presented in absolute unit.

Fig. 7.1 : Sample output of Shewhart Chart, CUMUF Chart, Average LOSS chart and associated Alarm Sequence Charts generated by SPTPLTG Module
—— Step 2.5 ——

The technique of the alarm-sequence chart was developed by Los Alamos National Laboratory as a tool to display the results of decision analyses in compact and readable form. It is considered convenient for the potential user of PROMAC-J who will be required to understand the results of the analyses for sequential MUF data in question without any difficulty probably in a short time after collecting such a data sequence.
The decision test procedure selects all possible initial points and sequence lengths. To generate the alarm-sequence chart, each sequence causing an alarm is assigned a descriptor that classifies the alarm according to its false-alarm probability, and a pair of integers (r_1, r_2) that are,

respectively, the indexes of the initial and final material balance numbers in the sequence. The alarm-sequence chart is a point plot of r_1 vs r_2 for each sequence that caused an alarm, with the significance range of each point indicated by the plotting symbol.
In PROMAC-J, following correspondence are chosen.

Classification (Plotting Symbol)		False-Alarm Probability (%)
Loss	Gain	
A	1	1.0 —— 0.5
B	2	0.5 —— 0.1
C	3	0.1 —— 0.05
D	4	0.05 —— 0.01
E	5	0.01 —— 0.005
F	6	0.005 —— 0.001
G	7	< 0.001
T	T	≥ 50.

Fig. 7.2 : Sample Output of Operation Sequence Chart generated by OPCHARTG Module
—— Step 2.6 ——

This chart shows an operation history of the plant indicating input batches, output batches and in-process inventories with their dates and hours that these operations have happened.

Table 7.1 Sample Output of PIT List generated by LISTFG Module

IN-PROCESS INVENTORY TAKING LIST

DPIT	SAMPLING TIME AND ITEMS	(Q1)	(D1)	(D2)	(D3)	(D4)	(Q9)	(OTHERS)	TOTAL INVENTORY
85/ 3/31	TIME								
	VOLUME (L)	0.	0.	0.	0.	0.	31.66		
0: 0	CONC. (G/L)	0.	0.	0.	0.	0.	22.36		
	WEIGHT (G)	0.	0.	0.	0.	0.	707.92	294.13	1002.05
85/ 4/ 9	TIME								
	VOLUME (L)	0.	2806.90	1298.90	338.00	57.20	41.20		
15:15	CONC. (G/L)	0.	1.22	0.42	0.94	5.25	12.10		
	WEIGHT (G)	0.	3424.42	545.54	317.72	300.30	498.52	301.63	5388.12
85/ 4/16	TIME								
	VOLUME (L)	0.	2550.80	1320.80	359.60	157.10	31.75		
12:30	CONC. (G/L)	0.	0.92	0.32	0.94	10.10	209.74		
	WEIGHT (G)	0.	2346.74	422.66	338.02	1586.71	6659.24	12.55	11365.93
85/ 4/25	TIME								
	VOLUME (L)	0.	2349.20	1847.77	442.98	163.64	32.64		
2: 0	CONC. (G/L)	0.	1.02	0.31	0.91	10.00	212.40		
	WEIGHT (G)	0.	2396.18	572.81	403.11	1636.40	6932.74	9.33	11950.57
85/ 5/ 4	TIME								
	VOLUME (L)	0.	1644.20	1242.00	394.50	200.40	30.74		
14: 0	CONC. (G/L)	0.	1.03	0.32	1.02	10.70	229.10		
	WEIGHT (G)	0.	1693.53	397.44	402.39	2144.28	7042.53	9.33	11689.49
85/ 5/ 7	TIME								
	VOLUME (L)	0.	2157.61	1163.06	472.87	159.38	31.10		
18: 0	CONC. (G/L)	0.	1.16	0.35	1.17	10.90	219.40		
	WEIGHT (G)	0.	2502.83	407.07	553.26	1737.24	6823.34	14.12	12037.86
85/ 5/16	TIME								
	VOLUME (L)	0.	3325.42	1557.85	637.21	166.28	30.74		
10: 0	CONC. (G/L)	0.	1.09	0.38	1.28	10.70	217.10		
	WEIGHT (G)	0.	3624.71	591.98	815.63	1779.20	6673.65	11.98	13497.15
85/ 5/21	TIME								
	VOLUME (L)	0.	1204.11	1587.87	384.20	158.77	30.53		
6: 0	CONC. (G/L)	0.	1.40	0.44	0.67	10.30	221.00		
	WEIGHT (G)	0.	1685.75	698.66	257.41	1635.33	6747.13	5.04	11029.33
85/ 5/29	TIME								
	VOLUME (L)	0.	2434.45	1345.13	695.94	108.21	29.26		
2: 0	CONC. (G/L)	0.	0.02	0.00	0.06	2.02	199.00		
	WEIGHT (G)	0.	38.71	2.43	45.03	218.58	5822.74	2.88	6130.37
85/ 6/18	TIME								
	VOLUME (L)	0.	3188.45	1520.65	667.19	110.98	0.		
2: 0	CONC. (G/L)	0.	1.21	0.36	0.75	8.48	0.		
	WEIGHT (G)	0.	3858.02	547.43	500.39	941.11	0.	1946.36	7793.32

Table 7.1 (Continued)

IN-PROCESS INVENTORY TAKING LIST

DPIT	SAMPLING TIME AND ITEMS	(Q1)	(D1)	(D2)	(D3)	(D4)	(Q9)	(OTHERS)	TOTAL INVENTORY
85/ 6/27	TIME								
	VOLUME (L)	0.	2043.45	1796.34	462.96	205.28	34.34		
19: 0	CONC. (G/L)	0.	1.60	0.44	1.37	10.90	216.50		
	WEIGHT (G)	0.	3269.52	790.39	634.26	2237.55	7434.61	23.90	14390.23
85/ 7/ 2	TIME								
	VOLUME (L)	0.	1095.14	1556.38	497.32	265.63	33.50		
10: 0	CONC. (G/L)	0.	1.65	0.54	1.70	10.70	192.50		
	WEIGHT (G)	0.	1806.98	840.45	845.44	2842.24	6448.75	12.28	12796.14
85/ 7/ 9	TIME								
	VOLUME (L)	0.	1915.08	1462.25	386.28	166.28	32.69		
3: 0	CONC. (G/L)	0.	0.96	0.29	1.20	10.20	197.30		
	WEIGHT (G)	0.	1838.48	424.05	463.54	1696.06	6449.74	4.24	10876.09
85/ 7/17	TIME								
	VOLUME (L)	0.	1451.12	1826.34	413.05	130.23	32.78		
3: 0	CONC. (G/L)	0.	1.02	0.24	1.00	9.51	207.90		
	WEIGHT (G)	0.	1480.14	438.32	413.05	1238.49	6814.96	3.79	10388.75
85/ 7/23	TIME								
	VOLUME (L)	0.	1739.12	1893.34	379.81	178.03	32.30		
14: 0	CONC. (G/L)	0.	1.41	0.38	1.20	11.10	209.70		
	WEIGHT (G)	0.	2452.16	719.47	455.77	1976.13	6773.31	3.35	12380.20
85/ 7/31	TIME								
	VOLUME (L)	0.	849.99	513.40	61.92	55.18	38.40		
20: 0	CONC. (G/L)	0.	0.02	0.01	0.06	3.02	246.70		
	WEIGHT (G)	0.	13.77	6.31	3.62	166.64	9473.28	2.90	9666.53
85/ 8/20	TIME								
	VOLUME (L)	0.	0.	0.	0.	0.	0.		
0: 0	CONC. (G/L)	0.	0.	0.	0.	0.	0.		
	WEIGHT (G)	0.	0.	0.	0.	0.	0.	1943.86	1943.86
85/ 9/16	TIME								
	VOLUME (L)	0.	1777.20	1826.30	320.90	229.90	33.25		
12:30	CONC. (G/L)	0.	1.71	0.43	1.20	10.70	186.50		
	WEIGHT (G)	0.	3039.01	785.31	385.08	2459.93	6201.13	0.	12870.46
85/ 9/24	TIME								
	VOLUME (L)	0.	2441.40	1886.30	374.20	159.20	33.93		
19:43	CONC. (G/L)	0.	1.31	0.38	1.40	11.30	209.30		
	WEIGHT (G)	0.	3198.23	716.79	523.88	1798.96	7101.55	0.74	13340.15
85/10/ 5	TIME								
	VOLUME (L)	0.	1893.00	1944.50	460.40	252.20	37.40		
1:30	CONC. (G/L)	0.	1.21	0.34	1.10	10.70	176.30		
	WEIGHT (G)	0.	2290.53	661.13	506.44	2698.54	6593.62	1111.50	13861.76

Table 7.1 (Continued)

IN-PROCESS INVENTORY TAKING LIST

DPIT	SAMPLING TIME AND ITEMS	(Q1)	(D1)	(D2)	(D3)	(D4)	(Q9)	(OTHERS)	TOTAL INVENTORY
85/10/ 9	TIME								
	VOLUME (L)	0.	55.00	2663.80	330.80	26.70	35.17		
5:15	CONC. (G/L)	0.	1.30	0.37	1.20	10.60	218.60		
	WEIGHT (G)	0.	71.50	985.61	396.96	283.02	7688.16	5.84	9431.09
85/10/16	TIME								
	VOLUME (L)	0.	2801.60	2671.00	446.40	139.80	34.59		
10:35	CONC. (G/L)	0.	1.30	0.39	1.50	10.00	221.60		
	WEIGHT (G)	0.	3642.08	1041.69	669.60	1398.00	7665.14	5.85	14422.37
85/10/22	TIME								
	VOLUME (L)	0.	1005.70	2066.30	452.90	28.10	35.77		
2: 0	CONC. (G/L)	0.	1.17	0.42	1.22	11.20	214.80		
	WEIGHT (G)	0.	1176.67	867.85	552.54	314.72	7683.40	0.64	10595.81
85/10/29	TIME								
	VOLUME (L)	0.	48.00	2070.10	523.80	218.20	2.49		
6:40	CONC. (G/L)	0.	1.20	0.29	0.80	10.30	214.80		
	WEIGHT (G)	0.	57.60	600.33	419.04	2247.46	534.85	10.40	3869.68
85/11/ 6	TIME								
	VOLUME (L)	0.	3282.10	2624.30	525.40	128.00	33.31		
9:25	CONC. (G/L)	0.	1.68	0.43	1.30	9.40	214.10		
	WEIGHT (G)	0.	5513.93	1128.45	683.02	1203.20	7131.67	13.42	15673.69
85/11/13	TIME								
	VOLUME (L)	0.	3051.50	3221.70	578.60	153.90	38.95		
2:30	CONC. (G/L)	0.	1.34	0.52	1.50	12.60	187.30		
	WEIGHT (G)	0.	4089.01	1675.28	867.90	1939.14	7295.34	1.13	15867.80
85/11/21	TIME								
	VOLUME (L)	0.	2806.90	2668.60	437.60	191.60	33.57		
5: 5	CONC. (G/L)	0.	1.62	0.46	1.40	11.80	206.40		
	WEIGHT (G)	0.	4547.18	1227.56	612.64	2260.88	6928.85	0.82	15577.92
85/11/26	TIME								
	VOLUME (L)	0.	861.60	1345.10	111.50	113.80	28.03		
17:49	CONC. (G/L)	0.	0.02	0.01	0.02	1.80	137.40		
	WEIGHT (G)	0.	14.22	8.81	2.74	204.84	3851.32	3.55	4085.48
85/12/10	TIME								
	VOLUME (L)	0.	0.	0.	0.	0.	29.78		
10: 0	CONC. (G/L)	0.	0.	0.	0.	0.	32.30		
	WEIGHT (G)	0.	0.	0.	0.	0.	961.89	57.00	1018.89
AVERAGE	VOLUME (L)	0.	1751.00	1617.93	384.70	135.31	30.00		
	CONC. (G/L)	0.	1.18	0.36	1.08	9.92	185.02		
	WEIGHT (G)	0.	2071.44	589.79	416.15	1342.93	5549.63	200.43	10170.38

Table 7.2 Sample Output of Input Batch Data List generated by LISTFG Module

..... INPUT ACCOUNTABILITY VES .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8508/ 1	17: 0	IBAT-001	1436.15	0.0020	2.87		2.87
8508/ 1	18: 0	HEEL	6.72	0.0020	0.01	2.86	
8508/ 2	18: 0	IBAT-002	979.53	0.0060	5.88		5.86
8508/ 2	19: 0	HEEL	0.	0.0060	0.	5.88	
8509/13	21: 0	IBAT-003	1755.53	1.3250	2326.08		2326.08
8509/13	21:10	HEEL	6.15	1.3250	8.15	2317.93	
8509/14	10: 0	IBAT-004	1884.02	1.4700	2769.51		2761.36
8509/14	11: 0	HEEL	6.28	1.4700	9.23	2760.28	
8509/14	21: 0	IBAT-005	1917.23	1.5080	2891.18		2881.95
8509/14	22: 0	HEEL	5.87	1.5080	8.85	2882.33	
8509/15	0: 0	IBAT-006	1975.77	1.4830	2930.07		2921.21
8509/15	0:10	HEEL	6.26	1.4830	9.28	2920.78	
8509/15	22: 0	IBAT-007	1864.27	1.5250	2843.01		2833.73
8509/15	22:10	HEEL	5.90	1.5250	9.00	2834.01	
8509/16	14: 0	IBAT-008	2261.33	1.5030	3398.78		3389.78
8509/16	15: 0	HEEL	6.09	1.5030	9.15	3389.63	
8509/17	5: 0	IBAT-009	1607.42	1.5030	2415.95		2406.80
8509/17	6: 0	HEEL	5.97	1.5030	8.97	2406.98	
8509/17	21: 0	IBAT-010	1907.67	1.4340	2735.60		2726.63
8509/17	22: 0	HEEL	6.88	1.4340	9.87	2725.73	
8509/18	10: 0	IBAT-011	1965.37	1.4880	2924.47		2914.60
8509/18	11: 0	HEEL	6.88	1.4880	10.24	2914.23	
8509/18	21: 0	IBAT-012	1933.95	1.5180	2935.74		2925.50
8509/18	22: 0	HEEL	6.81	1.5180	10.34	2925.40	
8509/19	7: 0	IBAT-013	1924.46	1.4830	2853.97		2843.64
8509/19	8: 0	HEEL	6.95	1.4830	10.31	2843.67	
8509/20	0: 0	IBAT-014	2371.72	1.4100	3344.13		3333.82
8509/20	1: 0	HEEL	7.02	1.4100	9.90	3334.23	
8509/20	15: 0	IBAT-015	1702.14	1.3230	2251.93		2242.03
8509/20	16: 0	HEEL	6.73	1.3230	8.90	2243.03	
8509/21	8: 0	IBAT-016	2012.05	1.3960	2808.82		2799.92
8509/21	9: 0	HEEL	6.92	1.3960	9.66	2799.16	
8509/21	20: 0	IBAT-017	1919.58	1.4520	2787.23		2777.57
8509/21	21: 0	HEEL	6.72	1.4520	9.76	2777.47	
8509/22	8: 0	IBAT-018	1939.78	1.4650	2841.78		2832.02
8509/22	8:10	HEEL	6.72	1.4650	9.84	2831.93	
8509/22	18: 0	IBAT-019	1906.43	1.3640	2600.37		2590.53
8509/22	18:10	HEEL	6.88	1.3640	9.38	2590.99	
8509/23	8: 0	IBAT-020	2023.72	1.2200	2468.94		2459.55
8509/23	9: 0	HEEL	7.11	1.2200	8.67	2460.26	
8509/23	21: 0	IBAT-021	2287.23	1.2650	2893.35		2884.67
8509/23	22: 0	HEEL	7.11	1.2650	8.99	2884.35	
8509/24	14: 0	IBAT-022	1628.73	1.1720	1908.87		1899.88
8509/24	15: 0	HEEL	7.02	1.1720	8.23	1900.64	
8509/25	2: 0	IBAT-023	1954.53	1.2820	2505.71		2497.48
8509/25	3: 0	HEEL	6.87	1.2820	8.81	2496.90	
8509/25	18: 0	IBAT-024	2120.14	1.3030	2762.54		2753.74
8509/25	19: 0	HEEL	6.89	1.3030	8.98	2753.56	
8509/26	4: 0	IBAT-025	1943.19	1.3050	2535.86		2526.89
8509/26	5: 0	HEEL	6.89	1.3050	8.99	2526.87	

Table 7.2 (Continued)

..... INPUT ACCOUNTABILITY VES .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8509/26	17: 0	IBAT-026	1996.68	1.2440	2483.87		2474.88
8509/26	18: 0	HEEL	6.77	1.2440	8.42	2475.45	
8509/27	5: 0	IBAT-027	2012.59	1.2760	2568.06		2559.64
8509/27	6: 0	HEEL	7.00	1.2760	8.93	2559.13	
8509/27	20: 0	IBAT-028	1877.82	1.2510	2349.15		2340.22
8509/27	21: 0	HEEL	6.95	1.2510	8.69	2340.46	
8509/28	7: 0	IBAT-029	1940.44	1.1980	2324.65		2315.95
8509/28	8: 0	HEEL	7.11	1.1980	8.52	2316.13	
8509/28	22: 0	IBAT-030	2090.65	1.2070	2523.41		2514.90
8509/28	23: 0	HEEL	7.01	1.2070	8.46	2514.95	
8510/ 3	22: 0	IBAT-031	2321.05	1.2400	2878.10		2869.64
8510/ 3	23: 0	HEEL	6.98	1.2400	8.66	2869.45	
8510/ 3	22:30	IBAT-032	212.54	5.8710	1247.82		1239.17
8510/ 3	22:40	HEEL	24.03	5.8710	141.08	1106.74	
8510/ 4	15: 0	IBAT-033	1846.13	1.0950	2021.51		1880.43
8510/ 4	16: 0	HEEL	7.04	1.0950	7.71	2013.80	
8510/ 5	3: 0	IBAT-034	1941.92	1.2170	2363.32		2355.61
8510/ 5	4: 0	HEEL	6.93	1.2170	8.43	2354.88	
8510/ 5	16: 0	IBAT-035	2026.81	1.1780	2387.58		2379.15
8510/ 5	17: 0	HEEL	6.98	1.1780	8.22	2379.36	
8510/ 6	4: 0	IBAT-036	1960.20	1.3260	2599.23		2591.00
8510/ 6	5: 0	HEEL	6.93	1.3260	9.19	2590.04	
8510/ 6	18: 0	IBAT-037	1907.21	1.2680	2418.34		2409.15
8510/ 6	19: 0	HEEL	6.98	1.2680	8.85	2409.49	
8510/ 7	14: 0	IBAT-038	2021.59	1.2190	2464.32		2455.47
8510/ 7	15: 0	HEEL	6.77	1.2190	8.25	2456.07	
8510/ 8	5: 0	IBAT-039	2028.65	1.2280	2491.18		2482.93
8510/ 8	6: 0	HEEL	7.06	1.2280	8.67	2482.51	
8510/ 9	15: 0	IBAT-040	2327.27	1.2400	2885.81		2877.15
8510/ 9	16: 0	HEEL	7.06	1.2400	8.75	2877.06	
8510/11	11: 0	IBAT-041	1679.06	1.0420	1749.58		1740.83
8510/11	12: 0	HEEL	6.95	1.0420	7.24	1742.34	
8510/12	4: 0	IBAT-042	1909.88	1.1850	2263.21		2255.97
8510/12	5: 0	HEEL	6.77	1.1850	8.02	2255.19	
8510/12	16: 0	IBAT-043	1954.82	1.2440	2431.80		2423.77
8510/12	17: 0	HEEL	6.81	1.2440	8.47	2423.32	
8510/13	4: 0	IBAT-044	2142.68	1.2330	2641.92		2633.45
8510/13	5: 0	HEEL	6.81	1.2330	8.40	2633.53	
8510/13	18: 0	IBAT-045	1963.28	1.3120	2575.82		2567.43
8510/13	19: 0	HEEL	34.19	1.3120	44.86	2530.97	
8510/14	13: 0	IBAT-046	1954.32	1.3370	2612.93		2568.07
8510/14	14: 0	HEEL	7.46	1.3370	9.97	2602.95	
8510/15	0: 0	IBAT-047	2045.38	1.2500	2556.73		2546.75
8510/15	1: 0	HEEL	7.52	1.2500	9.40	2547.33	
8510/15	15: 0	IBAT-048	1930.01	1.2990	2507.08		2497.68
8510/15	15:10	HEEL	7.38	1.2990	9.59	2497.50	
8510/16	6: 0	IBAT-049	2369.50	1.2060	2857.62		2848.03
8510/16	7: 0	HEEL	7.76	1.2060	9.36	2848.26	
8510/16	23: 0	IBAT-050	1812.23	1.1550	2093.13		2083.77
8510/17	0: 0	HEEL	7.47	1.1550	8.63	2084.50	

Table 7.2 (Continued)

..... INPUT ACCOUNTABILITY VES .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8510/17	11: 0	IBAT-051	1969.89	1.2780	2517.52		2508.89
8510/17	12: 0	HEEL	7.64	1.2780	9.76	2507.76	
8510/18	20: 0	IBAT-052	1943.64	1.2640	2456.76		2447.00
8510/18	21: 0	HEEL	7.33	1.2640	9.27	2447.50	
8510/19	8: 0	IBAT-053	2119.31	1.2280	2602.51		2593.25
8510/19	9: 0	HEEL	7.66	1.2280	9.41	2593.11	
8510/19	22: 0	IBAT-054	1948.45	1.2940	2521.29		2511.89
8510/19	23: 0	HEEL	7.47	1.2940	9.67	2511.63	
8510/20	10: 0	IBAT-055	2063.23	1.2330	2543.96		2534.30
8510/20	11: 0	HEEL	7.61	1.2330	9.38	2534.58	
8510/21	3: 0	IBAT-056	2357.67	1.1680	2753.76		2744.38
8510/21	4: 0	HEEL	7.52	1.1680	8.78	2744.98	
8510/24	0: 0	IBAT-057	193.20	1.0000	193.20		184.42
8510/29	7: 0	HEEL	1937.93	1.2010	2327.45		2318.67
8510/29	7:10	IBAT-058	7.84	1.2010	9.42	2318.04	
8511/ 4	23: 0	HEEL	2263.35	1.4970	3388.23		3378.82
8511/ 5	0: 0	IBAT-059	7.79	1.4970	11.66	3376.57	
8511/ 5	10: 0	HEEL	2051.84	1.4330	2940.29		2928.63
8511/ 5	14: 0	IBAT-060	7.76	1.4330	11.12	2929.17	
8511/ 6	5: 0	HEEL	2072.56	1.6450	3409.36		3398.24
8511/ 6	6: 0	IBAT-061	7.49	1.6450	12.32	3397.04	
8511/ 6	18: 0	HEEL	2051.96	1.3870	2846.07		2833.75
8511/ 6	19: 0	IBAT-062	7.47	1.3870	10.36	2835.71	
8511/ 7	8: 0	HEEL	2145.06	1.6110	3455.69		3445.33
8511/ 7	9: 0	IBAT-063	7.55	1.6110	12.16	3443.53	
8511/ 8	0: 0	HEEL	2503.94	1.3180	3300.19		3288.03
8511/ 8	1: 0	IBAT-064	7.46	1.3180	9.83	3290.36	
8511/ 8	23: 0	HEEL	1955.23	1.5210	2973.90		2964.07
8511/ 9	0: 0	IBAT-065	7.58	1.5210	11.53	2962.38	
8511/ 9	15: 0	HEEL	2158.68	1.3340	2879.68		2868.15
8511/ 9	16: 0	IBAT-066	7.48	1.3340	9.98	2869.70	
8511/10	13: 0	HEEL	2172.71	1.5780	3428.54		3418.56
8511/10	14: 0	IBAT-067	7.49	1.5780	11.82	3416.72	
8511/11	3: 0	HEEL	2212.34	1.3120	2902.59		2890.77
8511/11	4: 0	IBAT-068	7.52	1.3120	9.87	2892.72	
8511/12	6: 0	HEEL	2409.76	1.5580	3754.41		3744.54
8511/12	7: 0	IBAT-069	7.73	1.5580	12.04	3742.36	
8511/13	0: 0	HEEL	2001.78	1.3020	2606.32		2594.27
8511/13	0:10	IBAT-070	7.57	1.3020	9.86	2596.46	
8511/13	14: 0	HEEL	2049.54	1.6670	3416.58		3406.73
8511/13	15: 0	IBAT-071	7.55	1.6670	12.59	3404.00	
8511/14	3: 0	HEEL	2136.18	1.5510	3313.22		3300.63
8511/14	4: 0	IBAT-072	7.69	1.5510	11.93	3301.29	
8511/14	20: 0	HEEL	2528.61	1.5600	3944.63		3932.70
8511/14	21: 0	IBAT-073	7.76	1.5600	12.11	3932.53	
8511/16	0: 0	HEEL	1915.10	1.4100	2700.29		2688.19
8511/16	0:10	IBAT-074	7.78	1.4100	10.97	2689.32	
8511/16	11: 0	HEEL	2137.37	1.6370	3498.87		3487.90
8511/16	12: 0	IBAT-075	7.51	1.6370	12.29	3486.58	
8511/17	2: 0	HEEL	2331.72	1.3970	3257.41		3245.12

Table 7.2 (Continued)

..... INPUT ACCOUNTABILITY VES .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8511/17	3: 0	IBAT-076	7.46	1.3970	10.42	3246.99	
8511/17	19: 0	HEEL	2620.77	1.5600	4088.40		4077.98
8511/17	20: 0	IBAT-077	7.53	1.5600	11.75	4076.65	
8511/18	21: 0	HEEL	1835.00	1.4950	2743.33		2731.58
8511/18	21:10	IBAT-078	7.48	1.4950	11.18	2732.14	
8511/19	16: 0	HEEL	2161.48	1.6210	3503.76		3492.58
8511/19	17: 0	IBAT-079	7.47	1.6210	12.11	3491.65	
8511/20	21: 0	HEEL	2230.33	1.5270	3405.71		3393.60
8511/20	21:10	IBAT-080	7.40	1.5270	11.30	3394.41	
8511/21	15: 0	HEEL	2450.54	1.5340	3759.13		3747.83
8511/21	16: 0	IBAT-081	7.45	1.5340	11.43	3747.70	
8511/22	14: 0	HEEL	1209.60	0.3490	422.15		410.72
8511/22	19: 0	IBAT-082	7.24	0.3490	2.53	419.62	
8511/23	8: 0	HEEL	1226.18	0.1100	134.88		132.35
8511/23	9: 0	IBAT-083	7.99	0.1100	0.88	134.00	
8511/23	10: 0	HEEL	8.70	19.8276	172.50		171.62
8511/24	3: 0	IBAT-084	1848.51	0.1500	277.28		276.40
8511/24	4: 0	HEEL	8.07	0.1500	1.21	276.07	
8511/24	23: 0	IBAT-085	1765.01	0.1000	176.50		175.29
8511/25	0: 0	HEEL	8.07	0.1000	0.81	175.69	
8511/26	2: 0	IBAT-086	1717.39	0.	0.		-0.81
8511/26	3: 0	HEEL	0.	0.	0.	0.	
				TOTAL	218585.22	216359.45	216715.49

Table 7.3 Sample Output of Product Batch Data List generated by LISTFG Module

..... OUTPUT ACCOUNTABILITY VE .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8508/ 2	14: 0	OBAT-001	31.88	213.6000	6809.57		6809.57
8508/ 2	15: 0	HEEL	2.44	213.6000	521.18	6288.38	
8509/14	17: 0	OBAT-002	2652.70	0.0026	6.90		-514.29
8509/14	17:10	HEEL	240.50	0.0026	0.63	6.27	
8509/17	14: 0	OBAT-003	33.25	186.5000	6201.13		6200.50
8509/17	14:10	HEEL	2.55	186.5000	475.57	5725.55	
8509/18	14: 0	OBAT-004	33.50	219.7000	7359.95		6884.38
8509/18	14:10	HEEL	3.52	219.7000	773.34	6586.61	
8509/19	6: 0	OBAT-005	35.18	224.7000	7904.95		7131.60
8509/19	6:10	HEEL	2.34	224.7000	525.80	7379.15	
8509/20	7: 0	OBAT-006	33.27	224.6000	7472.44		6946.64
8509/20	7:10	HEEL	2.52	224.6000	565.99	6906.45	
8509/22	8: 0	OBAT-007	2743.20	0.0290	79.55		-486.44
8509/22	8:10	HEEL	304.60	0.0290	8.83	70.72	
8509/22	14: 0	OBAT-008	34.10	207.8000	7085.98		7077.15
8509/22	14:10	HEEL	2.75	207.8000	571.45	6514.53	
8509/23	23: 0	OBAT-009	33.31	222.3000	7404.81		6833.36
8509/23	23:10	HEEL	2.38	222.3000	529.07	6875.74	
8509/25	10: 0	OBAT-010	33.93	209.3000	7101.55		6572.48
8509/25	10:10	HEEL	4.31	209.3000	902.08	6199.47	
8509/26	15: 0	OBAT-011	34.99	199.2000	6970.01		6067.92
8509/26	15:10	HEEL	3.58	199.2000	713.14	6256.87	
8509/27	23: 0	OBAT-012	37.34	192.1000	7173.01		6459.88
8509/27	23:10	HEEL	3.63	192.1000	697.32	6475.69	
8509/29	11: 0	OBAT-013	32.94	209.0000	6884.46		6187.14
8509/29	11:10	HEEL	2.64	209.0000	551.76	6332.70	
8509/30	17: 0	OBAT-014	2822.00	0.0349	98.49		-453.27
8509/30	17:10	HEEL	204.70	0.0349	7.14	91.34	
8509/30	23: 0	OBAT-015	2830.70	0.0004	1.02		-6.12
8509/30	23:10	HEEL	203.80	0.0004	0.07	0.95	
8510/ 1	10: 0	OBAT-016	2646.50	0.0007	1.80		1.73
8510/ 1	10:10	HEEL	383.20	0.0007	0.26	1.54	
8510/ 5	15: 0	OBAT-017	37.40	176.3000	6593.62		6593.36
8510/ 5	15:10	HEEL	2.36	176.3000	416.07	6177.55	
8510/ 7	2: 0	OBAT-018	32.03	209.3000	6703.88		6287.81
8510/ 7	2:10	HEEL	2.54	209.3000	531.62	6172.26	
8510/ 8	11: 0	OBAT-019	35.60	197.6000	7034.56		6502.94
8510/ 8	11:10	HEEL	4.66	197.6000	920.82	6113.74	
8510/ 9	22: 0	OBAT-020	35.17	218.6000	7688.16		6767.35
8510/ 9	22:10	HEEL	2.53	218.6000	553.06	7135.10	
8510/10	0: 0	OBAT-021	2898.60	0.0063	18.26		-534.80
8510/10	0:10	HEEL	262.10	0.0063	1.65	16.61	
8510/10	17: 0	OBAT-022	2831.80	0.0002	0.54		-1.11
8510/10	17:10	HEEL	281.50	0.0002	0.05	0.48	
8510/13	22: 0	OBAT-023	35.21	201.2000	7084.25		7084.20
8510/13	22:10	HEEL	3.47	201.2000	698.16	6386.09	
8510/15	10: 0	OBAT-024	35.12	226.1000	7940.63		7242.47
8510/15	10:10	HEEL	4.09	226.1000	924.75	7015.88	
8510/17	1: 0	OBAT-025	34.59	221.6000	7665.14		6740.40
8510/17	1:10	HEEL	2.93	221.6000	649.29	7015.86	

Table 7.3 (Continued)

..... OUTPUT ACCOUNTABILITY VE .....

DATE	HOUR	BATCH NAME	VOLUME (L)	CONCENTRATION (G/L)	GROSS WEIGHT (G)	NET WEIGHT-1 (G)	NET WEIGHT-2 (G)
8510/17	18: 0	OBAT-026	2888.50	0.0021	6.04		-643.25
8510/17	18:10	HEEL	277.60	0.0021	0.58	5.46	
8510/18	3: 0	OBAT-027	1845.90	0.0011	1.96		1.38
8510/18	3:10	HEEL	248.70	0.0011	0.26	1.69	
8510/20	2: 0	OBAT-028	36.88	204.3000	7534.58		7534.32
8510/20	2:10	HEEL	2.34	204.3000	478.06	7056.52	
8510/21	7: 0	OBAT-029	32.23	212.8000	6858.54		6380.48
8510/21	7:10	HEEL	3.43	212.8000	729.90	6128.64	
8510/22	9: 0	OBAT-030	2936.80	0.0001	0.35		-729.55
8510/22	9:10	HEEL	185.60	0.0001	0.02	0.33	
8510/22	15: 0	OBAT-031	35.77	214.8000	7683.40		7683.37
8510/22	15:10	HEEL	2.49	214.8000	534.85	7148.54	
8511/ 7	2: 0	OBAT-032	33.31	214.1000	7131.67		6596.82
8511/ 7	2:10	HEEL	2.50	214.1000	535.25	6596.42	
8511/ 8	14: 0	OBAT-033	34.59	206.4000	7139.38		6604.13
8511/ 8	14:10	HEEL	2.49	206.4000	513.94	6625.44	
8511/10	15: 0	OBAT-034	34.35	203.8000	7000.53		6486.59
8511/10	15:10	HEEL	3.46	203.8000	705.15	6295.38	
8511/12	2: 0	OBAT-035	34.16	215.2000	7351.23		6646.08
8511/12	2:10	HEEL	2.37	215.2000	510.02	6841.21	
8511/12	13: 0	OBAT-036	2874.10	0.0020	5.66		-504.36
8511/12	14: 0	HEEL	261.40	0.0020	0.51	5.15	
8511/13	23: 0	OBAT-037	38.95	187.3000	7295.34		7294.82
8511/13	23:10	HEEL	2.35	187.3000	440.16	6855.18	
8511/14	22: 0	OBAT-038	32.90	204.2000	6718.18		6278.02
8511/14	23: 0	HEEL	4.47	204.2000	912.77	5805.41	
8511/16	2: 0	OBAT-039	35.65	221.1000	7882.21		6969.44
8511/16	2:10	HEEL	2.22	221.1000	490.84	7391.37	
8511/17	23: 0	OBAT-040	35.12	206.2000	7241.74		6750.90
8511/17	23:10	HEEL	2.37	206.2000	488.69	6753.05	
8511/19	6: 0	OBAT-041	34.07	222.2000	7570.35		7081.66
8511/19	6:10	HEEL	2.53	222.2000	562.17	7008.19	
8511/21	18: 0	OBAT-042	33.57	206.4000	6928.85		6366.68
8511/21	18:10	HEEL	2.33	206.4000	480.91	6447.94	
8511/22	1: 0	OBAT-043	32.23	212.0000	6832.76		6351.85
8511/22	1:10	HEEL	2.31	212.0000	489.72	6343.04	
8511/22	22: 0	OBAT-044	2671.00	0.0122	32.59		-457.13
8511/22	22:10	HEEL	258.70	0.0122	3.16	29.43	
8511/24	9: 0	OBAT-045	33.25	187.9000	6247.68		6244.52
8511/24	9:10	HEEL	2.47	187.9000	464.11	5783.56	
8511/27	15:40	OBAT-046	28.03	137.4000	3851.32		3387.21
8511/27	15:50	HEEL	2.58	137.4000	354.49	3496.83	
				TOTAL	260833.73	220364.31	220718.80

Table 7.4 Sample Output of Material Balance Table generated by LISTFG Module

MATERIAL BALANCE DETAIL TABLE

** ENDING INVENTORY ** TIME 9/28 23:35 DMBP= 10

VESSEL	VALUE	VESSEL	VALUE	VESSEL	VALUE
IMP001	0.	IMP002	3834.75120	IMP003	597.77800
IMP004	556.92000	IMP005	1292.48000	IMP006	6884.46000
IMP007	3.37174	IMP008	0.	IMP009	0.
OTH-1	0.	OTH-2	0.	OTH-3	0.

ENDING INVENTORY TOTAL 13169.76094

INPUT				OUTPUT				OTHERS	
DATE & TIME	(FULL)	DATE & TIME	(HEEL)	DATE & TIME	(FULL)	DATE & TIME	(HEEL)	DATE & TIME	(VALUE)
9/27 20: 0	2349.15282	9/27 21: 0	-8.69445	9/27 23: 0	7173.01400	9/27 23:10	-697.32300		
9/28 7: 0	2324.64712	9/28 8: 0	-8.51778						
9/28 22: 0	2523.41455	9/28 23: 0	-8.46107						
TOTAL	7197.21449		-25.67330		7173.01400		-697.32300		0.
(FULL+HEEL)			7171.54119				6475.69100		

BEGINING INV. : 13348.90869
NET TRANSFER : 695.85019
ENDING INV. : 13169.76094
M U F : 874.99794

MATERIAL BALANCE DETAIL TABLE

** ENDING INVENTORY ** TIME 10/ 5 1:30 DMBP= 11

VESSEL	VALUE	VESSEL	VALUE	VESSEL	VALUE
IMP001	0.	IMP002	2290.53000	IMP003	661.13000
IMP004	506.44000	IMP005	2698.54000	IMP006	6593.62000
IMP007	1111.50000	IMP008	0.	IMP009	0.
OTH-1	0.	OTH-2	0.	OTH-3	0.

ENDING INVENTORY TOTAL 13861.76000

INPUT				OUTPUT				OTHERS	
DATE & TIME	(FULL)	DATE & TIME	(HEEL)	DATE & TIME	(FULL)	DATE & TIME	(HEEL)	DATE & TIME	(VALUE)
				9/29 11: 0	6884.46000	9/29 11:10	-551.76000		
				9/30 17: 0	98.48780	9/30 17:10	-7.14403		
				9/30 23: 0	1.01905	9/30 23:10	-0.07337		
				10/ 1 10: 0	1.79962	10/ 1 10:10	-0.26058		
10/ 3 22: 0	2878.10200	10/ 3 23: 0	-8.65520						
10/ 3 22:30	1247.82234	10/ 3 22:40	-141.08013						
10/ 4 15: 0	2021.51235	10/ 4 16: 0	-7.70880						
TOTAL	6147.43669		-157.44413		6985.76647		-559.23797		0.
(FULL+HEEL)			5989.99256				6426.52850		

BEGINING INV. : 13169.76094
NET TRANSFER : -436.53594
ENDING INV. : 13861.76000
M U F : -1128.53500

Table 7.5 Sample Output of Measurement Error Data for each KMP generated by LISTFG Module

LAST UPDATE NAME : PNC8707
LAST UPDATE TIME : 87Y07M23D10H56M

I-KMP		NO. OF A/S	METHOD	RANDOM ERROR	LONG-TERM ERROR	SHORT-TERM ERROR
	VOLUME		10	5.00000E-02	0.00000E+00	0.00000E+00
IMP001	SAMPLING	2	10	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	10	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		2	5.00000E-02	0.00000E+00	0.00000E+00
IMP002	SAMPLING	2	2	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	2	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		3	5.00000E-02	0.00000E+00	0.00000E+00
IMP003	SAMPLING	2	3	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	3	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		4	5.00000E-02	0.00000E+00	0.00000E+00
IMP004	SAMPLING	2	4	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	4	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		5	5.00000E-02	0.00000E+00	0.00000E+00
IMP005	SAMPLING	2	5	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	5	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		11	5.00000E-02	0.00000E+00	0.00000E+00
IMP006	SAMPLING	2	11	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	11	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		8	5.00000E-02	0.00000E+00	0.00000E+00
IMP007	SAMPLING	2	8	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	8	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		9	5.00000E-02	0.00000E+00	0.00000E+00
IMP008	SAMPLING	2	9	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	9	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		12	5.00000E-02	0.00000E+00	0.00000E+00
IMP009	SAMPLING	2	12	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	12	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		16	5.00000E-02	0.00000E+00	0.00000E+00
OTH-1	SAMPLING	2	16	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	16	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		14	5.00000E-02	0.00000E+00	0.00000E+00
OTH-2	SAMPLING	2	14	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	14	0.00000E+00	0.00000E+00	0.00000E+00
	VOLUME		15	5.00000E-02	0.00000E+00	0.00000E+00
OTH-3	SAMPLING	2	15	0.00000E+00	0.00000E+00	0.00000E+00
	ANALYSIS	2	15	0.00000E+00	0.00000E+00	0.00000E+00

LAST UPDATE NAME : IHARA
LAST UPDATE TIME : 87Y07M08D21H39M

F-KMP	I/O		NO. OF A/S	METHOD	RANDOM ERROR	LONG-TERM ERROR	SHORT-TERM ERROR
		VOLUME		1	4.00000E-03	0.00000E+00	3.00000E-03
INPUT AC	IN	SAMPLING	2	1	3.00000E-03	0.00000E+00	2.00000E-03
		ANALYSIS	2	1	1.00000E-02	0.00000E+00	4.00000E-03
		VOLUME		6	3.00000E-03	0.00000E+00	2.00000E-03
OUTPUT A	OUT	SAMPLING	2	6	5.00000E-03	0.00000E+00	2.00000E-03
		ANALYSIS	2	6	1.00000E-02	0.00000E+00	3.00000E-03

Table 7.6 Sample Output of Material Balance and CUMUF Table generated by LISTFG Module

***** MATERIAL BALANCE AND CUMUF TABLE LIST *****

PERIOD OF MATERIAL BALANCE = 6106 (HOURS)

DMBP NO.	INVENTORY DATE	INVENT.	TRANSFER INPUT	OUTPUT	OTHERS	MUF	S.D.MUF	CUMUF	S.D. CUMUF
	85/ 3/31	1002.							
1			6994.	0.	0.	2608.	188.	2608.	188.
	85/ 4/ 9	5388.							
2			18482.	12264.	0.	241.	430.	2849.	406.
	85/ 4/16	11366.							
3			19769.	18898.	0.	286.	552.	3135.	493.
	85/ 4/25	11951.							
4			19576.	18820.	0.	1017.	562.	4152.	588.
	85/ 5/ 4	11689.							
5			13251.	13239.	0.	-336.	549.	3816.	658.
	85/ 5/ 7	12038.							
6			21826.	18884.	0.	1482.	574.	5298.	787.
	85/ 5/16	13497.							
7			16643.	19022.	0.	89.	558.	5387.	878.
	85/ 5/21	11029.							
8			24425.	31804.	0.	-2480.	520.	2907.	1028.
	85/ 5/29	6130.							
9			8493.	6051.	0.	779.	369.	3687.	1059.
	85/ 6/18	7793.							
10			27958.	19879.	0.	1482.	520.	5168.	1280.
	85/ 6/27	14390.							
11			18723.	19697.	0.	620.	589.	5788.	1387.
	85/ 7/ 2	12796.							
12			15558.	18516.	0.	-1038.	531.	4750.	1491.
	85/ 7/ 9	10876.							
13			19296.	19094.	0.	690.	526.	5439.	1620.
	85/ 7/17	10389.							
14			29479.	26463.	0.	1024.	570.	6463.	1813.
	85/ 7/23	12380.							
15			27255.	32562.	0.	-2593.	655.	3870.	2028.
	85/ 7/31	9667.							
16			13.	8943.	0.	-1207.	497.	2663.	1999.
	85/ 8/20	1944.							
17			13715.	6.	0.	2782.	391.	5446.	2088.
	85/ 9/16	12870.							
18			41028.	40059.	0.	499.	636.	5945.	2366.
	85/ 9/24	13340.							
19			25973.	25359.	0.	93.	597.	6038.	2535.
	85/10/ 5	13862.							
20			14672.	18464.	0.	639.	566.	6678.	2643.
	85/10/ 9	9431.							
21			24958.	20554.	0.	-587.	618.	6091.	2807.
	85/10/16	14422.							
22			17424.	20208.	0.	1042.	611.	7133.	2925.
	85/10/22	10596.							
23			193.	7149.	0.	-230.	417.	6904.	2920.
	85/10/29	3870.							
24			12021.	0.	0.	217.	482.	7121.	3004.
	85/11/ 6	15674.							
25			28050.	26364.	0.	1492.	678.	8613.	3186.
	85/11/13	15868.							
26			33756.	33813.	0.	232.	680.	8845.	3412.
	85/11/21	15578.							
27			4926.	18604.	0.	-2186.	494.	6659.	3457.
	85/11/26	4085.							
28			0.	3497.	0.	-430.	202.	6229.	3461.
	85/12/10	1019.							

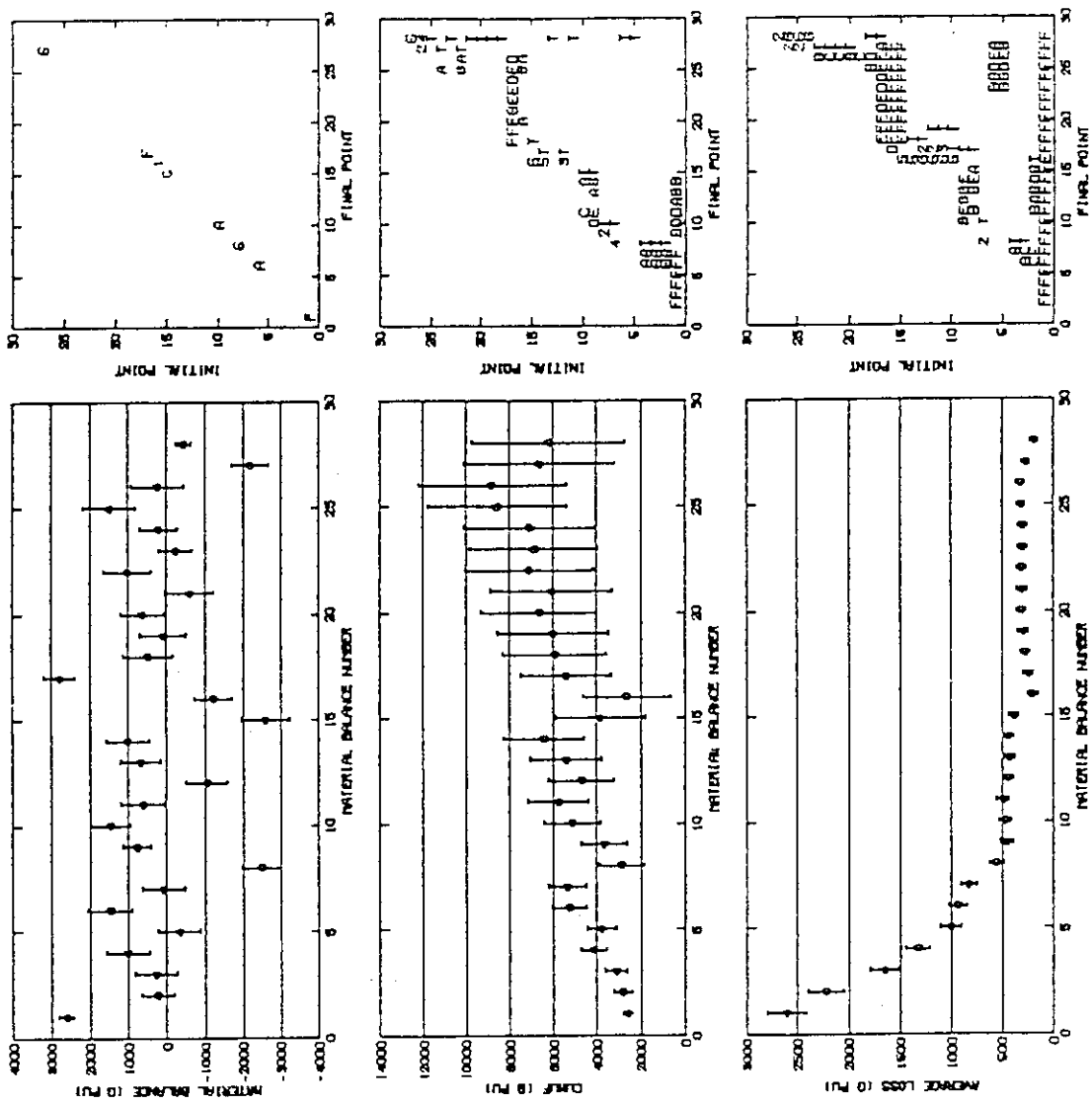

Fig. 7.1 Sample Output of Shewhart Chart, CUMUF Chart, Average Loss Chart and Alarm Sequence Charts generated by SPTPLTG Module in Step 2.5

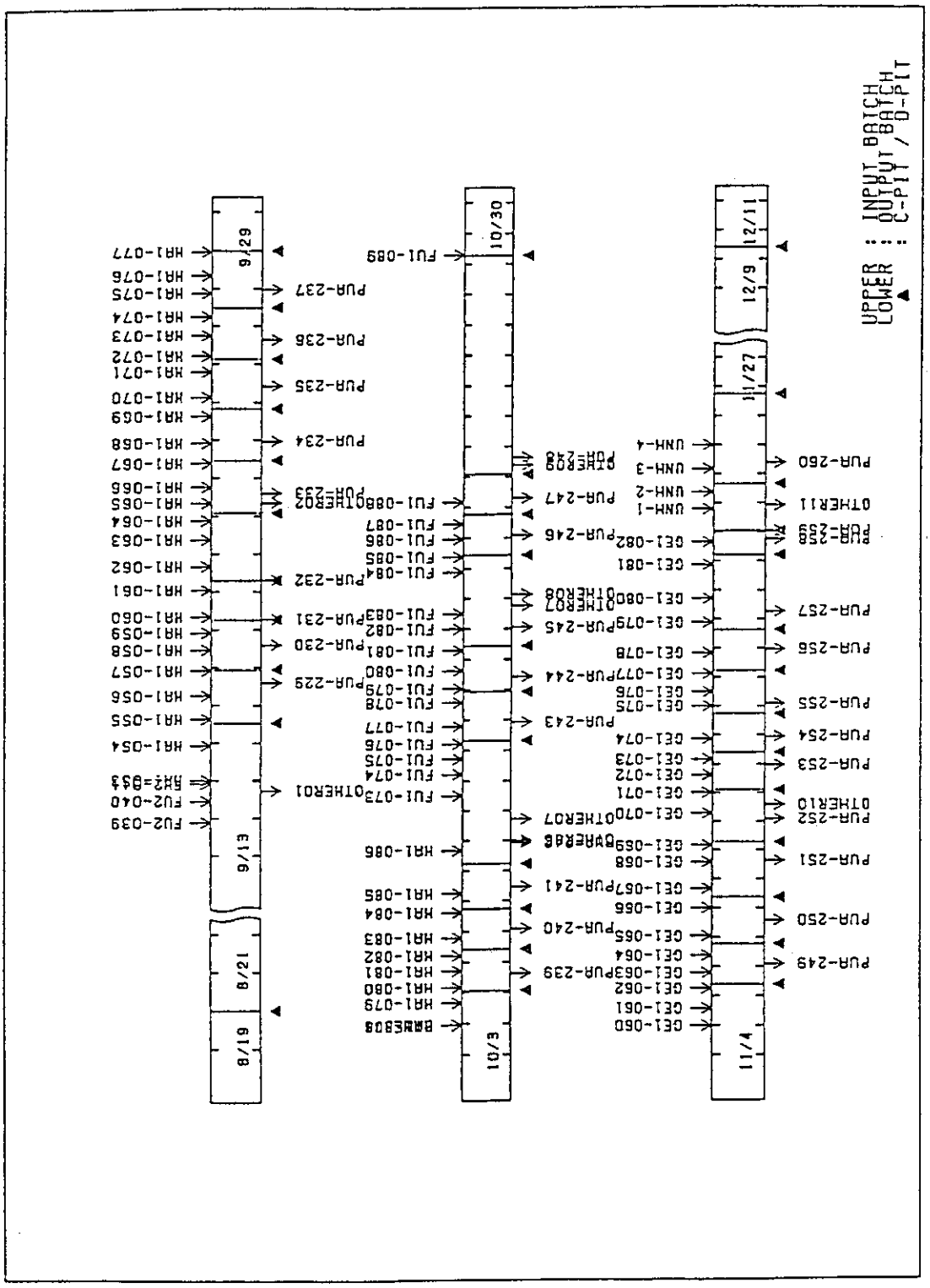

Fig. 7.2 Sample Output of Operation Sequence Chart generated by OPCHARTG Module in Step 2.6

8. CONCLUSION

The parent system of the present PROMAC-J system was used for the field test of the NRTA at Tokai Reprocessing Plant that was carried out during the period of September 1985 to December 1985. The results showed that the PROMAC-J system would be useful and effective for the data processing and MUF analyses and could be routinely used if the plant operator wanted to do so. The present PROMAC-J system has been developed as an improved system taking our experiences into account. This system is, however, developed in a sense that it could be used as a back-up system for the original system. Therefore, we could not apart too far from the original concept and circumstances of the computer system, which means that the recent advancement in the field of computer and its peripheral instruments have not fully taken into consideration.

Decision analysis methods such as Page's test have not been installed in this system yet, and a procedure to estimate an un-measured inventory have not yet incorporated in this system, too.

Apart from these problems, the system PROMAC-J could be used to implement the NRTA at Tokai Reprocessing Plant. This may improve inspector's data collection and analysis procedures, that is the main object of the JASPAS Task JB-1.

ACKNOWLEDGEMENT

The authors wish to acknowledge the helpful consultations of Mr. Y. Yamamoto of Safeguards Technology Laboratory especially with regard to preparing figures and the manuscript.

8. CONCLUSION

The parent system of the present PROMAC-J system was used for the field test of the NRTA at Tokai Reprocessing Plant that was carried out during the period of September 1985 to December 1985. The results showed that the PROMAC-J system would be useful and effective for the data processing and MUF analyses and could be routinely used if the plant operator wanted to do so. The present PROMAC-J system has been developed as an improved system taking our experiences into account. This system is, however, developed in a sense that it could be used as a back-up system for the original system. Therefore, we could not apart too far from the original concept and circumstances of the computer system, which means that the recent advancement in the field of computer and its peripheral instruments have not fully taken into consideration.

Decision analysis methods such as Page's test have not been installed in this system yet, and a procedure to estimate an un-measured inventory have not yet incorporated in this system, too.

Apart from these problems, the system PROMAC-J could be used to implement the NRTA at Tokai Reprocessing Plant. This may improve inspector's data collection and analysis procedures, that is the main object of the JASPAS Task JB-1.

ACKNOWLEDGEMENT

The authors wish to acknowledge the helpful consultations of Mr. Y. Yamamoto of Safeguards Technology Laboratory especially with regard to preparing figures and the manuscript.

References

[1] Miura, N, Masui, J., Komatsu, H., Todokoro, A., Iwanaga, M., Kusano, Y., Komori, Y.,Lovett, J.E.: Field Testing of Near-Real-Time Materials Accountancy at the PNC-Tokai Reprocessing Plant, STR-202 (1987)

[2] Miura, N, Komatsu, H., Masui, J., Todokoro, A., Iwanaga, M., Kusano, Y., Komori, Y.: Field Test of Near-Real-Time Material Accountancy at the Tokai Reprocessing Plant, IAEA-SM-293/34 (1986)

[3] Ihara, H., Nishimura, H., Ikawa, K., Miura, N., Iwanaga, M.,Komori, Y.: Development of a Near Real Time Materials Accountancy Data Processing System and Evaluation of Statistical Analysis using Field Test Data, IAEA-SM-293/33 (1986)

[4] Ihara, H., Nishimura, H., Ikawa, K., Miura, N., Iwanaga, M., Kusano, T.: A Study of Statistical Tests for Near-Real-Time Materials Accountancy using Field Test Data of Tokai Reprocessing Plant, Jointly published by JAERI as JAERI-M 88-059 and by PNC as PNC SJ1500 88-011.

[5] Miura, N., Hirano, H., Yamana, H., Kusano, T., Ihara, H., Nishimura, H., Ikawa, K., Lovett, J.E. : Task No. JA-5, Field Test of Near-Real-Time Material Accountancy at the Tokai Reprocessing Plant, JASPAS89-1 / PNC ZN8410 89-011 (1989)

[6] J.L.Jaech, :Statistical Methods in Nuclear Material Control, TID-26298

[7] J.P.Shipley; Decision Analysis for Nuclear Safeguards, U.S. Safeguards Technology Training Program; Measurement& Accounting Systems for Safeguarding Nuclear Materials, held at LASL, May 9-11, 1978

[8] E.A.Hakkila, D.D.Cobb,H.A.Dayem, R.J.Dietz, E.A.Kern, E.P.Schlonka, J.P.Shipley, D.B.Smith, R.H.Augustson, J.W.Barnes: Coordinated Safeguards for Material Managementin a Fuel Reprocessing Plant, LA-6881 Vol.I, II (1977)

[9] J.P.Shipley :DECANAL User's Manual, LA-9043-M (1982)

[10] D.Sellinschegg, U.Bicking: MUF-Residuals Tested by a Sequential Test

with Power One, IAEA-SM-260/35

[11] A.J.Woods: Analysis of MUF TimeSeries, harwood academic publishers: MATHEMATICAL AND STATISTICAL METHODS IN NUCLEAR SAFEGUARDS, PP.213-239

[12] D.J.Pike, A.J.Woods: Criteria for Specification of Statistical tests for materials safeguards, IAEA-SM-293/157 (1986)

[13] B.J.Jones: Near-real-time material accountancy; calculation of the parameters used in a Page's Test, ESRDA Bull. No.7(1984)

[14] Edited by F.Argentesi, R. Avenhause, M.Franklin, J.P.Shipley: Mathematical and Statistical Methods in Nuclear Safeguards, Joint Research Centre, Ispra, Italy (1981)

[15] K.Gonda, K.Oka, S.Fukuda: Calculation Code revised Mixset for Purex Process, PNCT 841-79-26 (1979) (in Japanese)

[16] TASTEX: Tokai Advanced Safeguards Technology Exercise, International Atomic Energy Agency, Technical Reports Series No. 213, Vienna 1982.

[17] Ikawa,K., Ihara,H., Nishimura, H., Hirata, M., Sakuragi, H., Ido, M., Sawahata, T., Tsutsumi, M. Suyama, N., Lovett, J.E.;"Study of the Application of Near-Real-Time Material Accountancy to safeguards for Reprocessing Facilities", Jointly published by Power Reactor and Nuclear Fuel Development Corp. (PNC) as PNCT-N841-33-26 and by Japan Atomic Energy Research Institute (JAERI) as JAERI M-83-158 (1983).

[18] Lovett, J.E., Hirata, M., Ikawa, K., Augustson, R.H.,"Application of the Basic Concepts of Dynamic Material Accountancy to the Tokai Spent Fuel Reprocessing Facility - A Feasibility Study", International Atomic Energy Agency Department of Safeguards internal report STR-94 (January 1980). Also published in Japan as JAERI M-9186 (November 1980)

[19] Ikawa,K., Ihara, H., Nishimura, H., Hirata, M., Sakuragi, H., Iwanaga, M., Suyama, N., Matsumoto, K.,; "Study of the Application of Semi-Dynamic Material Control Concepts to Safeguarding Spent Fuel Reprocessing Plants", in NBS Special Publication 582, Report of the Kiawah

Island Topical Meeting, Measurement Technology for Safeguards Materials Control, (meeting date November 1979, publication date June 1980), pp 730-739.

[29] Ikawa, k., Ihara, H., Nishimura, H., Hirata, M., Ido, M.; "An Integrated Near-Real-Time Material Accountancy Safeguards System", Journal of the Institute of Nuclear Materials Management, Proceedings Issue, 22nd annual meeting (July 1981) pgs. 390-401.

[21] Ikawa,K., Ihara, H., Nishimura, H.;"A Near-Real-Time Material Accountancy Model and its Preliminary Demonstration in Tokai Reprocessing Plant", Nuclear Safeguards Technology -1982, proceedings of an IAEA symposium, paper number IAEA-SM-260/136, Vienna, 1982.

[22] A.L.Beyerlein, J.F.Geldard: Nuclear Material Inventory Estimation in Solvent Extraction Contactors, Final Report IAEA Contract No. 4086/TC, Clemson University, Clemson South Carolina (1986)