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Produced by the NASA Center for Aerospace Information (CASI)
STREAM TABLE PROGRAM

USER'S MANUAL

AND

PROGRAM DOCUMENT

MAY, 1981

Prepared for:

NASA/George C. Marshall Space Flight Center
Huntsville Computer Complex

Prepared by:

Computer Sciences Corporation
Engineering Systems Department
Project Development and Systems Support Section

NASA - 161810
STREAM TABLE PROGRAM:
USER'S MANUAL AND PROGRAM DOCUMENT Final Report (Computer Sciences Corp.) 83 F
RC 405/ME 701

N81-26746

CSCL 09B

G3/61 26741

Unclass

UNCLASSIFIED
STREAM TABLE PROGRAM
USER'S MANUAL
AND
PROGRAM DOCUMENT
MAY, 1981

NASS-31640

Prepared by:

Member of Technical Staff B

Reviewed by:

Manager
Project Development and Systems Support Section

Manager
Engineering Systems Department

5/20/81
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COMPUTER SCIENCES CORPORATION
ABSTRACT

This program was designed to be an editor for the Lewis Chemical Equilibrium program input files and is used for storage, manipulation and retrieval of the large amount of data required. The files are based on the facility name, case number, and table number. The data is easily recalled by supplying the sheet number to be displayed. The retrieval basis is a "sheet" where "sheet" is defined to be all of the individual flow streams which comprise a given portion of a coal gasification system. A "sheet" may cover more than one page of output tables. The program allows for the insertion of a new table, revision of existing tables, deletion of existing tables or the printing of selected tables.

No calculations are performed. Only pointers are used to keep track of the data. The process is done interactively with a TEKTRONIX 4000 series terminal and the UNIVAC 1100/82. A copy of the program also resides on the Honeywell SIGMA V System.
### TABLE OF CONTENTS

**ABSTRACT** ................................................................. i

1.0 INTRODUCTION ............................................................... 1-1

1.1 PURPOSE ........................................................................ 1-1

1.2 MSFC FORM 3559 ............................................................. 1-1

1.3 RELATED PROJECTS .......................................................... 1-3

2.0 PROBLEM TASK DESCRIPTION ........................................... 2-1

3.0 METHOD OF SOLUTION ..................................................... 3-1

4.0 PROGRAM DESCRIPTION .................................................. 4-1

4.1 OPERATING ENVIRONMENT ................................................ 4-1

4.1.1 Hardware .................................................................. 4-1

4.1.2 Software ................................................................... 4-1

4.2 PROGRAM SPECIFICATIONS ........................................... 4-1

4.3 SUBROUTINES .................................................................. 4-2

5.0 OPERATING INSTRUCTIONS ............................................. 5-1

5.1 DECK SETUP .................................................................. 5-1

5.1.1 Input ........................................................................ 5-2

5.1.1.1 Magnetic Tapes .................................................... 5-2

5.1.1.2 File Requirements ................................................ 5-2

5.1.1.3 Other ..................................................................... 5-2

5.1.1.4 Sample Control Runstream .................................... 5-2

5.1.2 Output ....................................................................... 5-4

5.1.2.1 Magnetic Tapes .................................................... 5-4

5.1.2.2 Sample Output ...................................................... 5-4

5.1.2.3 Other ..................................................................... 5-4

5.1.3 Test Case ................................................................. 5-16

5.1.3.1 Test Case Listing ................................................... 5-18

6.0 SOURCE CODE LISTING .................................................. 6-1

APPENDIX A--DOCUMENTATION CHECKLIST .................................. A-1

APPENDIX B--DOCUMENTATION APPROVAL ................................ B-1
1.0 INTRODUCTION

1.1 PURPOSE

The STREAM program was developed for the purpose of quick retrieval of stored data in sheets. The retrieval basis is a "sheet" where "sheet" is defined to be all of the individual flow streams which comprise a given portion of a coal gasification system. A "sheet" may cover more than one page of output tables.

The sheets can be revised or deleted. Once a change has been made, this change is reflected in all of the flow streams.

The final results are displayed, one sheet at a time, in the form of a table. The program was written for the UNIVAC 1100/82 and the Univac control language is used in this document. To run the program on the Honeywell Sigma V, only the control cards need to be changed.

The STREAM Program was developed for the Computer Services Organization (AH33) in support of activities in the Coal Gasification Task Team (PF15) under NASA contract NAS8-31640.

1.2 MSFC FORM 3559

See the following page.
TVA Coal Gasification

Provide flow sheet graphics; absorption, stripping, and distillation column design; facility and equipment sizing and plant layout; startup procedure timelines; and analyses of: cost and economics, material and energy balance, combustion equilibrium for the TVA Coal Gasification facility.

18-81 FISCAL YEAR RESOURCES PLAN

<table>
<thead>
<tr>
<th>1ST. QTR</th>
<th>2ND. QTR</th>
<th>3RD. QTR</th>
<th>4TH. QTR</th>
<th>TOTAL</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>LABOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>1927</td>
<td>1926</td>
<td>1927</td>
<td>7706</td>
<td>$105,957.50</td>
</tr>
<tr>
<td>COMPUTER</td>
<td>10</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>$5,880.00</td>
</tr>
<tr>
<td>UNIVAC 1100</td>
<td>1926</td>
<td>1927</td>
<td>1926</td>
<td>1927</td>
<td>7706</td>
</tr>
</tbody>
</table>

22. TOTAL COST: $111,837.50

24. FUNDING SOURCE: □ R&E, □ D&O, □ R&D, □ REIMBURSABLE

25. WORK PACKAGE: 34X

28. NAME OF PROGRAMMER/ANALYST (24 characters): Mike Fagye

31. NAME OF MONITOR (24 characters): R. Martin

34. COMMENTS: Scientific/Engineering

36. SIGNATURE OF AUTHORIZED REQUESTER: Billy H. Breed

37. DATE RECEIVED:
1.3 RELATED PROJECTS

The Related Projects include the Timeline Resource Analysis Program (TRAP) and the CEC Lewis Program.
2.0 PROBLEM TASK DESCRIPTION

The STREAM Program is a bookkeeping program which allows the user easy access to a table of output.

The user has the option to define a new table. After a table has been defined, this existing table can be revised or deleted. One can also print existing tables with the option of printing one or all of the sheets dealing with a particular facility name, case number, and table number. Once the printing option has been selected, the user has the option to print more individual sheets and to print more tables with a different facility name, case and table number.
3.0 METHOD OF SOLUTION

The STREAM Program is designed with pointers used to output the tables. These pointers are used with three different files. The names of these files are 14, 16, and 20.

To add a new table, the user selects option one in the main menu. After this selection has been made, the user is asked to supply the facility name with an A8 format, the case number and the table number both in I1 formats. Then, this information is used for the different files. File 14 contains:

- NNAME - number of facilities
- ICOILM - pointer of columns
- ICHAIN - chain of column pointers
- TNAME - facility name
- NPTR - counter of pointers
- TCASE - case name
- TTABLE - table number
- TSHEET - sheet number

File 16 contains:

- IPTR - counter pointer to columns
- SYSNAM - system label
- DRAWN - drawn by
- ENGR - engineer's name
- APPR - approved by
- DATE - is current date

of which DRAWN ENGR, APPR are optional to the output page.

File 20 contains:

- COLNAM - column name or stream number
- COLDES - stream description
- COLVAR - actual numerical data for output tables
- CXTR - component name and formula
- XTR - compound molecular weight and moles/hour

To revise, the user first has to write the facility name, case and table number. The existence of the table is verified; then, the sheet number is input and verified. After that, the original data is located. The system data can be changed by choosing that option which results in the new item being keyed in. When this is completed, the entire record is written back to file 16. Column data can then be changed in a likewise manner. To change moles/hour for the compounds, the entire column of data must be keyed in for each compound. After this process is completed, the information is written
back to file 20. The user is able to edit as much as he likes without going back to the main menu.

To delete, it is the same process of adding except in reverse. The user can delete an entire case, table, sheet and column. Once the user decides which one is to be deleted, then the respective pointers are updated.

To output tables, the user must again input the facility name, case and table number to be used as pointers to sheet data. The user can output one sheet at this time or all of the sheets if desired. If more than one sheet is desired, but not all, the user must again input the sheet number to be output. The user has the option to output more tables before returning to the main menu.

One thing to keep in mind is that the pointers used start out from the largest category down to the smallest. In this case, it is the facility name, case number, table number, sheet number and finally, the column number or name.
4.0 PROGRAM DESCRIPTION

4.1 OPERATING ENVIRONMENT

4.1.1 Hardware

- The program was first written for the UNIVAC 1100-82.

- Core Requirements
  
The amount of core memory required for the program to run on the UNIVAC 1100-82 is 13853.

- Magnetic Tapes
  
  On the UNIVAC 1100/82, the number of nine track magnetic tape units required is one.

- Mass Storage Requirements for the assignment of the files:
  
  (a) STREAM is catalogued:
      @CAT,P CGS, F/64/TRK/128
  
  (b) Files 14, 16, 20 are assigned:
      @CAT,P 14,F/2/TRK/4
      @CAT,P 16, F/1/POS/2
      @CAT,P 20, F/2/POS/4
      respectively.

4.1.2 Software

- Operating System - The host operating system will be a UNIVAC 1100/82 Executive, level 9R1.

- The program is written in ASCII Fortran on the UNIVAC.

- Demand, interactive is how the processing mode used to execute

- Library Subroutines include:

  SYS$*MSFC$.

4.2 PROGRAM SPECIFICATIONS

If the user wants to retrieve information already existing, all the user needs to do is to input the facility name, case number, table number, and sheet number and the correct sheets will be displayed. But if the sheet does not exist, the user will need to define new sheet data which require stream name, stream description, moles per hour for the different compounds, special compounds, and the different totals.
4.3 SUBROUTINES

A list of all the subroutines and their main function are given below.

1) CHECK - checks for a duplicate column name and if found will flag as an error.

2) CNAME - user will input stream name, isolate multiplier and remove N, (, and).

3) COLUMN - write stream description and column data for compounds, special compounds, weight, temperature, pressure PSIA, gas molecular weight, power in kilowatts and BTU per hour.

4) CSHEET - changes sheet information which includes drawn by, engineer, approved by, and date.

5) DEFINE - reads in sheet data, column data and stores the information on the file.

6) DELETE - will delete entire facility, case, table, sheet or column data, and will update all pointers.

7) EDIT - user will select basic table, check existence of table, and used as a driver to change sheet and column data.

8) FILE - used to create a new file data to create first records, to adjust multiplier column, to write new column data and to update the chain of column pointers.

9) INIT - defines files 14, 16, 20.

10) MAIN - main driver of program

11) MENU - main menu of program to either define new table, revise existing table, delete existing table or print selected table.

12) OPDATA - used if user wishes to input drawn by, the engineer's name or approved by.

13) OUTPUT - will display all of the related output in table form.

14) PSELECT - user will determine which table, sheets to be output; an option will enable him to print more sheets and tables.
15) SELECT - user will input facility name, case and table number.

16) SHEET - user will input sheet number and system label.

17) SHTNUM - user writes the number sheets (1-16) to be printed.
5.0 OPERATING INSTRUCTIONS

5.1 DECK SETUP

This program was designed to run interactively. Here are some of the commands that make it easier for the user.

• to copy program from tape to file
  @RUN.
  @ASG,TF PUR., U9S, tape number
  @COPY,G PUR., TPFS.
  @ADD,L BOOT

After this sequence, the user is able to execute the program. BOOT will catalog file CGS, 14, 16, 20, will assign them to the user's run and will copy information from tape to file.

• to get on once files are copied from tape
  @ADD,L GETON

will assign files to user's run once they are cataloged.

• to make hard-copy print-out of program
  @ADD,L COPY

• to remap
  @ADD,L MAP
  will pack, prep and remap

• to make a new tape with new information
  @ADD,L UPDATE
  will assign a new tape, copy information to tape, and will give you a new tape number.

• to execute program
  @XQT XQT
5.1.1 Input

5.1.1.1 Magnetic Tapes

For file 14:

NNAME is dimensioned (1)    NPTR is dimensioned (4)
ICOLM is dimensioned (1)    TCASE is dimensioned (16)
ICHAIN is dimensioned (1)    TTABLE is dimensioned (32)
TNAME is dimensioned (2,4)    TSHEET is dimensioned (16,32)

For file 16, the format is:

IPTR is dimensioned (9,2)    ENGR is dimensioned (4A4)
SYSNAM is dimensioned (20A4)    APPR is dimensioned (4A4)
DRAWN is dimensioned (4A4)    DATE is dimensioned (2A4)

For file 20, the format is:

COLNAM is dimensioned (2,9)    COLDES is dimensioned (3,9,4)
COLVAR is dimensioned (36,9)    CXTR is dimensioned (6,3,9)
XTR is dimensioned (2,3,9)

The assigned tape is called STREAM and was made with a TF (labeled tape) option on the assign card. The Tape Assign Card is as follows:

@ASG,TF STREAM, U9S,SAVE04. . . CGS STREAM Table

5.1.1.2 File Requirements

The file set-up requirements are:

1) for file 14, the mass storage requirement is one record with a maximum length of 575 characters.

2) for file 16, there are 512 records, each with a maximum length of 52 characters.

3) for file 20, there are 5120 records, each with a maximum length of 74 characters.

5.1.1.3 Other

For all the input to be given by the user is explained in the reference test case

5.1.1.4 Sample Control Runstream

See the following page.
TO EXECUTE PROGRAM, LINES UNDERLINED INDICATE INPUT FROM USER.

```
ORIG. PAGE IS OF POOR QUALITY

MILL INCHLES 61 MPH/1230000000 KDLESIDK2000.99 89.99
DATE 04/20/81  TIME 101918
> MSG 2 PUR .UDDS. 29444
READY
> XCOPY 2 PUR
PURPUR ZERIHI EED74T11 04/20/81 10:17:14
B:SIGN05B01CG5(1) COPIED ON 01/14/81 AT 08:54:54
66 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
>ADD 2. BOOT

@CAT.P CGS.F/64/TRK/128
READY
@CAT.P 14.F/2/TRK/4
READY
@CAT.P 16.F/2/TRK/4
READY
@CAT.P 20.F/2/TRK/4
READY
@SG.A CGS
READY
@SG.A 14
READY
@SG.A 16
READY
@SG.A 20
READY
@COPY TPFS .CGS
PURPUR ZERIHI EED 74T11 04/20/81 10:17:14
66 BLOCKS COPIED
@COPY.PUR .14
B:SIGN05B014(1) COPIED ON 01/14/81 AT 08:56:04
6 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
@COPY.G PUR .16
B:SIGN05B016(1) COPIED ON 01/14/81 AT 08:56:04
64 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
@COPY.G PUR .80
B:SIGN05B018(1) COPIED ON 01/14/81 AT 08:55:48
```

5.1.2 Output

All of the output consists of one basic output page. This is all dependent on the facility name, case name, and table case that the user desires.

5.1.2.1 Magnetic Tapes

If the user makes changes and wants to retain the change, he can make a new tape by assigning a nine track tape and copying the files to this tape.

5.1.2.2 Sample Output

(See attached Output pages).

The number of Output pages will depend on how many the user desires. After each page is printed, a pause statement will appear and will give the user a chance to look at the output or to make a hard copy before he continues.

5.1.2.3 Other

The output is done interactively with a TEKTRONIX 4000 series terminal. After the headings are printed, a list of components with their molecular weight and abbreviations are listed. These components are then listed with the number of these components that are needed to make up the process listed in the STREAM description.
<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>FORMULA</th>
<th>FUEL</th>
<th>PRODUCT</th>
<th>GAS/L(H)</th>
<th>UTIL/HR</th>
<th>OXYGEN</th>
<th>CHLORIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROGEN MONOXIDE</td>
<td>H2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE</td>
<td>CO2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>METHANE</td>
<td>CH4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETHANE</td>
<td>C2H6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROPAINE</td>
<td>C3H8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUTANE</td>
<td>C4H10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROPANE</td>
<td>C3H8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUTANE</td>
<td>C4H10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NITROGEN</td>
<td>N2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HELIUM</td>
<td>He</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GEORGE C. MARSHALL SPACE FLIGHT CENTER**

**COAL GASIFICATION ECONOMIC ANALYSIS**

**STREAM BUDGET**

**FACILITY**

**DATE**

**REVIEWED BY**

**APPROVED BY**

**NOTE**

**OUTPUT**
## Table: Coal Gasification Stream & Utility Table

<table>
<thead>
<tr>
<th>Module System</th>
<th>Stream Number</th>
<th>Stream Description</th>
<th>Coal Preparation System (L)</th>
<th>Coals and Slurry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>H2S</td>
<td>LP</td>
</tr>
</tbody>
</table>

### Components

<table>
<thead>
<tr>
<th>Name</th>
<th>MOL-UT</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>4.02</td>
<td>H2</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>1.01</td>
<td>CO2</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1.01</td>
<td>CO2</td>
</tr>
<tr>
<td>Methane</td>
<td>1.84</td>
<td>CH4</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>4.02</td>
<td>N2</td>
</tr>
<tr>
<td>Oxygen</td>
<td>1.01</td>
<td>O2</td>
</tr>
<tr>
<td>Argon</td>
<td>4.02</td>
<td>Ar</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>1.01</td>
<td>H2S</td>
</tr>
<tr>
<td>Carbon Sulfide</td>
<td>1.01</td>
<td>CS2</td>
</tr>
<tr>
<td>Sulphur</td>
<td>1.84</td>
<td>SO2</td>
</tr>
<tr>
<td>Ammonia</td>
<td>1.84</td>
<td>NH3</td>
</tr>
<tr>
<td>Hydrogen Cyanide</td>
<td>1.01</td>
<td>HCN</td>
</tr>
<tr>
<td>Hydrogen Chloride</td>
<td>1.01</td>
<td>HCl</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>1.84</td>
<td>N2O</td>
</tr>
<tr>
<td>Chlorine</td>
<td>1.84</td>
<td>Cl</td>
</tr>
<tr>
<td>Ethylene</td>
<td>1.84</td>
<td>C2H4</td>
</tr>
<tr>
<td>Ethane</td>
<td>1.84</td>
<td>C2H6</td>
</tr>
<tr>
<td>Propylene</td>
<td>1.84</td>
<td>C3H6</td>
</tr>
<tr>
<td>Propane</td>
<td>1.84</td>
<td>C3H8</td>
</tr>
<tr>
<td>Sulfur</td>
<td>1.84</td>
<td>S</td>
</tr>
</tbody>
</table>

### Summary

- **Total Dry Water**: 18.02
- **Total Wet Water**: 21.50
- **Total Gas/Liquid**: 400000 + 66
- **Total Solids**: 43830 + 66
- **Total Steam**: 30000 + 82
- **Temperature, Deg F**: 80000 + 82
- **Pressure,psia**: 1.0000 + 82
- **Gas/Liq Mole Weight, lb/lb-mol**: 18000 + 23
- **Power, KW (Btu/hr)**: 20000 + 23
<table>
<thead>
<tr>
<th>NAME</th>
<th>FORMULA</th>
<th>MOL/HR</th>
<th>AIR</th>
<th>STEAM</th>
<th>CONDENSATE</th>
<th>( \text{LB- MOLES/HR} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROGEN</td>
<td>H2</td>
<td>2.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON MONOXIDE</td>
<td>C0</td>
<td>29.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE</td>
<td>CO2</td>
<td>44.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>METHANE</td>
<td>CH4</td>
<td>16.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NITROGEN</td>
<td>N2</td>
<td>28.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OXYGEN</td>
<td>O2</td>
<td>32.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARGON</td>
<td>AR</td>
<td>48.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYDROGEN SULFIDE</td>
<td>H2S</td>
<td>34.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBONYL SULFIDE</td>
<td>COS</td>
<td>68.06</td>
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TOTAL DRY WATER

| TOTAL DRY WATER | H2O | 18.02 | 11524+06 | 44180+04 | 30180+05 |

TOTAL WET

| TOTAL WET | H2O | 35621+06 | 35730+08 | 36060+08 | 60590+06 |

TOTAL GAS/LIQUID

| TOTAL GAS/LIQUID | 35621+06 | 35730+08 | 36060+08 | 60590+06 |

COAL

| ASH | 46240+04 | 13870+05 |
| CARBON | 16800+04 | 48800+04 |
| TOTAL SOLIDS | 62440+04 | 19730+05 |
| TOTAL STREAM | 38245+06 | 36060+08 | 60590+06 |

TEMPERATURE, DEG F

| 46500+03 | 88000+02 | 10000+03 | 10000+03 |

PRESSURE, PSIA

| 71470+03 | 76470+03 | 66470+03 | 66470+03 |

GAS/LIQUID WEIGHT, LB/LB-MOL

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**TOTAL DRY**
- WATER: 18.02
- H2O: 30160+05
- TOTAL: 14300+02

**TOTAL WET**
- WATER: 18.02
- H2O: 14300+02

**TOTAL GAS/LIQUID**
- 69590+06
- 65930+06
- 65930+06
- 45600+03
- 12400+02
- 94400+02
- 16000+06

**COAL**
- ASH
- CARBON
- TOTAL SOLIDS
- TOTAL STREAM

**TEMPERATURE, DEG F**
- 1000+03
- 808+82
- 1200+02
- 1200+02
- 1400+02
- 1400+02
- 2000+03

**PRESSURE, PSIA**
- 64470+03
- 64470+03
- 14700+02
- 14700+02
- 14700+02
- 14700+02
- 64700+02
- 64700+02

**GAS/LIQUID MOLE WEIGHT, LB/LB-MOL**
- 20100+02
- 18000+02
- 18000+02
- 32000+02
- 23100+02
- 36000+02
- 18000+02
- 18000+02

**PAUSE 00000 >**
<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>FORMULA</th>
<th>MOL-UT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>H2</td>
<td>2.02</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
<td>12.01</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>CO2</td>
<td>44.01</td>
</tr>
<tr>
<td>Methane</td>
<td>CH4</td>
<td>16.64</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>N2</td>
<td>28.01</td>
</tr>
<tr>
<td>Oxygen</td>
<td>O2</td>
<td>32.00</td>
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<tr>
<td>Argon</td>
<td>Ar</td>
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<td>Hydrogen Sulfide</td>
<td>H2S</td>
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<tr>
<td>Carbonyl Sulfide</td>
<td>C4H6S</td>
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<tr>
<td>Carbon Disulfide</td>
<td>CS2</td>
<td>76.14</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>SO2</td>
<td>64.06</td>
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<td>Hydrogen Cyanide</td>
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<td>Hydrogen Chloride</td>
<td>HCL</td>
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</tr>
<tr>
<td>Nitrous Oxide</td>
<td>NO</td>
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</tr>
<tr>
<td>Chlorine</td>
<td>Cl</td>
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</tr>
<tr>
<td>Ethylene</td>
<td>C2H4</td>
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</tr>
<tr>
<td>Ethane</td>
<td>C2H6</td>
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<tr>
<td>Propylene</td>
<td>C3H6</td>
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</tr>
<tr>
<td>Propane</td>
<td>C3H8</td>
<td>44.09</td>
</tr>
<tr>
<td>Sulfur</td>
<td>S</td>
<td>32.07</td>
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**TOTAL DRY**

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<thead>
<tr>
<th>COMPONENTS</th>
<th>FORMULA</th>
<th>MOL-UT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>H2O</td>
<td>18.02</td>
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**TOTAL WET**

**TOTAL GAS/ LIQUID**

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<tr>
<th>COMPONENTS</th>
<th>FORMULA</th>
<th>MOL-UT</th>
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<tbody>
<tr>
<td>Coal</td>
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<td>Ash</td>
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<td></td>
</tr>
<tr>
<td>Carbon</td>
<td></td>
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**TOTAL SOLIDS**

**TOTAL STREAM**

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>FORMULA</th>
<th>MOL-UT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>H2O</td>
<td>18.02</td>
</tr>
</tbody>
</table>

**TEMPERATURE, DEG F**

**PRESSURE, PSIA**

**GAS/ LIQ MOLE WEIGHT, LB/LB-MOL**

**POWER, KW (BTU/HR)**

**PAUSE**
**Module System Stream Number**

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORMULA</th>
<th>MOL-UT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROGEN</td>
<td>H2</td>
<td>2.02</td>
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<tr>
<td>CARBON MONOXIDE</td>
<td>CO</td>
<td>26.01</td>
</tr>
<tr>
<td>CARBON DIOXIDE</td>
<td>CO2</td>
<td>44.01</td>
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<tr>
<td>METHANE</td>
<td>CH4</td>
<td>16.04</td>
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<tr>
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<td>N2</td>
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<tr>
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<td>32.00</td>
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<tr>
<td>ARGON</td>
<td>AR</td>
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<td>CARBON DISULFIDE</td>
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<td>AMMONIA</td>
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</tr>
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<td>CHLORINE</td>
<td>CL</td>
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<td>ETHYLENE</td>
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<td>ETHANE</td>
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<td>PROPYLENE</td>
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<td>PROPANE</td>
<td>C3H8</td>
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<tr>
<td>SULFUR</td>
<td>S</td>
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**Product Gas Usage**

<table>
<thead>
<tr>
<th>NAME</th>
<th>MOL-UT</th>
<th>LB-MOLES/HR</th>
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<tbody>
<tr>
<td>HYDROGEN</td>
<td>1.94</td>
<td>18941.96</td>
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**Total Dry Water**

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<tr>
<td>WATER</td>
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**Total Wet Water**

<table>
<thead>
<tr>
<th>NAME</th>
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<tbody>
<tr>
<td>WATER</td>
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**Total Gas/Liquid**

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<tbody>
<tr>
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**Coal Ash**

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<tr>
<td>COAL Ash</td>
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**Total Solids**

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>TOTAL SOLIDS</td>
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</tbody>
</table>

**Total Stream**

<table>
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</thead>
<tbody>
<tr>
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**Temperature, Deg F**

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**Pressure, PSIa**

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<tbody>
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**Gas-Liquid Mole Weight, LB/LB-MOL**

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<tbody>
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**Power, KW (BTU/HR)**

<table>
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</thead>
<tbody>
<tr>
<td>POWER</td>
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</tr>
<tr>
<td>NAME</td>
<td>COMPONENTS</td>
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<tr>
<td>------------------</td>
<td>------------</td>
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<tr>
<td>HYDROGEN</td>
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<tr>
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</tr>
<tr>
<td>CARBON DIOXIDE</td>
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</tr>
<tr>
<td>METHANE</td>
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<td>NITROGEN</td>
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</tr>
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<td>OXYGEN</td>
<td></td>
</tr>
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<td>ARGON</td>
<td></td>
</tr>
<tr>
<td>HYDROGEN SULFIDE</td>
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<tr>
<td>CARBONYL SULFIDE</td>
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<tr>
<td>CARBON DISULFIDE</td>
<td></td>
</tr>
<tr>
<td>SULFUR DIOXIDE</td>
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</tr>
<tr>
<td>AMMONIA</td>
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<tr>
<td>HYDROGEN CYANIDE</td>
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<td>ETHYLENE</td>
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<td>PROPANE</td>
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<td>SULFUR</td>
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</tbody>
</table>

TOTAL DRY WATER

TOTAL NET WATER

TOTAL GAS/LIQUID

COAL ASH CARBON TOTAL SOLIDS TOTAL STREAM TEMPERATURE, DEG F

PRESSURE, PSIA

GAS/LIQ MOL WEIGHT, LB/LB-MOL

POWER, KU (BTU/HR)

PAUSE 00000
5.1.3 Test Case

To execute the program:

@XQT XQT

Once this has happened, a Stream and Utility Table Menu appears with the following options:

1) Define New Table
2) Revise Existing Table
3) Delete Existing Table
4) Print Selected Table
5) Save Revision

1) If the user chooses to define a new table, he chooses option number one. Then, the user is asked to write the facility name in an A8 format, the case number and table number, both in an I1 format. The user is then asked to write the sheet number in an I2 format with leading zeroes. If the user wants sheet number two, he must insert '02' and not just 2. A two will give user sheet number 20. The user is asked to give the data in format MM/DD/YY. The System Label is to be written in an A76 format. There are two asterisks given to define the limits of the system label.

An answer of 'YES' will allow the user to put optional data in. The optional data includes 'drawn by', 'engineer's name' and 'approved by'. A return of the carriage will allow the user to skip these questions.

Next, the stream name will be asked for in an A8 format. A stream description will be asked for in the form of four lines with a maximum of 9 characters per line. Again, the limits of the nine characters per line are indicated by two asterisks. Centering of each line is not needed for the line because the program itself will take care of the centering of lines for the user.

Finally, the user is asked for the moles per hour for the twenty-one compounds in a F-type format. If a zero is wanted, all the user has to do is to hit the carriage return. If the user wants to use special compounds, answer yes. A carriage return will allow the user to bypass the questions. If special compounds are required, the user needs to input the compound name in an A16 format, compound formula in an A8 format, the compound molecular weight in any F-type format, and moles per hour in any F-type format. This loop is continued until the user desires no more special compounds. The last information is the totals, temperature, pressure PSIA, gas molecular weight and power kilowatt BTU per hour.

5-16
At this time, the user can input more column data and the
process will start over. If not, the user can input more
column, sheet data or can even input a new facility name,
case name, and table name. If all of the answers are no,
then the user returns to the main menu.

2) To revise existing tables, the user again is asked to
input facility name, case number, table number, and sheet
number. If the sheet number is less than 10, the user is
required to use leading zeroes.

The user can then change the system name, drawn by name,
enengineer's name, approved by, or change the data. If
none of the above require a change, the user will continue.
If the user wants to change a particular column, he will insert
the column number which he wants. The system will ask him to write
the desired information again.

If the user wants to continue, the names of the columns
are listed. The user will write the number of the column
to be changed in 11 format. Then, the user will write
the stream name in an A8 format. After a match is found,
the following information is then changed: the stream de-
scription, the moles/hour for the compounds, special com-
ponents, and conditions. The user does not have an option
to change any part of it, but has to input all of the
information.

The user has the choices to change more column data, sheet
data or the change facility name/case/table.

3) To delete existing data, the user has a choice of deleting
the entire facility, case, table, sheet or column. After
the user has decided upon which one he desires, the pro-
gram will remove name and update all of the pointers. The
user will continue and can delete as many columns, sheets,
tables, cases or facility names.

4) To output the tables, the user has to first input the
facility name, case number, and table number. The user
must know the sheet number to be printed. Again, if the
sheet number is less than 10, leading zeroes must be used.
If all of the sheets are to be printed dealing with that
facility name, case number, and table number, the user
needs to input a 99. The user has the option to print
more individual sheets or to process more tables.
5.1.3.1 Test Case Listing

See the following pages.
STREAM AND UTILITY TABLE MENU

1 - DEFINE NEW TABLE
2 - REVISE EXISTING TABLE
3 - DELETE EXISTING TABLE
4 - PRINT SELECTED TABLE
5 - SAVE REVISION

PRESS RETURN TO EXIT

INPUT CHOICE IN 'I1 FORMAT

4

5-10
WRITE FACILITY NAME IN AB FORMAT
> "EXCO"
WRITE CASE NUMBER IN II FORMAT
> 3
WRITE TABLE NUMBER IN II FORMAT
> ;
WRITE SHEET(1-16) NUMBER TO BE PRINTER IN IB FORMAT. USING LEADING ZEROS
> 30
USE 90 IF ALL SHEETS ARE REQUIRED
CALLER PASSED 03 ARGUMENTS. SUBPROGRAM EXPECTS 04 ARGUMENTS
WRITE FACILITY NAME IN AB FORMAT
WRITE SYSTEM NAME
WRITE DRAWN BY NAME
WRITE APPR. NAME
WRITE DATE
RETURN TO CONTINUE

641 642 643 644 645 646 647 648 0
1 1 1 1 1 1 1 1
1899
2097
5105
4106
5109
6197
7199
8199 1-3
WRITE NUMBER OF COLUMN TO BE CHANGED IN AB FORMAT
WRITE STREAM NAME IN AB FORMAT
WRITE STREAM DESCRIPTION IN 4 LINES OF 9 CHARACTERS EACH
WITHIN THE LIMITS INDICATED

IP
STEAM
WRITE THE MOL/HR FOR THE FOLLOWING COMPOUNDS IN F-TYPE FORMAT.
ZEROS MAY BE ENTERED AS BLANKS
N2
CO
CO2
CH4
N2
O2
AR
N2S
CO
CS2
TO CHANGE EXISTING DATA: IN THIS CASE,
COLUMN DATA WAS CHANGED
SO2
NH3
HCN
HCL
NC
CL
C2H4
C2H6
C3H6
C3H8
S

ANSWER YES IF SPECIAL COMPOUNDS ARE REQUIRED

TOTL DRY

H2O
2762
TOTL WET
2763
TOTL GAS
49738
COAL
ASH
CARBON
TOT SLDS
TOT STMR

49738
WRITE FOLLOWING CONDITIONS IN ANY F-TYPE FORMAT
ZEROES MAY BE ENTERED A BLANKS

TEMP DEG. F
298
PRES PSIA
64
GAS MOL-LT
18
POWER KU (+) BTU/HR (-)

WRITE NUMBER OF COLUMN TO BE CHANGED IN II FORMAT

0
ANSWER YES TO EDIT MORE SHEET DATE
ANSWER YES TO EDIT NEW FACILITY NAME/CASE/TABLE
1 - DELETE ENTIRE FACILITY
2 - DELETE ENTIRE CASE
3 - DELETE ENTIRE TABLE
4 - DELETE ENTIRE SHEET
5 - DELETE ENTIRE COLUMN
RETURN TO CONTINUE

WRITE CHANGE TYPE IN II FORMAT

WRITE FACILITY NAME IN AB FORMAT
>TEXACO

WRITE CASE NUMBER IN II FORMAT

WRITE TABLE NUMBER IN II FORMAT

WRITE SHEET NUMBER IN II FORMAT WITH LEADING ZEROS

WRITE NUMBER OF THE COLUMN TO BE DELETED USING II FORMAT

ANSWER YES TO DELETE MORE COLUMNS

TO DELETE, IN THIS EXAMPLE AN ENTIRE COLUMN WAS DELETED.
WRITE FACILITY NAME IN A8 FORMAT
WRITE CASE NUMBER IN I1 FORMAT
WRITE TABLE NUMBER IN I1 FORMAT
WRITE SHEET NUMBER IN I8 FORMAT WITH LEADING ZEROS
WRITE STREAM NAME IN A8 FORMAT
WRITE STREAM DESCRIPTION IN 4 LINES OF 9 CHARACTERS EACH
WITHIN THE LIMITS INDICATED

TEST

CASE

WRITE THE BALANCE FOR THE FOLLOWING COMPOUNDS IN F-TYPE FORMAT.
ZEROES MAY BE ENTERED AS BLANKS

H2
CO
C02
CH4
N2
O2
Ar
H2S
CS2
SO2
PH3
HCN
HCl
NO
CL
C2H4
C2H6
C3H4
C3H6

S
ANSWER YES IF SPECIAL COMPOUNDS ARE REQUIRED

WRITE COMPOUND NAME IN A/B FORMAT

WRITE COMPOUND FORMULA IN A/B FORMAT

WRITE COMPOUND MOLECULAR WEIGHT IN ANY F-TYPE FORMAT

WRITE MOLES/HP IN ANY F-TYPE FORMAT

ANSWER YES IF SPECIAL COMPOUNDS ARE REQUIRED

TOL DPY

H2O

TOLU ETA

TOLU GAS

COAL

ASH

CARBON

TOT SLD

TOT STH

WRITE FOLLOWING CONDITIONS IN ANY F-TYPE FORMAT

ZEROES MAY BE ENTERED A BLANKS

TEMP DEG. F

PRES PSIA

GAS MOL-UT

POWER KW (+) BTU/HR (-)

651 652 653 654 655 666 646 650 669

1 1 1 1 1 1 1 1 1

656 66 67 68 69 70 71 72 73 74 0 0 0 0 0

ANSWER YES TO INPUT MORE COLUMN DATA

ANSWER YES TO INPUT MORE SHEET DATA

ANSWER YES TO INPUT NEW FACILITY NAME/CASE/TABLE
6.0 SOURCE CODE LISTING

See the following pages.
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<th>SHORT LIST</th>
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@HDG, P BOOT

@PRT, S BOOT
FURPUR 28R1M1 E36 574T11 01/14/81 08:53:35
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**@HDG, P** CHECK

**@PRI, S** CHECK

FURPUR 28R1H1 E36 574T11 01/14/81 08:53:37
SEVIGNBIN208*CGS(1).CHECK

1  SUBROUTINE CHECK(COLNAM,TSHEET,NTABLE,ICOL,IOPT)
2    INTEGER TSHEET
3    COMMON /TSHEET/TSHEET(16,32)
4    COMMON /JOUT/JOUT,JIN
5    DIMENSION ITR(9,2)
6    CHARACTER BNAME(12)
7    CHARACTER COLNAME(12)
8    IF (NTABLE.EQ.0) GO TO 350
9    IF (NTABLE.LE.0) NTABLE=-NTABLE
10   IF (MOD(NTABLE,2).EQ.1) GO TO 10
11  N1=NTABLE-1
12  N2=NTABLE
13  GO TO 20
14
15  N1=NTABLE
16  N2=N1+1
17  DO 20 330 KK=N1,N2
18     DO 320 J=1,16
19       J3=TSHEET(J,KK)
20      IF (J3.EQ.0) GO TO 320
21      READ (16,J3) ITR
22      DO 310 J=1,9
23        J1=ITR(J)
24      IF (J1.EQ.0) GO TO 318
25      READ (20,J1) BNAME
26     DO 316 K=1,2
27        IF (BNAME(K).NE.COLNAME(K)) GO TO 318
28   316 CONTINUE
29   318 CONTINUE
30   WRITE (6,9000) J1
31   9000 FORMAT (' MATCH AT',I6)
32     ICOL=ITR(J,1)
33     IF (ICOL.EQ.TSHEET.AND.KK.EQ.NTABLE) GO TO 340
34   320 CONTINUE
35   330 CONTINUE
36   340 IF (IOPT.EQ.2) GO TO 350
37      WRITE (JOUT,342)
38   342 FORMAT (' *** THIS COLUMN NAME ALREADY EXISTS FOR A GIVEN',
39      ' X' FACILITY NAME/CASE/TABLE/SHEET/'
40      ' USE EDIT MENU TO CHANGE')
41      GO TO 360
42   350 IOPT=2
43   360 CONTINUE
44   RETURN
45 END

/#HDG.P CNAME

#PRTS CNAME
FURPUR 28R1H1 E36 574T11 01/14/81 08:53:38
SEVIGNIN208*CGS11.CNAME

1 SUBROUTINE CNAME(COLNAM,MULT)
2 COMMON /IOUT/JOUT,JIN
3 CHARACTER COLNAM*4(2)
4 CHARACTER ADUM*4(2),SDUM*8
5 EQUIVALENCE (ADUM(1),SDUM(1))
6 CHARACTER BLANK*1,DOUM*1,BLMK*1,NO*1,N9*1
7 CHARACTER IYY*1,IZZ*1
8 CHARACTER IA*1,IZ*1,ILP*1,IRP*1
9 DATA BLANK/*,'/BLNK/*
10 DATA IA/*A/*Z/*Z/*ILP/*I/*IRP/*I/*NO/*O*/N9/*9*/
11 WRITE (IOUT,10)
12 FORMAT (5X,'WRITE STREAM NAME IN AB FORMAT ')
13 11 READ (JIN,17,ERR=11) ADUM
14 12 FORMAT (2(A))
15 C ISOLATE ANY MULTIPLIER
16 MULT=1
17 IZZ=SUBSTR(ADUM(1),1,1)
18 IF (IZZ.GE.IA.AND.IZZ.LE.IZ) GO TO 30
19 IF (IZZ.LT.NO.OR.IZZ.GT.N9) GO TO 8
20 IYY=SUBSTR(ADUM(1),2,1)
21 IF (IYY.NE.ILP) GO TO 8
22 DECODE(20,ADUM) MULT
23 20 FORMAT (11)
24 C REMOVE (I1)
25 SUBSTR(ADUM,1,6)=SUBSTR(ADUM,3,6)
26 SUBSTR(ADUM,7,2)=SUBSTR(BLMK,1,2)
27 C REMOVE FINAL 1
28 DO 22 I=8,1,-1
29 DOUM=SUBSTR(ADUM,1,1)
30 IF (DOUM.NE.IRP) GO TO 22
31 SUBSTR(ADUM,1,1)=SUBSTR(BLMK,1,1)
32 GO TO 30
33 22 CONTINUE
34 GO TO 8
35 30 DO 32 I=1,2
36 32 COLNAM(I)=ADUM(I)
37 RETURN
38 END

@HOG.P COLUMN

@PRJ.S COLUMN
FURPUP 2B13HI E36 ST4T11 01/14/R1 08:53:39
SUBROUTINE COLUMN(COLDIS,COLVAR,CXTR,XTR)
CHARACTER COLDIS*4
DIMENSION COLDIS(12)
DIMENSION COLVAR(36)
COMMON /IOUT/ IOUT,JIN
CHARACTER PROMPT*8,COND*12
DIMENSION PROMPT(30),COND(35)
CHARACTER BLANK*1,DDUM*1
DIMENSION XTR(1.3)
CHARACTER CXTR*16,30
CHARACTER YES*4,YYES*4
CHARACTER BDUM*13,TDUM*9
EQUIVALENCE (BDUM11,TBDM11)
DATA BLANK/" "/
DATA YYES/"YES "/
DATA (PROMPT1),I=1,30/
L'H2*,'CO', 'CO2*,'CH4*,'N2*,'O2*,'Ar*,'Hz*,'Cs2*,'SO2*,'NH3*,'HCN*,'HCL*,'NO*,'Cl*,'C2H4*,'C2H6*,'E3H8*,'S*,'TOUL DRYS*,'M20*,'TROT WET', 'TROT GAS', 'COAL', 'ASH', 'CARBON', 'T SLD5', 'T OT STR',
DATA (COND1),I=1,51/
L'TEMP DEG, F', 'FRES PSA*', 'GAS MOL-WT',
L'POWER KW(+)', 'BTU/HR(-)/'
DO 10 K=1,6
DO 10 J=1,3
10 CXTR(K,J)=0.
WRITE(JOUT,20)
20 FORMAT(5X,'WRITE STREAM DESCRIPTION IN 4 LINES OF 9 CHARACTERS *
L'EACH*/8X,'WITHIN THE LIMITS INDICATED'//IX,*9X,*9)
21 READ (JIN,22,ERR=21) BDUM
22 FORMAT(2X,4I1)
23 IX=0
24 DO 22 222=K=9,1,-1
25 DOUM=SUBSTR(TDUM,K,1)
26 IF (.NE. BLANK) GO TO 224
27 IX=IX+1
222 CONTINUE
224 IF (IX.LT.1) GO TO 227
227 IX=IX+1
228 IX=9-IX
229 SUBSTR(TDUM,IX,1,IX1)=SUBSTR(TDUM,1,IX1)
230 DO 225 K=1,IX
231 SUBSTR(TDUM,K,1)=SUBSTR(BLANK,1,1)
232 CONTINUE
233 IX=IX+1
234 IF (IX.LE.1) GO TO 227
237 IX=IX+2
238 IX=9-IX
239 SUBSTR(TDUM,IX,1,IX1)=SUBSTR(TDUM,1,IX1)
240 DO 225 K=1,IX
241 SUBSTR(TDUM,K,1)=SUBSTR(BLANK,1,1)
242 CONTINUE
243 CONTINUE
244 WRITE(JOUT,27)
245 27 FORMAT(5X,'WRITE THE MOIRES/HR FOR THE FOLLOWING *
L'COMPounds IN F-TyPE FORMAT.'//8X,*9ZERES MAY BE *
L,'ENTERED AS BLANKS')
DO 40 I=1,30
  WRITE (JOUT,301) PROMPT(II)
30  FORMAT(5X,A8)
31  READ (JIN,32,ERR=31) COLVAR(I)
32  FORMAT(F15.0)
33  IF (I.NE.21) GO TO 40
34  IXX=1
40  WRITE (JOUT,41)
41  FORMAT (5X,'ANSWER YES IF SPECIAL COMPOUNDS ARE REQUIRED')
42  IF (YES.NE.YES) GO TO 40
43  WRITE (JOUT,44)
44  FORMAT (5X,'WRITE COMPOUND NAME IN A16 FORMAT')
45  READ (JIN,46,ERR=45) (CXXTR(II,IXX),II=1,4)
46  FORMAT (4AN)
47  WRITE (JOUT,48)
48  FORMAT (5X,'WRITE COMPOUND FORMULA IN A8 FORMAT')
49  READ (JIN,50,ERR=49) (CXXTR(II,IXX),II=5,6)
50  FORMAT (2A4)
51  WRITE (JOUT,52)
52  FORMAT (5X,'WRITE COMPOUND MOLECULAR WEIGHT IN ANY F-TYPE FORMAT')
53  READ (JIN,52,ERR=53) XTR(I,IXX)
54  WRITE (JOUT,54)
55  FORMAT (5X,'WRITE MOLES/HR IN ANY F-TYPE FORMAT')
56  READ (JIN,52,ERR=55) XTR(I,IXX)
57  IF (IXX.LE.3) GO TO 240
58  CONTINUE
59  WRITE (JOUT,58)
60  FORMAT(5X,'WRITE FOLLOWING CONDITIONS IN ANY F-,TYPE FORMAT. *IF* ZEROS MAY BE ENTERED A BLANK')
61  WRITE (JOUT,60) COND(I)
62  DO 70 I=1,3
63  READ (JIN,32,ERR=61) COLVAR(3D+I)
64  CONTINUE
65  WRITE (JOUT,80) COND(4),COND(5)
66  READ (JIN,32,ERR=81) COLVAR(34)
67  CONTINUE 3
68  RETURN
69  END
SUBROUTINE CSHEET(ISHEET, IN, JOUT, JIN, SNAM, DRAWN, ENGR, APPR, DATE)

COMMON/JOUT/JOUT, JIN

INTEGER ISHEET

CHARACTER DATE(4), SNAM(4), DRAWN(4), ENGR(4), APPR(4)

DIMENSION ISHEET(12, 12), SNAM(12), DRAWN(12), ENGR(12), APPR(12)

DIMENSION IPTR(12)

IF((ISHEET(1) .GT. 0) .AND. (ISHEET(1) .LE. 12)) GO TO 20

WRITE(JOUT, 10)

10 FORMAT(5X, 'WRITE SHEET NUMBER IN INTEGER FORMAT WITH LEADING ZEROS')

11 READ(JIN, 12, ERR=11) ISHEET

12 FORMAT(32)

WRITE(JOUT, 16)

16 FORMAT(5X, '*** SHEET NUMBER DOES NOT EXIST ***')

GO TO 8

LOCATE ORIGINAL DATA

20 J3=ISHEET(1)

READ (16, J3) IPTR, SNAM, DRAWN, ENGR, APPR, DATE

WRITE(JOUT, 30)

30 FORMAT(5X, 10) - CHANGE SYSTEM NAME

40 FORMAT(1, 10)

WRITE(JOUT, 42)

42 FORMAT(5X, 'WRITE SYSTEM NAME IN A76 FORMAT WITHIN THE LIMITS')

WRITE(JOUT, 43)

50 WRITE(JOUT, 52)

52 FORMAT(5X, 'WRITE DRAWN BY NAME IN A16 FORMAT')

53 READ(JIN, 54, ERR=53) DRAWN

54 FORMAT(48)

GO TO 24

60 WRITE(JOUT, 62)

62 FORMAT(5X, 'WRITE ENGINEER NAME IN A16 FORMAT')

63 READ(JIN, 64, ERR=63) ENGR

GO TO 24
56. C  APPROVED
57.  70  WRITE(JOUT,72)
58.   72  FORMAT(5X,'WRITE APPR= NAME IN A16 FORMAT')
59.   73  READ(JIN,54,ERR=73) APPR
60.   GO TO 24
61. C
62. C  DATE
63.  80  WRITE(JOUT,82)
64.   82  FORMAT(5X,'WRITE DATE IN MM/DD/YY FORMAT')
65.   83  READ(JIN,84,ERR=83)DATE
66.   84  FORMAT(24A)
67.   GO TO 24
68.  100  J3=TSHEET(ISHEET,NTABLE)
69.   WRITE(16*J3) IPTR,SYSNAM,DRAM,ENGR,APPR,DATE
70.   RETURN
71.  END

END FTN 167 IBANK 429 DBANK 519 COMMON

CHARS P  DEFIN
SUBROUTINE DEFIN(IER)
COMMON /LIMIT/ NNAME,ICOLM,ICCHAIN,JCOLM,JCHAIN
COMMON /NAME/ TNAME(2,4),NPTR(4)
COMMON /ICASE/ TCASE(16)
COMMON /TABLE/ TABLE(32)
COMMON /TSHEET/ TSHEET(16,32)
9.
IER=0
10. DEFINE FILE 19(1,575,V,JDATA)
11. DEFINE FILE 16(512,52,V,JCHAIN)
12. DEFINE FILE 2014120,74,V,JCOLM)
13. FIND(14*1)
14. READ(14*1,ERR=100) NNAME,ICOLM,ICCHAIN,TNAME,NPTR,
15. ICASE,TABLE,TSHEET
16. ICOLM=1
17. ICCHAIN=1
18. RETURN
19. IER=1
20. RETURN
21. END

END FTV I3 I8ANK 47 DBANK 577 COMMON

#HDG.P  DEFINE
SUBROUTINE DELETE
COMMON /JOUT/, JOUT, JIN
COMMON /TLIMIT/, NNAM, INCOL, ICHEIN
CHARACTER TNAME(*), NAM(1:2), BLANK
INTEGER TCASE, TTABLE, TSHEET
COMMON /NAME/, TNAME(2,4), NPTR(4)
COMMON /TCASE/, TCASE(1:4)
COMMON /TABLE/, TTABLE(32)
COMMON /TSHEET/, TSHEET(1:32)
DIMENSION IPIR(9,2)
CHARACTER COLNAME(42)
CHARACTER SYSNAME(20), DRAWN(4), ENGIN(4), APPR(4), DATE(12)
CHARACTER YES(4), YYES(4)
DATA BLANK */ */
DATA YES */ */
8 WRITE(JOUT,10)
10 FORMAT('1 - DELETE ENTIRE FACILITY')
11 C 2 - DELETE ENTIRE CASE')
12 C 3 - DELETE ENTIRE TABLE')
13 C 4 - DELETE ENTIRE SHEET')
14 C 5 - DELETE ENTIRE COLUMN')
15 C RETURN TO CONTINUE')
12 WRITE(JOUT,14)
14 FORMAT(5X,'WRITE CHANGE TYPE IN II FORMAT')
15 READ(JIN,16,ERR=15)IP
16 FORMAT(11)
27 IF(IP.GT.5)GO TO 12
28 IF(IP.EQ.0)GO TO 140
C FACILITY NAME
20 WRITE(JOUT,22)
22 FORMAT(5X,'WRITE FACILITY NAME IN AB FORMAT')
23 READ(JIN,24,ERR=23)NAM
24 FORMAT(2A4)
25 GO TO 26 I=1, NNAME
26 IF(NAM(I).NE.TNAME(I,J))GO TO 26
27 IF(NAM(2).NE.TNAME(2,J))GO TO 26
28 GO TO 20
29 CONTINUE
30 GO TO 20
C REMOVE NAME AND UPDATE ALL POINTERS
39 28 IF(IP.GT.1)GO TO 40
40 TNAME(1,I)=BLANK
41 TNAME(2,I)=BLANK
42 IF=NPIR(I)
43 NPTR(I)=1
44 I=1
45 IQ=TCASE(I-1+I)
46 TCASE(I-1+I)=0
47 J=1
48 ID=TTABLE(I-1+J)
49 TTABLE(I-1+J)=0
50 K=1
51 IS=TSHEET(I-1+J)
52 IF(IS.EQ.0)GO TO 39
53 GO TO 10
DELETE

57 TSHEET(K,IR)=0
58 READ(16,15)IPTR,SYNAME,DRAWN,ENGR,APP,DATE
59 37 L=1
60 38 IT=IPTR(L,1)
61 IF (IT.GT.0) IPTR(L,1)=0
62 L=L+1
63 IF (L.LE.9)GO TO 38
64 WRITE(16,15)IPTR,SYNAME,DRAWN,ENGR,APP,DATE
65 WRITE(16,90015,IPTR
66 39 K=K+1
67 IF (K.LE.16)GO TO 36
68 J=J+1
69 IF (J.LE.2)GO TO 34
70 I=I+1
71 IF (I.LE.4)GO TO 32
72 IF (IOP.NE.4)GO TO 204
73 WRITE (JOUT,200)
74 200 FORMAT (5X,'ANSWER YES TO DELETE MORE SHEETS')
75 READ (JIN,202) YES
76 202 FORMAT (A4)
77 IF (YES.EQ.YYES) GO TO 80
78 GO TO 8
79 IF (IOP.NE.3) GO TO 208
80 WRITE (JOUT,206)
81 206 FORMAT (5X,'ANSWER YES TO DELETE MORE TABLES')
82 READ (JIN,202) YES
83 IF (YES.EQ.YYES) GO TO 60
84 GO TO 8
85 IF (IOP.NE.2) GO TO 8
86 WRITE (JOUT,210)
87 210 FORMAT (5X,'ANSWER YES TO DELETE MORE CASES')
88 READ (JIN,202) YES
89 IF (YES.EQ.YYES) GO TO 40
90 GO TO 8
91
92 C REMOVE CASE AND UPDATE ALL POINTERS
93 40 WRITE(JOUT,42)
94 42 FORMAT(5X,'WRITE CASE NUMBER IN 11-FORMAT')
95 43 READ(JIN,16,ERR=43)ICASE
96 NCASE=NCASE+1
97 ICASE=NCASE
98 IF (10.EQ.0160 TO 40
99 IF (IOP.GT.2)GO TO 60
100 CASEINCASE=10
101 I=4
102 GO TO 33
103 C REMOVE TABLE AND UPDATE ALL POINTERS
104 60 WRITE(JOUT,62)
105 62 FORMAT(5X,'WRITE TABLE NUMBER IN 11-FORMAT')
106 63 READ(JIN,16,ERR=63)ITABNO
107 NTABNO=NTABNO+1
108 IF (IOP.EQ.0160 TO 60
109 IF (IOP.GT.3)GO TO 80
110 ITABLE(NTABNO)=0
111 I=4
J=2
GO TO 35

C REMOVE SHEET AND UPDATE ALL POINTERS
80 WRITE(JOUT,82)
82 FORMAT(5X,'WRITE SHEET NUMBER IN I2 FORMAT WITH LEADING ZEROS')
83 READ(JIN,84,ERR=83)ISHEET
84 FORMAT(12I1)
122 ISHEET(ISHEET,NTABNO)
124 IF(IOP.GT.4)GO TO 100
125 ISHEET(ISHEET,NTABNO)=0
126 READ(I16*IS1,IPT1,SYSNAM,DRAWN,ENGR,APPR,DATE
127 I=4
128 J=2
129 K=16
130 GO TO 37

C REMOVE COLUMN AND UPDATE POINTERS
100 READ(16*IS1,IPT1,SYSNAM,DRAWN,ENGR,APPR,DATE
110 M=1,9
111 J=IPTR(M,1)
113 IF(JJ.EQ.0)GO TO 110
114 READ(100*J1)COLNA
116 WRITE(JOUT,106)M,J,K
118 FORMAT(5I2)
120 CONTINUE
121 C WRITE(JOUT,114)
122 FORMAT(5X,'WRITE NUMBER OF THE COLUMN TO BE DELETED'
123 & USING I1 FORMAT')
124 READ(JIN,16,ERR=115)IX
125 IF(IX.EQ.0)GO TO 120
126 IPTIX,1=0
127 WRITE(JOUT,116)
128 WRITE (JOUT,116)
129 FORMAT (5X,'ANSWER YES TO DELETE MORE COLUMNS'
130 READ (JIN,202) YES
131 IF (YES.EQ.YYES) GO TO 112
132 WRITE(16*IS1,IPT1,SYSNAM,DRAWN,ENGR,APPR,DATE
133 WRITE(6,900)15,IPTR
900 FORMAT(5I2,3X,14I2)
GO TO 8
140 WRITE (14*11) NNAME,ICOLM,ICHA,NAME,NPTR,TCASE,TABLE,TSHEET
141 RETURN
142 END

MDG,E IT
SUBROUTINE EDIT
CHARACTER NAME*,INAME*,
DIMENSION NAM(2)
CHARACTER COLNAME*(2),COLDESC*(12)
CHARACTER YES*,Y*,YES*4
INTEGER TCASE,T,TABLE,T,SHEET
COMMON/TNAME,TNAME(2,4),NPIR(4)
COMMON/TCASE/TCASE(2)
COMMON/T,TABLE/TABLE(32)
COMMON/SHEET/SHEET(16,32)
COMMON/IT/TNAME,NAM*,ICHAIN
COMMON/JOUT,JOUT,J
DIMENSION IPT(9,2),COLVAR(36)
DIMENSION XTR(2,3)
CHARACTER CNTR(6,3)
DATA YES'/YES'/'
CALL SELECT(NAM,ICASE,ITABNO)
CHECK EXISTANCE OF TABLE
IER=0
DO 6 I=1,INAME
DO 2 J=1,2
IF(INAME(J) .NE. TNAME(J,II)) GO TO 6
2 CONTINUE
GO TO 8
6 CONTINUE
IER=1
NCASE=NPIR(I-1)+ICASE
IF(TCASE(NCASE).EQ.0) IER=2
NTABLE=TCASE(NCASE)-1+ITABNO
IF(NTABLE(ITABLE).EQ.0) IER=3
IF(IER.EQ.0) GO TO 20
WRITE(JOUT,12)
12 FORMAT('****ERROR NAME/CASE/TABLE ****')
GO TO 2
C CHANGE SHEET DATA
CALL CSHEET(NAM,ISHEET,IPIR,SYNSAME,DRAWN,ENDR,APPR,DATE)
WRITE(6,900) IPT
900 FORMAT(9(1X,A10))
C CHANGE COLUMN DATA
DO 40 J=1,9
J=IPIR(I-1)
IF(J,J).EQ.0) GO TO 40
READ(20,J) COLNAM
WRITE(JOUT,2011) COLNAM
201 FORMAT(12,1X,A10)
40 CONTINUE
CALL JOUT(44)
44 FORMAT(5X,'WRITE NUMBER OF COLUMN TO BE CHANGED IN II FORMAT')
READ(JIN,46) IOP
46 FORMAT(II)
IF(IOP.EQ.0) GO TO 60
J=IPIR(IOP+1)
IF(J,J).EQ.0) GO TO 42
CALL CNAME(COLNAM,MULT)

IPTR(IP,2)=MULT

ICOL=0

IOP=2

CALL CHECK(COLNAM,ISHEET,NTABLE,ICOL,IOP)

CALL COLUMN(COLDES,COLVAR,CXTR,XTR)

IF (ICOL.NE.0) J1=ICOL

IF (MULT.EQ.1) GO TO 56

DO 50 I=1,30

DO 52 I=1,3

50 COLVAR(I)=COLVAR(I)/MULT

52 XTR(2,1)=XTR(2,1)/MULT

56 WRITE (20,*J1) COLNAM,COLDES,COLVAR,CXTR,XTR

58 J3=ISHEET(ISHEET,NTABLE)

70 WRITE (16,*J3) IPTR,SYSNAM,DRAWN,ENGR,APPR,DATE

71 GO TO 42

60 WRITE(JOUT,62)

62 FORMAT(5X,'ANSWER YES TO EDIT MORE SHEET DATE')

63 READ (JIN,64,ERR=63)YES

64 FORMAT(A4)

66 IF(YES.EQ.YES) GO TO 20

72 WRITE(JOUT,72)

76 FORMAT(5X,'ANSWER YES TO EDIT NEW FACILITY NAME/CASE/TABLE')

77 READ(JIN,64,ERR=73)YES

79 IF(YES.EQ.YES) GO TO 2

80 RETURN

82 END

END FTN 195 IBANK 355 DBANK 577 COMMON

AHDG,P FILE
FILE

1. SUBROUTINE FILE (NAM, ICASE, ITABNO, DRAWN, ENGR, APPR, ISHEET, NTABLE,
   DATE, SYNAM, COLNAM, COLDES, COLVAR, CXTR, XTR, ICOL, MULT)
2. COMMON /IOUT/, JOUT, JIN
3. COMMON /NAM**, DRAWN**, ENGR**, APPR**
4. CHARACTER NAM**(2), DRAWN**(2), ENGR**(2), APPR**(2)
5. CHARACTER DATE**(2), SYNAM**(20)
6. DIMENSION NAM(2), DRAWN(2), ENGR(2), APPR(2)
7. DIMENSION DATE(2), SYNAM(20)
8. CHARACTER COLNAM**, COLDES**
9. DIMENSION COLNAM(2), COLDES(12)
10. DIMENSION COLVAR(36)
11. COMMON /LIMIT/, NNAME, ICOLM, JCHAIN, JCOLM, JCHAIN
12. CHARACTER TNAME**
13. INTEGER TCASE, ITABLE, TSHEET
14. COMMON /TNAME/, TNAME(2,4), NPTR(4)
15. COMMON /TCASE/, TCASE(16)
16. COMMON /ITABLE/, ITABLE(2)
17. COMMON /TSHEET/, TSHEET(16,32)
18. DIMENSION IPTR(9,2), JPTR(9,2)
19. DIMENSION XTR(2,31)
20. CHARACTER CXTR**(6,31)
21. IF (NNAME .EQ. 0) GO TO 100
22. C ADD SECOND AND SUBSEQUENT ENTRIES
23. DO 4 I=1, NNAME
24. IF (NAM(I) .NE. TNAME(I,1)) GO TO 1
25. IF (NAM(I) .NE. TNAME(I,2)) GO TO 1
26. GO TO 6
27. CONTINUE
28. C TREAT AS A NEW NAME IF NO MATCH WITH EXISTING NAME
29. GO TO 100
30. NNAME=NPTR(I)-1+ICASE
31. C CHECK FOR MATCHING CASE
32. IF (TCASE(NM) .EQ. 0) GO TO 110
33. NTABLE=TCASE(NM)+ITABNO+1
34. C CHECK FOR MATCHING TABLE
35. IF (ITABLE(NTABLE) .EQ. 0) GO TO 120
36. GO TO 124
37. C CREATE FIRST RECORDS
38. 100 DO 104 I=1, NNAME
39. IF (NPTR(I) .LE. 0) GO TO 106
40. CONTINUE
41. 104 TNAME(I,1)=NAM(I)
42. TNAME(I,2)=NAM(I)
43. IF (NPTR(I) .EQ. 0) NNAME=NNAME+1
44. NPTR(I)=NNAME+1
45. 110 NPTR=NPTR(I)
46. NCASE=NPTR+TCASE-1
47. TCASE=TCASE+INCASE-1
48. IPT=IPT+INCASE
49. NTABLE=ITABLE+ITABNO-1
50. 120 ITABLE(NTABLE)=I
51. C SEARCH FOR ALREADY EXISTING MATCH FOR COLUMN NAME
52. 124 JK=0
53. DO 126 L=1,9
54. DO 126 K=1,2
55. JPTR(K,1)=0
FILE

DATE 01/1481  PAGE 2

2  56.  126  IPTR(1,K)=0
57.  J3=JABS(I$HEET+1+$TABLE+1)
58.  IF (J3.EQ.0) GO TO 135
59.  READ(16*J3)IPTR, SYSNAME, DRAWN, ENGR, APPR, DATE
60.  C NEW COLUMN ONLY
61.  135 GO 136 L=1,9
62.  DO 136 K=1,2
63.  136 IPTR(L,K)=IPTR(L,K)
64.  DO 136 L=1,9
65.  IF (IPTR(1,1).GT.0) GO TO 138
66.  JK=L
67.  138 CONTINUE
68.  GO TO 140
69.  138 CONTINUE
70.  C ADJUST MULTIPLIER COLUMN
71.  140 IF (MULT.EQ.1.OR.icol.NE.0) GO TO 148
72.  DO 141 L=1,30
73.  141icol=icol+icol
74.  INX=icol
75.  DO 144 L=1,INX
76.  144 XTR(I,L)=XTR(I,L)/MULT
77.  C WRITE NEW COLUMN DATA
78.  148 IF (ICOL.NE.0) GO TO 145
79.  JCOLM=ICOL+10*ICOL+1
80.  J1=JCOLM
81.  GO TO 149
82.  145 JCOLM=ICOL
83.  J1=JCOLM
84.  GO TO 142
85.  149 WRITE (20,JC0L)ColName, ColDes, ColVar, CkTr, xTr
86.  142 IPTR(JK,1)=1
87.  IPTR(JK,2)=MULT
88.  C UPDATE CHAIN OF COLUMN POINTERS
89.  150 IF (JK.EQ.1) THEN
90.  JCHAIN=16+$TABLE+1+$SHEET
91.  J3=JCHAIN
92.  WRITE(16*,JCHAIN)IPTR, SYSNAME, DRAWN, ENGR, APPR, DATE
93.  T$HEET=T$HEET+TABLE+J3
94.  GO TO 200
95.  ELSE
96.  J3=TSHEET($SHEET, $TABLE)
97.  WRITE(16*,J3)IPTR, SYSNAME, DRAWN, ENGR, APPR, DATE
98.  GO TO 200
99.  END IF
100. C PRINT WARNING MESSAGE
101.  160 WRITE(*1,162)
102.  162 FORMAT(5x,*** ALL COLUMNS FILLED FOR THIS SHEET ***)
103.  GO TO 200
104. C RETURN TO MENU LIST
105.  200 CONTINUE
106.  WRITE(14*,111NAME, ICOL, ICHAIN, INAME, NIPTR, TCASE, TABLE, T$HEET
107.  107. WRITE(16,602)IPTR
108.  108. WRITE(16,302) (TSHEET, $TABLE, I=1,161, $SHEET, $TABLE
109.  110. 302 FORMAT(16,15)
111.  RETURN
112. END
<table>
<thead>
<tr>
<th>GETON</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEVIGNBINZOB*CGS(1).GETON</td>
</tr>
<tr>
<td>1  @ASG,A 14.</td>
</tr>
<tr>
<td>2  @ASG,A 16.</td>
</tr>
<tr>
<td>3  @ASG,A 20.</td>
</tr>
<tr>
<td>4  @FREE TPFs.</td>
</tr>
<tr>
<td>5  @USE TPFs.,CGS.</td>
</tr>
<tr>
<td>@HDG,P INIT</td>
</tr>
</tbody>
</table>
SUBROUTINE INIT(IER)

COMMON /TNAME, INAME, ICOLM, ICHAIN

INTEGER TCASE, TTABLE, TSHET

COMMON /TNAME/ TNAME(2,4), NPT(4)

COMMON /TNAME/ TNAME(2,4), NPT(4)

COMMON /TTABLE/ TTABLE(32)

COMMON /TSHEET/ TSHEET(16,32)

IER=0

DEFINE FILE 1(41,575,UI,DATA)

DEFINE FILE 1A(512,52,UI,CHAIN)

DEFINE FILE 2A(512,574,UI,ICOLM)

FIN(14*1)

READ(14*1, IER=100) NNAME, ICOLM, ICHAIN, TNAME, NPT,

TCASE, TTABLE, TSHET

WRITE(6,9000) NNAME, TNAME, NPT, TCASE, TTABLE, TSHET

9000 FORMAT (15/1X, 4(2A4)/4(1X, 16X)/1(16X)/1(16X)/1(32(16X/))

RETURN

100 IER=1

199 RETURN

END
BEGIN: 
C MAIN:CREATE
C COAL GASIFICATION
C STREAM AND UTILITY TABLE
C COMMON /IOUT/ JOUT, JIN, JTABLE
C DATA JTABLE /4/, JIN/5/, JOUT/6/
C IOPCO
C INITIALIZE POINTER TABLES
C CALL INITIER
IF (IER .NE. 0) THEN
  WRITE (JOUT, 2)
  FORMAT(* ERROR IN BASIC POINTER TABLES*)
ELSE
  CONTINUE
END IF
C SELECT FROM MENU
CALL MENU
C STOP
END

END FTN 17 IBANK 19 DBANK 3 COMMON

END FTN 5 MAP

FURPUR 28R1H1 E36 S14111 01/14/81 08:54:07
MAP

SEVIGNBIN208*CGS11,MAP
1  @PACK CGS
2  @PREP CGS
3  @MAP,1 CGS,*XMAP,CGS,XOT
4  LIB SYS*MSFCG
5  a

@HDG,P  MENU
SUBROUTINE MENU
COMMON /OUT/ JOUT, JIN, JTABLE
1. WRITE(JOUT, 10)
2. 10 FORMAT(10X, 'STREAM AND UTILITY TABLE MENU'//)
3. WRITE(JOUT, 14)
4. 14 FORMAT(1, 1 - DEFINE NEW TABLE'//)
5. WRITE(JOUT, 18)
6. 18 FORMAT(1, 2 - REVISE EXISTING TABLE'//)
7. WRITE(JOUT, 22)
8. 22 FORMAT(1, 3 - DELETE EXISTING TABLE'//)
9. WRITE(JOUT, 26)
10. 26 FORMAT(1, 4 - PRINT SELECTED TABLE'//)
11. WRITE(JOUT, 30)
12. 30 FORMAT(1, 5 - SAVE REVISION'//)
13. WRITE(JOUT, 34)
14. 34 FORMAT(5X, 'PRESS RETURN TO EXIT'//)
15. WRITE(JOUT, 38)
16. 38 FORMAT(5X, 'INPUT-CHOICE IN 1-4 FORMAT'//)
17. 40 READ (JIN, 42, ERR=40) IND
18. 42 FORMAT(1I1)
19. IF (IND GT 5) GO TO 40
20. IF (IND EQ 0) GO TO 1000
21. GO TO (100, 200, 300, 400, 500), IND
22. C DEFINE (AUD) NEW TABLES
23. 100 CALL DEFINE
24. GO TO 2
25. C EDIT EXISTING TABLE
26. 200 CALL EDIT
27. IUP=1
28. GO TO 2
29. C DELETE EXISTING TABLE
30. 300 CALL DELETE
31. IUP=1
32. GO TO 2
33. C PRINT SELECTED TABLE
34. 400 CALL PSELECT
35. GO TO 2
36. 500 GO TO 2
37. C SAVE REVISIONS
38. 500 IUP=1
39. C GO TO 2
40. C 1000 RETURN
41. END
42.
END FTN 71 IBANK 120 DBANK 3 COMMON

@MDG,P OPDATA

@PRY,5 OPDATA
FURPUR 28RIH1 E36 S74111 01/14/81 08:54:11
SUBROUTINE OPCODE(DRAWN, ENGR, APPR)

CHARACTER DRAWN(*), ENGR(*), APPR(*)

DIMENSION DRAWN(*), ENGR(*), APPR(*)

COMMON /JOUT/JOUT, JIN

CHARACTER YES(*), YYES(*), BLANK(*)

DATA YYES/'YES', BLANK/ */

DO 2 I=1,4

DRAWN(I)=BLANK

ENGR(I)=BLANK

APPR(I)=BLANK

2 CONTINUE

WRITE(JOUT,10)

10 FORMAT(5X,'ANSWER YES IF OPTIONAL DATA IS TO BE ENTERED':)

11 READ(JIN,12,ERR=11) YES

12 FORMAT(A4)

IF (YES .EQ. YYES) THEN

WRITE(JOUT,21)

20 FORMAT(5X,'WRITE "DRAWN BY" NAME IN A16 FORMAT')

21 READ(JIN,22,ERR=21) DRAWN

22 FORMAT(A4)

WRITE(JOUT,30)

30 FORMAT(5X,'WRITE "ENGR" NAME IN A16 FORMAT')

31 READ(JIN,22,ERR=31) ENGR

WRITE(JOUT,40)

40 FORMAT(5X,'WRITE "APPROVED BY" NAME IN A16 FORMAT')

41 READ(JIN,22,ERR=41) APPR

ELSE

CONTINUE

END IF

RETURN

END
IF (SYSNAM(I),NE.BLANK) GO TO 32
  IX=IX+1
31 CONTINUE
32 IF (IX.EQ.0) GO TO 38
  IX1=(20-IX1)*4
  IY=10FNUM*11
36 IF (IX1.LT.IX1) GO TO 38
  IY1=(IX1-IX1)*9
34 IF (IY+EQ.0) GO TO 38
  IX1=20-IX
36 DO 34 I=IX1,1,-1
37 SYSNAM(I+1)=SYSNAM(I)
36 DO 36 I=1,11
39 SYSNAM(I)=BLNK
38 K=0
30 CONTINUE
39 DO 50 I=1,36
30 DO 50 J=1,9
31 DO 50 K=1,3
32 ACOLVR(K,J,II)=BLNK
33 ATR(K,J,II)=BLNK
34 CONTINUE
35 DO 52 I=1,3
36 DO 52 J=1,9
37 DO 52 K=1,3
38 ATR(K,J,II)=BLNK
39 CONTINUE
40 DO 60 I=1,36
41 DO 60 J=1,10FNUM
42 IF (COLVAR(J,J)) 60,1
43 IF (I,J.LE.30) COLVAR(J,J)=COLVAR(J,J)*IPTR(J,2)
44 IF (COLVAR(J,J)) 60,1
45 ENCODE(62,DUM) COLVAR(J,J)
46 CONTINUE
47 SUBSTR(ACOLVR(1,J,11,1,1))=SUBSTR(DUM,1,4)
48 SUBSTR(ACOLVR(2,J,11,1,1))=SUBSTR(DUM,5,4)
49 SUBSTR(ACOLVR(3,J,11,1,1))=SUBSTR(DUM,9,4)
50 SUBSTR(ACOLVR(3,J,11,1,1))=SUBSTR(DUM,10,3)
51 IF (COLVAR(J,J)) 60,1
52 BITS(ACOLVR(1,J,11,1,1))=BITS(LPAR,1,9)
53 BITS(ACOLVR(3,J,11,1,1))=BITS(RPAR,1,9)
54 SUBSTR(ACOLVR(1,J,11,1,1))=SUBSTR(LPAR,1,1)
55 SUBSTR(ACOLVR(3,J,11,1,1))=SUBSTR(RPAR,1,1)
56 CONTINUE
57 DO 88 J=1,10FNUM
58 IY=0
59 DO 75 K=8,1,-1
60 IF (SUBSTR(DUM(J,K,1))=NE.BLANK) GO TO 76
61 IY=IY+1
62 75 CONTINUE
63 76 IS=8-IY
64 IZ=0
IF (IPTR(J,2)-1,0) .GT. 0,
  SUBSTRS(J),1,IPTR(J,2)-1=SUBSTR(SPAR,1,IPTR(J,2))
  IZ=2
  SUBSTRS(J),IZ,6-IZ=SUBSTR(SUM(J),1,6-IZ)
  SUBSTRS(J),IZ+1,9-IZ=SUBSTR(LPAR,1,9-IZ)
  ENCODE (1,77,SDUM(J)) IPTR(J,2)
  77 FORMAT (11)
  120  CONTINUE
  WRITE (JOUT,1130)
  1130  FORMAT (' CLEAR PAGE')
  WRITE (JOUT,64)
  WRITE (JOUT,10)
  10 FORMAT(9X,'GEORGE C. MARSHALL SPACE FLIGHT CENTER')
  WRITE (JOUT,21) NAM, DRAWN, DATE
  21 FORMAT(9X,'NASA',14X,'HUNTSVILLE, ALABAMA',2X,
    'FACILITY',2X,'DRAWN BY',4X,'DATE ',2A4)
  WRITE (JOUT,30) ICASE, ISHEET, ISHEE
  30 FORMAT(9X,'CASE NO.',12X,'SHEET',12X,'OF',12X)
  WRITE (JOUT,41) AP, ITABNO
  41 FORMAT(9X,'CASE NO.',12X,'TABLE NO.',2X,13)
  IF (ITABNO .EQ. 1) THEN
  WRITE (JOUT,55) SYSAM
  ELSE
  WRITE (JOUT,51) SYSAM
  END IF
  55 FORMAT(10X,'MODULE SYSTEM',9X,20AN)
  51 FORMAT(9X,'FACILITY SYSTEM',9X,20AN)
  WRITE (JOUT,61) (icolam[I,J],I=1,2), J=1,10FNUM
  61 FORMAT(10X,'STREAM NUMBER',12X,2AN,4X,2AN)
  WRITE (JOUT,70) (icolam[I,J],I=1,3), J=1,10FNUM
  70 FORMAT(10X,'STREAM DESCRIPTION',9X,12X,2AN,4AN)
  DO 66 K=2,4
  WRITE (JOUT,72) (icolam[I,J,K],I=1,3), J=1,10FNUM
  66 CONTINUE
  72 FORMAT(12X,9A12,2A4,4A)
  WRITE (JOUT,80)
  80 FORMAT(12X,'COMPONENTS',10X,
    '*-----------------------------* LBMOL/HR **''**
    '*-----------------------------*'
  WRITE (JOUT,90)
  90 FORMAT(9X,'NAME',7X,'FORMULA',14X,'MOL-WT')
  WRITE (JOUT,100) (icolam[I,J,K],I=1,2), J=1,3), K=1,10FNUM
  100 FORMAT(9X,'HYDROGEN',2A2',1X,9(2A4,4A)
  WRITE (JOUT,110) (icolam[I,J,K,3],J=1,3), K=1,10FNUM
  110 FORMAT(9X,'CARBON MONOXIDE',2A4',1X,9(2A4,4A)
  WRITE (JOUT,120) (icolam[I,J,K,3],J=1,3), K=1,10FNUM
  120 FORMAT(9X,'CARBON DIOXIDE',2A4',1X,9(2A4,4A)
  WRITE (JOUT,130) (icolam[I,J,K,3],J=1,3), K=1,10FNUM
  130 FORMAT(9X,'CARBON DIOXIDE',2A4',1X,9(2A4,4A)
170. 130  FORMAT X,*METHANE    CH4  1.04*,1X,9(2A4,A3)
171. WRITE(JOUT,140) (ACOLVRK(J,J),J=1,10FNUM)
172. 140  FORMAT X,*NITROGEN  N2  26.01*,1X,9(2A4,A3)
173. WRITE(JOUT,150) (ACOLVRK(J,J),J=1,10FNUM)
174. 150  FORMAT X,*OXYGEN    O2  32.00*,1X,9(2A4,A3)
175. WRITE(JOUT,160) (ACOLVRK(J,J),J=1,10FNUM)
176. 160  FORMAT X,*ARGON     AR  40.00*,1X,9(2A4,A3)
177. WRITE(JOUT,170) (ACOLVRK(J,J),J=1,10FNUM)
178. 170  FORMAT X,*HYDROGEN SULFIDE H2S  34.08*,1X,9(2A4,A3)
179. WRITE(JOUT,180) (ACOLVRK(J,J),J=1,10FNUM)
180. 180  FORMAT X,*CARBON SULFIDE COS  60.08*,1X,9(2A4,A3)
181. WRITE(JOUT,190) (ACOLVRK(J,J),J=1,10FNUM)
182. 190  FORMAT X,*CARBON DISULFIDE CS2  76.14*,1X,9(2A4,A3)
183. WRITE(JOUT,200) (ACOLVRK(J,J),J=1,10FNUM)
184. 200  FORMAT X,*SULFUR DIOXIDE S02  64.06*,1X,9(2A4,A3)
185. WRITE(JOUT,210) (ACOLVRK(J,J),J=1,10FNUM)
186. 210  FORMAT X,*AMMONIA    NH3  17.03*,1X,9(2A4,A3)
187. WRITE(JOUT,220) (ACOLVRK(J,J),J=1,10FNUM)
188. 220  FORMAT X,*HYDROGEN CYANIDE HCN  27.03*,1X,9(2A4,A3)
189. WRITE(JOUT,230) (ACOLVRK(J,J),J=1,10FNUM)
190. 230  FORMAT X,*HYDROGEN CHLORIDE HCL  36.46*,1X,9(2A4,A3)
191. WRITE(JOUT,240) (ACOLVRK(J,J),J=1,10FNUM)
192. 240  FORMAT X,*NITRUS OXIDE NO  30.01*,1X,9(2A4,A3)
193. WRITE(JOUT,250) (ACOLVRK(J,J),J=1,10FNUM)
194. 250  FORMAT X,*CHLORINE  CL  35.45*,1X,9(2A4,A3)
195. WRITE(JOUT,260) (ACOLVRK(J,J),J=1,10FNUM)
196. 260  FORMAT X,*ETHYLENE   C2H4  28.05*,1X,9(2A4,A3)
197. WRITE(JOUT,270) (ACOLVRK(J,J),J=1,10FNUM)
198. 270  FORMAT X,*ETHANE    C2H6  30.07*,1X,9(2A4,A3)
199. WRITE(JOUT,280) (ACOLVRK(J,J),J=1,10FNUM)
200. 280  FORMAT X,*PROPYLENE  C3H6  42.09*,1X,9(2A4,A3)
201. WRITE(JOUT,290) (ACOLVRK(J,J),J=1,10FNUM)
202. 290  FORMAT X,*PROPANE   C3H8  44.09*,1X,9(2A4,A3)
203. WRITE(JOUT,300) (ACOLVRK(J,J),J=1,10FNUM)
204. 300  FORMAT X,*SULFUR    S  32.07*,1X,9(2A4,A3)
205. 301 CONTINUE
206. JMAX=0
207.  IF JMAX.EQ.0 GO TO 300
208.  DO 1310 J=1,10FNUM
209.  IXX=COLVAR(35,J)
210.  IF (IXX.EQ.0) GO TO 1310
211.  IF (IXX.GT.1) JMAX=IXX
212.  K=IXX
213.  XTR(2,K,J)=XTR(2,K,J)+1PTR(J,2)
214.  ENCODE (62,DUM) XTR(2,K,J)
215.  SUBSTR(XTR(1,J,K),1,14)=SUBSTR(DUM,1,4)
216.  SUBSTR(XTR(2,J,K),1,14)=SUBSTR(DUM,5,4)
217.  SUBSTR(XTR(3,J,K),1,14)=SUBSTR(DUM,9,4)
218.  SUBSTR(XTR(4,J,K),1,14)=SUBSTR(DUM,10,3)
219.  1310 CONTINUE
220.  IF (JMAX.EQ.0) GO TO 300
221.  DO 1320 I=1,JMAX
222.  IF (IXTR(I,J,K).EQ.BLNK) GO TO 1316
223.  1314 CONTINUE
224.  1316 CONTINUE
225.  WRITE (JOUT,111) (IXTR(K,J,K),K=1,6),XTR(1,J,K)
226.  X (IXTR(K,J,K),K=1,3,J=1,10FNUM)
1 227. 1312 FORMAT (1X,4AN,2X,2AN,FS,2,1X,9(2AN,A3))
1 228. 1320 CONTINUE
1 229. 308 IX=3-JMAX
1 230. DO 1322 IX=1,IX
1 231. WRITE (JOUT,1324)
1 232. 1324 FORMAT ("*")
1 233. 1322 CONTINUE
1 234. WRITE(JOUT,310) ((ACOLVRK,J,241),K=1,31,1,10FNUM)
1 235. WRITE(JOUT,320) ((ACOLVRK,J,231),K=1,31,1,10FNUM)
1 236. 320 FORMAT(IX,'WATER H2O 18.02',1X,9(2AN,A3))
1 237. WRITE(JOUT,330) ((ACOLVRK,J,241),K=1,31,1,10FNUM)
1 238. 330 FORMAT(5X,'TOTAL WET',1X,9(2AN,A3))
1 239. WRITE(JOUT,326)
1 240. 326 FORMAT(32X,
1 241. C * * * * * * * * * * * * * * * * * * * * * * * * * L B S / H R * * * * * *
1 242. C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
1 243. [6-34]
1 244. WRITE(JOUT,390) ((ACOLVRK,J,25),K=1,31,1,10FNUM)
1 245. 390 FORMAT(5X,'TOTAL GAS/ LIQUID',1X,9(2AN,A3))
1 246. WRITE(JOUT,350) ((ACOLVRK,J,261),K=1,31,1,10FNUM)
1 247. 350 FORMAT(IX,'COAL',1X,9(2AN,A3))
1 248. WRITE(JOUT,360) ((ACOLVRK,J,27),K=1,31,1,10FNUM)
1 249. 360 FORMAT(IX,'ASH',1X,9(2AN,A3))
1 250. WRITE(JOUT,365) ((ACOLVRK,J,28),K=1,31,1,10FNUM)
1 251. 365 FORMAT(IX,'CARBON',1X,9(2AN,A3))
1 252. WRITE(JOUT,370) ((ACOLVRK,J,29),K=1,31,1,10FNUM)
1 253. 370 FORMAT(5X,'TOTAL SOLIDS',1X,9(2AN,A3))
1 254. WRITE(JOUT,380) ((ACOLVRK,J,30),K=1,31,1,10FNUM)
1 255. 380 FORMAT(10X,'TOTAL STREAM',1X,9(2AN,A3))
1 256. WRITE(JOUT,390) ((ACOLVRK,J,31),K=1,31,1,10FNUM)
1 257. 390 FORMAT(IX,'TEMPERATURE',1X,9(2AN,A3))
1 258. WRITE(JOUT,400) ((ACOLVRK,J,32),K=1,31,1,10FNUM)
1 259. 400 FORMAT(IX,'PRESSURE',1X,9(2AN,A3))
1 260. WRITE(JOUT,410) ((ACOLVRK,J,33),K=1,31,1,10FNUM)
1 261. 410 FORMAT(10X,'GAS/LIQUID MOL Weight',1X,9(2AN,A3))
1 262. WRITE(JOUT,430) ((ACOLVRK,J,34),K=1,31,1,10FNUM)
1 263. 430 FORMAT(10X,'POWER',1X,9(2AN,A3))
1 264. PAUSE
1 265. IF (IALL .EQ. 0) GO TO 520
1 266. IF (ISHEET .GT. 16) GO TO 520
1 267. ISHEET=ISHEET+1
1 268. GO TO 16
1 269. 520 RETURN
1 270. END

END FIN 914 IBANK 3896 DBANK 575 COMMON

&HOG,P PSELCY

&PRR,S PSELCY

FURPUR 38911 E36 574T11 01/14/81 08:54:29
SUBROUTINE PSELECT
COMMON /IOUT,JOUT,JIN
CHARACTER NAME(*)
DIMENSION NAME(2)
CHARACTER YES(4),YBUS(4)
DATA YES/\'YES\'/
C DETERMINE OVERALL TABLE
2 CALL SELECTNAME,ICASE,ITABNO)
C SELECT ONE SHEET OR ALL SHEETS
4 CALL SHINUMISHEET)
IER=0
CALL OUTPUTNAME,ICASE,ITABNO,ISHEET,IER)
IF (IER .EQ. 11) GO TO 2
WRITE(IOUT,10)
FORMAT(* ANSWER YES TO PRINT MORE INDIVIDUAL SHEETS*)
11 READ(JIN,12,ERR=11)YES
12 FORMAT(4)
IF (YES.EQ.YBUS) GO TO 4
WRITE(JOUT,20)
20 FORMAT(5X,\'ANSWER YES TO PROCESS MORE TABLES\'
13 READ(JIN,12,ERR=21)YES
14 IF (YES.EQ.YBUS) GO TO 2
RETURN
END
SUBROUTINE SELECT(NAM, ICASE, ITABNO, LTABLE)
COMMON /JOUT/ JOUT, JIN
COMMON /LIMIT/NNAME
CHARACTER NAME(*)
INTEGER ICASE, ITABLE
COMMON /NAME/NNAME(2, 2), NPTR(4)
COMMON /CASE/ICASE(16)
COMMON /ITABLE/ITABLE(32)
CHARACTER NAME(*)
DIMENSION NAME(2)
WRITE (JOUT, 10)
FORMAT(5X, 'WRITE FACILITY NAME IN AB FORMAT')
READ JIN, 12, ERR=11) NAM
FORMAT(2A4)
WRITE (JOUT, 20)
FORMAT(5X, 'WRITE CASE NUMBER IN II FORMAT')
READ JIN, 22, ERR=21) ICASE
FORMAT(II)
WRITE (JOUT, 30)
FORMAT(5X, 'WRITE TABLE NUMBER IN II FORMAT')
READ JIN, 32, ERR=31) ITABNO
FORMAT(II)
LTABLE=0
IF(INAME .EQ. 0) RETURN
DO 36 I=1, NNAME
1 IF(INAME(I).NE.TNAME(I, 1)) GO TO 36
1 IF(INAME(2).NE.TNAME(2, I)) GO TO 36
1 GO TO 30
1 CONTINUE
30 RETURN
31 NCASE=NPTR(I) - 1 + ICASE
32 IF(ITABLE(NCASE).EQ. 0) RETURN
33 NTABLE=CASE - ICASE - 1 + ITABNO
34 IF(ITABLE(NTABLE).EQ. 0) RETURN
35 LTABLE=NTABLE
36 RETURN
37 END
SUBROUTINE SHEET(ISHEET,DATE,SYSNAM,TABLE)
INTEGER TSHEET
COMMON /TSHEET/TSHEET(16,32)
CHARACTER SYSNAM*4,DATEn
DIMENSION SYSNAM(201),DATE(2)
COMMON /JOUT/,JOUT,JIN
WRITE(JOUT,10)
FORMAT(5X,WRITE SHEET NUMBER IN 12 FORMAT WITH LEADING ZEROS*)
READ(JIN,12,ERR=11) ISHEET
FORMAT(12)
IF(ITABLE .EQ.0) GO TO 14
IF(ISHEET(ISHEET,ITABLE) .EQ.01) THEN
ITABLE = ITABLE
ELSE
RETURN
END IF
WRITE(JOUT,20)
FORMAT(5X,*WRITE DATE IN FORMAT MM/DD/YY*)
READ(JIN,22,ERR=21) DATE
FORMAT(2A4)
WRITE(JOUT,30)
FORMAT(5X,*WRITE SYSTEM LABEL IN A70 FORMAT WITHIN THE LIMITS*)
* INDICATED/*X,*-37*,*76X,***)
READ(JIN,32,ERR=31) (SYSNAM(I),I=1,19)
FORMAT(19A4)
SYSNAM(201)= *
RETURN
END
SUBROUTINE SHEETM(SHEET)
COMMON /OUT/ JOUT, JIN
WRITE(JOUT,10)
10 FORMAT(5X,'WRITE SHEET(1-16) NUMBER TO BE PRINTED IN 12 FORMAT',
          5X, 'USING LEADING ZEROS'/
          5X, 'USE 99 IF ALL SHEETS ARE REQUIRED'/

11 READ(JIN,12,ERR=11) ISHEET
12 FORMAT(12)
RETURN
END

@HDG,P UPDATE

APRT,S UPDATE
FURPUR 28R1W1 E36 S74741 01/14/81 08:54:32
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SEVIGNBIN200@CGS11.UPDATE

1. `@ASG,TF STREAM,.U9S,SAVED4.CGS STREAM TABLE`
2. `@COPY,GM CGS,,STREAM.`
3. `@COPY,GM 14,,STREAM.`
4. `@COPY,GM 16,,STREAM.`
5. `@COPY,GM 20,,STREAM.`
6. `@XOT MIR@ADS,TPNO`
7. `STREAM`
8. `@FREE STREAM`

`AHOG.P XMAP`

`APRT.S XMAP`

FURPUR 28RI01 E36 574711 01/14/81 08:54:32

6-39
# DOCUMENTATION CHECKLIST

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### Computer Time Requirements

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### Symbols

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### Appendices

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APPENDIX B

DOCUMENTATION APPROVAL
DOCUMENTATION APPROVAL

Documentation Prepared By:

Kathy Hiles
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Title

CSC 453-0918
Organization and Telephone No.

5-22-81
Date

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(Supervisor of Person Preparing Documentation)

Dave Johnson
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Section Manager
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Organization and Telephone No.

5-26-81
Date

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Huntsville Computer Complex
(Project Officer or Monitor)

Van McAuley
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Mathematician
Title

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Organization and Telephone No.

5-28-81
Date