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NASA
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COMPUTER PROGRAM DOCUMENTATION

RAW-TO-PROCESSED SINDA PROGRAM (RTOPHS)

USER'S GUIDE

Job Order 52-309

CPD-923

Prepared By

Lockheed Engineering & Management Services Co., Inc.

Houston Division

Houston, Texas

Contract NAS 9-15800

For

STRUCTURES AND MECHANICS DIVISION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

LYNDON B. JOHNSON SPACE CENTER

HOUSTON, TEXAS

April 1980

LEMSCO - 14860

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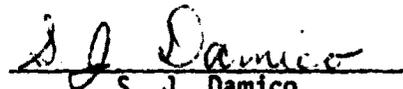
S. J. Damico
S. J. Damico
Thermal Technology Section

Approved By
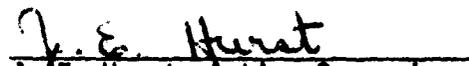
J. E. Hurst
J. E. Hurst, Acting Supervisor
Thermal Technology Section
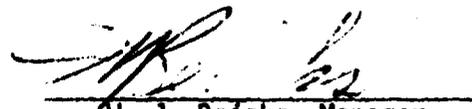
W. J. Reicks
W. J. Reicks, Manager
Applied Mechanics Department

Prepared By

Lockheed Engineering & Management Services Co., Inc.
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1. INTRODUCTION

The Raw-To-Processed SINDA (System Improved Numerical Differencing Analyzer) Program, RTOPHS, provides a means of making the temperature prediction data on binary HSTFLO and HISTRY (referred to later as HISTRY) units generated by SINDA available to engineers in an easy to use format. The program accomplishes this by reading the HISTRY unit and, according to user input instructions, extracting the desired times and temperature prediction data and writing it to a word addressable drum file.

2. DESCRIPTION

RTOPHS processes a binary "raw" HISTRY unit to its word addressable "processed" form and returns the input unit number of the new drum file for subsequent use. The user can process some or all of the times of the raw file by indicating the desired start and stop times. The processed file will be in the same time units as the raw file and the temperature prediction data for all the node numbers on the input unit will be processed. The forms of processed HSTFLO and HISTRY units are shown in figures 1 and 2.

3. INPUT

The RTOPHS program requires HISTRY data assigned to a logical unit and the $CNVTHS namelist data as input. The namelist data is used to determine the input HISTRY logical unit, file number, and the time span desired for the processed file. The variables of $CNVTHS are described in Table I. A HISTRY unit may contain several files so the user must specify which file he desires to be processed. One explanation is important to aid in determining the unit number of the processed file before executing RTOPHS. The program has logical unit numbers 10 through 28 set aside to be used as the processed file. When the program attempts to assign the unit number to be used as the final file, it checks the status of these 19 unit numbers, starting with number 10, and assigns the first one which is not already assigned in the user's overall runstream. However, unit numbers can be assigned by the user in this range, but he should be careful. For example, if units 4 and 7 were assigned to the run, the program would assign unit 10 for the processed file. However, if units 7 and 10 were assigned to the run, the program would assign unit 11 for the

```
                                          HEADER WORDS
       ┌──────────────────────────┐
       │    WORD POSITION DATA     │       1-12   DESCRIPTION
       │        5 WORDS            │       13     START TIME
IB(1)  │       (ARRAY IB)          │       14     STOP TIME
       ├──────────────────────────┤       15     TIME DELTA
       │ HEADER                    │       16     NPTS - NUMBER OF TIME POINTS
       │                           │       17     UNUSED
       │        27 WORDS           │       18     NW
IB(2)  │                           │       19     NPR
       ├──────────────────────────┤       20     NV
       │      DICTIONARY           │       21     0
       │                           │       22     0
       │     NLTOTAL WORDS         │       23     0
       │  TUBE NUMBERS      1-NW   │       24     0
       │  PRESSURE NUMBERS  1-NPR  │       25     0
       │  VALVE NUMBERS     1-NV   │       26     0
IB(3)  │  NODE NUMBERS      1-NN   │       27     NN
       ├──────────────────────────┤
       │ TIME ARRAY                │
       │                           │
       │         NPTS WORDS        │
IB(4)  │                           │       LTOTAL = 2*NW+NPR+NV+NN
       ├──────────────────────────┤
       │ NODE 1                    │       NLTOTAL = NW+NPR+NV+NN
       │         NPTS WORDS        │       LTOTAL NODES
       │                           │
       ├──────────────────────────┤       1-NW    PRESSURE DROPS
       │ NODE 2                    │
       │                           │       1-NPR   PRESSURES
       │         NPTS WORDS        │
       │                           │       1-NV    VALVE POSITIONS
       ├──────────────────────────┤
       │             •             │       1-NW    FLOW RATES
       │             •             │
       │             •             │       1-NN    TEMPERATURES
       ├──────────────────────────┤
       │ NODE LTOTAL               │
       │                           │
       │         NPTS WORDS        │
IB(5)  │                           │
       └──────────────────────────┘
```

Figure 1. - Processed HSTFLO file format.

WORD POSITION DATA 5 WORDS (ARRAY IB)	**HEADER WORDS** 1-12 DESCRIPTION 13 START TIME 14 STOP TIME 15 TIME DELTA 16 NPTS - NUMBER OF TIME POINTS 17 UNUSED 18 NWW 19 NPRR 20 NVP 21 NND 22 NGT 23 NCT 24 NQI 25 NNC 26 UNUSED 27 NSL

The diagram on the left (ARRAY IB):

IB(1)
```
┌─────────────────────────────┐
│   WORD POSITION DATA         │
│        5 WORDS               │
│      (ARRAY IB)              │
├─────────────────────────────┤
│ HEADER                       │
│        27 WORDS              │
IB(2)
├─────────────────────────────┤
│        DICTIONARY            │
│      NLTOTAL WORDS           │
│ TUBE NUMBERS        1-NWW    │
│ PRESSURE NUMBERS    1-NPRR   │
│ VALVUE NUMBERS      1-NVP    │
│ NODE NUMBERS        1-NNT    │
│ CONDUCTOR NUMBERS   1-NGT    │
│ CONSTANT NUMBERS    1-NCT    │
IB(3)
├─────────────────────────────┤
│ TIME ARRAY                   │
│        NPTS WORDS            │
IB(4)
├─────────────────────────────┤
│ NODE 1                       │
│        NPTS WORDS            │
├─────────────────────────────┤
│ NODE 2                       │
│        NPTS WORDS            │
├─────────────────────────────┤
│            ·                 │
│            ·                 │
│            ·                 │
├─────────────────────────────┤
│ NODE LTOTAL                  │
│        NPTS WORDS            │
IB(5)
└─────────────────────────────┘
```

HEADER WORDS

1-12	DESCRIPTION
13	START TIME
14	STOP TIME
15	TIME DELTA
16	NPTS - NUMBER OF TIME POINTS
17	UNUSED
18	NWW
19	NPRR
20	NVP
21	NND
22	NGT
23	NCT
24	NQI
25	NNC
26	UNUSED
27	NSL

$$LTOTAL = 2*NWW+NPRR+NVP+NSL+$$
$$NND+NNC+NQI+NGT+NCT$$

$$NLTOTAL = NWW+NPRR+NVP+NNT+NGT+NCT$$

LTOTAL NODES

1-NWW	PRESSURE DROPS
1-NPRR	PRESSURES
1-NVP	VALVE POSITIONS
1-NWW	FLOW RATES
1-NSL	TEMPERATURES
1-NQI	INCIDENT HEATS
1-NND	HEAT CAPACITY
1-NNC	NET HEAT
1-NGT	CONDUCTIVITIES
1-NCT	CONSTANTS

Figure 2. - Processed HISTRY file format.

TABLE I. - $CNVTHS NAMELIST VARIABLE DESCRIPTION

Variable	Description	Default
IN	Input HISTRY unit number	1
NFILE	Number of file on input unit to be processed	1
NHSAY	Flag for processing all times (0-no, 1-yes)	0
TFINAL	User stop time for processed file	200.0
TZERO	User start time for processed file	0.0

```
∇RUN,R/R  170SDX,E3206,ES3-L7777,30,500

∇ASG,T 1., 8c,X12345                  . ASSIGN INPUT HISTRY

∇MAP  ES3*SINDA.RTOPH/MAP,ABS          . MAP FROM ES3*SINDA.

∇XQT  ABS

 $CNVTHS                               . ADD NAMELIST DATA

   IN=1,

   NFILE=1,

   TZERO=0.0,

   TFINAL=200.0,

   NHSAY=0,

 $END

∇USE  2,ES3*L77777*FILE.               . ASSIGN PERSONAL FILE

∇USE  S,ES3*SURTEM

∇S.DRM2DRM  10.,2.                     . WRITE PROCESSED FILE TO

∇FIN                                   . PERSONAL FILE
```

Figure 3. - Sample runstream for RTOPHS with namelist variables.

APPENDIX A
LIST OF ROUTINES

APPENDIX A

LIST OF ROUTINES

1. EXRPHS

EXRPHS is the main routine. It reads the namelist data, calls RNEWFL to assign the temporary unit the processed data will be written to, RHSTFN to obtain the header information from the input HISTRY unit, and RHSTCN to process the raw temperature prediction data on the input HISTRY unit.

2. RHSTCN

RHSTCN has the unit number of the raw HISTRY unit, the options for processing it, and the dictionary of the raw unit as input. It reads the raw unit, extracts the time and temperature prediction data for the desired time span, and writes the dictionary and the extracted time and temperature prediction data to the temporary unit in its processed form.

3. RHSTFN

RHSTFN has the raw unit and file number as input. It positions the raw unit to the desired file and reads the header and dictionary information for that file. It returns the header, dictionary, and the length of the dictionary to EXRPHS.

4. RNEWFL

RNEWFL searches an array of unit numbers, ranging from 10 to 28, to obtain the first file in the array that is not already assigned to the run and assign it so it can be used for the word-addressable processed file. RNEWFL returns the unit number of the unit it assigns.