NOTICE

THIS DOCUMENT HAS BEEN REPRODUCED FROM MICROFICHE. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE.
COMPUTER PROGRAM DOCUMENTATION
USER'S GUIDE
TO THE
UTIL-ODRC TAPE PROCESSING PROGRAM

JOB ORDER 52-309

Prepared By
Lockheed Engineering and Management Services Company
Houston, Texas
Contract NAS 9-15800

for
STRUCTURES AND MECHANICS DIVISION

AUGUST 1981

LEMSCO-17151
COMPUTER PROGRAM DOCUMENTATION

USER'S GUIDE TO THE

UTIL-ODRC TAPE PROCESSING PROGRAM

Job Order 52-309

Prepared By

S. M. Juba
Thermal Technology Section

Approved By

J. E. Hurst, Supervisor
Thermal Technology Section

D. G. Probe, Manager
Applied Mechanics Department

Prepared By

Lockheed Engineering and Management Services Co., Inc.

For

Structures and Mechanics Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

AUGUST 1981
CONTENTS

Section                                   Page

ABSTRACT                                  ii
LIST OF TABLES                            iii
LIST OF FIGURES                           iii
DESCRIPTION OF TERMS                     iv
1. INTRODUCTION                           1
2. PROGRAM DESCRIPTION                    2
   2.1 OVERVIEW                            2
   2.2 INPUT                                4
   2.3 PROCESSING                           4
   2.4 OUTPUT                               5
3. SYSTEM INTERFACE                      11
   3.1 LOGICAL UNIT REQUIREMENTS          11
   3.2 PROGRAM COLLECTION                  12
This document describes the UTIL-ODRC CCT-tape processing program, its I/O options and requirements, and its interface with the EXEC 8 Operating System.
## TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>CAUSAL CONDITIONS FOR ERROR EXIT</td>
<td>5</td>
</tr>
<tr>
<td>II</td>
<td>NAMELIST EFFECTS ON LOGICAL UNIT REQUIREMENTS</td>
<td>11</td>
</tr>
</tbody>
</table>

## FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INPUT A&quot; OUTPUT OF UTIL-ODRC</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>SHORT PRINTOUT OPTION EXAMPLE</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>LONG PRINTOUT OPTION EXAMPLE</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>SAMPLE TEMPERATURE PRINTOUT</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>SAMPLE MAXIMUM AND MINIMUM TEMPERATURE PRINTOUT</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>PRAMPT/FLOPLT INPUT DATA EXAMPLE</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>BATCH PLOT INPUT DATA EXAMPLE</td>
<td>10</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>BATCH PLOT, FLOPLT, PRAMPT</td>
<td>SINDA Temperature History Plotting Programs</td>
<td></td>
</tr>
<tr>
<td>CCT</td>
<td>Computer Compatible Tape</td>
<td></td>
</tr>
<tr>
<td>I/O</td>
<td>Input/Output</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>1024 words of storage</td>
<td></td>
</tr>
<tr>
<td>NTRAN</td>
<td>UNIVAC/FORTRAN V Data Transfer Routine</td>
<td></td>
</tr>
<tr>
<td>ODRC</td>
<td>Orbital Data Reduction Center</td>
<td></td>
</tr>
<tr>
<td>SINDA</td>
<td>Systems Improved Numerical Differencing Analyzer</td>
<td></td>
</tr>
</tbody>
</table>
1. INTRODUCTION

The UTIL-ODRC program has been designed as a multi-purpose ODRC tape processing utility, and provides the user with the ability to create: 1) tape copies: exact duplicate and/or SINDA/HISTORY format, 2) plot data elements for PRAMPT/FLOPLT and/or BATCH PLOT programs, and 3) a printed summary. Consequently, execution of UTIL-ODRC allows the user to view ODRC data rapidly, with the data presented in a manner most suited to the user's analytic method.
2. PROGRAM DESCRIPTION

2.1 OVERVIEW

Figure 1 shows the input required and output produced by UTIL-ODRC. The program processes one raw ODRC data CCT as specified by the user in both the $DATAIN namelist, and an optional list of measurement identifiers following the namelist in the input stream. In addition, a measurement description list will be made available to the program if the user chooses to build a PRAMPT/FLOPLT input data element.

Output may take the form of: a duplicate of the original tape, a SINDA/HISTORY format tape, a PRAMPT/FLOPLT input data element, a CATCH PLOT input data element, and/or summary information displayed on the terminal or on line printer copy.
Figure 1 - Input and Output of UTIL-ODRC
2.2 INPUT

Up to four input entities may be required by UTIL-ODRC: a raw ODRC data CCT, the $DATAIN namelist, a list of measurement identifiers or relative measurement numbers, and a measurement description list. Only the CCT and namelist inputs are required to execute this program. Namelist variables, their possible and default values and their meaning to the program are listed in Appendix A. If detailed summary output is desired for particular measurements, a list of measurement identifiers may be appended to the namelist, and namelist variable REALM must be true. If the relative locations of the desired measurements on the CCT are known to the user, namelist array AREL can be assigned these relative values. Relative location specifications must occupy consecutive positions in the array, beginning with MREL(1), and REALM must be false.

The measurement description list is read when the user specifies PRAMPT/FEOPLT data output by setting namelist variable BLDELT to true. The list supplies a description and range of values for each measurement, to be used, respectively, to title the plot, and to insure appropriate y-axis limits.

2.3 PROCESSING

The general flow of control in UTIL-ODRC is schematically depicted in Appendix B. The program uses NTRAN I/O processing when reading or copying an ODRC CCT. Except for namelist reading and writing, all other I/O is formatted. Formatted main storage transfer (DECODE) is invoked when further examination of NTRAN input is necessary.

Program termination occurs in one of three ways: error exit with diagnostic message, error exit due to bad tape (no message), or normal termination. Table I describes the causal conditions for each type of exit.
<table>
<thead>
<tr>
<th>TYPE OF EXIT</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR WITH MESSAGE</td>
<td>Number of measurements on tape exceeds the capacity of the program</td>
</tr>
<tr>
<td></td>
<td>Error in namelist</td>
</tr>
<tr>
<td></td>
<td>Number of records per scan &gt; 5</td>
</tr>
<tr>
<td>ERROR WITHOUT MESSAGE</td>
<td>Number of physical records ≤ 0</td>
</tr>
<tr>
<td>(values output before</td>
<td>Sequential record counter &lt; 0</td>
</tr>
<tr>
<td>error abort)</td>
<td>Size of data records ≤ 0</td>
</tr>
<tr>
<td></td>
<td>Scans per data record = 0</td>
</tr>
<tr>
<td></td>
<td>Number of scans ≤ 0</td>
</tr>
<tr>
<td>NORMAL</td>
<td>IYEAR = 1: End of CCT data</td>
</tr>
</tbody>
</table>

2.4 OUTPUT

This section pertains only to UTIL-ODRC output resulting from normal program termination. For information concerning error abort, see the preceding section on processing.

All output from UTIL-ODRC is optional excepting a short printed summary of the ODRC data records processed by the program, as in Figure 2. A long summary printout is also available, as shown in Figure 3, and is obtained by setting namelist variable PRINT to true.

Printed summary information for specific measurements can be output when REALM is true, and a list of the actual measurement identifiers follows the namelist, or when REALM is false, and array MREL contains integers identifying the relative positions, on the CCT, of the measurements of interest.
Then either variable PRNTMP or MAXMIN (or both) may be set to true, producing a printout of all temperatures, or the maximum and minimum temperature, for each specified measurement. Figures 4 and 5 show examples of output generated by these options.
Figure 2 - Short Printout Option Example

1 MEASUREMENT NUMBER E41T1010B
SAMPLES PER SCAN 1
WORD NO. IN SCAN OF FIRST SAMPLE 16
TIME DELTA FOR FIRST SAMPLE .000
TIME DELTA BETWEEN CONTIGUOUS SAMPLES .000
PRECISION CODE 1-SP 2-DP 2
TIME SKEW WORD NUMBER 4

2 MEASUREMENT NUMBER E41T1011B
SAMPLES PER SCAN 1
WORD NO. IN SCAN OF FIRST SAMPLE 18
TIME DELTA FOR FIRST SAMPLE .000
TIME DELTA BETWEEN CONTIGUOUS SAMPLES .000
PRECISION CODE 1-SP 2-DP 2
TIME SKEW WORD NUMBER 4

3 MEASUREMENT NUMBER E41T1012B
SAMPLES PER SCAN 1
WORD NO. IN SCAN OF FIRST SAMPLE 20
TIME DELTA FOR FIRST SAMPLE .000
TIME DELTA BETWEEN CONTIGUOUS SAMPLES .000
PRECISION CODE 1-SP 2-DP 2
TIME SKEW WORD NUMBER 4

4 MEASUREMENT NUMBER E41T1013B
SAMPLES PER SCAN 1
WORD NO. IN SCAN OF FIRST SAMPLE 22
TIME DELTA FOR FIRST SAMPLE .000
TIME DELTA BETWEEN CONTIGUOUS SAMPLES .000
PRECISION CODE 1-SP 2-DP 2
TIME SKEW WORD NUMBER 4

Figure 3 - Long Printout Option Example
Figure 4 - Sample Temperature Printout

<table>
<thead>
<tr>
<th>TIME</th>
<th>TEMP</th>
<th>TIME</th>
<th>TEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>E41T101B</td>
<td>18.35</td>
<td>.00</td>
<td>18.35</td>
</tr>
<tr>
<td>U087921A</td>
<td>18.35</td>
<td>193.05</td>
<td>20.54</td>
</tr>
<tr>
<td>U127936A</td>
<td>20.48</td>
<td>45.19</td>
<td>18.35</td>
</tr>
<tr>
<td>U377917A</td>
<td>20.42</td>
<td>67.53</td>
<td>20.50</td>
</tr>
<tr>
<td>U4171261C</td>
<td>18.35</td>
<td>.00</td>
<td>18.48</td>
</tr>
</tbody>
</table>

Figure 5 - Sample Maximum and Minimum Temperature Printout
In addition to printed output, UTIL-ODRC will produce a copy of the ODRC CCT if variable COPY is true, and will reformat the CCT data into SINDA temperature history form if HISTRY is true.

Input data for plotting programs can be produced by UTIL-ODRC to facilitate trend analysis. PRA/HPT/FLOPLT input data is created by setting variable BLDELT to true. An example of the data produced is shown in Figure 6. BATCH PLOT input data is output when 3LDBAT is true, and a sample of this data is listed in Figure 7.
Figure 6 - PRAMPT/FLOPLT Input Data Example

Figure 7 - BATCH PLOT Input Data Example
3. SYSTEM INTERFACE

3.1 LOGICAL UNIT REQUIREMENTS

One logical unit must be assigned to the job before executing UTIL-ODRC, and corresponds to the raw ODRC CCT. Any necessity for other temporary file assignments is determined by $DATAIN namelist input. Table II lists the namelist specifications that affect logical unit assignments. If a variable in the left column has been set to true, the corresponding logical unit variable in the center column must be assigned an integer unit number (1-29 except 5, 6 and 8), and that temporary logical unit file must be assigned to the job before attempting execution. To use the default unit specifications, simply assign the corresponding temporary file to the run before execution. The program will then perform I/O on the appropriate units as listed in the rightmost column of Table II.

<table>
<thead>
<tr>
<th>CORRESPONDING OUTPUT OPTION FLAG</th>
<th>CORRESPONDING LOGICAL UNIT VARIABLE</th>
<th>DEFAULT UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPY</td>
<td>IOUT</td>
<td>2</td>
</tr>
<tr>
<td>HISTRY</td>
<td>IBIN</td>
<td>3</td>
</tr>
<tr>
<td>BLDELT</td>
<td>IELT</td>
<td>4</td>
</tr>
<tr>
<td>BLDBAT</td>
<td>IBAT</td>
<td>7</td>
</tr>
</tbody>
</table>

Note that units 5, 6, and 8 are not available for user assignment. Units 5 and 6 are the standard system default input and output files, respectively, and should never be assigned by the user. Unit 8 contains the measurement description list which is used when building a PRAMPT/FLOPLT data element (BLDELT true), but may be assigned by the user for other purposes if BLDELT is false.
3.2 PROGRAM COLLECTION

UTIL-ODRC consists of three routines: the main routine, a routine that searches and extracts data from a measurement description list (FINDID), and a time conversion routine (DPSECW). FINDID is called only when building a PRAMPT/FLOPLT data element (BLDELT true). A MAP processor input element is available in ES3-L74338*PLOT, with element name UTIL-ODRC/MAP. Its use is illustrated in the runstream examples in Appendix C. After collection, instruction and data banks occupy approximately 26.5K words of storage, within the required storage limits for interactive execution, and well within batch submission limits.
APPENDIX A

$DATAIN NAMELIST VARIABLE DESCRIPTION
<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN</td>
<td>Raw CCT Input Unit</td>
<td>1-29, except 5,6&amp;8</td>
<td>1</td>
</tr>
</tbody>
</table>
| COPY | Copy Flag  
if TRUE, copy CCT on IOUT  
if FALSE, no copy | True or False | False |
| IOUT | Copy Output Unit | 1-29, except 5,6&8 | 2 |
| HISTORY | SINDA/HISTORY Flag  
if TRUE, make data look like  
SINDA/HISTORY output on  
unit IBIN  
if FALSE, no HISTORY output | True or False | False |
| IBIN | SINDA/HISTORY Output Unit | 1-29, except 5,6&8 | 3 |
| BLDELT | PRAMPT/FLOPLT Data Flag  
if TRUE, output data for use  
with plotting programs PRAMPT  
or FLOPLT on IELT  
if FALSE, no PRAMPT/FLOPLT output | True or False | False |
| IELT | PRAMPT/FLOPLT Data Output Unit | 1-29, except 5,6&8 | 4 |
| MCOUNT | Minus Sign Interval for  
PRAMPT/FLOPLT Data:  
Number of Measurements per Plot | 2,3,4,5 | 5 |
| BLDBAT | BATCH PLOT Data Flag  
if TRUE, output measurement  
list for use with BATCH PLOT  
on IBAT  
if FALSE, no BATCH PLOT output | True or False | False |
| IBAT | BATCH PLOT Data Output Unit | 1-29, except 5,6&8 | 7 |
| PRINT | Print Flag  
if TRUE, produce full printout  
if FALSE, produce short printout | True or False | False |
| REALM | Actual Measurement ID List Flag  
if TRUE, list of ID's will  
follow namelist  
if FALSE, no list | True or False | False |
### DATAIN NAMELIST VARIABLE DESCRIPTION
(Continued)

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MREL (I)</td>
<td>List of Relative Measurement Numbers for which summaries will be Output</td>
<td>Integers</td>
<td>50 * 0</td>
</tr>
<tr>
<td>I=1,50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRNTMP</td>
<td>Temperature Printout Flag</td>
<td>True or False</td>
<td>False</td>
</tr>
<tr>
<td></td>
<td>if TRUE, print temperatures for all measurements in list</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>if FALSE, no temperature printout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAXMIN</td>
<td>Maximum and Minimum Temperature Print Flag</td>
<td>True or False</td>
<td>False</td>
</tr>
<tr>
<td></td>
<td>if TRUE, print maximum and minimum temperatures for all measurements in list</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>if FALSE, no max and min printout</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

UTIL-ODRC FLOW OF CONTROL
UTIL-ODRC

READ SDATAIN NAMELIST

READ TAPE HEADER AND PROCESS MEASUREMENT RECORDS

# RECORDS IN TOTAL # RECORDS?

NO

IS THERE AN ACTUAL MEASUREMENT LIST?

YES

READ LIST AND FILL MREL ARRAY

NO

HISTORY, BLDELT AND BLDBAT FALSE?

WRITE TO IELT, IBAT, AND/OR IBIN UNITS

NO

RECORD SIZE > 0?

YES

A

B
Figure C-1

Batch Runstream with Namelist and Measurement List
Figure C-2
Demand Runstream with Namelist and Measurement List
Figure C-1
Batch Runstream with Namelist and Measurement List
Figure C-2
Demand Runstream with NameiList and Measurement List