USER GUIDE TO A COMMAND AND CONTROL SYSTEM;

A PART OF A PRELAUNCH WIND MONITORING PROGRAM

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General Description of Command and Control System

Command and control system (CCS) is a set of Fortran programs, symbolic elements consisting of sequences of UNIVAC 1100 series operating control commands and 3 Assembly language programs. CCS is written for and intended to be run on a UNIVAC 1100 series computer with UNIVAC 1100 series operating system, Ref. 2, and UNIVAC 1100 Series Fortran V, Ref. 3.

CCS uses four catalogued files, and initiation of these programs assumes the existence of these files. The four necessary files all use the qualifier LVDSA and have file names COMSYS., W., ST., and either AC. or TC. See the section on description and maintenance of files (p. 23) for detailed information concerning the contents, preparation, and maintenance of all files used within this system.

CCS is intended to be executed from a remote terminal in conversational mode. CCS prompts the user at the terminal to input the name of the task to be executed. After replying, the user will be solicited for the input information necessary to perform the desired task. A detailed description of the possible tasks and all responses is given in the following section, (user's guide). When all information needed to perform the selected task has been input, the program generates the necessary executive controls and also puts into execution the program required to perform this task. Control is then returned to the main program called SYSTEM and the user is prompted to input the next task.

The CCS has been designed to check and validate, as much as possible, the replies to the prompts to catch misspelling of task and data names and to reject erroneous input.

User Guide of CCS

The primary mode of operation is conversational from a remote terminal. This section therefore describes the running of CCS from such a terminal. A secondary mode of operation, (card batch operation), which might be necessary in certain unusual conditions is covered in the section on Anomalies, (p. 25).

In the use of CCS there are 3 phases to be considered 1) logging on, 2) initiallizing the system, and 3) using the system.

1. Logging on

The logon procedure described is the sequence of steps to get logged onto the UNIVAC 1100/40 computer system from a terminal with a PAX telephone and modem setup.

Dial the proper PAX number. When the tone is heard, the data button on the phone is pushed down. Follow the steps indicated on Figure 1, sample logon procedure. The user responses for the procedure are noted with (UR) to the right of the lines. Each input line by the user must be terminated by hitting the key marked RETURN.

```
   TTY503                    (UR)

ENTER USERID/PASSWORD:

@@TTY C, CNTL/H      (UR, depress H key while holding down
                         CNTL key, initializes backspace feature)

(RETURN)                  (UR)


*DESTROY USERID/PASSWORD ENTRY
*UNIVAC 1100 OPERATING SYSTEM VER. 33.R1A.122T (RSI)*
  @RUN      1323C,YOW6236,LVDSA       (UR)

DATE:  112575    TIME:  161031
```

FIGURE 1 LOGON PROCEDURE

2. Initializing the Command and Control System

After the logon procedure is completed, one input entry is
all that is needed to initialize the CCS and get into
execution.   There are 2 types of launches, (Atlas and
Titan), and the command given to initialize will
automatically set up the proper analysis program. The 2
possible choices for the input command are:

        1)   @ADD,P   COMSYS.ATLAS
or   2)   @ADD,P   COMSYS.TITAN

Again, the input typed into the terminal must be followed by
a return.   When the initialization procedure is completed
the message, 'THIS IS AN ATLAS/A TITAN LAUNCH, TYPE IN
DESIRED TASK', will be printed. Figure 2 is a sample of
terminal output for an initialization. Note that in figure
2 there is only one line input by the user, denoted by (UR).
All remaining lines are output by EXEC8 System denoting that
files have been assigned (READY), and various EXEC8
processors are being called upon.

```
@ADD,P      COMSYS.ATLAS            (UR)
@ADD,P      COMSYS,ATLAS
@ADD,P      COMSYS.RUN
READY
READY
READY
READY
READY
FURPUR 27R2 RL72R1 10/28/76 14:02:34
READY
READY
DURPUR 27R2 RL72R1 10/28/76 14:02:37
READY
READY
READY
FURPUR 27R2 RL72R1 10/28/76 14:02:41
END PACK.   TEXT=5,TOC=1,SYM=14
END PACK. TEXT=2,TOC=1,SYM=25
READY
READY
MAP28R1 RL71-3 10/28/76 14:02:44 (0,)
END MAP
MAP28R1 RL71-3 10/28/76 14:03:01 (0,)
END MAP
INTERVENING STATEMENTS SKIPPED
FURPUR 27R2 RL72R1 10/28/76 14:03:19
 1 SYM
 1 ABS
CASE UPPER ASSUMED
ED 15.00-10/28/76-14:03:24-(0,)
EDIT
LINES:2 FIELDATA
INTERVENING STATEMENTS SKIPPED
FURPUR 27R2 RL72R1 10/28/76 14:03:25
END PREP.
READY
FURPUR 27R2 RL72R1 10/28/76 14:03:26
END PREP.
READY
READY
   THIS IS AN ATLAS LAUNCH
   TYPE IN DESIRED TASK---POSSIBLE TASKS ARE---
 RUN, PLOT, LIST, DATAIN, STOP, EDIT, EXPRESS, SAVEDATA, SAVEPROGS
```

FIGURE 2   SAMPLE CCS INITIALIZATION

When the last 3 lines shown on Figure 2 are printed, the CCS is in execution, waiting for input data from the user. At this point the required input data is the name of the task the user desires to accomplish. The possible tasks are described in the next section.

3. Using the Command and Control System

All task names and their associated input data must be typed on the keyboard with no initial spaces and no embedded spaces.

Input data to CCS is verified by the program before the next data is requested. If an error is detected a message will be printed on the terminal and the user will be prompted for a correction. If typing errors are detected before the return is given they may be corrected, by either back spacing or by eliminating the entire line and starting again at the beginning of the line. To backspace, if there is no backspace key on the terminal, for example as on the TI Silent 700 terminal, depress the key marked CTRL and then hit the H key as many times as positions desired to backup. For example, if it is desired to back space 4 positions depress and hold CTRL key down, then hit the H key 4 times. (This backspace feature must be initialized, see Figure 1). To eliminate the line to start over hold the CNTL key down then the X key. This will return the printer to start position without transmitting any data to the computer.

The list of the available task names along with a short description of each follows.

Taskname	Description
RUN	initiate execution of the preselected trajectory program
PLOT	produce plots of a set of wind data
LIST	produce a list of a set of data, or a list of names of data available
DATAIN	move data from the micro-processor into the computer
EXPRESS	execute the analysis program using the most

recent wind and steering data. Most recent
means by year, month, day, and time of day
in the name of the data set.

EDIT   edit or change some values of a set of wind
data or steering data

STOP   used to stop execution of CCS and return
control to the UNIVAC Executive System

SAVEDATA   update the magnetic tape which contains the
historical data records, as well as the
contents of the current files

SAVEPROGS   update the magnetic tape which has a record
of all program files

Described below are the responses by user to successfully
complete each of the above tasks.

RUN - When the RUN task is requested the user will be
prompted by the system for the following input data:

1) N ame of wind data to be used.
2) Name of steering program. If library steering
programs are required it is necessary to input two
names, one for pitch program and one for yaw
program. When the prompt for steering name is
made by the system the user may input either the
pitch name or the yaw name. After the input name
has been verified the program will then prompt the
user for the other steering name.
3) At this point the data values, called namelist
input, are printed on the terminal along with a
prompt as to whether the user wishes to change any
of these values. The correct responses are Y for
yes and N for no.
4) If the response from 3) is Y the user will be
prompted for the name of the variable he wishes to
change then after this name has been verified, he
will be prompted for the new data value. After
entering the new data value the user will then be
prompted to answer Y or N to the question, "Any
more change?". Values may be altered for any
number of the namelist variables during this step.

An answer of N completes this portion of the input data.

5) The next input data for the RUN task is mode of running the analysis program. Two modes are available, Demand or Batch. Demand mode means that the analysis program is immediately started with the condensed output printed at the terminal. Hence the terminal is in use during the entire length of the run. In Batch mode the analysis program is started in core as if the run were submitted to the computer via cards. All of the output goes to the high speed printer in the computer room. Hence, as soon as the run is started the terminal is not being used by that particular analysis run, and the user can then request another task to be done. Any number of runs may be started in batch mode as fast as the user can input the necessary input data. However experience has shown that starting a number of batch runs seems to slow down the execution time of all of them. It is recommended that usually not more than one or two batch runs be started to run concurrently at any given time.

PLOT - Input for the plot task calls for four pieces of data.

1) Name of wind data to be plotted
2) Value of the launch azimuth in degrees.
3) C, T, or N - The vectors to be plotted may be saved on cards--C--, tape--T--, or not saved--N.
4) T or P - where should the plot output be printed?
   T - on users terminal
   P - on the high speed printer

LIST - When the list task is requested, a message will be printed on the terminal 'LIST WHAT'. The possible responses to this prompt are as follows:

WNAMES - list names of wind data in file W.

SNAMES - list name of steering data in file ST.

ALLNAMES - list names of all sets of data in both W. and ST. files.

DATA - list the values of a set of data. User will be prompted for the name of the data set he wishes to list.

LATESTNAMES - print out the names of the most recent wind data and most recent steering data. Most recent determined by the time, day, month, and year in the data set name. See section on naming of wind and steering data.

LATESTDATA - print out the values of the most recent wind and steering data.

DATAIN - On a signal from the microprocessor operator, type the command DATAIN. This starts into execution the real-time program (JPGM) which moves the data from the micro-processor into the computer. This program then makes a determination as to the type of data, i.e. wind data or steering data, then generates the data set name according to the naming conventions described in the section on data naming and formats, then moves the data into the proper data file, W. or ST.

EXPRESS - The express task runs the trajectory analysis program using the latest wind and steering data. The only input prompts for the express task are those to change the namelist input data. The analysis program is automatically executed in demand mode.

EDIT - The edit task permits the user to edit, change or correct, any data value or values in a set of data. The necessary input data for which the user is prompted are:

1. Name of the wind or steering data.
2. Line number of the data set which contains the value to be changed. The header card is line number 1.
3. Which element of the specified line is to be changed, by number, counting left to right, starting with the column containing actual data values.
4. The new data value. For wind data 3 digits must be input. For steering data 10 characters must be input, (sign; 6 digit mantissa; sign and 2 digit exponent)

Note-all sets of wind data may be edited using this
task, but only ADDJUST steering data (p. 18) in
"new" format may be edited with this task.
Steering data in "old" format and library steering
data may not be edited using this task. Types and
formats of steering data are discussed on pages 17
and 18.

STOP - The stop task returns control to the UNIVAC operating
system (EXEC8) command language. This task is used when a
launch exercise has been completed and no further tasks are
required. The STOP task may also be used in case of trouble
in order to recover from an error by the use of UNIVAC
control commands. The user then would restart execution of
CCS by typing in the following (XQT bbbb .SYSTEM).

SAVEDATA - As described above this task updates the magnetic
tape containing the historical records of the data. No
further input responses are required. This task is normally
done upon completion of a launch to archive the data.

SAVEPROGS - As with the previous task no other input
responses are prompted for. This task would normally be
called prior to a series of testing for a launch in order to
have the most recent symbolic elements and also the most
recent frozen versions of the programs on a magnetic tape as
a back up in case of a disk failure.

As each task, except for the stop task, is completed the CCS
returns to the main program and requests a new task name to
be input by the user.

As described above, the CCS prompts the user for necessary
data to perform the requested task. At any of these prompts
the user may omit the execution of the selected task by
typing STOP instead of the required data. This will stop
the prompting for input for that task and return to the main
program and type the message "TYPE IN DESIRED TASK---",
requesting that a new task name be input.

A typical launch exercise consists of 4 cycles. In each of
the first three cycles three sets of data are received, two
wind data sets from ETR, a Windsonde and a Jimsphere, and
one steering program from GDC computed from the Windsonde.

These three cycles occur approximately five hours, three hours and one hour prior to the scheduled launch time. The sequence for the first cycle is normally as follows. 1) Receive Windsonde data from ETR into the microprocessor. Perform the CCS commands DATAIN, PLOT. 2) Receive Jimsphere data from ETR, do DATAIN, PLOT. 3) Run the Windsonde data with a few library steering programs chosen by the Wind data director. 4) Receive the steering program from GDC, run this steering data with both winds received.

For all subsequent cycles, 1) Receive Windsonde data, do DATAIN, PLOT, RUN with steering data from previous cycle. 2) Receive Jimsphere data, do DATAIN, PLOT, RUN with previous steering data. 3) Receive new steering data, RUN with both Wind data sets. Cycle four is a contingency cycle and Windsonde data only is usually received and plotted. Under normal conditions the contingency cycle is received only minutes prior to launch, and so this data is run only if a hold condition exists to delay the launch.

In between cycles there is usually about an hour of inactivity. During this period of time Computer Operations should be notified so other programs can be run. The CCS is waiting for input data during this period of time. During the periods of inactivity the executive system will print a message, "TIMEOUT WARNING", after a ten minute period of inactivity. If during the next ten minutes following the warning there is no input from the terminal the phone line will be dropped by the executive system. To keep this from happening whenever the timeout warning message is printed the operator should depress the return key. This is enough input so that the system will stay on line.

When the launch exercise is completed type in STOP for the task name. When the STOP task is requested a message will be printed "STOPPING---". When FIN is typed in the user is logged off the computer and some accounting lines will be printed. When all of the accounting lines are printed the user should type in @@TERM. This will disconnect the phone line to the computer. See figure 3.

```
   THIS IS A TITAN LAUNCH
   TYPE IN DESIRED TASK---POSSIBLE TASKS ARE---
RUN, PLOT, LIST, DATAIN, STOP, EDIT, EXPRESS, SAVEDATA, SAVEPROGS
 LIST          (UR)
 LIST WHAT,(WNAMES,SNAMES,ALLNAMES,DATA,LATESTNAMES,LATESTDATA)
 WNAMES        (UR)
          WTD000000000
          WTD200000000
          WSD211720085
          JIM213720085
          WSD180725095
          JIM181725095
          WSD195225095
          JIM200124095
          WSD215225095
          JIM220225095
          WSD225225095
          RND000226095
          WSD001226095
          JIM003126095
          WRD000000000
   TYPE IN DESIRED TASK---POSSIBLE TASKS ARE---
RUN, PLOT, LIST, DATAIN, STOP, EDIT, EXPRESS, SAVEDATA, SAVEPROGS
 EDIT          (UR)

   TYPE IN NAME OF DATA TO BE EDITED
 STOP          (UR)

   TYPE IN DESIRED TASK---POSSIBLE TASKS ARE---
RUN, PLOT, LIST, DATAIN, STOP, EDIT, EXPRESS, SAVEDATA, SAVEPROGS
 STOP          (UR)
   S  ING
@MSG,N  END OF PROGRAM ENTER @FIN.
 @FIN          (UR)
RUNID:  1323C     ACCT:  YOW6236      PROJECT:  LVDSA
TIME:     TOTAL:  00:01:00.891
          CAU:    00:00:01.843    I/O:  00:00:18.116
          CC/ER:  00:00:40.932    WAIT: 00:01:36.607
SRC:      PS --  12538            ES -- 4200050
START:      11:52:33 DEC 01,1975  FIN:  11:55:58 DEC 01,1975
*TERMINAL INACTIVE*
 @@TERM        (UR)
```

FIGURE 3   SAMPLE OF A LIST TASK, STOP, AND LOGOFF

Naming and Format of Wind and Steering Data

Naming

The Wind and steering data names are generated by the real-time program, then put into the proper data file, W. or ST. The names are made up from information on the first record of each set of data, denoted as the header card, by the following conventions. All names are 12 characters in length.

For wind data the name is made up of 3 alphabetic characters indicating the type of tracking used, followed by 9 numeric characters designating the balloon release time (4 digits), day (2 digits), month (2 digits), and year (1 digit). The balloon release time is given as Greenwich Mean Time (Z). See figure 4 for typical wind data names, type of tracking, and a typical header card.

Typical Wind Names   Description

WSD13252?3085   Windsonde released at 1325
           hrs Z on August 23, 1975
JIM220225095   Jimsphere released at 2202
           hrs Z on September 25, 1975
RND204620085   Raywindsonde released at
           2046 hrs Z on August 20, 1975

Typical Header Card (Numbers indicate card columns)

```
1      10      20      30      40      50      58
C J    ,0031Z 26 09 75,ETR WIND DATA,3072,ALT 200 F,VEL FPS
```

FIGURE 4 Typical Wind Names and Wind Header Card

The names of ADDJUST steering program data are also made up
of 12 characters. The alphabetic character A, followed by
11 numeric characters designating steering program ID (2
digits), time (4 digits), day (2 digits), month (2 digits),
year (1 digit). The time, day, month, and year will match
the time, day, month and year of the wind data that was used
to design the steering data.

The library steering programs are broken into two groupings.
Sets of data for pitch programs and sets of data for yaw
programs. The data sets for pitch have P as the first
character of the name, followed by 11 alphabetic and numeric
characters for identification. The yaw data sets begin with
the letter Y, again followed by 11 characters. See figure 5
for typical steering names and a header card from an ADDJUST
data set.

```
     A05132523085          ADDJUST steering program
     P1H050AØA36A          Library pitch steering
     P1T100AØA36A
     Y1R050AØA36A          Library yaw steering
     Y1L100AØA36A




1      10       20        30       40   50        60        70        80
C PY ,2152Z 25 09 75,GDC STEERING NO. 11   P1A1100*ᴧC36 Y1A1100*AC36__115533
```

FIGURE 5   Typical Steering Data Names and
              a Steering Header Card

Format.

There are two formats for the wind data and two formats for the steering program data, to be designated as "old" and "new" For wind data the old format has 18 values per card. Input format is (8X,18(I3,1X)). New format has 16 values per card plus checksum information in CC 72-80. CCS reads these data with format (8X,16(I3,1X)). The header card on the wind data, both old and new formats, must contain the altitude interval in cc 45,46,47,48 and the units of distance in cc 50. See sample header card in figure 4. The CCS automatically determines which format to use and reads the data in with the proper format. Hence the only restrictions on the wind data, for either old or new format, are that there must be a header card and the header card must have at least the two pieces of information described above in cc 45 to 48 and in cc 50.

There are 3 types of steering data. ADDJUST steering in "new" format, ADDJUST steering in "old" format and library data. The library steering data and "old" format data are read in namelist format and hence the data must be in a form that is readable by namelist input. Further the old format data sets and library data sets must not have a header card.

Recall that the time, date and year is part of the data set names for the steering data. Any steering data whose name has a date prior to July 1, 1975 is automatically called "old" format by CCS.

The steering data in new format, i.e. any name with date on or after July 1, 1975, is read by the programs with a formatted read. This format is (6X,6E10.6/6X,5E10.6). CC 72-80 contain checksum information.
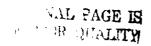
Examples of Wind data, ADDJUST steering data, and library steering data in both new and old formats are shown in figures 6,7,8,9,10,11. Note that in figure 8, steering data in new format, there are no decimal points. The decimal point is implicitly in front of the first digit. For example from figure 8 the first data value is shown to be 217029-14, this is read by the program as 0.217029E-14.

```
C J    .22432 13 05 76.ETR WIND DATA 2211.ALT 230 F.VEL FPS              000022
  A 001  140,136,134,131,129,133,136,134,130,137,136,142,149,153,146,145,  116611
  A 017  150,157,154,153,158,161,165,165,159,163,153,148,153,151,156,151,YY117733
  A 033  142,143,147,143,152,151,146,160,156,141,150,137,142,148,146,138,II116677
  A 049  137,121,123,129,144,162,186,188,193,174,167,210,170,175,185,178,...116666
  A 065  175,194,190,179,181,194,183,185,193,190,206,222,214,212,221,218,XX116611
  A 081  227,239,232,238,241,244,237,244,241,243,246,255,247,253,260,255,  117777
  A 097  261,256,268,263,258,264,256,262,257,263,263,269,258,258,256,254,LL116644
  A 113  254,253,258,258,258,263,264,270,267,263,268,268,263,272,277,273,AA117733
  A 129  272,276,283,283,291,292,294,291,295,304,306,310,315,307,302,297,33117711
  A 145  302,299,307,309,303,296,299,308,300,296,297,303,296,304,302,299,  117755
  A 161  305,298,303,298,303,304,308,303,308,301,307,303,300,299,298,301,XX116600
  A 177  296,307,304,313,309,308,312,308,296,301,301,304,302,299,306,299,**117733
  A 193  301,292,295,295,289,283,269,275,275,283,280,284,280,283,281,283,PP117722
  A 209  283,282,277,275,272,270,272,273,269,267,265,264,272,272,285,289,00117711
  A 225  294,302,306,299,298,297,296,297,306,313,316,322,321,315,315,313,00116622
  A 241  311,311,314,306,299,302,302,309,312,317,323,327,330,325,321,314,aa117766
  A 257  321,324,326,324,315,310,297,000000000000000000000000000000000.  117777
  S 001  027,030,032,035,036,043,043,043,043,042,041,037,039,039,039,036,00115566
  S 017  034,034,026,023,024,022,024,025,027,028,028,026,024,022,024,027,::114433
  S 033  026,020,026,024,021,024,019,018,021,018,015,018,014,023,014,015,**114422
  S 049  012,008,011,009,007,012,009,010,011,013,005,006,007,009,015,018,**114411
  S 065  018,016,020,018,017,014,015,014,011,013,011,014,020,017,025,029,**115533
  S 081  028,029,031,029,029,028,028,028,026,029,026,030,031,031,028,030,LL114422
  S 097  030,032,027,028,028,027,028,031,034,043,037,039,041,042,042,046,KK115555
  S 113  045,051,048,049,051,054,051,051,054,053,050,049,047,040,040,042,00115500
  S 129  040,037,036,037,037,036,036,036,034,034,035,037,037,037,034,035,XX115522
  S 145  033,034,035,037,038,036,034,033,036,033,032,033,032,031,071,030,77115511
  S 161  030,029,031,029,029,027,028,030,030,036,034,036,038,038,037,037,00114477
  S 177  036,032,033,030,029,030,028,027,033,031,032,030,030,035,032,023,22114466
  S 193  029,031,027,028,029,028,031,033,036,038,040,039,041,042,042,041,KK115555
  S 209  043,044,042,046,050,048,045,047,048,046,047,045,047,045,042,042,  115566
  S 225  053,054,057,052,054,057,059,065,076,083,082,076,077,077,069,063,::114433
  S 241  059,054,050,048,044,042,044,045,046,053,058,063,061,060,053,047,YY115577
  S 257  045,042,037,030,031,031,027,000000000000000000000000000000000.  114466
```

FIGURE 6   Sample Wind Data "New" Format

```
TEST WIND DATA IN OLD FORMAT , TITAN TEST  200 F  ALT=200,  UNITS=F
A(0001)=310,328,335,339,342,345,348,351,357,359,010,015,354,348,342,339,339,340,
A(0019)=336,339,339,332,333,318,318,315,312,310,305,305,303,302,300,298,302,295,
A(0037)=301,301,303,305,301,303,305,301,306,309,319,320,328,327,326,321,320,317,
A(0055)=312,309,307,309,308,314,314,318,323,328,332,331,327,326,328,328,324,328,
A(0073)=325,329,330,330,332,330,332,329,326,319,314,312,308,305,302,299,297,296,
A(0091)=289,291,290,288,285,285,283,283,282,282,284,284,287,288,288,287,286,286,
A(0109)=287,287,287,282,283,283,281,282,280,281,281,279,276,275,275,274,273,272,
A(0127)=273,273,273,273,275,275,275,275,277,277,277,278,279,281,281,281,281,281,
A(0145)=281,280,281,282,281,281,282,282,281,282,280,280,278,277,275,273,272,271,
A(0163)=269,269,269,269,269,269,269,268,267,266,265,264,264,264,263,263,263,261,
A(0181)=261,260,260,261,261,261,263,263,263,264,265,266,267,267,267,269,270,271,
A(0199)=273,271,272,271,268,266,266,265,267,267,266,265,265,264,263,266,267,270,
A(0217)=272,272,273,271,271,273,275,277,276,275,277,277,276,276,276,277,273,273,
A(0235)=272,269,269,268,267,271,269,271,273,273,278,273,276,273,279,277,276,273,
A(0253)=267,267,270,272,273,277,277,272,278,276,276,278,272,273,270,270,270,270,
A(0271)=265,266,266,269,268,269,269,271,273,269,268,262,256,261,000000000000000,
S(0001)=010,020,029,031,033,035,035,038,036,035,035,033,037,028,029,028,028,024,
S(0019)=034,031,040,038,036,034,035,041,038,042,041,042,042,049,046,049,051,053,
S(0037)=054,053,055,059,051,060,054,053,050,048,051,055,053,067,070,077,076,077,
S(0055)=080,074,080,073,073,066,067,061,064,066,071,077,076,076,075,074,075,066,
S(0073)=068,067,066,067,068,069,067,068,069,064,065,065,063,072,066,069,071,068,
S(0091)=077,081,083,089,091,095,099,097,102,100,103,104,111,112,112,122,121,130,
S(0109)=133,130,123,123,127,128,130,130,127,127,124,125,122,125,131,133,134,137,
S(0127)=141,143,142,144,147,147,145,147,149,149,148,149,150,151,150,151,147,147,
S(0145)=151,149,150,153,151,151,154,154,154,157,156,156,160,161,160,164,161,167,
S(0163)=165,164,162,164,163,163,164,165,165,167,167,165,166,168,171,173,172,169,
S(0181)=172,172,172,175,175,173,176,174,172,172,169,159,172,172,172,176,172,174,
S(0199)=175,172,171,165,159,154,150,145,145,148,145,145,146,147,147,150,152,149,
S(0217)=149,149,146,147,145,144,146,143,138,139,137,131,130,130,126,122,124,121,
S(0235)=118,117,120,121,120,121,127,128,129,130,129,125,121,122,121,116,114,114,
S(0253)=112,111,108,109,111,107,105,107,106,102,100,101,105,107,108,112,112,115,
S(0271)=114,115,113,108,102,105,100,095,093,092,083,079,082,086,000000000000000,
```

FIGURE 7   Sample Wind Data "Old" Format

```
C PY   .1739Z 22 07 76.GDC STEERING NO. 12         P1A1200+AC4D Y1A1200+AC4D  115522
  P2=   217029-14.-329625-15. 154396-15. 187773-15.-397789-15. 471382-15.CC117711
        506603-15.-215628-15. 436934-16. 444426-16. 138048-16.           00001122
  P1=  -449835-10.-165724-10.-185686-10.-140967-10.-123133-10.-160025-10.  116600
       -110819-10.-410961-11.-768077-11.-563747-11.-366869-11.           99001177
  P0=   157380-05. 136530-05. 121163-05. 107296-05. 995138-06. 923627-06.AA117755
        855399-06. 812654-06. 786715-06. 714277-06. 619305-06.           RR000022
  Y2=  -144759-14. 875707-15.-312234-15. 220413-15.-486703-15. 530968-15.>>116666
        501039-15.-316456-15.-740161-16. 231484-18. 130111-18.           77000055
  Y1=   123966-10.-830498-11. 160514-11.-143368-11.-116192-13.-638041-11.--117711
        363196-12. 453788-11. 110967-11.-303037-13.-257705-13.           GG000011
  Y0=   0.        . 173004-07. 690580-08.-236050-09.-903260-09.-131289-07.##115555
       -317568-07.-174148-07.-263683-08. 135824-08. 544761-09.           --000011
```

FIGURE 8   Sample Steering Data "New" Format

```
P2( 1)=   2.65819068E-09,    4.11470771E-10,    2.54507930E-11,
P2( 4)=  -8.40135596E-11,    9.68033925E-10,   -5.09382659E-10,
P2( 7)=   3.45913878E-10,   -1.04141752E-10,    1.23916544E-10,
P2(10)=   6.57678393E-11,    1.36696724E-11,
P1( 1)=  -4.92013033E-05,   -2.62073733E-05,   -1.45055879E-05,
P1( 4)=  -1.32189348E-05,   -1.52389575E-05,   -4.76476597E-06,
P1( 7)=  -1.21227345E-05,   -7.72851656E-06,   -8.91743263E-06,
P1(10)=  -6.38971937E-06,   -3.60039004E-06,
P0( 1)=   1.57079633E+00,    1.35915904E+00,    1.17583418E+00,
P0( 4)=   1.06141833E+00,    9.79080231E-01,    9.27086292E-01,
P0( 7)=   8.90527896E-01,    8.38562070E-01,    7.97315943E-01,
P0(10)=   7.20533272E-01,    6.19046020E-01,
Y2( 1)=  -1.61109142E-09,    3.53516543E-10,   -1.40591339E-10,
Y2( 4)=  -1.59039875E-11,   -5.77321235E-11,    2.14335246E-10,
Y2( 7)=   5.66881841E-10,   -5.35005635E-10,   -1.30507886E-10,
Y2(10)=   2.50408942E-11,    1.03868933E-13,
Y1( 1)=   1.37968323E-05,   -3.52581824E-06,    5.15760356E-09,
Y1( 4)=  -1.64073177E-06,   -2.34852287E-06,   -3.54915533E-06,
Y1( 7)=  -7.70317181E-09,    3.78654047E-06,    1.95369797E-06,
Y1(10)=  -2.22789240E-07,   -2.19770872E-08,
Y0( 1)=   0.              ,   1.92487002E-02,    1.36672130E-02,
Y0( 4)=   4.71062810E-03,   -5.70630608E-03,   -1.88922235E-02,
Y0( 7)=  -3.12796190E-02,   -1.71460889E-02,   -1.15885274E-02,
Y0(10)=  -5.10233632E-03,    4.58236577E-04,
```

FIGURE 9   Sample Steering Data "Old" Format

```
P0(01)= 1.57080E+00, 1.37506E+00, 1.19986E+00, 1.06538E+00, 9.81355E-01,
P0(06)= 9.19575E-01, 8.65579E-01, 8.20962E-01, 7.82441E-01, 7.17076E-01,
P0(11)= 6.19766E-01,
P1(01)=-3.82558E-05,-2.48851E-05,-1.88542E-05,-1.49769E-05,-1.30621E-05,
P1(06)=-1.19003E-05,-9.92232E-06,-8.14813E-06,-7.24028E-06,-5.78083E-06,
P1(11)=-3.56236E-06,
P2(01)= 1.39147E-09, 3.73155E-10, 2.55447E-10, 1.62261E-10, 1.41207E-10,
P2(06)= 2.20224E-10, 1.99798E-10, 8.87724E-11, 7.03774E-11, 4.57653E-11,
P2(11)= 1.28672E-11,
```

FIGURE 10   Sample Library Steering - Pitch

```
Y0(01)= 0.           ,-6.66142E-02,-3.53190E-02, 3.77615E-03, 3.23979E-02,
Y0(06)= 5.50226E-02, 7.00590E-02, 6.57137E-02, 5.51313E-02, 3.49821E-02,
Y0(11)=-1.07129E-04,
Y1(01)=-4.81621E-05, 2.76728E-06, 4.83674E-06, 4.88151E-06, 4.65661E-06,
Y1(06)= 5.50062E-06, 1.43840E-06,-2.13696E-06,-2.09425E-06,-1.95391E-06,
Y1(11)= 8.10218E-09,
Y2(01)= 5.63333E-09, 1.43110E-10, 6.26888E-12,-1.85361E-11,-2.63354E-11,
Y2(06)=-4.98665E-10,-4.61493E-10, 4.09415E-12, 7.93381E-12, 9.97251E-12,
Y2(11)=-4.66117E-14,
```

FIGURE 11   Sample Library Steering - Yaw

File Description and Maintenance

As mentioned earlier (p. 5) four files are used during the execution of CCS. Two of these four files are the data files W. and ST. which contain the sets of wind data and steering data respectively. These two files are catalogued public. The maintenance of these two files is quite simple. Prior to a sequence of exercises leading up to a launch it is best to purge the wind data from file W. except for one or two sets to be used as testing data. The ST. file should also be purged except for one test data set. Then insert into file ST the steering libraries that will be used during the up-coming launch. This is accomplished by UNIVAC EXEC8 control language. Other files that may be used in this operation are ACLIB. or TCLIB. (which are files containing library steering programs for ATLAS and TITAN respectively). Figure 12 shows two possible sets of EXEC commands: one to purge and save two elements of file W.; the other to purge and save one element from ST., and then store Titan libraries in ST.

```
PURGE W.

1)  Usual logon procedure; Dial up, TTY503, @RUN ----, etc.
2)  @ASG,T   SAVEW,F///200
3)  @COPY,S   W.WTD000000,SAVEW.WTD000000       (moves 2 wind data)
4)  @COPY,S   W.WSD215225095,SAVEW.WSD215225095  sets into SAVEW.)
5)  @ERS      W.                                  (erases file W.)
6)  @COPY,S   SAVEW.,W.          (moves the 2 data sets
7)  @FIN                                        back into W.)

PURGE ST.
1)  Logon as above
2)  @ASG,T   SAVEST,F///200
3)  @COPY,S   ST.A11215225095,SAVEST.A11215225095   (moves 1 ST data
4)  @ERS      ST.                              set to the save file)
5)  @COPY,S   iCLIB.,ST.   (moves TITAN steering libraries into ST.)
6)  @COPY,S   SAVEST.,ST.   (moves saved data set back to ST.)
7)  @FIN

These  operations  may be  combined with a single  LOGON and
fin.
```

FIGURE 12   Sample Univac Executive Commands to Save
               Some Data, Purge Files W. or ST., restore
               saved data into the files., then to store
               a set of library steering programs into ST.

At the end of a launch it is recommended that the task SAVEDATA be requested from CCS. This will update tape 0341, (data tape), by saving the current contents of files W. and ST., merge new wind data and new steering data with historical data and save the steering library files ACLIB and TCLIB on the tape. After doing SAVEDATA at the end of a launch, the user may now go through the purge procedure to get ready for the next exercise.

The third of the four files used by the CCS is a file named COMSYS. COMSYS is catalogued public in read-only mode, and contains the CCS programs and runstreams necessary to execute CCS. This file is built and maintained by Computer Services Division personnel.

The fourth file used is either the file AC., (Atlas program), or TC. (Titan Program). These files are built by the commands:

```
        @ADD      COMSYS.FREEZEATLAS
   or   @ADD      COMSYS.FREEZETITAN
```
These two commands build the files AC or TC by forming the executable elements. The programs used to build these executable elements are the relocatable (binary) versions of the Atlas or Titan programs which reside in the two catalogued files named ATLAS. and TITAN. respectively. The ATLAS. and TITAN. files are maintained by LVD personnel.

After all programs are in the form desired for an upcoming launch, and before the exercises begin it is suggested that the task SAVEPROGRAMS be executed from CCS. This will save all of the program files on magnetic tape U0267 to be available if the computer system loses the files resident on the disk, so that recovery of the programs in frozen form is possible.

Anomalies

While using CCS over a period of time occasional unusual circumstances have arisen and occasional errors have occurred. Following is a list of these circumstances along with possible correction methods. This list is not exhaustive nor does it cover all possible anomalies.

    1) If the real time program cannot generate a data name from the header card of the set of data, the

data set is saved in a file called ERR. The
element name given to the data set is the current
date and time. When this occurs an error message
is printed on the terminal and the element name
will appear on the line containing ELT ERR. date
time. To recover from this it is necessary to
request the STOP task from CCS. This will turn
control over to UNIVAC EXEC. Then by using EXEC
commands the header card can be corrected, then
the element may be renamed according to CCS naming
conventions and then moved to the proper data
file, W. or ST., to be used by CCS. If an error
of this type occurs it is a good idea to list the
data set to check for other errors in the data as
far as can be determined. After the data has been
moved into the proper file and determined to be
useable by CCS it is necessary to restart
execution of CCS. This is done by the control
XQTbbSYSTEM.

2) If the real time program senses a card count
different than that transmitted to the
micro-processor a message will be printed to that
effect. The data is stored in the proper data
file however. It is a good idea to list this
data.

3) If the phone line to the CCS terminal drops, hang
up, redial, and reinitialize to resume running.

If the phone at micro-processor drops, the CCS
operator must stop execution of the program by
ε@X T. The micro-processor operator must
reinitialize the micro-processor then redial. The
CCS operator then gives the DATAIN task again.

4) Occasionally the program appears to stop
executing, or be holding. The symptoms of this is
no output to the terminal when it is expected for
some period of time. Two minutes is a reasonable
time to wait. If this occurs just hit the return
key. This will normally get things started again,
or a message will be printed giving current
status.

5) It may be desirable to change the value of one or
more of the namelist variables for the duration of
the time on the computer. This would eliminate
the need to make the change each time the run task

is requested. This can be done with the use of
EXEC commands, primarily the text editor. To make
such a change first request the CCS task STOP.
Then @ED,Ubbbbb15.. This will invoke the text
editor, at which time the changes can be made.
Should there occur a need to reinitialize the CCS
after such a change is made, it will be necessary
to remake the changes as they are lost during the
reinitialization process.

6) To send messages to the computer operator at the
console, type the following @@MSGb YOUR MESSAGE
(5? characters or less).

7) If it should become necessary to stop the
execution of a task, this can be done by hitting
the BREAK key followed by XbT. This will
terminate execution of the task in progress.
However any output which has not as yet been
printed will print out before control is returned
to the terminal.

8) The CCS can be run from cards in a batch mode in 2
ways. Normally the only tasks that would be done
using cards are PLOT,RUN, and DETAIL. In order to
put wind or steering data into the data files from
cards the user needs the deck of data cards and
three executive control cards. The deck set up
for wind data is as follows:

```
@RUN,M          1323C,YOW6236,LVDSA
@ELT,IS         W.___data name___
```

                    data deck

        FIN
To plot or run analysis programs by using cards
the CCS can be put into execution; then the input
to perform the tasks would be on cards, one input
per card. Figure 13 shows a sample run stream to
plot a wind data set then run the Atlas analysis
program twice. To run Titan programs substitute
TITAN in place of ATLAS on the second card.

```
@RUN,M              1323C, YOW6236, LVDSA
@ADD,P              COMSYS.ATLAS
PLOT                Plot wind data RND000226095
RND000226095
100.982
P
RUN                 Run atlas program with wind
RND000226095        RND000226095 and steering
A11215225095        A11215225095, no changes of
N                   any namelist data
DEMAND
RUN
WSD001226095
A11215225095
N
DEMAND
@FIN
```

FIGURE 13   Sample of Deck Setup to Plot and Run
                 Analysis Programs with Cards

Another way of plotting and running from cards is as
follows:

```
    To Plot    @RUN      1323C,YOW6236,LVDSA
               @ADD,P    COMSYS.PLOTTCNCARDS
               @ADD,P    .WSD183509095
               100.986
               @FIN

    To Run     @RUN      1323C,YOW6236,LVDSA
               @ADD,P    RUNTCCARDS
                 NOMINAL=.FALSE., RSAFTY=1.,      change
                                                  namelist
                                                  data
               $END
               @ADD,P    .A08084621075           steering name
               @ADD,P    .JIM084507215           wind name
               @FIN
```

REFERENCES

1. Goldberg, Fred: Wind Data Network Communication System.
   NASA TM X-   , 1976.

2. UNIVAC 1100 series operating series, Programmer Reference.
   UP-4144, Sperry Rand Corp., 1973, rev. 3.

3. UNIVAC 1100 series FORTRAN V Programmer Reference. UP-4060,
   Sperry Rand Corp., 1973, rev. 2

APPENDIX A

LOGICAL FLOW DIAGRAM OF CCS

PAGE 30

Logon Computer

@ADD COMSYS.ATLAS or @ADD COMSYS.TITAN

ATLAS

TITAN

Move Atlas PGM From AC to Runfile

Move Titan PGM From TC to Runfile

Move Plot Progs to Plot File

CCS In Execution Main Program Request Task From User

EXPRESS

Change Namelist Data?

Y

Make Change

N

Demand or Batch

RUN

Input Data For Run

Run Batch Start Run in Batch Mode

Run Demand Run Analysis Program Summary Output to Terminal

PLOT

Solicit Input

Make Plot

LIST

Input Data

List Desired Info

EDIT

Input Data

Edit Dataset

DATAIN

Move Data From Micro to 1110

STOP

Stop Execution of CCS

Exec Control

SAVEDATA

Start Program to Save Data Files on Tape as Batch Run

SAVPROGS

Start Program to Store All Program Files on as Batch Run