SDS PROGRAM LIBRARY
PROGRAM DESCRIPTION

Model No. 860799-11A00

IDENTIFICATION:	NAA DES-1 Hybird Call Library
AUTHOR:	SDS
ACCEPTED:	August 23, 1968
COMPUTER CONFIGURATION:	SDS 9300, DES-1, and Interface hardware for NAA System.
PURPOSE:	The DES-1 Hybird Call Library consists of a number of subroutines which provide the DES-1 user control of the Hybird System hardware.
PROGRAMMED OPERATORS:	None
SUBROUTINES REQUIRED:	None
STORAGE:	N/A
TIMING:	N/A
SOURCE LANGUAGE:	SDS 9300 Metasymbol
LOADING PROCEDURE:	Called by DES-1 call statements
USE:	GENERAL All of the routines of the DES-1 Hybird Call Library are subroutines which expect and return only floating point arguments. Reentrancy is taken care of by having duplicate copies of each of the routines.

USE: (cont.)

GENERAL Cont.

If the same routine is to be used in both RATE 1 and RATE 2 calculations, the number one version should be used in RATE 1 and the number two version should be used in RATE 2. Either version may be used in INITIAL calculations or if the routine is not used in both RATE 1 and RATE 2 calculation.

If external patchable interrupts are used, care must be exercised in their use. Since DES-1 is protected from the timing interrupt only, user interrupt initiated subroutines must restore any registers which are used and protect themselves from recursion.

In all the following descriptions the n in the name must be either a 1 or 2.

A. INTERRUPT STATEMENTS.

1. CALL EIRn

   All system interrupts are enabled.

2. CALL DIRn

   All system interrupts are disabled.

3. CALL ARMn (I_i, I_j, I_k,...)

   Interrupts I_i, I_j, I_k, etc., are armed.

   Error messages:

   a. ERR ARM - Occurs when an interrupt number is outside the allowable range (0-31).

USE: (cont.)

A. INTERRUPT STATEMENTS.

4. CALL DRMn (I_i, I_j, I_k, ...)

Interrupts I_i, I_j, I_k, etc., are disarmed.

Error messages:

a. ERR DRM - Occurs when an interrupt number is outside the allowable range (0-31).

5. CALL IDLn

The machine halts waiting for an interrupt. After any interrupt has occurred and been processed, the flow of control passes to the next statement.

6. CALL NULn (I_i, I_j, I_k, ...)

Interrupt I_i, I_j, I_k, etc., are tied to the briefest possible clear and return routine.

Error messages:

a. ERR NUL - Occurs when an interrupt number is outside the allowable range, (0-31).

7. CALL INTn (I)

This subroutine returns a plus one if all system interrupts are disabled, and a minus one if they are enabled.

USE: (cont.)

B. DIGITAL-ANALOG CONVERSION INSTRUCTIONS

1. CALL DACn (L_i, V_i, L_j, V_j, ...)

The values of V_i, V_j, etc., are output as analog voltages on channels L_i, L_j, etc., of the ditital-to-analog conversion system. The V's must lie in the range $1.0 > v \geq -1.0$ representing percentage of full scale.

Error messages:

a. ERR DAC - INSUFFICIENT DATA - Occurs if the number of arguments is odd.

b. ERR DAC - INVALID CHAN NO. - Occurs if L is outside the allowable range, (0-47).

c. ERR DAC - VALUE OUT OF LIMITS - Occurs if V is outside the allowable range.

2. CALL ADCn (L_i, V_i, L_j, V_j, ...)

Channels L_i, L_j, etc., of the analog-to-digital conversion system are read and the values assigned as floating point numbers to the variables V_i, V_j, etc. The return arguments will lie in the range $1.0 > v \geq -1.0$ representing percentage of full scale.

Error messages:

a. ERR DAC - INSUFFICIENT DATA - Occurs if the mumber of arguments is odd.

b. ERR ADC - INVALID CHAN NO. - Occurs if L is outside the allowable range (0-79).

USE: (cont.)

C. ANALOG COMPUTER INSTRUCTIONS

1. CALL CONn (N)

Analog Console N is selected.

Error messages:

a. ERR CNS - Occurs if N is outside the allowable range (0-7).

b. ERR CNS - CONSOLE NOT SELECTED - Occurs if console N cannot be selected within 100 ms.

2. CALL MODn (M_i, M_j, ...)

Analog console N is placed in modes M_i, M_j, ...).

Error messages:

a. ERR MODE - Occurs if an M is outside the allowable range (0-10).

b. ERR MODE - CONSOLE - MODE NOT SELECTED - Occurs if the console N or a mode M cannot be selected within 100 ms.

The modes are as follows:

0	=	Operate
1	=	Hold
2	=	Reset
3	=	Static test
4	=	Pot set
5	=	Rate test
6	=	IMC #1
7	=	IMC #2
8	=	IMC #3
9	=	IMC #4
10	=	IMC #5

USE: (cont.)

C. DIGITAL-ANALOG CONVERSION INSTRUCTIONS

3. CALL SCNn (M_i, V_i, M_j, V_j, ...)

The specified elements M_i, M_j, etc., of analog console N are read and the values assigned to the associated variables V_i, V_j, etc., in floating point format. The return arguments will lie in the range of $1.0 > v \geq -1.0$ representing percentage of full scale. In the argument list, M's are three digit integers made up of the category (first digit of integer from the following table) and a two-digit unit address.

First Integer Digit	Category
0	Resolvers
1	Multipliers
2	Function Generators
3	Integrator Check Points
4	Amplifiers
5	Trunks
6	Potentiometers (First 100)
7	Potentiometers (Second 100)

Error messages:

a. ERR SCN - INSUFFICIENT DATA - Occurs if the number of arguments is odd.

b. ERR SCN - INVALID CATEGORY XXXX - Occurs if category XXXX is not from the above table.

USE: (cont.)

C. DIGITAL-ANALOG CONVERSION INSTRUCTIONS.

3. Cont.

c. ERR SCN - INVALID UNIT ADDRESS XXXX - Occurs if the address is outside of the allowable range (0-79).

D. LINKAGE INSTRUCTIONS

1. CALL TSTn (L_i, L_j, L_k, ...,V)

This subroutine returns a minus one in V if any one of the sense lines L_i, L_j, L_k, has a true signal on it, and a plus one if not.

Error messages:

a. ERR TST - Occurs when a line number is outside the allowable range (0-51).

2. CALL SETn (L_i, M_i, L_j, M_j, ...)

Level output lines L_i, L_j, etc., are placed in the state determined by M_i, M_j, etc. The "on" state is represented by minus one, and the "off" state is represented by plus one.

Error messages:

a. ERR STL - INSUFFICIENT DATA - Occurs if the number of arguments is odd.

b. ERR STL - INVALID LINE NO. - Occurs when a line number is outside the allowable range (0-51).