

**DataGeneral**

---

---

**TECHNICAL  
STATEMENT**

---

---

TEXT LISTING

068-000220-03

PROGRAM

DIGITAL TO ANALOG CONVERTER  
DIAGNOSTIC

TEXT TAPE

097-000220-03

ABSTRACT

THE DIGITAL TO ANALOG CONVERTER DIAGNOSTIC (DACD) USES THE IOPAC SOFTWARE ROUTINE FOR BASIC I/O HANDLING. THIS PROGRAM TAKES EITHER THE VALUE SPECIFIED ON THE TTY OR THE CPU SWITCH SETTINGS, CAUSES THE D/A CONVERTER TO CONVERT THIS SPECIFIC DIGITAL VALUE TO ITS ANALOG EQUIVALENT, THEN OUTPUTS THIS ANALOG VALUE TO THE D/A CHANNEL SPECIFIED.

```

0001 IOPAC          MACRO REV 06.30          09:30:15 02/16/79          10002 IOPAC
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

```

```

*****
? NAME: DACO.TX          PART NUMBER: 097-000220
?
? DESCRIPTION: DIGITAL TO ANALOG CONVERTER DIAGNOSTIC
?
? REVISION HISTORY:
? REV.          DATE
? 00           10/11/74
? 01           04/25/75
? 02           08/15/75
? 03           07/23/76
?
? COPYRIGHT © DATA GENERAL CORPORATION, 1974, 1975, 1976
? ALL RIGHTS RESERVED.
*****

```

```

LSR
:MW:017177:377:7771777:3777:77771777:3777:77771777:3777:7777
:BIT: VOLTAGE FOR SWITCH SETTING (IN VOLTS)
-----
8 BIT
0-5VT :19 :.2912.514.9:
+/-2.5 :19 :.2912.514.9:
0-10 :39 :.5824.919.9:
+/-5 :39 :.5824.919.9:
+/-10 :78 :1.1649.819.9:
-----
10 BIT
0-5VT :4.9:.071.6211.2:2.514.99:
+/-2.5 :4.9:.071.6211.2:2.514.99:
0-10 :9.8:.151.2422.5:5.019.99:
+/-5 :9.8:.151.2422.5:5.019.99:
+/-10 :19 :.2912.514.9:1.1649.819.99:
-----
12 BIT
0-5VT :1.2:.021.161.31:6211.25:2.5014.99:
+/-2.5 :1.2:.021.161.31:6211.25:2.5014.99:
0-10 :2.4:.041.31.621.25:5.0019.99:
+/-5 :2.4:.041.31.621.25:5.0019.99:
+/-10 :4.9:.071.6211.2:2.514.99:1.1649.819.99:
-----
13 BIT
0-5VT :.61:.01:.081.15:31:6241.1.2512.5014.99:
+/-2.5 :.61:.01:.081.15:31:6241.1.2512.5014.99:
0-10 :1.2:.021.161.31:6211.25:2.5019.99:
+/-5 :1.2:.021.161.31:6211.25:2.5019.99:
+/-10 :2.4:.041.31.621.25:5.0019.99:
-----
14 BIT
0-5VT :.31:.00:.041.08:16:312:6241.1.2512.5014.99:
+/-2.5 :.31:.00:.041.08:16:312:6241.1.2512.5014.99:
0-10 :.61:.01:.081.16:31:6241.1.2512.5019.99:
+/-5 :.61:.01:.081.16:31:6241.1.2512.5019.99:
+/-10 :1.2:.021.161.31:6211.25:2.5019.99:
-----
15 BIT
0-5VT :.15:.00:.021.04:08:155:311:6241.1.2512.5014.99:
+/-2.5 :.15:.00:.021.04:08:155:311:6241.1.2512.5014.99:
0-10 :.31:.00:.041.08:16:312:6241.1.2512.5019.99:
+/-5 :.31:.00:.041.08:16:312:6241.1.2512.5019.99:
+/-10 :.61:.01:.081.16:31:6241.1.2512.5019.99:
-----
16 BIT
0-5VT :.08:.00:.011.02:04:077:155:312:6241.1.2512.50:
+/-2.5 :.08:.00:.011.02:04:077:155:312:6241.1.2512.50:
0-10 :.15:.00:.021.04:08:155:311:6241.1.2512.5019.99:
+/-5 :.15:.00:.021.04:08:155:311:6241.1.2512.5019.99:
+/-10 :.31:.00:.041.08:16:312:6241.1.2512.5019.99:
-----

```

```

NOTE: ON A 16 BIT DAC RE CAREFUL THE RANGE IS NOT +/-10.3 VT
THE LITERAL READINGS WILL BE LOW BY 3%.
-----
54
55
56
57

```

10003 IOPAC

01  
02  
04  
05  
06  
07  
08  
09  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27

.TITL DACD.WU

DIGITAL TO ANALOG CONVERTER DIAGNOSTIC OPERATION.

ABSTRACT: THE DIGITAL TO ANALOG CONVERTER DIAGNOSTIC (DACD) USES THE IOPAC SOFTWARE ROUTINE FOR BASIC I/O HANDLING. THIS PROGRAM TAKES EITHER THE VALUE SPECIFIED ON THE TTY OR THE CPU SWITCH SETTINGS, CAUSES THE D/A CONVERTER TO CONVERT THIS SPECIFIC DIGITAL VALUE TO ITS ANALOG EQUIVALENT, THEN OUTPUTS THIS ANALOG VALUE TO THE D/A CHANNEL ON A DVM, SCOPE, OR OTHER VOLTMETER. THE SELECTED MONITOR POINTS ON THE BACK PADDLE BOARD CONNECTOR P401 ARE AS FOLLOWS:  
CHANNEL 0 HIGH = A47  
CHANNEL 0 GROUND = A45  
CHANNEL 1 HIGH = A48  
CHANNEL 1 GROUND = A49  
THE DACD IS DESIGNED TO TEST DAC'S # 4055A, 4058B, 4056H, 4080, 4081, AND 4082. THE MAIN PROGRAM STARTS AT .LOC 2500 ON PAGE 47.

PHILOSOPHY OF OPERATION: THE DACD IS ADAPTABLE TO MANY MODES OF OPERATION. IT IS RECOMMENDED THAT THE OPERATOR FOLLOW THIS GENERAL SCHEME FOR TESTING DAC'S. FIRST RUN THE PROGRAM USING THE SWITCHES AND NO VARIANCE. WITH THE TABLE OF VOLTAGES, AND A MONITOR ON THE OUTPUT CHANNEL, IT WILL BE POSSIBLE TO DETERMINE IF THE CONVERTER WORKS AT ALL. IF ERRORS OCCUR IT IS THEN POSSIBLE TO SCOPE THE DAC TO DETERMINE THE NATURE OF THE FAILURE.(EXAMPLES WOULD BE: BAD OUTPUT BITS, NO OUTPUT-CPU ERROR, ETC.) SECOND, IF THE PROGRAM SEEMS TO RUN OK IN THE FIRST MODE, ADD A VARIANCE TO THE SWITCH SETTINGS. CHANGE THE VARIANCE SIZE AND VARIANCE DELAY TIME. THESE SETTINGS WILL DETERMINE IF THE DAC HAS TROUBLE TRACKING OUTPUT DATA. AGAIN THIS LOOP CAN BE SCOPED. THIRD, IF EVERYTHING IS WORKING OK, USE THE TELETYPE INPUT FOR A TEST OF THE ACCURACY OF THE DAC. TO COMPLETELY TEST THE DAC VALUES MUST BE ENTERED OVER THE ENTIRE DAC RANGE. THERE IS NO PASS/FAIL OUTPUT FOR THIS TYPE DIAGNOSTIC AS THERE IS NO CLOSED LOOP TESTING. THE DECISION AS TO ACCEPT-ABILITY OF THE DAC IS THE OPERATORS.

MACHINE REQUIREMENTS: DACD MAY BE RUN ON ANY NOVA COMPUTER WITH AT LEAST 4K OF MEMORY AND A TELETYPE OR CRT I/O.

10004 IOPAC

01  
02  
03  
04  
05  
06  
07  
08  
09  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59

SWITCH SETTINGS: THE CONSOLE SWITCHES ARE USED ONLY IN THE CASE OF NON TELETYPE INPUT. WHEN USED, THE SWITCHES ARE SET ACCORDING TO THE AVAILABLE BITS OF THE DAC INTERFACE; SEE THE TABLE OF VOLTAGE VALUES BEFORE THIS WRITUP.  
MINUS VOLTAGE OUTPUT REQUIRES THE TWO'S COMPLEMENT OF THE POSITIVE VALUE FOR THE SWITCH SETTING.  
'VARIANCE' IS USED ONLY WHEN THE SWITCHES ARE USED FOR INPUT. VARIANCE ALLOWS THE OPERATOR TO SELECT A VARIABLE VOLTAGE TO BE OUTPUT. THE VARIANCE BIT POSITION IS SELECTED BY HOW MUCH IT IS DESIRED FOR THE VOLTAGE OUTPUT TO VARY IN TIME. EACH POSITION MOVED TO THE LEFT MULTIPLIES THE BASIC MV/BIT BY A FACTOR OF 2. THE DELAY TIME DETERMINES HOW LONG THE OUTPUT VOLTAGE WILL BE HELD AT THE PRESENT SETTING. THE VOLTAGE OUTPUT WILL BE THE CPU SWITCH SETTING MINUS THE VARIANCE, THE CPU SWITCH SETTING, THE CPU SWITCH SETTING PLUS THE VARIANCE.

LOADING: USE THE BINARY LOADER TO ENTER THE PAPER TAPE OR USE DTOS. SET SWITCHES TO 000002 OR 200 AND PRESS RESET AND START. RESTART BY LOCATION 2 OR 200 AS IN LOADING

OPERATION: ALL INPUT PARAMETERS ARE FOLLOWED BY A CR. THE MAIN PROGRAM STARTS ON PAGE 47 AT .LOC 2500. THE PROGRAM MAY BE RESTARTED DURING A TEST AT ANY OF THREE POINTS IN THE INITIAL QUESTION/ANSWER SEQUENCE. ANY QUESTIONS FROM A SPECIFIC START POINT FORWARD WILL BE RE-ASKED AND NEW INFORMATION STORED: ANSWERS TO ANY QUESTIONS PRIOR TO THAT START POINT WILL BE THE SAME AS FOR THE LAST RUN.  
THE FOLLOWING WILL BE TYPED:

"DIGITAL TO ANALOG CONVERTER DIAGNOSTIC"  
"DATA GENERAL CORPORATION © 1975"  
"1: ENTER NUMBER OF BITS IN D-A CONVERTER:"  
!GIVE THE NUMBER OF BITS IN CONVERTER  
!CAN BE RESTARTED HERE BY TYPING (0)  
"OUTPUT VOLTAGE RANGE:"  
"LO:"  
!ENTER LOW VOLTAGE RANGE. IE (0,-5,ETC)  
"HI:"  
!ENTER HIGH VOLTAGE RANGE. IE (5,10,ETC)  
"2: OUTPUT TO DAC CHANNEL NUMBER:"  
!ENTER CHANNEL NUMBER. (0 TO 30 OCTAL)  
!CAN BE RESTARTED HERE BY TYPING (CTR 0)  
"3: DESIRE TELETYPE INPUT? (Y OR N)"  
!ENTER A Y FOR TTY VOLTAGE INPUT.  
!ENTER A N FOR SWITCH INPUT.  
!CAN BE RESTARTED HERE BY TYPING (CTR C)

! IF YES IS ENTERED:  
"ENTER VOLTAGE TO BE OUTPUT (+/- MV):"

10005 IOPAC

01 ENTER VOLTAGE IN MILLIVOLTS.  
02 :GO TO RUN1 AND SKIP THE FOLLOWING  
03 :QUESTIONS.  
04

:IF NO IS ENTERED:

05  
06 "DESIRE VARIANCE ABOUT SWITCH SETTING (Y OR N)"  
07 :ENTER A Y FOR VARIANCE TEST.  
08 :ENTER A N TO BYPASS VARIANCE TEST.  
09

:IF YES IS ENTERED FOR VARIANCE:

10  
11 "ENTER VARIANCE BIT POSITION (0->N):"  
12 :ENTER A BIT POSITION MARKER  
13 :MOVED LEFT FROM RIGHT POSITION  
14 :BY THIS NUMBER OF PLACES.  
15

16  
17 "ENTER VARIANCE DELAY TIME (X 0.1 MS):"  
18 :ENTER THE VARIANCE TIME  
19 :IN MULTIPLES OF 0.1 MILLISECONDS.  
20

:IF YES OR NO IS ENTERED FOR VARIANCE:

21  
22 "SET UP CONSOLE SWITCHES, GIVE A CR:"  
23 :SET UP RITS FOR DAC,  
24 :GIVE A CR WHEN DONE.  
25 :GO TO RUNP.  
26  
27  
28

RUNNING:

29  
30 THE VOLTAGE VALUE TYPED IN WILL BE OUTPUT  
31 AND HELD TO THE SELECTED CHANNEL #.  
32 "(A/- MV):" WILL BE TYPED AND A NEW VOLT-  
33 AGE MAY BE TYPED IN AT ANY TIME.  
34 ACCURACY IS BETTER THAN 0.4% ON A 16 BIT  
35 CONVERTER, 0.02% ON A 12 BIT CONVERTER.  
36 CARE MUST BE EXERCISED IN LITERAL VOLTAGE  
37 INPUT NOT TO EXCEED THE DAC CAPABILITIES  
38 OR ERRORS WILL RESULT.  
39 A CTR C WILL ALLOW A NEW CHOICE AT LITERAL  
40 INPUT TO BE ENTERED.

41 A CTR B WILL RESTART THE PROGRAM  
42 WITH A NEW OUTPUT CHANNEL NUMBER.  
43 THE CONSOLE SWITCHES WILL BE READ ABOUT  
44 EVERY 40 USECONDS AND THE DATA THERE OUTPUT  
45 TO THE SELECTED CHANNEL NUMBER.  
46 IF VARIANCE IS SPECIFIED, THE SWITCH SETTING  
47 WILL BE OUTPUT LOW, DELAYED, OUTPUT EXACT,  
48 DELAYED, OUTPUT HIGH, THEN THE SWITCHES  
49 WILL BE READ AGAIN. THE CYCLE TIME WILL  
50 DEPEND ON THE VARIANCE DELAY TIME TIMES 3.

51 ERRORS: ANY INPUT ERRORS MAY BE DELETED BY A RUBOUT  
52 EXCEPT AFTER A CR. IF AFTER CR USE INTERRUPTS  
53 TO RESTART.  
54

INTERRUPTS:

55 1: AT ANY TIME THE OPERATOR MAY DISCONTINUE  
56 THE TEST IN PROGRESS BY TYPING CTR B, CTR C  
57 OR . IF THE CHARACTER HIT IS ECHOED,  
58  
59

10006 IOPAC

01 THE INTERRUPT IS NOT ENABLED. HIT RUBOUT,  
02 SUPPLY THE REQUESTED DATA, ASAP THEREAFTER,  
03 GIVE THE INTERRUPT AGAIN.  
04

05 2: CTR B RESTARTS THE PROGRAM AT 2: IN OPERATION

06 3: CTR C RESTARTS THE PROGRAM AT 3: " "

07 4: . RESTARTS THE ENTIRE PROGRAM AT 1: " "

08  
09 FAILURE: IF ANY MAJOR FAILURE OCCURS, STOP AND RESTART  
10 THE PROGRAM AS DESCRIBED IN LOADING.  
11  
12

.TITL IOPAC.WU

I/O HANDLER PACKAGE (03)

13  
14  
15  
16  
17  
18 ABSTRACT: THIS PACKAGE ALLOWS THE USER THE DIRECT ABILITY  
19 TO INTERFACE A PROGRAM WITH THE I/O, I/O, PTP, PTP, AND  
20 LPT. IOPAC CAN HANDLE AS WELL .TXT MATERIAL.  
21 IT ALSO CAN READ AND WRITE AND INTERMIX DECIMAL, BINARY,  
22 AND OCTAL CODING, EITHER + OR -.  
23 THE SIZE OF THE IOPAC ATTACHED TO A PROGRAM IS  
24 DEPENDENT ON THE LEADER CODING. THIS IS HANDLED IN THE  
25 PROGRAM CALLED "LEADR". TO MAKE A MACRO ASSEMBLY THE  
26 ORDER MUST BE MAC = LEADR IOPAC MAIN = OR ERRORS WILL  
27 RESULT.  
28

29 LEADR: THIS PROGRAM CARRIES HEADER MATERIAL TO DETERMINE THE  
30 IOPAC ROUTINES TO BE LOADED AT MACRO ASSEMBLY TIME.  
31 .DUSR IS USED AS A DEFINITION. IF THE ARGUMENT = 0  
32 THE CODING INVOLVED WILL BE LOADED; IF = 1, THE  
33 CODING IS DELETED.  
34

35 IOPAC: IOPAC CONSISTS OF 27 SELECTABLE ROUTINES, AND 34 MACRO  
36 EXPANSIONS OF WHICH 6 ARE SPECIALLY LOADED, AND AN INPUT  
37 AND OUTPUT HANDLER. THE LOADING IS CONTROLLED BY  
38 LEADR (SEE ABOVE). EACH ROUTINE REQUIRES EITHER 3  
39 DIRECT LOCATIONS OR THE NUMBER (X).  
40

THE ROUTINES ARE CALLED BY:  
SPECIALS:

CR?. X,Y,END :IS THE READ CODE A CR  
X = CODE READ IN AC(X)  
Y = CR CHECK IN AC(Y)  
END = JUMP POINT IF CR

ETB. X,Y,END :IS THE READ CODE AN END OF  
TRANSMISSION BLOCK (CTR W).  
X = CODE READ IN AC(X)  
Y = ETB CHECK IN AC(Y)  
END = JUMP POINT IF ETB

LF. DEVICE :GIVE A LINE FEED TO A LEGAL  
DEVICE (TTO:LPT)

01  
 02  
 03  
 04  
 05  
 06  
 07  
 08  
 09  
 10  
 11  
 12  
 13  
 14  
 15  
 16  
 17  
 18  
 19  
 20  
 21  
 22  
 23  
 24  
 25  
 26  
 27  
 28  
 29  
 30  
 31  
 32  
 33  
 34  
 35  
 36  
 37  
 38  
 39  
 40  
 41  
 42  
 43  
 44  
 45  
 46  
 47  
 48  
 49  
 50  
 51  
 52  
 53  
 54  
 55  
 56  
 57  
 58  
 59

:GIVE A TAR TO A LEGAL  
 DEVICE (R SPACE TAB INDIVIDUALLY  
 SET UP FOR TTD & LPT)  
 :GIVE A FORM FEED TO A LEGAL  
 DEVICE (LPT, VP)  
 :CHECK LOCATION .END TO  
 SEE IF > 0. IF SO WILL  
 JUMP TO LOCATION "END".  
 END OF SPECIALS:  
 : (2) SAVE THE AC'S  
 LEVEL = 0,1,2,3 LEVEL 1 RESERVED  
 FOR DALLY., LEVELS 2,3 RESERVED  
 FOR INTERRUPTS. ALL ARE USEABLE.  
 : (2) RESTORE THE AC'S BY LEVEL #  
 : PUSH STACKING REGISTER  
 WITH 30 AVAILABLE LOCATIONS.  
 NAME = LOCATOR TO BE PUSHED.  
 : POP UNSTACKING REGISTER  
 WORKING WITH PUSH.  
 NAME = LOCATOR TO BE POPPED.  
 : ECHO CHARACTER IN AC(X)  
 : (1) YES OR NO ? IS THE TTI  
 INPUT A Y ? IF SO RETURN  
 AT +\*1, IF N RETURN AT +\*2  
 IF NEITHER RETURN AT .  
 : (1) TRUE OR FALSE ? IS THE  
 TTI INPUT A Y ? IF SO  
 RETURN AT +\*1, IF F RETURN  
 AT +\*2, IF NEITHER RETURN AT .  
 MSKO.CTR A.CTR B.CTR D.CTR F.\*  
 : (18) AND A PRIORITY INTERRUPT  
 ROUTINE LINKING THE CLI  
 BY CONTROL Z. OTHER  
 CODES ARE ALLOWED.  
 THESE LINK VIA JUMP  
 ADDRESSES IN CALL.  
 CINT., STAK., & UNSTK. ARE  
 REQUIRED FOR OPERATION.  
 USUALLY .LOC 50 -> 60 ARE USED.  
 : (1) CHECK TO SEE IF THERE IS A  
 TTI INTERRUPT CODE IN AC1.  
 IF YES RETURN WITH TTI DONE SET  
 AND ENABLE INTERRUPTS, OTHERWISE  
 CLEAR DONE. THE AC'S ARE SAVED.  
 ASSEMBLED UNDER LINTRP.

01  
 02  
 03  
 04  
 05  
 06  
 07  
 08  
 09  
 10  
 11  
 12  
 13  
 14  
 15  
 16  
 17  
 18  
 19  
 20  
 21  
 22  
 23  
 24  
 25  
 26  
 27  
 28  
 29  
 30  
 31  
 32  
 33  
 34  
 35  
 36  
 37  
 38  
 39  
 40  
 41  
 42  
 43  
 44  
 45  
 46  
 47  
 48  
 49  
 50  
 51  
 52  
 53  
 54  
 55  
 56  
 57  
 58  
 59

: (7) STACK TTI CODES AS THEY  
 INTERRUPT CPU OPERATION.  
 30 WORDS ARE AVAILABLE.  
 LEVELS 0,1, & 2 AVAILABLE.  
 LIN.MYINT. TTI INTERRUPT  
 OVERFLOW RESETS THE STACK  
 AND HALTS THE CPU. CONT-  
 INUE RESTARTS PROGRAM AT  
 HALT POINT.) NORMAL RETURN AT .  
 OVERFLOW RETURN AT +\*1  
 STACK. 2 RESERVED FOR INTER-  
 RUPT SYSTEM.  
 : (1) UNSTACK THE TTI CODES  
 FROM THE BOTTOM AS THEY ARE  
 NEEDED. WHEN FULLY UNSTACKED  
 RESET STACK MARKERS.  
 LEVELS 0,1, & 2 AVAILABLE.  
 NORMAL RETURN AT .  
 IF FULLY UNSTACKED  
 RETURN AT +\*1  
 UNSTK. 2 RESERVED FOR INTER-  
 RUPT SYSTEM.  
 : (2) GIVE A CR TO A LEGAL  
 DEVICE (LPT, TTD)  
 THE IOPAC AUTOMATICALLY GIVES  
 A LF IF A CR IS SEEN ON OUTPUT.  
 : (2) GIVE A CR & LF TO A LEGAL  
 DEVICE (LPT, TTD)  
 : (7) A DELAY GENERATOR  
 TIME = X TIMES 0.1 MS  
 MACHINE = 800, 1200,  
 OR 2000 SERIES.  
 REQUIRES LEVEL 1 SAVE. AND REST.  
 2.5 SECONDS MAXIMUM.  
 : (7) A DELAY GENERATOR  
 EXTERNALLY ADDRESSABLE  
 BY A VARIABLE NAME IN  
 Y/O. CHARACTERISTICS ARE  
 THE SAME AS DALLY.  
 : (1) MULTIPLY ROUTINE.  
 AC 1 TIMES AC 2  
 PRODUCT IN AC 0 AND AC 1.  
 : (1) DIVIDE ROUTINE.  
 AC 0 HAS HIGH ORDER  
 AC 1 HAS LOW ORDER  
 AC 2 HAS DIVISOR  
 AC 0 HAS REMAINDER  
 AC 1 HAS QUOTIENT  
 IF CARRY=1, DIVIDEND  
 ASSUMED NEGATIVE.

10009 TOPAC

```

01 USECT. NAME,OPS CODE,MSKO
02 1(4)A MICRO-SECOND TIMER USING
03 INTERRUPTS.
04 NAME = LOCATOR FOR TIMER NAME
05 OPS CODE = OCTAL START DEVICE
06 CODE USING .DEVC.
07 MSKO = MASKING CODE FOR DEVICE
08 INTERRUPT.
09 .CPUT = CPU TYPE CODE IS READ
10 IN AT RUN TIME.
11 20 MS MAXIMUM TIME ALLOWED.
12 0 IS RETURNED IF THERE IS
13 A TIMING ERROR DETECTED.
14 REQUIRES DIV.
15 TYPE CODES:
16 NOVA #00 = 0
17 NOVA2 (R00) = "
18 SUPERNOVA = "
19 NOVA 1200 = 1
20 NOVA2 (1200) = "
21 NOVA = 2
22 ECLIPSE 0 = 3
23 (NON-INTERLEAVED)
24 CORE)
25 ECLIPSE 2 = 4
26 (2 WAY INTERLEAVED)
27 ECLIPSE 4 = 5
28 (4 WAY INTERLEAVED)
29 ECLIPSE 8 = 6
30 (8 WAY INTERLEAVED)
31
32 COC. START,END,OLD I/O CODE 1(4)CHANGE ALL I/O DEVICE
33 CODES WITHIN THE START AND END
34 LOCATIONS WHICH AGREE WITH THE
35 CALL, TO THE DEVICE CODE GIVEN
36 IN .DEVC. IF THE OLD
37 CODE IS ODD, INCREMENT
38 .DEVC BEFORE MASKING THE CODE.
39 .DEVC IS ENTERED AT RUN TIME
40 AND IS ASSUMED TO BE EVEN FOR
41 FOR MULTI-CODE DEVICES.
42
43
44 READ. NAME,DEVICE,SPECIAL 1(4)READ ASCII MATERIAL
45 FROM ANY LEGAL DEVICE
46 AND END READ WITH A CR
47 OR TAB, OR IF SPECIAL = 1,
48 WITH ETR (CTR W).
49 NAME = LOCATOR FOR THE READING
50 BLOCK. BLOCK IS USER
51 DEFINED AS TO ITS SIZE
52 2 CHARACTERS/WORD
53 DEVICE = ANY LEGAL DEVICE
54
55 SPECIAL = 0, OR 1
56 REQUIRES ECHO.. LIN
57
58 WRITE. NAME,DEVICE,SPECIAL 1(4)WRITE ASCII
59 MATERIAL ON A DEVICE

```

10010 TOPAC

```

01 FROM A GIVEN NAME.
02 NAME = LOCATOR FOR BLOCK
03 OF ASCII MATERIAL ENDING
04 WITH A CR OR TAB, OR IF SPECIAL
05 = 1, WITH ETR (CTR W).
06 DEVICE = ANY LEGAL DEVICE
07 (TTO,LPT,PTP)
08 SPECIAL = 0, OR 1
09 REQUIRES LOUT
10
11 PRINT. NAME,DEVICE
12 ANY LEGAL DEVICE
13 (TTO,LPT,PTP)
14 REQUIRES LOUT
15
16 URTO. NAME,DEVICE
17 FROM BINARY LOCATOR.
18 LEADING ZERO SUPPRESSION (LZS)
19 NAME = LOCATOR FOR BINARY NUMBER
20 DEVICE = ANY LEGAL DEVICE
21 (TTO,LPT,PTP)
22 REQUIRES LOUT
23
24 UOTR. NAME,DEVICE
25 READ A DECIMAL NUMBER AND
26 CONVERT TO BINARY STORING IT IN
27 NAME. END INPUT BY CR, TAB,
28 OR SPACE.
29 ACO HAS NUMBER ON RETURN.
30 NAME = DECIMAL WORD'S LOCATOR
31 DEVICE = ANY LEGAL DEVICE
32 (TTO,LPT,PTP)
33 REQUIRES LIN, & ECHO.
34 MAX SIZE = 32768
35
36 UOTR. NAME,DEVICE
37 READ AN OCTAL NUMBER AND STORE
38 IT IN NAME. END INPUT BY CR,
39 TAB, OR SPACE.
40 ACO HAS NUMBER ON RETURN.
41 NAME = OCTAL WORD LOCATOR
42 DEVICE = ANY LEGAL DEVICE
43 (TTO,LPT,PTP)
44 REQUIRES LIN
45 MAX SIZE = 7777
46
47 URTO. NAME,DEVICE,SUPPRESS 1(4)PRINT THE OCTAL WORD
48 IN NAME WITH LZS.
49 NAME = OCTAL WORD LOCATOR
50 DEVICE = ANY LEGAL DEVICE
51 (LPT,TTO,PTP)
52 IF SUPPRESS>0 NEGATIVE
53 NUMBERS ARE SUPPRESSED.
54 REQUIRES LOUT
55
56 URINR. NAME,DEVICE
57 READ A BINARY NUMBER AND STORE
58 IT IN NAME. END INPUT BY CR
59 OR TAB.
60 ACO HAS NUMBER ON RETURN.
61 NAME = BINARY WORD LOCATOR
62 DEVICE = ANY LEGAL DEVICE

```

10011 IOPAC

01  
02  
03  
04  
05  
06  
07  
08  
09  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29

0012 IOPAC  
01

.EOT

```

(TTI,PTR)
REQUIRES LIN
URINP. NAME,DEVICE
:PRINT THE BINARY WORD IN NAME
WITH LZS
NAME = BINARY WORD LOCATOR
DEVICE = ANY LEGAL DEVICE
(TTO,LPT,PTP)
REQUIRES LOUT
HANDLERS:
1: LIN(XX): INPUT ROUTINES FOR PTR AND TTI
TTI INCLUDES RURROUT FACILITY.
INPUT IS ENDED BY A CR OR TAB.
PTR ENDS INPUT AT ETR (END OF
TRANSMISSION BLOCK) CODE-CTR W.
(XX) REPRESENTS TT,OR PT.
TT=TTI PTE=PTR
2: LOUT(X): OUTPUT ROUTINES FOR PTP,LPT, & TTO
LPT & TTO INCLUDE A TAB FACILITY AND
INCLUDE A CR GIVING A LF FACILITY.
PTP ENDS OUTPUT WITH AN ETR (CTR W).
(X) REPRESENTS T, P, OR L.
T=TTO P=PTP L=LPT

```

0013 IOPAC

\*\*00000 TOTAL ERRORS. 00000 PASS 1 ERRORS