TEXT LISTING
068-000182-06

PROGRAM
ANALOG TO DIGITAL CONVERTER
DIAGNOSTIC

TEXT TAPE
097-000182-06

ABSTRACT
THIS IS A MAINTENANCE PROGRAM DESIGNED TO TEST THE FUNCTIONS OF THE 4120, 4032, 4033, AND 4055A-Q A TO D CONVERTERS AND OPTIONS. AT LEAST AN AC SIGNAL WIRE AND A GROUND WIRE ARE REQUIRED TO RUN THIS PROGRAM. FOR TESTING THE MULTIPLEXER SECTION, A SPECIAL RESISTOR LADDER NETWORK MUST BE USED. ALL OTHER SECTIONS MAY BE TESTED WITHOUT THIS NETWORK.
1. ABSTRACT
   THIS IS A MAINTENANCE PROGRAM DESIGNED TO TEST
   THE FUNCTIONS OF THE 4120, 4120P, 4120S, AND 4055A=Q
   A TO D CONVERTERS AND OPTIONS, AT LEAST
   AN AC SIGNAL WIRE AND A GROUND WIRE ARE REQUIRED TO
   RUN THIS PROGRAM, FOR TESTING THE MULTIPLIER
   SECTION, A SPECIAL RESISTOR LADDER NETWORK MUST BE USED.
   ALL OTHER SECTIONS MAY BE TESTED WITHOUT THIS NETWORK.
   NO MULTIPLIER RECORD CHECK IS MADE WITHOUT
   THE LADDER NETWORK.
   THIS PROGRAM WILL RUN WITH LADDER BOARDS NUMBERED
   AS FOLLOWS
   0001-574=01
   0001-446=02
   0001-465=02
   I/O IS HANDLED BY "IODAC" Routines.
   THE MAIN PROGRAM STARTS AT 045-020 ON PAGE 56.

2. MACHINERY REQUIREMENTS
   ANY STANDARD NOVAFAMILY PROCESSOR
   8K READ/WRITE MEMORY
   TYPE 4032 OR 4033 INTERFACE FOR
   TYPE 4055 SERIES CONVERTER OR
   TYPE 4120 CONVERTER
   TELETYP: KSR 33 OR ASR 33, OR CRT VISUAL PRINTER

2.1 NOTE: IN ADDITION, FOR NOVA 2 SERIES CPU'S
   AND/OR THE #/=/10 Volt A/Q7B,
   IT IS RECOMMENDED THAT A SEPARATE
   AC AND DC POWER SUPPLY BE USED FOR TESTING.
   (IF A SEPARATE SUPPLY IS NOT AVAILABLE
   A SPECIAL FILTER MUST BE USED ON THE NOVA 2 AC
   AND A #/=/10 Volt A/Q WILL BE IN ERROR IN THE
   NUMBER OF BITS IN THE A/Q D.
   (THE SPECIAL FILTER IS CONTAINED ON THE
   ABOVE LISTED LADDER BOARDS - IF NOT
   AVAILABLE, SEE 2.2 BELOW).
   THE AC SUPPLY SHOULD HAVE A PEAK
   VOLTAGE GREATER THAN 1/2 THE A/Q RANGE.
   THE DC SUPPLY SHOULD BE WELL FILTERED
   WITH LESS THAN 1 RIPPLE WITH AN OUTPUT
   VOLTAGE BETWEEN 3.0 AND 4.0 VOLTS.
   THE SPECIAL POWER SUPPLY BOARD (001-806)
   SHOULD BE USED FOR ALL TESTING IF AVAILABLE.
   IF THE SPECIAL POWER SUPPLY BOARD IS AVAILABLE
   CONNECT THE POWER CORD TO A SOURCE OF AC.
   CONNECT THE GROUND WIRE TO THE INPUT ANALOG GND.
   CONNECT THE 4.5 Volt VOLT OUTPUT TO THE LADDER
   BOARD "Y" (IF IT IS BEING USED). AND CONNECT THE 8.3
   VOLT AC OUTPUT TO THE AC INPUT ON THE LADDER
   BOARD, OR IF NO LADDER BOARD IS USED, TO
   CHANNEL 0 (CH ON IF DIFFERENTIAL), OR
   TO THE LOW CHANNEL BEING TESTED.

2.2 THE FILTER NETWORK CONSISTS OF THE
   FOLLOWING:
   BETWEEN CHANNEL 0 AND 0.3 VAC 2 CAPS OF

4. OPERATING PROCEDURE --- 4120 TYPE ---

4.1 TURN OFF AND UNPLUG THE CPU.
   THE TYPETE, AND ALL OTHER ELECTRICAL
   EQUIPMENT CONNECTED TO THE SYSTEM.

4.2 BE SURE JUMPERS W1 & W2 ARE REMOVED. INSTALL W55 ONLY
   IF DATA CHANNEL OPTION IS PRESENT.

4.3 IF YOU HAVE NEITHER A POWER SUPPLY BOARD NOR A LADDER BOARD GO TO 4.4.
   IF THE SPECIAL POWER SUPPLY BOARD IS USED
   SEE 2.1, THEN PROCEED TO 4.5 IF YOU HAVE
   THE LADDER BOARD OR TO 4.7 IF YOU DON'T.
   IF YOU HAVE ONLY A RESISTOR LADDER NETWORK
   PROCEED TO 4.5.

4.4 CONNECT A WIRE FROM THE SIGNAL (6.3 VAC) AT
   BACK PANEL PIN 82, SLOT 8 TO THE SUPERNova,
   OR WHATEVER SLOT IS BEING USED BY THE BASIC IO BOARD,
   TO CHANNEL 0 (CH ON IF DIFFERENTIAL)
   OR TO THE LOW CHANNEL.
   CONNECT A WIRE FROM 50 (GND) ON ANY SLOT
   TO ANALOG GND (CH ON IF DIFFERENTIAL)
   NOTE: BE SURE THE A/Q VOLTAGE IS AS
   SPECIFIED IN 2.1.
   GO TO 4.7.

4.5 PLUG THE GND WIRE FROM THE LADDER NETWORK
   INTO 82 (GND) OF SLOT 3 OR SLOT 4 IN THE SUPERNova,
   OR PLUG THE VAC WIRE INTO 89 (GND) OF THE SAME SLOT
   AND PLUG THE 0.3 VAC WIRE INTO 86, 83 VAC OF THE SAME SLOT.

4.51 PLUG THE RESISTOR LADDER NETWORK INTO THE JACK
   THAT CONTAINS CHANNEL 0, IN A DIFFERENTIAL SYSTEM THE
   SIGNAL (00) SIGNAL GOES TO EITHER CHASSIS GROUND
   OR TO AC RETURN IF THE SPECIAL POWER SUPPLY BOARD
   IS USED, IF THE A/Q IS SINGLE ENDED.
RUN A JUMPER FROM GROUND TO ONE CHANNEL GREATER THAN THE NUMBER OF A/D CHANNELS ON THE LADDER BOARD.
GO TO 4.7.

4. OPERATING PROCEDURE --- 6055 TYPE ---

4.1 TURN OFF AND UNPLUG THE NOVA, THE A TO D CONVERTER EQUIPMENT, THE TELETYPING, AND ALL OTHER ELECTRICAL EQUIPMENT CONNECTED TO THE SYSTEM.

4.2 CHECK THE PRESENCE OF JUMPER M1 ON INTERFACE AND CLOCK CONNECTION 447-463. NORMALLY BOTH ARE JUMPED. REMOVE M1 FOR BASIC INTERFACE. CONNECT A47 TO A48 IF EXTENDED INTERFACE HAS NO EXTERNAL CLOCK.

4.3 IF YOU HAVE NEITHER A POWER SUPPLY BOARD NOR A LADDER BOARD GO TO 4.4. IF THE SPECIAL POWER SUPPLY BOARD IS USED SEE 2.1. THEN PROCEED TO 4.91 IF YOU HAVE THE LADDER BOARD OR TO 4.7 IF YOU DON'T.

4.4 CONNECT A WIRE TO THE SIGNAL (6.3 VAC) AT BACK PANEL: PIN 86, SLOT 3 IN THE NOVA 800, OR SLOT 8 IN THE SUPERNOVA, OR SLOT 3 IN THE NOVA 1200, OR WHATSOEVER SLOT IS BEING USED BY THE BASIC I/O BOARD, TO CHANNEL 0 (CH 0L IF DIFFERENT). OR TO THE LOW CHANNEL.
CONNECT A WIRE FROM R1 (1.0U) ON ANY SLOT TO ANALOG GROUND (CH 0L IF DIFFERENT). OR TO THE LOW CHANNEL.
NOTE: BE SURE THE A.C. VOLTAGE IS AS SPECIFIED IN 2.1.
GO TO 4.7.

4.5 PLUG THE GROUND WIRE FROM THE LADDER NETWORK INTO 82 (GND) ON SLOT 3 OR SLOT 4, OR WHATSOEVER SLOT IS USED BY THE BASIC I/O BOARD.
PLUG THE +VAC WIRE INTO B6 (+5V) OF THE SAME SLOT, AND PLUG THE VAC WIRE INTO B6 (+5.3VAC) OF THE SAME SLOT.
CONNECT THE OTHER END TO THE RESISTOR LADDER BOARD FOR TESTING THE MUXED IN.

4.6 CONNECT THE PLUG OF THE RESISTOR LADDER BOARD TO THE A TO D CONVERTER.
CONNECT THE GROUND CLIP OF THE RESISTOR LADDER BOARD TO THE CHASSIS OF THE NOVA OR TO ANALOG GROUND IF A DIFFERENTIAL SYSTEM.

4.7 PLUG IN AND TURN ON THE SYSTEM.

4.8 LOAD THE PROGRAM VIA THE BINARY LOADER.

4.9 SET SWITCHES TO 000002 OR 200 (OR OPTIONAL 000003 SEE SECT. 9.2).

4.10 PRESS RESET

4.11 PRESS START

NOTE: WHEN IT IS DESIRED TO START THE PROGRAM AT A GIVEN ADDRESS AND ALSO HAVE A GIVEN CONFIGURATION OF DATA SwitchES SET UPON STARTING, DO THE FOLLOWING:
ENTER THE STARTING ADDRESS IN THE DATA SWITCHES PRESS "EXAMINE", RESET ALL SWITCHES EXCEPT THOSE DESIRED TO BE ON, PRESS "CONTINUE".

4.12 THE PROGRAM WILL REQUEST THAT YOU TYPE IN SEVERAL QUANTITIES. TYPE EACH NUMBER AND CARRIAGE RETURN OR A SPACE.
IF YOU ARE NOT USING THE MUX RESISTOR LADDER BOARD, TYPE "1" FOR THE NUMBER OF CHANNELS, AND "0" FOR LOW CHANNEL. INCREMENT THESE NUMBERS AND REPEAT THIS TEST UNTIL ALL CHANNELS ARE TESTED.

EXAMPLE:

COMPUTER TYPES:
*THE CPU TYPE IS836*
YOU RESPOND WITH ONE OF THE FOLLOWING CODES:
NOVA 800 = 0
NOVA 800 = 0
SUPERNOVA = 0
NOVA 1200 = 1
NOVA 1200 = 1
NOVA 8 = 2
NOVA 8 = 2
NOVA 3 = 4
(4 CORE MEMORY)
NOVA 3 = 4
(4 CORE MEMORY)
ECLIPSE 0 = 3
(8 CORE MEMORY)
ECLIPSE 0 = 3
(8 CORE MEMORY)
ECLIPSE 2 = 4
(2X512 MEMORY)
ECLIPSE 2 = 4
(2X512 MEMORY)
ECLIPSE 4 = 5
(4X512 MEMORY)
ECLIPSE 4 = 5
(4X512 MEMORY)
ECLIPSE 8 = 6
(8X512 MEMORY)
ECLIPSE 8 = 6

*TYPE A/D DEVICE CODE (OCTAL), LOWER VOLTAGE LIMIT, UPPER VOLTAGE LIMIT,
007 IOPAC

01 NUMBER OF BITS, NUMBER OF CHANNELS (DECIMAL),
02 AND LOW CHANNEL WITH A.C. (DECIMAL)."
03 YOU TYPE:
04 21
05 -10
06 10
07 12
08 48
09 32
10 THE PROGRAM WILL REQUEST THAT YOU TYPE A T OR AN F
11 FOR "TRUE" OR "FALSE" FOR THE FOLLOWING.
12 13 4.13 THE PROGRAM WILL ASK (T OR F)
14 IF THE A/D BEING TESTED HAS AN EXTENDED
15 INTERFACE BOARD.
16 17 4.14 THE PROGRAM WILL ASK (T OR F)
18 IF YOU WISH A 0.1% LADER TOLERANCE,
19 "F" WILL GIVE THE STANDARD 1% TOLERANCE
20 IF THE LADER BOARD IS PRESENT.
21 NOTE.... UNLESS THE ACCURACY OF THE LADER
22 BOARD RESISTORS HAS BEEN CHECKED, USE IT !
23 24 4.15 THE PROGRAM WILL ASK (T OR F)
25 IF THE A/D CONVERTER IS TYPE 4120.
26 27 4.16 THE PROGRAM WILL ASK (T OR F) (4120 ONLY)
28 IF THE CONVERTER HAS A PROGRAMMABLE AMPLIFIER.
29 30 4.17 THE PROGRAM WILL ASK (T OR F) (4055 ONLY)
31 IF THERE IS A SAMPLE & HOLD OR IF THERE IS A MULTIPLEXER.
32 33 4.18 THE PROGRAM WILL RUN UNTIL MANUALLY STOPPED
34 OR AN ERROR IS DETECTED. AT THE END OF EACH PROGRAM
35 PASS THE WORD "PASS" WILL BE PRINTED. ALLOW
36 THE PROGRAM TO COMPLETE SEVERAL PASSES.
37 38 5.0 THERE IS A SPECIAL SELECTION ROUTINE
39 AVAILABLE FOR BOTH TYPE A/D CONVERTERS
40 IF THE LADER NETWORK IS NOT AVAILABLE.
41 THIS ROUTINE SCANS THE A/D CHANNELS LOOKING
42 FOR A GROUNDED CHANNEL. WHEN ONE IS FOUND
43 THE CHANNEL NUMBER WILL BE PRINTED OUT IN
44 DECIMAL ON THE TELETYPE FOLLOWED BY THE DC
45 BIT OFFSET MEASURED.
46 AFTER COMPLETING SEVERAL "PASSES" ONLY ON
47 CHANNEL 0, THIS ROUTINE MAY BE CALLED UP BY
48 RESTARTING AT LOC 3.
49 50 5.1 A SINGLE W/W51 OHM RESISTOR IS
51 REQUIRED FOR TESTING. THIS NETWORK IS
52 CONNECTED BETWEEN THE CHANNEL TESTED
53 AND GROUND ON SINGLE ENDED SYSTEMS AND
54 IS CONNECTED BETWEEN THE HIGH INPUT
55 AND LOW INPUT OF THE DIFFERENTIAL CHANNEL
56 BEING TESTED.
6.0 PROGRAM OUTPUT/ERROR DESCRIPTION

EXAMINE THE LISTING TO DETERMINE IF OTHER AC CONTENTS ARE IMPORTANT. THE OPERATOR MAY CHANGE SWITCH SETTINGS AT THIS TIME. IF DESIRED, IF SWITCHES 1 AND 2 ARE ZERO (OFF) PRESSING CONTINUE WILL CAUSE A PRINT-OUT OF THE ERROR LOCATION, THE ROUTINE WILL ENTER A LOOP SUITABLE FOR SCOPING.
WHEN THE PROGRAM IS IN A SCOPE LOOP, SETTING SWITCH 3(1) WILL CAUSE THE FAILURE RATE TO BE PRINTED. SETTING SWITCH 4(1) WILL CAUSE THE PROGRAM TO PROCEED TO THE NEXT TEST.

6.2 THE FOLLOWING ERROR MESSAGES ARE POSSIBLE:

- THERE IS NO PROGRAMMABLE AMPLIFIER
- 12 BITS
- EXTENDED A TO D INTERFACE
- 24 MICROSECONDS IS CORRECT TIME: MEASURED TIME IS 35 MICROSECONDS
- THESE NUMBERS, OF COURSE, ARE ONLY REPRESENTATIVE.
- THEY INDICATE THAT THE PROGRAM DOESN'T DETECT THESE VARIABLES TO BE EQUAL TO WHAT YOU TYPED IN.
- THE NUMBER OF BITS IN THE CONVERTER, WHETHER YOU HAVE A PROGRAMMABLE AMPLIFIER, WHETHER YOU ARE USING A BASIC OR EXTENDED INTERFACE, THE SPECIFIED TOTAL TIME FOR CONVERSION, AND THE TIME FOR A CONVERSION OPERATION, FROM START PULSE TO DONE STATUS.

7.0 RESTRICTIONS/Misc
NO COMPLETE DATA ACCURACY CHECK IS MADE.
COC.

READ. NAME,DEVICE,SPECIAL

WRITE. NAME,DEVICE,SPECIAL

PRINT. NAME,DEVICE
PTR ENDS INPUT AT ETB (END OF TRANSMISSION BLOCK) CODE=CTH H.
(XI) REPRESENTS TT, OR PT.

21 LOUT(X): OUTPUT ROUTINES FOR PTP, LPT, & TTO
LPT & TTO INCLUDE A TAM FACILITY AND INCLUDE A OR GIVING A LF FACILITY.
PTP ENDS OUTPUT WITH AN ETB (CTH H).
(X) REPRESENTS T, P, OR L.
T=PTO P=PTP L=LPT