

TEXT LISTING

068-001663-00

PROGRAM

CS30 ARITHMETIC TEST

TEXT TAPE

097-001663-00

ABSTRACT

THE ARITHMETIC TEST FOR CS30 IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE THE ARITHMETIC AND LOGICAL INSTRUCTIONS OF THE NOVA COMPUTERS. THE PROGRAM ADJUSTS ITS PARAMETERS TO THE SIZE OF MEMORY AND RELOCATES ITSELF TO VARIOUS AREAS OF MEMORY.

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0001 LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
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0002 LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
01   .MAIN  ARITHMETIC TEST
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:1.  ABSTRACT
      ARITHMETIC TEST IS A MAINTENANCE PROGRAM
      DESIGNED TO EXERCISE THE ARITHMETIC AND
      LOGICAL INSTRUCTIONS OF THE NOVA COMPUTERS.
      THE PROGRAM ADJUSTS IT'S PARAMETERS TO THE
      SIZE OF MEMORY AND RELOCATES ITSELF TO VARIOUS
      AREAS OF MEMORY.

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:2.  MACHINE REQUIREMENTS
      :2.1 NOVA FAMILY PROCESSOR
      :2.2 4K READ/WRITE MEMORY
      :2.3 TELETYPE

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:3.  SWITCH SETTINGS

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LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS
(NOT SYSTEM CONFIGURATION). WHILE RUNNING UNDER DTOS,
THIS LOCATION WILL BE LOADED BY THE MONITOR.
HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES THIS
LOCATION WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED
BY THE OPERATOR. IN ANY CASE THE OPTIONS CAN BE CHANGED
OR VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC.
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SWITCH OPTIONS
DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
"SWREG" IS AS FOLLOWS:

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BIT   OCTAL  BINARY  INTERPRETATION
      VALUE   VALUE

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1     40000  1      LOOP ON ERROR
                       SKIP LOOPING ON ERROR

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2     20000  1      PRINT TO CONSOLE
                       ABORT PRINT OUT TO CONSOLE

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3     10000  1      PRINT DETAILED ERROR ON THE
                       SELECTED DEVICE/DEVICES
                       ONLY % FAILURE REQUIRED

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4     04000  1      ALLOW END OF PASS PRINT OUT
                       SUPPRESS END OF PASS PRINT OUT

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5     02000  1      DO NOT PRINT ON THE LINE PRINTER
                       PRINT ON THE LINE PRINTER

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6     01000  1      DO NOT HALT ON ERROR
                       HALT ON ERROR

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10003 .MAIN
01 SWITCH COMMANDS
02 ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
03 THE BITS CAN BE CHANGED BY HITTING KEYS 1 THROUGH 6. THE
04 PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS.
05 EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIAT-
06 ED WITH IT, THUS HIT 4 CAN BE ALTERED BY HITTING KEY 4.
07 SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
08 (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
09 THE PROGRAM CAN BE LOCKED INTO SWITCH MODIFICATION MODE
10 BY TYPING A 0, IN WHICH CASE MORE THAN ONE BITS CAN BE
11 CHANGED BEFORE THE CONTROL IS ALLOWED TO RETURN TO THE
12 MAIN PROGRAM.
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3.2 OTHER COMMANDS

"CR" A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE

"D THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG" TO DEFAULT MODE AND RESTART THE PROGRAM.

"R THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE PROGRAM. SWITCHES ARE LEFT WITH THE VALUES THEY HAD BEFORE THE COMMAND WAS ISSUED.

"O THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE PROGRAM CONTROL TO GO TO OUT (SEE SEC. 6)

M THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE CURRENT OPERATING MODES.

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10004 .MAIN
01 OPERATING PROCEDURE
02 LOAD THE PROGRAM VIA THE BINARY LOADER
03 AND START AT 200.
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14.1 OPERATING PROCEDURE

LOAD THE PROGRAM VIA THE BINARY LOADER AND START AT 200.

SEE SECTION 8.0 FOR RESTART PROCEDURE.

UPON STARTING, THE PROGRAM WILL PRINT THE MESSAGE "LAST LOCATION IN MEMORY IS XXXXX". THE OPERATOR SHOULD CHECK THE VALUE PRINTED WITH THE SYSTEM MEMORY SIZE. IF THEY DO NOT AGREE, A ERROR HAS OCCURED.

THE PROGRAM WILL RUN UNTILL MANUALLY STOPPED. AT THE END OF EACH PROGRAM ITERATION THE WORD "PASS" WILL BE PRINTED AND THE PROGRAM WILL RELOCATE ITSELF TO ANOTHER AREA OF MEMORY.

14.2

14.3

PROGRAM OUTPUT/ERROR DESCRIPTION

WHEN A ERROR IS DETECTED BY THE PROGRAM THE FOLLOWING WILL BE PRINTED:

ABS PC THE MEMORY LOCATION OF THE ERROR SUBROUTINE CALL.

LIST PC WHERE TO LOOK IN THE LISTING TO FIND THE FAILING ROUTINE.

ORIGINAL THE ACCUMULATOR VALUES AS DETERMINED VIA THE RANDOM NUMBER GENERATOR.

AC0,AC1,AC2

RESULT THE RESULT IN THE ACCUMULATORS PRIOR TO THE ERROR CALL

AC0,AC1,AC2

AFTER THE PRINTOUT THE PROGRAM WILL ITERATE THE FAILING ROUTINE WITH THE SAME NUMBERS AS PRINTED. CONSOLE SWITCH 3(1) MAY BE USED TO DETERMINE THE RATE OF FAILURE. SWITCH I(1) WILL CAUSE THE PROGRAM TO PROCEED TO THE NEXT TEST.

PROGRAM DESCRIPTION

THIS PROGRAM CONSIST OF A NUMBER OF SUBROUTINES PERFORMING VARIOUS OPERATIONS ON SETS OF PSEUDO RANDOM NUMBERS. SOME ROUTINES PERFORM MORE THEN ONE OPERATION, SUCH AS TAKING THE SQUARE ROOT OF A SQUARED NUMBER, WHEN THE OPERATOR QUESTIONS WHICH RESULT IS CORRECT, THE OPERATIONS MAY BE PERFORMED WITH PENCIL AND PAPER ON THE ORIGINAL NUMBERS.

AT THE END OF EACH PROGRAM ITERATION THE PROGRAM RELOCATES ITSELF TO ANOTHER AREA OF MEMORY FOR EXECUTION AT THAT SPOT. THIS RELOCATION PLACES DIFFERENT OPERATING CONDITIONS ON THE PROCESSOR REGISTERS SUCH AS, THE MEMORY ADDRESS REGISTER AND THE PROGRAM COUNTER.

BECAUSE THIS PROGRAM IS USED AS A FINAL TEST OF THE ARITHMETIC AND LOGICAL INSTRUCTIONS IT IS COMPLEX AND DIFFICULT TO TROUBLE SHOOT. IT IS THEREFOR SUGGESTED THAT THIS PROGRAM BE RUN AFTER OTHER PROCESSOR TEST.

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10005 .MAIN

37. OCTAL DEBUG TOOL (ODT)

THE DIAGNOSTIC IS EQUIPPED WITH A BUILT IN ODT WHICH CAN BE ACCESSED BY HITTING CONTROL 0 ("O") AT ANY TIME DURING THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARAMETERS).

ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.

CONVENTIONS AND SYMBOLS

THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:

PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RESPOND WITH A "P".

ODT IS READY AND AT YOUR SERVICE.

COMMAND STRUCTURE

AN ODT COMMAND THE FOLLOWING FORMAT:

[ARGUMENT] [COMMAND]

AN ARGUMENT MAY BE ONE OF THE FOLLOWING:

EXP AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEADING ZEROS NEED NOT BE TYPED.

ADR AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT THAT BIT 0 IS NEGLECTED.

A COMMAND IS A SINGLE TELETYPE CHARACTER

ODT COMMANDS

THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPE: INTERNAL CPU CELLS AND MEMORY LOCATIONS.

OPENING INTERNAL CELLS

THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN 0 AND 7

FOR ACCUMULATORS 0-3

FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN THE EVENT OF A "P" COMMAND.

CPU AND I/O STATUS

BIT INTERPRETATION

15 STATUS OF I/O DONE FLAG

14 STATUS OF INTERRUPTS

13 STATUS OF CARRY BIT

ADDRESS OF THE LOCATION HAVING BREAK POINT (IF ANY)

INSTRUCTION AT THE BREAK POINT LOCATION

10006 .MAIN

OTHER COMMANDS TO OPEN CELLS ARE:

ADM/ OPEN THE CELL AND PRINT ITS CONTENTS

./ OPEN THE CELL CURRENTLY POINTED BY THE POINTER AND PRINT ITS CONTENTS.

\*+ADR/ ADD ADR TO THE POINTER, OPEN THE CELL AND PRINT ITS CONTENTS.

\*-ADR/ SUBTRACT ADR FROM THE POINTER, OPEN THE CELL AND PRINT ITS CONTENTS.

"CR" THE RETURN KEY IS USED TO CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION.

"LF" LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING CELL.

/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED BY ITS CONTENTS.

\*ADR/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED BY ITS CONTENTS + ADR.

-ADR/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND OPEN THE CELL POINTED BY ITS CONTENTS - ADR.

MODIFICATION OF A CELL

ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF". IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EXPRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. ADDRESS ITSELF OR AN EXPRESSION RELATIVE TO THE ADDRESS CAN BE DEPOSITED BY TYPING A "." OR "\*/-OCTAL EXPRESSION". A REBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.

OTHER ODT COMMANDS

RUNOUT THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED DIGITS. EACH TIME THE KEY IS PRESSED RIGHT MOST DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A CELL THEN IT ALLOWS THE MODIFICATION OF THE CELL AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE KEY WAS PRESSED.

ADRB INSERT A BREAK POINT AT LOCATION "ADR". ONLY ONE BREAK POINT CAN BE INSERTED AND ANY ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL CAUSE IT TO BE DELETED.

D DELETE THE BREAK POINT IF ANY.

P RESTART THE EXECUTION OF THE PROGRAM AT LOCATION POINTED BY "A".

ADRR START EXECUTING THE PROGRAM AT "ADR" AFTER AN I/O-RESET.

K KILL THE STRING TYPED SO FAR. THE ODT RESPONDS WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT MODIFICATION.

MISC

IF THIS PROGRAM IS MANUALLY STOPPED WHEN IN THE PROCESS OF RELOCATION, IT CAN BE RESTARTED AT LOCATION 200.

10005 .MAIN

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0007 .MAIN

\*\*00000 TOTAL ERRORS, 00000 PASS 1 ERRORS