

- 1. IDENTIFICATION
- 1.1 Digital-8-29-U-Sym
- 1.2 Double Precision Decimal-to-Binary Conversion
and Input (ASR-33) (Signed or Unsigned)
- 1.3 January 14, 1966

2. ABSTRACT

This routine accepts a string of up to eight decimal digits (double-precision for the PDP-8) from the Teletype keyboard and converts it to the corresponding two's complement binary number.

The string may contain as legal characters a sign (+, -, or space) and the digits 0-9. If the first legal character is not a sign, the conversion is unsigned. A "back-arrow" (\leftarrow) at any point in the string erases the current string and allows the operator to re-enter the value. Any character after the first, other than another digit or "back-arrow", causes the conversion to terminate and is found in location "DIDSAV" within the subroutine.

3. REQUIREMENTS

3.1 Storage

This subroutine requires 110 core locations.

3.2 Subprograms and/or Subroutines (None)

3.3 Equipment

Basic PDP-8 with ASR-33

4. USAGE

4.1 Loading

The symbolic tape provided may be assembled with the user's main program with either PAL III or MACRO-8. There is neither origin setting nor terminating "\$" on the symbolic tape, but a PAUSE pseudo-instruction is the last line on the tape.

4.2 Calling Sequence

The subroutine is called by an effective JMS to location DDCB. The location immediately following the JMS instruction contains the address of the location where the high-order portion of the number is stored. (It is assumed that the low-order portion of the number is in the location immediately following the high-order portion.) Return is to the second location down from the calling JMS with the AC clear.

4.3 Switch Settings (Not Applicable)

4.4 Start-up and/or Entry (Not Applicable)

4.5 Errors in Usage

If the string of decimal digits is preceded by a sign (+, -, or space), the maximum decimal number that is correctly accepted is 8388607 ($2^{23}-1$). The sign, if any, must appear first. If the string of decimal digits is not preceded by a sign, the maximum decimal number that is correctly accepted is 16777215 ($2^{24}-1$).

4.6 Recovery from such Errors

If neither of these maxima is exceeded, the results are unspecified.

5. RESTRICTIONS (None)

5.1 Status Active Registers

The status of AC and link is not preserved.

5.2 Status Core (Not Applicable)

5.3 Status Hardware

This subroutine should not be used with the interrupt on.

5.4 Miscellaneous

The magnitude restrictions on numbers is described in 4.5.

6. DESCRIPTION

6.1 Discussion

The discussion, example and scaling of the conversion is given in 6.1 and 6.3 of the write-up on Digital-8-28-U. The only difference is that the multiplications by "4" and "2" are performed by the arithmetic shifts as described in Digital-8-8-U.

7. METHOD

See Digital-8-12-U.

8. FORMAT

8.1 Input Data

The input string may or may not contain a sign (+, -, or space). Any character other than a sign, 0-9, or rubout causes the subroutine to terminate as does a sign in any but the first position.

8.2 Core Data

The high-order portion of the binary equivalent of the number is found in the location specified by the address following the JMS. The low-order portion is found in the next successive location. This is the format compatible with the double-precision, fixed point arithmetic subroutines. The terminating character is found in location DIDSAV.

8.3 Output Data

Spacing tabulation, carriage return, etc., are not provided for in this subroutine. See Digital-8-19-U-Sym which contains short subroutines for the latter purposes.

9. EXECUTION TIME

9.1 Minimum (Not Applicable)

9.2 Maximum (Not Applicable)

9.3 Average
This subroutine is input limited at a maximum of 10 cps.

10. PROGRAM

10.1 Core Map (None)

10.2 Dimension List(s) (None)

10.3 Macro, Parameter, and Variable Lists (None)

10.4 Program Listing

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/DOUBLE PRECISION DECIMAL-TO-BINARY CONVERSION AND INPUT
/CALLING SEQUENCE:
/
/          JMS DICONV /SUBROUTINE CALLED
/          ADDRESS   /ADDRESS TO STORE HIGH-ORDER
/                   /LOW -ORDER WORD IN ADDRESS+1
0200  0000  DICONV,  0
0201  7300          CLA GLL          /INITIALIZE PROGRAM SWITCHES
0202  1324          TAD DISET1+1
0203  3235          DCA DICTRL
0204  1324          TAD DISET1+1
0205  3227          DCA DIXSW1
0206  1600          TAD I DICONV      /PICK UP ADDRESS TO STORE HI
0207  3351          DCA DIGET
0210  3352          DCA DIHIHD      /CLEAR LOCATIONS USED TO HOL
0211  3353          DCA DILOHD      /NUMBER
0212  3347          DCA DINEG1      /CLEAR NEGATIVE SWITCH
0213  5275          JMP DIIN
0214  3350  DIPROC, DCA DIDSAV      /STORE CHARACTER
0215  1350          TAD DIDSAV
0216  1341          TAD DIRBUT
0217  7450          SNA
0220  5201          JMP DICONV+1     /IS IT A "BACK-ARROW"(IE. ER
0221  1342          TAD DIM260      /YES, REINITIALIZE
0222  7510          SPA
0223  5235          JMP DICTRL      /IS IT LESS THAN 260 (IE. "07
0224  1343          TAD DIM271      /YES, TRANSFER TO SEE WHAT C
0225  7740          SMA SZA CLA     /IS IT GREATER THAN 271 (IE. 9
0226  5235          JMP DICTRL      /YES, TRANSFER TO SEE WHAT C
0227  7300  DIXSW1, CLA GLL        /NO, FIRST CHARACTER WAS A D
0230  1234          TAD .+4         /CLOSE SWITCH TO GO TO "DINM
0231  3227          DCA .-2
0232  1250          TAD DINMBR-1    /SET SWITCH TO SENSE TERMINA
0233  3235          DCA DICTRL
0234  5251          JMP DINMBR
0235  7200  DICTRL, CLA           /CONTINUE CHECKING TO DETERM
0236  1350          TAD DIDSAV
0237  1344          TAD DIMSPC
0240  7450          SNA
0241  5324          JMP DISET1+1    /IS IT A "SPACE"?
0242  1345          TAD DIMPLS      /YES, SET SWITCH TO SENSE TE
0243  7450          SNA
0244  5324          JMP DISET1+1    /IS IT A "PLUS"?
/YES, SET SWITCH TO SENSE TE

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0334 1352 TAD DIHIHD
 0335 7004 RAL
 0336 3352 DCA DIHIHD
 0337 5730 JMP I DIDSPL

/CONSTANTS AND VARIABLES

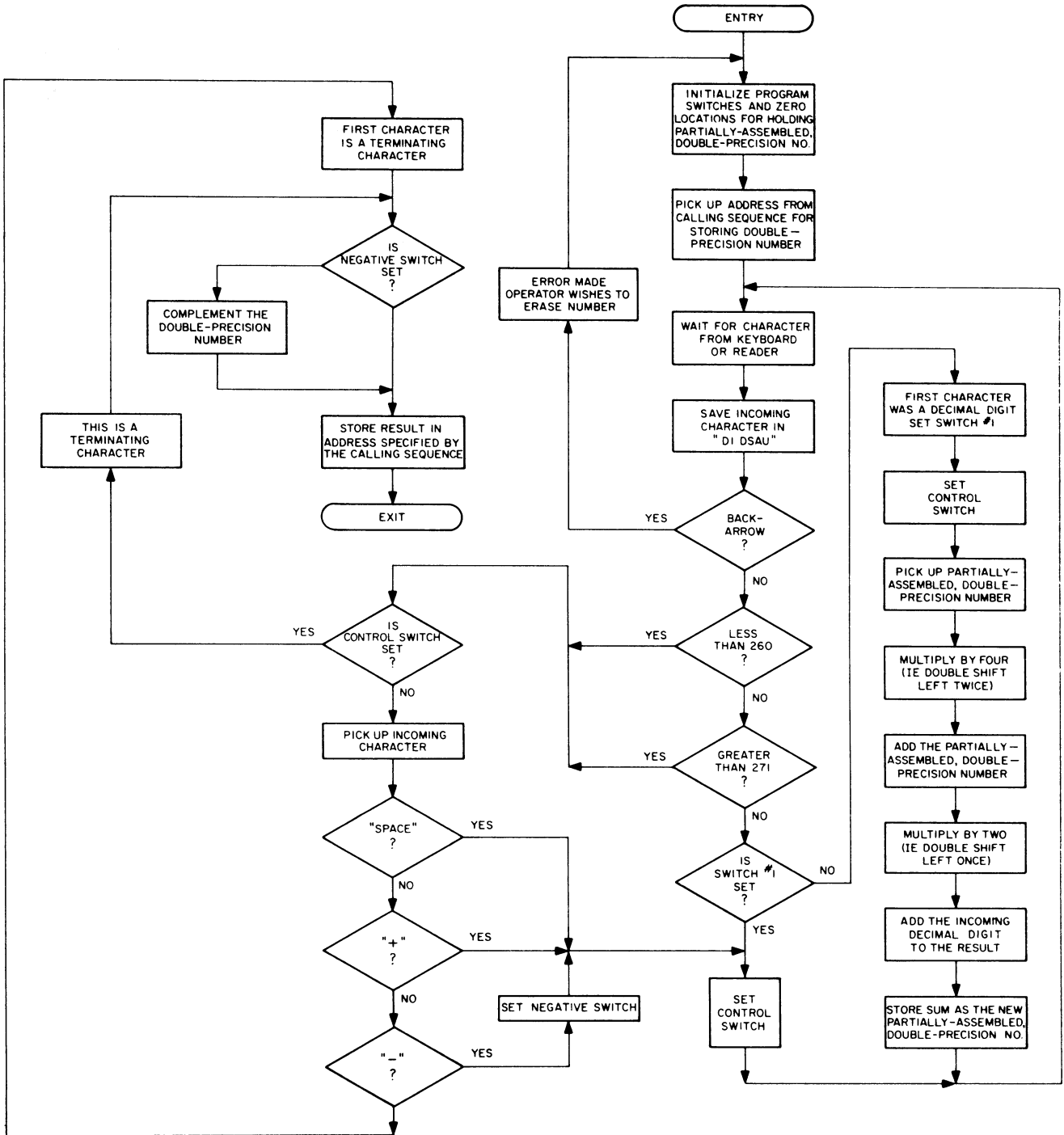
0340	0017	DIXMSK,	17	/MASK FOR LAST FOUR BITS
0341	7441	DIRBUT,	-337	/CODE FOR ERASE
0342	0057	DIM260,	57	/NUMBER USED TO GENERATE CODE
0343	7767	DIM271,	-11	/NUMBER USED TO GENERATE CODE
0344	7540	DIMSPC,	-240	/CODE FOR SPACE
0345	7765	DIMPLS,	-13	/NUMBER USED TO GENERATE CODE
0346	7776	DIMMNS,	-2	/NUMBER USED TO GENERATE CODE
0347	0000	DINEG1,	0	/STORAGE LOCATIONS
0350	0000	DIDSAV,	0	
0351	0000	DIGET,	0	
0352	0000	DIHIHD,	0	
0353	0000	DILOHD,	0	
0354	0000	DIXTM1,	0	
0355	0000	DIXTM2,	0	

PAUSE

DICONV 0200
 DICTRL 0235
 DIDSAV 0350
 DIDSPL 0330
 DIEND 0302
 DIGET 0351
 DIHIHD 0352
 DIIN 0275
 DILOHD 0353
 DIMMNS 0346
 DIMPLS 0345
 DIMSPC 0344
 DIM260 0342
 DIM271 0343
 DINEG1 0347
 DINMBR 0251
 DIPROC 0214
 DIRBUT 0341
 DISET1 0323
 DIXMSK 0340
 DIXSW1 0227
 DIXTM1 0354
 DIXTM2 0355

11. DIAGRAMS

11.1 Flow Chart



12. REFERENCES

12.1 Other Library Programs

Digital-8-8-U-Sym

Digital-8-19-U-Sym

Digital-8-28-U-Sym

