

- 1. IDENTIFICATION
- 1.1 Digital-8-11-U
- 1.2 Double Precision Binary Coded Decimal to Binary
- 1.3 March 18, 1966

2. ABSTRACT

This subroutine converts a 6-digit BCD number to its equivalent binary value in two computer words.

3. REQUIREMENTS

3.1 Storage

This subroutine requires 89 (decimal) memory locations.

3.2 Subprograms and/or Subroutines (None)

3.3 Equipment

Standard PDP-8

4. USAGE

4.1 Loading

The subroutine is loaded with the Binary Loader. The symbolic is either assembled with the user program or separately with the proper origin setting.

4.2 Calling Sequence

This subroutine is called with an effective JMS DOUBLE followed by the address of the high-order word of the double-precision BCD number. Control is returned to the following location with the high-order part of the result in C(AC) and with the low-order part of the result in C(LOW).

4.3 Switch Settings (None)

5. RESTRICTIONS (Not Applicable)

6. DESCRIPTION

6.1 Discussion

Upon entry, the BCD number is in the form:

$$(16^2D_1 + 16D_2 + D_3); (16^2D_4 + 16D_5 + D_6)$$

(each digit is 4 bits, $2^4 = 16$)

Using the single precision BCD to binary subroutine, then is reduced to

$$(10^2D_1 + 10D_2 + D_3); (10^2D_4 + 10D_5 + D_6)$$

The high order part of the BCD word is effectively multiplied by 1000 (= 8(128 - 3)) and the low-order part is added, giving

$$10^5 D_1 + 10^4 D_2 + 10^3 D_3 + 10^2 D_4 + 10 D_5 + D_6.$$

See Digital-8-10-U.

6.2 Examples

GO,	JMS I X				
	HIGH				
	HLT				
X,	DOUBLE				
HIGH,	1001	1001	1001	1	999,999
LOW,	1001	1001	1001		

If this program were started at GO, the C(AC) at the halt would be 0364₈ and C(LOW) would be 1077₈, i.e., 03641077₈ = 999,999₁₀.

7. METHOD (Not Applicable)

8. FORMAT (Not Applicable)

9. EXECUTION TIME

9.1 Minimum
252 μsec

9.2 Maximum
255 μsec

- 10. PROGRAM
- 10.1 Core Map (Not Applicable)
- 10.2 Dimension List(s) (Not Applicable)
- 10.3 Macro, Parameter, and Variable Lists (None)
- 10.4 Program Listing

/DIGITAL 8-11-U-SYM

/DOUBLE PRECISION BCD TO BINARY CONVERSION

/CALLING SEQUENCE:

/ JMS DOUBLE
/ ADDRESS OF HIGH ORDER ARGUMENT
/ RETURN: C(AC)=HIGH ORDER PART
/ C(LOW) = LOW ORDER PART

/ALSO CONTAINS SINGLE PRECISION BCD TO BINARY

/CALLING SEQUENCE:

/ C(AC) = 3 BCD CHARACTERS
/ JMS BCDBIN
/ RETURN: ANSWER IN C(AC)

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0200 0000 DOUBLE, 0
0201 7300 CLA CLL
0202 1600 TAD I DOUBLE / FETCH ADDRESS
0203 3271 DCA LOW1 / STORE
0204 2200 ISZ DOUBLE / INCREMENT RETURN
0205 1671 TAD I LOW1 /FETCH HIGH ORDER
0206 4275 JMS BCDBIN /CONVERT IT
0207 3272 DCA HIGH1 / STORE
0210 2271 ISZ LOW1 / INCREMENT POINTER
0211 1671 TAD I LOW1 /FETCH LOW ORDER
0212 4275 JMS BCDBIN /CONVERT IT
0213 3271 DCA LOW1 / STORE IT
0214 1272 TAD HIGH1
0215 7112 QLL RTR
0216 7012 RTR
0217 7010 RAR /MULTIPLY HIGH ORDER
0220 3275 DCA BCDBIN /PART BY 128
0221 1275 TAD BCDBIN
0222 0327 AND K177
0223 3274 DCA HIGH
0224 1275 TAD BCDBIN
0225 7010 RAR
0226 0325 AND K7600
0227 3273 DCA LOW
0230 1272 TAD HIGH1 / MULTIPLY HIGH ORDER
0231 7104 QLL RAL / BY THREE
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0232	1272	TAD HIGH1	/ FORM 128*HIGH-3*HIGH
0233	7141	QIA CLL	
0234	1273	TAD LOW	
0235	3273	DCA LOW	
0236	7420	SNL	
0237	7040	QMA	
0240	1274	TAD HIGH	
0241	3274	DCA HIGH	/ 125*HIGH
0242	1274	TAD HIGH	/ NOW MULTIPLY BY 8
0243	7106	QL RTL	
0244	7004	RAL	
0245	0326	AND K7770	/ MASK 9 BITS
0246	3274	DCA HIGH	
0247	1273	TAD LOW	
0250	7106	QL RTL	
0251	7004	RAL	
0252	3273	DCA LOW	
0253	1273	TAD LOW	
0254	7004	RAL	
0255	0324	AND K7	/3 BITS
0256	1274	TAD HIGH	
0257	3274	DCA HIGH	
0260	1273	TAD LOW	
0261	0326	AND K7770	/ 9 BITS
0262	7100	QLL	
0263	1271	TAD LOW1	/ ADD LOW ORDER PART
0264	3273	DCA LOW	/ STORE LOW ORDER PART
0265	1274	TAD HIGH	
0266	7430	SZL	
0267	7001	IAC	/CARRY
0270	5600	JMP I DOUBLE	
0271	0000	LOW1,	0
0272	0000	HIGH1,	0
0273	0000	LOW,	0
0274	0000	HIGH,	0

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/SINGLE PRECISION CONVERSION
0275 0000 BCDBIN, 0
0276 3274 DCA HIGH
0277 1274 TAD HIGH
0300 0330 AND K7400 / LEFT DIGIT
0301 7112 CLL RTR
0302 3273 DCA LOW
0303 1273 TAD LOW
0304 7010 RAR
0305 1273 TAD LOW
0306 7041 CIA
0307 1274 TAD HIGH
0310 3274 DCA HIGH
0311 1274 TAD HIGH
0312 0323 AND K7760
0313 7112 CLL RTR
0314 3273 DCA LOW
0315 1273 TAD LOW
0316 7010 RAR
0317 1273 TAD LOW
0320 7041 CIA
0321 1274 TAD HIGH
0322 5675 JMP I BCDBIN
0323 7760 K7760, 7760
0324 0007 K7, 7
0325 7600 K7600, 7600
0326 7770 K7770, 7770
0327 0177 K177, 177
0330 7400 K7400, 7400

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BCDBIN 0275
DOUBLE 0200
HIGH 0274
HIGH1 0272
K177 0327
K7 0324
K7400 0330
K7600 0325
K7760 0323
K7770 0326
LOW 0273
LOW1 0271

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