

- 1. IDENTIFICATION
- 1.1 Digital-8-24-U-Sym
- 1.2 Unsigned Decimal Print, Double Precision
- 1.3 January 19, 1966

2. ABSTRACT

This subroutine permits the typeout of a double-precision integer stored in the usual convention for double-precision numbers, (see Digital-8-13-F-Sym). The one exception is that all 24 bits are interpreted as magnitude bits (i.e. the bit "0" of the high-order word is not a sign bit). The typeout is in the form of a seven-digit, positive, decimal integer.

3. REQUIREMENTS

3.1 Storage

This subroutine requires (73) 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 is assembled with either PAL III or MACRO-8. It may be assembled with the user program or separately with the proper origin setting. Neither origin setting nor "\$" terminating character exists on the tape, but the tape does have a PAUSE on the end.

4.2 Calling Sequence

This subroutine is called by an effective JMS UDPRNT. The location immediately following the calling JMS contains the address of the high-order portion of the double-precision integer stored in the usual double-precision format.

5. RESTRICTIONS (none)

6. DESCRIPTION

6.1 Discussion

This is basic double-precision subroutine used to obtain decimal output corresponding to double-precision, binary words. First, the binary equivalent of 10,000,000 is subtracted from the original number until under-flow occurs. A count is kept of the number of subtractions necessary to accomplish this, thus yielding the most significant decimal digit. Then this digit is added to 2608 and printed on the ASR-33 through the AC. This process is repeated using the proper power of ten to give the seven remaining digits.

6.2 Examples and/or Applications (none)

6.3 Scaling

The numbers are interpreted and typed out as integers.

7. METHOD (See Digital-8-22-U-Sym)

8. FORMAT

8.1 Input Data (Not Applicable)

8.2 Core Data

The double-precision integers are stored in the usual double-precision format, (see Digital-8-13-F-Sym), with the exception that bit "0" of the high-order word is interpreted as part of the number not a sign bit.

8.3 Output Data

Output is in the form of eight consecutive decimal digits. No sign is printed. Spacing, tabulation, carriage return, etc., are not provided for in this subroutine. See Digital-8-19-U-Sym which contains short subroutines for those purposes.

9. EXECUTION TIME

9.1 Minimum (Not Applicable)

9.2 Maximum (Not Applicable)

9.3 Average

This subroutine is output limited at 10 cps by the ASR-33

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

```

/CHECK OUTB PROGRAM FOR UNSIGNED , DOUBLE-PRECISION PRINT
*200
RETURN=JMS TYCR
PRINT=JMS UDPRNT
SPACE=JMS TYSP
DEFINE DBLADD A B
<CLA CLL; TAD A+1; TAD B+1; DCA A+1; RAL; TAD A ;TAD B; DCA A
DEFINE DSHFT C D
<CLA CLL; TAD C; RAL; DCA C ;TAD D; RAL; DCA D>
DEFINE DMOVE E F
<CLA; TAD E; DCA F; TAD E+1; DCA F+1>
INITL,      RETURN
0201      CLA CLL
0202      DCA TEMP
0203      DCA TEMP+1
0204      TAD (-5)
0205      DCA COUNT1
0206      TAD (-2)

```

```

0200  4777
0201  7300
0202  3305
0203  3306
0204  1374
0205  3313
0206  1373

```

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Basic PDP-8 with ASR-33

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The symbolic tape provided is assembled with either PAL III or MACRO-8. It may be assembled with the user program or separately with the proper origin setting. Neither origin setting nor "\$" terminating character exists on the tape, but the tape does have a PAUSE on the end.

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6.2 Examples and/or Applications (none)

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7. METHOD (See Digital-8-22-U-Sym)

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8.1 Input Data (Not Applicable)

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Output is in the form of eight consecutive decimal digits. No sign is printed. Spacing, tabulation, carriage return, etc., are not provided for in this subroutine. See Digital-8-19-U-Sym which contains short subroutines for those purposes.

9. EXECUTION TIME

9.1 Minimum (Not Applicable)

9.2 Maximum (Not Applicable)

9.3 Average

This subroutine is output limited at 10 cps by the ASR-33

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

```
      /CHECK OUTB PROGRAM FOR UNSIGNED , DOUBLE-PRECISION PRINT
      *200
      RETURN=JMS TYCR
      PRINT=JMS UDPRNT
      SPACE=JMS TYSP
      DEFINE DBLADD A B
      <CLA CLL; TAD A+1; TAD B+1; DCA A+1; RAL; TAD A ;TAD B; DCA A
      DEFINE DSHFT C D
      <CLA CLL; TAD C; RAL; DCA C ;TAD D; RAL; DCA D>
      DEFINE DMOVE E F
      <CLA; TAD E; DCA F; TAD E+1; DCA F+1>
0200  4777      INITL,      RETURN
0201  7300      CLA CLL
0202  3305      DCA TEMP
0203  3306      DCA TEMP+1
0204  1374      TAD (-5)
0205  3313      DCA COUNT1
0206  1373      TAD (-2)
```

0207	3314		DCA COUNT2
0210	4777		RETURN
0211	4776	TOP,	PRINT;
0212	0307	DNUMB	
0213	4775		SPACE
0214	7300		DBLADD DNUMB,VARCON
0215	1310		
0216	1312		
0217	3310		
0220	7004		
0221	1307		
0222	1311		
0223	3307		
0224	2313		ISZ COUNT1
0225	5211		JMP TOP
0226	4777	FIVE,	RETURN
0227	1374		TAD (-5)
0230	3313		DCA COUNT1
0231	2314		ISZ COUNT2
0232	5211		JMP TOP
0233	1373		TAD (-2)
0234	3314		DCA COUNT2
0235	7200		DMOVE VARCON, TEMP
0236	1311		
0237	3305		
0240	1312		
0241	3306		
0242	7300		DSHFT VARCON+1,VARCON
0243	1312		
0244	7004		
0245	3312		
0246	1311		
0247	7004		
0250	3311		
0251	7300		DSHFT VARCON+1,VARCON
0252	1312		
0253	7004		
0254	3312		
0255	1311		
0256	7004		
0257	3311		
0260	7300		DBLADD VARCON,TEMP
0261	1312		
0262	1306		
0263	3312		
0264	7004		
0265	1311		
0266	1305		
0267	3311		
0270	7300		DSHFT VARCON+1,VARCON
0271	1312		
0272	7004		
0273	3312		
0274	1311		
0275	7004		
0276	3311		
0277	7200		DMOVE VARCON,DNUMB
0300	1311		

```

0301 3307
0302 1312
0303 3310
0304 5211          JMP TOP
0305 0000 TEMP, DUBL 0
0306 0000
0307 0000 DNUMB, DUBL 0
0310 0000
0311 0000 VARCON, DUBL 1
0312 0001
0313 0000 COUNT1, 0
0314 0000 COUNT2, 0
0373 7776 PAGE
0374 7773
0375 0627
0376 0400
0377 0617

      PAUSE

      /UNSIGNED DECIMAL PRINT, DOUBLE PRECISION
      /CALLING SEQUENCE:  JMS UDPRNT /SUBROUTINE CALLED
      /                   HI ADDR   /ADDRESS OF HIGH ORDER WORD
      /                   RETURN    /RETURN WITH AC AND L CLEAR

0200 0000 UDPRNT, 0
0201 7300      CLA CLL
0202 1600      TAD I UDPRNT      /PICK UP ADDRESS OF HIGH-ORDER WORD
0203 3267      DCA UDGET
0204 1667      TAD I UDGET      /PICK UP BOTH WORDS FOR USE IN SUBROUTIN
0205 3261      DCA UDHIGH
0206 2267      ISZ UDGET
0207 1667      TAD I UDGET
0210 3262      DCA UDLOW
0211 1255      TAD UDLOOP      /INITIALIZE DIGIT COUNTER FOR "8"
0212 3260      DCA UDCNT
0213 1256      TAD UDADDR      /INITIALIZE TO TABLE OF POWERS OF TEN
0214 3270      DCA UDPTR
0215 2200      ISZ UDPRNT      /INDEX LINKAGE FOR CORRECT RETURN
0216 1670 UDARND, TAD I UDPTR  /PICK UP CURRENT POWER OF TEN FOR
0217 2270      ISZ UDPTR      /USE IN SUBTRACTION
0220 3263      DCA UDHSUB
0221 1670      TAD I UDPTR
0222 2270      ISZ UDPTR
0223 3264      DCA UDLSUB
0224 7100 UDDO,  CLL          /DOUBLE PRECISION SUBTRACTION
0225 1264      TAD UDLSUB
0226 1262      TAD UDLOW
0227 3266      DCA UDTEML
0230 7004      RAL
0231 1263      TAD UDHSUB
0232 1261      TAD UDHIGH
0233 7420      SNL            /DID IT UNDERFLOW?
0234 5242      JMP UDOUT      /NO, COUNT IS DONE
0235 2265      ISZ UDBOX      /YES, COUNT NOT DONE YET. INDEX DIGIT
0236 3261      DCA UDHIGH      /DEPOSIT REMAINING PORTIONS OF WORD
0237 1266      TAD UDTEML
0240 3262      DCA UDLOW

```

0241	5224		JMP UDDO	/GO BACK AND SUBTRACT AGAIN
0242	7200	UDOUT,	CLA	
0243	1265		TAD UDBOX	/PICK UP RESULTING DIGIT
0244	1257		TAD UDTWO	/ADD "260" TO IT
0245	6046		TLS	/TYPE IT OUT
0246	6041		TSF	
0247	5246		JMP .-1	
0250	7300		CLA CLL	
0251	3265		DCA UDBOX	/INITIALIZE DIGIT TO "0"
0252	2260		ISZ UDCNT	/HAVE WE TYPED "8" DIGITS
0253	5216		JMP UDARND	/NO, DETERMINE NEXT DIGIT
0254	5600		JMP I UDPRNT	/YES, SUBROUTINE DONE. RETURN
0255	7770	UDLOOP,	-10	/COUNT OF "8" DIGITS
0256	0271	UDADDR,	UDCON1	/INITIAL ADDRESS OF POWERS OF TEN
0257	0260	UDTWO,	260	/ICODE FOR DIGITS
0260	0000	UDCNT,	0	/STORAGE LOCATIONS
0261	0000	UDHIGH,	0	
0262	0000	UDLOW,	0	
0263	0000	UDHSUB,	0	
0264	0000	UDLSUB,	0	
0265	0000	UDBOX,	0	
0266	0000	UDTEML,	0	
0267	0000	UDGET,	0	
0270	0000	UDPTR,	0	
0271	3166	UDCON1,	3166	/POWERS OF TEN
0272	4600		4600	/-10,000,000
0273	7413		7413	/-1,000,000
0274	6700		6700	
0275	7747		7747	/-100,000
0276	4540		4540	
0277	7775		7775	/-10,000
0300	4360		4360	
0301	7777		7777	/-1,000
0302	6030		6030	
0303	7777		7777	/-100
0304	7634		7634	
0305	7777		7777	/-10
0306	7766		7766	
0307	7777		7777	/-1
0310	7777		7777	
		PAUSE		

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UDADDR 0256
 UDARND 0216
 UDBOX 0265
 UDCNT 0260
 UDCON1 0271
 UDDO 0224
 UDGET 0267
 UDHIGH 0261
 UDHSUB 0263
 UDLOOP 0255
 UDLOW 0262
 UDLSUB 0264
 UDOUT 0242
 UDPRNT 0200
 UDPTR 0270
 UDTEML 0266
 UDTWO 0257

00000000	00000001	00000002	00000003	00000004
00000005	00000006	00000007	00000008	00000009
00000010	00000020	00000030	00000040	00000050
00000060	00000070	00000080	00000090	00000100
00000100	00000200	00000300	00000400	00000500
00000600	00000700	00000800	00000900	00001000
00001000	00002000	00003000	00004000	00005000
00006000	00007000	00008000	00009000	00010000
00010000	00020000	00030000	00040000	00050000
00060000	00070000	00080000	00090000	00100000
00100000	00200000	00300000	00400000	00500000
00600000	00700000	00800000	00900000	01000000
01000000	02000000	03000000	04000000	05000000
06000000	07000000	08000000	09000000	10000000
10000000	03222784	13222784	06445568	1

11 DIAGRAMS

11.1 Flow Charts



