


```

FFFFFFFFF 000000 RRRRRRRR UU UU NN NN DDDDDDDD EEEEEEEEE RRRRRRRR FFFFFFFFF
FFFFFFFFF 000000 RRRRRRRR UU UU NN NN DDDDDDDD EEEEEEEEE RRRRRRRR FFFFFFFFF
FF 00 00 RR RR UU UU NN NN DD DD EE RR RR FF
FF 00 00 RR RR UU UU NN NN DD DD EE RR RR FF
FF 00 00 RR RR UU UU NNNN NN DD DD EE RR RR FF
FFFFFFFF 00 00 RRRRRRRR UU UU NN NN DD DD EEEEEEE RRRRRRRR FFFFFFFF
FFFFFFFF 00 00 RRRRRRRR UU UU NN NN DD DD EEEEEEE RRRRRRRR FFFFFFFF
FF 00 00 RR RR UU UU NN NNNN DD DD EE RR RR FF
FF 00 00 RR RR UU UU NN NNNN DD DD EE RR RR FF
FF 00 00 RR RR UU UU NN NN DD DD EE RR RR FF
FF 00 00 RR RR UU UU NN NN DD DD EE RR RR FF
FF 000000 RR RR UUUUUUUUU NN NN DDDDDDDD EEEEEEEEE RR RR FF
FF 000000 RR RR UUUUUUUUU NN NN DDDDDDDD EEEEEEEEE RR RR FF

```

```

LL IIIII SSSSSSS
LL IIIII SSSSSSS
LL II SS
LL II SS
LL II SS
LL II SSSSS
LL II SSSSS
LL II SS
LL II SS
LL II SS
LLLLLLLLL IIIII SSSSSSS
LLLLLLLLL IIIII SSSSSSS

```

```
1 0001 0 %TITLE 'FOR$UNDERF - Fortran underflow exception handler'  
2 0002 0 MODULE FOR$UNDERF (  
3 0003 0 IDENT = '1-003' ! File: FORUNDERF.B32 Edit: JAW1003  
4 0004 0 ) =  
5 0005 1 BEGIN  
6 0006 1 ++  
7 0007 1  
8 0008 1 *****  
9 0009 1 *  
10 0010 1 * COPYRIGHT (c) 1978, 1980, 1982, 1984 BY *  
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27 0027 1 *  
28 0028 1 *  
29 0029 1 *****  
30 0030 1  
31 0031 1  
32 0032 1 FACILITY: Fortran Support Library  
33 0033 1  
34 0034 1 ABSTRACT:  
35 0035 1  
36 0036 1 This module contains a condition handler for floating underflow  
37 0037 1 exceptions and an exit handler to report the number of underflow  
38 0038 1 exceptions at image exit.  
39 0039 1  
40 0040 1 ENVIRONMENT: Runs at any access mode - AST reentrant  
41 0041 1  
42 0042 1 AUTHOR: John A. Wheeler, CREATION DATE: 21-Aug-1981  
43 0043 1  
44 0044 1 MODIFIED BY:  
45 0045 1  
46 0046 1 1-001 - Original. JAW 21-Aug-1981  
47 0047 1 1-002 - Remove address of UNDERFLOW_COUNT from exit control block, as  
48 0048 1 count is now referenced directly. Remove unused external  
49 0049 1 reference to LIB$MATCH_COND. JAW 25-Aug-1981  
50 0050 1 1-003 - Change name of FOR$HANDLER to FOR$UNDERFLOW_HANDLER. Give the  
51 0051 1 threshold value a non-public name. Include severity in  
52 0052 1 condition check to preclude counting the same exception twice  
53 0053 1 at more than one level. JAW 29-Aug-1981  
54 0054 1 --  
55 0055 1
```

```
57 0056 1 %SBTTL 'Declarations'
58 0057 1
59 0058 1 : SWITCHES:
60 0059 1
61 0060 1
62 0061 1 SWITCHES ADDRESSING_MODE (EXTERNAL = GENERAL, NONEXTERNAL = WORD_RELATIVE);
63 0062 1
64 0063 1
65 0064 1 : LINKAGES:
66 0065 1
67 0066 1 : NONE
68 0067 1
69 0068 1 : TABLE OF CONTENTS:
70 0069 1
71 0070 1
72 0071 1 FORWARD ROUTINE
73 0072 1 FOR$UNDERFLOW_HANDLER,
74 0073 1 EXIT_HANDLER : NOVALUE;
75 0074 1
76 0075 1
77 0076 1 : INCLUDE FILES:
78 0077 1
79 0078 1
80 0079 1 LIBRARY 'RTLSTARLE';
81 0080 1
82 0081 1 REQUIRE 'RTLML:FORMSG';
83 0246 1 REQUIRE 'RTLML:OTSMSG';
84 0333 1 REQUIRE 'RTLML:MTHMSG';
85 0409 1
86 0410 1 REQUIRE 'RTLIN:RTLPSECT'; ! Define PSECT declaration macros
87 0505 1
88 0506 1
89 0507 1 : MACROS:
90 0508 1
91 0509 1 : NONE
92 0510 1
93 0511 1 : EQUATED SYMBOLS:
94 0512 1
95 0513 1
96 0514 1 LITERAL
97 0515 1 K_UNDERFLOW_THRESHOLD = 2; ! Message-printing threshold
98 0516 1
99 0517 1
100 0518 1 : FIELDS:
101 0519 1
102 0520 1 : NONE
103 0521 1
104 0522 1 : PSECTS:
105 0523 1
106 0524 1 : Specify page alignment (9) for the OWN psect, so that EXIT_BLOCK
107 0525 1 will not occupy the same page as a user variable that is being
108 0526 1 WATCHed, and thus be unwritable when $DCLEXH is called.
109 0527 1
110 0528 1 DECLARE_PSECTS (FOR, 9); ! Declare PSECTS for FOR$ facility
111 0529 1
112 0530 1
113 0531 1 : OWN STORAGE:
```

FOR\$UNDERF
1-003

FOR\$UNDERF - Fortran underflow exception handle
Declarations

C 3
16-Sep-1984 00:56:03
14-Sep-1984 12:32:58

VAX-11 Bliss-32 V4.0-742
[FORRTL.SRC]FORUNDERF.B32;1

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```

: 114      0532  1  !
: 115      0533  1  !
: 116      0534  1  !      OWN
: 117      0535  1  !      UNDERFLOW_COUNT : VOLATILE,      ! Number of underflows which have
: 118      0536  1  !      ! occurred (and have reached FOR$UNDERFLOW_HANDLER)
: 119      0537  1  !      EXIT_HNDLR_LOCK : INITIAL (0)      ! Flag indicating whether exit
: 120      0538  1  !      VOLATILE;      ! handler has been declared yet
: 121      0539  1  !
: 122      0540  1  !
: 123      0541  1  !      EXTERNAL REFERENCES:
: 124      0542  1  !
: 125      0543  1  !
: 126      0544  1  !      EXTERNAL ROUTINE
: 127      0545  1  !      LIB$SIM TRAP,
: 128      0546  1  !      LIB$SIGNAL,
: 129      0547  1  !      LIB$STOP;
```

```
131 0548 1 GLOBAL ROUTINE FOR$UNDERFLOW_HANDLER ( : FORTRAN floating underflow handler
132 0549 1 SIG_ARGS_ADR, : Address of signal array
133 0550 1 MCH_ARGS_ADR, : Address of mechanism array
134 0551 1 ENB_ARGS_ADR : Address of enable array
135 0552 1 ) = : A handler always has a value
136 0553 1
137 0554 2 BEGIN
138 0555 2
139 0556 2 MAP
140 0557 2 SIG_ARGS_ADR : REF BLOCK [, BYTE],
141 0558 2 MCH_ARGS_ADR : REF BLOCK [, BYTE],
142 0559 2 ENB_ARGS_ADR : REF VECTOR;
143 0560 2
144 0561 2 OWN
145 0562 2 EXIT_REASON, : Reason for image exit (not used)
146 0563 2
147 0564 2 EXIT_BLOCK : VECTOR [4] INITIAL : Exit control block for $DCLEXH
148 0565 2 70, : Forward link (filled in by VMS)
149 0566 2 0, : Exit handler address
150 0567 2 2, : Number of arguments to exit handler
151 0568 2 0); : Address of EXIT_REASON
152 0569 2
153 0570 2 LOCAL
154 0571 2 DCLEXH_STATUS, : Result of $DCLEXH
155 0572 2 AST_STATUS; : Result of $SETAST
156 0573 2
157 0574 2 !+
158 0575 2 ! If the exception is any form of floating underflow (fault, trap or
159 0576 2 ! math library condition), count it, print a message if not yet over
160 0577 2 ! the limit, and continue.
161 0578 2 !-
162 0579 2
163 0580 2 IF (.SIG_ARGS_ADR [CHF$SIG_NAME] AND (STSSM_COND_ID OR STSSM_SEVERITY)) EQL
164 0581 2 (SS$FLTUND_F AND (STSSM_COND_ID OR STSSM_SEVERITY))
165 0582 2 THEN
166 0583 2
167 0584 2 !+
168 0585 2 ! A fault.
169 0586 2 !
170 0587 2 ! Convert the fault to a trap. Control will not return from
171 0588 2 ! LIB$SIM_TRAP; rather, a new exception (a trap) will occur.
172 0589 2 !-
173 0590 2
174 0591 2 LIB$SIM_TRAP (.SIG_ARGS_ADR, .MCH_ARGS_ADR)
175 0592 2
176 0593 2 ELSE
177 0594 2 IF ((.SIG_ARGS_ADR [CHF$SIG_NAME] AND (STSSM_COND_ID OR STSSM_SEVERITY)) EQL
178 0595 2 (SS$FLTUND AND (STSSM_COND_ID OR STSSM_SEVERITY)))
179 0596 2 OR
180 0597 2 ((.SIG_ARGS_ADR [CHF$SIG_NAME] AND (STSSM_COND_ID OR STSSM_SEVERITY)) EQL
181 0598 2 (MTH$FLOODMAT AND (STSSM_COND_ID OR STSSM_SEVERITY)))
182 0599 2 THEN
183 0600 2 BEGIN
184 0601 2
185 0602 2 !+
186 0603 2 ! A trap or math library condition.
187 0604 2
```

```

188 0605      ! Count the underflow. Then check EXIT_HNDLR_LOCK to see
189 0606      ! whether the exit handler has been declared yet (1 = yes,
190 0607      ! 0 = maybe). If maybe, disable ASTs and recheck. This
191 0608      ! assures that the exit handler will be declared only once
192 0609      ! even if underflows occur at AST level.
193 0610      !
194 0611      !
195 0612      UNDERFLOW_COUNT = .UNDERFLOW_COUNT + 1;
196 0613      !
197 0614      IF NOT .EXIT_HNDLR_LOCK
198 0615      THEN
199 0616          BEGIN
200 0617              AST_STATUS = $SETAST (ENBFLG = 0);
201 0618              IF NOT .EXIT_HNDLR_LOCK
202 0619              THEN
203 0620                  BEGIN
204 0621                      !
205 0622                      !+
206 0623                      ! Fill in the exit control block (at run time, to
207 0624                      ! keep it position-independent), declare the exit
208 0625                      ! handler, and set the lock.
209 0626                      !
210 0627                      !
211 0628                      EXIT_BLOCK [1] = EXIT_HANDLER;
212 0629                      EXIT_BLOCK [3] = EXIT_REASON;
213 0630                      DCLEXH_STATUS = $DCLEXH (DESBLK = EXIT_BLOCK);
214 0631                      EXIT_HNDLR_LOCK = 1
215 0632                      END
216 0633                  ELSE
217 0634                      DCLEXH_STATUS = 1;
218 0635                  !
219 0636                  IF .AST_STATUS EQL S$$_WASSET THEN $SETAST (ENBFLG = 1);
220 0637                  !
221 0638                  IF NOT .DCLEXH_STATUS THEN LIB$STOP (OTSS$_FATINTERR) ELSE 1
222 0639                  END;
223 0640              !
224 0641              !+
225 0642              ! If the number of underflows does not yet exceed the
226 0643              ! message threshold, change the severity of the condition to
227 0644              ! ERROR and resignal it so the catch-all handler will print
228 0645              ! a message and continue. Otherwise just continue.
229 0646              !
230 0647              !
231 0648              IF .UNDERFLOW_COUNT LEQ K_UNDERFLOW_THRESHOLD
232 0649              THEN
233 0650                  BEGIN
234 0651                      BLOCK [SIG_ARGS_ADR [CHF$L_SIG_NAME], ST$$V_SEVERITY; , BYTE] = ST$$K_ERROR;
235 0652                      RETURN S$$_RESIGNAL
236 0653                  END
237 0654              ELSE
238 0655                  RETURN S$$_CONTINUE
239 0656              END
240 0657          !
241 0658      ELSE
242 0659          !+
243 0660          ! Resignal the exception, since it is not an underflow.
244 0661          !

```

```

: 245      0662  2      :-
: 246      0663  2
: 247      0664  2      RETURN SSS_RESIGNAL
: 248      0665  2
: 249      0666  1      END;

```

. End of routine FOR\$UNDERFLOW_HANDLER

.TITLE FOR\$UNDERF FOR\$UNDERF - Fortran underflow excep
tion handle

.IDENT \1-003\

.PSECT _FOR\$DATA,NOEXE, PIC,9

00000 UNDERFLOW COUNT:

.BLKB 4

00000000 00004 EXIT_HNDLR_LOCK:

.LONG 0

00008 EXIT_REASON:

.BLKB 4

00000000 00000002 00000000 00000000 0000C EXIT_BLOCK:

.LONG 0, 0, 2, 0

.EXTRN LIB\$SIM_TRAP, LIB\$SIGNAL

.EXTRN LIB\$STOP, SYS\$SETAST

.EXTRN SYS\$DCLEXH

.PSECT _FOR\$CODE,NOWRT, SHR, PIC,2

007C 00000

.ENTRY FOR\$UNDERFLOW_HANDLER, Save R2,R3,R4,R5,R6

: 0548

56 00000000G 00 9E 00002

MOVAB SYS\$SETAST, R6

55 00000000' EF 9E 00009

MOVAB EXIT_HNDLR_LOCK, R5

52 04 AC D0 00010

MOVL SIG_ARGS_ADR, R2

000004C4 8F 04 A2

1C 00 ED 00014

CMPZV #0, #28, 4(R2), #1220

: 0580

0D 12 0001E

BNEQ 1\$

: 0581

08 AC DD 00020

PUSHL MCH_ARGS_ADR

: 0591

00000000G 00

52 DD 00023

PUSHL R2

02 FB 00025

CALLS #2, LIB\$SIM_TRAP

04 0002C

RET

0000049C 8F 04 A2

1C 00 ED 0002D 1\$:

CMPZV #0, #28, 4(R2), #1180

: 0595

0C 13 00037

BEQL 2\$

: 0598

001682CC 8F 04 A2

1C 00 ED 00039

CMPZV #0, #28, 4(R2), #1475276

: 0598

5D 12 00043

BNEQ 8\$

: 0612

FC A5 D6 00045 2\$:

INCL UNDERFLOW_COUNT

: 0614

45 65 E8 00048

BLBS EXIT_HNDLR_LOCK, 6\$

: 0617

7E D4 0004B

CLRL -(SPT)

66 01 FB 0004D

CALLS #1, SYS\$SETAST

54 50 D0 00050

MOVL R0, AST_STATUS

1D 65 E8 00053

BLBS EXIT_HNDLR_LOCK, 3\$

: 0618

0C A5 0000V

CF 9E 00056

MOVAB EXIT_HANDLER, EXIT_BLOCK+4

: 0628

14 A5 04

A5 9E 0005C

MOVAB EXIT_REASON, EXIT_BLOCK+12

: 0629

00000000G 00

08 A5 9F 00061

PUSHAB EXIT_BLOCK

: J630

01 FB 00064

CALLS #1, SYS\$DCLEXH

53 50 D0 0006B

MOVL R0, DCLEXH_STATUS

65 01 D0 0006E

MOVL #1, EXIT_HNDLR_LOCK

: 0631

03 11 00071

BRB 4\$

53 01 D0 00073 3\$:

MOVL #1, DCLEXH_STATUS

: 0634

09 54 D1 00076 4\$:

CMPL AST_STATUS, #9

: 0636

FOR\$UNDERF
1-003

FOR\$UNDERF - Fortran underflow exception handle
Declarations

6 3
16-Sep-1984 00:56:03
14-Sep-1984 12:32:58

VAX-11 Bliss-32 V4.0-742
[FORRTL.SRC]FORUNDERF.B32;1

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			05	12	00079		BNEQ	5\$:	
			01	DD	0007B		PUSHL	#1		:	
	66		01	FB	0007D		CALLS	#1, SYS\$SETAST		:	
	0D		53	E8	00080	5\$:	BLBS	DCLEXH STATUS, 6\$: 0638	
		00178014	8F	DD	00083		PUSHL	#15401T6		:	
	00000000G		01	FB	00089		CALLS	#1, LIB\$STOP		:	
		FC	A5	D1	00090	6\$:	CMPL	UNDERFLOW_COUNT, #2		: 0648	
			08	14	00094		BGTR	7\$:	
04	A2		02	F0	00096		INSV	#2, #0, #3, 4(R2)		: 0651	
		03	04	11	0009C		BRB	8\$: 0655	
			50	01	D0	0009E	7\$:	MOVL	#1, R0	:	
				04	000A1		RET			: 0664	
			50	0918	8F	3C	000A2	8\$:	MOVZWL	#2328, R0	:
				04	000A7		RET			: 0666	

; Routine Size: 168 bytes, Routine Base: _FOR\$CODE + 0000

```

: 251      0667 1 ROUTINE EXIT_HANDLER (
: 252      0668 1     EXIT_REASON
: 253      0669 1     ) : NOVA[UE =
: 254      0670 2     BEGIN
: 255      0671 2
: 256      0672 2     !+
: 257      0673 2     ! Cause a message containing the total number of underflows to be
: 258      0674 2     ! printed if nonzero. The severity is STS$K_INFO = 3 = INFORMATION.
: 259      0675 2     !-
: 260      0676 2
: 261      0677 2     IF .UNDERFLOW_COUNT GTR 0
: 262      0678 2     THEN
: 263      0679 2         LIB$SIGNAL (FOR$_FLOUNDEXC, 1, .UNDERFLOW_COUNT);
: 264      0680 2
: 265      0681 1     END;

```

! End of routine EXIT_HANDLER

```

                                0004 00000 EXIT_HANDLER:
                                .WORD      Save R2
52 00000000' EF 9E 00002         MOVAB   UNDERFLOW_COUNT, R2
                                TSTL      UNDERFLOW_COUNT
                                11 15 0000B         BLEQ   1$
                                62 DD 0000D         PUSHL  UNDERFLOW_COUNT
                                01 DD 0000F         PUSHL  #1
                                8F DD 00011         PUSHL  #1608035
00000000G 00 00188963 03 FB 00017         CALLS  #3, LIB$SIGNAL
                                04 0001E 1$:         RET

```

```

: 0667
: 0677
: 0679
: 0681

```

: Routine Size: 31 bytes. Routine Base: _FOR\$CODE + 00A8

```

: 266      0682 1
: 267      0683 1 END
: 268      0684 0 ELUDOM

```

! End of module FOR\$UNDERF

PSECT SUMMARY

Name	Bytes	Attributes
_FOR\$DATA	28	NOVEC, WRT, RD, NOEXE, NOSHR, LCL, REL, CON, PIC, ALIGN(9)
_FOR\$CODE	199	NOVEC, NOWRT, RD, EXE, SHR, LCL, REL, CON, PIC, ALIGN(2)

Library Statistics

File	----- Symbols -----		Pages Mapped	Processing Time
	Total	Loaded Percent		

FOR\$UNDERF
1-003

FOR\$UNDERF - intran underflow exception handle
Declarations

1³
16-Sep-1984 00:56:03
14-Sep-1984 12:32:58

VAX-11 Bliss-32 V4.0-742
[FORRTL.SRC]FORUNDERF.B32;1

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:
: _\$255\$DUA28:[SYSLIB]STARLET.L32;1 9776 14 0 581 00:01.0

:
: COMMAND QUALIFIERS

: BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/NOTRACE/LIS=LIS\$:FORUNDERF/OBJ=OBJ\$:FORUNDERF MSRC\$:FORUNDERF/UPDATE=(ENH\$:FORUNDERF
:)

: Size: 199 code + 28 data bytes
: Run Time: 00:07.2
: Elapsed Time: 00:25.5
: Lines/CPU Min: 5668
: Lexemes/CPU-Min: 16218
: Memory Used: 77 pages
: Compilation Complete

