

```
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTT      LLL
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTT      LLL
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSS      RRRRRRRRRRRR      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSS      RRRRRRRRRRRR      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSS      RRRRRRRRRRRR      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBB      BBB      AAA      AAA      SSS      RRR      RRR      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSSSS      RRR      RRR      TTT      LLLLLLLLLLLLLLLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSSSS      RRR      RRR      TTT      LLLLLLLLLLLLLLLL
BBBBBBB      BBB      AAA      AAA      SSSSSSSSSSSS      RRR      RRR      TTT      LLLLLLLLLLLLLLLL
```

```

BBBBBBBB      AAAAAA      SSSSSSSS      IIIIII      NN      NN      IIIIII      IIIIII      000000      LL
BBBBBBBB      AAAAAA      SSSSSSSS      IIIIII      NN      NN      IIIIII      IIIIII      000000      LL
BB      BB      AA      AA      SS      II      NN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NNNN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NNNN      NN      II      II      00      00      LL
BBBBBBBB      AA      AA      SSSSSS      II      NN      NN      NN      II      II      00      00      LL
BBBBBBBB      AA      AA      SSSSSS      II      NN      NN      NN      II      II      00      00      LL
BB      BB      AAAAAAAAAA      SS      II      NN      NNNN      NN      II      II      00      00      LL
BB      BB      AAAAAAAAAA      SS      II      NN      NNNN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NN      NN      II      II      00      00      LL
BB      BB      AA      AA      SS      II      NN      NN      II      II      00      00      LL
BBBBBBBB      AA      AA      SSSSSSSS      IIIIII      NN      NN      IIIIII      IIIIII      000000      LL
BBBBBBBB      AA      AA      SSSSSSSS      IIIIII      NN      NN      IIIIII      IIIIII      000000      LLLLLLLLLL

```

```

LL      IIIIII      SSSSSSSS
LL      IIIIII      SSSSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SSSSSS
LL      II      SSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LLLLLLLLLL      IIIIII      SSSSSSSS
LLLLLLLLLL      IIIIII      SSSSSSSS

```

```

1 0001 0 MODULE BASSINIT_IOL (           ! Initiate immediate frame
2 0002 0   IDENT = '1-009'             ! File: BASINIOL.B32 Edit: MDL1009
3 0003 0   ) =
4 0004 1 BEGIN
5 0005 1
6 0006 1 *****
7 0007 1 *
8 0008 1 *   COPYRIGHT (c) 1978, 1980, 1982, 1984 BY
9 0009 1 *   DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.
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19 0019 1 *   THE INFORMATION IN THIS SOFTWARE IS SUBJECT TO CHANGE WITHOUT NOTICE
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24 0024 1 *   SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.
25 0025 1 *
26 0026 1 *
27 0027 1 *****
28 0028 1
29 0029 1
30 0030 1
31 0031 1 ++
32 0032 1 FACILITY: BASIC-PLUS-2 Frame Support
33 0033 1
34 0034 1 ABSTRACT:
35 0035 1
36 0036 1     These routines set up and tear down frames for BASIC-PLUS-2.
37 0037 1     Frames are used for main routines, external functions,
38 0038 1     external subroutines, internal functions (both DEFs and DEF*s)
39 0039 1     internal subroutines (GOSUBs), condition handlers and immediate
40 0040 1     mode code.
41 0041 1
42 0042 1 ENVIRONMENT: VAX-11 user mode
43 0043 1
44 0044 1 AUTHOR: John Sauter, CREATION DATE: 08-feb-1979
45 0045 1
46 0046 1 MODIFIED BY:
47 0047 1
48 0048 1 1-001 - Original from BASSINIT_GOSUB. JBS 08-feb-1979
49 0049 1 1-002 - Convert BASS$ to BSF$ prefixes for stack frame. JBS 08-FEB-1979
50 0050 1 1-003 - If the caller is not a BASIC frame, just CALL the print list.
51 0051 1     JBS 14-FEB-1979
52 0052 1 1-004 - Change from I/O List to Immediate On-Line. JBS 10-SEP-1979
53 0053 1 1-005 - Set the IV bit in the PSW if requested. JBS 11-SEP-1979
54 0054 1 1-006 - Give an error if the specified root frame is not a BASIC
55 0055 1     frame. JBS 15-SEP-1979
56 0056 1 1-007 - Correct a comment. JBS 07-NOV-1979
57 0057 1 1-008 - For Basic 2.0, allocate temporary strings and numerics on the
    
```

BASSINIT_IOL
1-009

N 4
16-Sep-1984 00:37:28 VAX-11 Bliss-32 V4.0-742
14-Sep-1984 11:55:08 [BASRTL.SRC]BASINIOL.B32;1

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(1)

```
: 58      0058 1 !  
: 59      0059 1 ! 1-009 - stack. PLL 29-Mar-1982  
: 60      0060 1 ! check and make sure NO_TEMP_STR and NO_TEMP_NUM were passed as  
: 61      0061 1 ! parameters before using them. They are only passed from programs  
: 62      0062 1 ! compiled with the V2.0 or later compiler. MDL 4-Feb-1983  
: 63      0063 1 ! --  
: 64      0064 1 ! <BLF/PAGE>
```

```

: 66 0065 1 |
: 67 0066 1 | SWITCHES:
: 68 0067 1 |
: 69 0068 1 |
: 70 0069 1 | SWITCHES ADDRESSING_MODE (EXTERNAL = GENERAL, NONEXTERNAL = WORD_RELATIVE);
: 71 0070 1 |
: 72 0071 1 |
: 73 0072 1 | LINKAGES:
: 74 0073 1 |
: 75 0074 1 |
: 76 0075 1 | LINKAGE
: 77 0076 1 |     BASSIOLIST JSB = JSB :
: 78 0077 1 |     GLOBAL (BSF$A_MAJOR_STG = 11, BSF$A_MINOR_STG = 10, BSF$A_TEMP_STG = 9) !
: 79 0078 1 |     NOPRESERVE (8, 7, 6, 5, 4, 3, 2, 1, 0);
: 80 0079 1 |
: 81 0080 1 |
: 82 0081 1 | TABLE OF CONTENTS:
: 83 0082 1 |
: 84 0083 1 |
: 85 0084 1 | FORWARD ROUTINE
: 86 0085 1 |     BASSINIT_IOL : NOVALUE; ! start immediate mode code
: 87 0086 1 |
: 88 0087 1 |
: 89 0088 1 | INCLUDE FILES:
: 90 0089 1 |
: 91 0090 1 |
: 92 0091 1 | REQUIRE 'RTLIN:RTLPSECT'; ! macros for defining psects
: 93 0186 1 |
: 94 0187 1 | REQUIRE 'RTLIN:BASFRAME'; ! Define frame structure
: 95 0390 1 |
: 96 0391 1 | LIBRARY 'RTLSTARLE'; ! Define system symbols
: 97 0392 1 |
: 98 0393 1 |
: 99 0394 1 | MACROS:
100 0395 1 |     NONE
101 0396 1 |
102 0397 1 | EQUATED SYMBOLS:
103 0398 1 |
104 0399 1 |     NONE
105 0400 1 |
106 0401 1 |
107 0402 1 | PSECTS:
108 0403 1 |
109 0404 1 | DECLARE_PSECTS (BAS); ! declare psects for BASS facility
110 0405 1 |
111 0406 1 | OWN STORAGE:
112 0407 1 |     NONE
113 0408 1 |
114 0409 1 |
115 0410 1 | EXTERNAL REFERENCES:
116 0411 1 |
117 0412 1 |
118 0413 1 | EXTERNAL ROUTINE
119 0414 1 |     BASS$STOP : NOVALUE, ! Signal a fatal BASIC error
120 0415 1 |     BASS$HANDLER; ! handles signals
121 0416 1 |
122 0417 1 | !+

```

```
: 123      0418  | ! The following are the error codes used in this module:  
: 124      0419  | !-  
: 125      0420  |  
: 126      0421  | EXTERNAL LITERAL  
: 127      0422  |     BAS&K_SYNERR : UNSIGNED (8);           ' Syntax error  
: 128      0423  |
```

```

130 0424 1 GLOBAL ROUTINE BASSINIT_IOL (      : start immediate mode code
131 0425 1     NEW_PC,                          : place to start
132 0426 1     ROOT_FMP,                       : root frame
133 0427 1     NO_TEMP_STR,                   : number of temporary strings
134 0428 1     NO_TEMP_NUM,                   : number temp. numerics (in bytes)
135 0429 1     ) : NOVALUE =
136 0430 1
137 0431 1 ++
138 0432 1 FUNCTIONAL DESCRIPTION:
139 0433 1
140 0434 1     Set up a frame for immediate mode code. The frame is
141 0435 1     allocated on the stack. R11, R10 and R9 are set up from
142 0436 1     the root's frame, which is the frame which contains the
143 0437 1     symbols known to the keyboard monitor.
144 0438 1
145 0439 1 FORMAL PARAMETERS:
146 0440 1
147 0441 1     NEW_PC.ra.v    PC of the immediate mode code.
148 0442 1     ROOT_FMP.ra.v  Address of the frame which contains the variables
149 0443 1     NO_TEMP_STR.rl.v Number of temporary strings to allocate
150 0444 1     NO_TEMP_NUM.rl.v Number (in bytes) of temporary numerics to allocate
151 0445 1
152 0446 1 IMPLICIT INPUTS:
153 0447 1
154 0448 1     NONE
155 0449 1
156 0450 1 IMPLICIT OUTPUTS:
157 0451 1
158 0452 1     NONE
159 0453 1
160 0454 1 ROUTINE VALUE:
161 0455 1
162 0456 1     NONE
163 0457 1
164 0458 1 COMPLETION CODES:
165 0459 1
166 0460 1     NONE
167 0461 1
168 0462 1 SIDE EFFECTS:
169 0463 1
170 0464 1     Leaves lots of things on the stack for use by the compiled
171 0465 1     BASIC-PLUS-2 code. These things will be removed by
172 0466 1     the compiled RET instruction.
173 0467 1
174 0468 1 --
175 0469 1
176 0470 2 BEGIN
177 0471 2
178 0472 2 GLOBAL REGISTER
179 0473 2     BSFSA_MAJOR_STG = 11,
180 0474 2     BSFSA_MINOR_STG = 10,
181 0475 2     BSFSA_TEMP_STG = 9;
182 0476 2
183 0477 2 BUILTIN
184 0478 2     ACTUALCOUNT,
185 0479 2     FP,
186 0480 2     SP,

```

```

187 0481 2 BISPSW;
188 0482 2
189 0483 2 MAP
190 0484 2 ROOT_FMP : REF BLOCK [0, BYTE] FIELD (BSF$FCD); ! pointer to FCD
191 0485 2
192 0486 2 +
193 0487 2 Define local variables as registers. We cannot have any stack
194 0488 2 locals since we manipulate the stack pointer in this routine.
195 0489 2 -
196 0490 2
197 0491 2 REGISTER
198 0492 2 FMP : REF BLOCK [0, BYTE] FIELD (BSF$FCD); ! points to our frame
199 0493 2
200 0494 2 +
201 0495 2 If the root frame is not a BASIC frame, we have an error.
202 0496 2 -
203 0497 2
204 0498 2 IF (.ROOT_FMP [BSF$A_HANDLER] NEQA BAS$HANDLER) THEN BAS$$STOP (BAS$K_SYNERR);
205 0499 2
206 0500 2 +
207 0501 2 Load R9, R10 and R11 for the immediate mode code.
208 0502 2 -
209 0503 2 BSF$A_MAJOR_STG = .ROOT_FMP [BSF$A_BASE_R11];
210 0504 2 BSF$A_MINOR_STG = .ROOT_FMP [BSF$A_BASE_R10];
211 0505 2 +
212 0506 2 Allocate frame control data.
213 0507 2 -
214 0508 2 FMP = .FMP;
215 0509 2 SP = .FMP - BSF$K_LENFCDIOL;
216 0510 2 +
217 0511 2 Allocate string temporaries on the stack.
218 0512 2 -
219 0513 2 IF ACTUALCOUNT() GTR 2 THEN
220 0514 2 INCR COUNTER FROM 1 TO .NO_TEMP_STR DO
221 0515 2 BEGIN
222 0516 2 SP = .SP - %UPVAL;
223 0517 2 .SP = 0; ! ptr = 0 implies not allocated
224 0518 2 SP = .SP - %UPVAL;
225 0519 2 BLOCK [.SP, DSC$B_CLASS; 0, BYTE] = DSC$K_CLASS_D;
226 0520 2 BLOCK [.SP, DSC$B_DTYPE; 0, BYTE] = DSC$K_DTYPE_T;
227 0521 2 BLOCK [.SP, DSC$W_LENGTH; 0, BYTE] = 0;
228 0522 2 END;
229 0523 2 +
230 0524 2 Point R9 to the last string descriptor allocated.
231 0525 2 -
232 0526 2 BSF$A_TEMP_STG = .SP;
233 0527 2 +
234 0528 2 Allocate temporary numerics on the stack.
235 0529 2 -
236 0530 2 IF ACTUALCOUNT() GTR 2 THEN
237 0531 2 SP = .SP - .NO_TEMP_NUM;
238 0532 2 +
239 0533 2 Initialize the parts of the FCD relavent to immediate mode code.
240 0534 2 -
241 0535 2 FMP [BSF$A_MARK] = 0;
242 0536 2 FMP [BSF$A_BASE_SP] = .SP;
243 0537 2 FMP [BSF$A_BASE_R11] = .BSF$A_MAJOR_STG;

```



```

: 244      0538      2      FMP [BSFSA_BASE_R10] = .BSFSA_MINOR_STG;
: 245      0539      2      FMP [BSFSA_BASE_R9] = .BSFSA_TEMP_STG;
: 246      0540
: 247      0541
: 248      0542      2      + The 'PROCEDURE ID' is the address of the start of the immediate mode code.
: 249      0543      2      -
: 250      0544      2      FMP [BSFSA_PROC_ID] = .NEW_PC;
: 251      0545
: 252      0546      2      + Copy the frame flags from the root frame.
: 253      0547      2      -
: 254      0548      2      FMP [BSFSW_FCD_FLAGS] = .ROOT_FMP [BSFSW_FCD_FLAGS];
: 255      0549
: 256      0550      2      + Mark this is an immediate mode frame. The error handler will not let
: 257      0551      2      ON ERROR GO BACK propagate beyond this point.
: 258      0552      2      -
: 259      0553      2      FMP [BSFSB_PROC_CODE] = BSFSK_PROC_IOL;
: 260      0554
: 261      0555      2      + Set the frame length field.
: 262      0556      2      -
: 263      0557      2      FMP [BSFSB_LEN_FCD] = BSFSK_LENFCDIOL;
: 264      0558
: 265      0559      2      + Set the integer overflow enable bit in the PSW if the root program
: 266      0560      2      has integer overflow enabled.
: 267      0561
: 268      0562
: 269      0563      2      IF ((.FMP [BSFSW_FCD_FLAGS] AND BSFSM_FCD_IV) NEQ 0) THEN BISPSW (%REF (PSWSM_IV));
: 270      0564
: 271      0565      2      +
: 272      0566      2      Set up the handler address to mark this as a BASIC fra and for
: 273      0567      2      VAX/VMS CHF.
: 274      0568
: 275      0569      2      FMP [BSFSA_HANDLER] = BASSHANDLER;
: 276      0570
: 277      0571      2      +
: 278      0572      2      Branch to the compiled code. This code will issue a RET instruction
: 279      0573      2      rather than returning.
: 280      0574      2      BASSIOLIST_JSB (.NEW_PC);
: 281      0575      1      END;

```

! of BASSINIT_IOL

```

                                .TITLE BASSINIT_IOL
                                .IDENT  \1-009\
                                .EXTRN  BASS$STOP, BASSHANDLER
                                .EXTRN  BASSK_SYNERR
                                .PSECT  _BASSCODE, NOWRT, SHR, PIC, 2
                                OFFC 0000
                                .ENTRY  BASSINIT_IOL, Save R2,R3,R4,R5,R6,R7,R8,R9,-; 0424
                                R10,R11
                                MOVL   ROOT_FMP, R2                                : 0498
                                MOVAB  BASSHANDLER, R0
                                CML   (R2), R0
                                BEQL  1$
                                MOVZBL #BASSK_SYNERR, -(SP)
                                CALLS  #1, BASS$STOP
                                MOVQ   -16(R2), BSFSA_MINOR_STG                    : 0504

```

	50		5D	D0	00021		MOVL	FP, FMP		0508
	5E	E0	AC	9E	00024		MOVAB	-32(R0), SP		0509
	02		6C	91	00028		CMPB	(AP), #2		0513
			18	1B	0002B		BLEQU	4\$		
			51	D4	0002D		CLRL	COUNTER		0514
			0F	11	0002F		BRB	3\$		
	5E		04	C2	00031	2\$:	SUBL2	#4, SP		0516
			6E	D4	00034		CLRL	(SP)		0517
	5E		04	C2	00036		SUBL2	#4, SP		0518
	6E	020E0000	8F	D0	00079		MOVL	#34471936, (SP)		0521
EC	51		AC	F3	00040	3\$:	AOBLEQ	NO_TEMP_STR, COUNTER, 2\$		0514
	59		5E	D0	00045	4\$:	MOVL	SP, BSF\$A_TEMP_STG		0526
	02		6C	91	00048		CMPB	(AP), #2		0530
			04	1B	0004B		BLEQU	5\$		
	5E		AC	C2	0004D		SUBL2	NO_TEMP_NUM, SP		0531
			AD	D4	00051	5\$:	CLRL	-4(FMP)		0535
	F8	A0	5E	D0	00054		MOVL	SP, -8(FMP)		0536
	FO	A0	5A	7D	00058		MOVQ	BSF\$A_MINOR_STG, -16(FMP)		0538
	EC	A0	59	D0	0005C		MOVL	BSF\$A_TEMP_STG, -20(FMP)		0539
	E8	A0	AC	D0	00060		MOVL	NEW_PC, -24(FMP)		0544
	E6	A0	A2	B0	00065		MOVW	-26(R2), -26(FMP)		0548
	E4	A0	8F	B0	0006A		MOVW	#2080, -28(FMP)		0557
02	E6	A0	0B	E1	00070		BBC	#11, -26(FMP), 6\$		0563
			20	B8	00075		BISPSW	#32		
	60	00000000G	00	9E	00077	6\$:	MOVAB	BAS\$HANDLER, (FMP)		0569
			04	BC	16		JSB	@NEW_PC		0574
			04	00	00081		RET			0575

; Routine Size: 130 bytes, Routine Base: _BAS\$CODE + 0000

:	282	0576	1	
:	283	0577	1	END
:	284	0578	1	
:	285	0579	0	ELUDOM

PSECT SUMMARY

Name	Bytes	Attributes
_BAS\$CODE	130	NOVEC, NOWRT, RD, EXE, SHR, LCL, REL, CON, PIC, ALIGN(2)

Library Statistics

File	Total	Symbols Loaded	Percent	Pages Mapped	Processing Time
_\$255\$DUA28:[SYSLIB]STARLET.L32:1	9776	6	0	581	00:01.1

COMMAND QUALIFIERS

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

: Size: 130 code + 0 data bytes
: Run Time: 00:06.7
: Elapsed Time: 00:13.3
: Lines/CPU Min: 5185
: Lexemes/CPU-Min: 19244
: Memory Used: 83 pages
: Compilation Complete

			BASINIGSC LIS						
				BASINIT LIS					
BASINIDEF LIS									
	BASINIDFS LIS								
		BASINIGSB LIS		BASINSTR LIS					
			BASINTONE LIS					BASLEFT LIS	
								BASMARGIN LIS	
		BASINTOL LIS					BASKILL LIS		
				BASTOBEG LIS		BASTOEND LIS		BASMATADD LIS	
							BASMAGTAP LIS		