L 11

```
PPPPPPPPPPPP        AAAAAAAAA        SSSSSSSSSSSS     CCCCCCCCCCCC     AAAAAAAAA     LLL
PPPPPPPPPPPP        AAAAAAAAA        SSSSSSSSSSSS     CCCCCCCCCCCC     AAAAAAAAA     LLL
PPPPPPPPPPPP        AAAAAAAAA        SSSSSSSSSSSS     CCCCCCCCCCCC     AAAAAAAAA     LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPP         PPP  AAA         AAA  SSS              CCC              AAA         AAA  LLL
PPPPPPPPPPPP     AAA         AAA     SSSSSSSSS     CCC              AAA         AAA  LLL
PPPPPPPPPPPP     AAA         AAA     SSSSSSSSS     CCC              AAA         AAA  LLL
PPPPPPPPPPPP     AAA         AAA     SSSSSSSSS     CCC              AAA         AAA  LLL
PPP              AAAAAAAAAAAAAAA              SSS  CCC              AAAAAAAAAAAAAAA  LLL
PPP              AAAAAAAAAAAAAAA              SSS  CCC              AAAAAAAAAAAAAAA  LLL
PPP              AAAAAAAAAAAAAAA              SSS  CCC              AAAAAAAAAAAAAAA  LLL
PPP              AAA         AAA              SSS  CCC              AAA         AAA  LLL
PPP              AAA         AAA              SSS  CCC              AAA         AAA  LLL
PPP              AAA         AAA              SSS  CCC              AAA         AAA  LLL
PPP              AAA         AAA  SSSSSSSSSSSS        CCCCCCCCCCCC  AAA         AAA  LLLLLLLLLLLLLLL
PPP              AAA         AAA  SSSSSSSSSSSS        CCCCCCCCCCCC  AAA         AAA  LLLLLLLLLLLLLLL
PPP              AAA         AAA  SSSSSSSSSSSS        CCCCCCCCCCCC  AAA         AAA  LLLLLLLLLLLLLLL
```

P
V

FILEID**PASRT1

B 4

```
PPPPPPPP      AAAAAA      SSSSSSSS   RRRRRRRR   TTTTTTTTTT      11
PPPPPPPP      AAAAAA      SSSSSSSS   RRRRRRRR   TTTTTTTTTT      11
PP      PP  AA      AA  SS           RR      RR     TT        1111
PP      PP  AA      AA  SS           RR      RR     TT        1111
PP      PP  AA      AA  SS           RR      RR     TT          11
PP      PP  AA      AA  SS           RR      RR     TT          11
PPPPPPPP    AA      AA    SSSSSS     RRRRRRRR       TT          11
PPPPPPPP    AA      AA    SSSSSS     RRRRRRRR       TT          11
PP          AAAAAAAAAA          SS   RR  RR         TT          11
PP          AAAAAAAAAA          SS   RR  RR         TT          11
PP          AA      AA          SS   RR    RR       TT          11          ....
PP          AA      AA          SS   RR    RR       TT          11          ....
PP          AA      AA  SSSSSSSS     RR      RR     TT        111111        ....
PP          AA      AA  SSSSSSSS     RR      RR     TT        111111        ....


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
```

```
    0000   ;
    0000   ;******************************************************************************
    0000   ;*                                                                            *
    0000   ;*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                                   *
    0000   ;*  DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.                    *
    0000   ;*  ALL RIGHTS RESERVED.                                                      *
    0000   ;*                                                                            *
    0000   ;*  THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY BE USED AND COPIED     *
    0000   ;*  ONLY IN  ACCORDANCE WITH  THE  TERMS  OF  SUCH  LICENSE  AND WITH THE     *
    0000   ;*  INCLUSION OF THE ABOVE COPYRIGHT NOTICE. THIS SOFTWARE OR  ANY  OTHER     *
    0000   ;*  COPIES THEREOF MAY NOT BE PROVIDED OR OTHERWISE MADE AVAILABLE TO ANY     *
    0000   ;*  OTHER PERSON.  NO TITLE TO AND OWNERSHIP OF  THE  SOFTWARE IS  HEREBY     *
    0000   ;*  TRANSFERRED.                                                              *
    0000   ;*                                                                            *
    0000   ;*  THE INFORMATION IN THIS SOFTWARE IS  SUBJECT TO CHANGE WITHOUT NOTICE     *
    0000   ;*  AND  SHOULD  NOT  BE  CONSTRUED AS  A COMMITMENT BY DIGITAL EQUIPMENT     *
    0000   ;*  CORPORATION.                                                              *
    0000   ;*                                                                            *
    0000   ;*  DIGITAL ASSUMES NO RESPONSIBILITY FOR THE USE  OR  RELIABILITY OF ITS     *
    0000   ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                   *
    0000   ;*                                                                            *
    0000   ;*                                                                            *
    0000   ;******************************************************************************
    0000   ;*                                                                            *
    0000   ;*                              PAS$RT_UTIL                                   *
    0000   ;*           RUNTIME SUPPORT MODULE FOR PASCAL -- SECTION 1                   *
    0000   ;*                                                                            *
    0000   ;*                  VERSION V1.0-1 -- OCTOBER 1979                            *
    0000   ;*                                                                            *
    0000   ;*   This module defines the following routines:                              *
    0000   ;*                                                                            *
    0000   ;*      pas$entry:   JSB routine to expand stack on procedure entry           *
    0000   ;*      pas$unwind:  routine to unwind stack for nonlocal goto                *
    0000   ;*      pas$clock:   routine to implement the Pascal function clock           *
    0000   ;*      pas$card:    routine to implement the Pascal function card            *
    0000   ;*      pas$getargs: routine to get compiler options settings                 *
    0000   ;*      pas$extract,                                                          *
    0000   ;*      pas$insert:  routines for compile time variable field handling        *
    0000   ;*                                                                            *
    0000   ;*   Written by: Jeff Scofield 10-Dec-78                                      *
    0000   ;*               Hellmut Golde 15-Feb-79                                      *
    0000   ;*               Jan Sanislo   22-Feb-79                                      *
    0000   ;*                                                                            *
    0000   ;*   Edit History:
    0000   ;*      01-002: Eliminate body of pas$entry for VMS V2.0.  Leave the entry
    0000   ;*              point available for compatibility with older versions of
    0000   ;*              of the compiler.
    0000   ;*                                     Paul Hohensee   21FEB80
    0000   ;*
    0000   ;       01-003: Multiply result of PAS$CLOCK by 10.
    0000   ;                                     Paul Hohensee   20-Jul-81
    0000   ;
    0000   ;******************************************************************************
    0000           .title  pas$rt_util
    0000           .IDENT  'V04-000'
00000000           .psect _pas$code,pic,shr,exe,nowrt
    0000   ;
```

```
                            0000  ;     ROUTINE TO EXPAND STACK WHEN NECESSARY UPON PROCEDURE ENTRY
                            0000  ;
                            0000  pas$entry::
                        05  0000          rsb               ; leave entry point for compatibility
                            0001  ;
                            0001  ;
                            0001  ;     ROUTINE TO IMPLEMENT THE PROCEDURE PAS$UNWIND
                            0001  ;
                            0001  ;     Modified 5/22/79 - Restore correct SP in case of pathological goto
                            0001  ;                        Jan Sanislo
                            0001  ;
                      0000  0001          .entry  pas$unwind,^m<>
            0C AD   50  D1  0003  loop:   cmpl    r0,12(fp)
                    06  13  0007          beql    lastret
        10 AD    F7 AF  DE  0009          moval   loop,16(fp)
                        04  000E          ret
                            000F  lastret:
 10 AD    00000018'EF   9E  000F          movab   fixsp,16(fp)
                        04  0017          ret
                            0018  ;
            5E   F4 AD  D0  0018  fixsp:  movl    -12(fp),sp
                    61  17  001C          jmp     (r1)
                            001E  ;
                            001E  ;     ROUTINE TO IMPLEMENT THE PASCAL FUNCTION CLOCK
                            001E  ;
                            001E          $jpidef
                      0000  001E          .entry  pas$clock,^m<>
                    00  DD  0020          pushl   #0                          ; make room for returned cpu time
                            0022  ;
                            0022  ;     Create request list on stack at -20(fp)
                            0022  ;
                    7E  7C  0022          clrq    -(sp)                       ; two zero longwords
                 FC AD  DF  0024          pushal  -4(fp)                      ; address of spot to get cpu time
           04070004 8F  DD  0027          pushl   #<jpi$_cputima16>!4         ; size and request words
                            002D  ;
                            002D  ;     Push arguments and call sys$getjpi
                            002D  ;
                    7E  7C  002D          clrq    -(sp)                       ; arg6,arg7--null arguments
                    00  DD  002F          pushl   #0                          ; arg5--null argument
                 EC AD  DF  0031          pushal  -20(fp)                     ; arg4--address of request list
                    7E  7C  0034          clrq    -(sp)                       ; arg2,arg3--null arguments
                    00  DD  0036          pushl   #0                          ; arg1--null argument
     00000000'GF    07  FB  0038          calls   #7,G^sys$getjpi             ; get cpu time from system
      50   0A    FC AD  C5  003F          MULL3   -4(FP),#10,R0               ; multiply by 10 to get milliseconds
                        04  0044          ret
                            0045  ;
                            0045  ;     ROUTINE TO IMPLEMENT THE PASCAL FUNCTION CARD
                            0045  ;
                      003C  0045          .entry  pas$card,^m<r2,r3,r4,r5>
                    50  D4  0047          clrl    r0                          ; clear return count
                    51  D4  0049          clrl    r1                          ; clear starting position
                    55  D4  004B          clrl    r5                          ; clear size comparison reg.
           52    04 AC  D0  004D          movl    4(ap),r2                    ; get length of set
               53   52  D0  0051          movl    r2,r3                       ; into 3 registers
               54   52  D0  0054  10$:    movl    r2,r4                       ;
               20   54  D1  0057          cmpl    r4,#32                      ; check size field
               06   15  005A              bleq    20$                         ; is ok.
```

```
                          54    20    D0 005C       movl     #32,r4                  ; otherwise set size to 32
                          52    20    C2 005F       subl2    #32,r2                  ;
                          55    54    C0 0062  20$: addl2    r4,r5                   ; increment size comparison
          51     08 BC    54    51    EA 0065  30$: ffs      r1,r4,@8(ap),r1         ; find next "1" bit
                                0A    13 006B       beql     40$                     ; done if Z-bit = 1
                                50    D6 006D       incl     r0                      ; increment count
                                51    D6 006F       incl     r1                      ; increment starting position
                   54     55    51    C3 0071       subl3    r1,r5,r4                ; compute new length
                                EE    11 0075       brb      30$                     ; loop until done
                          51    53    D1 0077  40$: cmpl     r3,r1                   ; check if done
                                D8    14 007A       bgtr     10$                     ;
                                      04 007C       ret                              ; return to caller
                                         007D  ;
                                         007D  ;    ROUTINE TO GET OPTION SETTINGS FROM COMMAND LINE
                                         007D  ;
                                         007D  ;    This routine gets the option settings from the command line, which
                                         007D  ;    were passed as arguments to the main program level.  These argu-
                                         007D  ;    ments are not available within Pascal, which is why this routine is
                                         007D  ;    required.  This routine must be called directly from the main
                                         007D  ;    program, as it assumes that the main program's saved AP is on the
                                         007D  ;    stack at 8(FP).
                                         007D  ;
                                    0100 007D       .entry   pas$getargs,^m<r8>
                      58     08 AD    D0 007F       movl     8(fp),r8                ; r8 <-- saved ap of main program
                   04 BC     04 B8    B0 0083       movw     @4(r8),@4(ap)           ; set first return parameter
                   08 BC     08 B8    B0 0088       movw     @8(r8),@8(ap)           ; set second return parameter
                   0C BC     0C A8    D0 008D       movl     12(r8),@12(ap)          ; set third return parameter
          10 BC     10 B8     0B      28 0092       movc3    #11,@16(r8),@16(ap)     ; set fourth return parameter
          14 BC     14 B8     0B      28 0098       movc3    #11,@20(r8),@20(ap)     ; set fifth return parameter
   18 BC     18 B8     0080 8F        28 009E       movc3    #128,@24(r8),@24(ap)    ; set sixth return parameter
                   1C BC     1C A8    D0 00A6       movl     28(r8),@28(ap)          ; set seventh return parameter.
                                      04 00AB       ret                              ; return to caller
                                         00AC  ;
                                         00AC  ;    ROUTINES FOR VARIABLE FIELD INSERTION AND EXTRACTION BY COMPILER
                                         00AC  ;
                                    0000 00AC       .entry   pas$insert,^m<>
04 BC     10 AC     0C AC     08 BC   F0 00AE       insv     @8(ap),12(ap),16(ap),@4(ap)
                                      04 00B7       ret
                                         00B8  ;
                                    0000 00B8       .entry   pas$extract,^m<>
08 BC     04 BC     10 AC     0C AC   EF 00BA       extzv    12(ap),16(ap),@4(ap),@8(ap)
                                      04 00C3       ret
                                         00C4       .end
```

```
FIXSP                            00000018 R      01
JPI$_CPUTIM                    = 00000407
LASTRET                          0000000F R      01
LOOP                             00000003 R      01
PAS$CARD                         00000045 RG     01
PAS$CLOCK                        0000001E RG     01
PAS$ENTRY                        00000000 RG     01
PAS$EXTRACT                      000000B8 RG     01
PAS$GETARGS                      0000007D RG     01
PAS$INSERT                       000000AC RG     01
PAS$UNWIND                       00000001 RG     01
SYS$GETJPI                       ********    X   01

                                              +----------------+
                                              ! Psect synopsis !
                                              +----------------+

PSECT name                       Allocation          PSECT No.  Attributes
----------                       ----------          ---------  ----------
.  ABS  .                        00000000  (     0.)  00 (  0.)  NOPIC    USR    CON    ABS    LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
_PAS$CODE                        000000C4  (   196.)  01 (  1.)    PIC    USR    CON    REL    LCL   SHR   EXE   RD   NOWRT NOVEC BYTE
$ABS$                            00000000  (     0.)  02 (  2.)  NOPIC    USR    CON    ABS    LCL NOSHR   EXE   RD     WRT NOVEC BYTE

                                           +------------------------+
                                           ! Performance indicators !
                                           +------------------------+

Phase                       Page faults    CPU Time       Elapsed Time
-----                       -----------    --------       ------------
Initialization                       34    00:00:00.09    00:00:00.90
Command processing                  135    00:00:00.50    00:00:02.14
Pass 1                              128    00:00:01.66    00:00:03.55
Symbol table sort                     0    00:00:00.10    00:00:00.09
Pass 2                               45    00:00:00.53    00:00:01.10
Symbol table output                   3    00:00:00.02    00:00:00.03
Psect synopsis output                 3    00:00:00.02    00:00:00.02
Cross-reference output                0    00:00:00.00    00:00:00.00
Assembler run totals                351    00:00:02.92    00:00:07.84

The working set limit was 1050 pages.
7791 bytes (16 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 120 non-local and 4 local symbols.
157 source lines were read in Pass 1, producing 28 object records in Pass 2.
8 pages of virtual memory were used to define 7 macros.

                                          +--------------------------+
                                          ! Macro library statistics !
                                          +--------------------------+

Macro library name                        Macros defined
------------------                        --------------
_$255$DUA28:[SYSLIB]STARLET.MLB;2                4

168 GETS were required to define 4 macros.

There were no errors, warnings or information messages.
```

```
PAS
Sym

ALL
EXI
EXI
EXI
EXP
INP
INS
LAS
LIB
LIB
LIN
LIN
LOC
LOO
MAR
NES
PAR
PAS
PAS
PAS
PAS
PAS
PAS
PAS
PBL
POO
POO
REM
SET
SIZ
SPL

PSE
---
.
$AB
_PA
_PA

Pha
---
Ini
Com
Pas
Sym
Pas
Sym
Pse
Cro
```

```
MACRO/DISABLE=TRACE/LIS=LIS$:PASRT1/OBJ=OBJ$:PASRT1 MSRC$:PASRT1/UPDATE=(ENH$:PASRT1)
```

```
PAS
VAX

Ass

The
133
The
528
8 p

Mac
---
_$2

91

The

MAC
```

0293 AH-BT13A-SE
VAX/VMS V4.0

DIGITAL EQUIPMENT CORPORATION
CONFIDENTIAL AND PROPRIETARY

PASRT1
LIS

PASMACROS
REQ

PASFCB
SDL

PASPROLOG
REQ

PASOPEDEF
REQ

PASABSL
LIS

PASCARD2
LIS

PASRTL

PASBUGCOD
REQ

PASCLOSE2
LIS

PASRT2
LIS

PASRT3
LIS

PASRTL
MAP

PASIO4
LIS

PASEXTERN
REQ

PASKDB
REQ

PASPFD
REQ

PASCONVER
LIS

PASLIB
REQ

PASPFU
REQ

PASBIN
LIS

PASCLOCK2
LIS

PASRT4
LIS