```
LLL                 IIIIIIIII     BBBBBBBBBBBB     RRRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
LLL                 IIIIIIIII     BBBBBBBBBBBB     RRRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
LLL                 IIIIIIIII     BBBBBBBBBBBB     RRRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBB         BBB  RRR         RRR        TTT        LLL
LLL                    III        BBBBBBBBBBBB     RRRRRRRRRRRR           TTT        LLL
LLL                    III        BBBBBBBBBBBB     RRRRRRRRRRRR           TTT        LLL
LLL                    III        BBBBBBBBBBBB     RRRRRRRRRRRR           TTT        LLL
LLL                    III        BBB         BBB  RRR   RRR              TTT        LLL
LLL                    III        BBB         BBB  RRR   RRR              TTT        LLL
LLL                    III        BBB         BBB  RRR   RRR              TTT        LLL
LLL                    III        BBB         BBB  RRR      RRR           TTT        LLL
LLL                    III        BBB         BBB  RRR      RRR           TTT        LLL
LLL                    III        BBB         BBB  RRR      RRR           TTT        LLL
LLLLLLLLLLLLLLL     IIIIIIIII     BBBBBBBBBBBB     RRR         RRR        TTT        LLLLLLLLLLLLLLL
LLLLLLLLLLLLLLL     IIIIIIIII     BBBBBBBBBBBB     RRR         RRR        TTT        LLLLLLLLLLLLLLL
LLLLLLLLLLLLLLL     IIIIIIIII     BBBBBBBBBBBB     RRR         RRR        TTT        LLLLLLLLLLLLLLL
```

```
RRRRRRRR    TTTTTTTTTT  LL          LL          IIIIII    BBBBBBBB
RRRRRRRR    TTTTTTTTTT  LL          LL          IIIIII    BBBBBBBB
RR      RR      TT      LL          LL            II      BB      BB
RR      RR      TT      LL          LL            II      BB      BB
RR      RR      TT      LL          LL            II      BB      BB
RR      RR      TT      LL          LL            II      BB      BB
RRRRRRRR        TT      LL          LL            II      BBBBBBBB
RRRRRRRR        TT      LL          LL            II      BBBBBBBB
RR  RR          TT      LL          LL            II      BB      BB
RR  RR          TT      LL          LL            II      BB      BB
RR    RR        TT      LL          LL            II      BB      BB      ....
RR    RR        TT      LL          LL            II      BB      BB      ....
RR      RR      TT      LLLLLLLLLL  LLLLLLLLLL    IIIIII    BBBBBBBB      ....
RR      RR      TT      LLLLLLLLLL  LLLLLLLLLL    IIIIII    BBBBBBBB      ....

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
```

```
;  0001  0     ! Run-Time Library specific macros and symbols
;  0002  0     ! File: RTLLIB.REQ, Edit: SBL1005
;  0003  0     !
;  0004  0     !*****************************************************************************
;  0005  0     !*                                                                           *
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;  0023  0     !*                                                                           *
;  0024  0     !*                                                                           *
;  0025  0     !*****************************************************************************
;  0026  0     !
;  0027  0     ! Author: Steven B. Lionel, 16-August-1982
;  0028  0     !
;  0029  0     ! 1-001 - Original.  SBL 16-August-1982
;  0030  0     ! 1-002 - Add LIBGETXXI.R32.  SBL 14-Jan-1983
;  0031  0     ! 1-003 - Remove LIBGETXXI.R32.  It has been replaced with LIBFMTDEF which
;  0032  0     !         is in STARLET.  SBL 11-Mar-1983
;  0033  0     ! 1-004 - Move LIBFMTDEF back here as it isn't needed in STARLET.  SBL 25-May-1983
;  0034  0     ! 1-005 - Conditionally include LIBFMTDEF if it isn't already in STARLET.
;  0035  0     !         This is a temporary measure.  SBL 27-May-1983
;  0036  0     !--
;  0037  0     !
;  0038  0     !+
;  0039  0     ! This file is the master source for RTLLIB.L32.
;  0040  0     ! It contains definitions for macros and symbols used internally to the
;  0041  0     ! Run-Time Library.  All symbols defined in RTLLIB must have an appropriate
;  0042  0     ! facility prefix.  Only non-language-specific facility definitions should
;  0043  0     ! be included in RTLLIB.
;  0044  0     !-
;  0045  0     !
;  0046  0     SWITCHES ADDRESSING_MODE (EXTERNAL=GENERAL, NONEXTERNAL=WORD_RELATIVE);
;  0047  0     !
;  0048  0     LIBRARY 'RTLSTARLE';                    ! SYS$LIBRARY:STARLET.L32
;  0049  0     !
;  0050  0     !+
;  0051  0     ! Define linkages for LIB$ routines.
;  0052  0     !-
;  0053  0     !
;  0054  0     REQUIRE 'RTLIN:LIBLNK';
```

```
;  R0055  0      ! Run-Time Library LIB$ routine linkages
;  R0056  0      ! File: LIBLNK.REQ, Edit: SBL1001
;  R0057  0      !
;  R0058  0      !*****************************************************************************
;  R0059  0      !*                                                                           *
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;  R0077  0      !*                                                                           *
;  R0078  0      !*                                                                           *
;  R0079  0      !*****************************************************************************
;  R0080  0      !
;  R0081  0      ! Author: Steven B. Lionel, 16-August-1982
;  R0082  0      !
;  R0083  0      ! 1-001 - Original.  SBL 16-August-1982
;  R0084  0      !--
;  R0085  0      !
;  R0086  0      !+
;  R0087  0      ! This file contains linkage definitions for LIB$ procedures.
;  R0088  0      ! The linkage name is the routine name suffixed with "$LINKAGE".
;  R0089  0      !-
;  R0090  0      !
;  R0091  0      LINKAGE
;  R0092  0          LIB$ANALYZE_SDESC_R2$LINKAGE =      ! LIB$ANALYZE_SDESC_R2
;  R0093  0              JSB (
;  R0094  0                  REGISTER=0;          ! Descriptor address
;  R0095  0                  REGISTER=1,          ! Returned length word
;  R0096  0                  REGISTER=2) :        ! Returned string pointer
;  R0097  0              NOTUSED (3,4,5,6,7,8,9,10,11),
;  R0098  0      !
;  R0099  0          LIB$SCOPY_DXDX6$LINKAGE =           ! LIB$SCOPY_DXDX6
;  R0100  0              JSB (
;  R0101  0                  REGISTER=0,          ! Address of source descriptor
;  R0102  0                  REGISTER=1):         ! Address of destination descriptor
;  R0103  0              NOPRESERVE (2,3,4,5,6)  NOTUSED (7,8,9,10,11),
;  R0104  0      !
;  R0105  0          LIB$SCOPY_R_DX6$LINKAGE =           ! LIB$SCOPY_R_DX6
;  R0106  0              JSB (
;  R0107  0                  REGISTER=0,          ! Length (word) of source
;  R0108  0                  REGISTER=1,          ! Address of source
;  R0109  0                  REGISTER=2):         ! Address of destination descriptor
;  R0110  0              NOPRESERVE (2,3,4,5,6)  NOTUSED (7,8,9,10,11),
;  R0111  0
```

```
;  R0112  0          LIB$SFREE1_DD6$LINKAGE =            ! LIB$SFREE1_DD6
;  R0113  0              JSB (
;  R0114  0                  REGISTER=0):          ! Address of descriptor
;  R0115  0              NOPRESERVE (2,3,4,5,6)  NOTUSED (7,8,9,10,11),
;  R0116  0
;  R0117  0          LIB$SFREEN_DDR6$LINKAGE =           ! LIB$SFREEN_DDR6
;  R0118  0              JSB (
;  R0119  0                  REGISTER=0,           ! Number of strings to deallocate
;  R0120  0                  REGISTER=1):          ! Address array of descriptors
;  R0121  0              NOPRESERVE (2,3,4,5,6)  NOTUSED (7,8,9,10,11),
;  R0122  0
;  R0123  0          LIB$SGET1_DD_R6$LINKAGE =           ! LIB$SGET1_DD_R6
;  R0124  0              JSB (
;  R0125  0                  REGISTER=0,           ! Length (word) of string to allocate
;  R0126  0                  REGISTER=1):          ! Address of descriptor
;  R0127  0              NOPRESERVE (2,3,4,5,6)  NOTUSED (7,8,9,10,11);
;  R0128  0
;  R0129  0      ! End of file LIBLNK.REQ
```

```
;    0130  0
;    0131  0      !+
;    0132  0      ! Define macros for LIB$ routines.
;    0133  0      !-
;    0134  0
;    0135  0      REQUIRE 'RTLIN:LIBMACROS';
```

```
;  R0136  0      ! Macros for the Run-Time Library LIB$ facility
;  R0137  0      ! File: LIBMACROS.REQ, Edit: SBL1003
;  R0138  0      !
;  R0139  0      !****************************************************************************
;  R0140  0      !*                                                                          *
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;  R0159  0      !*                                                                          *
;  R0160  0      !****************************************************************************
;  R0161  0      !
;  R0162  0      ! Author: Steven B. Lionel, 16-August-1982
;  R0163  0      !
;  R0164  0      ! 1-001 - Original.  SBL 16-August-1982
;  R0165  0      ! 1-002 - Add macros to read, write and copy with autoincrement.
;  R0166  0      !         SBL 12-Apr-1983
;  R0167  0      ! 1-003 - Add $LIB$MOVQ.  SBL 17-June-1983
;  R0168  0      !--
;  R0169  0      !
;  R0170  0      !+
;  R0171  0      ! This file contains macros which are available to any BLISS module that
;  R0172  0      ! REQUIREs LIBPROLOG.REQ.  Macros in this file are useful to any LIB$
;  R0173  0      ! module written in BLISS.  All macros defined MUST have names that begin
;  R0174  0      ! with "$LIB$".
;  R0175  0      !-
```

```
;  R0176  0      !+
;  R0177  0      ! $LIB$VALIDATE_ARGCOUNT
;  R0178  0      !
;  R0179  0      ! Macro used to check that a LIB$ procedure was called with the correct
;  R0180  0      ! number of arguments.  If the test fails, the procedure returns with the
;  R0181  0      ! failure status LIB$_WRONUMARG.
;  R0182  0      !
;  R0183  0      ! Format:
;  R0184  0      !       $LIB$VALIDATE_ARGCOUNT (lo, hi);
;  R0185  0      !
;  R0186  0      !       lo = Lowest number of arguments which are valid (0-255)
;  R0187  0      !       hi = Highest number of arguments which are valid (0-255)
;  R0188  0      !-
;  R0189  0
;  R0190  0      MACRO
; MR0191  0          $LIB$VALIDATE_ARGCOUNT (lo, hi) =
; MR0192  0              BEGIN
; MR0193  0              BUILTIN
; MR0194  0                  ACTUALCOUNT;
; MR0195  0              EXTERNAL LITERAL
; MR0196  0                  LIB$_WRONUMARG;
; MR0197  0
; MR0198  0              %IF lo NEQ hi
; MR0199  0              %THEN
; MR0200  0                  %IF lo NEQ 0
; MR0201  0                  %THEN
; MR0202  0                      LOCAL
; MR0203  0                          DIFF: BYTE;
; MR0204  0                      DIFF = ACTUALCOUNT () - lo;
; MR0205  0                      IF .DIFF  GTRU (hi - lo)
; MR0206  0                      THEN
; MR0207  0                          RETURN LIB$_WRONUMARG;
; MR0208  0                  %ELSE
; MR0209  0                      IF ACTUALCOUNT () GTRU hi
; MR0210  0                      THEN
; MR0211  0                          RETURN LIB$_WRONUMARG;
; MR0212  0                  %FI
; MR0213  0
; MR0214  0              %ELSE
; MR0215  0                  IF ACTUALCOUNT () NEQU lo
; MR0216  0                  THEN
; MR0217  0                      RETURN LIB$_WRONUMARG;
; MR0218  0              %FI
; MR0219  0
;  R0220  0              END %;
```

```
;  R0221  0      !+
;  R0222  0      ! Macros to read, write and copy with autoincrement.
;  R0223  0      !-
;  R0224  0
;  R0225  0      MACRO
;  R0226  0          $LIB$RBYTE_A(P) = (P = .P+1; .(.P-1)<0, 8>) %,
;  R0227  0          $LIB$RWORD_A(P) = (P = .P+2; .(.P-2)<0,16>) %,
;  R0228  0          $LIB$RLONG_A(P) = (P = .P+4; .(.P-4)<0,32>) %,
;  R0229  0
;  R0230  0          $LIB$WBYTE_A(P) = (P=.P+1; .P-1)<0,8> %,
;  R0231  0          $LIB$WWORD_A(P) = (P=.P+2; .P-2)<0,16> %,
;  R0232  0          $LIB$WLONG_A(P) = (P=.P+4; .P-4)<0,32> %,
;  R0233  0
;  R0234  0          $LIB$COPY_BYTE_A (S,D) = ($LIB$WBYTE_A(D)=$LIB$RBYTE_A(S)) %,
;  R0235  0          $LIB$COPY_WORD_A (S,D) = ($LIB$WWORD_A(D)=$LIB$RWORD_A(S)) %,
;  R0236  0          $LIB$COPY_LONG_A (S,D) = ($LIB$WLONG_A(D)=$LIB$RLONG_A(S)) %,
; MR0237  0          $LIB$COPY_QUAD_A (S,D) = ((.D)<0,32>=.(.S)<0,32>;
;  R0238  0              (.D+4)<0,32>=.(.S+4)<0,32>; D=.D+8; S=.S+8) %;
;  R0239  0
;  R0240  0      !+
;  R0241  0      ! Macro to move a quadword with a MOVQ instruction.
;  R0242  0      !-
;  R0243  0
;  R0244  0      MACRO
; MR0245  0          $LIB$MOVQ (S,D) =
; MR0246  0              BEGIN
; MR0247  0              (D) = .(S);
; MR0248  0              ((D)+4) = .((S)+4);
;  R0249  0              END %;
;  R0250  0
;  R0251  0
;  R0252  0      ! End of file LIBMACROS.REQ
```

```
;    0253  0
;    0254  0     !+
;    0255  0     ! Define item format codes for LIB$GETxxI procedures.
;    0256  0     !-
;    0257  0
;  L 0258  0     %IF NOT %DECLARED(LIB$K_FMT_STRING)
;    0259  0     %THEN
;    0260  0     REQUIRE 'RTLML:LIBFMTDEF';
```

```
;  R0261  0      ! ****************************************************************************************************
;  R0262  0      !  Created 15-SEP-1984 22:48:43  by  VAX-11 SDL V2.0       Source: 15-SEP-1984 22:46:21  _$255$DUA28:[LIBRTL.SRC]LIBF
;  R0263  0      ! ****************************************************************************************************
;  R0264  0
;  R0265  0
;  R0266  0      !*** MODULE $LIBFMTDEF ***
;  R0267  0      !  Item formatting codes used by LIB$FORMAT_ITEM
;  R0268  0      literal LIB$K_FMT_STRING = 0;           !  Value is a string
;  R0269  0      literal LIB$K_FMT_ASCIC = 1;            !  Value is a counted string
;  R0270  0      literal LIB$K_FMT_HEXSTRING = 2;        !  Value is a hex string of arbitrary length
;  R0271  0      literal LIB$K_FMT_PSTRING = 3;          !  Value is a blank-padded string
;  R0272  0      !  Reserved for string expansion
;  R0273  0      literal LIB$K_FMT_BINARY = 8;           !  Value is a longword integer
;  R0274  0      literal LIB$K_FMT_HEX = 9;              !  Value is a hex-formatted integer
;  R0275  0      literal LIB$K_FMT_BOOLEAN = 10;         !  Value is a bit; use boolean for string
;  R0276  0      literal LIB$K_FMT_DATE = 11;            !  Value is a date
;  R0277  0      literal LIB$K_FMT_PRIVILEGE = 12;       !  Value is a privilege mask
;  R0278  0      literal LIB$K_FMT_UIC = 13;             !  Value is a UIC
;  R0279  0      literal LIB$K_FMT_PROT = 14;            !  Value is a protection specifier
;  R0280  0      literal LIB$K_FMT_VPROT = 15;           !  Value is a volume protection specifier
;  R0281  0      literal LIB$K_FMT_ACP = 16;             !  Value is an ACP type
;  R0282  0      literal LIB$K_FMT_STATE = 17;           !  Value is a process state
;  R0283  0      literal LIB$K_FMT_MODE = 18;            !  Value is a process mode
;  R0284  0      literal LIB$K_FMT_MIN = 0;
;  R0285  0      literal LIB$K_FMT_MAX = 18;
;  R0286  0      literal LIB$K_FMT_MAXSTRING = 3;
```

```
;   0287  0      %FI
;   0288  0
;   0289  0      ! End of file RTLLIB.REQ
```

; Library Statistics

File	Symbols Total	Symbols Loaded	Symbols Percent	Pages Mapped	Processing Time
_255DUA28:[SYSLIB]STARLET.L32;1	9776	0	0	581	00:01.0

; COMMAND QUALIFIERS

; BLISS/LIBRARY=LIB$:/LIST=LIS$:/SOURCE=REQUIRE SRC$:RTLLIB

```
; Run Time:         00:03.9
; Elapsed Time:     00:05.8
; Lines/CPU Min:     4434
; Lexemes/CPU-Min: 14961
; Memory Used:  32 pages
; Library Precompilation Complete
```

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