1 3

```
   CCCCCCCCCCCC  LLL                  IIIIIIIII     UUU         UUU  TTTTTTTTTTTTTTT  LLL
   CCCCCCCCCCCC  LLL                  IIIIIIIII     UUU         UUU  TTTTTTTTTTTTTTT  LLL
   CCCCCCCCCCCC  LLL                  IIIIIIIII     UUU         UUU  TTTTTTTTTTTTTTT  LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
CCC              LLL                     III        UUU         UUU        TTT        LLL
   CCCCCCCCCCCC  LLLLLLLLLLLLLLL      IIIIIIIII     UUUUUUUUUUUUUUU        TTT        LLLLLLLLLLLLLLL
   CCCCCCCCCCCC  LLLLLLLLLLLLLLL      IIIIIIIII     UUUUUUUUUUUUUUU        TTT        LLLLLLLLLLLLLLL
   CCCCCCCCCCCC  LLLLLLLLLLLLLLL      IIIIIIIII     UUUUUUUUUUUUUUU        TTT        LLLLLLLLLLLLLLL
```

```
                                                                     E 4
**FILE**ID**CHRSUB
```

```
  CCCCCCCC  HH      HH  RRRRRRRR      SSSSSSSS  UU      UU  BBBBBBBB
  CCCCCCCC  HH      HH  RRRRRRRR      SSSSSSSS  UU      UU  BBBBBBBB
CC          HH      HH  RR      RR  SS          UU      UU  BB      BB
CC          HH      HH  RR      RR  SS          UU      UU  BB      BB
CC          HH      HH  RR      RR  SS          UU      UU  BB      BB
CC          HH      HH  RR      RR  SS          UU      UU  BB      BB
CC          HHHHHHHHHH  RRRRRRRR      SSSSSS    UU      UU  BBBBBBBB
CC          HHHHHHHHHH  RRRRRRRR      SSSSSS    UU      UU  BBBBBBBB
CC          HH      HH  RR  RR              SS  UU      UU  BB      BB
CC          HH      HH  RR  RR              SS  UU      UU  BB      BB
CC          HH      HH  RR    RR            SS  UU      UU  BB      BB      ....
CC          HH      HH  RR    RR            SS  UU      UU  BB      BB      ....
  CCCCCCCC  HH      HH  RR      RR  SSSSSSSS    UUUUUUUUUU  BBBBBBBB        ....
  CCCCCCCC  HH      HH  RR      RR  SSSSSSSS    UUUUUUUUUU  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
```

Table of contents

```
0000          .TITLE  CHRSUB - CHARACTER MANIPULATION SUBROUTINES
0000          .IDENT  'V04-000'
0000
0000   ;
0000   ;****************************************************************************
0000   ;*                                                                          *
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0000   ;*                                                                          *
0000   ;*                                                                          *
0000   ;****************************************************************************
0000   ;
0000
0000   ;++
0000   ; FACILITY:     UTILITY SUBROUTINES
0000   ;
0000   ; ABSTRACT:     CHARACTER MANIPUATION SUBROUTINES
0000   ;
0000   ; ENVIRONMENT:  NATIVE/USER MODE CODE
0000   ;
0000   ; AUTHOR:       W.H.BROWN, CREATION DATE:       19-MAY-1977
0000   ;
0000   ; MODIFIED BY:
0000   ;
0000   ;       , : VERSION
0000   ; 01    -
0000   ;--
```

```
                 0000              .SBTTL  DECLARATIONS
                 0000       ;
                 0000       ; INCLUDE FILES:
                 0000       ;
                 0000
                 0000       ;
                 0000       ; MACROS:
                 0000       ;
                 0000       ; MACRO TO GENERATE AN ENTRY IN THE CHARACTER CLASSIFICATION TABLE
                 0000       ;
                 0000       ; CALL:
                 0000       ;          CHAR    NAME,CHR
                 0000       ; WHERE:
                 0000       ;          NAME IS THE SYMBOLIC NAME SUFFIX TO "CHR$K_" FOR THE CHAR
                 0000       ;          CHR IS THE ASCII CHAR.
                 0000       ;
                 0000              .MACRO  CHAR    NAME,CHR,N
                 0000              CHR$K_'NAME == N
                 0000              .BYTE   ^A\CHR\
                 0000              .ENDM
                 0000
                 0000       ;
                 0000       ; EQUATED SYMBOLS:
                 0000       ;
                 0000       ; DEFINE SPECIAL SYMBOLS FOR ALPHA/NUMERIC SETS
                 0000       ;
       00000001  0000              CHR$K_ALPHA == 1
       00000002  0000              CHR$K_NUMERIC == 2
                 0000
                 0000       ;
                 0000       ; OWN STORAGE:
                 0000       ;
             00000000              .PSECT  _PURE   RD,NOWRT,BYTE
                 0000
                 0000       CHRTBL:
                 0000              CHAR    SLASH   </>     12
                 0001              CHAR    SEMI    <;>     11
                 0002              CHAR    LBRAKT  <[>     10
                 0003              CHAR    RBRAKT  <]>     9
                 0004              CHAR    COMMA   <,>     8
                 0005              CHAR    DOT     <.>     7
                 0006              CHAR    COLON   <:>     6
                 0007              CHAR    BLANK   < >     5
                 0008              CHAR    DOLLAR  <$>     4
                 0009              CHAR    UNDRSCR <_>     3
          00 00  000A              .BYTE   0,0                     ; EOL AND FILLER FOR REMAINING COUNT
                 000C
       0000000C  000C       CHRTBLSIZ = . - CHRTBL
                 000C
       2B 25 2D  000C       SPCNUM: .ASCII  \-%+\                  ; SPECIAL CHARACTERS TREATED AS NUMERIC
       00000003  000F       SPCNUMSIZ = . - SPCNUM
                 000F
```

```
                        000F          .SBTTL  TEST A CHARACTER FOR CLASS
                        000F     ;++
                        000F     ; FUNCTIONAL DESCRIPTION:
                        000F     ;
                        000F     ;        THIS ROUTINE IS CALLED TO CLASSIFY AN ASCII CHARATER INTO
                        000F     ;        ONE OF SEVERAL CLASSES. AN ALTERNATE ENTRY PROVIDES LOWER
                        000F     ;        TO UPPER CASE CONVERSION AS WELL.
                        000F     ;
                        000F     ; CALLING SEQUENCE:
                        000F     ;
                        000F     ;        BSB/JSB CHR$TSTCHR              ; TEST THE CHARACTER
                        000F     ;        BSB/JSB CHR$CVT                 ; CONVERT AND TEST
                        000F     ;
                        000F     ; INPUT PARAMETERS:
                        000F     ;
                        000F     ;        R6 CONTAINS ADDRESS OF BYTE TO TEST
                        000F     ;
                        000F     ; IMPLICIT INPUTS:
                        000F     ;
                        000F     ;        STRING IS TERMINATED BY A ZERO BYTE
                        000F     ;
                        000F     ; OUTPUT PARAMETERS:
                        000F     ;
                        000F     ;        R0 SET TO "CHR$K_<CLASS_NAME>" IF ONE OF RECOGNIZED CHARACTERS
                        000F     ;           ELSE SET TO MINUS 1
                        000F     ;
                        000F     ; IMPLICIT OUTPUTS:
                        000F     ;
                        000F     ;        NONE
                        000F     ;
                        000F     ; COMPLETION CODES:
                        000F     ;
                        000F     ;        NONE
                        000F     ;
                        000F     ; SIDE EFFECTS:
                        000F     ;
                        000F     ;        NONE
                        000F     ;
                        000F     ;--
                        000F
                        000F     CHR$CVT::                               ; CONVERT TO UPPER CASE
61 8F     66    91      000F             CMPB    (R6),#<^A/A/+^X20>      ; LOWER CASE A?
          0D    19      0013             BLSS    CHR$TSTCHR              ; BR IF NOT LOWER
7A 8F     66    91      0015             CMPB    (R6),#<^A/Z/+^X20>      ; LOWER CASE Z?
          07    14      0019             BGTR    CHR$TSTCHR              ; BR IF NOT LOWER
   66     20    82      001B             SUBB    #^X20,(R6)              ; CONVERT TO UPPER
          02    11      001E             BRB     CHR$TSTCHR              ;
                        0020
                        0020     CHR$TSTNXT::                            ; TEST NEXT CHAR
          56    D6      0020             INCL    R6                      ; ADD ONE TI ADDRESS
                        0022
                        0022     CHR$TSTCHR::                            ; TEST A CHARACTER FOR CLASS
          50    D4      0022             CLRL    R0                      ; ASSUME END-OF-LINE
          66    95      0024             TSTB    (R6)                    ; END-OF-LINE?
          50    13      0026             BEQL    90$                     ; BR IF YES
          50    D6      0028             INCL    R0                      ; SET TYPE TO ALPHA
41 8F     66    91      002A             CMPB    (R6),#^A/A/             ; CHECK AGAINST LOW LIMIT
```

```
                 12  1F  002E           BLSSU   20$                     ; BR IF BELOW ALPHA
          5A 8F  66  91  0030           CMPB    (R6),#^A/Z/             ; NOW CHECK HI END
                 42  15  0034           BLEQ    90$                     ; BR IF ALPHA
          61 8F  66  91  0036           CMPB    (R6),#<^A/A/+^X20>      ; CHECK FOR LOWER CASE ALPHA
                 06  19  003A           BLSS    20$                     ; BR IF NO
          7A 8F  66  91  003C           CMPB    (R6),#<^A/Z/+^X20>      ; OTHER LIMIT
                 36  15  0040           BLEQ    90$                     ; FOUND THE CLASS
                 02  DD  0042     20$:  PUSHL   S^#CHR$K_NUMERIC        ; SET VALUE FOR NUMERIC CHARATERS
    C3 AF     03 66  3A  0044           LOCC    (R6),#SPCNUMSIZ,SPCNUM  ; CHECK FOR SPECIAL NUMERIC CHARACTERS
                 01  BA  0049           POPR    #^M<R0>                 ; GET VALUE FOR NUMERIC CHARACTER
                 2B  12  004B           BNEQ    90$                     ; BR IF CHARACTER IS SPECIAL NUMERIC
              30 66  91  004D           CMPB    (R6),#^A/0/             ; CHECK LOW LIMIT
                 05  19  0050           BLSS    30$                     ; BR IF NOT NUMERIC
              39 66  91  0052           CMPB    (R6),#^A/9/             ; WHAT ABOUT THE HI LIMIT
                 21  15  0055           BLEQ    90$                     ; BR IF NUMERIC
    A4 AF     0C 66  3A  0057     30$:  LOCC    (R6),#CHRTBLSIZ,CHRTBL  ; CHECK IF ONE OF SPECIALS
                 1A  12  005C           BNEQ    90$                     ; BR IF YES
              50 05  D0  005E           MOVL    #CHR$K_BLANK,R0         ; ASSUME TAB
              09 66  91  0061           CMPB    (R6),#^A/       /       ; IS IT A TAB?
                 12  13  0064           BEQL    90$                     ; BR IF YES
              50 0A  D0  0066           MOVL    #CHR$K_LBRAKT,R0        ; ASSUME LEFT BRACKET
              3C 66  91  0069           CMPB    (R6),#^A/</             ; IS IT THE FUNNY BRAKET?
                 0A  13  006C           BEQL    90$                     ; BR IF YES
                 50  D6  006E           INCL    R0                      ; CHANGE CODE TO RIGHT BRACKET
              3E 66  91  0070           CMPB    (R6),#^A/>/             ; CHECK CLOSE BRAKET
                 03  13  0073           BEQL    90$                     ; BR IF YES
              50 01  CE  0075           MNEGL   #1,R0                   ; SET AS GENERAL SPECIAL
                 50  D5  0078     90$:  TSTL    R0                      ; SET STATUS BASED ON VALUE
                 05  007A               RSB                             ;
```

```
                    007B
                    007B            .SBTTL  GET TOKEN
                    007B    ;++
                    007B    ; FUNCTIONAL DESCRIPTION:
                    007B    ;
                    007B    ;       THIS ROUTINE IS CALLED TO PARSE THE NEXT TOKEN FROM THE
                    007B    ;       COMMAND LINE.
                    007B    ;
                    007B    ; CALLING SEQUENCE:
                    007B    ;
                    007B    ;       BSB/JSB CHR$GETOKEN             ; GET TOKEN FROM LINE
                    007B    ;       BSB/JSB CHR$NXTOKEN             ; TOKEN AFTER NEXT CHARACTER
                    007B    ;
                    007B    ; INPUT PARAMETERS:
                    007B    ;
                    007B    ;       R6 CONTAINS ADDRESS OF NEXT BYTE ON THE LINE
                    007B    ;
                    007B    ; IMPLICIT INPUTS:
                    007B    ;
                    007B    ;       STRING IS TERMINATED BY ZERO BYTE
                    007B    ;
                    007B    ; OUTPUT PARAMETERS:
                    007B    ;
                    007B    ;       R6 IS ADVANCED TO THE FIRST NONE BLANK CHARACTER AFTER THE TOKEN.
                    007B    ;       R3,R4 ARE A DESCRIPTOR TO THE TOKEN
                    007B    ;
                    007B    ; IMPLICIT OUTPUTS:
                    007B    ;
                    007B    ;       "Z" BIT IS SET IF ZERO LENGTH TOKEN IS PARSED.
                    007B    ;
                    007B    ; COMPLETION CODES:
                    007B    ;
                    007B    ;       R0 IS SET TO THE TYPE OF THE CHARACTER
                    007B    ;
                    007B    ; SIDE EFFECTS:
                    007B    ;
                    007B    ;       NONE
                    007B    ;
                    007B    ;--
                    007B            .ENABL  LSB
                    007B
                    007B    CHR$GETOKEN::                           ; GET TOKEN
          56   D7   007B            DECL    R6                      ; BACK UP ONE FOR SKIP
                    007D    CHR$NXTOKEN::                           ; TOKEN FOLLOWING CURRENT CHAR
          1C   10   007D            BSBB    CHR$NXTNBLK             ; FIND NON-BLANK
     54   66   9E   007F            MOVAB   (R6),R4                 ; SET START ADDRESS OF TOKEN
          56   D7   0082            DECL    R6                      ; BACK UP SO SKIP WILL START HERE
  53   01 A6   9E   0084    10$:    MOVAB   1(R6),R3                ; SET ADDRESS OF NEXT BYTE
          96   10   0088            BSBB    CHR$TSTNXT              ; LOOK AT NEXT CHAR
          09   13   008A            BEQL    40$                     ; BR ON END OF LINE
     05   50   91   008C            CMPB    R0,#CHR$K_BLANK         ; VALID CHARACTER FOR TOKEN?
          F3   1F   008F            BLSSU   10$                     ; IF LSSU YES-KEEP LOOKING FOR TERMIATOR
          02   12   0091            BNEQ    40$                     ; BR IF NOT A SPACE
          06   10   0093            BSBB    CHR$NXTNBLK             ; SKIP TO NON-BLANK
     53   54   C2   0095    40$:    SUBL    R4,R3                   ; FIND LENGTH OF TOKEN
               05   0098    50$:    RSB                             ; GET OUT
```

```
                    0099          .DSABL  LSB
                    0099          .SBTTL  SET NONE BLANK
                    0099  ;++
                    0099  ; FUNCTIONAL DESCRIPTION:
                    0099  ;
                    0099  ;       THIS ROUTINE IS CALLED TO ADVANCE THE CHARACTER POINTER
                    0099  ;       TO  THE FIRST NONE BLANK CHARATER ON THE LINE.
                    0099  ;
                    0099  ; CALLING SEQUENCE:
                    0099  ;
                    0099  ;       BSB/JSB CHR$SETNB                ; SET NONE BLANK
                    0099  ;
                    0099  ; INPUT PARAMETERS:
                    0099  ;
                    0099  ;       R6 CONTAINS ADDRESS OF NEXT BYTE ON THE LINE
                    0099  ;
                    0099  ; IMPLICIT INPUTS:
                    0099  ;
                    0099  ;       NONE
                    0099  ;
                    0099  ; OUTPUT PARAMETERS:
                    0099  ;
                    0099  ;       R6 IS ADVANCED TO THE FIRST NONE BLANK CHARACTER
                    0099  ;
                    0099  ; IMPLICIT OUTPUTS:
                    0099  ;
                    0099  ;       NONE
                    0099  ;
                    0099  ; COMPLETION CODES:
                    0099  ;
                    0099  ;       R0 = 1 IF MORE DATA ON LINE, 0 IS NO NONE BLANK CHARACTERS
                    0099  ;
                    0099  ; SIDE EFFECTS:
                    0099  ;
                    0099  ;       NONE
                    0099  ;
                    0099  ;--
                    0099          .ENABL  LSB
                    0099
                    0099  CHR$SETNBLK::                            ; SET NONE BLANK
          56   D7   0099          DECL    R6                       ; BACK UP SO SKIP ONE WILL BE NOP
                    009B  CHR$NXTNBLK::                            ; SKIP THEN-THEN NEXT NONE BLANK
        FF82   30   009B  20$:    BSBW    CHR$TSTNXT               ;
          08   13   009E          BEQL    40$                      ; BR IF END-OF-LINE
     05   50   91   00A0          CMPB    R0,#CHR$K_BLANK          ; NEXT CHAR BLANK
          F6   13   00A3          BEQL    20$                      ; IF YES-KEEP LOOKING
     50   01   D0   00A5          MOVL    #1,R0                    ; SUCESS
               05   00A8  40$:    RSB                              ; ALL DONE
                    00A9
                    00A9          .DSABL  LSB
                    00A9          .END
```

```
                                                                      M  4
CHRSUB                          - CHARACTER MANIPULATION SUBROUTINES    15-SEP-1984 23:37:36  VAX/VMS Macro V04-00       Page   7
Symbol table                                                             4-SEP-1984 23:15:00  [CLIUTL.SRC]CHRSUB.MAR;1          (6)

CHR$CVT            0000000F RG     01
CHR$GETOKEN        0000007B RG     01
CHR$K_ALPHA      = 00000001  G
CHR$K_BLANK      = 00000005  G
CHR$K_COLON      = 00000006  G
CHR$K_COMMA      = 00000008  G
CHR$K_DOLLAR     = 00000004  G
CHR$K_DOT        = 00000007  G
CHR$K_LBRAKT     = 0000000A  G
CHR$K_NUMERIC    = 00000002  G
CHR$K_RBRAKT     = 00000009  G
CHR$K_SEMI       = 0000000B  G
CHR$K_SLASH      = 0000000C  G
CHR$K_UNDRSCR    = 00000003  G
CHR$NXTNBLK        0000009B RG     01
CHR$NXTOKEN        0000007D RG     01
CHR$SETNBLK        00000099 RG     01
CHR$TSTCHR         00000022 RG     01
CHR$TSTNXT         00000020 RG     01
CHRTBL             00000000 R      01
CHRTBLSIZ        = 0000000C
SPCNUM             0000000C R      01
SPCNUMSIZ        = 00000003

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

PSECT name                      Allocation            PSECT No.  Attributes
----------                      ----------            ---------  ----------
.  ABS  .                       00000000  (     0.)  00 (   0.)  NOPIC    USR    CON    ABS    LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
_PURE                           000000A9  (   169.)  01 (   1.)  NOPIC    USR    CON    REL    LCL NOSHR   EXE   RD   NOWRT NOVEC BYTE

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

Phase                        Page faults    CPU Time       Elapsed Time
-----                        -----------    --------       ------------
Initialization                        12    00:00:00.12    00:00:01.49
Command processing                   105    00:00:00.94    00:00:03.15
Pass 1                                94    00:00:00.76    00:00:03.16
Symbol table sort                      0    00:00:00.01    00:00:00.01
Pass 2                                62    00:00:00.53    00:00:01.85
Symbol table output                    4    00:00:00.04    00:00:00.04
Psect synopsis output                  1    00:00:00.02    00:00:00.03
Cross-reference output                 0    00:00:00.00    00:00:00.00
Assembler run totals                 280    00:00:02.43    00:00:09.74

The working set limit was 750 pages.
4246 bytes (9 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 23 non-local and 8 local symbols.
291 source lines were read in Pass 1, producing 11 object records in Pass 2.
1 page of virtual memory was used to define 1 macro.
```

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

Macro library name                           Macros defined
------------------                           --------------
_$255$DUA28:[CLIUTL.OBJ]CLIUTL.MLB;1                0
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                      0
_$255$DUA28:[SYSLIB]STARLET.MLB;2                   0
TOTALS (all libraries)                              0

0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:CHRSUB/OBJ=OBJ$:CHRSUB MSRC$:CHRSUB/UPDATE=(ENH$:CHRSUB)+EXECML$/LIB+LIB$:CLIUTL/LIB
```

0049 AH-BT13A-SE
VAX/VMS V4.0

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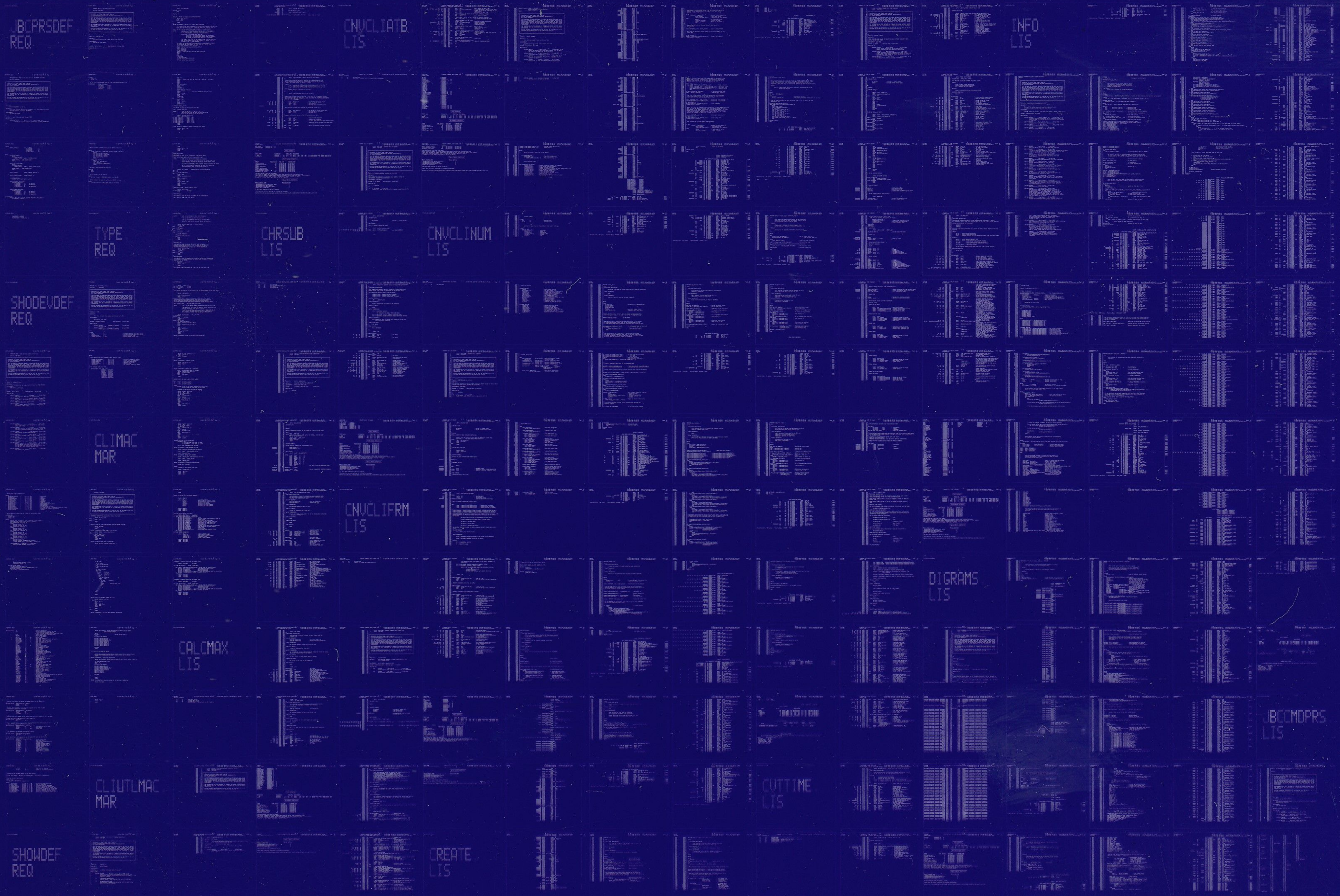
JBCPRSDEF
REQ

CNVCLIATB
LIS

INFO
LIS

TYPE
REQ

CHRSUB
LIS

CNVCLINUM
LIS

SHODEVDEF
REQ

CLIMAC
MAR

CNVCLIFRM
LIS

DIGRAMS
LIS

CALCMAX
LIS

JBCCMDPRS
LIS

CLIUTLMAC
MAR

CVTTIME
LIS

SHOWDEF
REQ

CREATE
LIS