

File created: 18-Oct-93 10:35:22 {Pele:mv:envos}<LispCore>Sources>CLTL2>CMLCHARACTER.;2

previous date: 24-Mar-92 14:42:50 {Pele:mv:envos}<LispCore>Sources>CLTL2>CMLCHARACTER.;1

Read Table: INTERLISP

Package: INTERLISP

Format: XCCS

::
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(RPAQQ CMLCHARACTERCOMS

```
[ (COMS ; Interlisp CHARCODE; Some is here, the rest is in LLREAD.
  (FNS CHARCODE CHARCODE.UNDECODE)
  (PROP MACRO SELCHARQ ALPHACHARP DIGITCHARP UCASECODE)
  (OPTIMIZERS CHARCODE)
  (ALISTS (DWIMEQUIVLST SELCHARQ)
          (PRETTYEQUIVLST SELCHARQ)))
 (COMS ; Common Lisp CHARACTER type
  (DECLARE%: EVAL@COMPILE DONTCOPY (RECORDS CHARACTER))
  (VARIABLES \CHARHI)
  (VARIABLES CL:CHAR-BITS-LIMIT CL:CHAR-CODE-LIMIT CL:CHAR-CONTROL-BIT CL:CHAR-FONT-LIMIT
             CL:CHAR-HYPER-BIT CL:CHAR-META-BIT CL:CHAR-SUPER-BIT))
 (COMS ; Basic character fns
  (FNS CL:CHAR-CODE CL:CHAR-INT CL:INT-CHAR)
  (FUNCTIONS CL:CODE-CHAR)
  (OPTIMIZERS CL:CHAR-CODE CL:CHAR-INT CL:CODE-CHAR CL:INT-CHAR))
 [COMS ; I/O; Some is here, the rest is in LLREAD.
  (FNS CHARACTER.PRINT)
  (DECLARE%: DONTVAL@LOAD DOCOPY (P (SETTOPVAL (\TYPEGLOBALVARIABLE 'CHARACTER T)
                                             (NTYPX (CL:CODE-CHAR 0 0 0)))
      (DEFPRINT 'CHARACTER 'CHARACTER.PRINT))
  (COMS ;; Common lisp character functions
  (FNS CL:CHAR-BIT CL:CHAR-BITS CL:CHAR-DOWNCASE CL:CHAR-FONT CL:CHAR-NAME CL:CHAR-UPCASE
      CL:CHARACTER CL:NAME-CHAR CL:SET-CHAR-BIT)
  (FUNCTIONS CL:DIGIT-CHAR CL:MAKE-CHAR CL::BASE-CHARACTER-P CL::EXTENDED-CHARACTER-P)
  (OPTIMIZERS CL:CHAR-UPCASE CL:CHAR-DOWNCASE CL:MAKE-CHAR))
 (COMS ;; Predicates
  (FNS CL:ALPHA-CHAR-P CL:ALPHANUMERICP CL:BOTH-CASE-P CL:CHARACTERP CL:GRAPHIC-CHAR-P
      CL:LOWER-CASE-P CL:STANDARD-CHAR-P CL:STRING-CHAR-P CL:UPPER-CASE-P)
  (FNS CL:CHAR-EQUAL CL:CHAR-GREATERP CL:CHAR-LESSP CL:CHAR-NOT-EQUAL CL:CHAR-NOT-GREATERP
      CL:CHAR-NOT-LESSP CL:CHAR/= CL:CHAR< CL:CHAR<= CL:CHAR= CL:CHAR> CL:CHAR>=)
  (FUNCTIONS CL:DIGIT-CHAR-P)
  (OPTIMIZERS CL:CHAR-EQUAL CL:CHAR-GREATERP CL:CHAR-LESSP CL:CHAR-NOT-EQUAL CL:CHAR-NOT-GREATERP
      CL:CHAR-NOT-LESSP CL:CHAR/= CL:CHAR< CL:CHAR<= CL:CHAR= CL:CHAR> CL:CHAR>= CL:CHARACTERP
      CL:LOWER-CASE-P CL:STRING-CHAR-P CL:UPPER-CASE-P))
 (COMS ;; Internals
  (FUNCTIONS %%CHAR-DOWNCASE-CODE %%CHAR-UPCASE-CODE %%CODE-CHAR))
 (COMS ;; Compiler options
  (PROP FILETYPE CMLCHARACTER)
  (DECLARE%: DONTVAL@LOAD DOEVAL@COMPILE DONTCOPY (LOCALVARS . T)))
 (DECLARE%: DONTVAL@LOAD DOEVAL@COMPILE DONTCOPY COMPILERVERS
  (ADDVARS (NLAMA)
           (NLAML)
           (LAMA CL:CHAR>= CL:CHAR> CL:CHAR= CL:CHAR<= CL:CHAR< CL:CHAR/= CL:CHAR-NOT-LESSP
                CL:CHAR-NOT-GREATERP CL:CHAR-NOT-EQUAL CL:CHAR-LESSP CL:CHAR-GREATERP CL:CHAR-EQUAL)
  )
)
```

:: Interlisp CHARCODE; Some is here, the rest is in LLREAD.

(DEFINEQ

(CHARCODE

```
[NLAMBDA (CHAR)
 (CHARCODE.DECODE CHAR)]
```

(CHARCODE.UNDECODE

```
[LAMBDA (CODE)
 (LET [(NAME (CL:CHAR-NAME (CL:CODE-CHAR CODE)
 (AND NAME (MKSTRING NAME))
```

(* jop%: "26-Aug-86 14:27")

)

```
(PUTPROPS SELCHARQ MACRO [F (CONS 'SELECTQ (CONS (CAR F)
 (MAPLIST (CDR F)
 (FUNCTION (LAMBDA (I)
 (COND
 ((CDR I)
 (CONS (CHARCODE.DECODE (CAAR I))
```

(CDAR I))
(T (CAR I])

(PUTPROPS **ALPHACHARP MACRO** ((CHAR)
([LAMBDA (UCHAR)
(**DECLARE** (LOCALVARS UCHAR))
(AND (IGEQ UCHAR (**CHARCODE** A))
(ILEQ UCHAR (**CHARCODE** Z])
(LOGAND CHAR 95))))

(PUTPROPS **DIGITCHARP MACRO** [LAMBDA (CHAR)
(AND (IGEQ CHAR (**CHARCODE** 0))
(ILEQ CHAR (**CHARCODE** 9])

(PUTPROPS **UCASECODE MACRO** (OPENLAMBDA (CHAR)
(COND
(AND (IGEQ CHAR (**CHARCODE** a))
(ILEQ CHAR (**CHARCODE** z)))
(LOGAND CHAR 95))
(T CHAR))))

(DEFOPTIMIZER **CHARCODE** (C)
(KWOTE (CHARCODE.DECODE C T)))

(ADDTOVAR **DWIMEQUIVLST** (SELCHARQ . SELECTQ))

(ADDTOVAR **PRETTYEQUIVLST** (SELCHARQ . SELECTQ))

:: Common Lisp CHARACTER type

(DECLARE%: EVAL@COMPILE DONTCOPY

(DECLARE%: EVAL@COMPILE

(ACCESSFNS CHARACTER [(CODE (\LOLOC (\DTEST DATUM 'CHARACTER]
(**CREATE** (\VAG2 \CHARHI CODE)))
)
)

(CL:DEFCONSTANT \CHARHI 7)

(CL:DEFCONSTANT **CL:CHAR-BITS-LIMIT** 1)

(CL:DEFCONSTANT **CL:CHAR-CODE-LIMIT** 65536)

(CL:DEFCONSTANT **CL:CHAR-CONTROL-BIT** 0)

(CL:DEFCONSTANT **CL:CHAR-FONT-LIMIT** 1)

(CL:DEFCONSTANT **CL:CHAR-HYPER-BIT** 0)

(CL:DEFCONSTANT **CL:CHAR-META-BIT** 0)

(CL:DEFCONSTANT **CL:CHAR-SUPER-BIT** 0)

:: Basic character fns

(DEFINEQ

(**CL:CHAR-CODE**
[LAMBDA (CHAR)
(\LOLOC (\DTEST CHAR 'CHARACTER])

(* jop%: "25-Aug-86 17:30")

(**CL:CHAR-INT**
[LAMBDA (CHAR)
(**CL:CHAR-CODE** CHAR])

(**CL:INT-CHAR**
[LAMBDA (INTEGER)
(**CL:CODE-CHAR** INTEGER])

(* Imm " 7-Jul-85 16:50")

(CL:DEFUN **CL:CODE-CHAR** (CODE &OPTIONAL (BITS 0)

```

(FONT 0))
(CL:IF (AND (EQ BITS 0)
            (EQ FONT 0)
           ;; This checks for smallposp
            (EQ (\HILOC CODE)
                \SmallPosHi)
           ;; Character 255 is undefined in all char sets
            (NOT (EQ (LDB (BYTE 8 0)
                        CODE)
                    255)))
        (%%CODE-CHAR CODE)))

```

```

(DEFOPTIMIZER CL:CHAR-CODE (CHAR)
  [LET [(CONSTANT-CHAR (AND (CL:CONSTANTP CHAR)
                            (CL:EVAL CHAR)
                           (CL:IF (CL:CHARACTERP CONSTANT-CHAR)
                                   (\LOLOC CONSTANT-CHAR)
                                   `(\LOLOC (\DTEST ,CHAR 'CHARACTER)))]])

```

```

(DEFOPTIMIZER CL:CHAR-INT (CHAR)
  `(CL:CHAR-CODE ,CHAR))

```

```

(DEFOPTIMIZER CL:CODE-CHAR (CODE &OPTIONAL (BITS 0)
                               (FONT 0))
  (CL:IF (AND (EQ BITS 0)
              (EQ FONT 0))
    [LET [(CONSTANT-CODE (AND (CL:CONSTANTP CODE)
                              (CL:EVAL CODE)
                             (CL:IF (EQ (\HILOC CONSTANT-CODE)
                                         \SmallPosHi)
                                     (CL:IF (NOT (EQ (LDB (BYTE 8 0)
                                                            CONSTANT-CODE)
                                                            255))
                                             (%%CODE-CHAR CONSTANT-CODE)))
                                   ` (LET ((%CODE ,CODE))
                                       (AND (EQ (\HILOC %CODE)
                                              ,\SmallPosHi)
                                           (NOT (EQ (LDB (BYTE 8 0)
                                                         %CODE)
                                                         255))
                                             (%%CODE-CHAR %CODE)))]])
        'COMPILER:PASS))

```

```

(DEFOPTIMIZER CL:INT-CHAR (INTEGER)
  `(CL:CODE-CHAR ,INTEGER))

```

;; I/O; Some is here, the rest is in LLREAD.

(DEFINEQ

(CHARACTER.PRINT

```

[LAMBDA (CHAR STREAM)
  [COND
```

; Edited 23-Sep-91 21:09 by jrb:

[*PRINT-ESCAPE*

; Name that can be read back

```

    (LET ((PNAME (CL:CHAR-NAME CHAR))
          LPN)
      [.SPACECHECK. STREAM (+ 2 (COND
```

```

        (PNAME (SETQ LPN (CL:LENGTH PNAME)))
        (T 1]

```

; Print as #\ followed by charcter name

```

        (\OUTCHAR STREAM (fetch (READTABLEP HASHMACROCHAR) of *READTABLE*))
        (\OUTCHAR STREAM (CHARCODE "\"))

```

(COND

```

        (PNAME (WRITE-STRING* PNAME STREAM 0 LPN))
        (T (\OUTCHAR STREAM (CL:CHAR-CODE CHAR)

```

; Character as character

```

        (T (\OUTCHAR STREAM (CL:CHAR-CODE CHAR)

```

]))

)

(DECLARE%: DONTEVAL@LOAD DOCOPY

```

(SETTOPVAL (\TYPEGLOBALVARIABLE 'CHARACTER T)
  (NTYPX (CL:CODE-CHAR 0 0 0)))

```

(DEFPRINT 'CHARACTER 'CHARACTER.PRINT)

)

;; Common lisp character functions

(DEFINEQ

(CL:CHAR-BIT

[LAMBDA (CHAR NAME) (* jop%: "26-Aug-86 15:01")
(CL:ERROR "Bit ~A not supported" NAME)]

(CL:CHAR-BITS

[LAMBDA (CHAR) (* jop%: "25-Aug-86 17:35")
(AND (CL:CHARACTERP CHAR)
0)]

(CL:CHAR-DOWNCASE

[LAMBDA (CHAR) (* jop%: "25-Aug-86 18:01")
(%%CODE-CHAR (%%CHAR-DOWNCASE-CODE (CL:CHAR-CODE CHAR))

(CL:CHAR-FONT

[LAMBDA (CHAR) (* jop%: "25-Aug-86 17:35")
(AND (CL:CHARACTERP CHAR)
0)]

(CL:CHAR-NAME

[LAMBDA (CHAR) ; Edited 19-Mar-87 15:49 by bvm:
(DECLARE (GLOBALVARS CHARACTERNAMES CHARACTERSETNAMES))
(COND
((EQ CHAR #\Space) ; Space is special because it is graphic but has a name
"Space")
((CL:GRAPHIC-CHAR-P CHAR) ; graphics have no special names
NIL)
(T (LET ((CODE (CL:CHAR-CODE CHAR))
CSET)
(COND
[(for X in CHARACTERNAMES when (EQ (CADR X)
CODE)
do (RETURN (CAR X])
(T (SETQ CSET (LRSH CODE 8))
(SETQ CODE (LOGAND CODE 255))
(COND
[(AND (EQ CSET 0)
(<= CODE (CHARCODE "^Z"))] ; represent ascii control chars nicely
(CONCAT "^" (CL:CODE-CHAR (LOGOR CODE (- (CHARCODE "A")
(CHARCODE "^A"))]
(T ; Else charset-charcode
(CONCAT (for X in CHARACTERSETNAMES when (EQ (CADR X)
CSET)
do (RETURN (CAR X)) finally (RETURN (OCTALSTRING CSET)))
"_"
(OCTALSTRING CODE)]

(CL:CHAR-UPCASE

[LAMBDA (CHAR) (* jop%: "25-Aug-86 18:01")
(%%CODE-CHAR (%%CHAR-UPCASE-CODE (CL:CHAR-CODE CHAR))

(CL:CHARACTER

[LAMBDA (OBJECT) (* jop%: "14-Nov-86 16:22")
(COND
((TYPEP OBJECT 'CL:CHARACTER)
OBJECT)
(AND (NOT *CLTL2-PEDANTIC*)
(TYPEP OBJECT 'CL:FIXNUM))
(CL:INT-CHAR OBJECT))
([AND (OR (TYPEP OBJECT 'STRING)
(TYPEP OBJECT 'CL:SYMBOL))
(EQL 1 (CL:LENGTH (SETQ OBJECT (STRING OBJECT))
(CL:CHAR OBJECT 0))
(T (CL:ERROR "Object cannot be coerced to a character: ~S" OBJECT))

(CL:NAME-CHAR

[LAMBDA (NAME) ; Edited 18-Feb-87 22:05 by bvm:
(LET ((CODE (CHARCODE.DECODE (STRING NAME)
T)))
(AND CODE (CL:CODE-CHAR CODE))

(CL:SET-CHAR-BIT

[LAMBDA (CHAR NAME NEWVALUE) (* jop%: "26-Aug-86 15:02")
(CL:ERROR "Bit ~A not supported" NAME)]

)

```
(CL:DEFUN CL:DIGIT-CHAR (WEIGHT &OPTIONAL (RADIX 10)
                          (FONT 0))
  [AND (EQ FONT 0)
        (< -1 WEIGHT RADIX 37)
        (CL:IF (< WEIGHT 10)
          (%%CODE-CHAR (+ (CONSTANT (CL:CHAR-CODE #\0))
                           WEIGHT))
          (%%CODE-CHAR (+ (CONSTANT (CL:CHAR-CODE #\A))
                           (- WEIGHT 10))))])
```

```
(CL:DEFUN CL:MAKE-CHAR (CHAR &OPTIONAL (BITS 0)
                                       (FONT 0))
  (CL:IF (AND (EQL BITS 0)
              (EQL FONT 0))
    CHAR))
```

```
(CL:DEFUN CL::BASE-CHARACTER-P (CL::OBJECT) ; Edited 13-Feb-92 19:51 by jrb:
  (AND (CL:CHARACTERP CL::OBJECT)
        ;; Same as (NOT (%%FAT-STRING-CHAR-P object))
        (ILEQ (\LOLOC CL::OBJECT)
              %%MAXTHINCHAR)))
```

```
(CL:DEFUN CL::EXTENDED-CHARACTER-P (CL::OBJECT) ; Edited 13-Feb-92 20:18 by jrb:
  (AND (CL:CHARACTERP CL::OBJECT)
        ;; Same as (%%FAT-STRING-CHAR-P object)
        (IGREATERP (\LOLOC CL::OBJECT)
                    %%MAXTHINCHAR)))
```

```
(DEFOPTIMIZER CL:CHAR-UPCASE (CHAR)
  \[%%CODE-CHAR (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
```

```
(DEFOPTIMIZER CL:CHAR-DOWNCASE (CHAR)
  \[%%CODE-CHAR (%%CHAR-DOWNCASE-CODE (CL:CHAR-CODE ,CHAR))
```

```
(DEFOPTIMIZER CL:MAKE-CHAR (CHAR &OPTIONAL BITS FONT)
  (CL:IF (AND (OR (NULL BITS)
                  (EQL BITS 0))
            (OR (NULL FONT)
                  (EQL FONT 0)))
    CHAR
    'COMPILER:PASS))
```

:: Predicates

```
(DEFINEQ
```

```
(CL:ALPHA-CHAR-P
  [LAMBDA (CHAR) ; (* raf "23-Oct-85 15:03")
    (LET ((CODE (CL:CHAR-CODE CHAR))) ; Might want to make this true for Greek char sets, etc.
      (OR (<= (CONSTANT (CL:CHAR-CODE #\A))
            CODE
            (CONSTANT (CL:CHAR-CODE #\Z)))
          (<= (CONSTANT (CL:CHAR-CODE #\a))
            CODE
            (CONSTANT (CL:CHAR-CODE #\z)))))
```

```
(CL:ALPHANUMERICP
  [LAMBDA (CHAR) ; (* Imm "28-Oct-85 20:40")
    (OR (CL:ALPHA-CHAR-P CHAR)
        (NOT (NULL (CL:DIGIT-CHAR-P CHAR)))))
```

```
(CL:BOTH-CASE-P
  [LAMBDA (CHAR)
    (OR (CL:UPPER-CASE-P CHAR)
        (CL:LOWER-CASE-P CHAR))
```

```
(CL:CHARACTERP
  [LAMBDA (OBJECT) ; (* Imm " 1-Aug-85 22:45")
    (TYPENAMEP OBJECT 'CHARACTER)])
```

```
(CL:GRAPHIC-CHAR-P
  [LAMBDA (CHAR) ; (* bvm%: "14-May-86 16:19")
```

::: True if CHAR represents a graphic (printing) character. Definition follows NS character standard

```
(LET* ((CODE (CL:CHAR-CODE CHAR))
      (CSET (LRSH CODE 8)))
  (AND [PROGN
        (OR (EQ CSET 0)
            (AND (> (SETQ CSET (LOGAND CSET 127))
                  32)
              (NOT (EQ CSET 127))
            )
        ]
    ; Graphic charsets are zero, 41 thru 176, 241 thru 276

    (PROGN
      ; Printing chars within a character set are SPACE thru 176 and
      ; 241 thru 276
      (OR (EQ (SETQ CODE (LOGAND CODE 255))
              (CONSTANT (CL:CHAR-CODE #\Space)))
          (AND (> (SETQ CODE (LOGAND CODE 127))
                32)
              (NOT (EQ CODE 127))
          )
      )
    )
  )
```

(CL:LOWER-CASE-P

```
[LAMBDA (CHAR)
  (<= (CONSTANT (CL:CHAR-CODE #\a))
      (CL:CHAR-CODE CHAR)
      (CONSTANT (CL:CHAR-CODE #\z]))
```

(CL:STANDARD-CHAR-P

```
[LAMBDA (CHAR)
  (AND (CL:MEMBER CHAR
    ; Edited 7-Jan-87 11:42 by jop
    '(#\! #\" #\$ #\% #\& #\' #( #\ ) #* #+ #\, #- #\. #\/ #\0 #\1 #\2 #\3 #\4 #\5 #\6 #\7
      #\8
      #\9 #\: #\; #\< #\= #\> #\? #\@ #\A #\B #\C #\D #\E #\F #\G #\H #\I #\J #\K #\L #\M #\N
      #\O
      #\P #\Q #\R #\S #\T #\U #\V #\W #\X #\Y #\Z #\[ #\] #\^ #\_ #\` #\a #\b #\c #\d #\e
      #\f
      #\g #\h #\i #\j #\k #\l #\m #\n #\o #\p #\q #\r #\s #\t #\u #\v #\w #\x #\y #\z #\{ #\|
      #\}
      #\~ #\Space #\Newline))
    T])
```

(CL:STRING-CHAR-P

```
[LAMBDA (CHAR)
  (\DTEST CHAR 'CHARACTER)]
```

(CL:UPPER-CASE-P

```
[LAMBDA (CHAR)
  (<= (CONSTANT (CL:CHAR-CODE #\A))
      (CL:CHAR-CODE CHAR)
      (CONSTANT (CL:CHAR-CODE #\Z]))
```

)

(DEFINEQ

(CL:CHAR-EQUAL

```
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-EQUAL takes at least one arg"))
  (CL:DO ((TEST (CL:CHAR-UPCASE (ARG N 1)))
          (I 2 (CL:1+ I)))
    (> I N)
    T)
  (CL:IF [NOT (EQ TEST (CL:CHAR-UPCASE (ARG N I)
    (RETURN NIL)))]])
  (* jop%: "25-Aug-86 16:03")
```

(CL:CHAR-GREATERP

```
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-LESSP takes at least one arg"))
  (CL:DO ([LAST (%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N 1]
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  [SETQ NEXT (%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N I]
  (CL:IF (NOT (> LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))])
  (* jop%: "25-Aug-86 17:15")
```

(CL:CHAR-LESSP

```
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-LESSP takes at least one arg"))
  (CL:DO ([LAST (%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N 1]
    NEXT
    (I 2 (CL:1+ I)))
  (* jop%: "25-Aug-86 17:17")
```

```

(> I N)
T)
[SETQ NEXT (%%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N I)
(CL:IF (NOT (< LAST NEXT))
(RETURN NIL)
(SETQ LAST NEXT))))]

```

(CL:CHAR-NOT-EQUAL

(* jop%: "25-Aug-86 16:02")

```

[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-NOT-EQUAL takes at least one arg"))
  (CL:DO ((I 1 (CL:1+ I))
    TEST)
    (> I N)
    T)
    (SETQ TEST (CL:CHAR-UPCASE (ARG N I)))
    (CL:IF (CL:DO ((J (CL:1+ I)
      (CL:1+ J))
      ((> J N)
      NIL)
      (CL:IF (EQ TEST (CL:CHAR-UPCASE (ARG N J)))
        (RETURN T))))
      (RETURN NIL))))]

```

(CL:CHAR-NOT-GREATERP

(* jop%: "25-Aug-86 17:18")

```

[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-LESSP takes at least one arg"))
  (CL:DO (([LAST (%%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N 1)
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  [SETQ NEXT (%%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N I)
  (CL:IF (NOT (<= LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))]

```

(CL:CHAR-NOT-LESSP

(* jop%: "25-Aug-86 17:19")

```

[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR-LESSP takes at least one arg"))
  (CL:DO (([LAST (%%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N 1)
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  [SETQ NEXT (%%CHAR-UPCASE-CODE (CL:CHAR-CODE (ARG N I)
  (CL:IF (NOT (>= LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))]

```

(CL:CHAR/=

(* jop%: "25-Aug-86 17:07")

```

[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR/= takes at least one arg"))
  (CL:DO ((I 1 (CL:1+ I))
    TEST)
    (> I N)
    T)
    (SETQ TEST (CL:CHAR-CODE (ARG N I)))
    (CL:IF (CL:DO ((J (CL:1+ I)
      (CL:1+ J))
      ((> J N)
      NIL)
      (CL:IF (EQ TEST (CL:CHAR-CODE (ARG N J)))
        (RETURN T))))
      (RETURN NIL))))]

```

(CL:CHAR<

(* jop%: "25-Aug-86 14:29")

```

[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR< takes at least one arg"))
  (CL:DO ((LAST (CL:CHAR-CODE (ARG N 1)))
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
    (SETQ NEXT (CL:CHAR-CODE (ARG N I)))
    (CL:IF (NOT (< LAST NEXT))
      (RETURN NIL)
      (SETQ LAST NEXT))))]

```

```
(CL:CHAR<=
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR< takes at least one arg"))
  (CL:DO ((LAST (CL:CHAR-CODE (ARG N 1)))
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  (SETQ NEXT (CL:CHAR-CODE (ARG N I)))
  (CL:IF (NOT (<= LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))
```

(* jop%: "25-Aug-86 14:38")

```
(CL:CHAR=
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR= takes at least one arg"))
  (CL:DO ((TEST (CL:CHAR-CODE (ARG N 1)))
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  (CL:IF [NOT (EQ TEST (CL:CHAR-CODE (ARG N I)
    (RETURN NIL)))]))
```

(* jop%: "25-Aug-86 17:05")

```
(CL:CHAR>
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR< takes at least one arg"))
  (CL:DO ((LAST (CL:CHAR-CODE (ARG N 1)))
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  (SETQ NEXT (CL:CHAR-CODE (ARG N I)))
  (CL:IF (NOT (> LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))
```

(* jop%: "25-Aug-86 14:34")

```
(CL:CHAR>=
[LAMBDA N
  (CL:IF (< N 1)
    (CL:ERROR "CHAR< takes at least one arg"))
  (CL:DO ((LAST (CL:CHAR-CODE (ARG N 1)))
    NEXT
    (I 2 (CL:1+ I)))
    (> I N)
    T)
  (SETQ NEXT (CL:CHAR-CODE (ARG N I)))
  (CL:IF (NOT (>= LAST NEXT))
    (RETURN NIL)
    (SETQ LAST NEXT))))
```

(* jop%: "25-Aug-86 14:40")

```
(CL:DEFUN CL:DIGIT-CHAR-P (CHAR &OPTIONAL (RADIX 10))
  "Returns the weigh of CHAR in radix RADIX, or NIL if CHAR is not a digit char in that radix."
  (LET* [(CODE (CL:CHAR-CODE CHAR))
    (VAL (COND
      [(<= (CONSTANT (CL:CHAR-CODE #\0))
        CODE
        (CONSTANT (CL:CHAR-CODE #\9)))]
      [- CODE (CONSTANT (CL:CHAR-CODE #\0)]
      [(<= (CONSTANT (CL:CHAR-CODE #\A))
        CODE
        (CONSTANT (CL:CHAR-CODE #\Z)))]
      [+ 10 (- CODE (CONSTANT (CL:CHAR-CODE #\A)]
      [(<= (CONSTANT (CL:CHAR-CODE #\a))
        CODE
        (CONSTANT (CL:CHAR-CODE #\z)))]
      [+ 10 (- CODE (CONSTANT (CL:CHAR-CODE #\a)]
      (AND VAL (< VAL RADIX)
        VAL)))]))
```

```
(DEFOPTIMIZER CL:CHAR-EQUAL (CHAR &REST MORE-CHARS)
  (CL:IF (EQL 1 (CL:LENGTH MORE-CHARS))
    '[EQ (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
      (%%CHAR-UPCASE-CODE (CL:CHAR-CODE , (CAR MORE-CHARS)
      'COMPILER:PASS))
```

```

(DEFOPTIMIZER CL:CHAR-GREATERP (CHAR &REST MORE-CHARS)
  \ (> (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (%%CHAR-UPCASE-CODE
        (CL:CHAR-CODE ,FORM]
        MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR-LESSP (CHAR &REST MORE-CHARS)
  \ (< (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (%%CHAR-UPCASE-CODE (CL:CHAR-CODE
        ,FORM]
        MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR-NOT-EQUAL (CHAR &REST MORE-CHARS)
  (CL:IF (EQL 1 (CL:LENGTH MORE-CHARS))
    \ [NOT (EQ (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
      (%%CHAR-UPCASE-CODE (CL:CHAR-CODE , (CAR MORE-CHARS)]
      'COMPILER:PASS))
    )

(DEFOPTIMIZER CL:CHAR-NOT-GREATERP (CHAR &REST MORE-CHARS)
  \ (<= (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA
      (FORM)
      \ (%%CHAR-UPCASE-CODE
        (CL:CHAR-CODE ,FORM]
        MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR-NOT-LESSP (CHAR &REST MORE-CHARS)
  \ (>= (%%CHAR-UPCASE-CODE (CL:CHAR-CODE ,CHAR))
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (%%CHAR-UPCASE-CODE
        (CL:CHAR-CODE ,FORM]
        MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR/= (CHAR &REST MORE-CHARS)
  (CL:IF (CDR MORE-CHARS)
    'COMPILER:PASS
    \ (NEQ ,CHAR , (CAR MORE-CHARS))))

(DEFOPTIMIZER CL:CHAR< (CHAR &REST MORE-CHARS)
  \ (< (CL:CHAR-CODE ,CHAR)
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (CL:CHAR-CODE ,FORM]
      MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR<= (CHAR &REST MORE-CHARS)
  \ (<= (CL:CHAR-CODE ,CHAR)
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (CL:CHAR-CODE ,FORM]
      MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR= (CHAR &REST MORE-CHARS)
  (CL:IF (CDR MORE-CHARS)
    [LET ((CH (GENSYM)))
      \ (LET ((,CH ,CHAR))
        (AND ,@ (for X in MORE-CHARS collect \ (EQ ,CH ,X))
        \ (EQ ,CHAR , (CAR MORE-CHARS))))
    )

(DEFOPTIMIZER CL:CHAR> (CHAR &REST MORE-CHARS)
  \ (> (CL:CHAR-CODE ,CHAR)
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (CL:CHAR-CODE ,FORM]
      MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHAR>= (CHAR &REST MORE-CHARS)
  \ (>= (CL:CHAR-CODE ,CHAR)
    ,@ (CL:MAPCAR [FUNCTION (CL:LAMBDA (FORM)
      \ (CL:CHAR-CODE ,FORM]
      MORE-CHARS)))
    )

(DEFOPTIMIZER CL:CHARACTERP (OBJECT)
  \ (TYPENAMEP ,OBJECT 'CHARACTER))

```

```
(DEFOPTIMIZER CL:LOWER-CASE-P (CHAR)
  `(<= (CONSTANT (CL:CHAR-CODE #\a)
        (CL:CHAR-CODE ,CHAR)
        (CONSTANT (CL:CHAR-CODE #\z))))
```

```
(DEFOPTIMIZER CL:STRING-CHAR-P (CHAR)
  `(\DTEST ,CHAR 'CHARACTER))
```

```
(DEFOPTIMIZER CL:UPPER-CASE-P (CHAR)
  `(<= (CONSTANT (CL:CHAR-CODE #\A)
        (CL:CHAR-CODE ,CHAR)
        (CONSTANT (CL:CHAR-CODE #\Z))))
```

:: Internals

```
(DEFMACRO %%CHAR-DOWNCASE-CODE (CODE)
  `(LET ((%%CODE ,CODE))
    (CL:IF (<= (CONSTANT (CL:CHAR-CODE #\A)
                     %%CODE
                     (CONSTANT (CL:CHAR-CODE #\Z))))
      [+ %%CODE (- (CONSTANT (CL:CHAR-CODE #\a)
                              (CONSTANT (CL:CHAR-CODE #\A)
                                          %%CODE)))]
```

```
(DEFMACRO %%CHAR-UPCASE-CODE (CODE)
  `(LET ((%%CODE ,CODE))
    (CL:IF (<= (CONSTANT (CL:CHAR-CODE #\a)
                     %%CODE
                     (CONSTANT (CL:CHAR-CODE #\z))))
      [- %%CODE (- (CONSTANT (CL:CHAR-CODE #\a)
                              (CONSTANT (CL:CHAR-CODE #\A)
                                          %%CODE)))]
```

```
(DEFMACRO %%CODE-CHAR (CODE)
  `(\VAG2 \CHARHI ,CODE))
```

:: Compiler options

```
(PUTPROPS CMLCHARACTER FILETYPE CL:COMPILE-FILE)
```

```
(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY
```

```
(DECLARE%: DOEVAL@COMPILE DONTCOPY
```

```
(LOCALVARS . T)
)
```

```
(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY COMPILERVERS
```

```
(ADDTOVAR NLAMA )
```

```
(ADDTOVAR NLAML )
```

```
(ADDTOVAR LAMA CL:CHAR>= CL:CHAR> CL:CHAR= CL:CHAR<= CL:CHAR< CL:CHAR/= CL:CHAR-NOT-LESSP CL:CHAR-NOT-GREATERP
          CL:CHAR-NOT-EQUAL CL:CHAR-LESSP CL:CHAR-GREATERP CL:CHAR-EQUAL)
```

(RPAQQ **CMLCHARACTERCOMS**

```
[ (COMS ; Interlisp CHARCODE; Some is here, the rest is in LLREAD.
```

```
(FNS CHARCODE CHARCODE.UNDECODE)
(PROP MACRO SELCHARQ ALPHACHARP DIGITCHARP UCASECODE)
(OPTIMIZERS CHARCODE)
(ALISTS (DWIMEQUIVLST SELCHARQ)
        (PRETTYEQUIVLST SELCHARQ)))
```

```
(COMS ; Common Lisp CHARACTER type
```

```
(DECLARE%: EVAL@COMPILE DONTCOPY (RECORDS CHARACTER))
(VARIABLES \CHARHI)
(VARIABLES CL:CHAR-BITS-LIMIT CL:CHAR-CODE-LIMIT CL:CHAR-CONTROL-BIT CL:CHAR-FONT-LIMIT
          CL:CHAR-HYPER-BIT CL:CHAR-META-BIT CL:CHAR-SUPER-BIT))
```

```
(COMS ; Basic character fns
```

```
(FNS CL:CHAR-CODE CL:CHAR-INT CL:INT-CHAR)
(FUNCTIONS CL:CODE-CHAR)
(OPTIMIZERS CL:CHAR-CODE CL:CHAR-INT CL:CODE-CHAR CL:INT-CHAR))
```

```
[ (COMS ; I/O; Some is here, the rest is in LLREAD.
```

```
(FNS CHARACTER.PRINT)
(DECLARE%: DONTEVAL@LOAD DOCOPY (P (SETTOPVAL (\TYPEGLOBALVARIABLE 'CHARACTER T)
                                             (NTYPX (CL:CODE-CHAR 0 0 0)))
  (DEFPRINT 'CHARACTER 'CHARACTER.PRINT)
```

```
(COMS :: Common lisp character functions
```

```

(FNS CL:CHAR-BIT CL:CHAR-BITS CL:CHAR-DOWNCASE CL:CHAR-FONT CL:CHAR-NAME CL:CHAR-UPCASE
  CL:CHARACTER CL:NAME-CHAR CL:SET-CHAR-BIT)
(FUNCTIONS CL:DIGIT-CHAR CL:MAKE-CHAR CL::BASE-CHARACTER-P CL::EXTENDED-CHARACTER-P)
(OPTIMIZERS CL:CHAR-UPCASE CL:CHAR-DOWNCASE CL:MAKE-CHAR)

```

(COMS ;; Predicates

```

(FNS CL:ALPHA-CHAR-P CL:ALPHANUMERICP CL:BOTH-CASE-P CL:CHARACTERP CL:GRAPHIC-CHAR-P
  CL:LOWER-CASE-P CL:STANDARD-CHAR-P CL:STRING-CHAR-P CL:UPPER-CASE-P)
(FNS CL:CHAR-EQUAL CL:CHAR-GREATERP CL:CHAR-LESSP CL:CHAR-NOT-EQUAL CL:CHAR-NOT-GREATERP
  CL:CHAR-NOT-LESSP CL:CHAR/= CL:CHAR< CL:CHAR<= CL:CHAR= CL:CHAR> CL:CHAR>=)
(FUNCTIONS CL:DIGIT-CHAR-P)
(OPTIMIZERS CL:CHAR-EQUAL CL:CHAR-GREATERP CL:CHAR-LESSP CL:CHAR-NOT-EQUAL CL:CHAR-NOT-GREATERP
  CL:CHAR-NOT-LESSP CL:CHAR/= CL:CHAR< CL:CHAR<= CL:CHAR= CL:CHAR> CL:CHAR>= CL:CHARACTERP
  CL:LOWER-CASE-P CL:STRING-CHAR-P CL:UPPER-CASE-P))

```

(COMS ;; Internals

```

(FUNCTIONS %%CHAR-DOWNCASE-CODE %%CHAR-UPCASE-CODE %%CODE-CHAR))

```

(COMS ;; Compiler options

```

(PROP FILETYPE CMLCHARACTER)
(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY (LOCALVARS . T)))
(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY COMPILERVARS
  (ADDVARS (NLAMA)
    (NLAML CHARCODE)
    (LAMA CL:CHAR>= CL:CHAR> CL:CHAR= CL:CHAR<= CL:CHAR< CL:CHAR/= CL:CHAR-NOT-LESSP
      CL:CHAR-NOT-GREATERP CL:CHAR-NOT-EQUAL CL:CHAR-LESSP CL:CHAR-GREATERP CL:CHAR-EQUAL]
  )
)

```

(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY COMPILERVARS

(ADDTOVAR NLAMA)

(ADDTOVAR NLAML CHARCODE)

```

(ADDTOVAR LAMA CL:CHAR>= CL:CHAR> CL:CHAR= CL:CHAR<= CL:CHAR< CL:CHAR/= CL:CHAR-NOT-LESSP CL:CHAR-NOT-GREATERP
  CL:CHAR-NOT-EQUAL CL:CHAR-LESSP CL:CHAR-GREATERP CL:CHAR-EQUAL)
)

```

(PUTPROPS CMLCHARACTER COPYRIGHT ("Venue & Xerox Corporation" 1985 1986 1987 1990 1991 1992 1993))

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| CL::BASE-CHARACTER-P | 5 | CL:CHAR-NOT-LESSP | 7 | CL:DIGIT-CHAR | 5 |
| CL:BOTH-CASE-P | 5 | CL:CHAR-UPCASE | 4 | CL:DIGIT-CHAR-P | 8 |
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| CL:CHAR-CODE | 2 | CL:CHAR<= | 8 | CL:INT-CHAR | 2 |
| CL:CHAR-DOWNCASE | 4 | CL:CHAR= | 8 | CL:LOWER-CASE-P | 6 |
| CL:CHAR-EQUAL | 6 | CL:CHAR> | 8 | CL:MAKE-CHAR | 5 |
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| CL:CHAR-CODE-LIMIT | 2 | CL:CHAR-FONT-LIMIT | 2 | CL:CHAR-META-BIT | 2 | \CHARHI | 2 |

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|-------------------|---|---------------------|---|

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