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

```
;;
;; Copyright (c) 1985, 1986, 1987, 1990, 1991, 1992, 1993 by Venue & Xerox Corporation.  All rights reserved.

(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)
                      (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)                                                 (* jop%: "26-Aug-86 14:27")
    (LET [(NAME (CL:CHAR-NAME (CL:CODE-CHAR CODE]
         (AND NAME (MKSTRING NAME])

)

(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)                                        (* jop%: "25-Aug-86 17:30")
    (\LOLOC (\DTEST CHAR 'CHARACTER])

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

(CL:INT-CHAR
  [LAMBDA (INTEGER)                                     (* lmm " 7-Jul-85 16:50")
    (CL:CODE-CHAR INTEGER])

)


(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)                                    ; Edited 23-Sep-91 21:09 by jrb:
    [COND
       [*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]
       (T                                                  ; Character as character
          (\OUTCHAR STREAM (CL:CHAR-CODE CHAR]
    T])

)

(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)                                           (* lmm "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)                                         (* lmm " 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                                          ; Graphic charsets are zero, 41 thru 176, 241 thru 276
                      (OR (EQ CSET 0)
                          (AND (> (SETQ CSET (LOGAND CSET 127))
                                  32)
                               (NOT (EQ CSET 127]
               (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)                                               ; Edited  7-Jan-87 11:42 by jop
    (AND (CL:MEMBER CHAR
                '(#\! #\" #\# #\$ #\% #\& #\' #\( #\) #\* #\+ #\, #\- #\. #\/ #\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                                                    (* jop%: "25-Aug-86 16:03")
    (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)))])
```

(CL:CHAR-GREATERP

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 17:15")
    (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-LESSP

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 17:17")
    (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-EQUAL

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 16:02")
    (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

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 17:18")
    (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

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 17:19")
    (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/=

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 17:07")
    (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<

```
  [LAMBDA N                                                    (* jop%: "25-Aug-86 14:29")
    (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                                                    (* jop%: "25-Aug-86 14:38")
    (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                                                    (* jop%: "25-Aug-86 17:05")
    (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)))])

(CL:CHAR>
  [LAMBDA N                                                    (* jop%: "25-Aug-86 14:34")
    (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                                                    (* jop%: "25-Aug-86 14:40")
    (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: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 COMPILERVARS

(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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