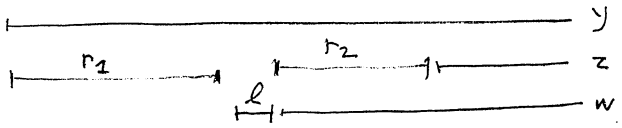
Example 1 : Quick Sort

```
 TYPE QSORT.MCT
+NOTRACE.
+LET(

QSORT(*L.*R,*Y,*Z):_
   SPLIT(*R,*L,*R1,*R2)&
   QSORT(*R1,*Y,*L.*W)&
   QSORT(*R2,*W,*Z);
QSORT(NIL,*Z,*Z)

).+LET(

SPLIT(*L.*R,*X,*L.*R1,*R2):_
   *L LE *X & SPLIT(*R,*X,*R1,*R2);
SPLIT(*L.*R,*X,*R1,*L.*R2):_
   *L ) *X & SPLIT(*R,*X,*R1,*R2);
SPLIT(NIL,*X,NIL,NIL)

).+LET(

QSORT(*X,*Y):_ QSORT(*X,*Y,NIL)!;
QSORTS(*N,*X):_
   SKIPCHAR(67)&INTEGER(1,*I)&QSORT(*X,*Y)&EQ(*I,*N)&
   SKIPCHAR(67)&SORTER(*Y)&NEWLINE;
GOAL:_ QSORTS(10,0.3.1.2.2.9.7.1.6.6.
                 0.3.1.6.6.7.1.0.1.1.NIL)

).+LET(

INTEGER(*N,*N);
INTEGER(*M,*N):_ *M1 IS *M+1 & INTEGER(*M1,*N);

EQ(*X,*X)

).-COMPILE.-STOP.

.TYPE QSORT.OUT
```

Meaning of QSORT (*a, *b, *c) :
The difference of *b and *c is the sorted version of *a.



Times

10 sorts	0·32 sec
100 sorts	3·16 sec.

cf. compiled Lisp

10 sorts	0·46 sec.
100 sorts	5·12 sec.

```
 C1:  ADD ST,DBL7
   JUMPGE ST,STOFL
   SETZM 2(V)
   SETZM 3(V)
   JUMPE Y,C1+13
   MOVE T,@1(B)
   TLNN T,MSKMA
   JSP C,UVAR1
   MOVEM T,2(V)
   MOVE T,@2(B)
   TLNN T,MSKMA
   JSP C,UVAR1
   MOVEM T,3(V)
   MOVE T,@1(A)
   TLNN T,MSKMA
   JSP C,UVAR
   MOVEM T,4(V)
   MOVE T,@2(A)
```

```
    TLNN T,MSKMA
    JSP C,UVAR
    MOVEM T,5(V)
    HRLM FL,0(V)
    SETZM 6(V)
    SETZM 7(V)
    SETZM 8(V)
    MOVE X,V
    JSP A,P1
    WD 3(X)
    WD 2(X)
    WD 6(X)
    WD 7(X)
    JSP A,P2
    WD 6(X)
    WD 4(X)
    WD C1+45
    JSP A,P2
    WD 7(X)
    WD 8(X)
    WD 5(X)
    MOVE A,1(X)
    HLRZ X,A
    JRST 3(A)
    XWD SKEL,1
    WD 2(Y)
    WD 3(Y)
    XWD SKEL,1
    WD 2(Y)
    WD 8(Y)
C2:  AOBJP ST,STOFL
    MOVE T,@1(A)
    TLNN T,MSKMA
    JSP C,UVAR
    MOVEM T,2(V)
    MOVE B,@2(A)
    MOVE B1,2(V)
    JSP C,UREF
    HRLM FL,0(V)
    JRST 3(A)
C3:  ADD ST,DBL5
    JUMPGE ST,STOFL
    SETZM 2(V)
    SETZM 3(V)
    JUMPE Y,C3+13
    MOVE T,@1(B)
    TLNN T,MSKMA
    JSP C,UVAR1
    MOVEM T,2(V)
    MOVE T,@2(B)
    TLNN T,MSKMA
    JSP C,UVAR1
    MOVEM T,3(V)
    MOVE T,@1(A)
    TLNN T,MSKMA
    JSP C,UVAR
    MOVEM T,4(V)
    MOVE B,@2(A)
    JSP C,USKEL
    WD C3+58
    SETZM 5(V)
    JUMPE Y,C3+29
```

```
        MOVE T,@1(B)
        MOVE B1,2(V)
        JSP C,UREF1
        MOVE T,@2(B)
        TLNN T,MSKMA
        JSP C,UVAR1
        MOVEM T,5(V)
        MOVE T,@3(A)
        TLNN T,MSKMA
        JSP C,UVAR
        MOVEM T,6(V)
        HRLM FL,0(V)
        MOVE X,V
        MOVE R2,4(X)
        HLRZ R1,R2
        CAIE R1,INT
        JSP C,INTLD
        HRRZ AC0,R2
        MOVE R2,2(X)
        HLRZ R1,R2
        CAIE R1,INT
        JSP C,INTLD
        HRRZ AC6,R2
        CAMLE AC6,AC0
        JRST EPFAIL
        JSP A,P1
        WD 3(X)
        WD 4(X)
        WD 5(X)
        WD 6(X)
        MOVE A,1(X)
        HLRZ X,A
        JRST 4(A)
        XWD SKEL,1
        WD 2(Y)
        WD 3(Y)
        XWD SKEL,1
        WD 2(Y)
        WD 5(Y)
C4:     ADD ST,DBL5
        JUMPGE ST,STOFL
        SETZM 2(V)
        SETZM 3(V)
        JUMPE Y,C4+13
        MOVE T,@1(B)
        TLNN T,MSKMA
        JSP C,UVAR1
        MOVEM T,2(V)
        MOVE T,@2(B)
        TLNN T,MSKMA
        JSP C,UVAR1
        MOVEM T,3(V)
        MOVE T,@1(A)
        TLNN T,MSKMA
        JSP C,UVAR
        MOVEM T,4(V)
        MOVE T,@2(A)
        TLNN T,MSKMA
        JSP C,UVAR
        MOVEM T,5(V)
        MOVE B,@3(A)
        JSP C,USKEL
```

```
   WD C4+58
   SETZM 6(V)
   JUMPE Y,C4+33
   MOVE T,@1(B)
   MOVE B1,2(V)
   JSP C,UREF1
   MOVE T,@2(B)
   TLNN T,MSKMA
   JSP C,UVAR1
   MOVEM T,6(V)
   HRLM FL,0(V)
   MOVE X,V
   MOVE R2,2(X)
   HLRZ R1,R2
   CAIE R1,INT
   JSP C,INTLD
   HRRZ AC0,R2
   MOVE R2,4(X)
   HLRZ R1,R2
   CAIE R1,INT
   JSP C,INTLD
   HRRZ AC6,R2
   CAML AC6,AC0
   JRST EPFAIL
   JSP A,P1
   WD 3(X)
   WD 4(X)
   WD 5(X)
   WD 6(X)
   MOVE A,1(X)
   HLRZ X,A
   JRST 4(A)
   XWD SKEL,1
   WD 2(Y)
   WD 3(Y)
   XWD SKEL,1
   WD 2(Y)
   WD 6(Y)
C5:  MOVE T,@2(A)
   TLNN T,MSKMAS
   JSP C,UATOM
   CAME T,A1
   JRST FAIL
   MOVE T,@3(A)
   TLNN T,MSKMAS
   JSP C,UATOM
   CAME T,A1
   JRST FAIL
   HRLM FL,0(V)
   JRST 4(A)
C6:  AOBJP ST,STOFL
   AOBJP ST,STOFL
   MOVE T,@1(A)
   TLNN T,MSKMA
   JSP C,UVAR
   MOVEM T,3(V)
   HRLM FL,0(V)
   MOVE X,V
   JSP A,P2
   WD 2(X)
   WD 3(X)
   WD A1
```

```
   HRRZ R1,0(X)
   MOVEM R1,0(V)
   MOVE A,1(X)
   HLRZ X,A
   JRST 2(A)
C7:  ADD ST,DBL4
   JUMPGE ST,STOFL
   MOVE T,@1(A)
   TLNN T,MSKMA
   JSP C,UVAR
   MOVEM T,3(V)
   HRLM FL,0(V)
   SETZM 4(V)
   SETZM 5(V)
   MOVE X,V
   INCHWL AC1
   CAIE AC1,67
   JRST C7+10
   JSP A,P4
   WD A2
   WD 4(X)
   JSP A,P3
   WD 3(X)
   WD 5(X)
   JSP A,P5
   WD 4(X)
   WD 2(X)
   INCHWL AC1
   CAIE AC1,67
   JRST C7+22
   JSP A,PSORTE
   WD 5(X)
   OUTSTR CRLF
   MOVE A,1(X)
   HLRZ X,A
   JRST 2(A)
C8:  HRLM FL,0(V)
   MOVE X,V
   JSP A,P6
   WD A3
   WD C8+8
   MOVE A,1(X)
   HLRZ X,A
   JRST 0(A)
   XWD SKEL,1
   WD A4
   WD C8+11
   XWD SKEL,1
   WD A5
   WD C8+14
   XWD SKEL,1
   WD A2
   WD C8+17
   XWD SKEL,1
   WD A6
   WD C8+20
   XWD SKEL,1
   WD A6
   WD C8+23
   XWD SKEL,1
   WD A7
```

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```
   JSP C,INTLD
   HRRZ AC6,R2
   ADDI AC6,1
   MOVEI R2,4(X)
   JSP C,INTASS
   JSP A,P4
   WD 4(X)
   WD 3(X)
   MOVE A,1(X)
   HLRZ X,A
   JRST 2(A)
C11:  AOBJP ST,STOFL
   MOVE B,@1(A)
   MOVE B1,2(V)
   JSP C,UREF
   HRLM FL,0(V)
   JRST 2(A)
P5:  JSP C,INTRO
   JSP FL,C11
   WD 0
P4:  JSP C,INTRO
   JSP FL,C9
   JSP FL,C10
   WD 0
P0:  JSP C,INTROO
   JSP FL,C8
   WD 0
P6:  JSP C,INTRO
   JSP FL,C7
   WD 0
P3:  JSP C,INTRO
   JSP FL,C6
   WD 0
P1:  JSP C,INTRO
   JSP C,SSECL0
   WD P1+14
   WD 0
   JRST FAILB
   CAMN R2,C3+S5
   JRST P1+10
   CAMN R2,A1
   JRST C5
   JRST @P1+4
   JSP FL,C3
   JSP C,RELDSK
   MOVEI FL,P1+3
   JRST C4
   MOVEI R1,C3+S5
   JSP C,ASSSK1
   JSP FL,C3
   MOVEI R1,C4+S5
   JSP C,ASSSK1
   JSP FL,C4
   MOVE R1,A1
   MOVE R2,-1(V)
   MOVEM R1,0(R2)
   JSP FL,C5
   WD 0
P2:  JSP C,INTRO
   JSP C,SSECL0
   WD P2+10
   WD 0
```

```
        JSP C,INTLD
        HRRZ AC6,R2
        ADDI AC6,1
        MOVEI R2,4(X)
        JSP C,INTASS
        JSP A,P4
        WD 4(X)
        WD 3(X)
        MOVE A,1(X)
        HLRZ X,A
        JRST 2(A)
C11:    AOBJP ST,STOFL
        MOVE B,@1(A)
        MOVE B1,2(V)
        JSP C,UREF
        HRLM FL,0(V)
        JRST 2(A)
P5:     JSP C,INTRO
        JSP FL,C11
        WD 0
P4:     JSP C,INTRO
        JSP FL,C9
        JSP FL,C10
        WD 0
P0:     JSP C,INTROO
        JSP FL,C8
        WD 0
P6:     JSP C,INTRO
        JSP FL,C7
        WD 0
P3:     JSP C,INTRO
        JSP FL,C6
        WD 0
P1:     JSP C,INTRO
        JSP C,SSECL0
        WD P1+14
        WD 0
        JRST FAILB
        CAMN R2,C3+S5
        JRST P1+10
        CAMN R2,A1
        JRST C5
        JRST @P1+4
        JSP FL,C3
        JSP C,RELDSK
        MOVEI FL,P1+3
        JRST C4
        MOVEI R1,C3+S5
        JSP C,ASSSK1
        JSP FL,C3
        MOVEI R1,C4+S5
        JSP C,ASSSK1
        JSP FL,C4
        MOVE R1,A1
        MOVE R2,-1(V)
        MOVEM R1,0(R2)
        JSP FL,C5
        WD 0
P2:     JSP C,INTRO
        JSP C,SSECL0
        WD P2+10
        WD 0
```

```
   JRST FAILB
   CAMN R2,C1+42
   JRST C1
   CAMN R2,A1
   JRST C2
   JRST @P2+4
   MOVEI R1,C1+42
   JSP C,ASSSK1
   JSP FL,C1
   MOVE R1,A1
   MOVE R2,-1(V)
   MOVEM R1,0(R2)
   JSP FL,C2
   WD 0
FNTAB:  XWD 0,N0
   XWD 2,N1
N0:  ASCIZ "NIL"
N1:  ASCIZ "."
A9:  XWD INT,6
A8:  XWD INT,7
A7:  XWD INT,9
A6:  XWD INT,2
A5:  XWD INT,3
A4:  XWD INT,0
A3:  XWD INT,10
A2:  XWD INT,1
A1:  XWD ATOM,0
A0:  XWD ATOM,0
    END START
```