Do Not Miss the Holidays

by Winfried Gerum

Everybody is talking about the Y2K issue. I will write about calendar topics today, but not about Y2K, which I hope everybody has cleaned up long ago.

Let's talk about the lighter side of the calendar. Let's have a look at holidays. One of the lessons of Y2K is that I **NEVER** use anything but the $H-Format for the internal representation of dates. Therefore, all algorithms refer to this date format only.

The most frequent holiday is Sunday.

```
IF $H#7=3 WRITE "Today is
Sunday"
```

If you need the number of days until Sunday,

```
WRITE 3-$H#7," days until
Sunday"
```

It is ok to do this with MUMPS. If you do the same thing with a "remainder" operator in another programming language, it will not work! The modulo operator (see Ed de Moel's June '98 article) is somewhat different from a remainder operator. But it happens to be just right in date computations of all kinds.

Many Christian festivals are tied to Easter and move around with it. Easter is the tricky part.

```
EASTER(year) n a,d,e,h
  s a=year#19,d=year\100,
```

```
  d=a*19+d-(d\3)-
    (d\4)+ 15#30
  s h=year*365+(year\4)-
    (year\100)+(year\
    400)-672331+d
  s e=3-h#7
  i e=0,d<29,d<28!(a<11)  s
    e=7
  q h+e
```

How does this work? Easter is the first Sunday after the first full moon in spring. Line EASTER+1 computes d as the number of days between the vernal equinox and the subsequent full moon. Or at least it pretends to do so. When the church fixed the computus paschalis, astronomy and mathematics were not in good shape in Europe. So the Christian moon is not completely in sync with the real moon. But the formula is easy to do even without a computer.

In line EASTER+2
```
  s h=year*365+(year\4)-
  (year\100)+(year\400)-
  672331
```
gives the $H-Value for March, 21 so,
```
  s h=year*365+(year\4)-
  (year\100)+(year\400)-
  672331+d
```
is the day of the first full moon in spring. Then
```
  s e=3-h#7
```
gives the number of days until Sunday. If the full moon is on a Sunday, Easter is usually postponed for another week.

Line EASTER+4
```
  i e=0,d<29,d<28!(a<11)  s
    e=7
```

the reason for this is, that Easter should not coincide with the beginning of Pessah. And Pessah starts at the day of the full moon in the spring month.

This Easter formula is good for the next millennium. But when people start worrying about the Y10K problem ("having four digits is not an intrinsic property of years!") one should bring the Christian moon in sync with the real one.

George Washington's birthday.

```
GWB(year) N H
    S H=year-
    1,H=H*365+(H\4)-
    H\100)+(H\400)-672000
    Q 4-H#7+H
```

George Washington's birthday is the third Monday in February. The earliest possible date is the 15th of February. This is, what line GWB+1 computes. If the 15th is not a monday, we advance 4-R#7 days to the following Monday. *M*

References:

[1] D.E. Knuth, *The Art of Computer Programming* Vol 1 p.156
[2] Ed de Moel, *M Computing* Vol. 6, issue 2, p. 18 - 19

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