1.1 Title: **HOROLOG SYSTEM FUNCTION 2.1**

1.2 MDC Proposer and Sponsor:

Wally Fort
VA ISC-SF
301 Howard St. Suite 600
San Francisco, CA. 94105
(415) 744-7520
fort.w@forum.va.gov

1.3 Motion: That X11/SC13/TG6/98-3 be accepted as a replacement SC13 type A document superseding document X11/SC13/95-21.

1.4 History:

June 1998	X11/SC13/TG6/98-3	<this document> A straw poll at the March meeting showed support for a simpler version. Reduced to -1,0,1.
Sept. 1997	X11/SC13/95-21	Failed to pass as MDC type A (9:10:7)
Oct. 1995	X11/SC13/95-21	No action
June 1995	X11/SC13/95-2	Passed as SC13 type A, as amended. (17:1:3) Passed by TG6 without dissent.
Jan. 1995	X11/SC13/94-44	Amended document reaffirmed as SC13 type B (19:0:3) Passed by TG6 as amended (7:0:1)
June 1994	X11/SC13/94-22	Passed as a SC13 type A document (22:0:4)
Feb 1994	X11/SC13/TG6/94-1	Amended document reaffirmed as SC13 type B (16:0:5) The task group voted to reaffirm as type B as amended (7:0:2) The document was amended to add the UCT offset to all values. This gives local time stamps a way to calculate UCT. Timezone changed to time-offset. Also this document is to supersede all previous $H function & $UCT documents (X11/SC13/92-21, X11/SC13/93-31, X11/SC13/93-32).
Oct 1993	X11/SC13/TG6/93-4	Passed by SC13 as type B as amended (9:0:3) Passed by TG6 as amended (19:16) from X11/SC13/TG6/93-5 - replace ZT with TZ - replace $H(O) with $H(0) - Delete note about leap seconds. - add two new options (4,-4) between h and i. for number of seconds since $H origin.
June 1993		Discussion document.

2. Justification of Proposed Change

2.1 Needs

2.1.1 Universal Coordinated Time

Many applications now integrate and coordinate data from multiple time zones. This requires the availability of time values relative to a single point of reference. Due to wide acceptance of UCT (Universal Coordinated Time also known as Greenwich Mean Time), the M language needs to provide easy reference to UCT time values.

In addition, timezone information is required for some applications.

2.1.2 High Resolution Time Values

The present resolution of $HOROLOG is in seconds. Many applications which need to "time stamp" their data require finer resolution. The M language should provide higher resolution when available.

2.2 Existing Practice in Area of the Proposed Change

For UCT needs, applications typically resort to some "home brewed" solutions which are vendor specific as well. There is no known universal solution.

Increased time resolution is occasionally available (if at all) through specific vendor $Z functions. There is no known universal solution.

3. Description of Proposed Change

3.1 General Description of the Proposed Change.

Add a function form of $HOROLOG to provide the necessary date, time, and time-offset values. This proposal leaves the system variable $HOROLOG unchanged. The new intrinsic system function accepts one parameter which select the returned value.

The function returns either the local date/time value plus time-offset UCT date/time values. However, unlike $HOROLOG, the 'seconds' portion may contain fractional seconds.

D integer value counting days since the origin used by $H. (Like the D in $HOROLOG)

S real value counting the seconds since midnight. (Like the S in $HOROLOG but not restricted to integer values, if the M implementation can supply it.)

TO the number of seconds in the time-offset needed to get UCT (Greenwich Mean Time) from local time (localtime + TO = UCT).

The following, integer values for $HOROLOG(...) are defined:

$H(0) Returns a 3 piece value (separated by commas) of $H. TO

$H(1) Returns a 3 piece value (separated by commas) of D, S, TO in local time. (Like $H)

$H(-1) Returns a 2 piece value (separated by commas) of D, S in UCT.

All other values are reserved to allow for future extensions.

3.2 Annotated Examples of Use

This section contains examples in order to illustrate this function.

Getting local or UCT date/time and timezone information:

On Feb. 18, 1991 at 05:18:43 am in Greenwich England this is what you would get in Washington D C with a high resolution clock.

$H(0)	Sample value: 54835,1123,18000	(local time in Washington D.C.)
$H(1)	Sample value: 54835,1123.43,18000	(local time in Washington D.C.)
$H(-1)	Sample value: 54835,19123.43	(UCT)

3.3 Formalization

(References are to the 1995 standard)

Add to the list for functionname H[OROLOG].

Add the following to "7.1.5 Intrinsic function" in the proper place:

7.1.5.x SHOROLOG

SH[OROLOG] (intexpr)

This gives date, time, and time-offset with one access. Let m be the value of intexpr. The following cases are defined:

D an integer value counting days since the origin used by $H. (Like the D in $HOROLOG)

S a numeric value counting the seconds since local midnight. (Like the S in $HOROLOG but not restricted to integer values, if the M implementation can supply it).

TO the number of seconds in the time-offset needed to get UCT (Greenwich Mean Time) from local time (localtime + TO = UCT).

a. $m=0$ Returns a string in the format 'D,S,TO', where S is restricted to an integer value. (The value of $HOROLOG with offset).

b. $m=1$ Returns a string for local time in the format 'D,S,TO' where S is not restricted to an integer value.

c. $m = -1$ Returns a string for UCT in the format 'D,S' where S is not restricted to an integer value.

d. All other values of 'm' are reserved.

4. Implementation Impacts

4.1 Impact on Existing User Practices and Investments
Allow a standard way to get a UCT date/time or to get an local date/time with the time-offset.

4.2 Effect on Existing Vendor Practices and Investments
Cost of adding a new function.

4.3 Techniques and Costs for Compliance Verification
Compare the values returned by different inexpr and see that the formats are correct. Then do similar testing as is done with $H svn.

4.4 Legal Considerations
none known so far.

5. Closely Related Standards Activities

5.1 Other X11 Proposals Under Consideration.

5.2 Other Related Standards Efforts
ISO standard representation of date and time should be taken into account.

5.3 Recommendations for Coordinating Liaison
none.

6. Associated Documents

X11/SC1/88-46 $Horolog Function
X11/SC1/89-44   Horolog Function ver 2
X11/SC1/89-54   SSVN
X11/SC1/90-1   Horolog/SSVN
X11/SC1/90-22   Clock
X11/SC1/90-63   Clock version 2

ANSI X3.51-1986. Representation of universal time, local time differential, and United States time zone references for information interchange.

7. Issues, Pros and Cons, and Discussion

Jan. 95 The reason for the changes made to X11/SC13/94-44 was the understanding that the definition of S in part 3.3 was to use the value of S from $H. It could be argued that even though S wasn't limited to a integer it couldn't have any other value. A integer to real

Pro   1. Achieves functionality desired

2. Won't have to do $P($H...

June 95 The document was amended in the 2nd paragraph by moving the) to the end of the paragraph and by replacing the words **no longer** with the word **not**, and in the 3rd paragraph by replacing the

words **no longer** with the word **not.** This was ruled non-substantive.

Pro.   1. Needed functionality

2. Does allow finer granularity.

Con: 1. Portability issue in the granularity of seconds.

2. Portability in the wrong section.

Sept. 97   Passed in SC13 but failed in the full MDC.

Pro: 1. long tortuous history.

2. can still be done as an object.

3. functional approach fits in the current standard.

Con: 1. overly complex

2. should be an object

March 1998   The most cited con in the MDC vote was "overly complex". A straw poll at this meeting showed support for a simpler version. Removed the +2,+3,+4 and -2, -3, -4 versions. Also removed the offset from the UCT value. Changed TZ to TO for time-offset.

8. Glossary

GMT - Greenwich Mean Time.

UCT - Universal Coordinated Time.

9. Appendix