A Guide to METRIC TIME or DECIMALIZED TIME

"A TOUS LES TEMPS; A TOUS LES PEUPLES"
"FOR ALL TIME; FOR ALL PEOPLES"

UMT:
46.560

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What Is Metric Time?

Metric Time (**MT**) is an attempt to create a decimalized time system for our modern base-10 using world. This is a neglected part of the Metric System (or SI) which has created a whole measuring system based on 10 for mass, distance, volume, etc., but no official decimalized time units for normal day-to-day use. Since any system for measuring time is arbitrary, we should be using one that is most practical for us. I think that system is Metric Time.

Although I will advocate on these pages a specific Metric Time system, I will also present general information about different decimalized time systems. This is because there is no real consensus yet on what the official Metric Time system for the new millennium should be. My proposal here is subject to change if a differing consensus is reached or anyone can convince me that another way is better.

I am not advocating a decimal time system because I have some axe to grind against base-60. On the contrary, I find different number systems to be useful and fascinating. Debates the practicality of binary and hexadecimal in computer programming, the use of different number systems in different cultures (such as the Babylonians from whom our base-60 time system originated and Mayans who had base-20,) and the difficulty that we as decimal users have in using their systems (most of us can't just start doing addition in base-20 without having to keep track with paper and pencil,) raises all sorts of intriguing questions about how we think about numbers. Would we be able to do math at all if we didn't have a language or written system to aid us? It seems to me that the main problem we have in using other base systems is that those of us who have grown up in a decimal using culture think in decimal. And this brings me to why I am advocating decimal based Metric Time; because we *do* live in a decimal using society, it's just perverse for us to be using base-60 for telling time.

NOTE: The time system that you are used to (24hr/day) will be referred to here as **Anglo-Babylonian Time** (**ABT**). The reason for the Babylonian part was mentioned above. The Anglo is there because the system in its current form has been associated with the British (Greenwich and all that.)

The Metric Time System

Basic Description

A Metric or Decimalized Time system is, like ABT, based on the solar day (i.e. one revolution of the Earth). This day is then divided into units of tenths, hundredths, thousands, etc. that are used to keep and tell time.

NOTE: Although we are defining Metric Time here based on the rotation period of the Earth, that doesn't mean that we couldn't redefine it based on something more stable (such as the radioactive decay rate of some atom,) as has been done with ABT.

Most proposed day-based decimalized time systems are basically the same in that one tenth of a day is one tenth of a day for all of them. However there are differences between systems, these mainly being the unit names, display format and how **locality** and **universality** are handled.

Units

Any system of measurement must have a unit that measurements are expressed in and a standard format for expressing that unit to avoid confusion. Metric Time is no different. However, there are and have been a number of units and formats proposed. Visit the **links** for sites with a variety of systems.

The most popular unit system (it seems to have been reinvented a number of times) is the one instituted in France during the Revolution along with the Metric System. This system uses hours, minutes, and seconds like ABT but redefines their lengths:

French Revolutionary Metric Time
10 metric hours in a day
100 metric minutes in a metric hour
100 metric seconds in a metric minute
10 days in a metric week (called a dekade)

(Note: I will refer to the above metric second here as an "MT second" to avoid confusion with the official SI second which is equal to the ABT second.)

The main attraction of this is that seconds and minutes are fairly close to their ABT counterparts, allowing people to continue to use expressions like "I'll be done in a few seconds" or "any minute now!" and have them mean the same thing. There are, however, two major drawbacks.

One is that using unit names that are the same as the ABT units could lead to confusion where precision is more important. This is especially problematic with the metric hour which is almost two and a half times the length of the ABT hour -- a significant period of time for a scheduling mishap. This could be solved by always saying "metric hours" and "ABT hours", but this would quickly grow tiresome.

The second drawback is that, while metric minutes and MT seconds are as convenient as their ABT counterparts, the metric hour is a bit unginity. Blocking out time in ABT hours is manageable, but a tenth of a day is too long a period to be useful for higher resolution mapping of the day on the scale of appointments, TV show times and such (although it would still have value as a low resolution day-overview).

The obvious solution to the latter problem is to pick a base-ten fraction that gives a more reasonable length of time and promote its use as the basic building block of the day, much as ABT hours and half-hours are used. It will be the unit that time is normally expressed in, except in technical situations. A hundredth of a day (let's call it a **centiday** here for brevity) is the logical choice for this unit as it is 14.4 ABT minutes. For example: a TV sitcom is 2 centidays long and a typical class session lasts 4 centidays.

Names

The first problem with the French system leads us to the question of what -- if not hours, minutes and seconds -- we should name our units. Here we have options.

There is a tradition in science of naming units after researchers who made important discoveries in the related field. For instance, the unit of absolute temperature is the **kelvin**, named in honor of **Lord Kelvin** who came up with the concept of absolute temperature. This methodology could apply to Metric Time too. One person has suggested that a hundredth of a day be called a **fleming** in honor of Sir Sanford Fleming, Canadian inventor of standard time zones. While there is precedent for a naming scheme like this, there are all sorts of politics involved in who exactly the unit would be named after (would Quebecers approve of telling time in flemings?). And although scientists are used to this sort of meritocracy of names, the general populace would probably find any person's name to be too provincial for a much used unit of time.

Another method would be to come up with more neutral words specifically for each useful division of the day, much as we currently have with hours, minutes and seconds. For instance: Jonathan Jay's Global Network Time uses **cycles, grands, beats and ticks** for a hundredth, thousandth, etc. of a day. Swatch's Internet Time uses **.beat** for a thousandth of a day.

Since we are using decimalized time, we can take advantage of the Metric System's set of standard prefixes. This will allow us to only have to name one base unit -- be it a cycle or a MT second or whatever -- and then be able to express a time in a unit scaled for specific usage. For example, if a fleming is a hundredth of a day, then a **millifleming** is a hundred-thousandth or an MT second. It's easier to say "two millflemings" than "zero point zero zero two flemings".

The Metric Time Unit

Although a tenth of a day is a convenient unit for scheduling purposes, it is a rather arbitrary one as the base unit for naming purposes. The most natural base unit is a *day*. Therefore *I propose that the base Metric Time unit be called a day in English and that it be equal to one mean solar day*. This should, however, be considered a temporary name for the present purpose of explaining decimalized time in English. Users of other languages should replace it with their word for day, such as *Tag, dia, Jour, on*, or *Il*.

Using metric prefixes on **day** we get:

Metricized Day
deciday (dd) = 1/10 day (Metric hour)
centiday (cd) = 1/100 day
milliday (md) = 1/1000 day (Metric minute)
microday (µd) = 1/1000000 day (Metric decisecond)

The "day"s may be omitted for brevity in situations where it is understood that you are referring to time. This gives us the following informal or slang names:

Informal Names
deciday = deci or dez
centiday = centi or cent
milliday = milli or mil
microday = micro or mic (pronounced "mike") or moo (the symbol for micro is µ)

The MT Second And SI Second

We now come to some problems. You may have noticed that there was no equivalent to a MT second listed above. Since there is no current metric prefix for 10^{-5} we can't state a MT second using the unit day (except as 10 µd). Also there is the existence of the SI second, which is the official unit of time of the International System of Units (aka the Metric System or SI). Here are some options:

- **Create a 10^{-5} prefix.**

  May I float the idea of a **quinto** (**q**) for 10^{-5} and a matching **Quotta** (**Q**) for 10^{5}? With this we get the following:

quintoday (qd) =	1/100000 day (MT second) informal = "quint

- **Redefine the SI second to be equal to 10^{-5} day.**

  The SI second is defined as the period of time that it takes a specific number of cesium isotope radiation emissions to occur such that it is as close to a mean ABT second (1/86400 day) as feasible given the variance of the earth's rotation. To redefine the SI second to be equal to a MT second would mean redefining it to be equal to whatever number of cesium-133 emissions are close to 10^{-5} mean day given variation.

  There are two problems with this option. First is that there could be confusion over having the same name for two different time periods as was mentioned above for hours and minutes. Second is that the rate of the SI are that there is one base unit for each base quantity. By introducing the day as a base unit and keeping the second, we will have two base units of the quantity time. How much of a problem this is depends on how strictly you wish to adhere to the SI rules.

- **Create a new name for 10^{-5} day.**

  Perhaps named for a researcher? This would solve the first of the previous problems but not the second.

- **Keep the SI second.**

  Since the SI second isn't really defined as 1/86400 of a day but instead an arbitrary number of cesium isotope decays, we can't really fault it for being Babylonian. The SI second is already used as a decimalized unit in science and engineering. We could keep the SI second as the time unit for technical purposes and the SI day as the unit for clock keeping and day-to-day use (timing boiled eggs and such). This also introduces a dual unit system though, and one where conversion is harder.

- **Adopt the day as the official SI time unit**

  Let seconds go the way of scruples and stones. Expect to hear scientists and engineers use **femtodays** a lot. A day will need to be more precisely defined as mentioned above.

Use and Format of Metric Time

Clock Format:

Metric Time should be written as a single decimal number expressed in whatever scale unit is needed. For normal time keeping, such as on your watch or in schedules, *that unit should be the* ***centiday*** *and it should be labeled with* ***UMT*** *or* ***LMT*** *depending on whether you are expressing the universal or local metric time. The number of decimal places that it should be written out to depends on need.* One decimal place would give you the rough equivalent of an ABT display to the minute, three to the ABT second:

Example Usage	
00.0 LMT	(12:00 midnight ABT, local)
50.0 LMT	(12:00 noon ABT, local)
00.0 UMT	(12:00 noon ABT, GMT)
50.0 UMT	(12:00 midnight ABT, GMT)
50.000 LMT	(12:00:00 noon ABT, local)
02.425 UMT	(12:34:56AM ABT, local)

Note that leading and trailing zeros are never truncated. Also, you should not round up in clock usage:

```
00.099 cd = 00.0 LMT
```

When speaking a Metric Time say it as you would any decimal number. For instance, 98.765 UMT is pronounced "ninety-eight point seven six five universal". Although you may be tempted to say 98.7 UMT as "ninety-eight seven" in more informal situations, this could lead to confusion as 50.5 UMT would sound like 55.0 UMT. So always include the "point" or your local equivalent.

Non-Clock Formats:

When using Metric Time for more general measuring purposes you use it as you would any other metric unit (meters, liters, etc.). Numbers may be rounded up and leading and trailing zeros may be truncated (keeping in mind the rules regarding significant digits when dealing with more technical situations). Examples of Metric Time in use:

> "The half-life of Bromine-75 is 6.75 cd"
>
> "Cook the frozen entrée in the microwave oven for 5.5 md on high"
>
> "Otto ran the 5k in 1.276 cd"

Day format:

Using a non-scaled day as a unit can have advantages when writing dates and times together (i.e. time stamps) as the day and time can be written as a single decimal number. For example:

```
2001-01-01.50000 UMT
```

is noon at the International Date Line (IDL), to greater than a second, on the 1st of January, 2001. The above would also be equal to:

```
2001-01-02.00000 LMT
```

at the prime meridian (00:00:00 midnight GMT), however localized date formats should be avoided.

Because the context in the above examples is clear, we don't have to specify that the last number is in day units. However, if you were to write this without the year and month you would need to state the unit to avoid confusion:

```
01.50000 d UMT
```

If you have a Java Script capable browser, you should see a local date-time format clock in your browser's status bar.

Julian Day:

The **Julian Day** chronology system has it's days begin on the IDL (or rather at GMT - 12 hours). The reason for this is that Julian days are used mostly by astronomers, most astronomy (at least prior to the Hubble telescope) is done at night, and the people who created the system were European. It's just more convenient to have your night's observations all happen on the same day. The reason I bring this up here is that the Julian day system uses a decimal number to express the time of the day, so the decimal part of a Julian date is the same as UMT expressed in days.

Metric/Anglo-Babylonian Conversion

Conversion Table			
ABT sec = 11.57 µd	1 µd	= 0.086 ABT sec	
ABT min = 0.694 md	1 md	= 1.440 ABT min	
ABT hr = 4.167 cd	1 cd	= 14.40 ABT min	
ABT hr = 0.417 dd	1 dd	= 2.400 ABT hr	
ABT wk = 0.700 MT wk	1 MT wk	= 1.428 ABT wk	
Values are rounded off.			

Formula for converting from ABT to MT

First convert ABT to 24 hour (i.e. no AM/PM and midnight=00:00). Next fill in the formula where h=hour m=minute s=second:

ABT to Centidays Formula
MT = (s/864)+(m/14.4)+(h/0.24)

NOTE: This will give you MT in centidays. To get it in days, milldays, etc. simply move the decimal to the proper place or, more formally, multiple/divide by the appropriate power of ten.

Here is a more generalized version of the formula. Plug in the right value for x and it'll give you MT in the desired unit:

General ABT to MT Formula			
MT = ((s/86400)+(m/1440)+(h/24))*10^x			
Days:	x = 0	Milldays:	x = 3
Decidays:	x = 1	Quintoday:	x = 5
Centidays:	x = 2	Microdays:	x = 6

See how easy Metric Time is!

Formula for converting from MT to ABT

Why the heck would you want to do that?!

Well, ok... here's how you do it. This is a little more complicated since ABT uses three different units (when expressed in decimal, anyway) each needing its own formula (with references to the results of the previous formulas). Below, h = hour (24), m = minute, s = second, d = MT expressed in days, and truncate() means to chop off everything after the decimal point (i.e. 1.23 becomes simply 1):

MT to ABT Formula(e)
h = truncate(d * 24)
m = truncate(((d * 24) - h) * 60)
s = truncate((((d * 24) - h) * 60) - m) * 60)
ABT = h : m : s

See how complicated Anglo-Babylonian Time is!