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DATA FILE FOR DETERMINING THE JEWISH CALENDAR

THE PURPOSE of the Jewish calendar calculations is to establish dates for the Jewish calendar IN TERMS OF THE ROMAN JULIAN AND GREGORIAN CALENDARS. Without the existence of the Roman calendar the current Jewish calendar calculations become totally meaningless and useless. The Jewish calendar calculations ONLY determine the Molad of Tishri in terms of the Roman calendar (originally Julian, and today by means of an adjustment Gregorian). So these calculations establish the dates for one calendar in terms of another calendar that is taken as the standard (i.e. the Roman calendar). Without the existence of another calendar, which is used as the yardstick, these calculations for the Jewish calendar could not possibly have been used.

PART I: GENERAL INFORMATION

1) The Jewish calendar for any given year is determined by calculating exactly how many lunar months have passed from a specific starting date in Roman calendar terms, for which starting date the exact time of the Molad of Tishri is known, to the Molad of Tishri for the year in question. Every calculation is always based on going back to the same starting date in the Roman calendar, totally ignoring any other years that may have been calculated previously.

2) The Week is divided into 7 Days, where Day 1 is Sunday (i.e. from Saturday evening sunset until Sunday evening sunset), and Day 7 is Saturday (i.e. from Friday evening sunset until Saturday evening sunset).

3) The Day is divided into 24 Hours.

4) Every Hour is divided into 1080 Parts, also called Halakim. Thus one Halak is equal to three-and-one-third seconds (i.e. 3600 seconds in every hour being divided by 1080 parts equals three-and-one-third seconds per Halak or Part).

Thus to convert Parts into minutes and seconds, use the following procedure: 289 P = 289 x 3.3333 = 963,3237 seconds, divided by 60 = 16 minutes plus 3 seconds (rounded off).

5) Every Day is deemed to start and end at 6:00 p.m. [Comment: Some computer programs for the Jewish Calendar start and end days at midnight in their calculations. Thus in interpreting their results this needs to be taken into account. Understand that this does not in any way affect days actually starting and ending at the real sunset times. The time of 6:00 p.m. is purely a benchmark time for the purpose of the calculations.]

6) The precise time of a Molad is expressed in the formula: Dx Hy Pz, where D stands for Day, H for Hour, and P for Parts. The letters "x y z" represent the actual numbers involved. In the final result the value of "x" will range from 1 to 7; the value of "y" will range from 0 to 23; the value of "z" will range from 0 to 1079. (In all the examples and calculations in the tutorial, when the results are also presented in terms of "hours and minutes and seconds" the parts of a second at the end of a calculation are ignored for practical reasons.)

Here is an example:

D1 H4 P980 means:
Day 1 = Saturday sunset to Sunday sunset
Hour 4 = 10 p.m.
Parts 980 = 54 minutes and 26 seconds
(Comment: H0 = 6 p.m., H1 = 7 p.m., H2 = 8 p.m., H3 = 9 p.m., H12 = 6 a.m., etc.)
So our time of D1 H4 P980 means: Saturday evening 10:54:26 p.m.

Another example: D5 H13 P72 means:
Day 5 = Thursday
Hour 13 = 7 a.m.
Parts 72 = 4 minutes 0 seconds
So our time of D5 H13 P72 means: Thursday morning 7:04:00 a.m.

One more example: D7 H0 P102 means:
Day 7 = Friday sunset to Saturday sunset
Hour 0 = 6 p.m.
Parts 102 = 5 minutes 40 seconds
So our time of D7 H0 P102 means: Friday evening 6:05:40 p.m.

In this last example: If the time of the actual lunar conjunction was in agreement with this Molad time of Friday evening 6:05:40 p.m., THEN the Jewish calendar calculations simply ASSUME that it is after sunset.

So for the Jewish calendar calculations any time after 6:00 p.m. is always considered to be part of a new day, irrespective of the time of the actual sunset. When we look at the postponement rules we will see why to the Jewish calendar calculations it doesn't really make a difference whether a molad time is just before or just after the real sunset.

[Comment: In our own evaluation of the data, after we have established the results, we can then still determine for ourselves whether a time like that was still before sunset near the end of one day, or whether it was after sunset and part of the next day. Thus: if in this particular example it would turn out that sunset was only at 6:10 p.m., THEN our decision (in conflict with the Jewish calendar decisions!) would be that the conjunction was actually just over 4 minutes before the end of DAY 6 (i.e. Friday). But if in this case it would turn out that sunset was at 5:58 p.m., THEN the decision would be that the conjunction was actually just over 7 minutes after the start of DAY 7 (i.e. Saturday), and in agreement with the Jewish calendar decisions. I have mentioned this to illustrate that using 6:00 p.m. for the purposes of calculations does not present any problems, any more than using midnight for the calculations presents any problems. It is simply a convenient way for performing the calculations. But our process of evaluating the results against real sunset times has nothing to do with calculating the Jewish calendar itself; it is only a part of our own evaluation of the results after all the calculations have been completed. For more details regarding sunset times see the directory with the Jerusalem Sunset Times.]

7) Another point to take note of: when we are doing calculations and adding or multiplying periods of time, then the numeric value precedes the symbol. Thus, 2D 8H 724P will signify 2 Days plus 8 Hours plus 724 Parts. So where D2 H8 P724 signifies a Monday at 2:40:13 a.m., 2D 8H 724P is used in the calculations to refer to a period of time equal to 2 days plus 8 hours plus 724 parts, which is the same as 56 hours plus 724 parts.

We have the need to do both, work with periods of time in multiplications, divisions and additions, and also to pinpoint specific points in time. This difference we denote by having the numeric value before or

after the symbol. Where D2 refers to Monday, 2D refers to a period of 48 hours. Similarly, in a calculation we might have the value "0D" meaning "zero days", but in pinpointing a specific moment in time we can never have "D0" because there is no day in the week signified by the expression "D0".

8) The Starting Date that is always used is THE JULIAN CALENDAR DATE of the Molad of Tishri (the 7th month) for the year 3761 B.C., and this is taken as OCTOBER 7 at D2 H5 P204. This is equal to Sunday evening 11:11:20 p.m. on October 6. [Comment: Some computer programs for the Jewish calendar which reckon days from midnight to midnight will give this starting date as being October 6 at D1 H23 P204. This time is exactly the same as the previous one, since October 7 in the sunset to sunset reckoning started at 6:00 p.m. on October 6. When you notice exactly 6 hour differences between the calculations here and those you might find in some other computer program, understand that this is only due to a different way of reckoning days, but both results actually pinpoint the exact same precise moment in time.]

Since many Molad calculations result in a Molad during the month of September, this starting date is for convenience of calculations also commonly presented as September 37 D2 H5 P204. This simplifies the calculations without actually changing anything. [In the midnight to midnight calculations you might see this starting date as September 36 D1 H23 P204, which is the exact same point in time.] When in the final result the number of days for September still exceeds 30, then that is at that point obviously changed back into October by subtracting 30 from the total number of days for September. This is simply a tool for making calculations.

[COMMENT: In the Julian calendar the date of the spring equinox for 3761 B.C. would be APRIL 20, and the date for the autumn equinox would be OCTOBER 23! So the Molad of Tishri for the starting date of 3761 B.C. is actually 16 full days before the start of autumn! That starting Molad for 3761 B.C. would have placed the start of the Feast of Tabernacles before the end of summer, not a very good footing for a calendar to start out with. This is not immediately apparent to people who do not realize that the starting date is in terms of the Julian calendar, in which the equinoxes and solstices were not kept in constant positions. The same starting date converted into the Gregorian calendar (which you are unlikely to ever see elsewhere) is September 7 D2 H5 P204 (i.e. Sunday, September 6 at 11:11:20 p.m.), and this doesn't look nearly as good as does "October 7".]

8) The first 6 months of the Jewish calendar are always, independently of any real new moons, reckoned to be exactly 177 days. So the start of the year is always placed exactly 177 days before the Day of Trumpets, the date for Trumpets being established after the Molad of Tishri has been evaluated against the postponement rules.

9) The Calendar Meridian is taken to be Jerusalem.

10) Years are reckoned in 19-Year Cycles, where 12 years have 12 months each and the other 7 years have 13 months each. Years with 12 months are known as Ordinary Years or as Common Years, and years with 13 months are known as Leap Years or as Intercalary Years.

11) The 13th month is known as the Embolismic Month because it is inserted or "wedged in" between the 11th and the 12th months. In a leap year the 12th month, normally called "Adar", is shifted and becomes "Adar II", while the Embolismic Month becomes known as "ADAR I" and is wedged into the annual cycle in front of "Adar II".

[Comment: We do exactly the same type of thing in the Gregorian calendar. In a leap year we don't add a day to the end of the year, which would make that day "December 32". No, in a leap year we insert a day in front of the start of March, making that inserted day "February 29".]

12) The 7 Leap Years are inserted into the 19-Year Cycle in a fixed sequence, which is never changed. This creates a predictable pattern of years starting earlier and later in the seasons, which pattern with only a relatively minor shift repeats itself every 19 years. That sequence of leap years is: Years 3, 6, 8, 11, 14, 17, 19 within the 19-Year Cycle.

13) In assuming that this Jewish calendar was also used during Christ's ministry, which is not correct at all, the Church used to teach that during Christ's ministry the sequence of leap years was: Years 2, 5, 7, 10, 13, 16, 18 within the 19-Year Cycle. This changed sequence of leap years has the effect of making gross seasonal errors with the present sequence of leap years, when applied to 2000 and more years ago, look less objectionable. This changed sequence of leap years for the time of Christ's ministry and before, for which change there is no evidence at all, is the reason why in some cases you may find two different sources stating differing Passover dates for certain New Testament years and also for B.C. dates, dates that differ by one full lunar month.

14) Length of a Year: Common Years may be 353 or 354 or 355 days long. Leap years may be 383 or 384 or 385 days long.

15) Exact Length of a 19-Year Cycle: This is 6939 Days 16 Hours 595 Parts.

16) Possible length in full days for a 19-Year Cycle: It can be 6939 or 6940 or 6941 days long. [An exception where a cycle is 6942 days long is covered in another directory.]

17) A Lunar Year of 12 lunar months runs approximately 11 days behind the solar year, with the solar year controlling the seasons. It is to avoid the months regressing into different seasons that necessitates some years within the 19-Year Cycle having 13 months.

18) CURRENT 19-YEAR CYCLE: The current 19-year cycle for the Jewish Calendar is Cycle #304, and it includes the years from 1997 - 2015.

PART II: SPECIFIC DATA NEEDED FOR THE CALCULATIONS

The Jewish calendar is determined by performing TWO SEPARATE CALCULATIONS. These are fully independent of each other. These two calculations are:

A) Finding the DAY OF THE WEEK for the Molad of Tishri for the year in question.

B) Finding the DAY OF THE MONTH IN THE JULIAN CALENDAR for the same Molad.

The proof that both calculations have been performed without mistakes is that the Hours and the Parts in these two independent calculations must be identical! If there is even a difference of one halak (i.e. just over three seconds) between the results of these two calculations, then it must be assumed that there is a mistake somewhere in one or even both of the calculations. And the calculations must be done again to locate that mistake.

So these calculations have a built-in self-checking feature. That was especially important in previous generations when these calculations were performed manually, without recourse to computers or electronic calculators.

DATA FOR FINDING THE DAY OF THE WEEK

1) A Jewish 19-Year Cycle exceeds a full number of weeks by 2 Days 16 Hours 595 Parts. This is written as 2D 16H 595P.

2) A common year exceeds a full number of weeks by 4 Days 8 Hours 876 Parts. This is written as 4D 8H 876P.

3) A (Jewish) leap year exceeds a full number of weeks by 5 Days 21 Hours 589 Parts. This is written as 5D 21H 589P.

DATA FOR FINDING THE DAY OF THE MONTH IN THE ROMAN CALENDAR

1) A Jewish 19-Year Cycle is shorter than 19 Julian years by 1 Hour 485 Parts. This is written as 1H 485P.

2) The average common year is shorter than the average Julian year by 10 Days 21 Hours 204 Parts. This is written as 10D 21H 204P.

3) The average (Jewish) leap year is longer than the average Julian year by 18 Days 15 Hours 589 Parts. This is written as 18D 15H 589P.

4) Converting from the Julian calendar to the Gregorian calendar: in 1582 A.D. 10 Days were dropped. Thereafter 1 additional Day is dropped for each full century NOT divisible by 400 (i.e. 1 Day is dropped for 1700, 1 Day for 1800, 1 Day for 1900, 1 Day for 2100, etc.).

5) Adjusting for Gregorian leap years: Add 6 Hours for every year following a Gregorian leap year (i.e. add 6 Hours for 1981, 12 Hours for 1982, 18 Hours for 1983, zero for 1984, 6 Hours for 1985, etc.).

This is all the data we need to calculate the Molad of Tishri for any given year. And the two independent calculations for the exact time in terms of the day of the week and in terms of the date in the Roman calendar must ALWAYS yield the same number of Hours and the same number of Parts in order to be correct.

Once the Molad of Tishri has been established and verified by these two calculations, THEN it is evaluated against the 4 Rules of Postponement, designed to prevent the Day of Atonement and also the Day of Trumpets from falling on inconvenient days of the week (i.e. from falling on either a Friday or a Sunday). These rules of postponement are also known as "Dehiyyot" (the singular is "Dehiyyah"). These rules have nothing whatsoever to do with any astronomical reasons or requirements. That will become abundantly clear from the examples we will work through in this tutorial.

PART III: RULES OF POSTPONEMENT, THE DEHIYYOT

Once the exact day and time of the Molad of Tishri has been determined by the above-mentioned calculations, THEN this result is evaluated against all 4 of the rules of postponement. These 4 rules serve the following purposes:

- One rule establishes a compromise between sometimes starting the Day of Trumpets with the sunset that precedes the precise time of the Molad, and sometimes starting the Day of Trumpets with the sunset that follows the precise time of the Molad.

- One rule ensures that inconvenient days of the week (meaning Fridays and Sundays) are avoided for all four of the autumn Holy Days (Trumpets, Atonement, the First Day of Tabernacles, and the Last Great Day) by means of simply "postponing" the start of the month (and thereby the start of the whole year) to one or two days later. In those cases the previous year becomes one or two days longer.

- The remaining two rules are needed to avoid problems that could arise because of the

application of the first two rules. These last two rules are only responses to the effects of the first two rules on the lengths of certain years, and they would not exist without the first two rules. Put another way: these last two rules are intended to sort out problems created by the first two rules.

With this background, here are the 4 rules:

RULE #1: When the Molad of Tishri occurs at noon or later (i.e. in the sunset to sunset reckoning that would be H18 P0 or later), then the sunset following the time of the Molad becomes the start of Tishri 1. If the time of the Molad is before noon (i.e. in the sunset to sunset reckoning that would be H17 P1079 or earlier), then the sunset preceding the exact time of the Molad becomes the start of Tishri 1.

[Comment: It is this postponement rule that makes the actual time of sunset redundant in the Jewish calculations. Since any molad time between 12:00 o'clock noon and 6:00 p.m. (i.e. theoretically sunset) automatically receives a postponement to the next day, therefore these calculations are independent of all real sunset times. So it makes no difference whether sunset is as early as 5:30 p.m. or whether it is as late as 6:30 p.m.]

However, the other 3 rules of postponement must also still be applied before the FINAL decision regarding Tishri 1 is made.

RULE #2: When the Molad of Tishri, after being evaluated against Rule #1, falls on a Sunday, Wednesday or Friday, then the start of Tishri 1 is postponed by one day. The only purpose for this rule is to avoid ever having any of the autumn Holy Days fall on a Friday or a Sunday. Astronomical considerations never enter the question, as the tutorial examples will show.

[Comment: You may see some people reversing these first two rules of postponement, but that is based on a lack of understanding. The Jewish calendar NEVER evaluates the time of the molad against the "no Sunday, Wednesday or Friday" rule, until AFTER it has first been evaluated against the "before or after 12:00 o'clock noon" rule. Done the other way around would require the molad time to be evaluated TWICE against the "no Sunday, Wednesday or Friday" rule. For example: A molad time of Saturday 2:30 p.m. would have to be evaluated as follows: 1) Is it on a Sunday, Wednesday or Friday? NO! 2) Is it after 12:00 o'clock noon? YES! Because it is after 12:00 o'clock noon, therefore it is postponed to the next day. So it is postponed to the SUNDAY. 3) You then again ask: Is this a Sunday, Wednesday or Friday? This time the answer is YES! So therefore it is then postponed to the Monday. But in this process you are forced to evaluate the date twice against the same postponement rule. The correct procedure is to FIRST ask the question: Is the molad time before or after noon?]

RULE #3: In a Common Year when the Molad of Tishri falls on a Tuesday at or after H9 P204 (this is 3:11:20 a.m. on Tuesday morning), then Tishri 1 is moved to Wednesday. However, as Rule #2 does not allow Tishri 1 to fall on a Wednesday, therefore in this case Tishri 1 will be moved to the Thursday. So this postponement rule, when applicable, always produces a two-day postponement.

RULE #4: In a Common Year immediately after a Leap Year (i.e. only in Years # 1, 4, 7, 9, 12, 15 and 18) when the Molad of Tishri falls on a Monday at or after H15 P589 (this is 9:32:43 a.m. on a Monday morning), then Tishri 1 is moved to Tuesday.

[COMMENT: Rules #3 and #4 are designed to contain a Jewish 19-Year Cycle within the bounds of from 6939 to 6941 days. While there is not a clearly spelled out statement that "a 19-Year cycle may not be shorter than 6939 days, and it may not be longer than 6941 days", that is in actual terms the explicit purpose of postponement rules #3 and #4.

Note that whereas Rule #1 and Rule #2 are complementary (i.e. Rule #2 can be applied on top of Rule

#1), Rule #3 and Rule #4 are mutually exclusive (i.e. only one of these last two rules can ever apply to one specific Molad) . Rules #3 and #4 ONLY come into consideration when neither Rule #1 nor Rule #2 demand a postponement.

So Rules #1 and #4 can cause only a one-day postponement; Rule #3, when applicable, always causes a two-day postponement; and Rule #2 may cause either a one-day postponement, or, if applied in conjunction with Rule #1, a two-day postponement.

PART IV: PUTTING THE WHOLE CALENDAR TOGETHER

Once all the above information has been established, THEN the calendar for the whole year can be determined. Of importance to us are only the Passover, the three annual Feasts and the seven annual Holy Days.

This is actually the simplest procedure of the whole process. It goes as follows:

1) The above calculations and application of the postponement rules have given us the date for Tishri 1, the Day of Trumpets, the First Day of the Seventh Month of the Jewish year, in Roman calendar terms.

2) Tishri 1 plus 9 days = Tishri 10, the Day of Atonement.

3) Tishri 1 plus 14 days = Tishri 15, the First Day of the Feast of Tabernacles.

4) Tishri 1 plus 21 days = Tishri 22, the Last Great Day.

5) Tishri 1 minus 177 days = Nisan 1, the First Day of the First Month; this day is not observed in any religious way; it only marks the start of the year.

6) Nisan 1 plus 13 days = Nisan 14, the Passover Day, observed the previous evening after sunset.

7) Nisan 1 plus 14 days = Nisan 15, the First Day of the Feast of Unleavened Bread.

8) Nisan 1 plus 20 days = Nisan 21, the Seventh Day of the Feast of Unleavened Bread.

9) Starting with the Sunday, after the Sabbath in the period of Nisan 14 to Nisan 20, count seven Sundays to determine the date for the Feast of Pentecost. Another way to say this is: starting with the Sunday in the period of Nisan 15 to Nisan 21, count seven Sundays to determine the date for the Feast of Pentecost.

AND THAT IS ALL THERE IS TO THE JEWISH CALENDAR!

While nobody is expected to learn all of these facts and figures off by heart, the above information is a ready reference for anyone wishing to "check up on" the Jewish calendar.

Armed with this information we can proceed to do the actual calculations for the example years I have chosen. It is of no value to choose years where the Jewish calendar "happens to get it right". It is the years when the Jewish calendar very clearly "gets it wrong" that expose the flaws in that calendar. We need to use a calendar that CONSISTENTLY "gets it right"! And the Jewish calendar simply does not do that.

I suggest that you now choose one of the Tutorial examples to work through, to see all of these facts applied. Remember, you will not be asked to do any calculations yourself. They are all done for you. It is

THE PROCESS and THE CONCLUSIONS that are exposed in these tutorial examples. Doing any mathematical calculations yourself is always optional and never required in this tutorial here.

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