The Principles of the Biblical Calendar

(Orignially written for the program in §144)

§126 The new moon nearest to the spring equinox is the first month of the year. The first month will always be either the new moon just before the spring equinox, or it will be the new moon just after it. One way of determining this is to compute the equinox Julian date and time and find the difference between it and the Julian date and time of the respective new moons, taking the nearest as the first month. A new moon is measured from sunset on the evening of the crescent.

§127 In the first century c.e., the day of the new moon was determined by eyewitness observation. When two witnesses had seen the new moon in the west, just after sunset, that day, beginning with that sunset, would be declared the new moon day. The new moon was declared when the new crescent was first seen in the west after the conjunction. The Sanhedrin's calendar council, called the Beth Din, was responsible for cross-examining the witnesses. Jerusalem was the prime location of observation, although the council would take testimony from witnesses who traveled to Jerusalem in those cases in which the seeing conditions were not good at Jerusalem. In no case was the month ever made to be longer than 30 days, or shorter than 29 days. If there was any doubt whatever, due to poor conditions, it was the practice of the Jewish people to observe two new moon days, and two feast days for each feast day, in order to be sure of observing the correct day.

§128 This program can be considered an electronic 'eyewitness' which computes with utmost precision the location of the moon and sun on the day or days in question, and then it determines if the moon could be seen based upon two factors (a) the size of the lighted portion of the moon, and (b) the amount of twilight competing with the crescent just after sunset on the day or days in question. The mathematical relationships between these two values can no doubt be improved with continued examination of actual documented cases in which witnesses have seen the new moon after sunset.

§129 The lighted portion of the moon is directly proportional to its apparent angular distance from the sun, which is quantified by a value called the 'arc of light' herein designated as AL. The amount of twilight working against the arc of light is directly proportional to the length of time the moon stays above the horizon after sunset. This is quantified by a value called the 'arc of vision,' herein quantified by AV. When the AV is large visibility of the new moon is likely. When the AL is small, visibility of the moon is not as likely. It was determinged by a French astronomer named Danjon that if the arc of light was less than 7 degrees, the moon in no case could be seen. This is due to the fact that the lunar mountains shade

out all light hitting the moon near the terminator as viewed from the earth. When this condition occurs on the day preceeding visibility, this program will post PR: < 7. Many times it happens that even though the arc of light is substantial, the moon sets before the sun. This condition is posted as S>M, i.e. sun greater than moon (in altitude) for the day preceeding visibility.

§130 The formulae relating the 'arc of vision' and the 'arc of light' are

(1) Arc needed (AN) = -1/4*AL + 12.75 when AL>=7 or AL < 11

(2) AN = -1/3*AL + 12.66 when AL>=11 or AL < 20

(3) AN = -1/2*AL + 17.00 when AL>=20 or AL < 22

(4) AN = -2/3*AL + 20.66 when AL>=22 or AL < 25

(5) AN = always engough when AL>=25

(7) AL < 7 ==> never visible

§131 For example if AL = 8, then AN= 10.75. If the AV>= 10.75 or AV < 12.75, the program will designate the new moon as AMB, i.e. ambiguous The AMB designation is placed on any AV that is within 2 degrees of the arc of vision needed. The day will be listed as the new moon day, however. It will be clear that the next day is to be observed also as the new moon day.

§132 If the designation is AMBpr, this means the previous day came within one degree of meeting the formulae's criteria for visibility. In that case the preceeding day should be observed with the day listed as the new moon day.

§133 The arc of light and arc of vision are computed without refraction, which amounts to about 33'' of arc at sunset. Please take this into account when using other software to check on this program. The reason for not computing the atmospheric refraction is that the arc of light is used to measure the visible portion of the crescent, which is not changed by the refraction. Refraction will reduce the arc of vision at sunset. Refraction will increase the arc of vision the nearer the observation time is to moonset. This effect of 33'' is within the Ambiguity parameters of the program. which are two degrees when AV>AN and 1 degree when AV<AN. Improvement's will need a better theory.

Proving the Equinox Rule

§133.1 There are two other methods of fixing the first month besides the rule stated in §126. [1] One method is to always take the first new moon after the equinox (which appears to have been the

Babylonian's method). [2] Another is watch the crops in the holy land (A method favoured by the Karaites). Both methods and the Biblical one (§126) could be used with or without the Metonic Cycle as an assistant in predicting the equinox, however, since the equinox can be determined by simple observations, the Metonic Cycle is unnecessary.

The invalidity of method [2] is explained in §135 and §137. This leaves method [1] to be disproved and the Biblical method (§126) to be confirmed. This is done by comparing the Scriptural dates of Nebudcadnezzar's conquest of Jerusalem in 597 b.c.e. with the Babylonian records and the two calendars. According to the Scripture, the exiles of the fallen city were taken in the seventh year of the king (Jer. 52:28; Bab. Chronicle), that is his seventh regnal year according to the Babylonians, which year extended to 4/12/597 b.c.e. On the other hand, it is stated that the city fell in the eighth year of the king (II Kings 24:12-16), which must have happened before the exiles were taken.

So how can the city fall in both the seventh and the eighth year? There is only one way. The book of kings begins the eighth year with the Biblical Calendar on 3/14/597 b.c.e. before the equinox, while the Babylonians did not begin it till the next month. The fall of the city fell between the two points on 3/16/597 b.c.e., the second day of the month (Bab. Chronicle). Hence, the book of Kings is using the Biblical criteria of the new moon nearest the equinox, while the Babylonians are using the new moon after the equinox, even if it is not the nearest, to begin the new regnal year.

§133.2 Another proof that the moon nearest the equinox is to be taken, is that it is the only rule that works in obtaining a solution to the Biblical Chronology. A different rule will yeild a different date, but alas, it will be in the wrong year for the chronology of Yeshua's ministry, and in an impossible year for fulfilment of Daniel's Prophecy. Given these other two confirmations, the rule is self proving.

§133.3 If we assume, based upon Revelation 12:1, that the Messiah was born on the new moon of trumpets (the seventh month) in either 2 or 3 b.c.e., then it follows automatically that the rule of the new moon nearest to the spring equinox is being used. In both 2 and 3 b.c.e. the new moon on the Revelation 12:1 synchronism was before the equinox (See *The Birth of Christ Recalculated*, by Ernest L. Martin).

§133.4 Another proof is found in Hezekiah's two year coregency with his wicked father Ahaz [724.25-722.25]. Since this was a coregency, an accession year is not likely, which makes year one of Hezekiah equal to year four of Hoshea, but II Kings 18:1-2 tells us that Hezekiah ruled in the 3rd year of Hoshea. This conundrum is solved by noting that the new moon of the seventh month was ambiguous [9/12 or 9/13] 725 b.c.e., and that the accession dates of the two kingdoms could therefore, differ, thereby allowing Hezekiah to rule

one day in the third year of Hoshea.

A Brief History of the Calendar

§134 The Jewish Calendar in the first century was based upon the actual observation of the first crescent of the new moon. The Talmud is very clear on this point. The first century calendar also placed the new moon nearest to the spring equinox. Like Israel, the Babylonians, Assyrians, Persians, and Greeks also observed the first visible crescent for their new moons. It is evident, however, that they did not always put the new moon of the first month nearest to the spring equinox. Sometimes, it was simply the new moon after the equinox, as in the case of most of the Babylonian years.

§135 The main justification for using the equinox to determine the beginning of the Luni-solar year, is that the sun is to have a place in determining the times and seasons (Gen. 1:14). This place of the sun should not be usurped by agriculture or the weather (see Deut. 16:9 below).

§136 After the Jews were exiled from the land after 135 c.e. in the wake of the Bar Kochba revolt, they were forced more and more to rely on calculation of the new moon or local observation. At some point the Rabbinic Jews began to rely on the 19-year cycle of the Greek Astronomer Menton to predict the day of the new moon. The 19 year cycle seems to have been adjusted periodically to the equinox, but it appears during the dark and middle ages this was neglected. As a result the 19 year cycle in use today is about 7 days out of phase with the true equinox. In addition, after the year 359 c.e. the rabbinic Jews began to observe the 1st of Tishri on the day of the conjunction, called the 'molad,' rather than on the day of the visible crescent according to all previous tradition. The astronomically inclined Rabbis acknowledge that the current calendar among them in use is not the same as the ancient calendar used in the second temple period. They also acknowledge the error of the equinox, however, they value the modern tradition too highly to repair the errors in the calendar. Many Christian scholars have mistaken this modern calendar for the orignal, and have even calculated it back into the first century, complete with the errors it contains. This leads them to the wrong conclusions regarding the chronology of Yeshua's (Jesus') death and Resurrection, and also to incorrect prophetical interpretations.

§137 The Karaite Jews, unlike the Rabbinic Jews, continued to observe the new moon locally into the 19th century. In this they were in agreement with the Muslims, and so were accorded some favor by them. However, they believed that the year was to be intercalcuated by the condition of the crops in the holy land, based upon Deut. 16:9, 'Seven weeks you shall count for yourself from the time you put the sickle to the standing grain.' Therefore, they made

sure the crops were ripe, and by those crops determined the begining of the seven sevens (weeks), which in turn determined the Passover, which in turn determined the time of the first month. However, the words 'the time' in the verse mean in Hebrew 'legal time,' i.e. 'Seven weeks you shall count for yourself from the time it becomes lawful to harvest the standing grain.' The day in which it became lawful to harvest, grain ripe or not, was the 16th day of the first month, after the Passover Sabbath (Lev. 23:11).

§138 The Karaites, like their Sadducean predecessors also errored in the timing of the feast of Pentecost by counting it from the weekly Sabbath in Passover week, rather than the feast day. But the Pharisees, and their Rabbinic heirs had it right all along, even if they didn't always practice what they knew to be the truth (Mt. 23:1-3), which is why Yeshua intsructed the faithful to abide by the rulings of the Pharisees.

§139 The Karaite Jews also observed the Passover at the incorrect time. They applied the phrase 'between the evenings' to the time just after sunset on the 13th of Nisan (Aviv). But the Pharisees and Rabbinic Jews apply 'between the evenings' to the afternoon of the daylight portion of the 14th day of Nisan (Aviv). 'Between the evenings' means the time of the evening sacrifice, which was in the day, not the night, showing that 'beyn ha erevim' means the afternoon. In fact Numbers 28:1-4 says that they shall offer two lambs 'to a day' (la-yom), 'one lamb you shall offer in the morning and the other you shall offer between the evenings,' showing that the words 'between the evenings' mean the afternoon. More technically the words mean between the sunsettings, as the word 'erev' means 'sunsetting.' The sun begins to set at noon, and completes its setting at midnight.

§140 That is why the Passover was to be slain 'at the going down of the sun' (Deut. 16:6), on the anniversary of the Exodus.

§141 So the modern Rabbinic calendar is in error on two points. The first is the calculation of the equinox. And the second is in putting the new moon day on the conjunction day rather than the first day of visibility. The ancient calendar did not have these errors. The Rabbis have admitted to the difference. The Karaites, Sadducees, Samaritans, and other sects, however, made additional errors in placing Pentecost on a Sunday every year, and in killing the Passover in the night following the 13th of Nisan.

Calendar Errors in Passion Chronology

§142 (1) The most common calendar error of Passion Chronologists is to intercalate the luni-solar year incorrectly, hence those who place a Wednesday Passion in 31 c.e. do so only by having Aviv a month late. Such is the error of the World Wide Church of God. (2) Sir Robert Anderson, *The Coming Prince*, goofted in selecting 32

c.e. for the Passion, since that year has no useful Passover dates. (3) Another popular mistake is to retrocalculate the modern Rabbinic Calendar or some variation of it (see history above). (4) Another error is to place the new moon at the conjunction.

The Basis of the Fixed Calendar

§142.1 The fixed calendar was established ca. 359[§142.91] c.e., so it is clear that neither Yeshua or other Jews used it in the first century. Yet this is the calendar that is used throughout most of the Jewish world today. Obstensibly, the fixed calendar was instituted as a measure to unify Judaism at a time when many Jews were observing the moon locally. Hence it could often happen that the calendars and feast dates of two separated communities could disagree. But instead of unifying Judaism, the fixed calendar fueled the schism between the Rabbinite and Karaite Jewish sects, as the Karaites wanted to follow the Scripture more literally, and the Rabbinite Jews wanted to follow the authority of the Rabbis' tradition.

§142.2 It is probable that the Rabbis who introduced the fixed calendar not only wanted to unify Judaism, they wanted it unified under their authority. They wanted to ordain the feast days, fasts, and new moons. According to Feldman (see note 1), and Arthur Spier (*The Comprehensive Hebrew Calendar*) only a new Sanhedrin has the authority to reform the calendar. This is also the opinion of most other Rabbinic Jews.

§142.3 When the fixed calendar was set up ca. 359 c.e., the calendar makers used 3761 b.c.e. as their starting point. *Tishri 3761- Tishri 3760* marks year 1 of the W.E. (world era). The world era begins precisely 10/6/3761 b.c.e. at 11 p.m. 11 min. 20 seconds. That moment is called *Molad Tohu*, which means "formless birth," i.e. so named because in Rabbinical reckoning it was 6 months before creation which was in the spring of 3760 by their computation. I should point out that the equinox of Nisan in the spring serves as the starting point for the solar year, which points up a great inconsistency in the fixed calendar, and that is the Bible ordains Aviv (Nisan) as the first month (Exodus 12:1-3), and the fixed calendar makers recognize this by using the T'kufah (equinox) of Nisan as the starting point for their solar year, yet they make the calendar year begin with the 1st of Tishri!

§142.4 All the *Moladoth* (or conjunctions) of the fixed calendar are determined by adding 29 days 12 hours 44 minutes, and 3 1/3 seconds, or a multiple thereof to the *Molad Tohu*. Keep in mind that 29d 12h 44m 3.33s is only the average length of a lunation. The real conjunction can deviate as much as 15 hours from this average.

§142.5 Hence, when the fixed calendar makers say, or when the modern calendar says that the *molad*, i.e. conjuntion was at such and such a moment, they do not mean the real conjunction, but only what the conjunction would be based upon averages. An actual conjunc-

tion, for all practical purposes never comes exactly 29d 12h 44m 3.333sec after the previous one.

§142.6 In point of fact, the length of a lunation is now 29d 12h 44m 2.8sec, and after a few thousand years, the *molad* of the fixed calendar will deviate greatly from the actual *molad*. The fixed calendar thus does not depend upon current observations (or calculations) of the position of the moon or the sun. In fact, the actual position of the sun and moon has been of no use to the fixed calendar since 359 c.e. and probably ealier, i.e. 249 c.e. Yet, God ordained the sun and moon to fix the times and seasons in Genesis.

§142.7 Starting with *Molad Tohu* at 3761 b.c.e. at 10/6, at 11h 11m 20 sec p.m., 29d 12h 44m 3 1/3 sec are added to obtain the next *Molad* (even though it wasn't the actual moment of the conjunction, but only an average guess). There are 12 lunations (or months) in the common year. Hence to obtain *Molad Tishri* of the year 3760, i.e. the start of the second year, 29d 12h 44m 3 1/3sec are added 12 times to *Molad Tohu*. For *Molad Tishri* starting the third year, another 12 lunations are added. However, at least every 3 years a leap year of 13 lunations length must be used. For this the fixed calendar uses the Metonic cycle. According to the Metonic cycle the third year must be 13 lunations in length, hence 29d 12h 44m 3 1/3sec is added 13 times.

§142.8 The above pattern is repeated adding 12 lunations for the 4th year, and 12 more for the 5th; 6th = 13 mon., 7th = 12mon, 8th = 13, 9th = 12, 10th = 12, 11th = 13, 12th = 12, 13th = 12, 14th = 13, 15th = 12, 16th = 12, 17th = 13, 18th = 12, 19th = 13 months. That is, in the first 19 years, years 3, 6, 8, 11, 14, 17, and 19 are 13 months, and years 1, 2, 4, 5, 7, 9, 10, 12, 13, 15, 16, and 18 are 12 months. After 19 years the pattern repeats, being the same in the 20th year as in the first year. Using this method, any molad can be computed up to the present and beyond.

§142.81 Of course 19 years with its 12 common years, and 7 leap years requires 235 lunations to complete (12*12 + 7*13 = 235). But 235 * 29d 12h 44m 3 1/3sec = 6939d 16h 33m 3 1/3 sec, which when divided by 19 gives a year length of 365.246822 days, which is in excess of the true value 365.2422001, since the inception of the fixed calendar has caused the cycle to run ahead of the sun some seven days. This in turn causes the months of the whole year to be 1 month out of phase with the first century method about 1/4 of all years, since 7/29.5 is about 1/4.

§142.82 For example the molad beginning the 40th year is determined by adding up the correct number of lunations of 29d 12h 44m 3 1/3 sec to *Molad tohu*. Two 19 year cycles = 38 years complete, plus 1 year equals 39 years complete, which is the start of the 40th year. But 38 years is 235*2 lunations. The 39th year is year 1 of the cycle, hence it is 12 lunations long. Therefore:

10/6/3761 11h 11min 20sec plus (235 * 2 + 12) * 29d 12h 44m

3 1/3 sec brings us to the molad beginning the 40th year, i.e. *molad tishri* for the 40th year.

Typically it is easiest to convert the *Molad Tohu* to the Julian day and fraction thereof before adding lunations to this benchmark. Then one will be able to compute the Julian day no. of *molad tishri*.

§142.83 At this point the day of the week for *molad tishri* would also be determined, and then the following rules applied:

(1) If *molad tishri* is noon or later, the first day of Tishri is on the next day after the molad.

(2) If *molad tishri* falls on Sunday, Wednesday, or Friday, the first day of Tishri is postponed till the next day.

(3) If as a result of rule 1, the first day would be a Sunday, Wednesday, or Friday, the first day of Tishri is postponed yet another day.

(4) If the year in question is a common year of 12 months (this is known from the Metonic cycle explained above), and the *molad tishri* falls on Tuesday between 3:11:20 a.m. and 12 noon, then the first day of Tishri is postponed till Thursday.

(5) If the *molad tishri* of the next year (this will have to be computed also using the above method, i.e. one needs to compute for year x and x+1), i.e. year x+1 occurs on Monday between 9hr:32min:43 1/3sec a.m. and noon, AND year x, the current year is 13 months long (consult Metonic cycle), then the first of Tishri is postponed to Tuesday.

§142.84 It should be clear from these rules that the molad and the first day of the month are not equivalent. After the day of Tishri 1 is found for year x, and year x+1, then the number of days for year x is known. The lengths of the months are known from the length of the year as follows, starting with Tishri.

353 = { 30,29,29,29,30,29, x, 30,29,30,29,30,29}
354 = { 30,29,30,29,30,29, x, 30,29,30,29,30,29}
355 = { 30,30,30,29,30,29, x, 30,29,30,29,30,29}
383 = { 30,29,29,29,30,30, 29, 30,29,30,29,30,29}
384 = { 30,29,30,29,30,30, 29, 30,29,30,29,30,29}
385 = { 30,30,30,29,30,30, 29, 30,29,30,29,30,29}

§142.85 Of course, doing all these calculations by hand to determine the calendar is very laborious. Feldman describes a shorthand method, which is much easier in his book (see note §142.91), but with the advent of the computer this is unnecessary. It took me two days to write the program to compute all of this, which YHWH willing I will someday make available. (I have checked the results against the published tables for the 20th century, for the first of Tishri in every year).

§142.86 A few notes are in order. First, many have computed the feast days on the basis of the fixed calendar for the years 26 to 35 c.e. in order to gain insight into the chronology of the death and Resurrection of Yeshua. The folly of this should be apparent. If it is not, then

read note 142.91, below, and the Talmudic tractate *Rosh Hashana*. The fixed calendar simply was not used in the first century. If it was, then it had to be used by an unknown insignificant sect.

§142.87 Furthermore, not only has the fixed calendar been calculated for the first century, but the World Wide Church of God has put out a calendar that apparently readjusts the Metonic cycle to fit their theology of 31 A.D, notwithstanding the fact that the Phase Method was used in the first century. The adjustments made by the WWCOG have the effect of pulling the first month out of spring in many years (for example 34 c.e.), which would not be the case if they stuck with the traditional fixed calendar.[§142.92]

§142.88 The solution, as I have said before, is to return to the phase method, i.e. the observation (or calculation) of the first visible crescent from the district of Jerusalem to determine the beginnings of the months, and the observation (or calculation) of the true equinox (see JMS 2-3).

END NOTES

§142.91 "**The Phase Method** of determining the beginning of a month described in the preceeding pages, prevailed until the time of Abbaye and Raba (middle of 4th century), when it was replaced by the **fixed calendar Method** which makes use of a *Mean Conjuntion* or *Molad* to determine the beginning of a month" (*Rabbinical Mathematics and Astronomy*, W.M. Feldman, pg. 185).

§142.92 "The Hebrew Calendar: A Mathematical Introduction," by John A. Kossy, ed. by Herman L. Hoeh, Ph.d., first edition, Ambassador College Press, (c) 1971, 1974. If anyone wants to pursue this, I suggest writing to John B. Bowers, 1141 W. Shaw Ave #201, Fresno, CA 93711. When and how the Metonic Cycle was set, adjusted, or readjusted prior to 359 c.e., when the Fixed Calendar was introduced is a matter of historical interest, not theological, since the Fixed Calendar was not used in Yeshua's day

§143 *Spring Equinox: 3/22/ 34 22h:13m*

1st Heb: Aviv Bab: Nisan. AL: 20.3 AV: 20.3 AN: 7.1 D: 13.2 PR: 99.0
Starts at sunset on: 3/10/34 Julday: 1733545 Weekday: WED 29 days in Month

Feasts begin on preceeding day at Sunset:
Sab. Cycle: 1. Jub. Cycle: 8 Cycle No: 85

Passover 3/25/34 THR Julday: 1733560
Last High Sabbath 3/31/34 WED Julday: 1733566
Pentecost 5/14/34 FRI Julday: 1733610

2nd Heb: Ziv Bab: Iyyar. AL: 16.1 AV: 16.1 AN: 7.3 D: 8.8 PR: 99.0
Starts at sunset on: 4/8/34 Julday: 1733574 Weekday: THR 29 days in Month

3rd Heb: Bab: Sivan. AL: 12.3 AV: 12.3 AN: 8.6 D: 3.7 PR: 77.0
Starts at sunset on: 5/7/34 Julday: 1733603 Weekday: FRI 30 days in Month

4th Heb:Shoshana Bab: idol. AL: 21.1 AV: 20.2 AN: 6.6 D: 13.6 PR: -2.1
Starts at sunset on: 6/6/34 Julday: 1733633 Weekday: SUN 29 days in Month

5th Heb: Bab: Av. AL: 15.6 AV: 13.5 AN: 7.5 D: 6.1 PR: 99.0
Starts at sunset on: 7/5/34 Julday: 1733662 Weekday: MON 30 days in Month

6th Heb: Bab: Elul. AL: 20.9 AV: 13.4 AN: 6.7 D: 6.7 PR: -3.8
Starts at sunset on: 8/4/34 Julday: 1733692 Weekday: WED 30 days in Month

7th Heb: Ethanim Bab: Tishri. AL: 24.6 AV: 11.3 AN: 4.3 D: 7.0 PR: -2.3
Starts at sunset on: 9/3/34 Julday: 1733722 Weekday: FRI 30 days in Month

Feasts begin at sunset on preceeding day
Sab. Cycle: 2. Jub. Cycle: 9 Cycle No: 85

Trumpets 9/4/34 SAB Julday: 1733723
Day of Atonement 9/13/34 MON Julday: 1733732
Tabernacles 9/18/34 SAB Julday: 1733737
Last High Sabbath 9/25/34 SAB Julday: 1733744

8th Heb: Bul Bab: Marchesvan. AL: 27.1 AV: 10.4 AN: 2.6 D: 7.8 PR: -2.1
Starts at sunset on: 10/3/34 Julday: 1733752 Weekday: SUN 30 days in Month

9th Heb: Bab: Chislev. AL: 29.2 AV: 12.6 AN: 1.2 D: 11.4 PR: -0.3
Starts at sunset on: 11/2/34 Julday: 1733782 Weekday: TUE 29 days in Month

10th Heb: Bab: Tebeth. AL: 20.6 AV: 10.7 AN: 6.9 D: 3.8 PR: -7.7
Starts at sunset on: 12/1/34 Julday: 1733811 Weekday: WED 30 days in Month

11th Heb: Bab: Shebat. AL: 23.9 AV: 18.6 AN: 4.7 D: 13.9 PR: -0.4
Starts at sunset on: 12/31/34 Julday: 1733841 Weekday: FRI 29 days in Month

12th Heb: Bab: Adar. AL: 16.8 AV: 15.7 AN: 7.1 D: 8.6 PR: 99.0
Starts at sunset on: 1/29/35 Julday: 1733870 Weekday: SAB 29 days in Month

13th Heb: Bab: Adar II. AL: 10.9 AV: 10.9 AN: 10.0 D: 0.8 PR: 77.0
Starts at sunset on: 2/27/35 Julday: 1733899 Weekday: SUN 30 days in Month

§144

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* The version of cmoon.c herein adjusts the ELP2000-85 analytical Lunar
* theory of Chapront-Touze and Chapront to fit the Jet Propulsion
* Laboratory's DE404 long ephemeris on the interval from 3000 B.C.
* to 3000 A.D.  The component Source code, which is freeware, can be found on
* Compuserve in the 'Astroforum.' The program places the first month nearest
* to the equinox.  The new moon is determined by the criteria of first
* visibility at the location of Jerusalem, which is the same criteria used
* by the Jews previous to the Bar Kochba revolt ca. 135 c.e.  Between 359 c.e.
* and the 11th century, the Hebrew Calendar was changed by the Rabbis. There
* are plenty of programs which compute this changed calendar.  This is not one
* of them.  This program answers the need of those of us who wish to observe
* the biblical holy days according to sound astronomical, traditional, and
* bib[2Jlical requirements.  Type 12 at the menu for a brief history.

Enter Year (-4140 to 3000):  34

Spring Equinox: 3/22/  34  22h:13m

Extensive Astronomical Calculations in Progress ...

* This program adjusts for the coefficient of tidal
* acceleration which is significant for ancient dates.
* The Equinox is computed separately for each year.
* The new moon is never on the day of the conjunction
* known as the 'Molad' in Hebrew.  Rather the new moon is
* on the day of the 'Hodesh,' or first visibile crescent.
* No rules of 'postponement' are needed since each new moon
* is calculated from its precise topocentric relation to
* the sun, i.e. the angular distance between the sun and
* moon [AL], and amount of twilight after sunset (quantified by
* the 'arc of vision' [AV] are related to determine if the
* moon will be visible on a given evening after sunset.

*     Copyright 1995 by Dan Gregg. All Rights Reserved.

*     THIS PROGRAM IS SHAREWARE.  TYPE 11 AT MENU FOR INFO.

The Calendar of Israel Version 3.1
Main Menu

(1) Display High Sabbath Feast Days.
(2) Display New Moons for the year.
(3) Display New Moon Astronomical data.
(4) Display Verification Data.
(5) Show Sabbatical Cycle.
(6) Show Jubilee Cycle.
(7) Calendar Principles.
(8) Compute Another year.
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(9) Bible Chronology.
(10) Exit program.
(11) SHAREWARE NOTICE.
(12) A brief History.
(13) Ver. 3.1 Update Info.

Enter your choice: 1 The Year is 4174 A.M. (Anno Mundi: Year 1 = 4140 B.C.E.).

Passover	3/25/ 34 THR	Julday: 1733560
Last High Sabbath	3/31/ 34 WED	Julday: 1733566
Pentecost	5/14/ 34 FRI	Julday: 1733610
Trumpets	9/ 4/ 34 SAB	Julday: 1733723
Day of Atonement	9/13/ 34 MON	Julday: 1733732
Tabernacles	9/18/ 34 SAB	Julday: 1733737
Last High Sabbath	9/25/ 34 SAB	Julday: 1733744

* Feast Days begin on preceeding day at sunset. For example if the feast is listed as 4/1, then the feast high Sabbath begins on 3/31 at sunset and ends on 4/1 at sunset.

* The Julday for the given feast day is listed. This is to enable the user to measure the number of days between any two feasts. For example it often happens that the number of days between two feasts about 3 1/2 years apart comes to one of the prophetic time periods mentioned in the book of Daniel, viz. the 1335, 1290, or 1150 (2300 evening-morning sacrifices), or the book of Revelation, viz. 12. . .

All the New Moons of the Year

1. AVIV (Nisan)	WED	3/10/ 34	29 days	Jul: 1733545.16
2. ZIV (Iyyar)	THR	4/ 8/ 34	29 days	Jul: 1733574.17
3. Sivan	FRI	5/ 7/ 34	30 days	Jul: 1733603.18
4. Shoshana	SUN	6/ 6/ 34	29 days	Jul: 1733633.19
5. Av	MON	7/ 5/ 34	30 days	Jul: 1733662.20
6. Elul	WED	8/ 4/ 34	30 days	Jul: 1733692.19
7. ETHANIM (Tishri)	FRI	9/ 3/ 34	30 days	Jul: 1733722.17
8. BUL (Marchesvan)	SUN	10/ 3/ 34	30 days	Jul: 1733752.14
9. Kislev	TUE	11/ 2/ 34	29 days	Jul: 1733782.12
10. Tebeth	WED	12/ 1/ 34	30 days	Jul: 1733811.11
11. Shebat	FRI	12/31/ 34	29 days	Jul: 1733841.12
12. Adar	SAB	1/29/ 35	29 days	Jul: 1733870.13
13. Adar II	SUN	2/27/ 35	30 days	Jul: 1733899.15

* Months begin at sunset on the day listed (not the day before)
* Months in capital letters are Pre-exilic biblical names
* All other month names are post exilic Hebrew-Babylonian
* I have taken the liberty to replace ‘Tammuz’ with ‘Shoshana’
* since ‘Tammuz,’ (the the son of Semiramis, who styled herself
* the ‘Queen of Heaven,’) should not by honoured by a month name.

Astronomical Circumstances of Each New Moon

1. AVIV (Nisan)	AL: 20.2	AV: 20.2	AN: 7.2	D: 13.0	PR: <7
2. ZIV (Iyyar)	AL: 16.0	AV: 16.0	AN: 7.3	D: 8.6	PR: <7
3. Sivan	AL: 12.2	AV: 12.2	AN: 8.6	D: 3.6	PR: S>M
4. Shoshana	AL: 21.0	AV: 20.1	AN: 6.7	D: 13.5	PR: -2.3
5. Av	AL: 15.5	AV: 13.5	AN: 7.5	D: 6.0	PR: <7
6. Elul	AL: 20.9	AV: 13.3	AN: 6.8	D: 6.5	PR: -3.9
7. ETHANIM (Tishri)	AL: 24.5	AV: 11.3	AN: 4.3	D: 6.9	PR: -2.3
8. BUL (Marchesvan)	AL: 27.0	AV: 10.4	AN: 2.7	D: 7.7	PR: -2.2
9. Kislev	AL: 29.1	AV: 12.5	AN: 1.2	D: 11.3	PR: -0.4 AMBpr
10. Tebeth	AL: 20.5	AV: 10.6	AN: 7.0	D: 3.7	PR: -7.7
11. Shebat	AL: 23.8	AV: 18.5	AN: 4.8	D: 13.7	PR: -0.5 AMBpr
12. Adar	AL: 16.7	AV: 15.6	AN: 7.1	D: 8.5	PR: <7
13. Adar II	AL: 10.8	AV: 10.8	AN: 10.1	D: 0.7	PR: S>M

* AL = Arc of Light = Angular distance between sun and moon
* AV = Arc of Vision = Difference between sun and moon altitude
* AN = Arc Needed for Visibility (altitude difference)
* D = AV-AN (AV over or under that needed).
* AMB = Ambiguous (New Moon uncertain when D<2.0 degrees.
* PR = notes on circumstances of previous day

Time Data for Verification Purposes for each New Moon

1. AVIV (Nisan)	3/10/ 34	UT: 15h:43m	LMT: (UT+2hrs) 17h:43m	DT: 2.471
2. ZIV (Iyyar)	4/ 8/ 34	UT: 16h: 0m	LMT: (UT+2hrs) 18h: 0m	DT: 2.471
3. Sivan	5/ 7/ 34	UT: 16h:18m	LMT: (UT+2hrs) 18h:18m	DT: 2.471
4. Shoshana	6/ 6/ 34	UT: 16h:37m	LMT: (UT+2hrs) 18h:37m	DT: 2.471
5. Av	7/ 5/ 34	UT: 16h:45m	LMT: (UT+2hrs) 18h:45m	DT: 2.470
6. Elul	8/ 4/ 34	UT: 16h:33m	LMT: (UT+2hrs) 18h:33m	DT: 2.470
7. ETHANIM (Tishri)	9/ 3/ 34	UT: 16h: 3m	LMT: (UT+2hrs) 18h: 3m	DT: 2.470
8. BUL (Marchesvan)	10/ 3/ 34	UT: 15h:25m	LMT: (UT+2hrs) 17h:25m	DT: 2.470
9. Kislev	11/ 2/ 34	UT: 14h:52m	LMT: (UT+2hrs) 16h:52m	DT: 2.469
10. Tebeth	12/ 1/ 34	UT: 14h:38m	LMT: (UT+2hrs) 16h:38m	DT: 2.469
11. Shebat	12/31/ 34	UT: 14h:48m	LMT: (UT+2hrs) 16h:48m	DT: 2.469
12. Adar	1/29/ 35	UT: 15h:12m	LMT: (UT+2hrs) 17h:12m	DT: 2.469
13. Adar II	2/27/ 35	UT: 15h:35m	LMT: (UT+2hrs) 17h:35m	DT: 2.468

* UT = Universal Time | LMT = Local Mean Time | DT = TDT - UT
* TDT = Terrestrial Dynamical Time (TDT = DT + UT)
* The time is that of sunset on the stated date at Jerusalem