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# LUNAR SEISMIC PROFILING EXPERIMENT
# NATURAL ACTIVITY STUDY

## FINAL REPORT

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Prepared by F.K. Duennebier*

THE MARINE SCIENCE INSTITUTE
700 THE STRAND
GALVESTON, TX. 77550

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*Now at the Hawaii Institute of Geophysics, University of Hawaii, Honolulu, HI. 96822.

## I. Introduction.

The Lunar Seismic Experiment Natural Activity Study has provided a unique opportunity to study the high frequency (4-20 Hz) portion of the seismic spectrum on the moon. The purpose of this project was to study the data obtained from the LSPE and determine as much as possible about 1) the origin and importance of the process that generates thermal moonquakes; 2) the characteristics of the seismic scattering zone at the lunar surface; and 3) the meteoroid flux for masses between 0.1 and about 10 grams.

The first problem has received the most effort and is the subject of the paper enclosed with this report (Appendix A). The detection of thermal moonquakes by the LSPE array made it possible to locate the sources of many events and determine that they are definitely not generated by astronaut activities but are the result of a natural process on the moon.

The second problem, that of the propagation of seismic waves in the near-surface layers, was studied in a qualitative manner. In the absence of an adequate theoretical model for the propagation of seismic waves in the moon, it is not possible to assign a depth for the scattering layer. The LSPE data does define several parameters which must be satisfied by any model developed in the future.

The third problem, that of meteoroid flux, was not studied. The vast numbers of events observed are almost certainly about 99% thermal moonquakes and, unlike the Apollo 14 PSE case (Duennebier and Sutton, 1974), there was no obvious way to discriminate between thermal moonquakes and meteoroid impacts. At station 14, thermal moonquakes always had a lower frequency spectrum than near-by impacts. At the LSPE array, thermal moonquakes are found with all ranges of spectra.

In addition to the above problems, a search was made for events detected by the PSE that were also detected by the LSPE. During the times when both instruments were operating, only one event was detected that was visible on both systems. This event, a fairly large meteoroid impact, was just barely visible on the LSPE records although easily visible at all PSE stations. The reason for the difference in amplitude is the different frequency responses of the two systems, the LSPE being less sensitive to frequencies below 4 Hz than the PSE. No high frequency teleseismic events (HFT) (Nakamura, et al., in prep.) were observed during the times of LSPE operation. HFT events should be clearly recorded on the LSPE and the PSE. The LSPE is now being operated solely for the purpose of studying events that are recorded on both the LSPE and PSE network.

## II. Data Collection.

During the short periods of time during which the LSPE was activated for the active portion of the experiment, several natural seismic events were noticed (Kovach, et al., 1973). In the hopes that these events were caused by thermal moonquakes of the type observed at the PSE stations (Duennebier and Sutton, 1974), the LSPE was activated for a 4-day period during the summer of 1973 to see if more of this activity could be observed. The results of this experiment showed that large numbers of thermal moonquakes were being detected by the LSPE. Because of the possibility of locating the source of many of these events using array techniques, it was decided to collect at least one full lunar month (lunation) of LSPE data. The data rates used by the LSPE require that all other experiments at the Apollo 17 site lose data when the LSPE is activated. To prevent long periods of data loss to other experiments, the LSPE was activated for 4-day periods at different parts of the lunation for a period of about one year until ten 4-day listening periods had been obtained. In this way data covering one full lunation (plus two periods of overlap) were obtained. In addition, a 4-hour period spanning the occurrence of a solar eclipse was recorded. For the more than 40 days of coverage, less than 5% of the data was lost due to poor transmission from the moon since the listening periods were planned by JSC personnel to coincide with times of optimal transmission.

Upon receipt of the data, about one full-reel tape per 4-hour period, compressed time scale playouts were produced (Figure 1) using the University of Texas PDP-15 computer. These records were scanned by eye and events above a given size (7 mm) were recorded. A listing of these events and copies of the compressed playouts were sent to R.L. Kovach at Stanford for his use as soon as they became available. Once events of interest were chosen, a set of event tapes was generated containing only periods where events occurred. These tapes were then used to generate expanded time scale playouts (Figures 2A and 2B of Appendix A) and power spectral analyses (Figure 2) of each event.

## III. Analysis.

### Thermal moonquakes.

The most time-consuming operation was the hand correlation of the more than one thousand events recorded. A property of thermal moonquakes is that their source mechanism is so repeatable that the same events are seen at about the same time of each lunation. Some types of events occur several times per lunation. When two events were found to have identical or nearly identical wave forms, they were assigned a number corresponding approximately to the longitude of the sun at the time of observation. Events generated by the LM were also identified. A complete listing of events observed is contained as Appendix B of this report. Of the 1730 events listed, 324 are caused by thermal noises in the LM, and 359 are thermal moonquakes with at least two events with nearly identical character observed. It is believed that almost all of the remaining events are thermal moonquakes for which no matching event was found either because of low signal-to-noise ratio or because the period of recording was not long enough to record a matching event. The reader is referred to Appendix A for further discussion as to the methods used in the study of thermal moonquakes at the LSPE site.

### Seismic Propagation and Scattering.

The eight explosive package (EP) signals and the LM impact signal were analyzed to obtain information concerning the propagation of seismic waves and the effects of scattering. A problem encountered with the EP records is the occurrence of fairly high amplitude electronic noise at times when the detonation timing circuits are activated. This noise severely reduces the signal-to-noise ratio. Cooper and Kovach, 1975, used prediction filtering to remove this noise. Close scrutiny of the signals reveals, however, that the noise repeats exactly with a periodicity of 21 data points and can thus be removed by simple subtraction of the noise waveform from the signal. Power spectra of the corrected EP data were then calculated and studies of the amplitude decay with frequency and range were made. The results were then compared with the predictions made by Nakamura, <u>et al</u>., in prep. using PSE data. His results predict that a two-dimensional scattering model should fit the data to ranges of at least 4 km. As shown by Cooper and Kovach (1975) and in Figure 3, this is not the case. The two-dimensional scattering model is valid to ranges of only one km, beyond which the observed signals reach their peak amplitudes well before the model would predict. The early peak is apparently due to the increase in energy from seismic waves passing below the scattering zone, thus a change in diffusivity with depth that is not modelled in the two-dimensional case.

The variation of amplitude of the signal peak with range also does not follow the two-dimensional scattering theory (see Appendix A) and is strongly frequency-dependent in such a way as to imply that cylindrical spreading cannot account for the decay of amplitudes beyond a range that decreases with frequency, i.e. high frequencies attenuate faster than expected if values of Q are used that fit the data at short range.

When this information is coupled with that obtained from earlier studies, several qualitative observations concerning propagation of seismic waves in the moon can be made.

1) The high degree of scattering in the surface layers prevents the propagation of plane waves in any direction for more than about a wave length. The coherence of seismic waves on the three components of the PSE is very low and no coherence is observed in wave trains observed at the LSPE even though the separation between the closest sensors is about 50 meters. These observations imply that no azimuthal information as to the source of an event can be obtained from observing phase variations on orthogonal instruments or across an array.

2) The depth of the scattering zone is very shallow (probably less than about 500 m and most likely less than 100 m in most regions). This is verified by the observation that the two-dimensional scattering theory does not fit the data beyond distances that decrease with frequency.

3) The lunar surface is a very poor reflector of seismic energy. The process of scattering coupled with the strong increase in seismic velocity with depth cause almost all seismic energy that originates at or reaches the lunar surface from below to be trapped. Only seismic rays that leave the surface at angles within about one degree of vertical ever reach the lunar interior because the rapid increase in velocity with depth turns the energy back towards the surface. Seismic energy reaching the surface nearly vertically from below (such as from a deep moonquake) is severely scattered and very little energy is reflected at the near-vertical angles necessary to return to the interior. Once trapped at the surface,

the seismic energy decays because of absorption and slow leakage into the interior. This property of trapping is observed in several ways. a) In general, seismic signal amplitude decreases monotonically with distance from the source at all times; even tens of seconds after an event, the source region will contain more seismic energy than regions farther away. b) Events originating at the lunar surface have long rise times while those originating below the scattering layer have sharp rise times. Events (such as impacts) with sources at the surface insonify a region with seismic energy that slowly spreads across the surface of the moon and, as the insonified surface gets larger, leaks energy into the interior. Events originating below the scattering layer generate seismic waves that insonify a large region of the lunar surface at once and have short rise times. c) For events from a surface source high frequencies are observed to be stronger earlier in the wave train than low frequencies. This is because the higher frequencies are more easily scattered out of the surface wave guide than low frequencies, thus arriving at the receiver earlier. This effect causes a statistical dispersion effect in lunar seismograms. d) Surface reflections are not observed. If the lunar surface were a good reflector of seismic waves, then seismic phases such as PP, PPP, SS, and SSS would be observed. The only reliable candidates for these cases are at frequencies of 0.2 Hz and lower, which may be low enough such that the scattering layer is no longer important. At higher frequencies, however, the lunar surface is far too good an absorber to allow such phases to be seen.

Three factors are necessary to explain the characteristics of all lunar events: 1) high Q in the surface regions, 2) a steep velocity gradient, and 3) scattering near the lunar surface. Without any one of these three factors the lunar seismograms would look vastly different. Unfortunately a model which incorporates all three of these factors has not been found. Models that include high Q and scattering do not include the change in scattering with depth or the increase of seismic velocity with depth. Models that include the increase in velocity with depth don't include scattering. Until an adequate model can be obtained it will be hard to quantify the above conclusions or accurately predict the characteristics of lunar seismograms and anelastic properties of the near-surface layers.

Meteoroid flux. As mentioned earlier, no new information has been obtained on the meteoroid flux because of the lack of features with which to discriminate impacts from moonquakes recorded on the LSPE. The seismic method itself (Duennebier, et al., 1975) is hampered by a lack of events with which to relate amplitude of a seismic event generated by a meteoroid impact to the energy of the impacting body. The SIVB impacts, used to obtain this parameter in the paper above, may not accurately reflect the same energy partitioning as a meteoroid impact since the density of an SIVB is about 0.01 $g/cm^3$ compared to a meteoroid density of greater than 1 $g/cm^3$. The SIVB, being less dense, will probably transfer more of its energy into seismic waves and less into crater formation than a meteoroid impact with equivalent energy. The net result would be an underestimate of the meteoroid flux. Since no means to calibrate this effect are available, the degree of underestimation, if any, is not known.

## IV. CONCLUSIONS.

The LSPE Natural Activity Study has supplied important information concerning 1) the source mechanism and importance of thermal moonquakes in the degradation of the lunar surface and 2) the processes of scattering and propagation of seismic waves in the moon. It has been shown that thermal moonquakes are most likely caused by the movement of regolith in response to diurnal stresses at the lunar surface. These events would tend to move material from hot regions to cold regions and always in a down-slope direction, thus degrading lunar slopes. The rate of slope degradation is still uncertain but it could be fast enough to account for a significant amount of the observed smoothing of the lunar surface.

Data obtained from the LSPE explosive packages and LM impact supply valuable constraints on any forthcoming models for the propagation of seismic waves in the moon. The need for theoretical work in this area must be stressed.

There are several problems still to be solved in lunar seismology, and I have two main recommendations for future seismic experiments on the moon.

1) Low frequency array. Because of size and weight restrictions, the Apollo seismometers have limited response, and seismic background noise at frequencies below about 1 Hz is certainly below the threshold of the instruments. Because of the very low noise conditions on the moon, it may be possible to detect surface waves and normal modes of oscillation from very small events. These instruments should contain 3 orthogonal components and be spread as thickly and widely as possible on the lunar surface. The information obtained from such an array would yield considerably more information about the structure of the moon.

2) High frequency array. It is well known from the Apollo seismic experiments that a large portion of the seismic energy from natural lunar events is found in the frequency band from 0.4 to 10 Hz. However, even in this frequency band, the Apollo instruments could not detect the seismic noise level for long periods of time (especially during the lunar night). Thus more sensitive instruments are also needed in this frequency band.

At frequencies above 0.5 Hz there is very little coherence between orthogonal components, except possibly for the first arrivals. In fact, little information at all is obtained by having more than one component (other than redundancy). For this reason it would probably be more advisable to use the weight and data allocations on one high gain (vertical) instrument at each station. To obtain azimuth information it would be advisable to deploy sub-arrays with separations of from 2 to 10 km between components. In this way the phase velocity across the array could be used to obtain azimuths to teleseismic events and source locations of local events could be found. Efficient triggering systems could be employed to compress the amount of data returned.

A system of several (5 or 6) arrays containing one set of orthogonal high sensitivity long period seismometers and a sub-array of three or four higher frequency vertical instruments could vastly increase our knowledge of the deeper interior because of increased accuracy of source locations and lower threshold for event detection. In addition, much more can be learned about the meteoroid flux in the smaller mass range and about thermal moonquakes.

## BIBLIOGRAPHY

**Please see the reference list for Appendix A.**

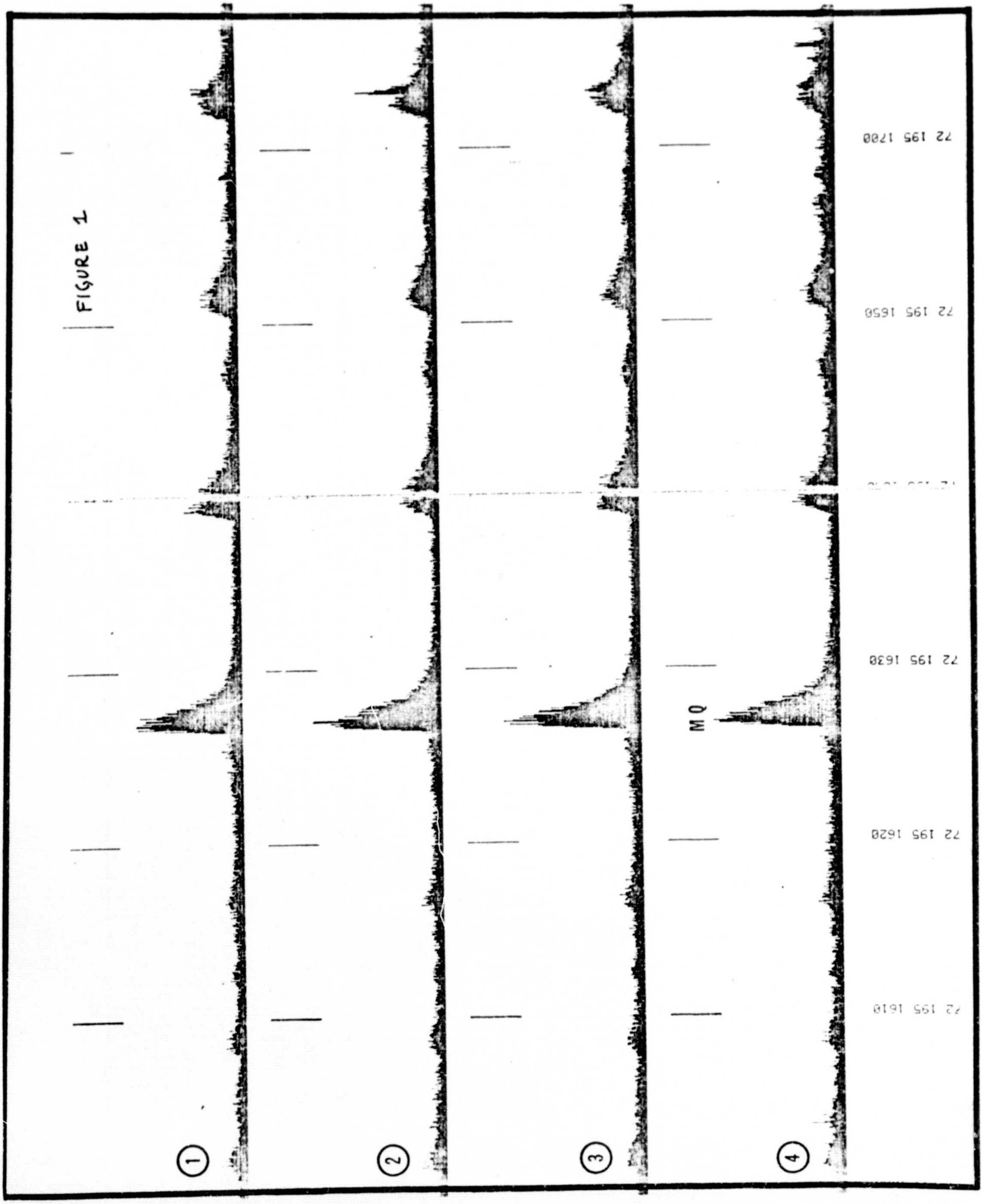
## FIGURE CAPTIONS

1. Compressed scale playout of LSPE data. LSPE data tapes were played out on a Versatec matrix plotter using the Marine Science Institute's PDP-15 computer. The numbers on the left correspond to the geophone numbers. The data was expanded from its log-compressed state and then rectified. The year, day, hour, and minute are labeled every 10 minutes. The event labeled "MQ" is a known thermal moonquake. (The year should be "73" -- not "72" as labeled).

2. Spectrograms of LSPE events. Spectrograms of three common types of events are shown. The top section of each figure shows two band-pass envelope recordings of the signal, the dark squares at a frequency of 19.2 Hz and the light squares at 9.2 Hz. The bottom section shows the power level contoured in 10 db steps plotted with frequency as the vertical axis and time as the horizontal axis. The time in days, hour, and minute is given at the bottom. These spectrums are not corrected for the frequency response of the instrument. Note that, compared to the thermal moonquakes, the LM event (center) has a sharp rise time and heavily banded spectrum.

3. Comparison of explosive package (EP) signal envelopes to theoretical scattering model. The theory, given by Nakamura et al., in prep., suggests that the signal amplitude should obey the function shown by the dashed line. While the fit is excellent at ranges (given in km by the number after the EP number) of less than 1 km, the theory obviously breaks down beyond 1 km. At lower frequencies, the theory fits to greater ranges.

FIGURE 1



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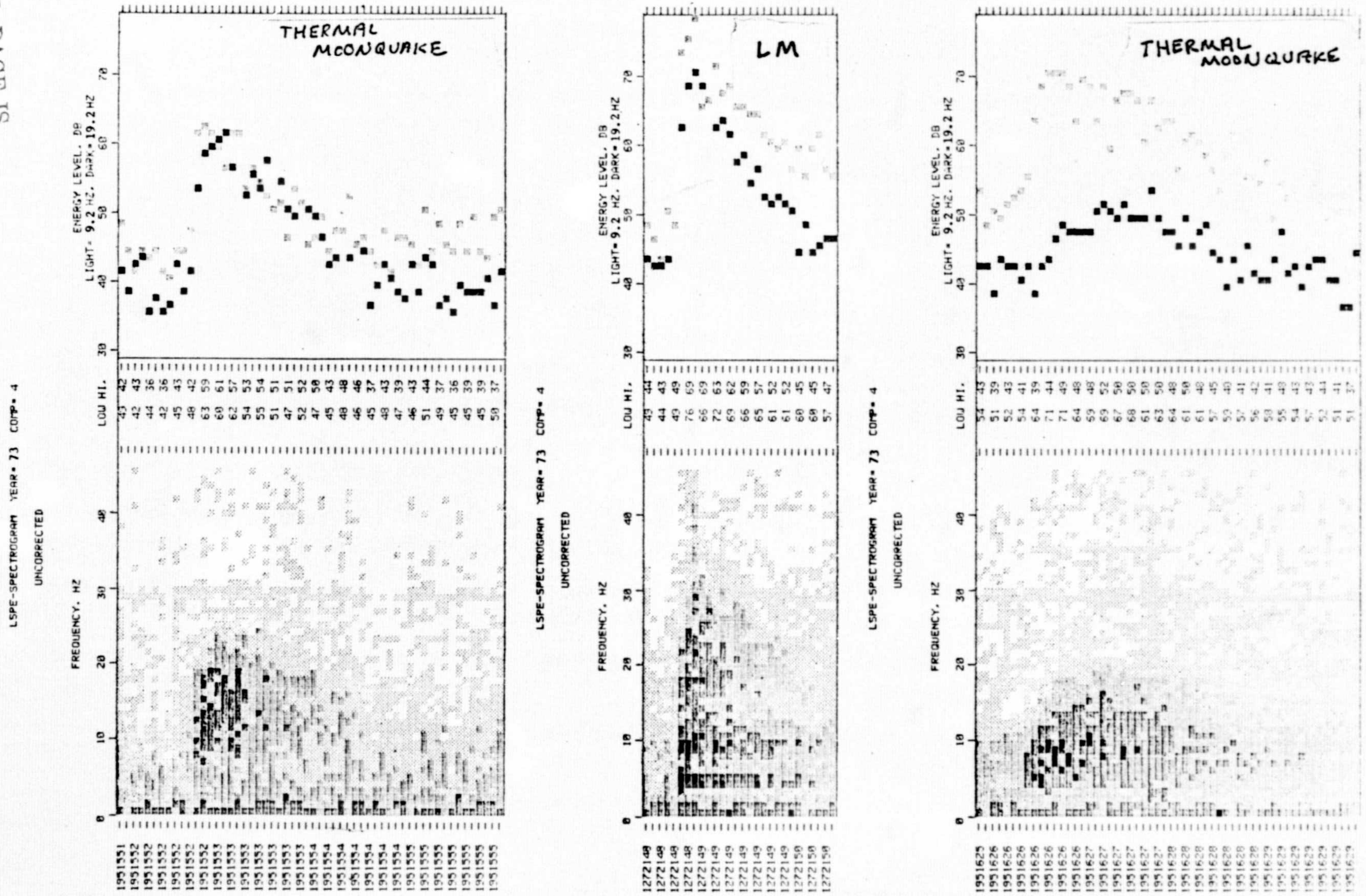
THERMAL MOONQUAKE
LM
THERMAL MOONQUAKE
LSPE-SPECTROGRAM YEAR= 73 COMP= 4
UNCORRECTED
FREQUENCY, HZ
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10
20
30
40
LOW HI.
ENERGY LEVEL, DB
LIGHT= 9.2 HZ, DARK=19.2 HZ
30
40
50
60
70

FIGURE 2

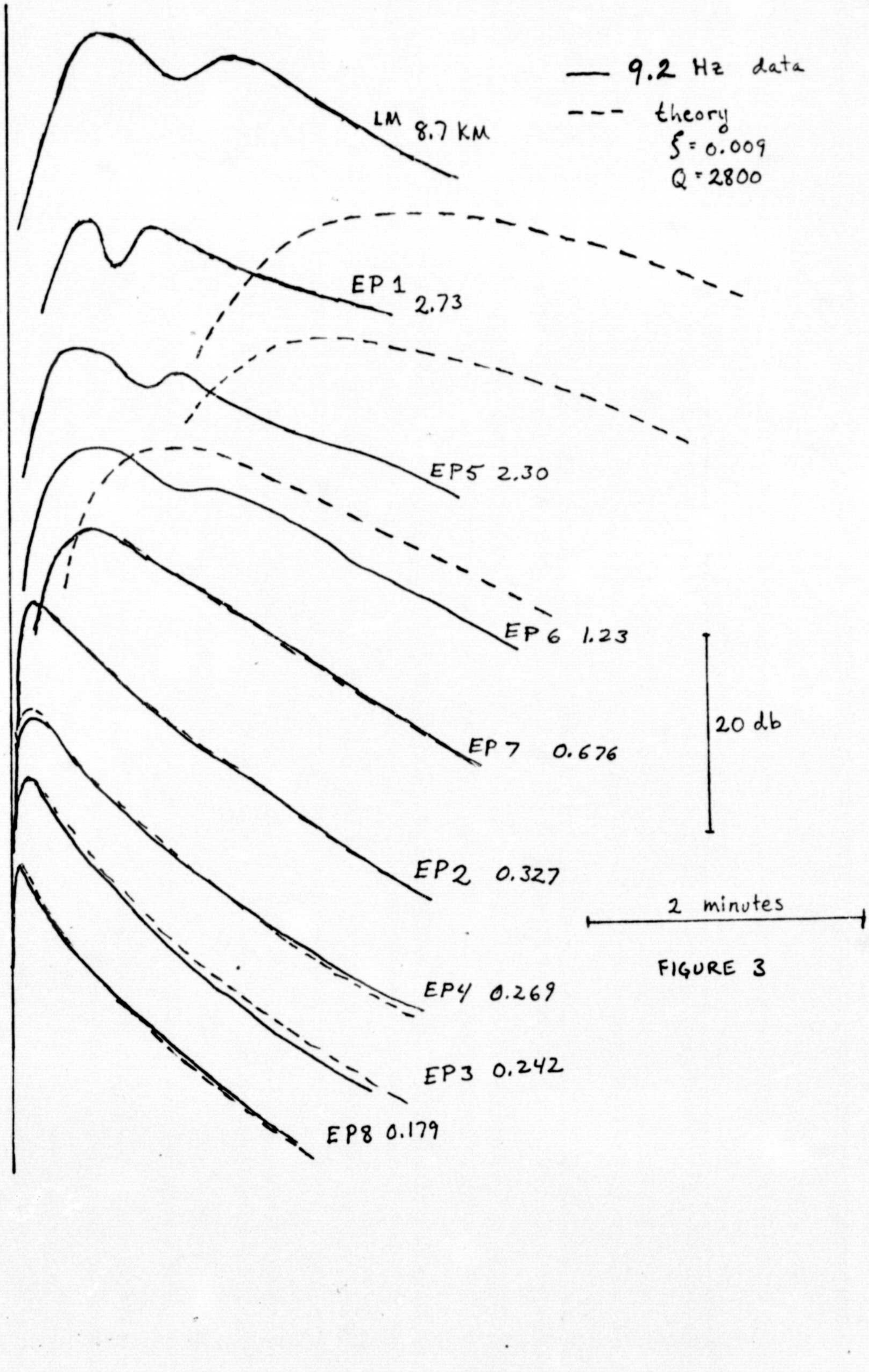
— 9.2 Hz data
--- theory
ξ = 0.009
Q = 2800
LM 8.7 KM
EP 1 2.73
EP5 2.30
EP 6 1.23
EP 7 0.676
EP2 0.327
EP4 0.269
EP3 0.242
EP8 0.179
20 db
2 minutes

FIGURE 3

APPENDIX A

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# Thermal movement of the regolith

FREDERICK DUENNEBIER

The Marine Science Institute, University of Texas, Galveston, Texas 77550

**Abstract**—High frequency seismic events observed at the Apollo landing sites indicate that the regolith moves in response to diurnal variations of thermal stresses. While these events (thermal moonquakes) are observed by each of the Passive Seismic Experiment stations, the location of their sources was not possible until they were observed by the Lunar Surface Profiling Experiment (LSPE) array at the Apollo 17 site. Comparison of source locations with topographic features near the LSPE array indicate that thermal moonquakes are associated to some degree with large rocks and to a larger degree with craters. They are not associated with man-made disturbances of the lunar surface. It is suggested that thermal moonquakes are the seismic expression of a phenomenon that is actively degrading slopes on the lunar surface.

## INTRODUCTION

THERMAL MOONQUAKES RECORDED by the Apollo Passive Seismic Experiments have been studied by Duennebier and Sutton (1974). Their paper provides a description of the important features of the observed seismic signals including periodicities, spectral content, and amplitudes. They suggest that thermal moonquakes are generated by fracturing of rocks along zones of weakness and by downslope movement of the regolith in response to thermal stresses as the surface temperature changes during each lunation. Because of their very small size, each thermal moonquake is recorded at only one station of the Passive Seismic Experiment, leaving no possibility of finding their source location. Estimates of the source distance were obtained by using knowledge of how the signal shape changes with distance, but this information yields only a rough guess at range, and no reliable correlations with surface topography were possible.

With the deployment of the LSPE array it became feasible to locate nearby thermal moonquakes by standard triangulation techniques. The array consists of four geophones arranged in a triangle about 100 m on a side with one geophone in the middle. Although the prime experiment for the array was profiling of the surface layers using explosive sources and seismic refraction techniques (Kovach *et al.*, 1973), a four-day period of passive listening during the summer of 1973 showed that large numbers of thermal moonquakes were being detected by the array. To capitalize on this fact, a series of seven additional four-day listening periods were scheduled such that data from a complete lunation (29½ days) could be obtained over a period of about one year beginning in July, 1974. The listening periods were staggered to create a minimum of interference to other experiments at the Apollo 17 site. Two additional periods supplied redundant data for correlation of events occurring at times of maximum and minimum activity. A six-hour period bracketing a solar eclipse was also recorded. Events recorded during the extended listening periods numbered in the thousands, with 1730 events recorded that were sufficiently large to warrant detailed study. Except for 324 events generated within the lunar module (LM), and a few possible meteoroid impacts, all the events detected appear to be thermal moonquakes.

The origin of thermal moonquakes has been a mystery since they were first observed on the Apollo 11 records. At that time, the most likely source was thought to be the LM. Data obtained from the Apollo 14 mission showed that there had to be many sources for these events that tend to repeat themselves at the same time of each lunation in numbers correlating with the diurnal heating cycle (Fig. 1). Because of this repetition they could not be generated by meteoroid impacts and because there were multiple sources they could not all be generated in the LM, thus the term "thermal moonquakes" (Duennebier, 1973). Because of an apparent correlation of activity levels with the topography near each station it was suggested that thermal moonquakes could be generated by downslope movement of the regolith (Duennebier and Sutton, 1974). The calculated source

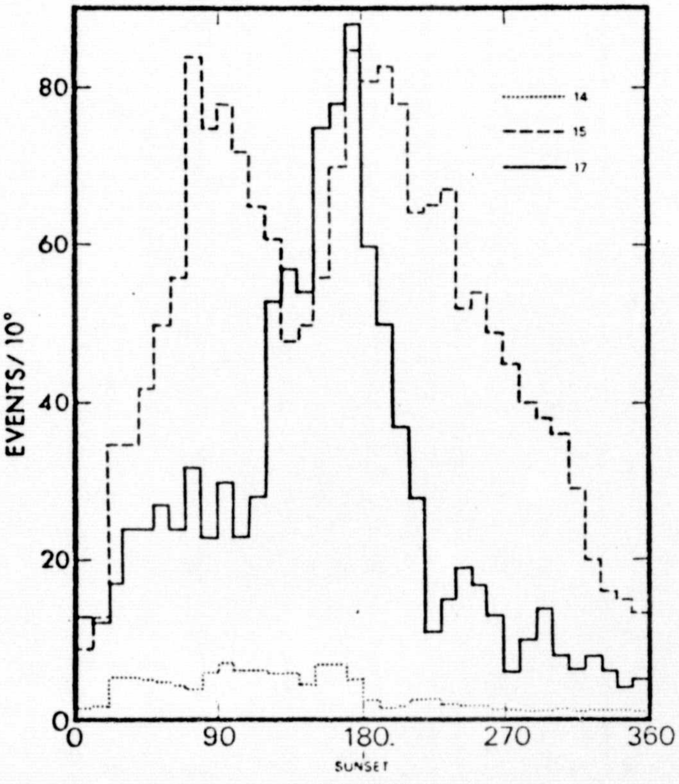

Fig. 1. Thermal moonquake activity at the Apollo 14, 15, and 17 sites. Ten degrees change in sun angle is about 20 hr. Activity increases abruptly about 2 days after sunrise and decreases rapidly after sunset at each station.

energies imply a change in slope of 1° per 100 m.y. in a 100 m deep crater (Cooper and Kovach, 1975). In this paper it will be shown that steep slopes are not a necessary condition for the occurrence of thermal moonquakes but that source locations do tend to correlate with crater locations.

## ANALYSIS

Thermal moonquake data obtained from the Passive Seismic Experiment has been discussed by Duennebier and Sutton (1974). A short review of their findings is in order. Characteristics of thermal moonquake signals include emergent beginnings, durations of one to four minutes, frequencies between 2 and 10 Hz, and small amplitudes. Signals with nearly identical wave forms repeat each other regularly every lunation usually within one hour of the same sun angle. Some signals show gradual changes in wave forms from one event to the next and others show cyclic changes; some occur once per lunation, others occur many times per lunation. About 50 distinctly different types of events were observed at the Apollo 14 site (indicating 50 different sources) while more than 250 types are recognized at the Apollo 15 site. The short-period component does not operate at the Apollo 12 site, and thermal moonquakes have not been actively studied at the Apollo 16 site, although they apparently are visible on the long-period components as well as on the short-period component. Four years after the initial study was made at Apollo 14, an attempt was made to predict the occurrence of five types of events based on when they occurred four years earlier. Three of the five types were observed within an hour of when they were predicted. The wave forms had not changed noticeably in four years.

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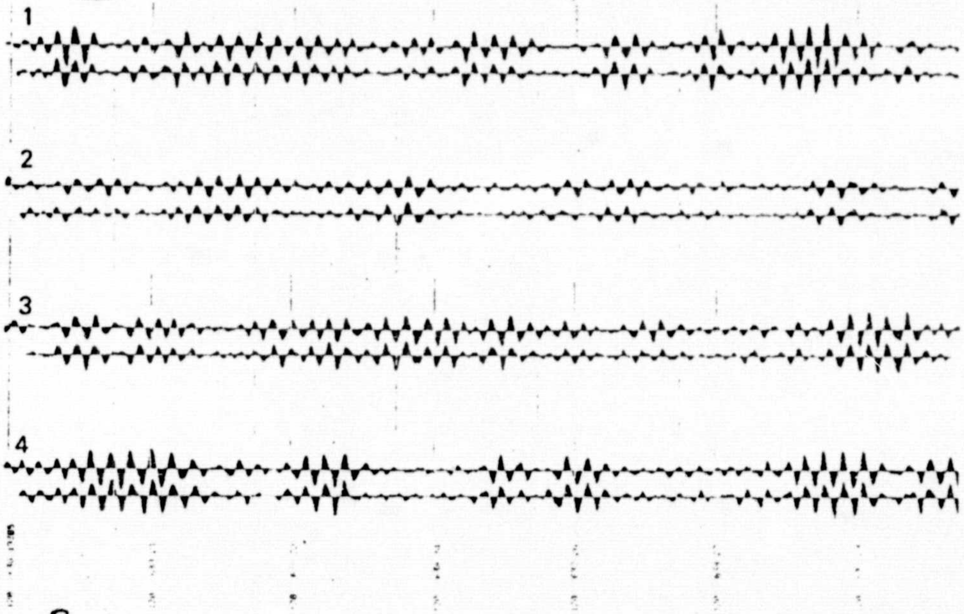
Data from the Apollo 17 LSPE array ha~~s~~ been described by Kovach *et al.* (1973) and Cooper and Kovach (1975). These data are an improvement over the PSE data in that each event is observed on four seismometers instead of one, thus making source location possible. An excellent set of calibration events at known ranges and with known energies are available. Characteristics of thermal moonquakes observed by the LSPE are nearly the same as those observed at the other seismic stations. Differences worthy of note are: (1) event activity has a single peak near sunset rather than multiple activity peaks earlier in the lunation as at the PSE stations (Fig. 1); and (2) while thermal moonquakes at the PSE stations are generally restricted to frequencies below 10 Hz, events with energy as high as 20 Hz are observed at the LSPE (Fig. 2).

## SOURCE LOCATION

The standard technique for seismic source location is to use the relative times of phase arrivals at each seismometer and, knowing the velocity structure, triangulating to find the source. This method is not useful for LSPE data because there are no clear phases observed; even the largest signals have emergent beginnings. Signals observed at one end of the array show no obvious wave form correlations with signals from the same event observed 100 m away, or even 50 m insert A

A



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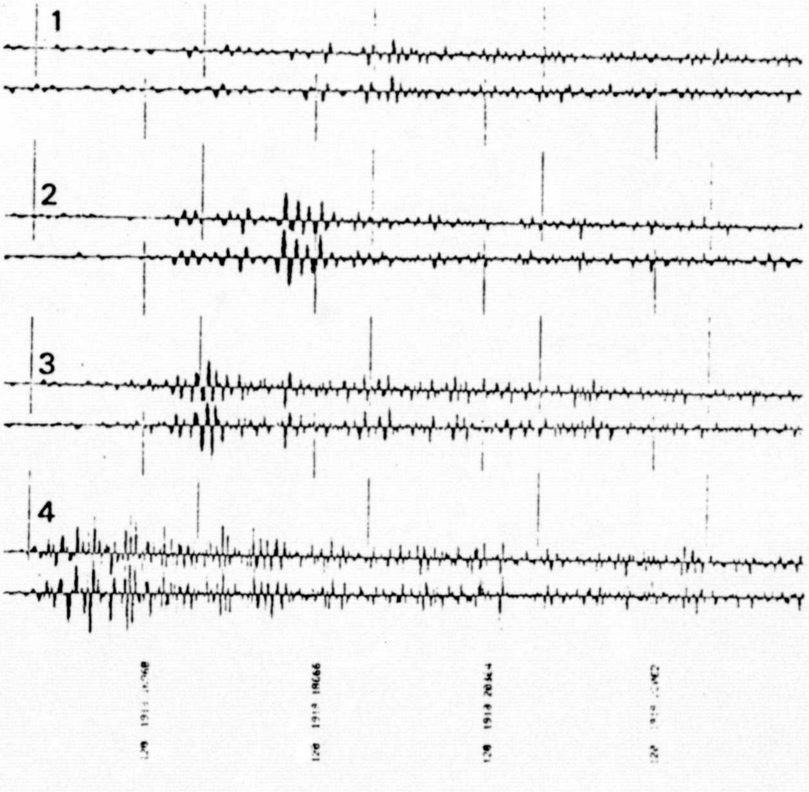

away (see Fig. 2). However, the observed events can be divided into two types, those which show constant signal amplitude across the array and those that show significant variations in amplitude. Not including events from the LM, about 200 events fall into the group showing variations, or approximately 15% of the total number of natural events observed. If the rate of change in amplitude with range is known, then this amplitude variation can be used (in place of travel time differences) to locate events.

Records from the LSPE explosive packages (E.P.'s) detonated at ranges from 100 to 3000 m provide an excellent means of determining the change in amplitude with distance. Because high frequencies attenuate faster than lower frequencies, care was taken to filter the records sharply (in the frequency domain) at frequencies of interest to avoid contamination from energy at other frequencies. To eliminate the effects of changes in efficiency of the different E.P.'s in coupling into seismic waves, the source energy was not included as a known parameter and each E.P. was treated as independent of the others (Nakamura *et al.*). The equation

$$A = kr^{\alpha} \tag{1}$$

was used as a model where $A$ is the amplitude at the peak of the signal and $r$ is the distance from the source to the seismometer. The value of $\alpha$ was then found which best fit the E.P. data. The resulting analysis shows that the amplitude varies inversely as the distance at low frequencies near 5 Hz, ($\alpha = -1$), the exponent increasing to the square of the distance at 19 Hz ($\alpha = -2$). The higher frequency was chosen for determination of source locations since it is the highest frequency at which most nearby events have sufficient energy for measurement and because the large variation in amplitude with distance increases the accuracy of source locations. The calibration data are shown in Fig. 3.

The differences between measured amplitudes for natural events are used to triangulate using a least squares technique to find the source. Because of the small size of the array and a ±1 db accuracy in amplitude determination, only those events within about 400 m of the center of the array could be located. As a check on the accuracy of the method, 30 events from the LM were also located. About 80% of these source locations fall within 50 m of the LM (located 187 m from the center of the array). Thus, while the method hardly gives pinpoint accuracy, it is capable of showing regions of high activity. Note that accuracy will decrease as distance from the array increases and that the average event size increases as

**Fig. 2.** (a) Thermal moonquakes recorded by the Apollo 17 LSPE. Recordings of two different but nearly identical events (177 days apart) are shown as recorded by the four LSPE geophones. Note the lack of coherence of wave forms across the array and the high coherence between the two events indicating that they both originate at the same source. Vertical lines are 1.7 sec apart. (b) Nearby thermal moonquakes. Note the change in amplitude and frequency content recorded at each geophone. These events occurred within 100 m of the array, closest to geophone 4. One event occurred 177 days before the other.

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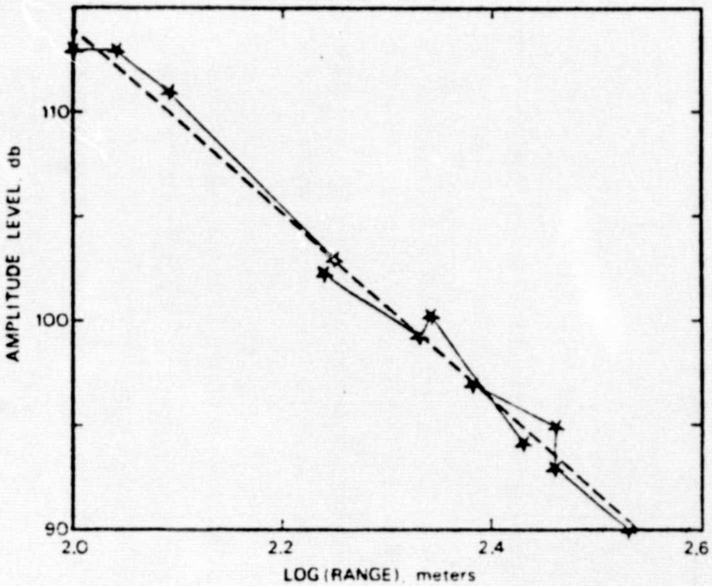

Fig. 3. Calibration data for amplitude-distance relationship. The data are from the LSPE explosive package recordings filtered at 20 Hz. The source energy for each event was not constrained to allow for changes in efficiency. The least-squares curve shown has a slope of −2.

distance increases: i.e., small events recorded from sources inside the array may not be visible when their sources are outside the array.

The resulting source location map for natural events is shown in Fig. 4. The event activity is obviously not random but concentrated in two regions, one inside the array and one to the southwest. The concentration inside the array correlates well with the location of "geophone rock," a 2 m high rock to the southwest of the center geophone. However, none of the events from this region are large enough to be observed had they occurred more than 100 m from the array, indicating that rocks of this size are not ~~the~~ sources of strong thermal moonquakes. Comparing Fig. 4 with Fig. 5, the concentration of activity to the southeast corresponds generally to the location of two subdued craters, approximately 100 and 200 m in diameter. The concentration to the northwest correlates with a crater (Rudolph) about 50 m in diameter. Just as important are the features that do not correlate with regions of thermal moonquake activity. The areas of astronaut activity in this region (concentrated mostly around the LM and the central (ALSEP) station slightly to the north of the center geophone) show no signs of any unusual activity, thus thermal moonquakes do not appear to be generated by man-made activity. The relatively featureless region to the southwest is also an area of little activity. Note again that many events occurring near the edges and outside of the region shown in Fig. 4 were not located because the change in amplitude across the array is too small for adequate resolution. Had the array size been 1 km on a side rather than 100 m, many more events could have been located by this method.

## SOURCE ENERGY

Previous estimates of thermal moonquake source energy were hampered by lack of adequate calibration events (Duennebier and Sutton, 1974). While this is still a problem, the LSPE has the advantage that the calibration events and thermal moonquakes are recorded on the same instruments, thus no conversion to actual ground motion needs to be made. The calibration events (eight small explosions and the Apollo 17 LM impact) are still not ideal in that the source mechanisms for explosion events (including the LM impact) and for moonquakes are vastly different and a much larger fraction of moonquake source energy will be converted into seismic waves than for explosives. In addition, no single model has yet been found that explains the characteristics of the signals. Cooper and Kovach (1975) noted that a two dimensional scattering equation failed to predict the observed signal rise times beyond a range of about 1 km. They also show that the value of $k$ in Eq. (1) is frequency and range dependent ($k$ decreasing as range and frequency increase). While Eq. (1) is an adequate model for near-range source location, a better model is needed for estimating the source energy of natural events. For this purpose the equation

$$A = kE_0^{\frac{1}{2}} r / \exp\left[\frac{-\pi f r}{QU}\right] \tag{2}$$

(alpha)

α /

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is used, where $A$ is the amplitude at the peak of the signal envelope, $E_0$ is the source energy, $f$ is the frequency, $Q$ is the quality factor, and $U$ is the average velocity of the signal peak. The values of $A$, $E_0$, $r$, $f$, and $U$ are measured and the values of $k$, $\alpha$, and $Q$ are found by regression. Only data within 1.5 km (6 events) are used since beyond this range the value of $U$ becomes a complicated function of range and frequency. Within 1.5 km $U$ averages about 25 m/sec. The regression to find the values of $k$, $\alpha$, and $Q$ was done for two frequency bands (4–13 Hz and 13–21 Hz) with 120 amplitude measurements used in each (5 frequencies per record, 4 records per event, and 6 events). The results yield $k = 141$ and 86, $\alpha = -1.02$ and $-0.97$, and $Q = 1400$ and 740 for the low and high frequency sets respectively.

To obtain source energy estimates for thermal moonquakes, the difference between explosives and moonquakes in the fraction of energy transformed into seismic waves must be accounted for. It is estimated that thermal moonquakes are more efficient at seismic wave generation such that the value of $k$ should be increased by a factor of from 32 to 100 (Duennebier and Sutton, 1974). The resulting energies, based on the events located earlier and the higher frequency band parameters above, range from $10^3$ to $5 \times 10^5$ ergs per event. Note, however, that only the events closest to the array are included, since it is only for these events that a reasonably reliable range is available. Events of similar amplitude at greater distances are observed implying that thermal moonquakes with source energies of $10^7$ ergs and possibly larger do occur.

A reliable estimate of the total amount of energy released by thermal moonquakes within a given period does not appear possible, since most of the

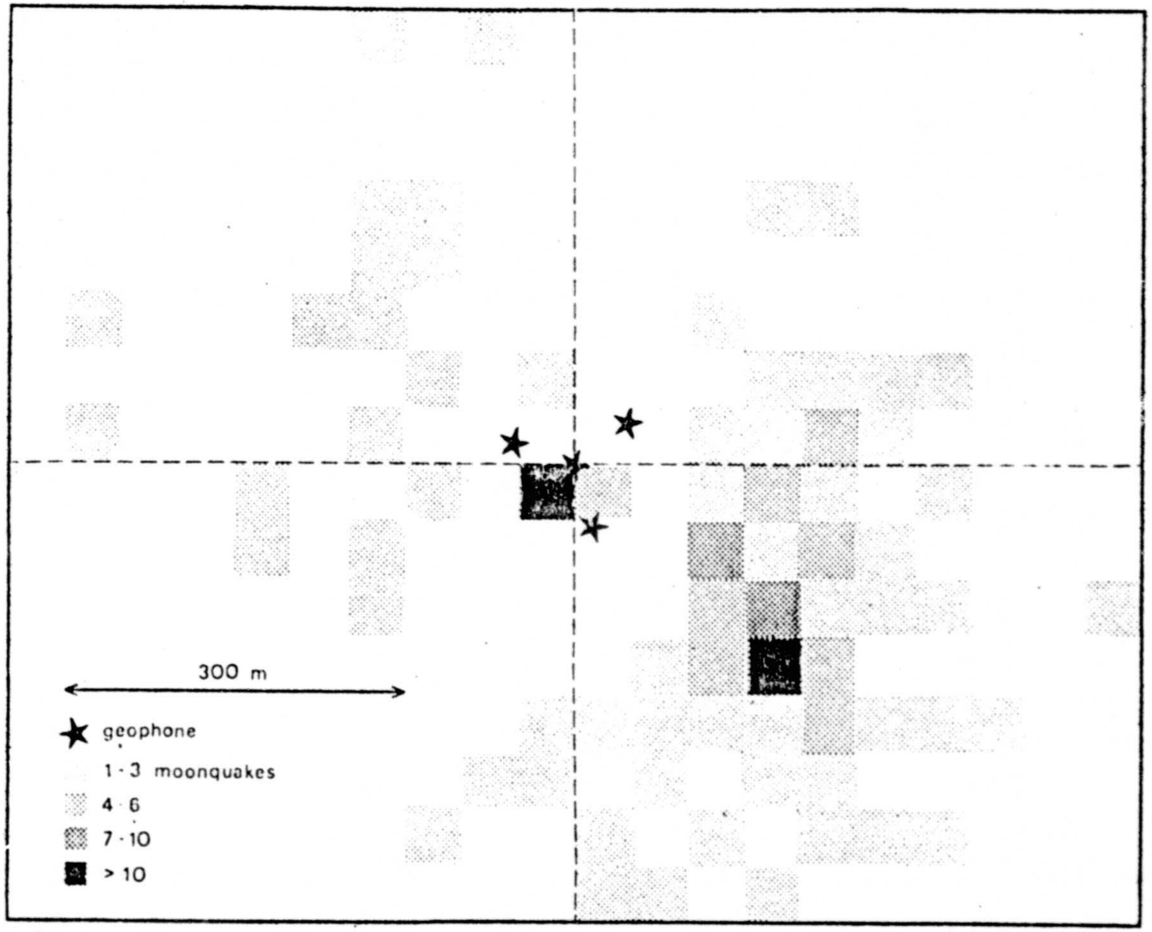

Fig. 4. Source location map. Density of thermal moonquake source locations in the region surrounding the LSPE array are shown. Comparison with Fig. 5 shows a correlation of activity with large craters and with geophone rock. This map does not include events that are known to originate at the LM.

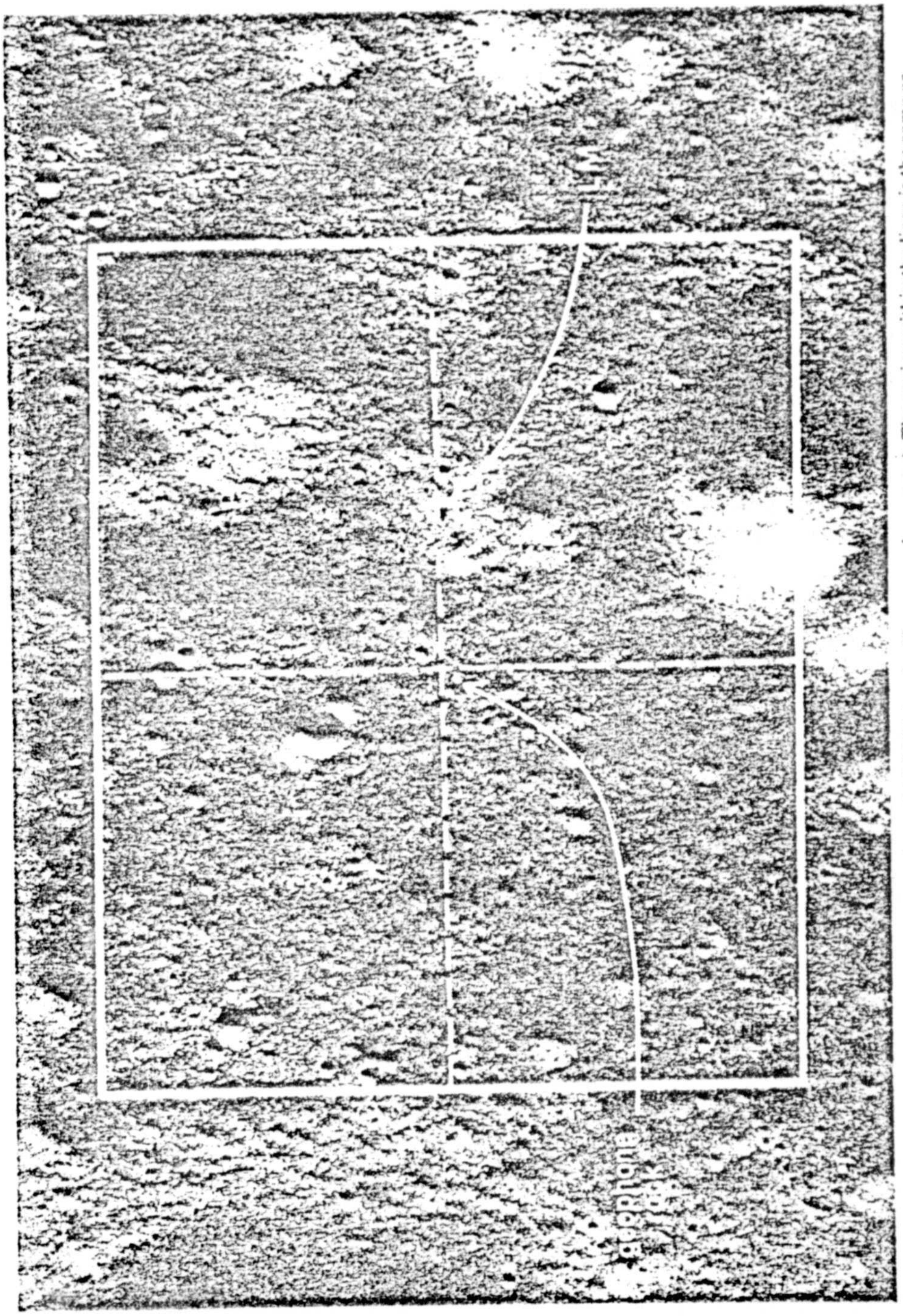

Fig. 5. Photograph of Apollo 17 landing site (AS 17-2309 Apollo 17 panoramic camera). The region within the lines is the same as that in Fig. 4. Note that the shadows of geophone rock and the LM are clearly seen.

energy is apparently released by events smaller than the detection threshold of the system (Duennebier and Sutton, 1974; Cooper and Kovach, 1975). All plots showing cumulative number of events vs. (log) amplitude for thermal moonquakes have slopes steeper than $-2$, implying that the large numbers of small events release more energy than the larger events. As a minimum estimate for total energy release from thermal moonquakes, consider the LSPE region where more than 100 events of $10^5$ ergs occur each month within 1 $km^2$. Extrapolating to the whole moon, $10^{15}$ ergs per year are released, as compared with $10^{13}$ ergs per year for the deep moonquakes (Lammlein *et al.*, 1974). Note that this estimate for thermal moonquakes is conservative in that the region around the LSPE site is relatively smooth whereas rougher regions are expected to have more activity.

For comparison with another energy source, a single 500 gm meteoroid impacting at 20 km/sec releases $10^{15}$ ergs of energy. An impact of this size or larger is expected about 2000 times per year on the lunar surface (Duennebier *et al.*, 1975). This difference in energies implies that the impacting process should be dominant in the sculpture of the lunar surface, which is no surprise since the surface is covered with craters. However, thermal movement observed as thermal moonquakes could be an important process in modification of existing features.

## SOURCE MECHANISM

With the evidence presented in this paper and others (Duennebier and Sutton, 1974; Cooper and Kovach, 1975), the correlation of thermal moonquakes with the solar heating cycle appears inescapable. Additional confirmation was obtained during a solar eclipse for which the LSPE array was activated. The cooling period of the eclipse is characterized by relatively large thermal moonquakes occurring at about 25 events per hour (Fig. 6). During reheating after return of sunlight, activity is reduced to mostly small events, although activity is still much higher than normal. It is difficult to imagine a mechanism other than thermal stress variations which could cause such activity.

As mentioned earlier (and by Duennebier and Sutton, 1974), thermal cracking of rocks along zones of weakness can account for only a fraction of the events observed. While events are observed from the region around geophone rock, they have very small source energies compared to most thermal moonquakes, although this is one of the largest rocks in the vicinity. The change in wave form from one event to the next during each lunation for some types of thermal moonquakes implies movement of the source, thus excluding rocks as sources for these events (Duennebier and Sutton, 1974).

Most thermal moonquakes appear to be generated in the regolith itself. Duennebier and Sutton (1974) arrived at this conclusion and suggested that the dominant source mechanism is triggering of gravitational downslope regolith movement by thermal stress variations. While this conclusion still appears to be true, many of the source locations obtained in this paper do not correlate with steeply sloping surfaces. Apparently the thermal stresses alone supply enough

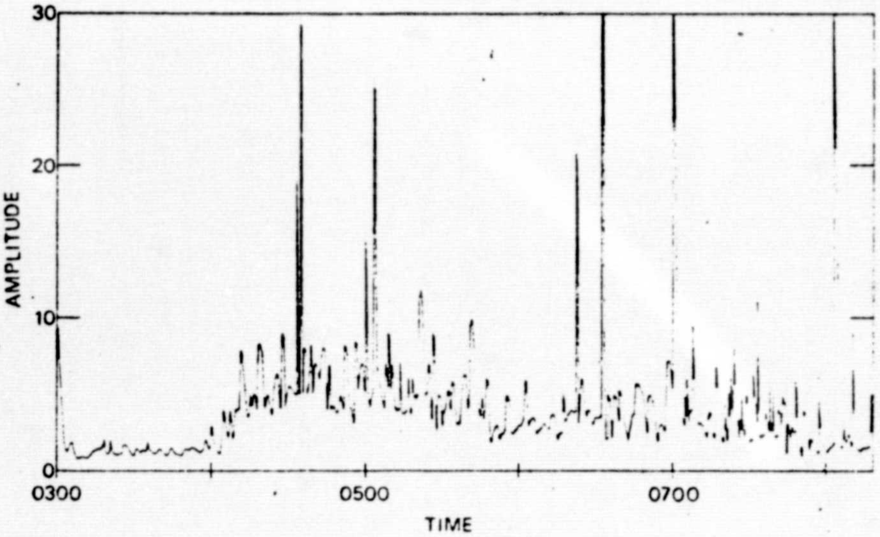

Fig. 6. Thermal activity at the LSPE during a solar eclipse. Trace amplitude is plotted as a function of time in hours.

energy for generation of thermal moonquakes and gravitational energy is not necessary.

Duennebier (1972) showed that, with reasonable assumptions as to the compressibility and strength of the lunar soil, the thermal stresses in the soil would be the same order of magnitude as the shear strengths, thus movement of the soil can be expected. Where and how these movements occur is a matter for debate. One might expect that the lunar soil would expand and contract elastically or "fracture" at close enough intervals such that no deformation or movement would be noticeable. Yet, if the new values of source energy are correct, using the method of Duennebier (1972) the source area will be about 6 cm in radius for a thermal moonquake of $10^6$ ergs source energy, and maximum displacement in this region will be about 1 mm. This value is reasonable within an order of magnitude if one assumes a linear thermal expansion coefficient of $5 \times 10^{-6}$, in which case the diurnal surface temperature variation of 380°K requires 1 mm expansion for every 50 cm.

Regions in which one might expect the most movement are where there are strong contrasts in temperature or in physical properties; such contrasts exist across shadow lines caused by sloping surfaces or other surface features. The tendency will be for material on the hot (expanding) side to push into the cold (contracting) side. In craters, the shadowed portion is always downslope of the sunlight region such that material will always tend to move downslope (Fig. 7). Along sharp crater edges, material from outside the crater will tend to move into the crater. Generally, the process will be one of smoothing the lunar surface and eradicating discontinuities. Cooper and Kovach (1975) computed a slope degradation rate of 1° per 100 m.y. for a 100 m high slope using the method of Duennebier

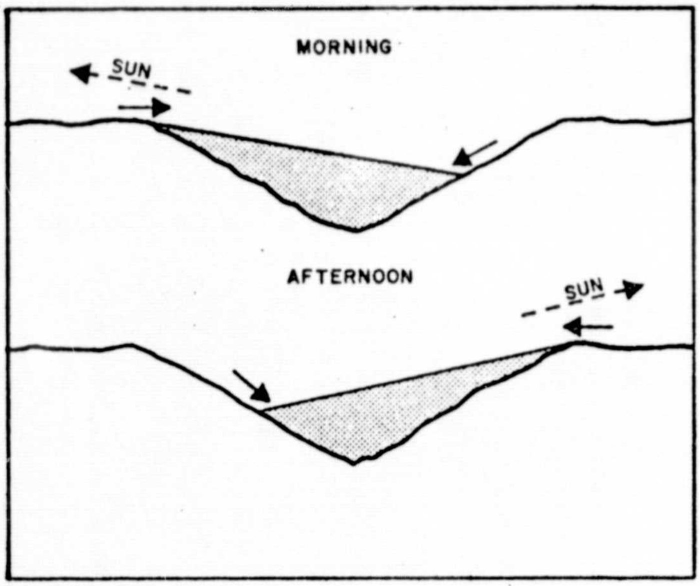

Fig. 7. Movement of the regolith caused by thermal expansion across shadows. The motion, shown by arrows, from hot regions to cold (shadowed) regions, will always be downslope.

and Sutton (1974) which assumes that gravitational energy is the only energy released. Using this model, fewer events are necessary to change gentle slopes by one degree than steep ones in craters of the same radius since the change in gravitational energy per degree becomes less as the slope decreases. Intuitively, however, one expects slopes to change rapidly when they are steep and more slowly as the erosion continues. It seems likely that gravitational energy release is significant only for steeper slopes. For shallower slopes, thermal energy probably dominates. If we assume that a typical thermal moonquake displaces 200 cm$^3$ by 1 mm, then we can calculate how long it will take to degrade a crater by 1° by computing how much volume is moved in the transition. A 5 m deep crater with a 28 m radius will have about 130 m$^3$ of material transported an average of 14 m in a slope change from 10° to 9°. This process will require $9 \times 10^9$ average thermal moonquakes and will take about 9 m.y. if 1000 events occur per year. A crater with twice the radius (and four times the number of events occurring per year) will require four times as long for the same transition.

## CONCLUSIONS

The movement of the regolith in response to diurnal stresses is observed as small high-frequency seismic events (thermal moonquakes). Most of this movement is apparently related to regolith materials moving downslope as sunlit areas expand and shadowed areas contract. Sources of thermal moonquakes located

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near the Apollo 17 LSPE array suggest that slopes at angles much less than the angle of repose can be sources for these events indicating that thermal energy, rather than gravitational energy, is the main driving force. The effect of this activity over long periods of time will be to fill craters, lessen slopes, and generally eradicate sharp discontinuities.

The importance of this mechanism relative to others suggested for lunar erosion is hard to determine. Other mechanisms include impact cratering (Arnold, 1975), seismic shaking (Houston *et al.*, 1972; Schultz and Gault, 1975), and electrostatic transport (Gold, 1960; Criswell, 1972). Downslope movement is well documented by photographs and astronaut observations (Mattingly, 1973), and the fact that fines move downslope faster than large rocks can be seen from the observation that fillets occur preferentially on the uphill side of rocks (Muehlberger *et al.*, 1973). Crater life times are also significantly shortened on slopes (Basilevsky, 1976). In an earlier paper (Duennebier and Sutton, 1974) it was suggested that more than enough energy was available in the thermal moonquake mechanism to account for significant erosion of lunar slopes. Although the source energy estimates have been lowered significantly since that paper, this conclusion still appears to be valid.

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# APPENDIX B

## EVENT LIST

The following list identifies all events of amplitude 7 mm or greater on the compressed time scale playouts described earlier. The date, time, amplitude, selenographic longitude of the sun, and event type are given for each event. The event type identifies the event as either unknown (blank), thermal moonquake (number) or noise from the lunar lander (LM, LM1, or LM2). LM1 and LM2 events are noticeably different LM events. When a number is assigned to an event, this means that another event has been found identical to it. The number assigned is as close to the longitude of the sun at that time as possible. At periods of high activity a letter may replace the units digit. The last page of the list shows events detected during an eclipse.

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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *   * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P. 1
* 1973 * 194 * 17 *  17 *   20 * 019.2 *      *   * 1973 * 196 * 07 *  03 *   50 * 000.1 *  349 *
* 1973 * 194 * 18 *  15 *   20 * 018.7 *      *   * 1973 * 196 * 07 *  26 *   50 * 359.9 *      *
* 1973 * 194 * 18 *  40 *   00 * 018.5 *      *   * 1973 * 196 * 07 *  27 *   40 * 359.9 *  LM2 *
* 1973 * 194 * 20 *  44 *   30 * 017.5 *  350 *   * 1973 * 196 * 07 *  30 *   50 * 359.8 *      *
* 1973 * 194 * 20 *  56 *   00 * 017.4 *  017 *   * 1973 * 196 * 08 *  01 *   30 * 359.6 *      *
* 1973 * 194 * 21 *  00 *   00 * 017.3 *      *   * 1973 * 196 * 08 *  20 *   10 * 359.4 *      *
* 1973 * 194 * 21 *  02 *   00 * 017.3 *      *   * 1973 * 196 * 08 *  23 *   40 * 359.4 *  353 *
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* 1973 * 194 * 21 *  24 *   40 * 017.1 *      *   * 1973 * 196 * 08 *  27 *   20 * 359.4 *      *
* 1973 * 194 * 23 *  00 *   00 * 016.3 *      *   * 1973 * 196 * 08 *  38 *   00 * 359.3 *      *
* 1973 * 194 * 23 *  28 *   30 * 016.1 *      *   * 1973 * 196 * 11 *  13 *   40 * 358.0 *      *
* 1973 * 195 * 00 *  26 *   00 * 015.6 *  012 *   * 1973 * 196 * 11 *  27 *   00 * 357.9 *  354 *
* 1973 * 195 * 00 *  35 *   00 * 015.5 *      *   * 1973 * 196 * 11 *  38 *   20 * 357.7 *      *
* 1973 * 195 * 00 *  46 *   20 * 015.4 *      *   * 1973 * 196 * 15 *  00 *   30 * 356.1 *      *
* 1973 * 195 * 01 *  12 *   00 * 015.2 *      *   * 1973 * 196 * 16 *  30 *   00 * 355.3 *      *
* 1973 * 195 * 01 *  19 *   10 * 015.1 *      *   * 1973 * 196 * 16 *  45 *   00 * 355.2 *      *
* 1973 * 195 * 02 *  33 *   30 * 014.5 *      *   * 1973 * 196 * 17 *  05 *   10 * 355.0 *      *
* 1973 * 195 * 03 *  28 *   00 * 014.0 *      *   * 1973 * 196 * 17 *  29 *   50 * 354.8 *      *
* 1973 * 195 * 04 *  39 *   30 * 013.5 *      *   * 1973 * 196 * 17 *  32 *   30 * 354.8 *      *
* 1973 * 195 * 04 *  55 *   00 * 013.3 *      *   * 1973 * 196 * 17 *  51 *   00 * 354.6 *      *
* 1973 * 195 * 07 *  22 *   15 * 012.1 *  012 *   * 1973 * 196 * 18 *  03 *   20 * 354.5 *      *
* 1973 * 195 * 09 *  44 *   20 * 010.9 *      *   * 1973 * 196 * 18 *  33 *   00 * 354.2 *      *
* 1973 * 195 * 11 *  32 *   40 * 010.0 *      *   * 1973 * 196 * 18 *  37 *   00 * 354.2 *      *
* 1973 * 195 * 12 *  00 *   00 * 009.8 *      *   * 1973 * 196 * 18 *  44 *   50 * 354.2 *      *
* 1973 * 195 * 12 *  28 *   45 * 009.6 *      *   * 1973 * 196 * 19 *  12 *   00 * 353.9 *      *
* 1973 * 195 * 15 *  01 *   00 * 008.2 *      *   * 1973 * 196 * 19 *  19 *   40 * 353.9 *  355 *
* 1973 * 195 * 15 *  08 *   10 * 008.2 *      *   * 1973 * 196 * 19 *  46 *   00 * 353.7 *      *
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* 1973 * 195 * 16 *  50 *   40 * 007.3 *      *   * 1973 * 196 * 20 *  47 *   10 * 353.1 *      *
* 1973 * 195 * 17 *  01 *   40 * 007.2 *      *   * 1973 * 196 * 21 *  00 *   20 * 353.0 *      *
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* 1973 * 195 * 19 *  58 *   00 * 005.7 *      *   * 1973 * 196 * 22 *  38 *   10 * 352.2 *  347 *
* 1973 * 195 * 20 *  21 *   30 * 005.5 *      *   * 1973 * 196 * 22 *  53 *   10 * 352.1 *  348 *
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* 1973 * 195 * 22 *  28 *   00 * 004.5 *      *   * 1973 * 196 * 23 *  14 *   00 * 351.9 *      *
* 1973 * 195 * 22 *  40 *   10 * 004.3 *      *   * 1973 * 196 * 23 *  21 *   00 * 351.8 *      *
* 1973 * 195 * 23 *  09 *   10 * 004.1 *      *   * 1973 * 196 * 23 *  57 *   10 * 351.5 *      *
* 1973 * 196 * 00 *  49 *   00 * 003.3 *      *   * 1973 * 197 * 00 *  06 *   30 * 351.5 *      *
* 1973 * 196 * 05 *  53 *   00 * 000.7 *      *   * 1973 * 197 * 00 *  18 *   00 * 351.3 *      *
* 1973 * 196 * 06 *  06 *   40 * 000.6 *      *   * 1973 * 197 * 00 *  19 *   40 * 351.3 *  352 *
* 1973 * 196 * 06 *  13 *   00 * 000.5 *      *   * 1973 * 197 * 00 *  28 *   10 * 351.3 *  356 *
* 1973 * 196 * 06 *  37 *   00 * 000.3 *      *   * 1973 * 197 * 00 *  35 *   10 * 351.2 *      *
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* 1973 * 197 * 01 *  09 *   10 * 350.9 *      *  * 1973 * 197 * 18 *  58 *   00 * 342.1 *      *
* 1973 * 197 * 02 *  15 *   20 * 350.4 *  349 *  * 1973 * 197 * 19 *  06 *   00 * 342.1 *      *
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* 1973 * 197 * 09 *  13 *   00 * 346.9 *      *  * 1973 * 198 * 03 *  18 *   10 * 337.6 *      *
* 1973 * 197 * 09 *  41 *   10 * 346.7 *      *  * 1973 * 198 * 03 *  22 *   50 * 337.6 *  338 *
* 1973 * 197 * 10 *  09 *   00 * 346.4 *      *  * 1973 * 198 * 03 *  29 *   00 * 337.6 *      *
* 1973 * 197 * 10 *  17 *   30 * 346.4 *      *  * 1973 * 198 * 03 *  51 *   05 * 337.5 *  332 *
* 1973 * 197 * 10 *  47 *   00 * 346.1 *      *  * 1973 * 198 * 04 *  23 *   50 * 337.1 *      *
* 1973 * 197 * 11 *  34 *   00 * 345.7 *      *  * 1973 * 198 * 04 *  45 *   00 * 336.9 *  33A *
* 1973 * 197 * 11 *  42 *   10 * 345.7 *      *  * 1973 * 198 * 05 *  01 *   15 * 336.7 *      *
* 1973 * 197 * 11 *  57 *   10 * 345.6 *  345 *  * 1973 * 198 * 05 *  30 *   25 * 336.5 *      *
* 1973 * 197 * 12 *  03 *   00 * 345.5 *      *  * 1973 * 198 * 05 *  36 *   00 * 336.4 *      *
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* 1973 * 197 * 15 *  55 *   40 * 343.6 *      *  * 1973 * 198 * 06 *  33 *   40 * 336.0 *      *
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* 1973 * 197 * 17 *  11 *   00 * 343.0 *      *  * 1973 * 198 * 08 *  22 *   50 * 335.0 *      *
* 1973 * 197 * 17 *  16 *   00 * 343.0 *      *  * 1973 * 198 * 08 *  27 *   30 * 335.0 *      *
* 1973 * 197 * 17 *  24 *   30 * 342.9 *      *  * 1973 * 198 * 08 *  33 *   00 * 334.9 *      *
* 1973 * 197 * 17 *  32 *   10 * 342.8 *      *  * 1973 * 198 * 08 *  35 *   30 * 334.9 *      *
* 1973 * 197 * 17 *  37 *   50 * 342.8 *      *  * 1973 * 198 * 09 *  10 *   10 * 334.6 *      *
* 1973 * 197 * 18 *  04 *   30 * 342.6 *  342 *  * 1973 * 198 * 09 *  50 *   20 * 334.3 *      *
* 1973 * 197 * 18 *  18 *   20 * 342.5 *      *  * 1973 * 198 * 10 *  08 *   00 * 334.1 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
* 1973 * 198 * 10 *  10 *   50 * 334.1 *      *  * 1974 * 064 * 05 *  26 *   03 * 042.4 *  043 *
* 1973 * 198 * 10 *  36 *   00 * 333.9 *      *  * 1974 * 064 * 06 *  28 *   03 * 041.9 *      *
* 1973 * 198 * 10 *  59 *   10 * 333.7 *      *  * 1974 * 064 * 06 *  50 *   02 * 041.7 *      *
* 1973 * 198 * 12 *  04 *   30 * 333.2 *      *  * 1974 * 064 * 07 *  29 *   03 * 041.3 *      *
* 1973 * 198 * 12 *  06 *   30 * 333.1 *      *  * 1974 * 064 * 07 *  57 *   03 * 041.1 *      *
* 1973 * 198 * 12 *  23 *   00 * 333.0 *      *  * 1974 * 064 * 07 *  51 *   03 * 041.1 *      *
* 1973 * 198 * 12 *  28 *   00 * 332.9 *  333 *  * 1974 * 064 * 07 *  16 *   02 * 040.9 *      *
* 1974 * 062 * 17 *  18 *   04 * 060.6 *      *  * 1974 * 064 * 08 *  23 *   05 * 040.9 *  041 *
* 1974 * 062 * 17 *  33 *   02 * 060.5 *      *  * 1974 * 064 * 08 *  31 *   03 * 040.8 *      *
* 1974 * 062 * 18 *  58 *   04 * 059.8 *  057 *  * 1974 * 064 * 08 *  50 *   11 * 040.7 *  043 *
* 1974 * 062 * 19 *  35 *   04 * 059.5 *  054 *  * 1974 * 064 * 08 *  54 *   20 * 040.6 *      *
* 1974 * 062 * 21 *  22 *   04 * 058.6 *      *  * 1974 * 064 * 08 *  58 *   40 * 040.6 *      *
* 1974 * 062 * 23 *  03 *   09 * 057.8 *      *  * 1974 * 064 * 06 *  09 *   08 * 040.5 *      *
* 1974 * 062 * 23 *  08 *   10 * 057.7 *  054 *  * 1974 * 064 * 09 *  19 *   04 * 040.4 *      *
* 1974 * 063 * 01 *  20 *   03 * 056.6 *  042 *  * 1974 * 064 * 09 *  38 *   05 * 040.3 *  036 *
* 1974 * 063 * 01 *  42 *   10 * 056.4 *      *  * 1974 * 064 * 10 *  26 *   05 * 039.8 *      *
* 1974 * 063 * 01 *  46 *   30 * 056.4 *      *  * 1974 * 064 * 11 *  33 *   04 * 039.3 *  042 *
* 1974 * 063 * 01 *  49 *   10 * 056.4 *      *  * 1974 * 064 * 11 *  49 *   04 * 039.1 *      *
* 1974 * 063 * 02 *  27 *   08 * 056.0 *  057 *  * 1974 * 064 * 12 *  30 *   04 * 038.8 *      *
* 1974 * 063 * 02 *  32 *   30 * 056.0 *  056 *  * 1974 * 064 * 12 *  43 *   04 * 038.7 *      *
* 1974 * 063 * 02 *  46 *   04 * 055.9 *  054 *  * 1974 * 064 * 12 *  49 *   05 * 038.6 *      *
* 1974 * 063 * 03 *  22 *   03 * 055.6 *      *  * 1974 * 064 * 14 *  01 *   05 * 038.0 *      *
* 1974 * 063 * 03 *  33 *   04 * 055.5 *      *  * 1974 * 064 * 14 *  09 *   04 * 038.0 *  038 *
* 1974 * 063 * 06 *  33 *   04 * 054.0 *  054 *  * 1974 * 064 * 14 *  38 *   04 * 037.7 *  041 *
* 1974 * 063 * 07 *  01 *   03 * 053.7 *  042 *  * 1974 * 064 * 16 *  19 *   05 * 036.9 *      *
* 1974 * 063 * 07 *  44 *   03 * 053.4 *  056 *  * 1974 * 064 * 16 *  54 *   06 * 036.6 *      *
* 1974 * 063 * 08 *  32 *   03 * 053.0 *      *  * 1974 * 064 * 17 *  29 *   04 * 036.3 *  036 *
* 1974 * 063 * 10 *  03 *   03 * 052.2 *  048 *  * 1974 * 064 * 19 *  14 *   04 * 035.4 *  042 *
* 1974 * 063 * 10 *  21 *   03 * 052.0 *  050 *  * 1974 * 064 * 19 *  28 *   02 * 035.3 *      *
* 1974 * 063 * 12 *  15 *   06 * 051.1 *  042 *  * 1974 * 064 * 20 *  47 *   09 * 034.6 *      *
* 1974 * 063 * 12 *  43 *   02 * 050.8 *      *  * 1974 * 064 * 23 *  07 *   04 * 033.4 *      *
* 1974 * 063 * 13 *  21 *   05 * 050.5 *  036 *  * 1974 * 065 * 00 *  35 *   03 * 032.7 *      *
* 1974 * 063 * 14 *  22 *   04 * 050.0 *  050 *  * 1974 * 065 * 00 *  41 *   03 * 032.6 *      *
* 1974 * 063 * 15 *  20 *   03 * 049.5 *      *  * 1974 * 065 * 00 *  47 *   04 * 032.6 *      *
* 1974 * 063 * 16 *  53 *   03 * 048.7 *      *  * 1974 * 065 * 01 *  18 *   07 * 032.3 *      *
* 1974 * 063 * 16 *  57 *   04 * 048.7 *  038 *  * 1974 * 065 * 02 *  59 *   07 * 031.5 *  041 *
* 1974 * 063 * 17 *  49 *   04 * 048.3 *  042 *  * 1974 * 065 * 03 *  04 *   20 * 031.4 *      *
* 1974 * 063 * 18 *  03 *   03 * 048.1 *  048 *  * 1974 * 065 * 04 *  44 *   04 * 030.6 *      *
* 1974 * 063 * 17 *  56 *   03 * 048.1 *  043 *  * 1974 * 065 * 06 *  12 *   09 * 029.8 *      *
* 1974 * 063 * 19 *  29 *   03 * 047.4 *  044 *  * 1974 * 065 * 06 *  15 *   30 * 029.8 *      *
* 1974 * 063 * 20 *  50 *   04 * 046.7 *      *  * 1974 * 065 * 06 *  19 *   25 * 029.8 *  017 *
* 1974 * 063 * 21 *  59 *   03 * 046.1 *  043 *  * 1974 * 065 * 06 *  35 *   07 * 029.7 *      *
* 1974 * 063 * 23 *  22 *   03 * 045.4 *  042 *  * 1974 * 065 * 06 *  39 *   20 * 029.6 *      *
* 1974 * 063 * 23 *  29 *   03 * 045.4 *      *  * 1974 * 065 * 07 *  07 *   05 * 029.4 *      *
* 1974 * 064 * 01 *  24 *   03 * 044.4 *  048 *  * 1974 * 065 * 08 *  00 *   05 * 028.9 *      *
* 1974 * 064 * 01 *  28 *   03 * 044.4 *      *  * 1974 * 065 * 08 *  07 *   04 * 028.9 *  026 *
* 1974 * 064 * 02 *  17 *   03 * 044.0 *  041 *  * 1974 * 065 * 09 *  32 *   04 * 028.2 *  023 *
* 1974 * 064 * 02 *  30 *   03 * 043.9 *  044 *  * 1974 * 065 * 10 *  08 *   04 * 027.9 *      *
* 1974 * 064 * 05 *  18 *   06 * 042.4 *  042 *  * 1974 * 065 * 10 *  44 *   04 * 027.6 *  024 *
* 1974 * 064 * 05 *  21 *   50 * 042.4 *      *  * 1974 * 065 * 11 *  39 *   05 * 027.1 *  026 *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *   * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P. 4
* 1974 * 065 * 12 *  27 *   04 * 026.7 *      *   * 1974 * 225 * 13 *  37 *   20 * 232.9 *      *
* 1974 * 065 * 13 *  26 *   04 * 026.2 *      *   * 1974 * 225 * 13 *  59 *   00 * 232.7 *      *
* 1974 * 065 * 13 *  58 *   04 * 025.9 *      *   * 1974 * 225 * 14 *  40 *   30 * 232.3 *      *
* 1974 * 065 * 14 *  04 *   05 * 025.9 *      *   * 1974 * 225 * 14 *  46 *   20 * 232.3 *  232 *
* 1974 * 065 * 14 *  43 *   03 * 025.5 *      *   * 1974 * 225 * 14 *  58 *   00 * 232.2 *  221 *
* 1974 * 065 * 15 *  01 *   06 * 025.4 *      *   * 1974 * 225 * 14 *  59 *   00 * 232.2 *      *
* 1974 * 065 * 15 *  05 *   10 * 025.4 *      *   * 1974 * 225 * 16 *  18 *   10 * 231.5 *      *
* 1974 * 065 * 15 *  21 *   04 * 025.2 *      *   * 1974 * 225 * 17 *  23 *   10 * 231.0 *  217 *
* 1974 * 065 * 15 *  48 *   05 * 025.0 *      *   * 1974 * 225 * 19 *  25 *   00 * 229.9 *      *
* 1974 * 065 * 16 *  08 *   03 * 024.9 *      *   * 1974 * 225 * 19 *  31 *   00 * 229.9 *      *
* 1974 * 065 * 16 *  30 *   06 * 024.6 *      *   * 1974 * 225 * 20 *  21 *   10 * 229.4 *  LM1 *
* 1974 * 065 * 16 *  33 *   00 * 024.6 *      *   * 1974 * 225 * 20 *  49 *   40 * 229.2 *      *
* 1974 * 065 * 16 *  50 *   06 * 024.5 *  024 *   * 1974 * 225 * 22 *  22 *   00 * 228.4 *      *
* 1974 * 065 * 18 *  58 *   04 * 023.4 *  023 *   * 1974 * 225 * 22 *  26 *   00 * 228.4 *      *
* 1974 * 065 * 20 *  22 *   04 * 022.7 *      *   * 1974 * 225 * 23 *  25 *   00 * 227.9 *      *
* 1974 * 065 * 20 *  39 *   05 * 022.5 *      *   * 1974 * 226 * 00 *  18 *   00 * 227.4 *      *
* 1974 * 065 * 22 *  04 *   06 * 021.4 *      *   * 1974 * 226 * 00 *  18 *   40 * 227.4 *      *
* 1974 * 065 * 22 *  47 *   04 * 021.3 *      *   * 1974 * 226 * 02 *  03 *   00 * 226.5 *  LM2 *
* 1974 * 224 * 10 *  26 *   10 * 246.7 *  217 *   * 1974 * 226 * 04 *  27 *   00 * 225.3 *  LM1 *
* 1974 * 224 * 10 *  54 *   30 * 246.5 *  LM2 *   * 1974 * 226 * 06 *  06 *   00 * 224.5 *      *
* 1974 * 224 * 11 *  46 *   40 * 246.0 *      *   * 1974 * 226 * 07 *  25 *   50 * 223.8 *  223 *
* 1974 * 224 * 12 *  51 *   50 * 245.5 *      *   * 1974 * 226 * 08 *  34 *   00 * 223.2 *      *
* 1974 * 224 * 14 *  06 *   40 * 244.8 *  LM1 *   * 1974 * 226 * 08 *  37 *   00 * 223.2 *  232 *
* 1974 * 224 * 14 *  49 *   20 * 244.5 *      *   * 1974 * 226 * 09 *  02 *   00 * 223.0 *      *
* 1974 * 224 * 14 *  54 *   00 * 244.4 *  223 *   * 1974 * 226 * 09 *  50 *   30 * 222.6 *      *
* 1974 * 224 * 17 *  36 *   30 * 243.1 *      *   * 1974 * 226 * 12 *  12 *   20 * 221.4 *  221 *
* 1974 * 224 * 18 *  59 *   10 * 242.4 *      *   * 1974 * 226 * 12 *  59 *   30 * 221.0 *  LM1 *
* 1974 * 224 * 19 *  39 *   10 * 242.0 *  LM1 *   * 1974 * 226 * 13 *  40 *   30 * 220.6 *      *
* 1974 * 224 * 20 *  00 *   20 * 241.9 *  232 *   * 1974 * 226 * 13 *  50 *   30 * 220.5 *      *
* 1974 * 224 * 21 *  56 *   40 * 240.9 *  LM2 *   * 1974 * 226 * 20 *  22 *   00 * 217.2 *  217 *
* 1974 * 224 * 22 *  13 *   40 * 240.7 *      *   * 1974 * 226 * 21 *  21 *   00 * 216.7 *  LM2 *
* 1974 * 224 * 22 *  23 *   10 * 240.7 *      *   * 1974 * 226 * 23 *  17 *   30 * 215.7 *  LM  *
* 1974 * 224 * 22 *  33 *   40 * 240.6 *      *   * 1974 * 226 * 23 *  41 *   00 * 215.5 *      *
* 1974 * 225 * 00 *  25 *   10 * 239.6 *      *   * 1974 * 227 * 00 *  30 *   40 * 215.1 *      *
* 1974 * 225 * 01 *  01 *   15 * 239.3 *  LM1 *   * 1974 * 227 * 00 *  42 *   00 * 215.0 *      *
* 1974 * 225 * 01 *  04 *   20 * 239.3 *  LM1 *   * 1974 * 227 * 01 *  19 *   10 * 214.7 *      *
* 1974 * 225 * 01 *  13 *   00 * 239.2 *  LM1 *   * 1974 * 227 * 01 *  28 *   00 * 214.6 *      *
* 1974 * 225 * 02 *  12 *   50 * 238.7 *      *   * 1974 * 227 * 04 *  39 *   40 * 213.0 *      *
* 1974 * 225 * 02 *  20 *   00 * 238.6 *      *   * 1974 * 227 * 04 *  43 *   00 * 212.9 *      *
* 1974 * 225 * 02 *  21 *   40 * 238.6 *      *   * 1974 * 227 * 06 *  36 *   00 * 212.0 *      *
* 1974 * 225 * 05 *  10 *   15 * 237.2 *      *   * 1974 * 227 * 07 *  15 *   20 * 211.6 *  221 *
* 1974 * 225 * 06 *  20 *   00 * 236.6 *  LM1 *   * 1974 * 227 * 07 *  57 *   30 * 211.3 *      *
* 1974 * 225 * 07 *  04 *   00 * 236.2 *      *   * 1974 * 227 * 09 *  25 *   30 * 210.5 *      *
* 1974 * 225 * 07 *  48 *   00 * 235.8 *      *   * 1974 * 227 * 10 *  02 *   00 * 210.2 *      *
* 1974 * 225 * 09 *  04 *   30 * 235.2 *      *   * 1974 * 227 * 10 *  59 *   30 * 209.7 *  LM1 *
* 1974 * 225 * 11 *  03 *   30 * 234.2 *  LM2 *   * 1974 * 227 * 17 *  04 *   30 * 206.6 *      *
* 1974 * 225 * 11 *  28 *   40 * 234.0 *      *   * 1974 * 227 * 17 *  28 *   20 * 206.4 *  223 *
* 1974 * 225 * 12 *  11 *   00 * 233.6 *      *   * 1974 * 227 * 17 *  35 *   30 * 206.4 *  LM2 *
* 1974 * 225 * 12 *  47 *   00 * 233.3 *  LM1 *   * 1974 * 227 * 21 *  16 *   00 * 204.5 *      *
* 1974 * 225 * 13 *  11 *   30 * 233.1 *      *   * 1974 * 227 * 21 *  41 *   30 * 204.3 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P. 5
* 1974 * 228 * 00 *  35 *   30 * 202.8 *  LM1 *  * 1974 * 250 * 03 *  56 *   00 * 292.5 *      *
* 1974 * 228 * 01 *  06 *   30 * 202.5 *      *  * 1974 * 250 * 04 *  27 *   20 * 292.3 *      *
* 1974 * 228 * 01 *  46 *   50 * 202.2 *  221 *  * 1974 * 250 * 04 *  47 *   30 * 292.1 *      *
* 1974 * 228 * 08 *  14 *   10 * 198.9 *  195 *  * 1974 * 250 * 04 *  56 *   30 * 292.0 *  LM1 *
* 1974 * 228 * 11 *  18 *   20 * 197.3 *  223 *  * 1974 * 250 * 06 *  01 *   10 * 291.5 *  291 *
* 1974 * 228 * 11 *  53 *   40 * 197.0 *  LM2 *  * 1974 * 250 * 06 *  05 *   10 * 291.4 *      *
* 1974 * 249 * 14 *  23 *   00 * 299.4 *      *  * 1974 * 250 * 06 *  10 *   00 * 291.4 *      *
* 1974 * 249 * 14 *  37 *   10 * 299.3 *      *  * 1974 * 250 * 06 *  16 *   10 * 291.3 *  289 *
* 1974 * 249 * 14 *  46 *   30 * 299.2 *      *  * 1974 * 250 * 06 *  20 *   50 * 291.3 *      *
* 1974 * 249 * 14 *  54 *   40 * 299.1 *      *  * 1974 * 250 * 06 *  24 *   00 * 291.3 *      *
* 1974 * 249 * 15 *  12 *   40 * 299.0 *      *  * 1974 * 250 * 06 *  30 *   20 * 291.2 *      *
* 1974 * 249 * 15 *  22 *   00 * 298.9 *      *  * 1974 * 250 * 06 *  31 *   50 * 291.2 *  LM1 *
* 1974 * 249 * 15 *  23 *   00 * 298.9 *      *  * 1974 * 250 * 06 *  46 *   40 * 291.1 *      *
* 1974 * 249 * 15 *  28 *   40 * 298.9 *      *  * 1974 * 250 * 06 *  48 *   30 * 291.1 *      *
* 1974 * 249 * 15 *  51 *   10 * 298.7 *      *  * 1974 * 250 * 07 *  33 *   00 * 290.7 *      *
* 1974 * 249 * 15 *  59 *   00 * 298.6 *      *  * 1974 * 250 * 07 *  46 *   00 * 290.6 *      *
* 1974 * 249 * 16 *  03 *   20 * 298.6 *  299 *  * 1974 * 250 * 07 *  53 *   50 * 290.5 *      *
* 1974 * 249 * 16 *  13 *   00 * 298.5 *  297 *  * 1974 * 250 * 08 *  02 *   10 * 290.4 *  LM1 *
* 1974 * 249 * 16 *  44 *   50 * 298.2 *      *  * 1974 * 250 * 08 *  06 *   10 * 290.4 *      *
* 1974 * 249 * 17 *  14 *   20 * 298.0 *      *  * 1974 * 250 * 08 *  20 *   30 * 290.3 *      *
* 1974 * 249 * 17 *  44 *   30 * 297.7 *      *  * 1974 * 250 * 09 *  02 *   30 * 289.9 *  287 *
* 1974 * 249 * 17 *  48 *   20 * 297.7 *      *  * 1974 * 250 * 09 *  12 *   50 * 289.8 *  286 *
* 1974 * 249 * 17 *  55 *   50 * 297.6 *      *  * 1974 * 250 * 09 *  18 *   00 * 289.8 *  LM1 *
* 1974 * 249 * 17 *  57 *   00 * 297.6 *  298 *  * 1974 * 250 * 09 *  25 *   10 * 289.7 *      *
* 1974 * 249 * 18 *  07 *   00 * 297.5 *  294 *  * 1974 * 250 * 09 *  44 *   40 * 289.6 *  290 *
* 1974 * 249 * 18 *  50 *   50 * 297.1 *  293 *  * 1974 * 250 * 10 *  03 *   00 * 289.4 *      *
* 1974 * 249 * 19 *  04 *   10 * 297.0 *      *  * 1974 * 250 * 10 *  06 *   30 * 289.4 *      *
* 1974 * 249 * 19 *  18 *   50 * 296.9 *      *  * 1974 * 250 * 10 *  13 *   20 * 289.3 *  288 *
* 1974 * 249 * 19 *  35 *   30 * 296.8 *      *  * 1974 * 250 * 10 *  30 *   40 * 289.2 *  LM1 *
* 1974 * 249 * 20 *  00 *   20 * 296.6 *  296 *  * 1974 * 250 * 10 *  30 *   40 * 289.2 *      *
* 1974 * 249 * 20 *  06 *   40 * 296.5 *      *  * 1974 * 250 * 11 *  23 *   00 * 288.7 *      *
* 1974 * 249 * 20 *  49 *   50 * 296.1 *  295 *  * 1974 * 250 * 11 *  54 *   50 * 288.5 *  LM1 *
* 1974 * 249 * 21 *  10 *   30 * 296.0 *      *  * 1974 * 250 * 12 *  10 *   30 * 288.3 *  283 *
* 1974 * 249 * 21 *  49 *   20 * 295.6 *      *  * 1974 * 250 * 12 *  52 *   00 * 288.0 *      *
* 1974 * 249 * 21 *  56 *   00 * 295.6 *      *  * 1974 * 250 * 13 *  03 *   00 * 287.9 *      *
* 1974 * 249 * 22 *  20 *   10 * 295.4 *      *  * 1974 * 250 * 13 *  13 *   20 * 287.8 *  LM1 *
* 1974 * 249 * 22 *  56 *   00 * 295.1 *      *  * 1974 * 250 * 13 *  27 *   50 * 287.7 *      *
* 1974 * 249 * 23 *  01 *   00 * 295.0 *      *  * 1974 * 250 * 13 *  53 *   20 * 287.5 *      *
* 1974 * 250 * 00 *  39 *   40 * 294.2 *      *  * 1974 * 250 * 14 *  31 *   00 * 287.1 *  LM1 *
* 1974 * 250 * 00 *  55 *   30 * 294.1 *      *  * 1974 * 250 * 14 *  55 *   00 * 286.9 *      *
* 1974 * 250 * 01 *  18 *   00 * 293.9 *      *  * 1974 * 250 * 14 *  55 *   50 * 286.9 *      *
* 1974 * 250 * 01 *  35 *   40 * 293.7 *      *  * 1974 * 250 * 15 *  39 *   40 * 286.6 *      *
* 1974 * 250 * 01 *  56 *   00 * 293.5 *      *  * 1974 * 250 * 15 *  56 *   00 * 286.4 *  LM1 *
* 1974 * 250 * 02 *  06 *   20 * 293.5 *  292 *  * 1974 * 250 * 16 *  14 *   50 * 286.4 *      *
* 1974 * 250 * 02 *  43 *   50 * 293.1 *  LM1 *  * 1974 * 250 * 16 *  35 *   20 * 286.1 *      *
* 1974 * 250 * 02 *  50 *   20 * 293.1 *      *  * 1974 * 250 * 17 *  00 *   00 * 285.9 *      *
* 1974 * 250 * 02 *  52 *   00 * 293.1 *      *  * 1974 * 250 * 17 *  01 *   50 * 285.9 *      *
* 1974 * 250 * 02 *  57 *   00 * 293.0 *      *  * 1974 * 250 * 17 *  12 *   50 * 285.8 *  LM1 *
* 1974 * 250 * 03 *  11 *   50 * 292.9 *      *  * 1974 * 250 * 17 *  13 *   50 * 285.8 *      *
* 1974 * 250 * 03 *  20 *   00 * 292.8 *      *  * 1974 * 250 * 17 *  34 *   10 * 285.6 *      *
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* YEAR * DAY * HR * MNI *   AMP *   LONG * TYPE *   * YEAR * DAY * HR * MNI *   AMP *   LONG * TYPE * P. 6
* 1974 * 250 * 18 *  03 *    00 * 285.4 *  283  *   * 1974 * 251 * 09 *  22 *    00 * 277.6 *      *
* 1974 * 250 * 18 *  10 *    30 * 285.3 *       *   * 1974 * 251 * 09 *  30 *    00 * 277.5 *      *
* 1974 * 250 * 18 *  29 *    40 * 285.1 *       *   * 1974 * 251 * 10 *  14 *    20 * 277.1 *      *
* 1974 * 250 * 18 *  34 *    00 * 285.1 *  LM1  *   * 1974 * 251 * 10 *  45 *    50 * 276.9 *      *
* 1974 * 250 * 18 *  59 *    10 * 284.9 *       *   * 1974 * 251 * 10 *  52 *    20 * 276.8 *      *
* 1974 * 250 * 19 *  34 *    40 * 284.6 *       *   * 1974 * 251 * 11 *  16 *    30 * 276.6 *  LM1 *
* 1974 * 250 * 19 *  56 *    00 * 284.4 *       *   * 1974 * 251 * 11 *  49 *    00 * 276.3 *      *
* 1974 * 250 * 20 *  01 *    10 * 284.4 *       *   * 1974 * 251 * 12 *  10 *    10 * 276.1 *      *
* 1974 * 250 * 20 *  02 *    10 * 284.3 *  LM1  *   * 1974 * 251 * 12 *  30 *    30 * 276.0 *      *
* 1974 * 250 * 20 *  12 *    00 * 284.3 *       *   * 1974 * 251 * 12 *  59 *    20 * 275.7 *  275 *
* 1974 * 250 * 21 *  09 *    10 * 283.8 *       *   * 1974 * 251 * 13 *  08 *    50 * 275.7 *      *
* 1974 * 250 * 21 *  30 *    10 * 283.6 *  LM1  *   * 1974 * 251 * 13 *  20 *    30 * 275.6 *  LM1 *
* 1974 * 250 * 21 *  57 *    50 * 283.4 *       *   * 1974 * 251 * 13 *  28 *    40 * 275.5 *      *
* 1974 * 250 * 22 *  15 *    00 * 283.2 *       *   * 1974 * 251 * 15 *  08 *    40 * 274.6 *      *
* 1974 * 250 * 22 *  28 *    50 * 283.1 *       *   * 1974 * 251 * 15 *  14 *    40 * 274.6 *  LM2 *
* 1974 * 250 * 22 *  45 *    40 * 283.0 *  283  *   * 1974 * 251 * 15 *  26 *    00 * 274.5 *      *
* 1974 * 250 * 22 *  52 *    40 * 282.9 *  LM1  *   * 1974 * 251 * 15 *  29 *    40 * 274.5 *  LM1 *
* 1974 * 250 * 22 *  59 *    40 * 282.8 *       *   * 1974 * 251 * 15 *  33 *    20 * 274.4 *      *
* 1974 * 250 * 23 *  38 *    10 * 282.8 *       *   * 1974 * 251 * 15 *  57 *    10 * 274.2 *  283 *
* 1974 * 251 * 00 *  28 *    40 * 282.1 *  LM1  *   * 1974 * 251 * 16 *  08 *    50 * 274.1 *      *
* 1974 * 251 * 00 *  57 *    20 * 281.8 *       *   * 1974 * 251 * 16 *  35 *    00 * 273.9 *      *
* 1974 * 251 * 01 *  17 *    10 * 281.7 *       *   * 1974 * 251 * 17 *  41 *    40 * 273.3 *  LM1 *
* 1974 * 251 * 01 *  50 *    40 * 281.4 *  275  *   * 1974 * 251 * 18 *  17 *    20 * 273.0 *      *
* 1974 * 251 * 02 *  19 *    50 * 281.2 *  LM1  *   * 1974 * 251 * 19 *  38 *    00 * 272.3 *      *
* 1974 * 251 * 02 *  37 *    00 * 281.0 *       *   * 1974 * 251 * 19 *  39 *    50 * 272.3 *      *
* 1974 * 251 * 02 *  51 *    50 * 280.9 *       *   * 1974 * 251 * 19 *  56 *    00 * 272.2 *  LM1 *
* 1974 * 251 * 02 *  56 *    10 * 280.8 *       *   * 1974 * 251 * 20 *  23 *    10 * 272.0 *  LM2 *
* 1974 * 251 * 03 *  00 *    00 * 280.8 *  283  *   * 1974 * 251 * 22 *  08 *    00 * 271.1 *      *
* 1974 * 251 * 03 *  10 *    30 * 280.7 *       *   * 1974 * 251 * 22 *  24 *    00 * 270.9 *  LM1 *
* 1974 * 251 * 03 *  59 *    30 * 280.3 *       *   * 1974 * 251 * 22 *  57 *    10 * 270.7 *      *
* 1974 * 251 * 04 *  09 *    00 * 280.2 *       *   * 1974 * 251 * 23 *  32 *    50 * 270.4 *      *
* 1974 * 251 * 04 *  13 *    00 * 280.2 *       *   * 1974 * 252 * 00 *  55 *    30 * 269.7 *      *
* 1974 * 251 * 04 *  27 *    20 * 280.1 *       *   * 1974 * 252 * 01 *  03 *    00 * 269.6 *  LM1 *
* 1974 * 251 * 04 *  53 *    00 * 279.8 *       *   * 1974 * 252 * 01 *  28 *    40 * 269.4 *  275 *
* 1974 * 251 * 05 *  16 *    20 * 279.7 *       *   * 1974 * 252 * 03 *  35 *    40 * 268.3 *      *
* 1974 * 251 * 05 *  25 *    20 * 279.6 *       *   * 1974 * 252 * 03 *  43 *    20 * 268.2 *  LM1 *
* 1974 * 251 * 05 *  47 *    00 * 279.4 *  LM1  *   * 1974 * 252 * 03 *  50 *    00 * 268.2 *      *
* 1974 * 251 * 05 *  49 *    30 * 279.4 *       *   * 1974 * 252 * 04 *  06 *    50 * 268.0 *      *
* 1974 * 251 * 06 *  10 *    30 * 279.2 *       *   * 1974 * 252 * 04 *  20 *    00 * 267.9 *      *
* 1974 * 251 * 06 *  12 *    00 * 279.2 *       *   * 1974 * 252 * 04 *  28 *    20 * 267.9 *      *
* 1974 * 251 * 06 *  19 *    30 * 279.1 *       *   * 1974 * 252 * 05 *  09 *    20 * 267.5 *      *
* 1974 * 251 * 06 *  28 *    00 * 279.0 *       *   * 1974 * 252 * 05 *  34 *    50 * 267.3 *      *
* 1974 * 251 * 07 *  06 *    40 * 278.7 *       *   * 1974 * 252 * 06 *  13 *    00 * 267.0 *      *
* 1974 * 251 * 07 *  25 *    30 * 278.6 *  283  *   * 1974 * 252 * 06 *  25 *    20 * 266.9 *      *
* 1974 * 251 * 07 *  35 *    30 * 278.5 *  LM1  *   * 1974 * 252 * 06 *  33 *    00 * 266.8 *  LM1 *
* 1974 * 251 * 07 *  50 *    00 * 278.3 *       *   * 1974 * 252 * 07 *  27 *    20 * 266.3 *      *
* 1974 * 251 * 07 *  51 *    20 * 278.3 *       *   * 1974 * 252 * 07 *  52 *    00 * 266.1 *      *
* 1974 * 251 * 08 *  13 *    20 * 278.2 *       *   * 1974 * 252 * 07 *  53 *    55 * 266.1 *      *
* 1974 * 251 * 08 *  14 *    10 * 278.1 *       *   * 1974 * 252 * 07 *  56 *    55 * 266.1 *      *
* 1974 * 251 * 09 *  18 *    40 * 277.6 *  LM1  *   * 1974 * 252 * 09 *  21 *    40 * 265.4 *  LM1 *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *   * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P. 7
* 1974 * 252 * 09 *  30 *   10 * 265.3 *      *   * 1974 * 295 * 20 *  40 *   30 * 095.1 *      *
* 1974 * 252 * 10 *  35 *   00 * 264.7 *      *   * 1974 * 295 * 22 *  15 *   10 * 094.2 *      *
* 1974 * 252 * 10 *  59 *   30 * 264.5 *      *   * 1974 * 295 * 22 *  17 *   15 * 094.2 *      *
* 1974 * 252 * 11 *  01 *   55 * 264.5 *  223 *   * 1974 * 295 * 22 *  47 *   35 * 094.0 *      *
* 1974 * 252 * 11 *  28 *   30 * 264.3 *      *   * 1974 * 296 * 00 *  01 *   00 * 093.4 *      *
* 1974 * 252 * 12 *  23 *   40 * 263.8 *      *   * 1974 * 296 * 01 *  10 *   45 * 092.8 *  LM2 *
* 1974 * 252 * 12 *  27 *   15 * 263.8 *  LM1 *   * 1974 * 296 * 01 *  48 *   40 * 092.4 *  089 *
* 1974 * 252 * 14 *  16 *   40 * 262.9 *      *   * 1974 * 295 * 03 *  32 *   30 * 091.6 *  LM2 *
* 1974 * 252 * 14 *  22 *   25 * 262.8 *      *   * 1974 * 296 * 03 *  46 *   30 * 091.4 *      *
* 1974 * 252 * 14 *  34 *   20 * 262.7 *      *   * 1974 * 296 * 05 *  43 *   40 * 090.5 *      *
* 1974 * 252 * 15 *  40 *   30 * 262.2 *  LM1 *   * 1974 * 296 * 06 *  17 *   50 * 090.2 *      *
* 1974 * 252 * 15 *  42 *   55 * 262.1 *  275 *   * 1974 * 296 * 06 *  46 *   20 * 089.9 *      *
* 1974 * 252 * 17 *  53 *   00 * 261.0 *      *   * 1974 * 296 * 07 *  42 *   20 * 089.5 *  089 *
* 1974 * 252 * 18 *  55 *   30 * 260.5 *  LM1 *   * 1974 * 296 * 07 *  51 *   00 * 089.4 *      *
* 1974 * 252 * 23 *  29 *   00 * 258.2 *      *   * 1974 * 296 * 08 *  28 *   20 * 089.1 *      *
* 1974 * 253 * 00 *  01 *   30 * 257.9 *      *   * 1974 * 296 * 08 *  46 *   05 * 088.9 *      *
* 1974 * 253 * 01 *  52 *   50 * 257.0 *  LM1 *   * 1974 * 296 * 13 *  25 *   20 * 086.6 *      *
* 1974 * 253 * 01 *  52 *   50 * 257.0 *      *   * 1974 * 296 * 13 *  31 *   20 * 086.5 *  LM2 *
* 1974 * 253 * 02 *  29 *   00 * 256.7 *      *   * 1974 * 296 * 14 *  48 *   10 * 085.9 *      *
* 1974 * 253 * 03 *  24 *   00 * 256.2 *      *   * 1974 * 296 * 14 *  55 *   00 * 085.8 *      *
* 1974 * 253 * 05 *  33 *   10 * 255.1 *  223 *   * 1974 * 296 * 16 *  02 *   20 * 085.2 *      *
* 1974 * 253 * 05 *  43 *   20 * 255.0 *  LM2 *   * 1974 * 296 * 16 *  02 *   30 * 085.2 *      *
* 1974 * 253 * 05 *  47 *   30 * 255.0 *  LM1 *   * 1974 * 296 * 16 *  31 *   50 * 085.0 *      *
* 1974 * 253 * 07 *  33 *   50 * 254.1 *      *   * 1974 * 296 * 16 *  38 *   30 * 084.9 *  083 *
* 1974 * 253 * 08 *  46 *   00 * 253.5 *  275 *   * 1974 * 296 * 17 *  10 *   20 * 084.6 *  084 *
* 1974 * 253 * 09 *  43 *   00 * 253.0 *  LM1 *   * 1974 * 296 * 17 *  15 *   10 * 084.6 *  083 *
* 1974 * 253 * 10 *  05 *   00 * 252.8 *      *   * 1974 * 296 * 17 *  46 *   50 * 084.3 *      *
* 1974 * 253 * 11 *  11 *   30 * 252.2 *      *   * 1974 * 296 * 18 *  00 *   20 * 084.2 *  083 *
* 1974 * 253 * 13 *  43 *   30 * 250.9 *  LM1 *   * 1974 * 296 * 18 *  46 *   00 * 083.8 *      *
* 1974 * 253 * 14 *  23 *   30 * 250.6 *  232 *   * 1974 * 296 * 18 *  55 *   40 * 083.8 *      *
* 1974 * 253 * 14 *  52 *   40 * 250.4 *  LM2 *   * 1974 * 296 * 19 *  36 *   20 * 083.4 *  082 *
* 1974 * 253 * 16 *  02 *   40 * 249.8 *      *   * 1974 * 296 * 19 *  45 *   50 * 083.3 *      *
* 1974 * 253 * 18 *  14 *   40 * 248.6 *  LM1 *   * 1974 * 296 * 21 *  13 *   40 * 082.6 *  LM2 *
* 1974 * 253 * 18 *  25 *   30 * 248.6 *      *   * 1974 * 296 * 21 *  17 *   30 * 082.6 *      *
* 1974 * 253 * 19 *  21 *   00 * 248.1 *      *   * 1974 * 296 * 21 *  48 *   00 * 082.3 *  082 *
* 1974 * 253 * 19 *  21 *   55 * 248.1 *      *   * 1974 * 296 * 21 *  53 *   30 * 082.3 *  LM2 *
* 1974 * 253 * 21 *  56 *   00 * 246.8 *      *   * 1974 * 296 * 23 *  03 *   20 * 081.7 *      *
* 1974 * 253 * 22 *  25 *   20 * 246.5 *      *   * 1974 * 296 * 23 *  19 *   50 * 081.5 *      *
* 1974 * 253 * 23 *  06 *   00 * 246.2 *  LM2 *   * 1974 * 297 * 03 *  01 *   50 * 079.7 *      *
* 1974 * 253 * 23 *  28 *   50 * 246.0 *  LM1 *   * 1974 * 297 * 03 *  05 *   40 * 079.6 *      *
* 1974 * 295 * 14 *  55 *   50 * 098.0 *  LM2 *   * 1974 * 297 * 04 *  06 *   00 * 079.1 *      *
* 1974 * 295 * 15 *  01 *   30 * 097.9 *      *   * 1974 * 297 * 04 *  32 *   00 * 078.9 *      *
* 1974 * 295 * 16 *  54 *   40 * 097.0 *      *   * 1974 * 297 * 05 *  19 *   00 * 078.5 *      *
* 1974 * 295 * 17 *  37 *   10 * 096.6 *      *   * 1974 * 297 * 06 *  07 *   40 * 078.1 *      *
* 1974 * 295 * 17 *  40 *   35 * 096.6 *      *   * 1974 * 297 * 07 *  01 *   20 * 077.6 *      *
* 1974 * 295 * 18 *  12 *   00 * 096.3 *  LM2 *   * 1974 * 297 * 07 *  22 *   50 * 077.4 *      *
* 1974 * 295 * 18 *  35 *   30 * 096.1 *      *   * 1974 * 297 * 08 *  50 *   20 * 076.7 *  LM2 *
* 1974 * 295 * 18 *  44 *   20 * 096.0 *  096 *   * 1974 * 297 * 09 *  22 *   00 * 076.4 *  057 *
* 1974 * 295 * 18 *  54 *   20 * 095.9 *      *   * 1974 * 297 * 09 *  55 *   20 * 076.2 *  068 *
* 1974 * 295 * 19 *  57 *   00 * 095.4 *  084 *   * 1974 * 297 * 10 *  03 *   10 * 076.1 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P. 8
* 1974 * 297 * 11 *  41 *   40 * 075.3 *  LM2 *  * 1974 * 305 * 18 *  40 *   30 * 334.5 *      *
* 1974 * 297 * 12 *  06 *   40 * 075.0 *      *  * 1974 * 305 * 19 *  09 *   10 * 334.2 *      *
* 1974 * 297 * 12 *  56 *   20 * 074.6 *  070 *  * 1974 * 305 * 19 *  28 *   20 * 334.1 *      *
* 1974 * 297 * 13 *  23 *   30 * 074.4 *  057 *  * 1974 * 305 * 19 *  58 *   00 * 333.8 *  33B *
* 1974 * 297 * 17 *  08 *   20 * 072.5 *      *  * 1974 * 305 * 20 *  36 *   20 * 333.5 *  33C *
* 1974 * 297 * 17 *  18 *   00 * 072.4 *  057 *  * 1974 * 305 * 20 *  39 *   50 * 333.5 *  33D *
* 1974 * 297 * 17 *  53 *   50 * 072.1 *      *  * 1974 * 305 * 21 *  01 *   20 * 333.3 *      *
* 1974 * 297 * 19 *  12 *   30 * 071.4 *      *  * 1974 * 305 * 21 *  16 *   10 * 333.2 *      *
* 1974 * 297 * 19 *  16 *   30 * 071.4 *  LM2 *  * 1974 * 305 * 21 *  44 *   50 * 332.9 *      *
* 1974 * 297 * 19 *  20 *   10 * 071.4 *      *  * 1974 * 305 * 22 *  01 *   10 * 332.8 *      *
* 1974 * 297 * 20 *  41 *   50 * 070.7 *      *  * 1974 * 305 * 22 *  16 *   20 * 332.7 *      *
* 1974 * 297 * 21 *  02 *   20 * 070.5 *      *  * 1974 * 305 * 22 *  42 *   00 * 332.5 *      *
* 1974 * 297 * 21 *  26 *   30 * 070.3 *  057 *  * 1974 * 305 * 23 *  05 *   00 * 332.3 *      *
* 1974 * 297 * 21 *  29 *   05 * 070.3 *      *  * 1974 * 305 * 23 *  15 *   20 * 332.2 *  33E *
* 1974 * 297 * 21 *  34 *   00 * 070.2 *  LM2 *  * 1974 * 305 * 23 *  26 *   00 * 332.1 *      *
* 1974 * 297 * 21 *  49 *   50 * 070.1 *  070 *  * 1974 * 306 * 00 *  27 *   40 * 331.6 *      *
* 1974 * 297 * 22 *  14 *   00 * 069.9 *      *  * 1974 * 306 * 01 *  37 *   20 * 331.0 *      *
* 1974 * 297 * 22 *  19 *   00 * 069.9 *      *  * 1974 * 306 * 01 *  55 *   10 * 330.8 *      *
* 1974 * 297 * 22 *  20 *   20 * 069.9 *      *  * 1974 * 306 * 01 *  59 *   10 * 330.8 *      *
* 1974 * 298 * 00 *  24 *   00 * 068.8 *  062 *  * 1974 * 306 * 02 *  01 *   05 * 330.8 *      *
* 1974 * 298 * 01 *  03 *   30 * 068.5 *      *  * 1974 * 306 * 02 *  28 *   40 * 330.5 *      *
* 1974 * 298 * 01 *  31 *   10 * 068.2 *  057 *  * 1974 * 306 * 02 *  33 *   10 * 330.5 *      *
* 1974 * 298 * 02 *  00 *   00 * 068.0 *  068 *  * 1974 * 306 * 02 *  45 *   40 * 330.4 *      *
* 1974 * 298 * 02 *  15 *   40 * 067.9 *      *  * 1974 * 306 * 02 *  48 *   40 * 330.4 *  329 *
* 1974 * 298 * 03 *  03 *   50 * 067.5 *      *  * 1974 * 306 * 03 *  20 *   40 * 330.1 *      *
* 1974 * 298 * 04 *  16 *   40 * 066.8 *      *  * 1974 * 306 * 03 *  47 *   20 * 329.9 *      *
* 1974 * 298 * 05 *  44 *   10 * 066.1 *      *  * 1974 * 306 * 04 *  37 *   10 * 329.5 *  326 *
* 1974 * 298 * 06 *  07 *   10 * 065.9 *  062 *  * 1974 * 306 * 05 *  05 *   40 * 329.2 *      *
* 1974 * 298 * 06 *  11 *   30 * 065.9 *  057 *  * 1974 * 306 * 05 *  11 *   50 * 329.2 *      *
* 1974 * 298 * 07 *  41 *   00 * 065.1 *      *  * 1974 * 306 * 05 *  43 *   30 * 328.9 *      *
* 1974 * 298 * 08 *  23 *   20 * 064.8 *      *  * 1974 * 306 * 06 *  29 *   20 * 328.5 *      *
* 1974 * 298 * 08 *  46 *   00 * 064.6 *      *  * 1974 * 306 * 06 *  45 *   20 * 328.4 *      *
* 1974 * 298 * 09 *  04 *   00 * 064.4 *      *  * 1974 * 306 * 06 *  49 *   30 * 328.3 *  328 *
* 1974 * 298 * 10 *  08 *   30 * 063.9 *      *  * 1974 * 306 * 07 *  25 *   00 * 328.0 *      *
* 1974 * 298 * 11 *  07 *   00 * 063.4 *  054 *  * 1974 * 306 * 08 *  13 *   00 * 327.6 *      *
* 1974 * 298 * 11 *  34 *   05 * 063.1 *      *  * 1974 * 306 * 08 *  35 *   00 * 327.6 *      *
* 1974 * 298 * 11 *  45 *   00 * 063.1 *  057 *  * 1974 * 306 * 08 *  38 *   45 * 327.4 *  327 *
* 1974 * 298 * 11 *  58 *   00 * 062.9 *  LM1 *  * 1974 * 306 * 08 *  42 *   00 * 327.4 *      *
* 1974 * 298 * 12 *  28 *   20 * 062.7 *  062 *  * 1974 * 306 * 08 *  52 *   40 * 327.3 *      *
* 1974 * 298 * 12 *  32 *   30 * 062.7 *      *  * 1974 * 306 * 09 *  23 *   20 * 327.0 *      *
* 1974 * 298 * 15 *  07 *   10 * 061.3 *  054 *  * 1974 * 306 * 09 *  28 *   30 * 327.0 *      *
* 1974 * 298 * 16 *  02 *   50 * 060.9 *      *  * 1974 * 306 * 10 *  04 *   10 * 326.7 *  LM2 *
* 1974 * 298 * 16 *  42 *   10 * 060.5 *      *  * 1974 * 306 * 10 *  05 *   50 * 326.7 *      *
* 1974 * 305 * 17 *  27 *   20 * 335.1 *      *  * 1974 * 306 * 10 *  13 *   20 * 326.6 *      *
* 1974 * 305 * 17 *  39 *   30 * 335.0 *      *  * 1974 * 306 * 10 *  24 *   00 * 326.5 *  326 *
* 1974 * 305 * 17 *  50 *   00 * 334.9 *      *  * 1974 * 306 * 10 *  40 *   30 * 326.4 *      *
* 1974 * 305 * 17 *  57 *   20 * 334.9 *      *  * 1974 * 306 * 10 *  45 *   00 * 326.4 *      *
* 1974 * 305 * 18 *  07 *   00 * 334.8 *      *  * 1974 * 306 * 10 *  53 *   10 * 326.3 *      *
* 1974 * 305 * 18 *  11 *   55 * 334.7 *      *  * 1974 * 306 * 11 *  04 *   00 * 326.2 *      *
* 1974 * 305 * 18 *  38 *   30 * 334.5 *  330 *  * 1974 * 306 * 11 *  07 *   30 * 326.2 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
* 1974 * 306 * 11 *  16 *   30 * 326.1 *      *  * 1974 * 306 * 22 *  00 *   00 * 320.7 *      *
* 1974 * 306 * 11 *  22 *   50 * 326.0 *      *  * 1974 * 306 * 22 *  02 *   20 * 320.6 *      *
* 1974 * 306 * 11 *  29 *   30 * 326.0 *      *  * 1974 * 306 * 22 *  07 *   00 * 320.6 *      *
* 1974 * 306 * 11 *  38 *   45 * 325.9 *  324 *  * 1974 * 306 * 22 *  09 *   10 * 320.6 *      *
* 1974 * 306 * 12 *  05 *   00 * 325.7 *  310 *  * 1974 * 306 * 22 *  22 *   30 * 320.5 *      *
* 1974 * 306 * 12 *  06 *   00 * 325.7 *      *  * 1974 * 306 * 22 *  38 *   10 * 320.3 *      *
* 1974 * 306 * 12 *  50 *   30 * 325.3 *      *  * 1974 * 306 * 21 *  41 *   00 * 320.8 *  32H *
* 1974 * 306 * 12 *  52 *   40 * 325.3 *      *  * 1974 * 306 * 22 *  41 *   00 * 320.3 *  32F *
* 1974 * 306 * 13 *  01 *   00 * 325.2 *  320 *  * 1974 * 306 * 23 *  12 *   10 * 320.1 *      *
* 1974 * 306 * 13 *  20 *   00 * 325.0 *      *  * 1974 * 306 * 23 *  14 *   10 * 320.0 *      *
* 1974 * 306 * 13 *  22 *   00 * 325.0 *  325 *  * 1974 * 306 * 23 *  15 *   20 * 320.0 *      *
* 1974 * 306 * 13 *  32 *   15 * 324.9 *  322 *  * 1974 * 306 * 23 *  38 *   00 * 319.8 *      *
* 1974 * 306 * 13 *  57 *   00 * 324.7 *      *  * 1974 * 307 * 00 *  05 *   00 * 319.6 *      *
* 1974 * 306 * 14 *  06 *   20 * 324.7 *      *  * 1974 * 307 * 00 *  31 *   50 * 319.4 *      *
* 1974 * 306 * 14 *  25 *   30 * 324.5 *  321 *  * 1974 * 307 * 00 *  35 *   00 * 319.4 *  319 *
* 1974 * 306 * 14 *  26 *   30 * 324.5 *      *  * 1974 * 307 * 01 *  05 *   40 * 319.1 *  LM2 *
* 1974 * 306 * 14 *  49 *   10 * 324.3 *      *  * 1974 * 307 * 01 *  08 *   25 * 319.1 *  310 *
* 1974 * 306 * 15 *  09 *   40 * 324.1 *      *  * 1974 * 307 * 01 *  22 *   00 * 319.0 *      *
* 1974 * 306 * 15 *  29 *   30 * 324.0 *      *  * 1974 * 307 * 01 *  35 *   00 * 318.8 *      *
* 1974 * 306 * 15 *  30 *   50 * 324.0 *  323 *  * 1974 * 307 * 01 *  39 *   20 * 318.8 *      *
* 1974 * 306 * 15 *  32 *   35 * 323.9 *      *  * 1974 * 307 * 01 *  59 *   20 * 318.6 *  LM2 *
* 1974 * 306 * 15 *  34 *   10 * 323.9 *      *  * 1974 * 307 * 02 *  10 *   50 * 318.6 *      *
* 1974 * 306 * 15 *  54 *   20 * 323.7 *      *  * 1974 * 307 * 02 *  13 *   00 * 318.5 *      *
* 1974 * 306 * 16 *  05 *   00 * 323.7 *      *  * 1974 * 307 * 02 *  17 *   40 * 318.5 *      *
* 1974 * 306 * 16 *  10 *   25 * 323.6 *      *  * 1974 * 307 * 02 *  19 *   40 * 318.5 *      *
* 1974 * 306 * 16 *  12 *   00 * 323.6 *      *  * 1974 * 307 * 02 *  34 *   00 * 318.3 *      *
* 1974 * 306 * 16 *  14 *   40 * 323.6 *      *  * 1974 * 307 * 02 *  51 *   50 * 318.2 *  312 *
* 1974 * 306 * 16 *  23 *   30 * 323.5 *      *  * 1974 * 307 * 03 *  20 *   00 * 318.0 *  316 *
* 1974 * 306 * 16 *  27 *   15 * 323.5 *      *  * 1974 * 307 * 03 *  25 *   50 * 317.9 *      *
* 1974 * 306 * 16 *  45 *   50 * 323.3 *      *  * 1974 * 307 * 03 *  40 *   50 * 317.8 *      *
* 1974 * 306 * 16 *  50 *   15 * 323.3 *      *  * 1974 * 307 * 04 *  17 *   00 * 317.5 *  318 *
* 1974 * 306 * 17 *  10 *   10 * 323.1 *      *  * 1974 * 307 * 04 *  24 *   10 * 317.4 *      *
* 1974 * 306 * 17 *  30 *   00 * 322.9 *      *  * 1974 * 307 * 04 *  30 *   50 * 317.4 *  317 *
* 1974 * 306 * 17 *  56 *   00 * 322.7 *  326 *  * 1974 * 307 * 05 *  52 *   00 * 316.7 *      *
* 1974 * 306 * 18 *  16 *   30 * 322.6 *  32A *  * 1974 * 307 * 05 *  58 *   00 * 316.6 *      *
* 1974 * 306 * 19 *  00 *   40 * 322.2 *      *  * 1974 * 307 * 07 *  07 *   25 * 316.0 *      *
* 1974 * 306 * 19 *  38 *   10 * 321.9 *      *  * 1974 * 307 * 07 *  10 *   50 * 316.0 *      *
* 1974 * 306 * 19 *  41 *   45 * 321.8 *  32E *  * 1974 * 307 * 07 *  20 *   35 * 315.9 *  LM2 *
* 1974 * 306 * 19 *  45 *   30 * 321.8 *      *  * 1974 * 307 * 07 *  43 *   20 * 315.7 *      *
* 1974 * 306 * 19 *  50 *   20 * 321.8 *  32C *  * 1974 * 307 * 07 *  44 *   40 * 315.7 *      *
* 1974 * 306 * 19 *  58 *   55 * 321.7 *      *  * 1974 * 307 * 07 *  47 *   45 * 315.6 *      *
* 1974 * 306 * 20 *  03 *   05 * 321.6 *      *  * 1974 * 307 * 07 *  59 *   00 * 315.6 *      *
* 1974 * 306 * 20 *  04 *   30 * 321.6 *      *  * 1974 * 307 * 08 *  02 *   30 * 315.6 *  314 *
* 1974 * 306 * 20 *  28 *   10 * 321.4 *  32B *  * 1974 * 307 * 08 *  46 *   30 * 315.2 *  315 *
* 1974 * 306 * 20 *  40 *   30 * 321.3 *      *  * 1974 * 307 * 09 *  00 *   40 * 315.1 * [illegible] *
* 1974 * 306 * 20 *  42 *   30 * 321.3 *      *  * 1974 * 307 * 09 *  05 *   50 * 315.1 *      *
* 1974 * 306 * 20 *  49 *   40 * 321.3 *      *  * 1974 * 307 * 09 *  25 *   20 * 314.9 *      *
* 1974 * 306 * 21 *  06 *   20 * 321.1 *  32D *  * 1974 * 307 * 09 *  32 *   50 * 314.8 *      *
* 1974 * 306 * 21 *  32 *   30 * 320.9 *  32G *  * 1974 * 307 * 09 *  38 *   10 * 314.8 *      *
* 1974 * 306 * 21 *  43 *   55 * 320.8 *      *  * 1974 * 307 * 09 *  49 *   30 * 314.7 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
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* 1974 * 307 * 10 *  48 *  10 * 314.2 *      *  * 1974 * 307 * 21 *  02 *  00 * 309.0 *  30A *
* 1974 * 307 * 11 *  04 *  00 * 314.0 *      *  * 1974 * 307 * 21 *  21 *  35 * 308.8 *  LM2 *
* 1974 * 307 * 11 *  10 *  00 * 314.0 *  311 *  * 1974 * 307 * 21 *  22 *  00 * 308.8 *      *
* 1974 * 307 * 11 *  10 *  30 * 314.0 *  31A *  * 1974 * 307 * 21 *  31 *  00 * 308.8 *      *
* 1974 * 307 * 11 *  20 *  05 * 313.9 *      *  * 1974 * 307 * 22 *  09 *  00 * 308.4 *  309 *
* 1974 * 307 * 11 *  28 *  30 * 313.8 *      *  * 1974 * 307 * 22 *  15 *  50 * 308.4 *  308 *
* 1974 * 307 * 12 *  04 *  00 * 313.5 *      *  * 1974 * 307 * 22 *  23 *  40 * 308.3 *      *
* 1974 * 307 * 12 *  18 *  00 * 313.4 *  LM2 *  * 1974 * 307 * 22 *  25 *  40 * 308.3 *      *
* 1974 * 307 * 12 *  23 *  00 * 313.4 *      *  * 1974 * 307 * 22 *  31 *  10 * 308.2 *      *
* 1974 * 307 * 12 *  44 *  05 * 313.2 *  LM2 *  * 1974 * 307 * 22 *  43 *  30 * 308.1 *  307 *
* 1974 * 307 * 12 *  51 *  30 * 313.1 *      *  * 1974 * 307 * 23 *  25 *  10 * 307.8 *      *
* 1974 * 307 * 13 *  26 *  00 * 312.8 *  31B *  * 1974 * 307 * 23 *  38 *  40 * 307.7 *      *
* 1974 * 307 * 13 *  33 *  00 * 312.8 *  303 *  * 1974 * 307 * 23 *  43 *  10 * 307.6 *      *
* 1974 * 307 * 13 *  41 *  00 * 312.7 *      *  * 1974 * 307 * 23 *  57 *  50 * 307.5 *  30A *
* 1974 * 307 * 13 *  50 *  50 * 312.6 *  31C *  * 1974 * 308 * 00 *  02 *  20 * 307.5 *      *
* 1974 * 307 * 14 *  00 *  00 * 312.6 *      *  * 1974 * 308 * 00 *  16 *  15 * 307.4 *      *
* 1974 * 307 * 14 *  34 *  20 * 312.3 *      *  * 1974 * 308 * 00 *  20 *  30 * 307.3 *      *
* 1974 * 307 * 14 *  40 *  10 * 312.2 *      *  * 1974 * 308 * 00 *  53 *  10 * 307.1 *  306 *
* 1974 * 307 * 14 *  41 *  50 * 312.2 *      *  * 1974 * 308 * 01 *  05 *  20 * 307.0 *      *
* 1974 * 307 * 14 *  43 *  45 * 312.2 *      *  * 1974 * 308 * 01 *  15 *  25 * 306.9 *  305 *
* 1974 * 307 * 14 *  53 *  45 * 312.1 *      *  * 1974 * 308 * 01 *  43 *  40 * 306.6 *  LM2 *
* 1974 * 307 * 15 *  03 *  20 * 312.0 *      *  * 1974 * 308 * 01 *  44 *  30 * 306.6 *  LM1 *
* 1974 * 307 * 15 *  15 *  30 * 311.9 *  31D *  * 1974 * 308 * 02 *  22 *  30 * 306.3 *      *
* 1974 * 307 * 15 *  25 *  40 * 311.8 *      *  * 1974 * 308 * 02 *  25 *  30 * 306.3 *      *
* 1974 * 307 * 15 *  27 *  20 * 311.8 *      *  * 1974 * 308 * 02 *  33 *  30 * 306.2 *  LM2 *
* 1974 * 307 * 15 *  35 *  00 * 311.8 *      *  * 1974 * 308 * 02 *  40 *  00 * 306.1 *      *
* 1974 * 307 * 15 *  47 *  00 * 311.7 *      *  * 1974 * 308 * 02 *  42 *  15 * 306.1 *      *
* 1974 * 307 * 15 *  57 *  50 * 311.6 *      *  * 1974 * 308 * 02 *  45 *  00 * 306.1 *      *
* 1974 * 307 * 16 *  08 *  40 * 311.5 *      *  * 1974 * 308 * 03 *  07 *  35 * 305.9 *      *
* 1974 * 307 * 16 *  11 *  10 * 311.5 *  31E *  * 1974 * 308 * 03 *  20 *  10 * 305.8 *  30A *
* 1974 * 307 * 16 *  22 *  10 * 311.4 *      *  * 1974 * 308 * 03 *  23 *  30 * 305.8 *  300 *
* 1974 * 307 * 16 *  26 *  15 * 311.3 *      *  * 1974 * 308 * 03 *  42 *  00 * 305.6 *  302 *
* 1974 * 307 * 16 *  50 *  00 * 311.1 *      *  * 1974 * 308 * 03 *  54 *  20 * 305.5 *      *
* 1974 * 307 * 17 *  00 *  50 * 311.0 *      *  * 1974 * 308 * 03 *  57 *  30 * 305.5 *      *
* 1974 * 307 * 17 *  07 *  50 * 311.0 *      *  * 1974 * 308 * 04 *  03 *  30 * 305.4 *      *
* 1974 * 307 * 17 *  10 *  50 * 311.0 *  LM2 *  * 1974 * 308 * 04 *  14 *  40 * 305.4 *  304 *
* 1974 * 307 * 17 *  35 *  00 * 310.7 *      *  * 1974 * 308 * 04 *  16 *  00 * 305.3 *      *
* 1974 * 307 * 17 *  53 *  30 * 310.6 *      *  * 1974 * 308 * 04 *  46 *  00 * 305.1 *      *
* 1974 * 307 * 17 *  59 *  10 * 310.5 *      *  * 1974 * 308 * 04 *  49 *  20 * 305.1 *  LM2 *
* 1974 * 307 * 18 *  20 *  50 * 310.4 *      *  * 1974 * 308 * 04 *  50 *  50 * 305.1 *  LM1 *
* 1974 * 307 * 18 *  32 *  00 * 310.3 *  310 *  * 1974 * 308 * 04 *  55 *  00 * 305.0 *      *
* 1974 * 307 * 18 *  44 *  30 * 310.2 *  31G *  * 1974 * 308 * 04 *  58 *  35 * 305.0 *  301 *
* 1974 * 307 * 18 *  49 *  00 * 310.1 *  31F *  * 1974 * 308 * 05 *  04 *  00 * 304.9 *      *
* 1974 * 307 * 18 *  56 *  10 * 310.1 *  31H *  * 1974 * 308 * 05 *  27 *  10 * 304.7 *      *
* 1974 * 307 * 19 *  01 *  30 * 310.0 *      *  * 1974 * 308 * 05 *  37 *  10 * 304.7 *      *
* 1974 * 307 * 19 *  26 *  00 * 309.8 *      *  * 1974 * 308 * 05 *  43 *  00 * 304.6 *  30B *
* 1974 * 307 * 19 *  49 *  50 * 309.6 *  LM1 *  * 1974 * 308 * 05 *  50 *  00 * 304.5 *      *
* 1974 * 307 * 20 *  17 *  30 * 309.4 *      *  * 1974 * 308 * 06 *  40 *  05 * 304.1 *      *
* 1974 * 307 * 20 *  41 *  20 * 309.2 *      *  * 1974 * 308 * 06 *  53 *  10 * 304.0 *  30A *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
* 1974 * 308 * 06 *  56 *   00 * 304.0 *      *  * 1974 * 308 * 19 *  48 *   30 * 297.5 *      *
* 1974 * 308 * 07 *  28 *   00 * 303.7 *      *  * 1974 * 308 * 20 *  23 *   00 * 297.2 *      *
* 1974 * 308 * 07 *  39 *   05 * 303.6 * LM1  *  * 1974 * 308 * 20 *  38 *   30 * 297.0 *  297 *
* 1974 * 308 * 07 *  40 *   05 * 303.6 * 30C  *  * 1974 * 308 * 20 *  45 *   00 * 297.0 *      *
* 1974 * 308 * 07 *  46 *   00 * 303.6 * 30D  *  * 1974 * 308 * 21 *  03 *   05 * 296.8 *  294 *
* 1974 * 308 * 07 *  51 *   00 * 303.5 *      *  * 1974 * 308 * 21 *  11 *   00 * 296.8 *  293 *
* 1974 * 308 * 07 *  57 *   55 * 303.5 * 30E  *  * 1974 * 308 * 21 *  32 *   00 * 296.6 *      *
* 1974 * 308 * 08 *  01 *   10 * 303.4 *      *  * 1974 * 308 * 22 *  21 *   05 * 296.2 *  296 *
* 1974 * 308 * 08 *  03 *   40 * 303.4 *      *  * 1974 * 308 * 22 *  35 *   50 * 296.1 *  295 *
* 1974 * 308 * 08 *  08 *   20 * 303.4 *      *  * 1974 * 308 * 22 *  39 *   20 * 296.0 *      *
* 1974 * 308 * 08 *  14 *   50 * 303.3 * LM2  *  * 1974 * 308 * 22 *  45 *   30 * 296.0 *      *
* 1974 * 308 * 08 *  24 *   00 * 303.2 * 303  *  * 1974 * 309 * 03 *  04 *   50 * 293.8 *      *
* 1974 * 308 * 08 *  28 *   20 * 303.2 *      *  * 1974 * 309 * 03 *  19 *   10 * 293.7 *  LM1 *
* 1974 * 308 * 08 *  36 *   20 * 303.1 *      *  * 1974 * 309 * 03 *  58 *   55 * 293.3 *      *
* 1974 * 308 * 08 *  41 *   10 * 303.1 *      *  * 1974 * 309 * 04 *  19 *   00 * 293.2 *      *
* 1974 * 308 * 08 *  46 *   25 * 303.1 * 30H  *  * 1974 * 309 * 05 *  44 *   00 * 292.4 *  LM1 *
* 1974 * 308 * 09 *  00 *   00 * 302.9 *      *  * 1974 * 309 * 05 *  53 *   00 * 292.4 *      *
* 1974 * 308 * 09 *  08 *   20 * 302.9 *      *  * 1974 * 309 * 06 *  40 *   30 * 292.0 *  292 *
* 1974 * 308 * 09 *  37 *   15 * 302.6 *      *  * 1974 * 309 * 06 *  52 *   50 * 291.9 *      *
* 1974 * 308 * 09 *  44 *   10 * 302.6 *      *  * 1974 * 309 * 07 *  01 *   05 * 291.8 *  291 *
* 1974 * 308 * 09 *  55 *   15 * 302.5 *      *  * 1974 * 309 * 07 *  20 *   30 * 291.6 *      *
* 1974 * 308 * 09 *  57 *   15 * 302.5 *      *  * 1974 * 309 * 07 *  32 *   00 * 291.5 *      *
* 1974 * 308 * 10 *  34 *   00 * 302.1 *      *  * 1974 * 309 * 07 *  43 *   25 * 291.4 *  LM1 *
* 1974 * 308 * 10 *  38 *   00 * 302.1 *      *  * 1974 * 309 * 07 *  50 *   20 * 291.4 *      *
* 1974 * 308 * 10 *  50 *   40 * 302.0 * 30F  *  * 1974 * 309 * 08 *  01 *   04 * 291.3 *      *
* 1974 * 308 * 10 *  51 *   20 * 302.0 * 30G  *  * 1974 * 309 * 08 *  03 *   50 * 291.3 *      *
* 1974 * 308 * 10 *  54 *   10 * 302.0 *      *  * 1974 * 309 * 08 *  12 *   40 * 291.2 *      *
* 1974 * 308 * 11 *  57 *   55 * 302.0 *      *  * 1974 * 309 * 08 *  22 *   40 * 291.1 *      *
* 1974 * 308 * 12 *  07 *   05 * 301.4 *      *  * 1974 * 309 * 08 *  24 *   55 * 291.1 *      *
* 1974 * 308 * 12 *  09 *   05 * 301.3 *      *  * 1974 * 309 * 09 *  17 *   00 * 290.6 *  LM1 *
* 1974 * 308 * 12 *  14 *   10 * 301.3 *      *  * 1974 * 309 * 09 *  38 *   20 * 290.5 *      *
* 1974 * 308 * 12 *  19 *   00 * 301.3 *      *  * 1974 * 309 * 09 *  40 *   55 * 290.4 *  290 *
* 1974 * 308 * 12 *  23 *   00 * 301.2 *      *  * 1974 * 309 * 10 *  15 *   00 * 290.2 *      *
* 1974 * 308 * 12 *  26 *   40 * 301.2 * 30I  *  * 1974 * 309 * 10 *  24 *   15 * 290.1 *      *
* 1974 * 308 * 12 *  54 *   50 * 301.0 *      *  * 1974 * 309 * 10 *  39 *   00 * 289.9 *  LM1 *
* 1974 * 308 * 13 *  05 *   00 * 300.9 * LM2  *  * 1974 * 309 * 10 *  57 *   50 * 289.8 *      *
* 1974 * 308 * 13 *  41 *   20 * 300.6 *      *  * 1974 * 309 * 11 *  34 *   15 * 289.5 *      *
* 1974 * 308 * 14 *  36 *   40 * 300.1 *      *  * 1974 * 309 * 11 *  43 *   00 * 289.4 *      *
* 1974 * 308 * 14 *  54 *   15 * 300.0 *      *  * 1974 * 309 * 11 *  52 *   05 * 289.3 *  LM1 *
* 1974 * 308 * 15 *  36 *   10 * 299.6 *      *  * 1974 * 309 * 12 *  16 *   20 * 289.1 *      *
* 1974 * 308 * 15 *  46 *   00 * 299.5 *      *  * 1974 * 309 * 13 *  06 *   45 * 288.7 *  LM1 *
* 1974 * 308 * 16 *  01 *   05 * 299.4 *      *  * 1974 * 309 * 13 *  20 *   15 * 288.6 *  289 *
* 1974 * 308 * 16 *  03 *   50 * 299.4 *      *  * 1974 * 309 * 13 *  52 *   25 * 288.3 *  288 *
* 1974 * 308 * 16 *  11 *   25 * 299.3 * LM2  *  * 1974 * 309 * 14 *  31 *   05 * 288.0 *  LM1 *
* 1974 * 308 * 16 *  44 *   00 * 299.0 *      *  * 1974 * 309 * 14 *  38 *   00 * 287.9 *      *
* 1974 * 308 * 17 *  42 *   50 * 298.5 * 299  *  * 1974 * 309 * 15 *  10 *   00 * 287.7 *  287 *
* 1974 * 308 * 18 *  09 *   45 * 298.3 *      *  * 1974 * 309 * 15 *  17 *   50 * 287.6 *      *
* 1974 * 308 * 18 *  21 *   05 * 298.2 *      *  * 1974 * 309 * 15 *  44 *   05 * 287.4 *  LM1 *
* 1974 * 308 * 18 *  22 *   55 * 298.2 *      *  * 1974 * 309 * 16 *  34 *   25 * 286.9 *  286 *
* 1974 * 308 * 18 *  32 *   50 * 298.1 * 298  *  * 19   *     *    *     *      *   .   *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *   * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P.12
* 1974 * 346 * 17 *  50 *   40 * 196.1 *      *   * 1974 * 348 * 03 *  30 *   10 * 179.0 *      *
* 1974 * 346 * 17 *  56 *   40 * 196.0 *      *   * 1974 * 348 * 04 *  02 *   50 * 178.7 *      *
* 1974 * 346 * 18 *  45 *   30 * 195.6 *  195 *   * 1974 * 348 * 05 *  55 *   25 * 177.7 *      *
* 1974 * 346 * 21 *  49 *   00 * 194.0 *  LM2 *   * 1974 * 348 * 10 *  30 *   00 * 175.4 *  LM2 *
* 1974 * 346 * 22 *  39 *   40 * 193.6 *      *   * 1974 * 348 * 10 *  50 *   20 * 175.2 *      *
* 1974 * 347 * 01 *  28 *   10 * 192.2 *  LM1 *   * 1974 * 348 * 11 *  10 *   00 * 175.1 *      *
* 1974 * 347 * 03 *  41 *   20 * 191.1 *  221 *   * 1974 * 348 * 14 *  35 *   20 * 173.3 *  LM1 *
* 1974 * 347 * 03 *  51 *   30 * 191.0 *      *   * 1974 * 348 * 15 *  09 *   50 * 173.0 *  221 *
* 1974 * 347 * 05 *  47 *   30 * 190.0 *      *   * 1974 * 348 * 18 *  46 *   15 * 171.2 *      *
* 1974 * 347 * 06 *  19 *   00 * 189.7 *  LM2 *   * 1974 * 349 * 04 *  28 *   00 * 166.3 *  151 *
* 1974 * 347 * 10 *  25 *   15 * 187.6 *  152 *   * 1974 * 349 * 05 *  00 *   25 * 166.0 *      *
* 1974 * 347 * 11 *  11 *   55 * 187.2 *      *   * 1974 * 349 * 08 *  57 *   00 * 164.0 *  221 *
* 1974 * 347 * 12 *  53 *   00 * 186.4 *      *   * 1974 * 349 * 11 *  36 *   05 * 162.7 *      *
* 1974 * 347 * 13 *  36 *   30 * 186.0 *      *   * 1974 * 349 * 12 *  14 *   55 * 162.3 *      *
* 1974 * 347 * 13 *  47 *   00 * 185.9 *      *   * 1974 * 349 * 13 *  30 *   00 * 161.7 *  LM1 *
* 1974 * 347 * 14 *  04 *   10 * 185.8 *      *   * 1974 * 349 * 16 *  01 *   10 * 160.4 *      *
* 1974 * 347 * 14 *  47 *   30 * 185.4 *      *   * 1974 * 349 * 19 *  13 *   40 * 158.8 *      *
* 1974 * 347 * 16 *  55 *   00 * 184.3 *      *   * 1974 * 349 * 21 *  48 *   25 * 157.5 *      *
* 1974 * 347 * 18 *  01 *   50 * 183.8 *  LM1 *   * 1974 * 350 * 01 *  03 *   10 * 155.8 *  LM2 *
* 1974 * 347 * 21 *  28 *   45 * 182.0 *  221 *   * 1974 * 350 * 01 *  34 *   50 * 155.6 *      *
* 1974 * 347 * 21 *  43 *   45 * 181.9 *      *   * 1974 * 350 * 02 *  53 *   00 * 154.9 *  221 *
* 1974 * 347 * 21 *  50 *   50 * 181.8 *  151 *   * 1974 * 350 * 07 *  18 *   20 * 152.7 *  142 *
* 1974 * 347 * 22 *  16 *   55 * 181.6 *      *   * 1974 * 350 * 08 *  08 *   05 * 152.2 *  152 *
* 1974 * 347 * 23 *  27 *   55 * 181.0 *      *   * 1974 * 350 * 08 *  41 *   10 * 152.0 *  151 *
* 1974 * 348 * 00 *  08 *   45 * 180.7 *  LM2 *   * 1974 * 350 * 11 *  16 *   15 * 150.6 *      *
* 1974 * 348 * 01 *  17 *   05 * 180.1 *      *   * 1974 * 350 * 12 *  03 *   40 * 150.2 *  LM  *
* 1974 * 348 * 03 *  22 *   00 * 179.0 *      *   * 19   *     *    *     *      *     . *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P.13
* 1975 * 103 * 15 *  07 *   15 * 152.7 *  LM1 *  * 1975 * 106 * 17 *  20 *   00 * 114.9 *  LM  *
* 1975 * 103 * 23 *  15 *   30 * 148.5 *      *  * 1975 * 106 * 17 *  25 *   20 * 114.8 *  LM  *
* 1975 * 104 * 00 *  03 *   00 * 148.1 *  LM2 *  * 1975 * 106 * 17 *  29 *   30 * 114.8 *  LM  *
* 1975 * 104 * 09 *  55 *   45 * 143.1 *      *  * 1975 * 106 * 17 *  31 *   20 * 114.8 *  LM  *
* 1975 * 104 * 10 *  08 *   05 * 143.0 *  109 *  * 1975 * 106 * 17 *  37 *   15 * 114.7 *  LM  *
* 1975 * 104 * 11 *  10 *   00 * 142.5 *  142 *  * 1975 * 106 * 17 *  43 *   30 * 114.7 *  LM  *
* 1975 * 104 * 13 *  12 *   40 * 141.4 *  141 *  * 1975 * 106 * 17 *  48 *   10 * 114.7 *  LM  *
* 1975 * 104 * 17 *  02 *   45 * 139.5 *  139 *  * 1975 * 106 * 17 *  50 *   30 * 114.6 *  LM  *
* 1975 * 104 * 20 *  29 *   00 * 137.7 *  LM1 *  * 1975 * 106 * 17 *  57 *   10 * 114.6 *  LM  *
* 1975 * 105 * 05 *  50 *   15 * 133.0 *  133 *  * 1975 * 106 * 17 *  58 *   50 * 114.6 *      *
* 1975 * 105 * 07 *  04 *   00 * 132.3 *      *  * 1975 * 106 * 18 *  04 *   10 * 114.5 *  LM  *
* 1975 * 105 * 11 *  27 *   15 * 130.1 *  109 *  * 1975 * 106 * 18 *  09 *   05 * 114.5 *  LM  *
* 1975 * 105 * 16 *  21 *   30 * 127.6 *      *  * 1975 * 106 * 18 *  13 *   00 * 114.4 *  LM  *
* 1975 * 105 * 20 *  44 *   45 * 125.4 *  124 *  * 1975 * 106 * 18 *  21 *   00 * 114.4 *  LM  *
* 1975 * 105 * 20 *  51 *   05 * 125.3 *      *  * 1975 * 106 * 18 *  25 *   50 * 114.3 *  LM  *
* 1975 * 105 * 22 *  41 *   50 * 124.4 *  LM2 *  * 1975 * 106 * 18 *  29 *   20 * 114.3 *  LM  *
* 1975 * 106 * 03 *  23 *   00 * 122.0 *      *  * 1975 * 106 * 18 *  38 *   40 * 114.2 *  LM  *
* 1975 * 106 * 06 *  44 *   00 * 120.3 *      *  * 1975 * 106 * 18 *  44 *   40 * 114.2 *  LM  *
* 1975 * 106 * 08 *  24 *   40 * 119.4 *  LM1 *  * 1975 * 106 * 18 *  48 *   10 * 114.1 *  LM  *
* 1975 * 106 * 13 *  05 *   10 * 117.1 *  109 *  * 1975 * 106 * 18 *  59 *   00 * 114.1 *  LM  *
* 1975 * 106 * 13 *  20 *   40 * 116.9 *  116 *  * 1975 * 106 * 19 *  01 *   00 * 114.0 *  LM  *
* 1975 * 106 * 13 *  37 *   00 * 116.8 *      *  * 1975 * 106 * 19 *  12 *   10 * 113.9 *  LM  *
* 1975 * 106 * 14 *  55 *   00 * 116.1 *      *  * 1975 * 106 * 19 *  19 *   50 * 113.9 *  LM  *
* 1975 * 106 * 14 *  56 *   30 * 116.1 *      *  * 1975 * 106 * 19 *  24 *   10 * 113.8 *  LM  *
* 1975 * 106 * 14 *  57 *   15 * 116.1 *  LM1 *  * 1975 * 106 * 19 *  36 *   10 * 113.7 *  LM  *
* 1975 * 106 * 15 *  04 *   00 * 116.0 *  LM2 *  * 1975 * 106 * 19 *  49 *   20 * 113.6 *  LM  *
* 1975 * 106 * 15 *  08 *   30 * 116.0 *  LM  *  * 1975 * 106 * 19 *  57 *   05 * 113.6 *  LM  *
* 1975 * 106 * 15 *  11 *   00 * 116.0 *  LM  *  * 1975 * 106 * 20 *  03 *   40 * 113.5 *  LM  *
* 1975 * 106 * 15 *  13 *   10 * 116.0 *  LM  *  * 1975 * 106 * 20 *  23 *   00 * 113.3 *  LM  *
* 1975 * 106 * 15 *  19 *   20 * 115.9 *  LM  *  * 1975 * 106 * 20 *  26 *   30 * 113.3 *  LM  *
* 1975 * 106 * 15 *  25 *   30 * 115.9 *  LM  *  * 1975 * 106 * 20 *  39 *   30 * 113.2 *  LM  *
* 1975 * 106 * 15 *  36 *   30 * 115.8 *  LM  *  * 1975 * 106 * 20 *  45 *   40 * 113.2 *  LM  *
* 1975 * 106 * 15 *  41 *   00 * 115.7 *  LM  *  * 1975 * 106 * 21 *  04 *   40 * 113.0    LM  *
* 1975 * 106 * 15 *  46 *   55 * 115.7 *  LM  *  * 1975 * 106 * 21 *  09 *   45 * 112.9 *      *
* 1975 * 106 * 15 *  52 *   15 * 115.6 *  LM  *  * 1975 * 106 * 21 *  22 *   10 * 112.8 *  LM  *
* 1975 * 106 * 15 *  57 *   15 * 115.6 *  LM  *  * 1975 * 106 * 21 *  38 *   10 * 112.7 *  LM  *
* 1975 * 106 * 16 *  03 *   00 * 115.5 *  LM1 *  * 1975 * 106 * 21 *  49 *   20 * 112.6 *  112 *
* 1975 * 106 * 16 *  08 *   50 * 115.5 *  LM1 *  * 1975 * 106 * 22 *  34 *   00 * 112.2 *  109 *
* 1975 * 106 * 16 *  15 *   55 * 115.4 *  LM  *  * 1975 * 106 * 23 *  22 *   50 * 112.0 *      *
* 1975 * 106 * 16 *  20 *   40 * 115.4 *  LM  *  * 1975 * 106 * 23 *  32 *   45 * 111.7 *      *
* 1975 * 106 * 16 *  26 *   00 * 115.3 *  LM  *  * 1975 * 107 * 01 *  26 *   45 * 110.8 *      *
* 1975 * 106 * 16 *  31 *   40 * 115.3 *  LM  *  * 1975 * 107 * 02 *  01 *   30 * 110.5 *      *
* 1975 * 106 * 16 *  36 *   40 * 115.3 *  LM  *  * 1975 * 107 * 03 *  00 *   45 * 110.0 *      *
* 1975 * 106 * 16 *  42 *   15 * 115.2 *  LM  *  * 1975 * 107 * 04 *  14 *   30 * 109.3 *      *
* 1975 * 106 * 16 *  47 *   40 * 115.2 *  LM  *  * 1975 * 107 * 04 *  17 *   25 * 109.3 *  109 *
* 1975 * 106 * 16 *  52 *   40 * 115.1 *  LM  *  * 1975 * 107 * 04 *  49 *   50 * 109.0 *      *
* 1975 * 106 * 16 *  58 *   25 * 115.1 *  LM  *  * 1975 * 107 * 05 *  20 *   05 * 108.8 *      *
* 1975 * 106 * 17 *  04 *   00 * 115.0 *  LM  *  * 1975 * 107 * 05 *  32 *   00 * 108.7 *      *
* 1975 * 106 * 17 *  09 *   45 * 114.9 *  LM  *  * 1975 * 107 * 05 *  33 *   45 * 108.7 *      *
* 1975 * 106 * 17 *  14 *   50 * 114.9 *  LM  *  * 1975 * 107 * 07 *  27 *   15 * 107.7 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P.14
* 1975 * 107 * 07 *  49 *   30 * 107.5 *      *  * 1975 * 107 * 19 *  03 *   05 * 101.8 *  LM  *
* 1975 * 107 * 07 *  51 *   45 * 107.5 *  LM  *  * 1975 * 107 * 19 *  26 *   30 * 101.6 *  LM  *
* 1975 * 107 * 08 *  54 *   40 * 107.0 *  LM  *  * 1975 * 107 * 19 *  40 *   30 * 101.5 *  LM  *
* 1975 * 107 * 09 *  18 *   50 * 106.8 *  LM  *  * 1975 * 107 * 19 *  48 *   20 * 101.4 *  LM  *
* 1975 * 107 * 09 *  47 *   00 * 106.5 *  LM  *  * 1975 * 107 * 20 *  17 *   10 * 101.2 *  LM  *
* 1975 * 107 * 10 *  11 *   10 * 106.3 *  LM  *  * 1975 * 107 * 20 *  21 *   05 * 101.1 *  LM  *
* 1975 * 107 * 10 *  55 *   30 * 105.9 *  LM  *  * 1975 * 107 * 20 *  24 *   05 * 101.1 *  LM  *
* 1975 * 107 * 11 *  25 *   50 * 105.7 *  LM  *  * 1975 * 107 * 20 *  38 *   40 * 101.0 *  LM  *
* 1975 * 107 * 11 *  47 *   30 * 105.5 *  LM  *  * 1975 * 107 * 20 *  48 *   30 * 100.9 *  LM  *
* 1975 * 107 * 11 *  51 *   00 * 105.5 *  LM  *  * 1975 * 107 * 20 *  54 *   45 * 100.9 *  LM  *
* 1975 * 107 * 12 *  11 *   20 * 105.3 *  LM  *  * 1975 * 107 * 21 *  03 *   15 * 100.8 *  LM  *
* 1975 * 107 * 12 *  39 *   00 * 105.1 *  LM  *  * 1975 * 107 * 21 *  21 *   50 * 100.6 *  LM  *
* 1975 * 107 * 13 *  09 *   15 * 104.8 *  LM  *  * 1975 * 107 * 21 *  49 *   45 * 100.4 *      *
* 1975 * 107 * 13 *  27 *   10 * 104.7 *  LM  *  * 1975 * 107 * 22 *  01 *   45 * 100.3 *  LM  *
* 1975 * 107 * 13 *  42 *   30 * 104.5 *  LM  *  * 1975 * 108 * 00 *  24 *   00 * 099.1 *      *
* 1975 * 107 * 14 *  16 *   40 * 104.2 *      *  * 1975 * 108 * 01 *  49 *   05 * 098.4 *  LM  *
* 1975 * 107 * 15 *  57 *   50 * 103.4 *  LM  *  * 1975 * 108 * 02 *  06 *   00 * 098.2 *  LM2 *
* 1975 * 107 * 16 *  03 *   10 * 103.3 *  LM  *  * 1975 * 108 * 03 *  02 *   25 * 097.7 *  096 *
* 1975 * 107 * 16 *  30 *   15 * 103.1 *      *  * 1975 * 108 * 04 *  47 *   15 * 096.9 *  LM  *
* 1975 * 107 * 17 *  00 *   50 * 102.8 *  LM  *  * 1975 * 108 * 05 *  38 *   00 * 096.4 *      *
* 1975 * 107 * 17 *  43 *   50 * 102.5 *  LM  *  * 1975 * 108 * 10 *  55 *   15 * 093.7 *  LM  *
* 1975 * 107 * 18 *  01 *   20 * 102.3 *      *  * 1975 * 108 * 11 *  12 *   50 * 093.6 *      *
* 1975 * 107 * 18 *  14 *   20 * 102.2 *  LM  *  * 1975 * 108 * 12 *  16 *   40 * 093.0 *      *
* 1975 * 107 * 18 *  17 *   50 * 102.2 *  LM  *  * 1975 * 108 * 12 *  33 *   00 * 092.9 *      *
* 1975 * 107 * 18 *  35 *   20 * 102.0 *  LM  *  * 1975 * 108 * 13 *  30 *   30 * 092.4 *  LM2 *
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* YEAR * DAY * HR * MNI *   AMP *  LONG * TYPE *   * YEAR * DAY * HR * MNI *   AMP *  LONG * TYPE *
* 1975 * 116 * 15 *  20 *    35 * 354.1 *  355 *   * 1975 * 117 * 09 *  08 *    15 * 345.0 *      *
* 1975 * 116 * 15 *  32 *    30 * 354.0 *      *   * 1975 * 117 * 09 *  19 *    35 * 344.9 *      *
* 1975 * 116 * 15 *  34 *    45 * 353.9 *      *   * 1975 * 117 * 10 *  06 *    25 * 344.5 *      *
* 1975 * 116 * 15 *  47 *    00 * 353.8 *      *   * 1975 * 117 * 10 *  30 *    25 * 344.3 *      *
* 1975 * 116 * 16 *  06 *    10 * 353.7 *  354 *   * 1975 * 117 * 11 *  23 *    40 * 343.9 *      *
* 1975 * 116 * 17 *  10 *    25 * 353.1 *      *   * 1975 * 117 * 11 *  36 *    00 * 343.8 *      *
* 1975 * 116 * 17 *  28 *    40 * 353.0 *      *   * 1975 * 117 * 11 *  40 *    45 * 343.8 *      *
* 1975 * 116 * 17 *  56 *    50 * 352.7 *  348 *   * 1975 * 117 * 12 *  38 *    55 * 343.3 *  340 *
* 1975 * 116 * 18 *  19 *    10 * 352.5 *      *   * 1975 * 117 * 12 *  39 *    50 * 343.2 *      *
* 1975 * 116 * 18 *  23 *    00 * 352.5 *      *   * 1975 * 117 * 13 *  28 *    50 * 342.8 *      *
* 1975 * 116 * 18 *  37 *    00 * 352.4 *      *   * 1975 * 117 * 13 *  32 *    45 * 342.8 *      *
* 1975 * 116 * 18 *  38 *    40 * 352.4 *      *   * 1975 * 117 * 13 *  48 *    40 * 342.7 *  341 *
* 1975 * 116 * 19 *  03 *    55 * 352.2 *      *   * 1975 * 117 * 13 *  54 *    30 * 342.6 *  342 *
* 1975 * 116 * 19 *  08 *    30 * 352.1 *      *   * 1975 * 117 * 14 *  03 *    05 * 342.5 *      *
* 1975 * 116 * 19 *  16 *    05 * 352.1 *      *   * 1975 * 117 * 14 *  06 *    20 * 342.5 *      *
* 1975 * 116 * 19 *  17 *    30 * 352.1 *      *   * 1975 * 117 * 15 *  17 *    10 * 341.9 *  343 *
* 1975 * 116 * 19 *  24 *    05 * 352.0 *      *   * 1975 * 117 * 15 *  38 *    55 * 341.7 *      *
* 1975 * 116 * 19 *  27 *    10 * 352.0 *      *   * 1975 * 117 * 15 *  55 *    40 * 341.6 *      *
* 1975 * 116 * 19 *  51 *    30 * 351.8 *      *   * 1975 * 117 * 16 *  03 *    10 * 341.5 *      *
* 1975 * 116 * 20 *  05 *    20 * 351.7 *      *   * 1975 * 117 * 16 *  06 *    00 * 341.5 *      *
* 1975 * 116 * 20 *  17 *    10 * 351.6 *  351 *   * 1975 * 117 * 16 *  10 *    30 * 341.5 *      *
* 1975 * 116 * 20 *  22 *    00 * 351.5 *  347 *   * 1975 * 117 * 16 *  30 *    30 * 341.3 *      *
* 1975 * 116 * 20 *  38 *    50 * 351.4 *      *   * 1975 * 117 * 17 *  01 *    05 * 341.0 *      *
* 1975 * 116 * 20 *  51 *    30 * 351.3 *  356 *   * 1975 * 117 * 17 *  28 *    05 * 340.8 *      *
* 1975 * 116 * 21 *  09 *    00 * 351.1 *      *   * 1975 * 117 * 17 *  46 *    30 * 340.7 *  337 *
* 1975 * 116 * 23 *  41 *    55 * 349.8 *      *   * 1975 * 117 * 18 *  09 *    50 * 340.5 *      *
* 1975 * 117 * 00 *  18 *    35 * 349.5 *      *   * 1975 * 117 * 18 *  31 *    50 * 340.3 *      *
* 1975 * 117 * 01 *  24 *    30 * 349.0 *      *   * 1975 * 117 * 18 *  37 *    00 * 340.2 *      *
* 1975 * 117 * 01 *  36 *    40 * 348.9 *      *   * 1975 * 117 * 18 *  40 *    35 * 340.2 *      *
* 1975 * 117 * 02 *  36 *    15 * 348.4 *  344 *   * 1975 * 117 * 19 *  22 *    45 * 339.8 *      *
* 1975 * 117 * 02 *  56 *    55 * 348.2 *      *   * 1975 * 117 * 19 *  28 *    35 * 339.8 *      *
* 1975 * 117 * 03 *  21 *    20 * 348.0 *      *   * 1975 * 117 * 20 *  17 *    50 * 339.4 *      *
* 1975 * 117 * 03 *  52 *    50 * 347.7 *      *   * 1975 * 117 * 20 *  35 *    15 * 339.2 *  339 *
* 1975 * 117 * 04 *  36 *    00 * 347.3 *      *   * 1975 * 117 * 20 *  39 *    30 * 339.2 *      *
* 1975 * 117 * 05 *  10 *    40 * 347.0 *      *   * 1975 * 117 * 21 *  25 *    50 * 338.8 *      *
* 1975 * 117 * 05 *  20 *    00 * 347.0 *      *   * 1975 * 117 * 21 *  35 *    50 * 338.7 *  338 *
* 1975 * 117 * 05 *  39 *    10 * 346.8 *      *   * 1975 * 117 * 22 *  31 *    25 * 338.2 *      *
* 1975 * 117 * 05 *  55 *    00 * 346.7 *      *   * 1975 * 117 * 22 *  32 *    25 * 338.2 *      *
* 1975 * 117 * 05 *  57 *    50 * 346.6 *  345 *   * 1975 * 117 * 23 *  02 *    50 * 338.0 *  336 *
* 1975 * 117 * 06 *  02 *    35 * 346.6 *  352 *   * 1975 * 118 * 00 *  25 *    00 * 337.3 *      *
* 1975 * 117 * 06 *  34 *    30 * 346.3 *  346 *   * 1975 * 118 * 00 *  52 *    40 * 337.1 *      *
* 1975 * 117 * 06 *  49 *    05 * 346.2 *      *   * 1975 * 118 * 00 *  59 *    10 * 337.0 *      *
* 1975 * 117 * 07 *  16 *    10 * 346.0 *      *   * 1975 * 118 * 01 *  18 *    00 * 336.8 *      *
* 1975 * 117 * 07 *  27 *    45 * 345.9 *      *   * 1975 * 118 * 01 *  31 *    20 * 336.7 *  338 *
* 1975 * 117 * 07 *  27 *    50 * 345.9 *      *   * 1975 * 118 * 01 *  39 *    50 * 336.7 *  335 *
* 1975 * 117 * 08 *  12 *    00 * 345.5 *      *   * 1975 * 118 * 01 *  45 *    45 * 336.6 *      *
* 1975 * 117 * 08 *  13 *    40 * 345.5 *      *   * 1975 * 118 * 01 *  51 *    50 * 336.6 *  334 *
* 1975 * 117 * 08 *  23 *    15 * 345.4 *      *   * 1975 * 118 * 02 *  40 *    30 * 336.1 *      *
* 1975 * 117 * 08 *  38 *    45 * 345.3 *      *   * 1975 * 118 * 02 *  52 *    00 * 336.0 *  333 *
* 1975 * 117 * 08 *  50 *    05 * 345.2 *      *   * 1975 * 118 * 03 *  03 *    00 * 336.0 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
* 1975 * 118 * 03 *  53 *   10 * 335.5 *      *  * 1975 * 118 * 21 *  53 *   35 * 326.4 *      *
* 1975 * 118 * 03 *  56 *   00 * 335.5 *      *  * 1975 * 118 * 21 *  56 *   25 * 326.4 *      *
* 1975 * 118 * 04 *  21 *   05 * 335.3 *      *  * 1975 * 118 * 21 *  59 *   30 * 326.3 *      *
* 1975 * 118 * 04 *  27 *   00 * 335.2 *      *  * 1975 * 118 * 22 *  03 *   30 * 326.3 *      *
* 1975 * 118 * 04 *  43 *   00 * 335.1 *      *  * 1975 * 118 * 22 *  04 *   10 * 326.3 *      *
* 1975 * 118 * 04 *  51 *   00 * 335.0 *  332 *  * 1975 * 118 * 22 *  31 *   00 * 326.1 *  322 *
* 1975 * 118 * 04 *  56 *   30 * 335.0 *      *  * 1975 * 118 * 23 *  44 *   05 * 325.4 *      *
* 1975 * 118 * 05 *  01 *   30 * 335.0 *      *  * 1975 * 118 * 23 *  49 *   05 * 325.4 *      *
* 1975 * 118 * 05 *  04 *   35 * 334.9 *  331 *  * 1975 * 118 * 23 *  56 *   00 * 325.4 *      *
* 1975 * 118 * 05 *  33 *   00 * 334.7 *  330 *  * 1975 * 119 * 00 *  01 *   00 * 325.3 *      *
* 1975 * 118 * 06 *  02 *   45 * 334.4 *  33A *  * 1975 * 119 * 00 *  16 *   00 * 325.2 *  323 *
* 1975 * 118 * 06 *  11 *   15 * 334.4 *      *  * 1975 * 119 * 00 *  53 *   50 * 324.9 *      *
* 1975 * 118 * 06 *  24 *   00 * 334.2 *      *  * 1975 * 119 * 00 *  58 *   05 * 324.8 *      *
* 1975 * 118 * 07 *  22 *   30 * 333.8 *      *  * 1975 * 119 * 01 *  07 *   30 * 324.8 *  32B *
* 1975 * 118 * 07 *  31 *   45 * 333.7 *  33C *  * 1975 * 119 * 01 *  13 *   00 * 324.7 *      *
* 1975 * 118 * 07 *  44 *   50 * 333.6 *      *  * 1975 * 119 * 01 *  27 *   55 * 324.6 *      *
* 1975 * 118 * 08 *  07 *   30 * 333.4 *      *  * 1975 * 119 * 01 *  36 *   30 * 324.5 *      *
* 1975 * 118 * 08 *  22 *   00 * 333.2 *      *  * 1975 * 119 * 01 *  45 *   40 * 324.4 *      *
* 1975 * 118 * 08 *  36 *   50 * 333.1 *      *  * 1975 * 119 * 02 *  36 *   05 * 324.0 *  321 *
* 1975 * 118 * 08 *  47 *   45 * 333.0 *      *  * 1975 * 119 * 02 *  53 *   00 * 323.8 *  326 *
* 1975 * 118 * 08 *  58 *   10 * 333.0 *      *  * 1975 * 119 * 03 *  00 *   55 * 323.8 *      *
* 1975 * 118 * 09 *  53 *   50 * 332.5 *      *  * 1975 * 119 * 03 *  03 *   35 * 323.8 *      *
* 1975 * 118 * 12 *  09 *   40 * 331.3 *  33D *  * 1975 * 119 * 03 *  10 *   50 * 323.7 *  32C *
* 1975 * 118 * 13 *  09 *   50 * 330.8 *  33E *  * 1975 * 119 * 03 *  56 *   50 * 323.3 *  32A *
* 1975 * 118 * 13 *  49 *   00 * 330.5 *      *  * 1975 * 119 * 04 *  12 *   00 * 323.2 *  320 *
* 1975 * 118 * 14 *  00 *   10 * 330.4 *      *  * 1975 * 119 * 04 *  17 *   10 * 323.1 *  32H *
* 1975 * 118 * 15 *  27 *   00 * 329.7 *      *  * 1975 * 119 * 04 *  50 *   55 * 322.9 *      *
* 1975 * 118 * 15 *  43 *   40 * 329.5 *      *  * 1975 * 119 * 05 *  02 *   00 * 322.8 *      *
* 1975 * 118 * 15 *  49 *   00 * 329.5 *  328 *  * 1975 * 119 * 05 *  15 *   30 * 322.6 *      *
* 1975 * 118 * 16 *  23 *   25 * 329.2 *  329 *  * 1975 * 119 * 05 *  29 *   45 * 322.5 *      *
* 1975 * 118 * 16 *  33 *   25 * 329.1 *  325 *  * 1975 * 119 * 05 *  45 *   30 * 322.4 *  32F *
* 1975 * 118 * 16 *  48 *   55 * 329.0 *      *  * 1975 * 119 * 06 *  07 *   10 * 322.2 *      *
* 1975 * 118 * 16 *  53 *   00 * 328.9 *      *  * 1975 * 119 * 06 *  19 *   00 * 322.1 *      *
* 1975 * 118 * 17 *  16 *   15 * 328.9 *      *  * 1975 * 119 * 06 *  11 *   05 * 322.2 *  32E *
* 1975 * 118 * 17 *  31 *   00 * 328.6 *      *  * 1975 * 119 * 06 *  23 *   05 * 322.1 *  32G *
* 1975 * 118 * 18 *  20 *   50 * 328.2 *      *  * 1975 * 119 * 07 *  01 *   30 * 321.8 *      *
* 1975 * 118 * 18 *  38 *   20 * 328.0 *      *  * 1975 * 119 * 07 *  35 *   25 * 321.5 *      *
* 1975 * 118 * 19 *  28 *   40 * 327.6 *      *  * 1975 * 119 * 07 *  44 *   00 * 321.4 *  32D *
* 1975 * 118 * 19 *  40 *   00 * 327.5 *      *  * 1975 * 119 * 07 *  49 *   20 * 321.4 *      *
* 1975 * 118 * 19 *  45 *   50 * 327.5 *  327 *  * 1975 * 119 * 08 *  05 *   15 * 321.2 *      *
* 1975 * 118 * 19 *  55 *   00 * 327.4 *      *  * 1975 * 119 * 08 *  11 *   15 * 321.2 *      *
* 1975 * 118 * 20 *  13 *   10 * 327.2 *      *  * 1975 * 119 * 08 *  32 *   55 * 321.0 *  319 *
* 1975 * 118 * 20 *  28 *   00 * 327.1 *  310 *  * 1975 * 119 * 08 *  35 *   10 * 321.0 *      *
* 1975 * 118 * 20 *  29 *   45 * 327.1 *      *  * 1975 * 119 * 08 *  45 *   40 * 320.9 *      *
* 1975 * 118 * 20 *  41 *   00 * 327.0 *      *  * 1975 * 119 * 09 *  04 *   00 * 320.7 *      *
* 1975 * 118 * 20 *  53 *   00 * 326.9 *      *  * 1975 * 119 * 09 *  17 *   00 * 320.6 *      *
* 1975 * 118 * 21 *  03 *   00 * 326.8 *      *  * 1975 * 119 * 09 *  38 *   45 * 320.4 *      *
* 1975 * 118 * 21 *  07 *   30 * 326.8 *      *  * 1975 * 119 * 09 *  57 *   20 * 320.3 *      *
* 1975 * 118 * 21 *  27 *   00 * 326.6 *      *  * 1975 * 119 * 10 *  05 *   35 * 320.2 *      *
* 1975 * 118 * 21 *  39 *   30 * 326.5 *  324 *  * 1975 * 119 * 10 *  17 *   15 * 320.1 *  LM2 *
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* YEAR * DAY * HR * MNI *   AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *   AMP *  LONG * TYPE * P.17
* 1975 * 119 * 10 *  19 *    15 * 320.1 *  318 *  * 1975 * 120 * 01 *  03 *    00 * 312.6 *      *
* 1975 * 119 * 10 *  59 *    50 * 319.7 *      *  * 1975 * 120 * 01 *  43 *    30 * 312.3 *      *
* 1975 * 119 * 11 *  01 *    35 * 319.7 *      *  * 1975 * 120 * 01 *  45 *    40 * 312.2 *      *
* 1975 * 119 * 11 *  31 *    15 * 319.5 *      *  * 1975 * 120 * 01 *  48 *    50 * 312.2 *      *
* 1975 * 119 * 11 *  43 *    30 * 319.4 *      *  * 1975 * 120 * 02 *  08 *    45 * 312.0 *  31D *
* 1975 * 119 * 11 *  54 *    00 * 319.3 *      *  * 1975 * 120 * 02 *  50 *    15 * 311.7 *      *
* 1975 * 119 * 11 *  56 *    15 * 319.3 *  313 *  * 1975 * 120 * 02 *  56 *    10 * 311.6 *      *
* 1975 * 119 * 12 *  46 *    00 * 318.8 *      *  * 1975 * 120 * 02 *  59 *    15 * 311.6 *      *
* 1975 * 119 * 13 *  24 *    05 * 318.5 *      *  * 1975 * 120 * 03 *  02 *    55 * 311.6 *  LM2 *
* 1975 * 119 * 13 *  41 *    30 * 318.4 *  317 *  * 1975 * 120 * 03 *  04 *    15 * 311.6 *      *
* 1975 * 119 * 14 *  00 *    45 * 318.2 *      *  * 1975 * 120 * 03 *  08 *    10 * 311.5 *      *
* 1975 * 119 * 15 *  20 *    00 * 317.5 *      *  * 1975 * 120 * 03 *  17 *    45 * 311.5 *      *
* 1975 * 119 * 16 *  01 *    40 * 317.2 *      *  * 1975 * 120 * 03 *  21 *    20 * 311.4 *      *
* 1975 * 119 * 16 *  03 *    00 * 317.2 *      *  * 1975 * 120 * 03 *  26 *    30 * 311.4 *      *
* 1975 * 119 * 16 *  28 *    10 * 317.0 *      *  * 1975 * 120 * 03 *  31 *    00 * 311.4 *      *
* 1975 * 119 * 16 *  37 *    05 * 316.9 *      *  * 1975 * 120 * 03 *  38 *    10 * 311.3 *      *
* 1975 * 119 * 16 *  46 *    00 * 316.8 *      *  * 1975 * 120 * 03 *  49 *    55 * 311.2 *      *
* 1975 * 119 * 16 *  53 *    00 * 316.8 *      *  * 1975 * 120 * 04 *  02 *    00 * 311.1 *  31F *
* 1975 * 119 * 17 *  30 *    00 * 316.4 *      *  * 1975 * 120 * 04 *  13 *    00 * 311.1 *  31G *
* 1975 * 119 * 17 *  35 *    00 * 316.4 *  316 *  * 1975 * 120 * 04 *  25 *    00 * 310.9 *      *
* 1975 * 119 * 18 *  29 *    35 * 315.9 *      *  * 1975 * 120 * 04 *  29 *    00 * 310.9 *      *
* 1975 * 119 * 18 *  40 *    10 * 315.8 *      *  * 1975 * 120 * 04 *  31 *    30 * 310.8 *      *
* 1975 * 119 * 19 *  17 *    00 * 315.5 *      *  * 1975 * 120 * 04 *  38 *    00 * 310.8 *      *
* 1975 * 119 * 19 *  35 *    50 * 315.4 *  314 *  * 1975 * 120 * 04 *  45 *    00 * 310.7 *      *
* 1975 * 119 * 19 *  48 *    45 * 315.3 *  31A *  * 1975 * 120 * 05 *  14 *    00 * 310.7 *      *
* 1975 * 119 * 19 *  51 *    50 * 315.2 *      *  * 1975 * 120 * 05 *  23 *    00 * 310.4 *      *
* 1975 * 119 * 19 *  58 *    25 * 315.2 *      *  * 1975 * 120 * 05 *  32 *    50 * 310.3 *  31H *
* 1975 * 119 * 20 *  03 *    05 * 315.1 *      *  * 1975 * 120 * 06 *  04 *    15 * 310.1 *      *
* 1975 * 119 * 20 *  06 *    20 * 315.1 *      *  * 1975 * 120 * 06 *  13 *    30 * 310.0 *      *
* 1975 * 119 * 20 *  23 *    40 * 315.0 *  315 *  * 1975 * 120 * 06 *  38 *    00 * 309.8 *  306 *
* 1975 * 119 * 20 *  25 *    00 * 315.0 *      *  * 1975 * 120 * 06 *  56 *    00 * 309.6 *      *
* 1975 * 119 * 20 *  40 *    40 * 314.8 *      *  * 1975 * 120 * 07 *  01 *    10 * 309.6 *  LM2 *
* 1975 * 119 * 20 *  47 *    00 * 314.8 *      *  * 1975 * 120 * 07 *  04 *    50 * 309.6 *      *
* 1975 * 119 * 20 *  51 *    30 * 314.7 *      *  * 1975 * 120 * 07 *  14 *    15 * 309.5 *      *
* 1975 * 119 * 20 *  57 *    20 * 314.7 *      *  * 1975 * 120 * 07 *  32 *    10 * 309.3 *      *
* 1975 * 119 * 20 *  57 *    45 * 314.7 *      *  * 1975 * 120 * 07 *  40 *    00 * 309.2 *      *
* 1975 * 119 * 21 *  49 *    15 * 314.2 *      *  * 1975 * 120 * 07 *  41 *    00 * 309.2 *      *
* 1975 * 119 * 22 *  17 *    45 * 314.0 *  LM2 *  * 1975 * 120 * 07 *  54 *    00 * 309.1 *  303 *
* 1975 * 119 * 22 *  50 *    40 * 313.7 *  311 *  * 1975 * 120 * 08 *  09 *    00 * 309.0 *      *
* 1975 * 119 * 23 *  16 *    00 * 313.5 *      *  * 1975 * 120 * 08 *  26 *    05 * 308.8 *  309 *
* 1975 * 119 * 23 *  27 *    50 * 313.4 *  312 *  * 1975 * 120 * 08 *  35 *    30 * 308.8 *      *
* 1975 * 120 * 00 *  01 *    01 * 313.4 *  31C *  * 1975 * 120 * 08 *  54 *    40 * 308.6 *  30A *
* 1975 * 120 * 00 *  12 *    30 * 313.0 *  303 *  * 1975 * 120 * 08 *  59 *    50 * 308.6 *  308 *
* 1975 * 120 * 00 *  16 *    15 * 313.0 *  31B *  * 1975 * 120 * 09 *  14 *    30 * 308.4 *      *
* 1975 * 120 * 00 *  21 *    30 * 313.0 *      *  * 1975 * 120 * 09 *  21 *    10 * 308.4 *  LM1 *
* 1975 * 120 * 00 *  32 *    50 * 312.9 *      *  * 1975 * 120 * 09 *  45 *    20 * 308.2 *  307 *
* 1975 * 120 * 00 *  36 *    00 * 312.8 *      *  * 1975 * 120 * 09 *  51 *    00 * 308.1 *      *
* 1975 * 120 * 00 *  37 *    30 * 312.8 *  31A *  * 1975 * 120 * 09 *  55 *    15 * 308.1 *      *
* 1975 * 120 * 00 *  53 *    00 * 312.7 *  31E *  * 1975 * 120 * 10 *  00 *    35 * 308.1 *      *
* 1975 * 120 * 00 *  55 *    40 * 312.7 *      *  * 1975 * 120 * 10 *  05 *    25 * 308.0 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
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* 1975 * 120 * 10 *  58 *   00 * 307.6 *      *  * 1975 * 120 * 19 *  18 *   05 * 303.3 *  30E *
* 1975 * 120 * 11 *  19 *   00 * 307.4 *      *  * 1975 * 120 * 19 *  18 *   30 * 303.3 *      *
* 1975 * 120 * 11 *  20 *   55 * 307.4 *  LM2 *  * 1975 * 120 * 19 *  28 *   00 * 303.2 *      *
* 1975 * 120 * 11 *  23 *   35 * 307.4 *      *  * 1975 * 120 * 19 *  34 *   05 * 303.2 *  30D *
* 1975 * 120 * 11 *  32 *   00 * 307.3 *  LM2 *  * 1975 * 120 * 19 *  36 *   45 * 303.2 *      *
* 1975 * 120 * 11 *  33 *   35 * 307.3 *      *  * 1975 * 120 * 19 *  40 *   20 * 303.2 *      *
* 1975 * 120 * 11 *  48 *   00 * 307.1 *  30A *  * 1975 * 120 * 19 *  45 *   30 * 303.1 *  303 *
* 1975 * 120 * 12 *  39 *   40 * 306.7 *      *  * 1975 * 120 * 20 *  04 *   00 * 302.9 *      *
* 1975 * 120 * 12 *  45 *   55 * 306.7 *  305 *  * 1975 * 120 * 20 *  05 *   50 * 302.9 *  30H *
* 1975 * 120 * 13 *  07 *   10 * 306.5 *  302 *  * 1975 * 120 * 20 *  23 *   00 * 302.8 *  LM2 *
* 1975 * 120 * 13 *  12 *   00 * 306.4 *  LM1 *  * 1975 * 120 * 20 *  33 *   35 * 302.7 *  30G *
* 1975 * 120 * 13 *  20 *   55 * 306.4 *      *  * 1975 * 120 * 20 *  39 *   05 * 302.6 *      *
* 1975 * 120 * 13 *  24 *   05 * 306.3 *      *  * 1975 * 120 * 21 *  05 *   00 * 302.4 *      *
* 1975 * 120 * 13 *  29 *   00 * 306.3 *      *  * 1975 * 120 * 21 *  11 *   00 * 302.4 *      *
* 1975 * 120 * 13 *  35 *   00 * 306.2 *  300 *  * 1975 * 120 * 21 *  15 *   10 * 302.3 *  30F *
* 1975 * 120 * 13 *  41 *   25 * 306.2 *      *  * 1975 * 120 * 21 *  18 *   45 * 302.3 *      *
* 1975 * 120 * 14 *  56 *   00 * 305.6 *  301 *  * 1975 * 120 * 21 *  23 *   25 * 302.3 *      *
* 1975 * 120 * 15 *  03 *   15 * 305.5 *      *  * 1975 * 120 * 21 *  41 *   50 * 302.1 *  30I *
* 1975 * 120 * 15 *  07 *   15 * 305.5 *  30A *  * 1975 * 120 * 21 *  46 *   25 * 302.1 *      *
* 1975 * 120 * 15 *  18 *   30 * 305.4 *  30B *  * 1975 * 120 * 21 *  50 *   25 * 302.0 *      *
* 1975 * 120 * 15 *  29 *   35 * 305.3 *  304 *  * 1975 * 120 * 21 *  57 *   00 * 302.0 *      *
* 1975 * 120 * 15 *  51 *   55 * 305.1 *      *  * 1975 * 120 * 22 *  01 *   55 * 302.0 *      *
* 1975 * 120 * 16 *  12 *   40 * 304.9 *      *  * 1975 * 120 * 22 *  07 *   30 * 301.9 *      *
* 1975 * 120 * 16 *  24 *   35 * 304.8 *      *  * 1975 * 120 * 22 *  11 *   25 * 301.9 *      *
* 1975 * 120 * 16 *  33 *   30 * 304.7 *      *  * 1975 * 120 * 22 *  14 *   05 * 301.8 *      *
* 1975 * 120 * 16 *  41 *   35 * 304.7 *      *  * 1975 * 120 * 22 *  16 *   50 * 301.8 *      *
* 1975 * 120 * 16 *  59 *   45 * 304.5 *      *  * 1975 * 120 * 22 *  22 *   40 * 301.8 *      *
* 1975 * 120 * 17 *  14 *   00 * 304.4 *      *  * 1975 * 120 * 22 *  24 *   30 * 301.8 *      *
* 1975 * 120 * 17 *  47 *   10 * 304.1 *      *  * 1975 * 120 * 22 *  27 *   00 * 301.7 *      *
* 1975 * 120 * 17 *  52 *   45 * 304.1 *      *  * 1975 * 120 * 22 *  31 *   10 * 301.7 *      *
* 1975 * 120 * 18 *  24 *   00 * 303.8 *      *  * 1975 * 120 * 22 *  43 *   50 * 301.6 *      *
* 1975 * 120 * 18 *  28 *   00 * 303.8 *      *  * 1975 * 120 * 22 *  55 *   55 * 301.5 *      *
* 1975 * 120 * 18 *  36 *   30 * 303.7 *      *  * 1975 * 120 * 23 *  09 *   00 * 301.4 *  LM2 *
* 1975 * 120 * 18 *  38 *   20 * 303.7 *  30A *  * 1975 * 120 * 23 *  10 *   00 * 301.4 *      *
* 1975 * 120 * 18 *  49 *   30 * 303.6 *      *  * 1975 * 120 * 23 *  26 *   20 * 301.2 *      *
* 1975 * 120 * 18 *  52 *   00 * 303.6 *  LM2 *  * 1975 * 120 * 23 *  39 *   30 * 301.1 *      *
* 1975 * 120 * 18 *  56 *   25 * 303.5 *  30C *  * 1975 * 120 * 23 *  48 *   05 * 301.0 *      *
* 1975 * 120 * 18 *  56 *   25 * 303.5 *      *  * 1975 * 120 * 23 *  56 *   30 * 301.0 *      *
* 1975 * 120 * 19 *  02 *   00 * 303.5 *      *  * 1975 * 121 * 00 *  36 *   00 * 300.6 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *
* 1975 * 132 * 20 *  04 *   35 * 156.3 *      *  * 1975 * 134 * 17 *  32 *   50 * 133.1 *  109 *
* 1975 * 133 * 00 *  14 *   30 * 154.1 *      *  * 1975 * 135 * 06 *  18 *   10 * 126.6 *      *
* 1975 * 133 * 00 *  31 *   50 * 154.0 *      *  * 1975 * 135 * 09 *  32 *   05 * 124.9 *  124 *
* 1975 * 133 * 03 *  41 *   00 * 152.4 *  LM1 *  * 1975 * 135 * 10 *  45 *   50 * 124.3 *      *
* 1975 * 133 * 13 *  50 *   00 * 147.2 *  109 *  * 1975 * 135 * 16 *  27 *   00 * 124.1 *      *
* 1975 * 133 * 14 *  23 *   10 * 146.9 *      *  * 1975 * 135 * 18 *  52 *   45 * 120.2 *  LM2 *
* 1975 * 133 * 14 *  39 *   50 * 146.8 *      *  * 1975 * 135 * 19 *  09 *   00 * 120.0 *  109 *
* 1975 * 133 * 14 *  48 *   00 * 146.7 *  142 *  * 1975 * 135 * 21 *  06 *   50 * 119.0 *  LM1 *
* 1975 * 133 * 21 *  13 *   25 * 143.4 *  LM2 *  * 1975 * 135 * 21 *  59 *   50 * 118.6 *  116 *
* 1975 * 133 * 23 *  28 *   00 * 142.3 *  141 *  * 1975 * 136 * 03 *  32 *   00 * 115.8 *  LM1 *
* 1975 * 133 * 23 *  30 *   30 * 142.3 *  139 *  * 1975 * 136 * 06 *  07 *   20 * 114.4 *  112 *
* 1975 * 134 * 01 *  10 *   30 * 141.4 *      *  * 1975 * 136 * 10 *  15 *   40 * 112.3 *      *
* 1975 * 134 * 05 *  42 *   25 * 139.1 *  133 *  * 1975 * 136 * 10 *  28 *   30 * 112.2 *  112 *
* 1975 * 134 * 09 *  18 *   58 * 137.3 *  LM1 *  * 1975 * 136 * 10 *  55 *   25 * 112.0 *      *
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* YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE *  * YEAR * DAY * HR * MNI *  AMP *  LONG * TYPE * P.20
* 1975 * 145 * 02 *  58 *   10 * 006.2 *      *  * 1975 * 145 * 06 *  20 *   50 * 004.5 *      *
* 1975 * 145 * 02 *  59 *   25 * 006.2 *      *  * 1975 * 145 * 06 *  31 *   50 * 004.4 *      *
* 1975 * 145 * 04 *  10 *   50 * 005.6 *      *  * 1975 * 145 * 06 *  49 *   20 * 004.3 *      *
* 1975 * 145 * 04 *  18 *   40 * 005.6 *      *  * 1975 * 145 * 07 *  00 *   45 * 004.2 *      *
* 1975 * 145 * 04 *  27 *   50 * 005.5 *      *  * 1975 * 145 * 07 *  16 *   25 * 004.1 *      *
* 1975 * 145 * 04 *  33 *   55 * 005.4 *      *  * 1975 * 145 * 07 *  23 *   05 * 004.0 *      *
* 1975 * 145 * 04 *  51 *   40 * 005.3 *      *  * 1975 * 145 * 07 *  37 *   10 * 003.9 *      *
* 1975 * 145 * 05 *  03 *   20 * 005.2 *      *  * 1975 * 145 * 07 *  56 *   50 * 003.7 *      *
* 1975 * 145 * 05 *  20 *   50 * 005.0 *      *  * 1975 * 145 * 08 *  03 *   05 * 003.7 *      *
* 1975 * 145 * 05 *  41 *   00 * 004.9 *      *  * 1975 * 145 * 08 *  10 *   00 * 003.6 *      *
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