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Hawaiian Volcano Observatory
1961 Quarterly Administrative reports

Introductory Note By Thomas L. Wright and Jennifer S. Nakata

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Summary 24
October, November, and December 1961
By Harold L. Krivoy, Robert Y. Koyanagi,
and Arnold T. Okamura

Open-File Report 2007-1321
U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
DIRK KEMPTHORNE, Secretary

U.S. Geological Survey
Mark D. Myers, Director

U.S. Geological Survey, Reston, Virginia 2007

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INTRODUCTORY NOTE

The Hawaiian Volcano Observatory Summaries have been published in the current format since 1956. The Quarterly Summaries (1956 through 1973) and the Annual Summaries (1974 through 1985) were originally published as Administrative Reports. These reports have been compiled and published as U.S. Geological Survey Open-File Reports. The quarterly reports have been combined and published as one annual summary. All the summaries from 1956 to the present are now available as .pdf files at http://www.usgs.gov/pubprod.

The earthquake summary data are presented as a listing of origin time, depth, magnitude, and other location parameters. Network instrumentation, field station sites, and location algorithms are described. Tilt and other deformation data are included until Summary 77, January to December 1977. From 1978, the seismic and deformation data are published separately, due to differing schedules of data reduction.

There are eight quarters—from the fourth quarter of 1959 to the third quarter of 1961—that were never published. Two of these (4th quarter 1959, 1st quarter 1960) have now been published, using handwritten notes of Jerry Eaton (HVO seismologist at the time) and his colleagues. The seismic records for the remaining six summaries went back to California in 1961 with Jerry Eaton. Other responsibilities intervened, and the seismic summaries were never prepared.

Chronology

The following Kīlauea eruption chronology covers the two recent reports and the six missing quarters:

Location	Beginning Date	Ending Date	Comment
Kīlauea Iki crater (Kīlauea's summit)	11/14/1959	12/20/1959	19 eruptive episodes
Kapoho (lower east rift zone)	1/13/1960	2/18/1960	4 eruption stages
Halemaumau (Kīlauea's summit)	2/24/1961	2/24/1961	Intermittent activity during uninterrupted inflation following the 1960 eruption
Halemaumau (Kīlauea's summit)	3/22/1961	3/25/1961	Same as above.
Halemaumau (Kīlauea's summit)	7/10/1961	7/17/1961	Same as above.
Heiheiahulu (middle east rift zone)	9/22/1961	9/25/1961	First historical east rift eruption at this location

The 1959-1960 eruptions were among two of the most spectacular Kīlauea eruptions. The HVO staff was kept busy with acquisition of unusually high quantities of instrumental data and observations of the two sequences, which were separated by less than one month. Even with a year's interval before the beginning of the summit-east rift sequence in 1961, the staff never caught up, and the seismic records were set aside for later study.

A total of 1,672 earthquakes—1,106 for 1960 and 566 for 1961—are part of HVO's cataloged database. The annual listings have been appended to the 1st Quarter Report of 1960 and to the 4th Quarter Report for 1961. The number of earthquakes is probably low, biased toward the larger magnitudes. The entire HVO catalog, including 1960 and 1961, is accessible from the ANSS CATALOG SEARCH site at http://www.ncedc.org/anss/catalog-search.

Thomas L. Wright and Jennifer S. Nakata

UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

HAWAIIAN VOLCANO OBSERVATORY

SUMMARY 24

October, November, and December, 1961

By

H. L. Krivoy, R. Y. Koyanagi, and A. T. Okamura

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October 1963

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HAWAIIAN VOLCANO OBSERVATORY SUMMARY 24

By H. L. Krivoy, R. Y. Koyanagi, and A. T. Okamura

Chronological summary

Coincident with the injection of magma into a long section of Kilauea's east rift zone during the brief 1961 eruption (Sept. 21-25), the summit of the volcano subsided rapidly. Although the total subsidence during the 1961 eruption was only about one half as great as that associated with the 1960 flank eruption at Kapoho, the rate of subsidence in 1961 was far greater than in 1960. In contrast to the 1960 subsidence, which continued slowly for months after the eruption, the 1961 collapse terminated with the eruption, and the cycle of inflation at Kilauea which began late in 1960 resumed. Slow swelling of the volcano continued through the rest of the year.

The tilting diagram (fig. 1) showing the 1961 collapse is based on changes between July 23 and October 8, and it obscures the high rates of subsidence that occurred during the brief eruption. A more detailed, qualitative picture of swelling and subsidence at Kilauea is provided by a graph of the daily readings of the short-base liquid-level tiltmeter in Uwekahuna vault (fig. 2), which summarizes the history of tilting at that station from July 1956 to August 1962. For comparison, tilt coordinates and changes from December 1959 to October 1961 at the Uwekahuna field tilt-base are listed in table 3.

During the later stages of the 1960 collapse, a great swarm of shallow earthquakes originated in and around Kilauea caldera. During February and March 1960, about 350 earthquakes were reported felt, and thousands were recorded by the seismographs. No such swarm of earthquakes at the summit of Kilauea accompanied the 1961 collapse, although many earthquakes originated along the rift zone just before and during the eruption. Apparently the collapse in 1961, like the first week of collapse in 1960, did not strain rocks surrounding the shrinking reservoir beyond the elastic limit. The lower pre-eruption level of the Kilauea summit, the smaller total subsidence, and the earlier cessation of subsidence in 1961, as compared to 1960, might also have checked the development of a swarm of collapse earthquakes in 1961.

Feeble shallow earthquakes at Kilauea caldera averaged about 20 per day throughout the quarter. A sequence of earthquakes from Kilauea's southwest rift zone continued through the quarter; daily counts of these earthquakes ranged from 1 to 31 and averaged about 10.

The most important seismic activity of the quarter originated in a zone about 30 km beneath Halemaumau (southwest edge of Kilauea caldera). Earthquakes from this source became prominent when Kilauea

began to reinflate in the fall of 1960, following the 1960 collapse. During the last quarter of 1961 quakes of this family occurred in groups of 40 or 50 over periods of 2 or 3 hours. About 150 of them were large enough for study. Foci of these earthquakes seemed to follow no regular pattern of migration, but they showed a "normal" scatter which indicated a source region that was broader than it was high.

Daily counts of these earthquakes are shown in table 4. Only one earthquake of this group had a magnitude larger than 2.4 during October; but in November there were 34 such earthquakes, and in December there were 17. The largest earthquakes from this deep source occurred on November 21 (magnitude 3.8), November 23 (magnitude 3.8), November 25 (magnitude 3.7), December 2 (magnitude 3.9), and December 31 (magnitude 3.9). Earthquakes of magnitude 2.9 were at the threshold of sensibility, and nearly all larger ones were reported felt. Ten were reported felt during November and 5 during December.

Most of the other earthquakes felt in Hawaii during this quarter originated in Kona. They are listed in table 5.

Tilting of the ground around Kilauea caldera

Tilting of the ground around the summit of Kilauea is monitored daily by a short-base water-tube tiltmeter in Uwekahuna vault (table 1), and at irregular intervals it is measured on a regional scale by means of a network of field tilt-bases and a portable water-tube tiltmeter (table 2). The attitude of the ground surface at each tilt base is reported in terms of north-south and east-west tilt coordinates. Both coordinates at each station were arbitrarily set equal to 500 when measurements at that station were begun. Increasing tilt coordinates correspond to northward and eastward tilting of the earth's surface, that is, to a relative subsidence toward the north and east. A 1-unit change in coordinate corresponds to a tilting of 1 microradian (1 mm per km) in the direction indicated.

Seismic summary

Events recorded by the U.S. Geological Survey seismograph network in Hawaii fall into two categories: local earthquakes and tremor originating in the region of the Hawaiian Islands, usually within 100 km of at least one seismograph, and distant earthquakes originating more than 3,000 km from Hawaii. As an index of seismic activity at Hawaiian volcanoes, daily counts of earthquakes and minutes of tremor recorded by seismographs in Hawaii are listed in table 4. The earthquakes are separated into groups on the basis of region of origin as determined by analysis of records obtained daily at the Observatory (U, M, A, D, N). Earthquakes of magnitude 2.5 or

greater are generally sufficiently well recorded to be located with greater precision; they are listed individually in table 5. Data on identifiable phases from distant earthquakes are listed in table 6.

Locations of the seismograph stations are shown on figure 3, and essential data on the stations are given in Summary 21.

Table 1.--Tilt coordinates at Uwekahuna vault, October, November, and December, 1961

Date	N-S	E-W	Date	N-S	E-W
Oct. 1	410	588	Nov. 19	412	562
8	410	584	26	414	556
15	411	577	Dec. 3	415	554
22	412	572	10	415	556
29	414	568	17	415	555
Nov. 5	408	569	24	415	554
12	409	566	31	416	552

Table 2.--Tilt coordinates and changes at bases around Kilauea caldera (see fig. 1)

Tilt base (location)	Date (1961)	Tilt coordinates		Rate (10^{-6} rad/mo) and direction of tilting since last reading		Date of last reading (1961)
		N-S	E-W			
Uwekahuna (19°25.5' N., 155°17.4' W.)	Oct. 6	358.9	565.2	54.8	S. 32° E.	Sept. 22
Tree Molds (19°26.3' N., 155°17.3' W.)	7	389.5	528.6	27.8	S. 16° E.	July 25
Sand Spit (19°24.1' N., 155°16.8' W.)	11	839.0	696.2	54.0	S. 15° E.	25
Kalihipaa (19°21.4' N., 155°15.3' W.)	8	580.4	421.3	16.4	N. 20° W.	22
	8	580.3	421.3	34.3	N. 29° W.	Sept. 22
Keamoku (19°25.1' N., 155°19.0' W.)	8	443.2	677.8	49.7	S. 58° E.	July 21
Kamokukolau (19°22.7' N., 155°16.6' W.)	7	769.4	469.4	90.0	N. 18° W.	21
Kipuka Nene (19°19.4' N., 155°16.7' W.)	9	516.3	495.4	3.0	N. 34° W.	24
Hilina Pali (19°18.2' N., 155°18.6' W.)	9	511.0	497.8	2.9	N. 32° W.	23
Mehana (19°26.2' N., 155°14.3' W.)	10	524.5	527.6	10.8	S. 47° W.	25
	Nov. 2	525.5	530.8	4.5	N. 72° E.	Oct. 10

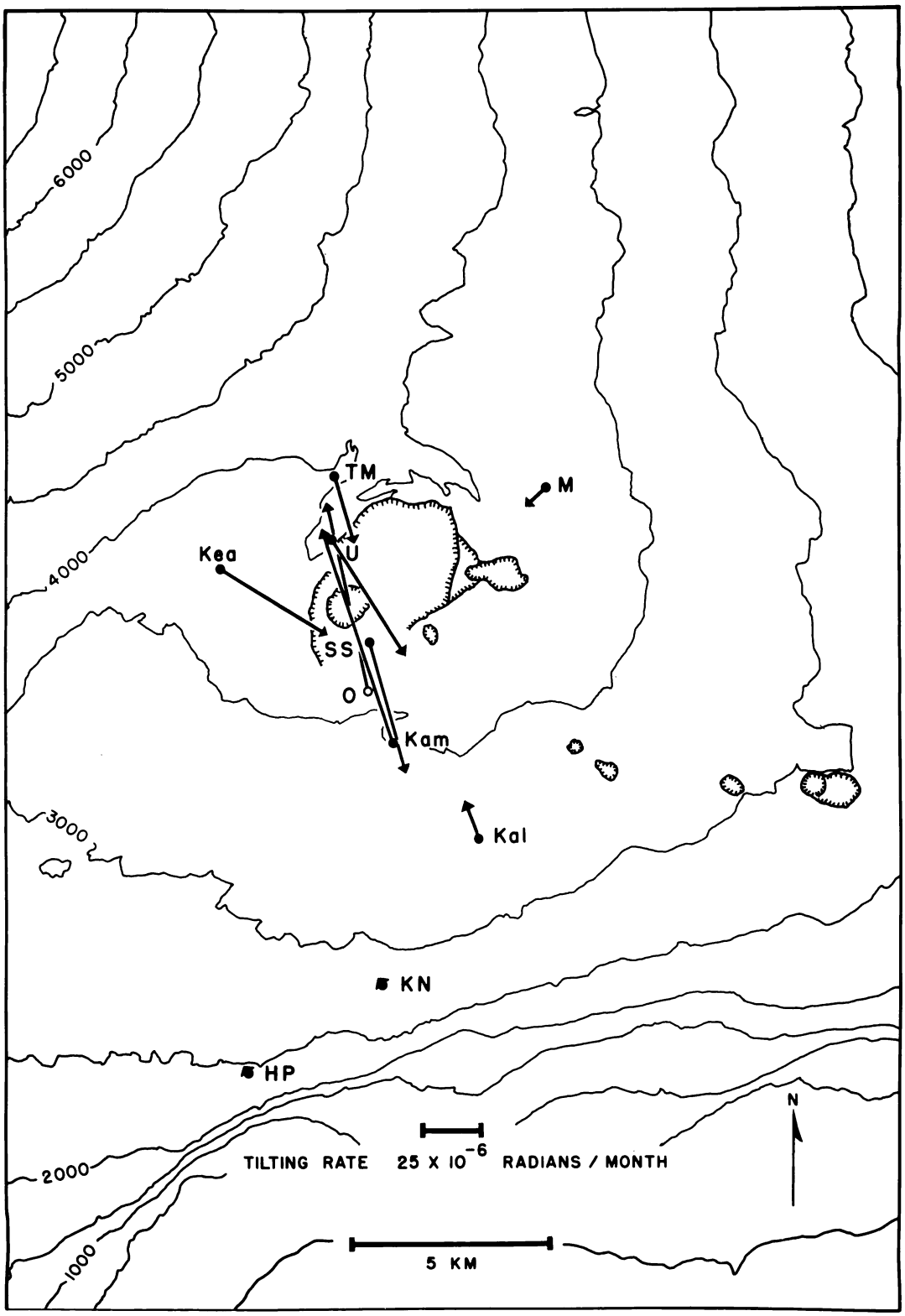

Figure 1.--Tilting of the ground around Kilauea caldera, July 23, 1961, to Oct. 8, 1961. The vector depciting tilting at a given tilt base points in the direction of maximum relative subsidence and has a length proportional to the rate of tilting during the measurement interval. Closed circles represent field tilt bases; open circles, short-base water-tube tiltmeters.

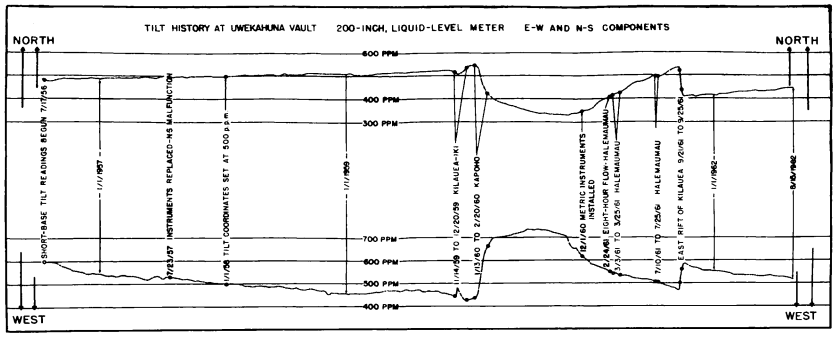

Figure 2.--East-west and north-south components of tilt revealed by daily readings at the short-base, liquid-level tiltmeter in Uwekahuna vault.

Data are plotted from July 17, 1956, when these readings began. The plots represent computed relative tilt based on 7-day averages and referred to an arbitrary base value of 500 parts per million on January 1, 1958. Departures from this base, therefore, represent changes of inclination at Uwekahuna in parts per million, or microradians. The curves are further keyed (along the date-line abscissa) to important periods of both geological and instrumental change.

Tilt variations toward the north and the west represent inflation of Kilauea centered approximately at Halemaumau. Important inflationary peaks were reached on January 12, 1960 and September 20, 1961 with a third cycle of swelling in progress on August 15, 1962--where the curve presently ends. Conversely, deflation such as Kilauea experienced on January 13, 1960 and September 20, 1961 is demonstrated by inclination of this tilt base toward the southeast.

Table 3.--Tilt coordinates and changes at the Uwekahuna field tilt-base from December 1959 to October 1961

[In general, tilting toward the northwest at Uwekahuna indicates swelling of Kilauea and tilting toward the southeast indicates subsidence]

Dates	Tilt coordinates		Rate (u-rad/mo)	Azimuth
	N-S	E-W		
12/28/59 to 3/28/60	518	480	118	S. 34° E.
3/28/60 to 7/5/60	219	679	19	S. 32° E.
7/5/60 to 9/16/60	216	678	1	S. 21° W.
9/16/60 to 11/29/60	283	609	39	N. 46° W.
11/29/60 to 2/23/61	375	548	38	N. 34° W.
2/23/61 to 5/8/61	444	514	31	N. 26° W.
5/8/61 to 6/26/61	468	503	16	N. 25° W.
6/26/61 to 7/22/61	477	492	16	N. 51° W.
7/22/61 to 9/22/61	404	546	44	S. 37° E.
9/22/61 to 10/6/61	360	565	55	S. 32° E.

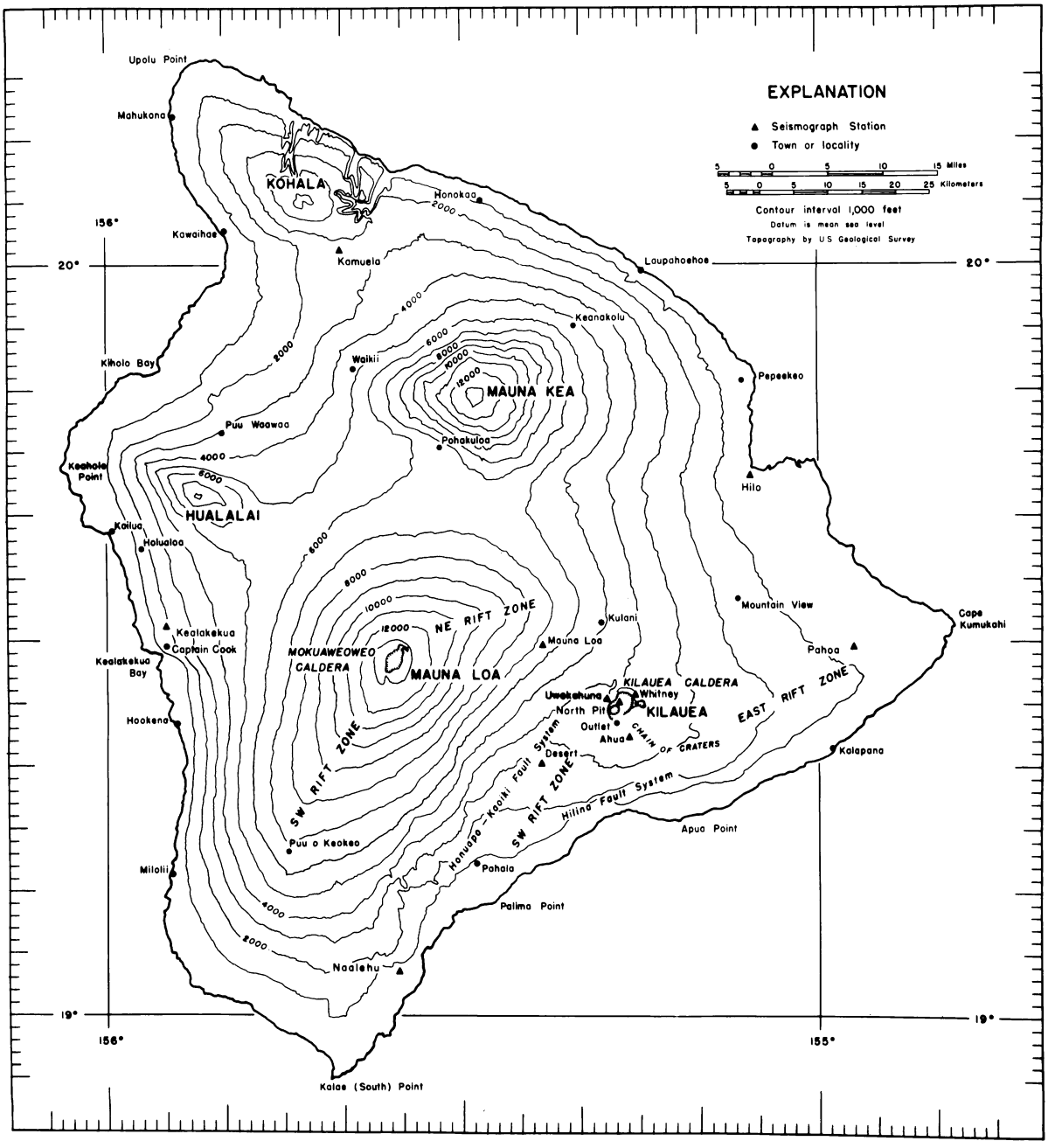

Figure 3.--Map of the island of Hawaii showing seismograph stations operated by the Geological Survey and localities mentioned in the text. Epicenters of local earthquakes are given in terms of geographic coordinates, which are indicated at the edges of the map.

Table 4.--Numbers of earthquakes and minutes of tremor recorded on seismographs around Kilauea caldera (U, M, A, D, and N)

[Tremor is separated into three categories--(1) deep, (2) intermediate, and (3) shallow--on the basis of relative amplitudes on seismographs in the summit region. Unless otherwise stated, tremor is presumed to be associated with movement of magma within the central complex of Kilauea.

Halemaumau rock slides (4) are detected by the characteristic record they produce on the North Pit seismograph.

Earthquake categories are: 5, shallow earthquakes in the Kilauea caldera region;
6, shallow earthquakes along the SW. rift zone of Kilauea and the adjacent portion of the Kaoiki fault system;
7, earthquakes along the eastern half of Kilauea's east rift zone;
8, earthquakes from a source about 30 km beneath Halemaumau (SE. edge of Kilauea caldera);
9, earthquakes from other regions: Kona, Mauna Kea, etc.]

Date (1961)	Tremor (in minutes)			Halemaumau slides	Kilauea caldera	SW. rift	E. rift	30 km	Others
	Deep	Intermediate	Shallow						
	1	2	3	4	5	6	7	8	9
Oct. 1	----	----------	-------	3	36	10	1	5	----------
2	----	----------	-------	1	35	14	1	1	1
3	----	----------	-------	2	18	7	2	2	----------
4	----	----------	-------	1	25	1	----	2	2
5	----	----------	3	----------	21	19	----	--	----------
6	21	----------	-------	----------	22	8	----	1	----------
7	33	----------	-------	----------	28	12	----	5	----------
8	----	----------	-------	1	29	11	1	2	----------
9	----	----------	3	7	53	18	4	1	1
10	4	----------	5	16	54	9	1	3	----------
11	----	----------	12	----------	13	13	1	3	2
12	----	----------	5	2	9	6	----	1	----------
13	32	----------	-------	2	38	8	----	4	1 (60 km)

	14	----	----------	-------	----------	33	8	----	5	----------
	15	----	----------	-------	1	18	5	1	3	1 (60 km)
	16	----	----------	-------	----------	12	2	2	6	----------
	17	----	----------	-------	----------	23	7	1	2	----------
	18	----	----------	-------	----------	15	8	----	1	3 (Kona)
	19	----	----------	-------	----------	17	6	1	3	----------
	20	----	----------	-------	----------	21	2	----	4	1 (Kona)
	21	----	----------	-------	----------	24	7	----	5	1 (Kona)
	22	----	2	-------	----------	7	6	1	5	----------
	23	----	----------	-------	----------	27	2	1	5	----------
	24	----	----------	-------	----------	19	5	----	5	----------
	25	----	----------	-------	1	22	1	1	1	----------
	26	----	----------	-------	1	20	10	----	1	----------
	27	----	----------	-------	----------	16	9	----	2	----------
	28	----	----------	-------	----------	17	9	----	2	1 (Kona)
	29	----	3	-------	3	20	10	----	6	----------
	30	----	3	-------	----------	12	8	3	3	----------
	31	40	----------	-------	1	24	7	----	--	----------
Nov.	1	----	----------	-------	----------	40	2	----	2	4 (Mauna Loa)
	2	----	----------	-------	1	30	5	1	4	----------
	3	----	----------	-------	1	40	9	----	2	2
	4	----	----------	-------	----------	40	11	1	25	1 (Kamuela)
	5	----	----------	-------	----------	46	30	----	25	1
	6	----	----------	-------	----------	40	8	1	8	1
	7	----	----------	-------	----------	40	5	----	10	1 (Mauna Loa)
	8	----	----------	-------	2	17	12	1	5	1
	9	----	2	-------	----------	25	10	2	6	1 (Kohala)
	10	----	----------	-------	----------	30	16	----	3	1 (Kohala)
	11	----	----------	-------	----------	50	11	----	4	----------
	12	----	----------	-------	----------	30	8	----	16	----------
	13	----	----------	-------	----------	25	4	----	18	1 (Kona)
	14	----	4	-------	----------	23	15	1	12	----------
	15	----	----------	-------	----------	30	7	----	6	----------
	16	----	----------	-------	----------	24	13	1	19	2
	17	----	----------	-------	----------	35	37	----	42	2
	18	----	----------	-------	2	30	23	----	3	----------
	19	----	----------	-------	----------	26	13	1	54	----------
	20	----	----------	-------	----------	18	6	----	49	----------
	21	----	----------	-------	----------	56	6	----	150	1 (Kona)
	22	----	----------	-------	----------	20	11	----	61	2
	23	----	----------	8	1	19	5	----	55	----------

	24	----	----------	-------	----------	17	11	----	30	2
	25	----	----------	-------	----------	10	14	----	41	2
	26	----	----------	-------	----------	32	12	----	32	----------
	27	----	----------	-------	----------	29	11	2	28	----------
	28	----	----------	-------	----------	32	21	----	18	----------
	29	----	----------	-------	----------	16	12	----	5	1 (Kona)
	30	----	----------	-------	----------	11	16	----	19	2
Dec.	1	----	----------	2	----------	11	7	----	6	----------
	2	----	----------	-------	----------	8	7	----	63	----------
	3	----	----------	-------	1	10	6	----	35	----------
	4	----	----------	-------	----------	26	11	----	15	2 (Mauna Loa)
	5	----	----------	-------	----------	28	10	----	8	2 (Mauna Loa)
	6	----	----------	-------	19	21	5	----	13	1
	7	----	----------	-------	2	12	11	----	22	1
	8	3	----------	-------	----------	18	11	----	11	----------
	9	----	----------	-------	----------	40	7	1	12	1 (Kona)
	10	----	2	-------	4	17	7	----	5	1 (Kona)
	11	----	----------	-------	2	14	12	----	11	1 (Kona)
	12	----	----------	-------	----------	22	6	1	9	1
	13	----	1	-------	2	28	5	----	4	----------
	14	19	----------	-------	8	26	6	----	2	----------
	15	----	----------	-------	2	12	15	1	28	----------
	16	----	----------	-------	----------	6	15	----	22	2
	17	----	5	-------	5	14	10	----	13	2 (Kona)
	18	----	----------	-------	1	18	18	----	12	1 (Kona)
	19	----	----------	-------	----------	7	6	----	18	----------
	20	----	----------	2	----------	18	16	1	4	1
	21	----	----------	-------	2	23	25	----	13	1 (Kona)
	22	----	2	-------	----------	46	20	1	20	----------
	23	----	5	-------	----------	32	23	----	10	----------
	24	----	----------	-------	----------	70	31	----	15	1 (Kaoiki)
	25	----	5	-------	1	38	9	2	2	3
	26	----	5	-------	----------	50	12	----	7	1 (Kona)
	27	----	----------	2	----------	50	10	----	7	2
	28	16	----------	-------	----------	59	3	----	24	----------
	29	12	----------	-------	----------	51	14	----	12	----------
	30	----	----------	-------	----------	63	10	1	7	3
	31	2	----------	-------	6	34	12	1	55	1

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961

[Except for smaller earthquakes of special interest, only earthquakes with magnitudes of 2.5 or greater are listed. Origin time is Hawaiian standard.

In the following list some origin times are followed only by "KM 30" and a statement of magnitude. These are all members of a continuing family of quakes noted in other reports as well. They were especially predominant in this quarter and thus are listed in this abbreviated fashion. The most accurately located mean epicenter for this group is under Halemaumau at a depth of 30 km (19°24.1' N., 155°17.1' W).]

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Oct. 1	22	10	25.0	2.5	19°15.5'	155°30.3'	6 km NNW. of Pahala------	At shallow depth.
2	00	17	46.5	2.3	19°18.8'	155°05.0'	45 km S. of Hilo, E. rift zone of Kilauea.	3 km deep.
4	06	01	25.7	2.3	19°22.7'	155°19.8'	6 km W. of Ahua seismometer.	25 km deep.
5	02	25	37.5	3.3	19°29.8'	155°43.5'	20 km ESE. of Kealakekua-	3 km deep.
6	12	46	22.5	2.7	19°09.1'	155°26.7'	6 km SE. of Pahala, SW. rift zone of Kilauea.	8 km deep.
15	19	05	22.3	2.5	19°37.1'	155°16.2'	22 km SW. of Hilo--------	55 km deep.
18	08	34	29.5	2.6	19°47.7'	155°39.8'	7.5 km S. of Waikii------	8 km deep.
18	17	15	32.5	2.6	19°46.4'	155°49.9'	Beneath Puu Waawaa. Felt in N. Kona and Kamuela.	At shallow depth.

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Oct. 22	09	49	45.5	2.8	19°11.7'	155°35.3'	14 km N. of Naalehu------	3 km deep.
23	05	04	49.0	2.6			KM 30.	
29	07	25	21.0	2.2	19°29.2'	155°51.2'	10 km SE. of Kealakekua. Felt near Kealakekua.	At shallow depth.
29	11	39	09.7	2.5	19°43.2'	155°13.6'	15 km W. of Hilo--------	30 km deep.
Nov. 3	09	13	14.5	2.6	19°53.0'	155°34.9'	18 km SE. of Kamuela-----	At shallow depth.
4	06	24	29.0	3.0	19°22.1'	155°29.4'	18 km NNW. of Pahala-----	8 km deep.
5	06	56	27.0	3.0	19°47.2'	155°34.8'	11 km SE. of Waikii. Felt near Puu Waawaa.	12.5 km deep.
5	07	20	52.3	2.5			KM 30.	
5	14	14	37.5	2.6	19°21.5'	155°32.4'	20 km NW. of Pahala------	12.5 km deep.
8	11	51	00.5	2.4	19°26.5'	155°18.5'	11 km SE. of Mauna Loa seismometer.	Do.
10	05	38	17.4	3.4	19°25.8'	155°18.8'	11 km SE. of Mauna Loa seismometer. Felt in Hilo and Kilauea caldera region.	Do.

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Nov. 12	15	45	22.0	2.7	19°20.5'	155°09.8'	29 km SW. of Pahoa, E. rift zone of Kilauea.	3 km deep.
14	04	51	27.0	3.3	19°25.4'	155°55.3'	11 km S. of Kealakekua. Felt in Honaunau.	Do.
16	06	17	12.4	2.5			KM 30.	
16	15	10	16.1	2.6			KM 30.	
16	16	50	41.9	2.7			KM 30.	
16	19	03	51.2	2.5	19°12.9'	155°21.2'	30 km NE. of Naalehu-------	35 km deep.
17	17	48	47.0	2.4			KM 30.	
17	19	33	26.0	2.5			KM 30.	
17	19	56	49.5	3.0	19°44.3'	155°57.6'	25 km NNW. of Kealakekua. Felt near Puu Waawaa.	At shallow depth.
17	23	22	37.4	2.8			KM 30.	
18	03	44	00.5	2.5			KM 30.	
18	08	09	14.5	3.0	19°26.3'	155°54.7'	9 km S. of Kealakekua. Felt throughout Kona.	At shallow depth.
18	09	41	01.5	2.7			KM 30.	

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Nov. 20	01	40	24.0	2.9			KM 30.	
20	03	14	07.1	2.6	19°21.7'	155°06.4'	8 km E. of Makaopuhi Crater, E. rift zone of Kilauea.	5 km deep.
20	19	40	27.2	2.5			KM 30.	
21	00	41	25.5	2.9			KM 30. Felt on E. rim of Kilauea caldera.	
21	02	42	56.9	2.4			KM 30.	
21	23	22	39.3	3.8			KM 30. Felt in Hilo, Kilauea caldera region, and N. Kona.	
21	23	25	56.8	2.4			KM 30.	
21	23	27	05.4	2.6			KM 30.	
21	23	46	01.9	3.0			KM 30. Felt on E. rim of Kilauea caldera.	
21	23	48	18.9	3.0			KM 30.	
22	00	09	20.7	2.7			KM 30.	
22	03	27	35.5	2.9			KM 30.	

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Nov. 22	05	44	48.1	3.1			KM 30.	
22	10	55	55.5	3.2			KM 30. Felt on N. rim of Kilauea caldera.	
22	16	32	41.8	2.6			KM 30.	
23	06	39	41.2	2.4			KM 30.	
23	07	24	54.5	2.7			KM 30.	
23	16	29	36.6	3.0			KM 30. Felt on NE. rim of Kilauea caldera.	
23	17	09	55.7	3.3			Do.	
23	17	14	30.6	3.8			KM 30. Felt throughout Kilauea caldera region.	
23	17	30	41.4	2.5			KM 30.	
24	05	35	40.7	2.9			KM 30. Felt on NE. rim of Kilauea caldera.	
24	10	31	11.8	2.7	19°18.1'	155°07.7'	17 km SE. of Ahua seismometer.	8 km deep.
24	20	46	55.5	2.4	19°21.2'	155°47.5'	23 km SE. of Kealakekua---	At shallow depth.

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Nov. 25	06	14	11.0	2.4	19°17.3'	155°11.6'	12.5 km SE. of Ahua seismometer.	12.5 km deep.
25	06	14	21.5	2.7	19°17.9'	155°08.5'	17 km SE. of Ahua seismometer.	3 km deep.
25	13	26	03.0	3.7			KM 30. Felt in N. Kona and Kilauea caldera area.	
25	20	22	55.5	2.3	19°44.0'	155°31.1'	47 km W. of Hilo---------	8 km deep.
27	01	32	35.8	2.8			KM 30.	
27	04	51	23.5	3.4			KM 30. Felt from Kilauea caldera region to Kona.	
27	09	44	45.5	2.5			KM 30.	
27	15	55	40.0	2.5			KM 30.	
30	14	30	49.5	2.6			KM 30.	
30	16	51	17.5	2.4			KM 30.	
30	18	58	46.5	2.6			KM 30.	
30	20	14	26.1	2.5			KM 30.	

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Dec. 1	06	37	43.6	2.8			KM 30.	
1	07	33	58.0	2.9	19°22.2'	155°42.0'	23 km E. of Hookena, SW. rift of Mauna Loa.	At shallow depth.
1	09	09	38.1	2.6			KM 30.	
2	18	57	59.8	3.9			KM 30. Felt throughout the island.	
2	20	28	45.0	2.3			KM 30.	
3	01	01	35.8	2.6	19°24.2'	155°25.3'	8 km NNW. of Desert seismometer.	5 km deep.
3	11	33	37.6	2.4			KM 30.	
4	01	06	50.3	2.3			KM 30.	
4	04	12	17.5	2.3			KM 30.	
4	14	08	03.5	3.1			KM 30.	
4	23	27	50.0	2.6	19°19.8'	155°44.6'	20 km SE. of Hookena, SW. rift of Mauna Loa.	At shallow depth.
5	01	54	19.0	2.5	19°18.7'	155°09.2'	30 km SW. of Pahoa------	3 km deep.

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Dec. 5	06	32	52.0	2.9	19°21.2'	155°47.3'	13 km ESE. of Hookena---	At shallow depth.
5	13	19	31.8	2.9			KM 30.	
5	17	11	13.8	2.4	19°21.2'	155°47.3'	13 km ESE. of Hookena---	At shallow depth.
5	20	41	28.0	3.3	19°10.0'	155°38.3'	13 km NW. of Naalehu. Felt in Pahala.	25 km deep.
6	03	08	05.5	2.6	19°13.6'	155°00.3'	21 km SSW. of Pahoa-----	35 km deep.
7	09	42	59.7	2.6			KM 30.	
9	16	59	19.8	2.9			KM 30. Felt on E. rim of Kilauea caldera.	
9	19	37	52.5	2.7	19°44.5'	155°57.4'	12 km NNE. of Kailua----	8 km deep.
10	20	47	34.0	2.6	19°59.7'	155°31.0'	10 km SW. of Honokaa----	Do.
11	17	03	18.3	3.0	19°24.3'	155°44.8'	17 km E. of Hookena-----	At shallow depth.
11	21	55	31.5	3.0			KM 30. Felt throughout Kilauea caldera region.	
13	01	36	32.5	2.6			KM 30.	

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Dec. 15	10	37	20.9	2.5	19°31.4'	154°50.3'	35 km SE. of Hilo, E. rift zone of Kilauea.	8 km deep.
15	11	17	57.4	3.2			KM 30. Felt on E. rim of Kilauea caldera.	
16	20	48	58.8	2.3	19°37.1'	155°16.2'	21 km WSW. of Hilo------	12.5 km deep.
17	05	46	15.0	2.2			KM 30.	
17	07	19	44.4	2.3			KM 30.	
17	07	50	52.5	3.4	19°37.7'	155°51.2'	10 km E. of Holualoa. Felt near Kealakekua.	12.5 km deep.
21	03	04	55.5	2.5	19°57.7'	155°19.6'	10 km SW. of Laupahoehoe	Do.
22	05	57	43.1	2.8	19°22.8'	155°48.7'	10 km E. of Hookena-----	3 km deep.
23	06	37	13.5	2.6	19°20.7'	155°30.6'	16 km NNW. of Pahala----	Do.
23	08	18	32.8	2.5			KM 30.	
24	10	54	40.6	3.0			KM 30.	
24	22	29	34.9	2.5	19°26.2'	155°26.1'	9 km SW. of Mauna Loa seismometer.	8 km deep.

Table 5.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December, 1961--Continued

Date (1961)	Time			Magnitude	Epicenter			Remarks
	h	m	s		Lat. N.	Long. W.	Description	
Dec. 25	10	17	45.0	2.4	19°28.3'	155°28.3'	30 km N. of Pahala------	5 km deep.
26	19	48	04.3	2.9	19°29.2'	155°50.9'	8 km ESE. of Kealakekua-	3 km deep.
27	17	14	27.7	2.7	19°14.2'	155°35.0'	19 km N. of Naalehu-----	Do.
28	00	28	46.0	2.7	19°24.2'	155°06.1'	20 km SW. of Pahoa, E. rift zone of Kilauea.	Do.
28	22	42	57.6	3.1			KM 30.	
28	22	43	33.6	2.5			KM 30.	
30	12	09	30.0	2.6	19°46.7'	155°26.3'	37 km WNW. of Hilo------	8 km deep.
30	13	08	22.0	2.5			KM 30.	
31	06	03	23.2	3.0	19°47.0'	155°31.8'	5 km N. of Pohakuloa. Felt in Pohakuloa.	8 km deep.
31	07	43	44.8	2.9	19°20.8'	155°26.3'	35 km NW. of Naalehu----	3 km deep.
31	08	13	06.8	2.5	19°14.5'	155°12.8'	40 km SW. of Pahoa------	5 km deep.
31	08	52	09.9	3.9			KM 30. Felt on E. rim of Kilauea caldera.	
31	11	38	17.0	3.6	20°54'	154°46'	139 km NNE. of Hilo-----	12.5 km deep.
31	19	07	22.7	2.9			KM 30.	

Table 6.--Distant earthquakes

[Times are reported in Greenwich civil time which is 10 hours faster than Hawaiian standard time. A "c" following the time of P indicates compressional first motion; a "d" indicates dilatational first motion. Station symbols, locations, and instrumentation are presented in Summary 21. Magnitudes calculated from the Hawaii seismograms are followed by (HVO). Location of epicenter, origin times, and focal depths, and magnitudes reported by other institutions are taken from "Preliminary Determination of Epicenters" published by the U.S. Coast and Geodetic Survey]

Oct. 2

M	Z	eP	07:12:34.2 c
A	Z	iP	07:12:33.5 c
D	Z	eP	07:12:34.0 c
U	PEZ	eR	07:29:07

From a southerly direction.

No preliminary C&GS listing.

Oct. 4

U	PEN	eS	02:39:11
U	PEZ	eS	02:39:35
U	PEZ	eR	02:46:47

C&GS card 81-61:
13.2° S., 166.5° E.
02:23:23.5.
New Hebrides region.
h about 66 km.

Oct. 5

Pa	Z	iP	18:17:52.8 c

No preliminary C&GS listing.

Oct. 8

M	Z	iP	23:52:22.3 d
A	Z	iP	23:52:23.8 d
D	Z	iP	23:52:23.4 d

Oct. 8--Continued

U	Z	iP	23:52:22.7 d

C&GS card 82-61:
1.6° N., 127.3° E.
23:41:32.2.
Halmahera.
h about 102 km.

Oct. 18

U	PEZ	ePP	17:15:54
U	PEZ	iPPP	17:17:58
U	PEZ	iS	17:23:28
U	PEZ	eR	17:35:32
M	Z	Tmax	18:51:05

Magnitude 6.8 (HVO).

C&GS card 84-61:
36.7° S., 72.6° W.
16:52:00.2.
Near coast of southern Chile.
h about 67 km.
Magnitude 6.5 (Pas).

Oct. 21

M	Z	iP	11:50:57.9 d
A	Z	iP	11:50:57.4 d
D	Z	eP	11:50:57.6 d
N	Z	eP	11:50:57.1 d
U	Z	iP	11:50:57.6 d

Table 6.--Distant earthquakes--Continued

Oct. 21--Continued

Ka	Z	eP	11:50:58.3	c
Na	Z	iP	11:50:54.0	c
Pa	Z	iP	11:50:59.8	c
Hi	Z	iP	11:50:59.9	d
Ha	Z	iP	11:51:02.7	c

C&GS card 84-61:
18.0° S., 178.5° W.
11:43:41.3.
Fiji Islands.
h about 618 km.

Oct. 21

M	Z	iP	17:43:01.8	c
A	Z	eP	17:43:02.1	d
D	Z	iP	17:43:00.6	c
Pa	Z	iP	17:43:02.8	d
Hi	Z	eP	17:43:04.6	c

C&GS card 85-61:
10.8° S., 166.0° E.
17:34:36.8.
Santa Cruz Islands.
h about 192 km.

Oct. 23

M	Z	iP	14:51:33.0	d
A	Z	iP	14:51:33.4	d
D	Z	iP	14:51:32.6	d
U	Z	iP	14:51:32.9	d
U	PEE	eS	15:02:20	

Oct. 23--Continued

U	PEE	eR	15:14:15	
U	PEN	eR	15:14:19	
U	PEZ	eR	15:14:27	

C&GS card 91-61:
3.5° N., 126.4° E.
14:39:33.5.
Molucca Passage.
h about 25 km.
Magnitude 6.5 (Pas) 6.25 (Berk).

Oct. 23

M	Z	iP	15:04:27.4	d
A	Z	iP	15:04:28.5	d
D	Z	iP	15:04:27.3	d
U	Z	iP	15:04:27.8	d

C&GS card 96-61:
3.5° N., 126.6° E.
14:52:28.2.
Molucca Passage.
h about 32 km.

Oct. 23

U	PEN		16:49:00

Start of pressure waves caused by Russian nuclear explosion. First waves had average period of 105 seconds.

Oct. 24

M	Z	iP	05:34:36.7	d
A	Z	iP	05:34:37.8	d
D	Z	iP	05:34:37.3	d

Table 6.--Distant earthquakes--Continued

Oct. 24--Continued

U	Z	iP	05:34:37.1	c

From a northerly direction.

No preliminary C&GS listing.

Oct. 26

M	Z	eP	00:48:35.6	c
A	Z	eP	00:48:35.8	c
D	Z	eP	00:48:35.2	c
U	PEZ	eP	00:48:35	c
U	PEZ	eSS	01:00:42	
U	PEZ	iR	01:05:40	
U	PEE	iS	00:56:45	
U	PEE	eG	01:03:20	
U	PEN	eG	01:03:25	

Magnitude 6.5 (HVO).

C&GS card 89-61:
3.1° S., 147.4° E.
00:38:20.3.
Bismarck Sea.
h about 14 km.
Magnitude 6.5 (Pas and Berk).

Oct. 28

U	PEZ	eS	23:00:53
U	PEZ	eR	23:07:16

C&GS card 88-61:
13.9° S., 166.0° E.
22:44:33.6.
New Hebrides Islands.
h about 89 km.

Oct. 29

U	PEN	eL	09:27:29
Hi	Z	eL	09:27:33
Ha	Z	eL	09:28:02
Ha	Z	Tmax	09:56:43
M	Z	Tmax	09:57:13
A	Z	Tmax	09:57:26
D	Z	Tmax	09:57:26
U	Z	Tmax	09:57:25
Pa	Z	Tmax	09:57:27

C&GS card 86-61:
49.0° N., 128.7° W.
09:12:15.7.
Vancouver Island region.
h about 16 km.

Oct. 29

Pa	Z	Tmax	10:47:22
Pa	Z	Tmax	11:55:19
Pa	Z	Tmax	12:01:53
Pa	Z	Tmax	14:45:07
Pa	Z	Tmax	17:01:29
Pa	Z	Tmax	19:12:18
Pa	Z	Tmax	20:13:43
Pa	Z	Tmax	23:09:51

These T-phases have no preliminary C&GS listing. They are assumed to have originated off the Vancouver Island-Oregon coasts.

Table 6.--Distant earthquakes--Continued

Oct. 29

U	PEN	eL	15:03:49
Ha	Z	Tmax	15:31:41
Pa	Z	Tmax	15:32:21
M	Z	Tmax	15:32:14
U	Z	Tmax	15:32:16

C&GS card 90-61:
48.7° N., 128.3° W.
14:47:18.3.
Vancouver Island region.
h about 73 km.

Oct. 30

Pa	Z	Tmax	02:25:50
Ha	Z	Tmax	02:25:55

No C&GS listing.

Oct. 30

U	PEN	eL	02:31:01
Ha	Z	Tmax	02:57:29
Ka	Z	Tmax	02:57:50
Pa	Z	Tmax	02:57:41
M	Z	Tmax	02:58:03
A	Z	Tmax	02:57:59
D	Z	Tmax	02:58:01
U	Z	Tmax	02:58:00

Oct. 30--Continued

C&GS card 86-61:
42.3° N., 126.7° W.
02:16:32.7.
Off coast of Oregon.
h about 36 km.

Oct. 30

U	PEN	17:01:00	

Start of pressure waves caused by Russian nuclear explosion. First waves had average period of 140 seconds.

Nov. 4

M	Z	eP	03:47:18.7 d
A	Z	eP	03:47:19.4 d

C&GS card 89-61:
50.0° N., 155.5° E.
03:38:30.1.
Kurile Islands.
h about 32 km.

Nov. 5

M	Z	iP	10:45:46.9 c
A	Z	iP	10:45:47.9 c
D	Z	iP	10:45:47.5 c
U	Z	iP	10:45:47.6 c
Pa	Z	iP	10:45:53.0 c
Hi	Z	eP	10:45:47.6 c
Na	Z	iP	10:45:47.8 c

Table 6.--Distant earthquakes--Continued

Nov. 5--Continued

C&GS card 89-61:
45.7° N., 147.9° E.
10:36:39.5.
Kurile Islands.
h about 142 km.

Nov. 10

M	Z	iP	18:08:06.7	c
A	Z	iP	18:08:06.0	c
D	Z	iP	18:08:06.1	c
U	Z	iP	18:08:06.1	c
Hi	Z	iP	18:08:09.5	c
Pa	Z	iP	18:08:08.3	c
Na	Z	iP	18:08:03.0	c
Ka	Z	iP	18:08:09.3	d
Ha	Z	iP	18:08:11.7	c

C&GS card 91-61:
17.5° S., 178.8° W.
18:00:49.6.
Fiji Islands.
h about 586 km.

Nov. 15

M	Z	eP	07:26:41.9	c
A	Z	eP	07:26:43.0	d
D	Z	eP	07:26:42.4	c
U	Z	eP	07:26:42.4	d
Hi	Z	iP	07:26:41.5	c
Pa	Z	eP	07:26:44.1	c
Ka	Z	iP	07:26:37.0	d

Nov. 15--Continued

Ha	Z	eP	07:26:33.1	d

Magnitude 7.0 (HVO).

C&GS card 91-61.
43.1° N., 145.1° E.
07:17:12.4.
Felt near coast of Hokkaido, Japan.
h about 43 km.

Nov. 19

M	Z	iP	23:33:54.9	d
A	Z	iP	23:33:55.2	d
D	Z	iP	23:33:54.4	d
U	Z	iP	23:33:55.0	d
Hi	Z	iP	23:33:55.8	d

C&GS card 96-61:
0.8° N., 124.3° E.
23:21:55.5.
Northern Celebes.
h about 157 km.

Nov. 20

U	PEZ	iS	12:01:19
U	PEZ	iSS	12:04:51
U	PEZ	iR	12:09:05

Magnitude 6.0 (HVO).

C&GS card 97-61:
21.8° S., 169.9° E.
11:44:19.4.
Loyalty Islands region.
h about 33 km.

Table 6.--Distant earthquakes--Continued

Nov. 21

M	Z	iP	11:19:15.4	c
U	Z	iP	11:19:15.2	c
N	Z	iP	11:19:15.6	c

C&GS card 94-61:
0.9° N., 122.5° E.
11:06:38.1.
Northern Celebes.
h about 85 km.

Nov. 27

M	Z	iP	17:22:39.2	d
A	Z	iP	17:22:38.8	c
U	Z	eP	17:22:39.5	d
U	PEN	eG	17:42:51	
U	PEZ	eR	17:46:29	

Magnitude 6.0 (HVO).

C&GS card 104-61:
0.6° S., 127.1° E.
17:10:33.3.
Halmahera region.
h about 25 km.
Magnitude 6.25 to 6.5 (Pas).

Dec. 1

M	Z	eP	21:24:12.1	d
A	Z	eP	21:24:12.7	d
D	Z	eP	21:24:12.4	d
U	PEE	eS	21:34:24	
U	PEZ	eG	21:46:08	

Dec. 1--Continued

C&GS card 100-61:
26.5° N., 124.9° E.
21:13:04.1.
East China Sea.
h about 206 km.

Dec. 5

M	Z	eP	13:11:16.2	c
A	Z	iP	13:11:16.6	c
D	Z	eP	13:11:15.8	c
U	Z	eP	13:11:17.3	c
Pa	Z	iP	13:11:19.9	c
Ha	Z	iP	13:11:19.4	c
U	PEN	iPs	13:23:56	
U	PEZ	iR	13:42:56	

C&GS card 102-61:
50.8° S., 139.8° E.
13:01:04.7.
Southwest of Tasmania.
h about 64 km.

Dec. 6

M	Z	eP	16:48:31	c
U	PEZ	iS	16:55:40	
U	PEZ	iR	17:02:04	

Magnitude 6.3 (HVO).

C&GS card 99-61:
49.4° N., 155.2°E.
16:39:31.5.
Kurile Islands.
h about 22 km.
Magnitude 6 to 6.25 (Pas),
6.25 (Berk).

Table 6.--Distant earthquakes--Continued

Dec. 9

U	PEN	eL	02:31:02
Ha	Z	Tmax	02:59:45.0
Hi	Z	Tmax	03:00:58.4
U	Z	Tmax	03:01:20.6
M	Z	Tmax	03:01:23.2
Pa	Z	Tmax	03:01:27.2
D	Z	Tmax	03:01:33.5
A	Z	Tmax	03:01:41.5

C&GS card 99-61:
56.3° N., 153.9° W.
02:15:22.0.
Kodiak Island, Alaska region.
h about 31 km.
Magnitude 5.5 to 5.75 (Berk), 5.5 (Pal).

Dec. 9

U	PEZ	ePS	11:44:20
U	PEZ	eSS	11:49:40
U	PEZ	iR	12:02:48

Magnitude 6.5 (HVO).

C&GS card 99-61:
43.7° S., 75.2° W.
11:18:08.9.
Near coast of southern Chile.
Magnitude 6.75 (Pas), 6.5 (Berk), 5.75 to 6.0 (Pal).
h about 34 km.

Dec. 9

M	Z	eP	19:57:26.8	d
U	Z	iP	19:57:26.9	d
A	Z	eP	19:57:27.1	d

Dec. 9--Continued

D	Z	eP	19:57:27.4	c
Ha	Z	iP	19:57:32.3	d
Ka	Z	eP	19:57:29.3	d
Hi	Z	iP	19:57:29.5	d
Pa	Z	iP	19:57:29.1	c
Na	Z	iP	19:57:23.4	c

C&GS card 99-61:
21.7° S., 179.9° E.
19:49:41.3.
Fiji Islands.
h about 620 km.

Dec. 20

M	Z	eP	13:37:20.8	d
M	Z	ipP	13:38:06.6	c
A	Z	eP	13:37:20.1	d
A	Z	ipP	13:38:06.5	c
D	Z	eP	13:37:21.0	d
D	Z	ipP	13:38:05.8	c
Pa	Z	eP	13:37:18.6	c
Hi	Z	iP	13:37:19.7	d
Hi	Z	ipP	13:38:09.2	c
Na	Z	eP	13:37:19.0	c
Ka	Z	eP	13:37:22.5	c
Ka	Z	epP	13:38:12.8	c
Ha	Z	eP	13:37:26.4	d
Ha	Z	ipP	13:38:15.4	c
U	PEZ	iP	13:37:20.1	d
U	PEZ	ipP	13:38:05.8	c

Table 6.--Distant earthquakes--Continued

Dec. 20--Continued

U	PEZ	eS	13:46:47
U	PEN	iG	13:58:20

C&GS card 102-61:
4.6° N., 75.6° W.
13:25:34.4.
West-central Colombia.
h about 176 km.
Magnitude 6.75 (Pas), 6.0 (Pal).

Dec. 22

M	Z	iP	22:55:48.0	c
A	Z	iP	22:55:48.5	c
D	Z	eP	22:55:47.3	c
N	Z	iP	22:55:48.1	c
U	Z	iP	22:55:48.3	c
Ka	Z	eP	22:55:50.8	d

C&GS card 104-61:
18.6° N., 145.6° E.
22:46:24.6.
Mariana Islands.
h about 155 km.

Dec. 24

M	Z	iP	02:51:03.4	
N	Z	eP	02:51:11.7	
U	Z	iP	02:51:19.3	
U	PEZ	eL	03:09:05	

C&GS card 104-61:
3.4° S., 140.3° E.
02:40:07.6.
New Guinea.
h about 29 km.

Dec. 25

U	PEZ	eL	00:27:49

Dec. 25--Continued

C&GS card 107-61:
3.4° S., 140.3° E.
00:01:52.1.
New Guniea.
h about 22 km.

Dec. 25

M	Z	iP	08:13:05.3	c

C&GS card 104-61:
3.7° S., 127.7° E.
08:00:59.3.
Ceram.
h about 47 km.

Dec. 25

M	Z	iP	08:25:13.1	d

C&GS card 106-61:
1.1° S., 126.7° E.
08:13:07.2.
Spice Islands.
h about 25 km.

Dec. 27

M	Z	eP	23:59:52.1	d
A	Z	eP	23:59:49.8	d
D	Z	eP	23:59:48.8	c
N	Z	eP	23:59:51.3	c
U	Z	eP	23:59:50.0	c
Ka	Z	eP	23:59:49.9	d
Ha	Z	eP	00:00:04.5	c
U	PEE	iS	00:07:44	
U	PEN	iSS	00:11:56	
U	PEN	iSSS	00:15:16	

Table 6.--Distant earthquakes--Continued

Dec. 27--Continued

Magnitude 6.5 (HVO).

C&GS card 105-61:
41.2° S., 175.7° E.
23:48:01.3.
North Island, New Zealand.
h about 57 km.
Magnitude 6.75 (Pas), 6 to 6.25 (Pal).

Dec. 29

U	PEE	eR	00:16:15	

C&GS card 105-61:
12.4° S., 166.3° E.
23:55:57.6 (Dec. 28).
Santa Cruz Islands.
h about 100 km.

Dec. 30

M	Z	eP	00:46:48.7	d
A	Z	eP	00:46:50.0	c
N	Z	eP	00:46:51.2	c
U	Z	eP	00:46:50.8	d
Pa	Z	iP	00:46:52.3	c
Hi	Z	eP	00:46:49.8	d
Na	Z	iP	00:46:52.5	c
Ha	Z	eP	00:46:36.8	c
U	PEZ	iP	00:46:50.2	d
U	PEZ	iS	00:52:52	
U	PEZ	iR	00:57:02	
Ha	Z	Tmax	01:27:35.0	

Dec. 30--Continued

Magnitude 6.8 (HVO).

C&GS card 105-61:
52.3° N., 177.7° E.
00:39:24.1.
Rat Islands.
h about 52 km.
Magnitude 6.75 (Pas), 6.5 (Berk), 7 (Pal).

Dec. 30

M	Z	eP	11:46:59.5	d
A	Z	eP	11:47:00.4	d
D	Z	eP	11:46:59.9	c
N	Z	eP	11:46:59.6	c
Hi	Z	eP	11:46:57.4	d
Ha	Z	Tmax	12:21:53.6	

Off Oregon coast.

No preliminary C&GS listing.

Dec. 30

M	Z	eP	11:48:19.5	c
A	Z	eP	11:48:21.4	d
D	Z	eP	11:48:22.2	c
N	Z	eP	11:48:21.2	c
Hi	Z	eP	11:48:17.4	d

From northeast source.

No preliminary C&GS listing.

Table 6.--Distant earthquakes--Continued

Dec. 30				Dec. 31			
M	Z	eP	16:49:21.0 c	M	Z	eP	13:57:44.4
M	Z	Tmax	17:27:42	A	Z	eP	13:57:44.6
A	Z	Tmax	17:27:46	N	Z	eP	13:57:44.6
D	Z	Tmax	17:27:58	U	Z	eP	13:57:44.5
N	Z	Tmax	17:27:45	C&GS card 107-61:			
U	Z	Tmax	17:27:46	1.6° N., 127.3° E.			
Off coast of Oregon.				13:46:01.8.			
No preliminary C&GS listing.				Halmahera.			
				h about 140 km.			

The following bibliography is furnished to provide references to recent publications by the staff at the Hawaiian Volcano Observatory. Many of the publications are either based upon, or supplementary to, data presented in these Summaries.

Recent H.V.O. contributions

No. 176. Richter, D. H., Moore, J. G., and Haugen, R. T., 1962, Recent growth of Halemaumau, Kilauea Volcano, Hawaii: U.S. Geol. Survey Prof. Paper 450-B, p. B53-B56.

No. 173. Murata, K. J., and Richter, D. H., 1961, Magmatic differentiation in the Uwekahuna laccolith, Kilauea Caldera, Hawaii: Jour. Petrology, v. 2, no. 3, p. 424-437.

No. 172. Krivoy, H. L., and Eaton, J. P., 1961, Preliminary gravity survey of Kilauea Volcano: U.S. Geol. Survey Prof. Paper 424-D, p. 205-208.

No. 171. Ault, W. U., Richter, D. H., and Stewart, D. B., 1962, A temperature measurement probe into the melt of the Kilauea Iki lava lake in Hawaii: Jour. Geophys. Research, v. 27, no. 2, p. 2809-2812.

No. 170. Richter, D. H., and Murata, K. J., 1961, Xenolithic nodules in the 1800-1801 Kaupulehu Flow of Hualalai Volcano: U.S. Geol. Survey Prof. Paper 424-B, p. B215-B217.

No. 169. Wentworth, C. K., Powers, H. A., and Eaton, J. P., 1961, Feasibility of a lava-diverting barrier at Hilo, Hawaii: Pacific Science, v. 15, no. 3, p. 352-357.

No. 168. Eaton, J. P., Richter, D. H., and Ault, W. U., 1961, The Tsunami of May 23, 1960, on the Island of Hawaii: Seismol. Soc. America Bull., v. 51, no. 2, p. 135-137.

No. 167. Ault, W. U., Eaton, J. P., and Richter, D. H., 1961, Lava temperatures in the 1959 Kilauea eruption and cooling lake: Geol. Soc. America Bull., v. 72, p. 791-794.

No. 166. Richter, D. H., and Murata, K. J., 1960, Xenolithic nodules in the 1800-1801 Kaupulehu Flow of Hualalai Volcano and their petrologic implication: Hawaiian Acad. Science Proc., 27 p.

No. 165. Okamura, R. T., and Forbes, J. C., 1961, Occurrence of silicified wood in Hawaii: Am. Jour. Sci., v. 259, no. 3, p. 229-230.

No. 164. Ault, W. U., 1960, Geochemical research during the 1959-60 activity of Kilauea Volcano: Geochemical News, p. 1-5.

No. 163. Fraser, G. D., 1960, Pahala Ash: U.S. Geol. Survey Prof. Paper 400-B, p. 354-355.

No. 162 Murata, K. J., 1960, Occurrence of CuCl emission in volcanic flames: Am. Jour. Sci., v. 258, p. 769-772.

No. 161. Eaton, J. P., and Murata, K. J., 1960, How volcanoes grow: Science, v. 132, no. 3432, p. 925-938.

No. 160. Murata, K. J., 1960, A new method of plotting chemical analyses of basaltic rocks: Am. Jour. Sci., Bradley Volume 258-A, p. 247-252.

No. 158. Richter, D. H., and Eaton, J. P., 1960, The 1959-60 eruption of Kilauea Volcano: The New Scientist, v. 7, p. 994-997.

No. 157. Eaton, J. P., 1959, A portable water-tube tiltmeter: Seismol. Soc. America, v. 49, no. 4, p. 301-316.

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF		AZ	MIN	1
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG		GAP	DS	
1961	JAN	2	2030	15.49	21	12.60	155	19.10	11.18	10	.16	9.3	10.5	DIS	-	4.1X		287	109	
1961	JAN	4	0008	57.74	19	26.47	155	21.74	15.89	5	.06	1.8	8.7	DML				143	7	
1961	JAN	4	0903	42.19	19	10.33	155	42.67	6.48	6	.09	5.6	12.3	LSW	-			271	18	
1961	JAN	4	1132	46.08	19	24.01	155	24.87	6.96	4	.01	3.2	9.9	KAO	-			216	8	
1961	JAN	4	1137	52.14	19	25.56	155	40.36	7.00	4	.14	13.8	10.5	MLO	-			327	31	
1961	JAN	4	1802	6.58	19	29.49	155	22.89	6.99	4	.06	8.1	10.3	KAO	-			180	1	
1961	JAN	4	1839	29.01	19	27.01	155	29.26	5.16	5	.03	3.8	12.2	KAO	-			283	12	
1961	JAN	7	0357	47.51	19	43.32	156	23.76	7.41	8	.17	10.7	11.8	DIS	F-	3.9X		319	109	
1961	JAN	7	1550	22.63	18	48.80	155	10.90	7.18	6	.08	8.6	11.1	LOI	-	3.3X		348	62	
1961	JAN	7	1705	34.68	19	46.46	155	24.45	17.57	9	.13	2.7	13.4	KEA	-	2.7X		266	31	
1961	JAN	8	0930	37.16	19	24.15	155	14.56	30.53	10	.21	2.7	1.7	DEP		2.5X		146	4	
1961	JAN	9	0042	32.73	19	21.53	154	53.39	4.54	6	.32	7.4	25.4	SLE	-	2.6X		289	16	
1961	JAN	11	1419	40.13	19	20.11	155	19.20	24.94	6	.07	2.3	2.0	DEP				171	7	
1961	JAN	12	1218	44.70	19	25.58	155	17.06	30.57	7	.04	2.7	1.5	DEP		2.6X		128	1	
1961	JAN	14	1539	0.17	20	2.46	155	20.96	14.92	6	.08	7.1	11.4	KEA	-	3.1X		318	45	
1961	JAN	15	0044	42.20	19	52.98	155	37.21	12.94	8	.09	1.5	4.1	KEA	F	4.2X		169	59	
1961	JAN	16	0554	34.43	19	11.18	156	3.32	9.83	6	.16	10.6	14.6	KON	F-	3.4X		343	72	
1961	JAN	16	1021	17.83	19	20.69	155	10.89	41.22	5	.18	9.1	11.0	DEP	-	2.9X		286	9	
1961	JAN	19	0314	4.12	19	16.62	155	12.89	7.57	7	.08	1.0	4.2	SF2		2.6X		190	17	
1961	JAN	21	0139	36.88	19	13.40	155	39.62	9.93	8	.07	3.0	1.1	LSW	F	4.8X		247	19	
1961	JAN	21	1930	0.91	19	20.96	155	31.78	13.33	5	.24	10.8	1.7	DML		2.8X		307	15	
1961	JAN	22	0547	7.23	19	20.41	155	17.35	30.92	6	.05	3.2	1.9	DEP				192	4	
1961	JAN	22	2145	10.49	19	59.73	155	27.84	3.44	8	.19	3.3	4.4	KEA		2.4X		314	50	
1961	JAN	23	2227	46.92	19	30.67	155	10.56	43.76	6	.04	4.1	3.8	DEP		2.3X		191	16	
1961	JAN	24	1330	42.00	19	58.16	155	28.98	5.75	10	.16	1.2	1.5	KEA	F	3.3X		165	50	
1961	JAN	24	1727	22.55	19	37.21	156	12.81	6.87	8	.08	8.4	10.7	KON	-			323	88	
1961	JAN	26	0941	49.81	19	23.70	155	18.29	0.03	5	.14	1.2	3.3	SSC	#	2.8X		115	3	
1961	JAN	26	2016	1.02	20	0.96	155	23.82	6.91	6	.03	2.3	1.5	KEA		2.3X		316	46	
1961	JAN	27	0643	34.57	19	26.16	155	24.66	5.08	6	.07	1.2	11.1	KAO	-	2.6X		212	7	
1961	JAN	28	1642	50.17	19	22.02	155	15.86	29.94	6	.07	3.2	1.7	DEP				231	1	
1961	JAN	29	0917	20.40	19	19.04	155	14.44	2.73	5	.02	1.5	2.6	SSF	#	2.9X		214	13	
1961	JAN	31	2007	26.00	19	27.76	155	22.21	12.72	5	.07	1.6	2.0	KAO				146	4	
1961	FEB	1	1951	30.21	19	20.25	155	21.10	26.83	6	.09	2.3	2.5	DEP				154	4	
1961	FEB	4	0445	16.84	19	24.87	155	28.50	6.45	4	.10	5.8	12.8	KAO	-			271	13	
1961	FEB	8	1717	28.34	19	21.95	155	14.40	31.92	5	.01	3.6	1.6	DEP				300	3	
1961	FEB	9	0946	26.67	19	22.20	155	28.64	7.55	5	.04	1.2	4.6	KAO				282	10	
1961	FEB	12	2034	39.26	19	25.25	155	35.23	12.46	6	.10	3.0	1.9	MLO	F	2.5X		238	23	
1961	FEB	13	0522	53.19	19	28.51	154	55.50	0.59	6	.10	1.6	.6	SLE	F	2.6X		285	3	
1961	FEB	13	1832	0.91	19	29.18	154	44.91	13.41	6	.03	7.1	9.5	LER	F-	2.2X		310	44	
1961	FEB	14	0911	39.98	19	31.99	154	53.08	6.99	5	.21	4.5	17.9	HIL	-	2.7X		292	30	
1961	FEB	15	0427	32.32	19	26.92	155	22.15	29.78	7	.17	3.1	1.7	DML		3.0X		131	6	
1961	FEB	15	0524	37.67	19	10.34	155	43.71	7.02	6	.03	1.9	10.4	KON	-	3.0X		276	19	
1961	FEB	18	1026	13.34	19	24.70	155	26.66	0.22	8	.16	1.4	.7	KAO		2.8X		190	10	
1961	FEB	19	1157	9.72	19	31.62	155	44.70	7.15	4	.04	2.7	12.8	KON	-			336	38	
1961	FEB	20	1734	20.37	19	18.48	155	38.53	7.00	5	.04	3.0	10.1	LSW	-	3.4X		244	27	

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF		AZ	MIN	2
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG		GAP	DS	
1961	FEB	24	0640	7.88	20	3.65	156	8.52	6.73	5	.19	12.1	15.6	KOH	-	2.9X		333	101	
1961	FEB	26	0649	54.49	19	26.33	155	14.62	3.56	6	.08	1.0	2.1	SNC		3.0X		265	5	
1961	MAR	3	0431	26.79	19	55.11	155	44.52	8.33	8	.07	7.6	9.9	KOH	-	3.7X		317	60	
1961	MAR	4	0457	45.14	19	24.75	155	13.72	0.01	4	.19	2.5	31.6	SER	-	2.3X		282	6	
1961	MAR	5	1109	40.18	19	25.75	155	15.36	6.75	4	.01	1.8	.8	INT	F	2.8X		250	4	
1961	MAR	8	1555	57.34	19	31.71	156	4.80	6.88	5	.14	10.5	13.7	KON	-			346	73	
1961	MAR	9	0116	55.71	19	22.91	155	14.37	28.86	4	.01	2.5	5.3	DEP				184	3	
1961	MAR	9	1855	51.08	19	25.27	155	22.88	26.60	5	.06	2.5	2.9	DML		2.8X		146	8	
1961	MAR	10	1158	3.49	19	20.40	155	0.16	52.74	7	.16	4.0	4.2	DEP		2.7X		252	18	
1961	MAR	11	2330	28.75	19	34.48	154	40.17	4.25	5	.20	7.5	7.2	HIL	#	3.0X		320	47	
1961	MAR	12	2208	56.40	19	25.69	155	25.52	7.34	4	.01	3.7	3.5	KAO		2.5X		229	9	
1961	MAR	13	0336	12.11	19	30.32	155	17.40	45.88	6	.09	2.5	4.2	DEP		2.7X		136	10	
1961	MAR	13	1706	0.90	19	21.54	155	15.53	34.15	7	.08	2.1	1.2	DEP		3.1X		162	2	
1961	MAR	13	2123	46.75	19	24.02	155	17.01	0.00	5	.09	2.9	.8	SSC	#	2.7X		169	3	
1961	MAR	14	0502	9.34	19	13.94	155	11.99	20.47	5	.07	1.7	4.1	DEP		2.7X		204	17	
1961	MAR	15	0632	32.90	19	24.27	155	26.64	6.81	4	.07	4.3	10.9	KAO	-			247	10	
1961	MAR	20	1258	27.83	19	22.54	155	34.63	6.53	6	.12	2.0	1.3	MLO		3.0X		311	20	
1961	MAR	20	2329	56.35	19	15.60	155	17.84	32.53	4	.00	3.3	5.5	DEP				220	13	
1961	MAR	21	0904	25.45	19	27.43	155	14.66	14.18	4	.00	1.3	.9	DEP				155	10	
1961	MAR	21	0937	40.14	19	55.59	155	33.35	8.51	5	.04	2.9	1.9	KEA		3.0X		310	51	
1961	MAR	22	2141	54.96	19	23.29	155	31.11	7.19	7	.04	1.1	1.3	KAO		2.8X		296	15	
1961	MAR	23	0223	0.27	19	24.85	155	15.31	31.02	6	.05	2.8	1.5	DEP		2.9X		130	4	
1961	MAR	27	1324	30.67	19	25.25	155	24.31	7.03	4	.18	3.1	14.4	KAO	-			202	9	
1961	MAR	29	0321	36.32	19	48.06	155	31.17	6.81	7	.09	2.7	2.3	KEA		2.7X		297	46	
1961	MAR	29	1007	9.56	19	23.35	155	26.43	7.66	6	.09	1.2	4.0	KAO		2.5X		248	8	
1961	MAR	29	1841	14.41	19	35.57	155	16.91	22.73	9	.10	2.2	1.4	KEA		3.2X		206	19	
1961	MAR	29	2159	45.25	19	54.97	155	41.68	14.22	10	.10	1.1	2.3	KEA		3.5X		156	56	
1961	MAR	31	0119	25.06	19	25.89	155	13.70	33.27	8	.11	3.5	1.8	DEP		2.3X		187	6	
1961	MAR	31	0159	7.06	19	49.03	155	29.88	9.19	8	.16	1.3	2.9	KEA		2.6X		277	44	
1961	APR	1	1006	36.39	19	24.37	155	17.89	1.03	5	.03	1.3	1.5	SSC		2.9X		181	2	
1961	APR	2	0604	16.38	19	59.20	155	24.26	8.90	9	.09	2.1	1.9	KEA		3.1X		313	44	
1961	APR	3	0035	46.37	19	26.42	155	42.94	2.22	4	.15	4.6	12.9	MLO	-	3.3X		263	44	
1961	APR	6	0505	42.37	19	45.96	155	42.19	10.52	7	.09	3.8	1.4	KEA		2.7X		309	44	
1961	APR	6	1428	51.22	19	19.26	155	25.78	5.37	9	.08	1.1	2.0	KAO		2.8X		161	5	
1961	APR	7	1735	39.06	19	24.05	155	11.68	32.58	6	.09	3.3	5.7	DEP				180	8	
1961	APR	9	0813	53.56	19	9.81	155	35.61	7.02	5	.03	2.7	12.4	LSW	-			214	11	
1961	APR	9	0916	13.48	19	25.42	155	29.30	8.94	8	.07	1.0	1.1	KAO		2.9X		217	13	
1961	APR	9	1810	23.37	19	23.74	155	16.12	31.53	9	.15	2.2	1.5	DEP	F	3.7X		100	3	
1961	APR	12	0101	44.68	19	22.91	155	16.08	27.27	8	.07	2.1	1.2	DEP		3.1X		92	1	
1961	APR	12	0404	6.90	19	23.01	155	23.46	10.10	4	.07	3.1	9.3	KAO	-			185	5	
1961	APR	12	1352	30.96	18	54.56	155	14.96	9.44	8	.06	2.0	1.2	LOI		3.5X		286	39	
1961	APR	15	2211	35.52	19	16.68	155	11.84	1.31	9	.06	.9	.9	SSF		2.8X		193	13	
1961	APR	16	0026	53.69	19	21.11	155	15.19	35.21	7	.07	2.2	3.3	DEP				165	3	
1961	APR	16	1531	13.28	19	18.40	155	11.91	0.02	10	.17	1.4	.4	SSF	#	3.0X		223	10	
1961	APR	16	1631	18.33	19	13.90	155	16.76	14.38	8	.19	2.3	.9	DEP		2.6X		191	16	

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	3
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	APR	16	2053	30.40	19	27.47	155	2.53	21.90	5	.04	5.4	10.2	DEP	-	2.0X	258	25	
1961	APR	17	0641	12.09	19	22.67	155	17.94	19.06	4	.02	3.6	8.9	DEP	-		148	4	
1961	APR	17	0642	25.09	19	25.95	155	10.88	32.43	9	.18	4.6	1.9	DEP		2.6X	210	11	
1961	APR	18	2304	45.03	19	54.23	155	17.69	11.24	5	.01	2.5	1.8	KEA		2.5X	300	30	
1961	APR	20	1654	34.29	19	22.53	155	25.32	11.57	7	.03	1.6	.8	KAO		2.2X	234	6	
1961	APR	21	1131	4.37	19	19.26	155	25.24	7.41	7	.05	1.1	1.4	KAO		3.7X	157	4	
1961	APR	22	1048	57.94	19	25.84	155	16.72	17.83	10	.13	1.2	1.0	DEP		2.6X	89	2	
1961	APR	22	1730	46.33	19	32.35	155	15.33	24.95	5	.07	2.4	10.3	DEP	-		149	13	
1961	APR	23	0930	12.10	19	27.53	155	27.14	1.47	8	.07	1.0	.7	KAO	F	3.0X	214	8	
1961	APR	23	1041	7.14	19	9.69	155	35.97	0.00	7	.28	6.3	1.3	LSW	#	2.6X	218	11	
1961	APR	25	1141	56.46	19	13.84	155	33.16	3.53	4	.07	2.3	13.6	LSW	-		199	19	
1961	APR	25	1346	29.68	19	26.43	155	22.28	0.58	5	.02	1.0	.7	KAO		2.4X	156	6	
1961	APR	26	2244	48.83	19	23.74	155	29.59	8.65	8	.13	1.5	1.5	KAO		2.5X	284	13	
1961	APR	27	0631	32.32	19	23.59	155	24.04	7.31	10	.10	.8	1.6	KAO		3.3X	157	6	
1961	MAY	3	0025	46.38	19	25.21	155	25.06	8.37	4	.05	3.0	9.6	KAO	-		218	9	
1961	MAY	5	1806	13.14	19	42.37	155	20.16	21.79	8	.17	2.2	3.6	KEA		2.8X	252	24	
1961	MAY	6	1057	39.69	19	23.74	155	18.71	16.81	5	.03	1.3	1.8	DEP			115	4	
1961	MAY	7	0823	50.31	19	21.56	155	13.68	38.49	6	.05	3.7	2.9	DEP		2.8X	210	4	
1961	MAY	9	1846	15.74	19	27.57	155	46.72	6.86	5	.19	9.8	18.4	KON	-		289	41	
1961	MAY	10	2340	15.16	19	25.35	155	16.57	30.81	8	.18	2.7	1.6	DEP		2.7X	91	2	
1961	MAY	10	2343	21.49	19	22.19	155	15.45	33.05	6	.21	3.9	2.1	DEP		2.6X	160	1	
1961	MAY	13	1721	47.96	19	34.03	155	15.04	28.34	7	.10	3.0	1.8	DEP		1.9X	163	16	
1961	MAY	14	1301	30.05	19	22.91	155	17.56	32.82	8	.21	3.2	1.8	DEP		2.7X	114	3	
1961	MAY	14	1355	40.56	19	23.94	155	25.87	5.51	6	.08	1.0	3.7	KAO		3.0X	178	8	
1961	MAY	14	1829	11.78	19	22.02	155	5.10	3.90	4	.10	3.5	15.1	SSF	-		220	19	
1961	MAY	16	1627	31.65	19	27.53	155	19.25	31.27	8	.09	2.8	1.5	DML		2.9X	192	5	
1961	MAY	16	1706	55.27	19	26.91	155	16.43	30.87	8	.08	2.4	1.4	DEP		2.2X	167	3	
1961	MAY	16	1810	58.68	19	26.44	155	17.31	40.03	7	.08	2.5	4.0	DEP		3.1X	171	2	
1961	MAY	16	2140	35.63	19	23.73	155	13.91	30.57	9	.09	1.8	2.3	DEP		3.0X	166	4	
1961	MAY	17	0433	39.36	19	29.11	155	21.32	30.52	8	.11	2.3	1.4	DML		2.6X	116	4	
1961	MAY	19	0031	51.00	19	5.05	155	16.78	16.19	7	.10	2.2	13.7	LOI	-	4.1X	229	30	
1961	MAY	20	0247	23.20	19	23.60	155	28.01	7.21	7	.12	1.4	3.8	KAO		2.5X	268	10	
1961	MAY	20	0355	26.53	19	24.72	155	15.52	24.66	6	.06	1.3	3.0	DEP			115	4	
1961	MAY	22	2221	43.34	19	6.59	156	12.47	12.29	7	.14	9.4	13.0	KON	-	3.3X	325	66	
1961	MAY	22	2232	18.63	19	25.01	155	23.37	13.96	9	.11	1.3	.5	DML		2.8X	152	9	
1961	MAY	26	0512	54.40	19	27.15	155	24.74	11.88	9	.07	1.2	.7	KAO		3.0X	183	6	
1961	MAY	26	1941	19.91	20	5.54	156	59.03	0.09	8	.42	18.6	3.3	DIS	#	3.2X	278	107	
1961	MAY	26	2212	45.42	19	27.11	155	27.03	6.77	9	.09	1.0	2.1	KAO	F	4.0X	132	8	
1961	MAY	26	2255	12.93	19	26.95	155	27.89	7.58	6	.05	1.5	2.3	KAO		2.2X	265	10	
1961	MAY	28	1348	31.90	19	18.69	155	13.84	11.42	6	.06	1.8	1.3	SF2		2.2X	225	8	
1961	MAY	30	0316	1.08	19	24.91	155	15.52	1.01	6	.13	1.0	.8	SNC	F	3.0X	245	3	
1961	JUN	1	0019	25.43	19	24.53	155	12.87	28.97	9	.09	1.7	1.0	DEP		2.7X	155	7	
1961	JUN	2	1343	54.82	19	14.19	155	16.65	69.42	6	.11	4.6	5.6	DEP		2.5X	190	15	
1961	JUN	4	1310	55.86	19	18.97	155	21.85	2.13	9	.19	1.0	1.3	SWR		2.4X	155	3	
1961	JUN	7	0848	34.18	19	30.58	155	20.88	51.58	4	.08	5.4	10.5	DML	-		257	4	

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	4
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	JUN	7	1434	6.86	19	21.39	155	14.78	29.58	7	.08	1.6	2.1	DEP		2.2X	165	3	
1961	JUN	8	1600	21.59	19	20.57	155	26.08	10.68	9	.13	1.7	.7	KAO		2.8X	167	5	
1961	JUN	10	2252	24.23	19	22.12	155	16.76	29.55	7	.09	2.3	1.3	DEP			153	2	
1961	JUN	10	2313	59.53	19	19.32	155	17.29	31.15	8	.08	2.1	2.1	DEP		2.8X	167	6	
1961	JUN	10	2327	26.00	19	27.91	155	13.29	16.22	6	.07	1.8	1.3	DEP			179	9	
1961	JUN	11	1214	1.40	19	18.36	155	21.94	2.56	7	.06	1.0	1.5	SWR		2.3X	167	4	
1961	JUN	11	1748	19.64	19	27.92	155	29.14	7.12	10	.13	1.1	2.9	KAO		2.7X	221	11	
1961	JUN	12	0529	58.95	19	19.55	155	22.42	3.42	7	.05	.6	.7	SWR			105	2	
1961	JUN	14	0114	37.08	19	18.48	155	22.16	3.17	8	.08	.6	1.2	SWR			123	4	
1961	JUN	14	1050	45.24	19	22.61	155	22.82	6.96	4	.01	1.9	4.9	KAO			166	5	
1961	JUN	17	0628	29.61	19	18.88	155	20.64	4.80	6	.09	2.5	5.9	SWR			232	4	
1961	JUN	17	1055	6.42	19	25.32	155	17.45	4.09	7	.10	1.1	.7	SNC		3.6X	164	1	
1961	JUN	17	1102	58.50	19	17.18	155	23.44	2.03	7	.11	2.2	1.3	SWR			280	6	
1961	JUN	17	1652	34.65	19	24.75	155	15.13	24.54	7	.04	1.8	3.1	DEP			130	3	
1961	JUN	17	1741	44.29	19	20.97	155	16.96	23.68	6	.16	5.9	13.4	DEP	-		173	3	
1961	JUN	18	0715	52.65	19	25.87	155	16.49	29.93	9	.14	1.9	1.3	DEP		3.1X	92	2	
1961	JUN	18	0717	13.26	19	30.46	155	13.18	8.29	6	.15	1.3	7.1	GLN		1.7X	123	12	
1961	JUN	18	0726	1.36	19	28.01	155	19.08	30.84	10	.13	2.9	1.5	DML		2.7X	187	5	
1961	JUN	18	0729	9.19	19	24.18	155	12.46	37.63	8	.10	3.4	4.5	DEP			205	7	
1961	JUN	18	1150	3.68	19	23.68	155	17.03	18.28	5	.01	4.0	7.9	DEP	-		138	2	
1961	JUN	18	2043	20.26	19	21.23	155	18.28	38.56	8	.09	2.0	3.2	DEP		2.2X	119	5	
1961	JUN	19	0453	36.20	19	21.02	155	20.14	0.17	7	.05	.5	3.5	SWR			101	6	
1961	JUN	19	1701	31.65	19	18.45	155	22.28	0.03	9	.38	1.3	.8	SWR	#	2.4X	122	4	
1961	JUN	20	0020	17.63	19	19.06	155	23.20	3.14	6	.12	3.1	.7	SWR			252	2	
1961	JUN	20	2207	47.90	19	20.82	155	0.24	6.93	4	.04	3.6	10.7	SF5	-	2.0X	249	17	
1961	JUN	20	2330	6.92	19	17.47	155	19.30	6.81	6	.10	8.7	8.5	SWR	-		254	1	
1961	JUN	21	1320	36.45	19	10.91	155	32.85	2.05	9	.11	3.3	.9	LSW		3.3X	200	14	
1961	JUN	21	2126	31.44	19	18.28	155	23.43	3.85	9	.14	.9	1.7	SWR			142	4	
1961	JUN	22	0435	0.72	19	17.39	155	22.74	1.07	7	.10	2.3	1.0	SWR		2.7X	269	5	
1961	JUN	22	0443	54.16	19	18.52	155	23.24	2.93	6	.14	4.4	1.2	SWR			261	3	
1961	JUN	23	1416	20.55	19	23.44	155	18.35	0.55	6	.19	1.2	4.6	SSC		2.7X	88	5	
1961	JUN	23	1706	3.46	19	13.66	155	19.54	4.43	5	.05	9.5	10.6	SWR	-		311	8	
1961	JUN	23	1706	58.33	19	14.95	155	19.16	9.96	8	.13	2.3	1.0	SWR		3.2X	300	6	
1961	JUN	24	0239	32.84	19	17.88	155	24.41	2.65	7	.08	3.9	2.1	SWR			276	5	
1961	JUN	25	0446	38.08	19	24.89	155	16.87	32.44	8	.11	2.2	2.8	DEP		2.3X	84	0	
1961	JUN	25	0726	5.89	19	20.91	155	21.58	0.03	5	.08	1.3	3.6	SWR	#		178	3	
1961	JUN	25	1944	57.39	19	16.78	155	24.12	4.60	7	.18	2.0	13.6	SWR	-	3.0X	286	10	
1961	JUN	26	0837	5.13	19	19.80	154	59.40	41.10	9	.17	1.8	2.0	LER		3.5X	252	19	
1961	JUN	27	0111	1.35	19	22.41	155	18.90	28.22	8	.09	2.0	1.0	DEP		2.4X	88	5	
1961	JUN	27	1859	54.60	19	19.38	155	23.52	3.94	7	.13	1.6	.9	SWR		2.6X	149	2	
1961	JUN	28	0028	19.77	19	21.51	155	16.65	29.58	9	.12	2.3	1.5	DEP		2.8X	142	2	
1961	JUN	28	0224	22.22	19	28.83	155	20.25	31.01	9	.15	3.5	1.9	DML		2.6X	205	8	
1961	JUN	28	0607	32.22	19	19.59	155	17.91	34.85	8	.13	2.1	3.3	DEP		2.7X	140	3	
1961	JUN	29	0247	59.94	19	23.07	155	15.14	30.04	9	.08	1.6	1.2	DEP		2.6X	159	2	
1961	JUN	29	0409	29.77	19	20.84	155	17.58	32.02	9	.12	1.2	1.8	DEP		4.4X	160	4	

1961 JUN 29 0415 16.78 19 22.09 155 15.90 30.51 9 .10 1.9 2.3 DEP 3.4X 188 1
1961 JUN 29 0452 0.34 19 21.05 155 16.96 34.89 7 .08 1.9 2.5 DEP 2.8X 161 3
1961 JUN 29 0546 15.70 19 20.73 155 13.49 32.34 6 .06 2.5 1.9 DEP 2.7X 212 5
1961 JUN 29 0642 16.22 19 23.55 155 15.98 29.43 9 .07 1.6 1.1 DEP 2.6X 105 2
1961 JUN 29 0801 36.64 19 22.07 155 15.70 27.05 7 .02 2.5 1.1 DEP # 2.9X 202 1

1961 JUN 29 0935 45.67 19 20.86 155 16.83 28.36 5 .00 1.6 2.5 DEP 2.2X 161 3
1961 JUN 29 1123 21.96 19 25.31 155 16.47 32.31 6 .07 1.9 2.4 DEP 2.5X 158 5
1961 JUN 29 1534 23.03 19 21.59 155 18.18 36.66 7 .10 2.6 3.5 DEP 154 4
1961 JUN 29 2342 21.58 19 23.55 155 15.75 28.83 9 .12 2.9 1.7 DEP 2.4X 162 2
1961 JUN 30 0223 12.41 19 23.36 155 17.79 33.27 10 .16 2.3 1.7 DEP 2.8X 103 3

1961 JUN 30 0223 55.63 19 24.65 155 17.13 28.60 9 .09 1.7 2.2 DEP 3.0X 81 1
1961 JUN 30 0225 56.85 19 23.25 155 16.56 33.96 9 .12 1.7 2.4 DEP 3.1X 80 2
1961 JUN 30 0245 17.51 19 22.82 155 15.90 29.60 9 .05 1.6 2.0 DEP 2.7X 112 1
1961 JUN 30 0321 12.91 19 21.83 155 16.04 31.28 10 .06 1.8 1.1 DEP 2.7X 160 1
1961 JUL 1 0219 29.50 19 27.74 155 18.47 29.88 8 .09 2.0 1.6 DEP 3.3X 186 5

1961 JUL 2 0036 6.26 19 24.50 155 15.41 27.62 11 .11 1.3 2.0 DEP F 3.4X 76 3
1961 JUL 2 1200 8.28 19 16.49 155 10.77 1.37 6 .0912.3 6.5 SSF - 3.2X 309 14
1961 JUL 2 1326 52.07 19 21.36 155 16.94 29.96 7 .12 3.5 2.2 DEP 182 3
1961 JUL 3 0441 0.83 19 17.60 155 22.69 5.41 9 .11 1.0 2.3 SWR 2.7X 158 5
1961 JUL 3 1048 47.94 19 19.03 155 13.46 2.54 9 .10 1.2 1.3 SSF 2.7X 223 8

1961 JUL 5 0633 58.64 19 10.52 155 28.86 31.40 9 .11 2.5 2.3 DLS 2.9X 165 17
1961 JUL 5 1458 7.72 19 23.91 155 16.09 4.24 6 .08 .6 1.2 SEC 2.4X 83 3
1961 JUL 5 2152 12.07 19 20.87 155 6.01 43.03 8 .13 3.0 2.9 DEP 238 7
1961 JUL 5 2258 6.20 19 18.39 155 16.20 38.35 5 .00 3.4 6.4 DEP 228 7
1961 JUL 7 0232 33.26 19 25.36 155 17.45 1.82 8 .06 .6 .2 SNC 2.9X 83 0

1961 JUL 7 0251 16.52 19 24.06 155 17.26 1.65 6 .12 1.0 .7 SSC F 3.4X 95 2
1961 JUL 9 1118 54.70 19 18.01 155 15.56 14.56 6 .14 2.9 2.5 DEP 237 8
1961 JUL 9 1229 12.94 19 20.56 155 26.18 36.76 8 .19 4.2 2.4 DML 168 5
1961 JUL 10 0144 9.60 19 26.45 155 6.30 56.07 6 .09 8.5 5.0 DEP 273 18
1961 JUL 10 1943 14.05 19 25.34 155 16.74 1.49 4 .01 1.7 .8 SNC 3.1X 218 2

1961 JUL 11 1156 26.17 19 18.96 155 22.30 1.68 5 .12 1.2 1.4 SWR 2.8X 159 3
1961 JUL 12 0758 17.78 19 16.59 155 3.69 5.48 5 .06 1.7 2.1 SF5 3.2X 221 24
1961 JUL 12 1737 13.90 19 25.35 155 26.16 14.40 5 .10 1.5 1.7 DML F 2.8X 189 10
1961 JUL 13 0910 1.33 19 21.79 155 16.49 29.58 7 .05 1.2 1.0 DEP 3.0X 158 2
1961 JUL 13 1430 30.54 19 18.43 155 26.16 15.00 4 .03 2.031.6 DLS F- 3.8X 306 6

1961 JUL 14 0336 54.34 19 23.88 155 19.67 6.98 4 .00 1.912.3 KAO - 142 7
1961 JUL 14 0414 49.09 19 20.66 155 18.73 43.39 7 .10 1.4 3.0 DEP # 2.1X 157 6
1961 JUL 14 0415 38.14 19 20.64 155 14.82 28.74 8 .34 2.9 2.5 DEP 2.7X 168 4
1961 JUL 14 0418 43.23 19 17.49 155 11.86 49.10 6 .06 3.2 3.2 DEP 226 11
1961 JUL 14 0423 43.54 19 20.77 155 17.33 42.06 5 .13 4.8 4.1 DEP 2.1X 187 4

1961 JUL 19 1749 0.52 20 10.14 156 14.59 13.00 5 .0510.213.1 KOH - 2.9X 225 66
1961 JUL 22 1940 57.24 19 32.40 155 40.42 6.98 4 .1013.710.7 MLO - 333 30
1961 JUL 23 0524 15.49 19 22.58 155 16.82 26.13 8 .04 1.0 1.5 DEP F 4.1X 122 2
1961 JUL 23 0528 23.36 19 23.76 155 17.84 23.42 7 .13 1.4 2.3 DEP F 4.0X 147 12
1961 JUL 23 0536 50.43 19 21.10 155 17.10 31.77 5 .05 1.9 3.0 DEP F 3.2X 160 3

1961 JUL 23 0605 25.81 19 23.13 155 15.12 36.46 9 .08 2.3 2.2 DEP 201 2
1961 JUL 23 0650 54.96 19 22.23 155 14.01 31.24 7 .15 1.6 2.7 DEP F 2.1X 163 3
1961 JUL 23 0757 5.65 19 20.29 155 16.71 26.37 6 .05 1.5 2.2 DEP 151 4
1961 JUL 23 0758 9.27 19 20.91 155 12.78 28.75 6 .07 1.3 2.1 DEP 166 6
1961 JUL 23 0816 10.03 19 21.64 155 13.74 30.43 7 .11 1.3 2.1 DEP 2.1X 142 4

1961 JUL 23 0820 18.74 19 23.64 155 15.89 23.07 5 .06 2.4 3.2 DEP 110 2
1961 JUL 23 0930 30.65 19 23.31 155 15.99 29.43 10 .14 1.3 1.1 DEP 2.6X 70 2
1961 JUL 23 0940 3.37 19 20.92 155 15.13 32.37 6 .07 4.5 3.0 DEP 255 3
1961 JUL 23 0958 10.96 19 23.36 155 14.54 37.00 7 .07 3.0 2.3 DEP 203 3
1961 JUL 23 1042 47.14 19 22.64 155 17.51 29.14 10 .05 1.3 .8 DEP 2.6X 123 3

1961 JUL 23 1048 11.39 19 24.46 155 14.55 27.73 10 .13 1.2 1.4 DEP 2.5X 91 4
1961 JUL 23 1050 3.76 19 22.85 155 17.64 30.79 10 .08 1.0 1.1 DEP F 2.7X 139 3
1961 JUL 23 1419 11.01 19 20.73 155 16.58 28.67 6 .06 3.0 1.7 DEP 206 3
1961 JUL 23 1550 31.85 19 24.86 155 16.51 28.06 9 .10 1.1 1.1 DEP 2.3X 91 2
1961 JUL 23 2029 12.58 19 22.64 155 17.37 34.78 9 .19 2.9 1.7 DEP 124 3

1961 JUL 23 2136 12.59 19 22.46 155 16.27 32.40 7 .11 2.7 1.5 DEP 124 1
1961 JUL 23 2329 56.65 19 10.15 155 15.16 5.28 6 .03 3.1 2.2 SF1 2.1X 237 23
1961 JUL 24 0114 48.45 19 22.53 155 15.88 28.33 9 .23 1.7 2.0 DEP 3.0X 123 0
1961 JUL 24 0238 54.01 19 22.32 155 17.02 28.64 8 .08 1.3 1.0 DEP 139 2
1961 JUL 24 0259 57.31 19 22.66 155 13.22 31.33 9 .14 2.5 1.5 DEP 2.7X 208 5

1961 JUL 24 0322 42.23 19 23.82 155 16.58 30.42 10 .19 1.8 1.4 DEP F 3.0X 83 3
1961 JUL 24 0512 28.28 19 9.46 155 38.92 1.31 6 .07 4.0 1.9 LSW 3.3X 249 12
1961 JUL 24 0750 18.41 19 21.52 155 15.58 27.18 7 .09 3.3 1.0 DEP 2.7X 246 2
1961 JUL 24 1659 46.17 19 25.01 155 16.82 30.70 11 .22 1.8 1.4 DEP F# 3.3X 85 0
1961 JUL 24 1903 9.37 19 19.40 155 17.10 31.11 9 .12 1.6 1.3 DEP 167 6

1961 JUL 25 1659 35.81 19 22.51 155 17.68 29.83 8 .09 2.8 1.4 DEP 2.8X 129 3
1961 JUL 25 2010 8.73 19 18.41 155 15.77 33.14 8 .08 3.1 1.1 DEP 233 7
1961 JUL 25 2306 12.24 19 23.92 155 41.16 7.00 4 .3023.318.3 MLO F- 328 32
1961 JUL 26 2318 22.82 19 20.75 155 14.08 35.24 7 .04 3.2 1.4 DEP 206 4
1961 JUL 27 0539 34.45 19 20.98 155 16.02 27.82 6 .10 2.8 4.2 DEP 200 3

1961 JUL 27 2121 3.60 19 25.71 155 17.14 31.21 9 .11 1.8 1.3 DEP 2.8X 86 1
1961 JUL 27 2319 21.24 20 3.24 155 19.02 3.00 8 .11 3.4 2.6 KEA F 3.0X 312 44
1961 JUL 28 1251 9.47 19 19.36 155 14.37 41.36 6 .12 2.8 4.2 DEP 2.5X 174 6
1961 JUL 29 0357 59.32 19 29.02 155 17.21 12.25 7 .09 1.1 1.9 GLN F 2.9X 131 7
1961 JUL 29 1621 28.79 19 24.46 155 18.06 0.55 7 .12 .5 .6 SSC F 2.4X 95 2

1961 AUG 2 0344 0.49 19 12.45 155 32.99 2.28 8 .07 1.1 .8 LSW 2.8X 158 16
1961 AUG 2 1608 25.25 19 21.70 155 42.75 33.63 5 .02 4.4 8.2 DML 268 34
1961 AUG 3 1336 29.81 19 22.96 155 17.98 0.03 6 .09 .4 .9 SSC # 2.3X 137 4
1961 AUG 3 1336 37.34 19 23.88 155 14.52 8.34 6 .11 2.5 1.4 INT F 3.6X 276 4
1961 AUG 4 0001 26.61 19 27.53 155 37.07 4.92 5 .07 9.612.6 MLO - 321 24

1961 AUG 7 0141 32.42 19 56.42 155 47.68 18.05 8 .09 3.0 4.4 KOH 3.2X 186 16
1961 AUG 9 1933 29.62 19 21.44 155 17.32 32.06 8 .13 2.7 2.1 DEP 2.6X 192 3
1961 AUG 9 1950 13.71 19 25.57 155 16.48 31.82 9 .08 1.1 .9 DEP 3.1X 109 2
1961 AUG 9 2110 51.79 19 22.03 155 13.37 42.61 7 .06 5.4 4.0 DEP 261 4
1961 AUG 12 0217 38.54 19 48.84 155 37.12 11.40 8 .09 1.4 1.5 KEA 2.5X 192 24

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC	PREF		AZ	MIN	7
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS	MAG	GAP	DS		
1961	AUG	12	1942	19.09	19	23.15	155	18.47	31.04	10	.13	1.3	.8	DEP F	3.1X	113	4		
1961	AUG	14	1617	10.99	19	28.34	155	49.36	9.88	4	.07	13.0	3.6	KON -		338	46		
1961	AUG	15	1240	47.83	19	21.96	155	30.00	0.01	7	.09	6.7	2.4	KAO F#	2.9X	294	12		
1961	AUG	15	1757	30.37	19	23.06	155	17.86	0.08	7	.15	.4	.3	SSC F	2.6X	133	4		
1961	AUG	15	1814	30.12	19	28.65	155	41.49	7.01	4	.15	14.9	11.8	MLO -		330	32		
1961	AUG	16	1157	7.04	19	21.82	155	17.16	31.92	7	.10	2.3	2.9	DEP		157	2		
1961	AUG	16	1733	15.28	20	6.97	155	31.10	10.59	6	.15	3.9	2.8	KEA		184	19		
1961	AUG	17	1446	58.15	19	17.38	155	12.59	25.60	9	.18	1.6	1.8	DEP	2.7X	188	11		
1961	AUG	20	1040	7.50	19	16.39	155	35.57	3.58	4	.07	13.1	13.9	LSW -	2.7X	329	23		
1961	AUG	20	1943	19.76	19	23.12	155	13.11	28.37	9	.11	1.2	1.0	DEP	2.7X	188	8		
1961	AUG	20	2344	45.62	19	22.00	155	14.76	31.28	10	.12	1.3	1.5	DEP	3.1X	162	7		
1961	AUG	21	0648	19.95	19	25.00	155	17.08	3.80	4	.09	14.4	.7	SNC -	3.1X	192	0		
1961	AUG	21	0655	11.36	19	24.54	155	14.64	0.23	6	.21	1.3	4.9	SNC F#	2.7X	152	5		
1961	AUG	21	0943	31.05	19	23.44	155	17.87	0.46	7	.06	.4	.3	SSC	2.4X	119	3		
1961	AUG	22	0756	53.41	19	23.20	155	17.26	0.02	6	.17	.7	1.1	SSC F#	2.4X	122	3		
1961	AUG	22	1239	57.73	19	24.69	155	17.32	1.46	6	.08	1.8	.8	SNC F	2.9X	93	1		
1961	AUG	22	1503	15.20	19	23.15	155	16.44	3.68	6	.05	2.5	1.7	SEC F	3.1X	162	2		
1961	AUG	22	1609	50.78	19	23.07	155	18.07	0.91	5	.08	1.4	3.4	SSC F	2.7X	132	4		
1961	AUG	25	0631	55.69	19	23.58	155	17.06	2.33	9	.15	.6	.6	SSC	2.4X	86	2		
1961	AUG	25	0845	34.93	19	49.79	155	5.28	43.60	9	.15	2.6	1.3	KEA F	4.5X	228	12		
1961	AUG	25	1231	3.63	19	53.18	155	32.50	0.26	7	.06	1.7	.8	KEA	2.5X	153	20		
1961	AUG	26	2209	46.86	19	22.51	155	4.50	43.08	10	.11	2.1	2.0	DEP	2.6X	193	19		
1961	AUG	28	0305	28.12	19	26.11	156	17.68	1.30	9	.11	3.6	1.8	KON	2.7X	243	85		
1961	AUG	28	2211	24.98	19	28.38	155	14.76	20.11	7	.08	.9	1.5	DEP	2.4X	127	7		
1961	AUG	31	0107	28.34	18	58.22	155	46.40	35.66	7	.18	3.8	8.9	DIS		309	57		
1961	SEP	1	0954	52.92	19	22.60	155	16.11	24.88	4	.01	2.1	4.2	DEP		117	1		
1961	SEP	1	1734	48.69	19	27.05	155	13.53	18.64	6	.11	1.5	2.1	DEP		126	8		
1961	SEP	2	0605	51.50	19	23.65	155	17.08	3.09	5	.04	1.9	1.5	SSC	3.1X	153	3		
1961	SEP	3	0424	29.82	19	49.53	155	20.67	31.23	10	.13	1.3	3.5	KEA F	3.6X	155	29		
1961	SEP	3	1914	14.20	19	37.43	155	40.89	3.54	9	.18	1.6	3.5	KEA	2.5X	200	34		
1961	SEP	5	2257	45.58	19	22.68	155	16.11	26.08	7	.06	1.8	2.0	DEP		88	1		
1961	SEP	8	0335	17.48	19	23.12	155	4.67	6.70	7	.07	1.8	7.8	SF5	2.3X	213	18		
1961	SEP	8	2234	11.58	19	23.53	155	15.98	2.49	8	.17	.7	.6	SEC F	2.6X	105	2		
1961	SEP	9	0825	54.26	19	27.63	155	28.41	28.06	6	.14	3.2	3.6	DML	3.3X	279	10		
1961	SEP	9	1331	20.99	19	24.34	155	27.44	6.10	10	.14	2.5	5.8	KAO	2.9X	142	11		
1961	SEP	9	2004	45.91	19	25.76	155	15.72	0.43	8	.06	.5	.6	SNC F	2.3X	154	3		
1961	SEP	12	1347	12.74	19	23.00	155	17.73	1.29	7	.04	.5	1.0	SSC F	3.1X	134	3		
1961	SEP	13	1910	59.16	19	18.07	156	16.33	6.78	7	.19	11.5	15.8	KON F-		311	93		
1961	SEP	13	2200	2.30	19	12.25	155	33.04	2.76	7	.02	1.1	2.4	LSW	2.6X	159	16		
1961	SEP	15	1506	14.42	19	26.40	155	8.24	39.49	8	.05	1.8	1.6	DEP	2.7X	169	15		
1961	SEP	15	2024	29.96	20	1.34	156	19.97	5.73	10	.11	2.3	5.6	KOH F	3.7X	222	69		
1961	SEP	16	0638	58.15	19	22.64	155	24.25	0.02	11	.19	.9	.5	KAO #	3.1X	130	5		
1961	SEP	17	0249	22.76	19	32.72	155	48.60	20.98	6	.12	5.7	14.1	KON -		339	45		
1961	SEP	17	2214	57.87	19	23.07	155	16.56	30.85	7	.05	2.3	2.0	DEP	2.8X	109	2		
1961	SEP	17	2320	21.53	19	22.74	155	16.04	28.90	7	.08	2.3	2.0	DEP		93	1		

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC	PREF		AZ	MIN	8
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS	MAG	GAP	DS		
1961	SEP	18	0020	38.19	19	16.29	155	27.08	27.93	7	.07	2.7	1.8	DLS	2.6X	314	10		
1961	SEP	21	1317	3.31	19	21.33	155	12.24	0.71	6	.09	.9	.9	SER	3.2X	172	12		
1961	SEP	21	1353	55.48	19	18.68	155	13.07	4.90	5	.04	2.4	12.6	SSF -	3.2X	274	15		
1961	SEP	21	1419	38.04	19	17.63	155	12.62	3.94	4	.16	5.2	14.0	SSF -	3.2X	278	17		
1961	SEP	21	1433	8.03	19	17.90	155	13.37	1.86	4	.00	4.5	3.6	SSF	3.2X	279	16		
1961	SEP	21	1441	56.99	19	30.50	155	26.76	7.14	4	.10	2.8	11.6	MLO -	2.7X	220	19		
1961	SEP	21	1454	21.61	19	18.76	155	13.70	4.86	5	.09	2.8	14.3	SSF -	3.3X	276	14		
1961	SEP	22	1701	33.91	19	23.32	155	9.42	7.75	6	.07	2.1	2.6	SF3	4.4X	221	11		
1961	SEP	23	1919	53.57	19	27.29	155	5.80	4.64	7	.11	1.6	3.0	GLN	2.9X	242	20		
1961	SEP	24	0108	18.24	19	20.86	154	58.93	12.06	8	.07	2.0	1.5	LER	2.9X	284	30		
1961	SEP	24	0349	51.49	19	20.55	155	8.31	17.51	4	.21	20.2	5.9	DEP -	3.7X	325	14		
1961	SEP	24	1841	0.95	19	20.93	154	54.28	13.65	8	.12	3.9	2.8	LER	3.5X	272	38		
1961	SEP	24	1909	39.88	19	23.09	155	15.39	29.97	12	.14	1.4	1.1	DEP F	3.3X	147	2		
1961	SEP	24	1925	7.01	19	12.87	154	58.64	38.76	4	.03	9.8	8.0	DIS F-	4.4X	312	35		
1961	SEP	24	1928	53.40	19	17.64	154	59.75	7.69	8	.12	2.0	1.5	LER F	4.3X	235	23		
1961	SEP	24	1935	39.81	19	21.06	155	0.52	1.95	6	.09	1.8	1.9	SSF	3.2X	221	17		
1961	SEP	24	1938	34.05	19	13.07	154	45.53	17.39	7	.07	5.5	12.9	DIS -	4.0X	291	36		
1961	SEP	24	1944	59.03	19	18.68	154	59.51	16.97	6	.22	7.2	16.3	LER -	3.0X	261	21		
1961	SEP	24	1948	42.10	19	8.34	154	56.92	19.45	6	.09	2.9	11.7	DIS -	3.1X	311	39		
1961	SEP	24	1950	14.57	19	23.57	155	3.76	11.24	7	.06	1.5	1.0	SF5	3.8X	190	17		
1961	SEP	24	2001	24.14	19	14.44	154	54.34	7.00	5	.08	1.9	13.1	DIS -	3.5X	290	28		
1961	SEP	24	2029	22.26	19	18.45	155	1.46	9.17	7	.09	2.0	1.2	SF5 F	4.3X	225	22		
1961	SEP	24	2038	27.39	19	18.21	154	57.24	9.89	8	.14	1.6	1.8	LER	3.6X	247	21		
1961	SEP	24	2050	33.76	19	25.24	154	54.62	13.10	7	.14	3.6	1.3	LER	2.8X	284	9		
1961	SEP	24	2114	6.86	19	23.77	155	6.85	12.42	6	.05	2.5	1.4	SF4 F	3.0X	230	16		
1961	SEP	24	2116	38.23	19	18.86	154	56.49	14.79	8	.07	4.5	4.6	LER	2.9X	249	20		
1961	SEP	24	2136	37.75	19	14.92	154	55.94	7.03	5	.06	1.8	13.3	DIS -	3.0X	285	27		
1961	SEP	24	2139	25.88	19	16.13	154	59.48	1.69	8	.17	2.4	2.0	SLE #	3.0X	241	25		
1961	SEP	24	2253	13.48	19	16.41	154	57.01	5.26	7	.12	2.8	2.3	LER	3.5X	251	25		
1961	SEP	25	0119	13.70	19	21.27	155	16.77	32.26	8	.10	3.2	1.4	DEP	3.1X	190	3		
1961	SEP	25	1302	30.73	19	19.13	154	58.51	12.39	8	.09	1.6	.8	LER F	3.5X	239	20		
1961	SEP	26	1712	19.11	19	16.90	154	59.10	7.06	7	.17	1.8	14.1	LER -	2.3X	291	31		
1961	SEP	26	2208	46.54	19	23.55	155	3.14	9.76	6	.05	1.7	4.2	SF5	2.7X	217	16		
1961	SEP	27	0250	10.58	19	13.04	155	2.01	5.76	7	.14	1.9	12.7	SF5 -		295	30		
1961	SEP	27	2124	38.52	19	15.65	154	57.14	10.41	10	.13	1.5	.9	DIS F	3.7X	280	26		
1961	SEP	27	2129	41.49	19	16.24	154	57.42	12.54	10	.18	1.8	1.0	LER F	3.7X	278	25		
1961	SEP	28	1807	27.15	20	1.93	157	34.52	16.43	9	.08	1.5	12.3	DIS -	3.9X	232	151		
1961	OCT	1	2210	23.81	19	10.76	155	36.88	0.70	10	.19	1.9	.7	LSW	2.6X	190	13		
1961	OCT	2	0017	47.71	19	19.28	155	4.22	8.72	10	.13	1.2	1.9	SF5	2.4X	239	21		
1961	OCT	2	0706	58.18	19	24.74	155	14.97	22.87	6	.07	1.3	3.5	DEP		128	5		
1961	OCT	4	0601	25.42	19	23.12	155	16.22	28.80	11	.14	1.5	1.3	DEP	2.0X	87	1		
1961	OCT	4	1357	39.63	19	28.78	155	22.10	34.47	8	.15	3.4	1.5	DML	2.4X	200	10		
1961	OCT	5	0825	41.88	19	24.60	155	35.94	8.87	8	.13	1.7	2.3	MLO	3.1X	239	24		
1961	OCT	6	0147	13.28	19	18.93	155	17.74	0.44	7	.11	1.2	.8	SWR	2.2X	223	7		
1961	OCT	6	1246	23.18	19	12.16	155	31.33	0.50	9	.13	2.6	.4	LSW	2.7X	179	17		

---ORIGIN TIME (HST)--				-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	9
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	OCT	15	1905	22.46	19	40.53	155	17.10	50.95	10	.09	3.1	1.5	KEA		2.4X	227	21	
1961	OCT	18	0834	28.72	19	50.32	155	40.93	1.67	8	.05	2.2	1.5	KEA		2.7X	288	61	
1961	OCT	18	1715	32.09	19	49.23	156	2.14	6.44	7	.13	10.3	11.9	HUA	F-	3.1X	291	44	
1961	OCT	20	0501	45.39	19	22.46	155	19.75	2.17	6	.11	.9	3.4	KAO		2.0X	129	7	
1961	OCT	21	2051	56.26	19	21.58	155	15.61	27.53	8	.07	2.2	1.4	DEP	#		162	2	
1961	OCT	22	0949	46.13	19	8.47	155	38.62	10.02	6	.05	2.8	6.7	LSW		3.0X	249	10	
1961	OCT	23	0504	49.31	19	25.68	155	14.77	29.01	9	.16	2.2	1.4	DEP		2.5X	123	5	
1961	OCT	29	0725	21.53	19	31.40	155	58.93	7.06	6	.08	8.9	10.9	KON	F-		344	62	
1961	OCT	29	1139	10.40	19	41.94	155	12.67	20.96	8	.13	3.5	4.8	KEA		2.5X	219	13	
1961	NOV	1	1148	19.45	19	24.25	155	14.58	30.67	8	.08	2.1	1.6	DEP		2.0X	142	4	
1961	NOV	3	0913	14.50	20	4.43	155	39.88	29.06	9	.13	2.0	2.1	KOH		2.8X	160	6	
1961	NOV	4	0624	29.60	19	23.44	155	30.06	8.37	10	.18	1.2	1.5	KAO		3.1X	152	13	
1961	NOV	5	0656	27.39	19	49.01	155	31.16	12.82	10	.12	1.4	1.7	KEA		2.6X	140	28	
1961	NOV	5	0720	52.73	19	24.29	155	15.37	29.79	10	.19	1.6	1.4	DEP		2.6X	123	3	
1961	NOV	5	1337	25.42	19	23.97	155	18.28	14.75	5	.00	2.5	6.8	DEP			108	3	
1961	NOV	5	1414	37.95	19	22.71	155	32.39	14.61	8	.12	1.3	1.2	DML		2.1X	161	17	
1961	NOV	5	1602	22.10	19	23.45	155	19.01	8.37	5	.06	1.6	4.7	INT			123	4	
1961	NOV	5	1651	19.39	19	23.17	155	16.91	23.73	5	.03	4.3	10.2	DEP	-		130	2	
1961	NOV	5	1702	45.43	19	21.91	155	16.86	35.13	9	.13	1.8	2.4	DEP	#	2.0X	157	2	
1961	NOV	8	1151	0.89	19	26.86	155	18.38	15.06	9	.10	1.0	.3	DEP		2.6X	109	3	
1961	NOV	10	0538	17.64	19	26.49	155	16.94	17.58	9	.11	1.1	1.4	DEP	F	3.3X	133	2	
1961	NOV	10	0928	13.28	19	28.71	155	14.82	25.07	7	.06	1.5	1.6	DEP		2.5X	113	8	
1961	NOV	12	1545	23.11	19	20.75	155	9.82	9.22	8	.07	1.3	1.8	SF3		2.9X	181	11	
1961	NOV	14	0451	27.53	19	27.36	156	0.81	10.55	10	.12	5.6	7.5	KON	F	3.3X	299	62	
1961	NOV	16	0617	12.54	19	24.15	155	15.82	28.14	9	.14	1.8	2.5	DEP		2.7X	111	2	
1961	NOV	16	0659	16.47	19	22.80	155	15.40	27.68	8	.08	2.2	1.3	DEP			157	1	
1961	NOV	16	1510	16.26	19	25.59	155	17.62	28.08	8	.06	1.2	.8	DEP		3.0X	108	0	
1961	NOV	16	1650	40.00	19	18.81	155	11.38	41.63	6	.07	6.0	7.9	DEP	-	2.6X	278	10	
1961	NOV	16	1903	50.18	19	17.23	155	26.31	45.60	9	.15	4.8	2.0	DLS		2.4X	184	8	
1961	NOV	17	1719	42.94	19	22.68	155	16.65	31.61	7	.10	1.5	1.0	DEP		2.6X	113	1	
1961	NOV	17	1748	46.98	19	24.05	155	14.84	30.76	8	.10	2.0	1.2	DEP		2.7X	141	4	
1961	NOV	17	1933	26.24	19	25.16	155	15.91	28.99	9	.10	1.7	1.2	DEP		2.7X	104	2	
1961	NOV	17	1956	49.09	19	45.63	156	9.94	6.72	8	.08	8.3	10.3	HUA	F-	3.1X	301	59	
1961	NOV	17	2247	39.32	19	21.15	155	17.17	26.45	7	.06	2.5	1.5	DEP			181	3	
1961	NOV	17	2322	38.30	19	25.51	155	14.44	26.66	10	.17	1.3	1.5	DEP		2.6X	130	5	
1961	NOV	17	2327	53.00	19	21.05	155	16.08	28.98	8	.07	2.2	1.5	DEP			163	3	
1961	NOV	18	0344	1.00	19	24.25	155	15.07	29.09	11	.16	1.6	1.3	DEP		3.2X	131	4	
1961	NOV	18	0809	14.08	19	22.10	156	7.10	6.91	8	.13	8.6	12.0	KON	F-	3.3X	300	77	
1961	NOV	18	0941	1.63	19	25.55	155	17.96	30.75	9	.10	2.3	1.2	DEP	#	2.7X	170	1	
1961	NOV	20	0140	24.48	19	25.59	155	18.08	27.89	9	.09	2.4	1.2	DEP		2.5X	171	1	
1961	NOV	20	0313	17.12	19	21.59	155	16.24	26.05	7	.12	2.8	1.5	DEP			193	2	
1961	NOV	20	0314	6.27	19	21.61	155	6.54	0.02	9	.06	1.2	.6	SSF	#	2.7X	189	16	
1961	NOV	20	0338	26.81	19	21.91	155	16.96	26.66	7	.07	2.5	1.3	DEP			188	2	
1961	NOV	20	1325	23.39	19	24.22	155	14.52	28.50	6	.07	3.5	1.7	DEP		2.5X	272	4	
1961	NOV	20	1400	57.83	19	23.53	155	16.14	28.96	7	.03	2.5	1.3	DEP		2.6X	101	2	

---ORIGIN TIME (HST)--				-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	10
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	NOV	20	1611	1.91	19	22.65	155	15.39	28.54	7	.06	2.6	1.4	DEP			176	1	
1961	NOV	20	1940	27.75	19	25.26	155	15.23	28.90	10	.12	1.1	1.2	DEP		3.0X	118	3	
1961	NOV	21	0041	26.00	19	18.05	155	14.41	26.56	8	.06	3.9	3.9	DEP	F	2.5X	180	8	
1961	NOV	21	0242	57.08	19	20.82	155	15.67	29.21	9	.07	1.3	1.1	DEP		2.7X	165	3	
1961	NOV	21	0342	23.13	19	23.59	155	15.97	29.62	7	.05	2.6	1.4	DEP			107	2	
1961	NOV	21	2322	39.78	19	23.18	155	13.24	23.67	8	.10	1.6	2.4	DEP	F	4.1X	186	5	
1961	NOV	21	2325	56.89	19	19.94	155	14.13	27.26	9	.07	1.1	.8	DEP		2.7X	173	5	
1961	NOV	21	2327	6.05	19	17.95	155	11.82	21.40	8	.07	1.2	1.6	DEP		2.9X	188	11	
1961	NOV	21	2346	2.06	19	22.84	155	15.39	28.36	9	.09	1.8	1.1	DEP	F	3.2X	157	1	
1961	NOV	21	2348	19.26	19	24.32	155	16.58	28.36	9	.12	2.0	1.3	DEP		2.8X	88	1	
1961	NOV	22	0009	21.03	19	17.49	155	13.34	21.32	8	.10	1.3	1.7	DEP		3.0X	185	10	
1961	NOV	22	0327	30.06	19	22.11	155	14.19	28.29	9	.09	1.7	1.2	DEP		2.9X	163	3	
1961	NOV	22	0434	39.44	19	18.82	155	13.50	22.59	8	.22	1.9	2.4	DEP		2.5X	179	8	
1961	NOV	22	0536	36.58	19	25.88	155	14.30	19.26	6	.06	1.4	1.3	DEP		2.7X	141	5	
1961	NOV	22	0544	48.43	19	23.95	155	15.66	29.95	9	.06	1.7	1.0	DEP		3.2X	117	3	
1961	NOV	22	0735	58.57	19	23.14	155	15.65	30.59	6	.05	3.3	1.6	DEP		2.6X	235	1	
1961	NOV	22	0816	17.02	19	23.46	155	12.06	29.77	8	.11	2.4	1.5	DEP		2.7X	163	7	
1961	NOV	22	1055	55.86	19	23.39	155	16.03	27.07	9	.09	1.7	1.1	DEP	F	3.3X	102	2	
1961	NOV	22	1128	59.33	19	23.18	155	15.42	27.82	5	.02	3.2	1.5	DEP			253	2	
1961	NOV	22	1631	57.70	19	21.97	155	15.11	29.00	8	.05	2.1	1.4	DEP		2.7X	162	2	
1961	NOV	22	1632	41.91	19	19.94	155	14.81	27.35	9	.13	1.6	1.0	DEP		3.1X	171	5	
1961	NOV	22	1932	17.67	19	21.30	155	16.24	29.35	8	.09	2.4	1.5	DEP		2.6X	161	2	
1961	NOV	23	0205	45.27	19	22.35	155	16.01	28.70	8	.11	2.5	1.4	DEP		2.6X	158	0	
1961	NOV	23	0447	32.81	19	21.71	155	16.19	26.45	8	.09	2.2	1.4	DEP			160	1	
1961	NOV	23	0451	14.15	19	22.01	155	16.69	26.10	8	.08	2.1	1.3	DEP			158	2	
1961	NOV	23	0639	41.16	19	22.49	155	16.70	28.71	8	.10	2.4	1.3	DEP		2.8X	128	1	
1961	NOV	23	0724	54.87	19	20.79	155	15.74	26.70	8	.12	1.5	1.1	DEP		3.1X	165	8	
1961	NOV	23	1042	36.94	19	28.21	155	13.86	14.69	6	.06	1.5	.9	DEP			163	8	
1961	NOV	23	1629	36.40	19	22.75	155	15.74	29.62	8	.16	1.9	1.2	DEP	F	2.7X	157	6	
1961	NOV	23	1709	55.93	19	25.48	155	18.89	29.68	8	.15	1.4	1.0	DEP	F	3.5X	123	2	
1961	NOV	23	1714	31.01	19	23.80	155	15.48	26.81	10	.11	1.1	1.1	DEP	F	3.7X	126	3	
1961	NOV	23	1730	42.08	19	21.84	155	17.75	26.13	7	.05	1.3	1.6	DEP		2.7X	151	3	
1961	NOV	24	0535	41.23	19	21.67	155	15.05	27.96	10	.13	1.5	1.4	DEP	F	2.7X	163	2	
1961	NOV	24	0806	16.18	19	22.64	155	14.19	27.95	6	.04	3.2	1.6	DEP			304	3	
1961	NOV	24	1031	11.01	19	17.74	154	58.98	7.05	8	.20	1.8	15.8	LER	-	2.8X	290	31	
1961	NOV	24	1557	46.86	19	21.88	155	15.60	28.19	6	.08	3.2	1.6	DEP			281	1	
1961	NOV	24	1715	42.97	19	23.58	155	15.56	27.48	7	.09	2.7	1.5	DEP			126	2	
1961	NOV	24	2046	58.64	19	17.56	155	40.69	1.05	7	.12	4.0	13.6	LSW	-		254	27	
1961	NOV	25	0614	6.70	19	5.94	154	55.65	6.98	6	.13	5.5	1.7	DIS		2.6X	345	47	
1961	NOV	25	0614	22.04	19	16.64	155	7.64	12.90	9	.22	2.1	1.4	SF4		2.8X	246	18	
1961	NOV	25	1326	3.22	19	23.92	155	16.57	28.30	9	.09	1.7	1.3	DEP	F	3.9X	85	2	
1961	NOV	25	1914	58.98	19	21.53	155	16.85	29.37	8	.05	2.2	1.3	DEP		2.6X	159	2	
1961	NOV	25	2022	55.05	19	47.28	155	34.22	6.95	7	.09	1.9	11.3	KEA	-	2.5X	299	37	
1961	NOV	26	0910	40.99	19	20.85	155	15.15	25.93	8	.06	2.0	1.5	DEP		2.5X	167	3	
1961	NOV	26	2043	25.74	19	21.72	155	15.99	28.98	8	.06	2.2	1.4	DEP			160	1	

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	11
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	NOV	27	0035	5.58	19	19.65	155	15.55	30.02	8	.12	3.5	2.5	DEP	#	2.6X	170	5	
1961	NOV	27	0132	34.78	19	27.01	155	19.84	37.70	7	.08	2.7	1.9	DML		3.0X	187	5	
1961	NOV	27	0215	53.97	19	19.47	155	26.69	13.72	6	.03	1.5	2.3	DML			300	6	
1961	NOV	27	0451	22.88	19	21.64	155	13.83	33.68	10	.13	2.1	1.2	DEP	F	3.4X	209	4	
1961	NOV	27	0943	56.40	19	21.18	155	15.31	29.90	8	.06	2.2	1.5	DEP		2.8X	164	2	
1961	NOV	27	1555	40.25	19	19.27	155	15.96	27.11	7	.07	1.9	1.6	DEP		2.8X	170	6	
1961	NOV	28	0449	16.59	19	20.58	155	13.22	39.09	6	.05	4.2	1.7	DEP			307	6	
1961	NOV	29	2105	8.37	19	21.84	155	58.80	6.85	6	.15	10.3	12.7	KON	-		344	62	
1961	NOV	30	0646	10.03	19	21.98	155	16.71	25.63	6	.06	2.7	1.4	DEP			194	2	
1961	NOV	30	1430	49.81	19	22.88	155	11.71	27.47	9	.10	1.3	1.8	DEP		2.8X	193	7	
1961	NOV	30	1651	17.65	19	22.49	155	14.43	27.89	9	.07	2.0	1.1	DEP		2.7X	233	3	
1961	NOV	30	1858	46.81	19	20.87	155	16.71	27.27	8	.12	2.4	1.6	DEP		3.0X	162	3	
1961	NOV	30	1932	17.36	18	59.28	155	28.60	7.25	5	.09	3.7	13.8	LSW	-		283	14	
1961	NOV	30	2014	26.41	19	21.67	155	15.78	28.01	8	.09	2.3	1.5	DEP		2.8X	161	1	
1961	DEC	1	0637	43.97	19	23.64	155	15.01	28.16	9	.07	1.9	1.0	DEP		2.5X	190	3	
1961	DEC	1	0733	59.17	19	23.76	155	40.12	0.86	8	.09	1.1	11.2	MLO	-	2.9X	194	30	
1961	DEC	1	0909	38.28	19	21.98	155	14.43	29.95	8	.07	3.0	.9	DEP		3.0X	259	3	
1961	DEC	2	0441	36.51	19	22.47	155	15.41	28.57	7	.04	2.8	1.6	DEP		2.8X	257	1	
1961	DEC	2	1857	59.39	19	21.68	155	16.84	35.69	10	.08	1.1	1.8	DEP	F	4.2X	158	2	
1961	DEC	2	1940	2.86	19	21.65	155	16.24	31.20	8	.02	2.2	1.3	DEP			160	2	
1961	DEC	2	2028	45.08	19	21.97	155	15.29	29.98	10	.07	1.2	1.0	DEP		2.4X	161	1	
1961	DEC	3	0101	35.96	19	23.67	155	25.53	6.41	9	.11	1.0	2.5	KAO		2.4X	174	7	
1961	DEC	3	1016	40.77	19	20.29	155	15.64	27.01	8	.12	2.4	1.9	DEP			167	4	
1961	DEC	3	1021	16.02	19	22.77	155	16.22	27.55	8	.07	2.1	1.2	DEP			88	1	
1961	DEC	3	1049	53.54	19	25.11	155	24.70	0.02	7	.11	1.6	.8	KAO	#	2.2X	211	9	
1961	DEC	3	1133	38.02	19	22.24	155	13.42	29.28	8	.06	2.7	2.2	DEP		2.6X	238	4	
1961	DEC	3	1658	33.77	19	13.85	155	26.09	8.26	5	.02	2.6	1.3	LSW		2.2X	173	13	
1961	DEC	4	0106	49.77	19	22.60	155	16.62	32.24	8	.09	1.1	1.7	DEP		2.7X	118	1	
1961	DEC	4	0412	17.44	19	24.72	155	16.43	30.48	10	.14	1.3	1.2	DEP		2.3X	93	1	
1961	DEC	4	0821	56.46	19	4.35	155	23.23	30.82	7	.07	4.2	3.1	LOI			247	21	
1961	DEC	4	1408	3.29	19	24.16	155	17.31	31.10	10	.18	1.6	1.3	DEP		2.7X	79	1	
1961	DEC	4	2008	58.04	19	21.06	155	16.81	30.98	8	.12	2.7	1.7	DEP		2.6X	161	3	
1961	DEC	4	2327	50.25	19	20.66	155	52.30	3.63	7	.15	7.2	10.6	KON	-	2.8X	295	43	
1961	DEC	5	0154	20.38	19	20.41	155	9.98	11.23	9	.12	1.4	.9	SF3		2.7X	183	11	
1961	DEC	5	0632	49.23	19	6.20	156	5.38	6.28	7	.13	8.8	12.6	KON	-	3.6X	313	78	
1961	DEC	5	1319	31.01	19	19.75	155	12.92	37.29	8	.06	3.3	2.5	DEP		3.1X	217	7	
1961	DEC	5	1711	15.20	19	20.81	155	51.92	6.87	7	.09	2.2	1.4	KON			295	43	
1961	DEC	5	2041	26.46	19	2.00	155	35.54	41.51	8	.14	5.5	7.1	DLS	F	3.3X	318	3	
1961	DEC	6	0308	5.91	19	20.47	155	1.30	39.90	8	.11	1.8	3.0	DEP		2.6X	246	19	
1961	DEC	6	1857	41.85	19	22.79	155	15.09	30.69	7	.08	2.8	2.5	DEP			176	2	
1961	DEC	6	2121	24.62	19	24.43	155	23.16	0.41	8	.12	.9	.6	KAO		2.2X	177	8	
1961	DEC	7	0942	59.76	19	25.43	155	18.13	29.36	6	.06	3.2	1.2	DEP		3.0X	123	1	
1961	DEC	7	1956	38.94	19	21.83	155	15.92	27.74	7	.04	2.3	2.0	DEP		2.5X	191	1	
1961	DEC	7	2004	6.48	19	20.63	155	16.22	26.91	6	.06	2.8	1.4	DEP			258	3	
1961	DEC	7	2040	55.78	19	21.22	155	16.28	28.26	6	.03	2.6	2.5	DEP			209	2	

---ORIGIN TIME (HST)--					-LAT N--		--LON W--		DEPTH	N	RMS	ERH	ERZ	LOC		PREF	AZ	MIN	12
YEAR	MON	DA	HRMN	SEC	DEG	MIN	DEG	MIN	KM	RD	SEC	KM	KM	REMKS		MAG	GAP	DS	
1961	DEC	7	2048	11.26	19	22.30	155	15.77	29.47	8	.09	2.3	1.4	DEP			158	0	
1961	DEC	8	0444	47.71	19	22.34	155	16.88	30.02	7	.06	2.7	1.3	DEP			165	2	
1961	DEC	9	1659	19.78	19	24.26	155	15.21	31.13	9	.12	2.4	1.5	DEP	F	2.5X	128	3	
1961	DEC	9	1937	52.97	19	37.75	156	0.72	7.15	8	.13	8.8	11.4	KON	-		313	67	
1961	DEC	10	2047	34.24	20	2.27	155	33.23	27.29	11	.13	1.6	2.3	KEA		2.7X	166	12	
1961	DEC	11	1703	17.12	19	18.58	155	54.02	0.25	9	.14	6.1	1.5	KON	#	3.3X	290	54	
1961	DEC	11	2155	31.96	19	25.80	155	14.40	26.85	10	.12	1.6	2.1	DEP	F	2.4X	127	5	
1961	DEC	12	1919	10.97	19	18.75	155	17.42	26.79	8	.11	2.4	2.0	DEP			169	7	
1961	DEC	13	0136	32.39	19	29.49	155	24.78	28.55	8	.11	1.1	1.7	DML		3.1X	134	15	
1961	DEC	14	0328	42.31	19	18.41	155	16.54	34.72	7	.04	2.0	3.2	DEP		2.7X	173	7	
1961	DEC	14	1756	10.06	19	6.31	155	26.44	34.24	5	.05	3.1	2.5	DLS			336	26	
1961	DEC	15	1037	21.36	19	30.15	154	48.37	9.68	6	.06	5.5	2.4	LER			344	50	
1961	DEC	15	1117	58.95	19	23.59	155	16.96	19.64	8	.07	1.5	1.8	DEP	F	3.2X	110	2	
1961	DEC	16	2048	59.82	19	36.01	155	18.36	0.52	9	.11	1.7	.5	KEA		2.3X	201	14	
1961	DEC	17	0522	18.83	19	16.54	155	18.31	28.66	7	.13	2.5	2.4	DEP		2.2X	175	11	
1961	DEC	17	0546	15.53	19	21.16	155	16.74	25.70	8	.04	1.7	1.5	DEP		2.5X	161	3	
1961	DEC	17	0719	44.37	19	26.60	155	18.90	32.25	8	.07	2.6	1.4	DEP		2.8X	183	3	
1961	DEC	17	0750	52.44	19	40.95	155	52.45	19.37	9	.16	3.3	16.3	HUA	F-	3.3X	216	55	
1961	DEC	20	0659	41.44	19	27.32	155	14.64	23.80	7	.20	2.7	1.4	DEP			154	6	
1961	DEC	21	0030	6.95	19	21.19	155	15.28	31.80	7	.18	3.4	2.2	DEP			164	2	
1961	DEC	21	0304	55.65	19	57.36	155	18.52	12.48	11	.11	2.3	1.3	KEA		2.3X	217	35	
1961	DEC	22	0557	46.21	19	18.43	155	38.26	0.52	7	.09	2.5	11.2	LSW	-	2.5X	243	26	
1961	DEC	23	0140	31.92	19	22.87	155	15.50	26.58	7	.05	2.4	1.4	DEP			151	1	
1961	DEC	23	0501	11.80	19	21.92	155	15.92	28.87	7	.05	3.0	1.2	DEP			255	1	
1961	DEC	23	0637	14.10	19	20.76	155	31.90	6.89	7	.09	2.0	1.1	KAO		2.7X	319	22	
1961	DEC	23	0818	32.88	19	22.56	155	16.74	29.39	8	.07	2.0	1.4	DEP		2.7X	149	1	
1961	DEC	23	1129	0.06	19	23.05	155	16.23	30.43	8	.08	2.3	1.2	DEP			91	1	
1961	DEC	24	0741	21.23	19	18.49	155	15.44	3.03	7	.06	1.4	1.0	SSF			262	7	
1961	DEC	24	1053	11.68	19	20.10	155	17.55	32.71	8	.09	2.3	2.2	DEP		2.6X	163	5	
1961	DEC	24	1054	41.25	19	25.03	155	15.48	27.37	9	.09	1.0	1.1	DEP		3.1X	114	3	
1961	DEC	24	2134	25.65	19	24.19	155	25.90	5.36	7	.12	1.2	6.4	KAO		2.0X	235	9	
1961	DEC	24	2229	35.51	19	26.56	155	25.61	3.69	9	.13	1.6	4.0	KAO		2.4X	234	7	
1961	DEC	25	1017	45.61	19	27.11	155	24.80	1.29	8	.12	1.8	.7	KAO		2.3X	219	6	
1961	DEC	25	1959	24.24	19	19.19	155	5.97	12.48	6	.14	3.5	4.8	SF4		2.7X	331	18	
1961	DEC	26	1948	4.19	19	31.01	156	3.22	7.00	6	.19	12.4	16.3	KON	-	3.2X	346	70	
1961	DEC	27	1714	28.23	19	13.74	155	38.45	5.90	9	.10	1.8	1.3	LSW		2.8X	239	19	
1961	DEC	28	0028	44.22	19	16.80	154	58.01	5.28	7	.09	4.9	10.5	LER	-	2.9X	274	24	
1961	DEC	28	2242	57.42	19	23.67	155	13.28	30.91	9	.07	2.0	1.7	DEP		2.5X	222	5	
1961	DEC	28	2243	33.96	19	23.22	155	15.71	28.08	9	.10	1.8	2.2	DEP		2.8X	123	2	
1961	DEC	28	2251	2.05	19	22.03	155	16.68	27.62	7	.04	2.4	1.2	DEP			187	2	
1961	DEC	28	2339	25.14	19	20.05	155	12.62	10.88	4	.00	3.2	3.0	SF2			214	7	
1961	DEC	28	2344	7.13	19	22.35	155	15.67	29.63	7	.03	2.6	1.3	DEP			187	0	
1961	DEC	28	2346	9.48	19	5.40	155	27.85	44.27	9	.06	2.7	2.1	DLS			208	13	
1961	DEC	28	2350	0.53	19	1.88	155	25.55	53.52	6	.12	5.0	5.4	DLS			258	17	
1961	DEC	29	0001	16.36	19	22.15	155	16.90	27.36	7	.08	2.6	1.3	DEP			178	2	

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---ORIGIN TIME (HST)-- -LAT N-- --LON W-- DEPTH  N RMS ERH ERZ LOC    PREF AZ MIN  13
YEAR MON DA HRMN  SEC  DEG MIN  DEG  MIN    KM  RD SEC  KM  KM REMKS  MAG  GAP DS

1961 DEC 29 0100 13.95 19 23.08 155 16.16 29.34  6 .01 3.0 1.5 DEP         183  1
1961 DEC 29 0223 41.95 19 23.78 155 17.77 28.48  7 .07 2.6 1.3 DEP         109  2
1961 DEC 29 0245 14.24 19 22.17 155 14.52 30.12  6 .03 3.2 1.6 DEP         297  2
1961 DEC 29 1114 53.95 19 23.15 155 15.97 25.94  7 .09 2.6 1.5 DEP    2.6X 105  1
1961 DEC 29 1122  3.87 19 23.03 155 15.19 27.45  7 .08 2.7 1.5 DEP         159  2

1961 DEC 29 1356 11.95 19 23.69 155 14.63 28.65  7 .03 2.5 1.4 DEP         154  3
1961 DEC 29 1609  7.85 18 59.24 155 15.77 11.38  7 .22 2.0 1.7 LOI         284 35
1961 DEC 29 2014 13.47 19 23.53 155 15.43 25.23  7 .07 2.4 1.4 DEP         132  2
1961 DEC 29 2307 50.99 19 22.11 155 15.43 29.28  7 .05 2.6 1.4 DEP         190  1
1961 DEC 30 0334 56.83 19 24.75 155 16.98 30.83  9 .11 1.9 1.4 DEP    2.0X  81  0

1961 DEC 30 1209 30.16 19 48.43 155 27.20  6.95  7 .08 1.311.8 KEA  - 2.5X 292 39
1961 DEC 30 1308 22.38 19 22.72 155 16.64 27.28  7 .04 1.7 1.6 DEP    2.9X 135  1
1961 DEC 31 0603 23.85 19 47.70 155 32.69 13.26  9 .10 1.4 1.7 KEA F  2.8X 171 28
1961 DEC 31 0743 45.15 19 22.89 155 27.36  2.20  9 .10 1.0 1.4 KAO    3.1X 187  9
1961 DEC 31 0813  6.95 19 15.77 155 13.07 10.97  9 .13 1.3  .9 SF2    2.3X 248 13

1961 DEC 31 0852 10.16 19 21.49 155 14.65 28.34 10 .15 1.8 2.3 DEP F  4.1X 198  3
1961 DEC 31 0901 39.43 19 22.79 155 15.27 27.68  7 .04 2.5 1.4 DEP         169  1
1961 DEC 31 0914  7.93 19 24.67 155 14.24 29.96  7 .08 3.0 1.7 DEP         142  5
1961 DEC 31 0937 42.90 19 22.67 155 15.42 30.70  7 .13 3.5 1.8 DEP         172  1
1961 DEC 31 0954 35.42 19 22.45 155 13.88 30.32  7 .07 2.9 1.6 DEP         191  4

1961 DEC 31 1103 55.55 19 21.81 155 13.86 29.75  9 .12 1.9 1.5 DEP    2.6X 166  4
1961 DEC 31 1136 27.98 19 23.77 155 14.62 25.96  9 .13 1.6 1.5 DEP    1.9X 152  3
1961 DEC 31 1138 19.14 20 47.30 154 49.31 15.09 11 .11 3.8 7.4 DIS    3.5X 276121
1961 DEC 31 1342 40.21 19 23.38 155 13.42 26.49  8 .08 1.2 1.5 DEP    2.3X 180  5
1961 DEC 31 1907 23.08 19 23.09 155 16.62 28.07 11 .12 1.5 1.3 DEP    2.7X 111  2

1961 DEC 31 2320 36.37 19 24.43 155 17.08 29.85  8 .04 1.7 1.2 DEP    2.7X 161  1
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