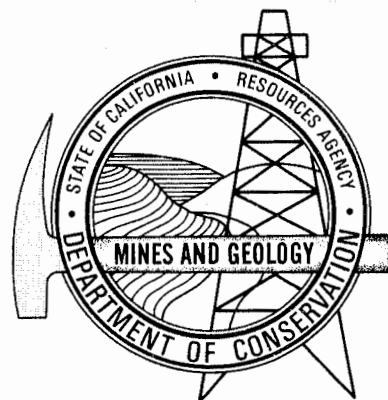


CSMIP STRONG-MOTION RECORDS
FROM THE
CHALFANT VALLEY, CALIFORNIA
EARTHQUAKES
OF
JULY AND AUGUST 1986

CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY
OFFICE OF STRONG MOTION STUDIES
REPORT OSMS 86-06

1988



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CSMIP STRONG-MOTION RECORDS
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JULY AND AUGUST 1986

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Report No. OSMS 86-06
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CSMIP STRONG-MOTION RECORDS FROM THE CHALFANT VALLEY, CALIFORNIA
EARTHQUAKES OF JULY AND AUGUST 1986

Introduction

During the months of July, August, and September in 1986, a series of earthquakes occurred in the rural Chalfant Valley, located about 18 km (11 miles) northeast of Bishop. This series of shocks was reported to have caused about \$2.7 million in damages (The Sacramento Bee, September 11, 1986). Approximately 50 mobile homes in the Chalfant area were knocked from their foundations during these earthquakes. In addition, several non-mobile homes were heavily damaged, and one frame house nearly collapsed (The Sacramento Union, July 22, 1986).

Field geologists identified approximately 11.5 km (7 miles) of surface faulting on several traces of the White Mountain fault zone (Kahle et al., 1986). A maximum of 5 cm of right lateral slip was observed. East-west extension across cracks which occurred in conjunction with known fault segments was also observed.

Many earthquakes of this series were recorded at strong-motion stations of the California Strong Motion Instrumentation Program (CSMIP), and the U.S. Geological Survey (USGS). Records recovered from USGS stations during the July 21 mainshock are given in Maley et al. (1986). This report presents copies of 36 accelerograms recorded at CSMIP stations during the four largest shocks: 21 July 1986, ML 6.4 (mainshock); 20 July 1986, ML 5.9 (foreshock); 21 July 1986, ML 5.6 (called Aftershock #1 in this report); 31 July 1986, ML 5.8 (Aftershock #2). The location and origin times of these four earthquakes are given in Table 1. Table 1 also lists the number of records recovered for each earthquake by station type.

TABLE 1
 Summary of Hypocentral Data
 for the
 Chalfant Valley Earthquakes of 1986*

	<u>Date</u>	<u>Origin Time</u> (GMT)	<u>N Lat.</u> (deg)	<u>W Long.</u> (deg)	<u>Depth</u> (km)	<u>ML</u>	<u>Number of</u> <u>Strong Motion Records</u>			<u>Totals</u>
							<u>Free</u> <u>Field</u>	<u>Bldg.</u>	<u>Dam</u>	
Mainshock	21 July	14:42:26 (07:42 PDT)	37.54	118.44	12	6.4	12	3	3	18
Foreshock	20 July	14:29:46 (07:29 PDT)	37.57	118.45	7	5.9	6	1	2	9
Aftershock #1	21 July	14:51:09 (07:51 PDT)	37.48	118.43	19	5.6	4	2	0	6
Aftershock #2	31 July	07:22:40 (00:22 PDT)	37.48	118.38	9	5.8	2	1	0	3
Totals							24	7	5	36

* Hypocentral information for the mainshock, foreshock, and aftershock #2 are from R. Cockerham (U.S. Geological Survey). Hypocentral estimates for aftershock #1 (21 July 1986, 14:51 GMT) are from E. Cobertt (University of Nevada at Reno). Because the onset of aftershock #1 is within the coda of the main earthquake, the hypocentral estimates should be considered preliminary. Estimates of the local (Richter) magnitude for all events are from UC Berkeley (BRK).

Highlights of CSMIP Strong-Motion Data

This report presents 36 strong-motion accelerograms recorded at 11 CSMIP stations during the four largest earthquakes of the Chalfant sequence. Some of the highlights of the data include:

- o Two free field stations (Chalfant and Bishop LADWP) recorded all four earthquakes.
- o The largest peak horizontal accelerations for the foreshock, the mainshock, and Aftershock #1 were recorded at the Chalfant strong-motion station (28% g, 46% g, and 17% g, respectively). The Bishop LADWP station recorded the largest peak horizontal acceleration for Aftershock #2 (19% g).
- o One structural station, the Bishop - N. Main Street office building, which is a two-story steel frame building, recorded all four earthquakes. Peak horizontal acceleration was 25% g on the ground and 40% g at the roof during the mainshock.

- o Long Valley Dam, an earth dam on Lake Crowley, recorded the foreshock and the mainshock. During the mainshock peak horizontal accelerations of 9% g on bedrock, 21% g on the crest and 34% g on the upper abutment were recorded. This site was instrumented in 1979 and has produced many good strong-motion records since. The accelerations recorded during this earthquake sequence are less than those recorded during the Mammoth Lakes earthquakes of May 1980 (Turpen, 1980).

Organization of the Report

The locations of CSMIP strong-motion stations and the epicenters are shown in Figure 1. A three-digit station code is shown on the map adjacent to each station symbol. The station code, the CSMIP station number and the station name are cross-referenced in Table 2. Table 2 also lists the page number on which records from the mainshock, the foreshock and the two aftershocks are displayed. Table 3 is an alphabetic listing of station names which provides information on site conditions and station coordinates. The record page numbers are also listed in Table 3. For the mainshock, detailed information about each record, including peak acceleration and instrument orientation, is presented in Table 5. Similarly, Table 6 presents information for the foreshock, Table 7 for Aftershock #1, and Table 8 for Aftershock #2. A summary of trigger times and maximum accelerations for 53 earthquakes recorded at CSMIP stations is given in Table 4.

Included as an addendum to this report are the accelerograms from Vermilion Dam for the Bishop earthquake of 23 November 1984. These records were not recovered in time for inclusion in the report by Shakal et al (1984), because roads were impassable due to winter storms.

TABLE 2

Station Code Reference Table

Code	CSMIP Number	Station Name	Record on Page*			
			MS	FS	AS1	AS2
010	45010	Fresno - California State University	26	--	--	--
015	44015	Lone Pine	--	--	--	--
031	55031	Tioga Pass	--	--	--	--
045	45045	Centerville	--	--	--	--
067	55067	Mariposa	--	--	--	--
080	43080	Death Valley - Grapevine	26	--	--	--
099	54099	Convict Creek - U.C. Experimental Station	23	--	--	--
100	54100	Benton	21	51	--	--
101	54101	Tinemaha Reservoir - Free Field	25,46	--	--	--
102	44102	Independence	--	--	--	--
171	54171	Bishop - LADWP South Street Garage	22	52	63	71
214	54214	Lake Crowley - Long Valley Dam	41	55	--	--
298	44298	Independence - LADWP Building	37	--	--	--
301	54301	Mammoth Lakes - Mammoth High School Gym	35	--	66	--
361	54361	Tinemaha Reservoir - Tinemaha Dam	45	--	--	--
362	54362	Lake Edison - Vermillion Dam	43	57	--	--
384	54384	Lake Edison - Vermillion Dam Free Field	25,44	53,58	--	--
388	54388	Bishop - North Main Street Office Bldg.	31	54	65	72
424	54424	Bishop - Paradise Lodge	22	52	64	--
428	54428	Chalfant - Zack Brothers Ranch	21	51	63	71
429	55429	June Lake	--	--	--	--
435	44435	Kings Canyon National Park - Cedar Grove A	--	--	--	--
482	54482	Mammoth Lakes - Mammoth High School Free Field	24,36	--	64	--
T03	54T03	Lake Crowley - Shehorn Residence	23	53	--	--
T04	54T04	Mammoth Lakes - Sheriff Substation	24	--	--	--

* Page number indicates the page in the report on which the record from a strong-motion station is given for the mainshock (MS) of 21 July 1986, the foreshock (FS) of 20 July 1986, aftershock #1 (AS1) of 21 July 1986, and aftershock #2 (AS2) of 31 July 1986.

TABLE 3

CSMIP Strong-Motion Stations - Chalfant Valley Earthquakes of July and August 1986

Station Name	N.Lat.	W.Long.	Sta. No.	Code	Site Geology	Record on Page#		
						MS	FS	AS1 AS2
Benton	37.818	118.475	54100	100	Alluvium	21	51	--
Bishop - LADWP South Street Garage	37.360	118.396	54171	171	Alluvium	22	52	63 71
Bishop - North Main Street Office Bldg.	37.370	118.396	54388	388	Alluvium	31	54	65 72
Bishop - Paradise Lodge	37.481	118.602	54424	424	Thin alluvium over tuff	22	52	64 --
Centerville	36.734	119.486	45045	045	Alluvium	NT		
Chalfant - Zack Brothers Ranch	37.662	118.398	54428	428	Alluvium	21	51	63 71
Convict Creek - U.C. Experimental Station	37.614	118.831	54099	099	Alluvium over glacial deposits	23	--	--
Death Valley - Grapevine	36.983	117.357	43080	080	Gravels over non- marine sediments	26	--	--
Fresno - California State University Independence	36.813	119.746	45010	010	Alluvium	26	--	--
Independence - LADWP Building June Lake	36.831	118.161	44102	102	Alluvium	NT		
Independence - LADWP Building June Lake	36.800	118.199	44298	298	Alluvium	37	--	--
June Lake	37.783	119.075	55429	429	Granite	NT		
Kings Canyon National Park - Cedar Grove A	36.788	118.674	44435	435	Silt and sand over granite	NT		
Lake Crowley - Long Valley Dam	37.588	118.705	54214	214	Layered, blocky rhyolite	41	55	--
Lake Crowley - Shehorn Residence	37.561	118.743	54T03	T03	Alluvium over glacial deposits	23	53	--

TABLE 3 (Continued)

Station Name	N.Lat.	W.Long.	Sta. No.	Code	Site Geology	Record on Page*		
						MS	FS	AS1 AS2
Lake Edison - Vermillion Dam	37.369	118.982	54362	362	Glacial deposits	43	57	--
Lake Edison - Vermillion Dam Free Field	37.356	118.988	54384	384	Granodiorite	25,44	53,58	--
Lone Pine	36.664	118.094	44015	015	Alluvium	NT		
Mammoth Lakes - Mammoth High School Free Field	37.641	118.963	54482	482	Glacial deposits	24,36	--	64
Mammoth Lakes - Mammoth High School Gym	37.641	118.963	54301	301	Glacial deposits	35	--	66
Mammoth Lakes - Sheriff Substation	37.638	118.892	54T04	T04	Thin alluvium over basalt	24	--	--
Mariposa	37.502	119.985	55067	067	Thin soil over metavolcanics	NT		
Tinemaha Reservoir - Tinemaha Dam	37.052	118.219	54361	361	Basalt	45	--	--
Tinemaha Reservoir - Free Field	37.054	118.229	54101	101	Basalt	25,46	--	--
Tloga Pass	37.940	119.190	55031	031	Granite	NT		

Footnote:

* Records for the mainshock (MS), foreshock (FS), and aftershocks (AS1, AS2) are shown on these pages. Dashes in this column indicate that the earthquake was not recorded at the station. NT indicates that instrument was not triggered during any of the earthquakes of the 1986 Chalfant sequence.

TABLE 4. MAXIMUM ACCELERATIONS AND TRIGGER TIMES OF ACCELEROGRAMS

1 Event	Chalfant - Zack Brothers Ranch (Sta. 54428)			Bishop - LADWP S. Street Garage (Sta. 54171)			Bishop - N. Main St. Office Bldg. (Sta. 54388)			Bishop - Paradise Lodge (Sta. 54424)			Lake Crowley - Shehorn Residence (Sta. 54T03)			Convict Creek - U.C. Exp. Station (Sta. 54099)		
	2 Time	3 Amax	4 Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg
20 July 14:29 FORESHOCK	48.7	0.28	51	51.3	0.12	52	--	0.14 (0.13)	54	--	0.09	52	51.6	0.05	53	54.0	0.03	-
20 July 14:30	07.4	0.03	-	09.4	0.01	-				--	0.02	-	09.9	0.01	-			
20 July 14:32	37.3	0.02	-															
20 July 14:38				59.2	0.05	-												
20 July 14:46	10.1	0.05	-															
20 July 18:38	56.4	0.03	-															
21 July 03:12	15.7	0.04	-															
21 July 11:15	24.6	0.05	-															
21 July 14:42 MAINSHOCK	29.9	0.46	21	30.5	0.25	22	--	0.25 (0.40)	29	30.2	0.18	22	31.9	0.16	23	33.4	0.08	23
21 July 14:43	00.3	0.03	-	00.5	0.01	-	--	**	-									
21 July 14:43	05.8	0.08	-										09.9	0.01	-			
21 July 14:43	18.4	0.13	-	19.5	0.01	-	--	**	-				19.6	0.01	-			
21 July 14:43	48.2	0.04	-	48.3	0.01	-	--	**	-									
21 July 14:44	35.2	0.05	-				--	**	-	31.4	0.02	-						
21 July 14:45	07.3	0.05	-							06.4	0.02	-						
21 July 14:45	23.9	0.14	-							23.2	0.06	-						
21 July 14:47	59.9	0.06	-															
21 July 14:50							--	**	-									
21 July 14:51 AFTERSHOCK #1	13.9	0.17	63	12.9	0.11	63	--	0.12 (0.13)	65	13.4	0.08	64	18.6	0.04	-	22.5	0.04	-
21 July 14:52	06.6	0.04	-	07.2	0.01	-	--	**	-				08.3	0.01	-			
21 July 14:53	34.4	0.04	-															
21 July 14:57	53.9	0.08	-															
21 July 15:11																		
21 July 15:19																		
21 July 15:26																		
21 July 17:05																		

*Footnotes:

1 Date and time (GMT) of minute prior to earliest trigger for a given event. Origin time, hypocenter, and magnitude of causative earthquake for most triggers not presently known.

2 Trigger time in seconds after the minute given in the first column; a "--" means no time available and event association is inferred.

FROM THE 1986 CHALFANT VALLEY EARTHQUAKE SEQUENCE*

1 Event	Lake Crowley - Long Valley Dam (Sta. 54214)			Benton (Sta. 54100)			Mammoth Lakes - Sheriff Substa. (Sta. 54T04)			Mammoth Lakes - Mammoth H.S. Gym (Sta. 54301 and 54482)			Lake Edison - Vermilion Dam (Sta. 54362 and 54384)		
	2 Time	3 Amax	4 Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg
20 July 14:29 FORESHOCK	51.1	0.05 (0.12)	55	51.9	0.06	51	--	0.02	-				56.5	0.01 (0.06)	53 57
20 July 14:30	09.4	**	-	10.3	0.01	-									
20 July 14:32															
20 July 14:38															
20 July 14:46															
20 July 18:38															
21 July 03:12															
21 July 11:15	25.9	**	-												
21 July 14:42 MAINSHOCK	31.2	0.10 (0.21)	39	32.3	0.21	21	--	0.05	24	35.5	0.04 (0.16)	24 33	36.2	0.02 (0.18)	25 43
21 July 14:43	01.3	**	-	02.3	0.01	-									
21 July 14:43	05.7	**	-	06.7	0.01	-									
21 July 14:43	16.6	**	-	20.3	0.01	-									
21 July 14:43	49.3	**	-	50.3	0.01	-									
21 July 14:44	39.7	**	-												
21 July 14:45	08.1	**	-												
21 July 14:45	24.4	**	-										35.1	**	-
21 July 14:47															
21 July 14:50															
21 July 14:51 AFTERSHOCK #1	14.8	0.04 (0.09)	-	--	0.04	-	--	0.05	-	18.8	0.04 (0.27)	64 66	24.9	0.02 (0.05)	-
21 July 14:52	07.8	**	-												
21 July 14:53															
21 July 14:57	58.4	**	-												
21 July 15:11													45.3	**	-
21 July 15:19	43.9	**	-												
21 July 15:26	57.3	0.02 (0.06)	-												
21 July 17:05	41.1	0.01 (0.06)	-												

*Footnotes (continued):

3 Maximum ground acceleration in g; maximum structural acceleration is given in parenthesis. A "***" means that the maximum peak acceleration is less than 0.05g.

4 Page number in this report where a record is shown; a dash (-) indicates the record is not shown in this report as it is of very low amplitude. Reference to the record in this table is for completeness.

TABLE 4. MAXIMUM ACCELERATIONS AND TRIGGER TIMES OF ACCELEROGRAMS

1 Event	Chalfant - Zack Brothers Ranch (Sta. 54428)			Bishop - LADWP S. Street Garage (Sta. 54171)			Bishop - N. Main St. Office Bldg. (Sta. 54388)			Bishop - Paradise Lodge (Sta. 54424)			Lake Crowley - Shehorn Residence (Sta. 54T03)			Convict Creek - U.C. Exp. Station (Sta. 54099)		
	2 Time	3 Amx	4 Pg	Time	Amx	Pg	Time	Amx	Pg	Time	Amx	Pg	Time	Amx	Pg	Time	Amx	Pg
21 July 22:07																		
22 July 00:09	53.7	0.06	-															
22 July 02:21	31.4	0.04	-															
22 July 03:02	13.2	0.04	-															
22 July 05:05	20.6	0.02	-															
22 July 05:40	45.5	0.03	-															
22 July 06:21	55.0	0.02	-	55.5	0.03	-												
22 July 06:58	10.8	0.03	-															
22 July 12:15	47.2	0.02	-															
22 July 12:24	54.5	0.04	-															
22 July 12:26	19.1	0.03	-															
22 July 13:34	03.2	0.07	-						04.8	0.02	-							
22 July 13:49	01.3	0.08	-						03.5	0.04	-							
22 July 14:18	52.1	0.01	-															
22 July 20:17	04.6	0.03	-															
22 July 20:22	28.7	0.05	-															
23 July 03:01	06.3	0.02	-															
23 July 15:39	15.4	0.10	-						19.0	0.01	-							
25 July 10:11	07.1	0.02	-															
29 July 09:57	59.3	0.09	-															
30 July 06:03	34.3	0.06	-															
30 July 06:41	55.4	0.11	-															
31 July 07:22 AFTERSHOCK #2	45.3	0.07	71	43.3	0.19	71	--	0.18	72 (0.32)	--	0.04	-	47.8	0.02	-			
1 Aug 14:27	23.0	0.03	-															
1 Aug 14:28	21.7	0.03	-	21.5	0.06	-	--	0.05	- (0.12)									
2 Aug 14:51	40.4	0.12	-															
3 Aug 10:33	06.9	0.15	-															

*Footnotes:

- 1 Date and time (GMT) of minute prior to earliest trigger for a given event. Origin time, hypocenter, and magnitude of causative earthquake for most triggers not presently known.
- 2 Trigger time in seconds after the minute given in the first column; a "--" means no time available and event association is inferred.

FROM THE 1986 CHALFANT VALLEY EARTHQUAKE SEQUENCE (Continued)*

1 Event	Lake Crowley - Long Valley Dam (Sta. 54214)			Benton (Sta. 54100)			Mammoth Lakes - Sheriff Substa. (Sta. 54T04)			Mammoth Lakes - Mammoth H.S. Gym (Sta. 54301 and 54482)			Lake Edison - Vermilion Dam (Sta. 54362 and 54384)		
	2 Time	3 Amax	4 Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg	Time	Amax	Pg
21 July 22:07	23.4	**	-												
22 July 00:09															
22 July 02:21															
22 July 03:02															
22 July 05:05															
22 July 05:40															
22 July 06:21															
22 July 06:58															
22 July 12:15															
22 July 12:24															
22 July 12:26															
22 July 13:34	07.4	**	-												
22 July 13:49	07.4	**	-												
22 July 14:18															
22 July 20:17															
22 July 20:22															
23 July 03:01															
23 July 15:39	20.5	**	-												
25 July 10:11															
29 July 09:58	04.5	**	-												
30 July 06:03															
30 July 06:41															
31 July 07:22 AFTERSHOCK #2	48.4	0.01 (0.03)	-	48.8	0.02	-							57.3	0.02 (0.05)	-
1 Aug 14:27															
1 Aug 14:28													34.9	**	-
2 Aug 14:51															
3 Aug 10:33															

*Footnotes (continued):

3 Maximum ground acceleration in g; maximum structural acceleration is given in parenthesis. A "****" means that the maximum peak acceleration is less than 0.05g.

4 Page number in this report where a record is shown; a dash (-) indicates the record is not shown in this report as it is of very low amplitude. Reference to the record in this table is for completeness.

Acknowledgments

The California Strong Motion Instrumentation Program extends its appreciation to the individuals and organizations which have permitted the installation of seismic strong-motion equipment on their property.

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STRONG-MOTION RECORDS FROM THE MAINSHOCK OF

21 JULY 1986

14:42:26 GMT (07:42:26 PDT)

37.54°N

118.44°W

12 km depth

6.4 ML (BRK)

TABLE 5 - Strong-Motion Data - Mainshock of 21 July 1986, 14:42 GMT, 6.4 ML

Name	Station	No.	Structure Type, Size*	Epicenter Dist. **	Trigger Time#	Max. Acceleration		Pg.
						Comp. (g)	Grnd. Struct. (g)	
Chalfant Zack Brothers Ranch		54428	1-story bldg.	14	42:29.9	360 Up 270	0.41 0.35 0.46	21
Bishop Paradise Lodge		54424	1-story bldg.	16	42:30.2	160 Up 70	0.17 0.14 0.18	22
Bishop North Main Street Office Bldg.		54388	2-story office bldg. (13 sensors)	20	---	360 Up 270	0.25 0.17 0.25	0.73 -- 0.40
Bishop- LADWP South Street Garage		54171	1-story bldg.	21	40:30.5	270 Up 180	0.18 0.14 0.25	22
Lake Crowley Long Valley Dam		54214	Earth dam (22 sensors)	24	42:31.2	90 Up 360	0.06 0.05 0.10 0.21	0.11 0.10 0.21
Lake Crowley Shehorn Residence		54T03	1-story bldg.	27	42:31.9	99 Up 9	0.09 0.09 0.16	23
Benton		54100	1-story bldg.	31	42:32.3	360 Up 270	0.19 0.13 0.21	21
Convict Creek U.C. Experimental Station		54099	1-story bldg.	35	42:33.4	90 Up 360	0.08 0.03 0.06	23
Mammoth Lakes Sheriff Substation		54T04	1-story bldg.	41	---	20 Up 290	0.05 0.03 0.05	24

TABLE 5 - Strong-Motion Data (Continued)

<u>Name</u>	<u>Station</u>	<u>No.</u>	<u>Structure</u> <u>Type, Size*</u>	<u>Epicerter</u> <u>Dist. **</u>	<u>Trigger</u> <u>Time#</u>	<u>Max. Acceleration</u>		<u>Pg.</u>	
						<u>Comp. (g)</u>	<u>Grnd. Struct. (g)</u>		
Mammoth Lakes Mammoth High School Gym		54301	1-story gym (10 sensors)	47	---	344 Up 254	0.04 0.03 0.03	0.16 -- 0.10	33
Mammoth Lakes Mammoth High School Free Field		54482	Inst. Shltr. H	47	42:35.5	344 Up 254	0.04 0.03 0.03		24,36
Lake Edison Vermilion Dam		54362	Earth dam (12 sensors)	52	42:36.2	282 Up 192	0.07 0.05 0.09	0.09 0.07 0.18	43
Lake Edison Vermilion Dam Free Field		54384	Inst. Shltr. H	53	42:42.2	90 Up 360	0.02 0.02 0.02		25,44
Tinemaha Reservoir Free Field		54101	Instr. Shltr. A	58	---	90 Up 360	0.05 0.03 0.03		25,46
Tinemaha Reservoir Tinemaha Dam		54361	Earth dam (9 sensors)	58	42:46.1	212 Up 302	0.04 0.02 0.03	0.07 0.05 0.10	45
Independence LADWP Building		44298	2-story bldg. (6 sensors)	85	---	243 Up 153	0.02 0.02 0.02	0.09 -- 0.04	37
Death Valley Grapevine		43080	1-story bldg.	115	43:03.4	330 Up 240	0.02 0.02 0.03		26

TABLE 5 - Strong-Motion Data (Continued)

<u>Name</u>	<u>No.</u>	<u>Station</u>	<u>Structure</u> <u>Type, Size*</u>	<u>Epicenter</u> <u>Dist. **</u>	<u>Trigger</u> <u>Time#</u>	<u>Max. Acceleration</u>		<u>Pg.</u>
						<u>Comp. (g)</u>	<u>Grnd. Struct. (g)</u>	
Fresno California State University	45010		2-story bldg.	141	43:09.4	90	0.02	26
						Up	0.02	
						360	0.02	

Footnotes:

* - Instrument shelter types:

Instr. shltr. A - small prefabricated metal building

Instr. shltr. D - small metal box

Instr. shltr. H - small fiberglass shelter
(adopted from Switzer et al., 1981)

** - Distance given (in km) relative to the estimated epicenter at 37.544N, 118.442W (USGS). The distance to the nearest point on the fault is not given for this earthquake because the causative faulting associated with this event is not clearly known at this time.

- Accelerograph trigger time, when present, in minutes and seconds after 14:00 GMT on 21 July 1986.

INDEX TO GROUND-RESPONSE RECORDS
FOR THE
MAINSHOCK

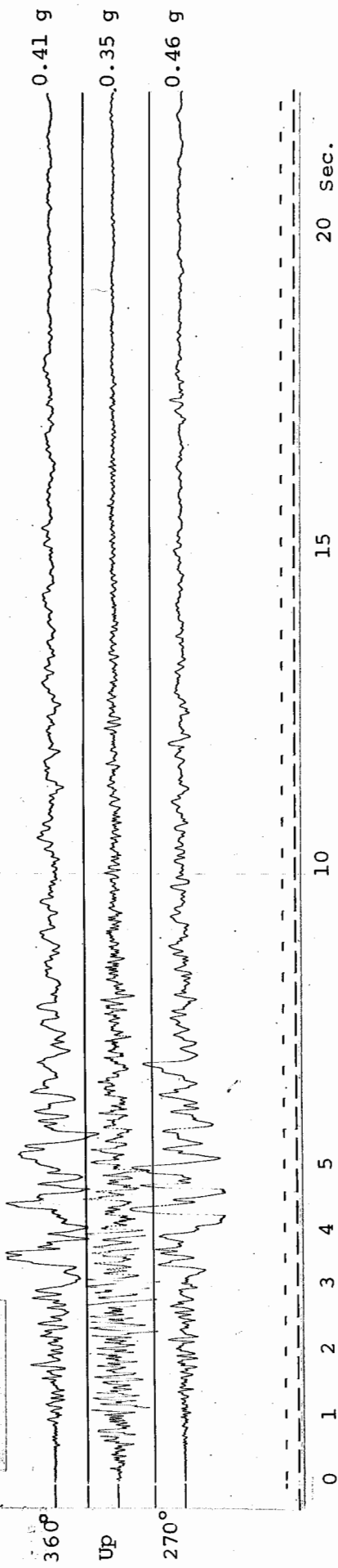
<u>Station</u>	<u>Page</u>	<u>Station</u>	<u>Page</u>
Chalfant - Zack Brothers Ranch	21	Mammoth Lakes - Sheriff Substation	24
Benton	21	Mammoth Lakes - Mammoth High School Free Field	24,36
Bishop - LADWP South Street Garage	22	Lake Edison - Vermilion Dam Free Field	25,44
Bishop - Paradise Lodge	22	Tinemaha Reservoir - Free Field	25,46
Lake Crowley - Shehorn Residence	23	Death Valley - Grapevine	26
Convict Creek - U.C. Experimental Station	23	Fresno - California State University	26

Chalfant - Zack Brothers Ranch
(CSMIP Station No. 54428)

Record 54428-S1702-86202.07(1)

Max.
Accel.

↑ 14:42:30 GMT



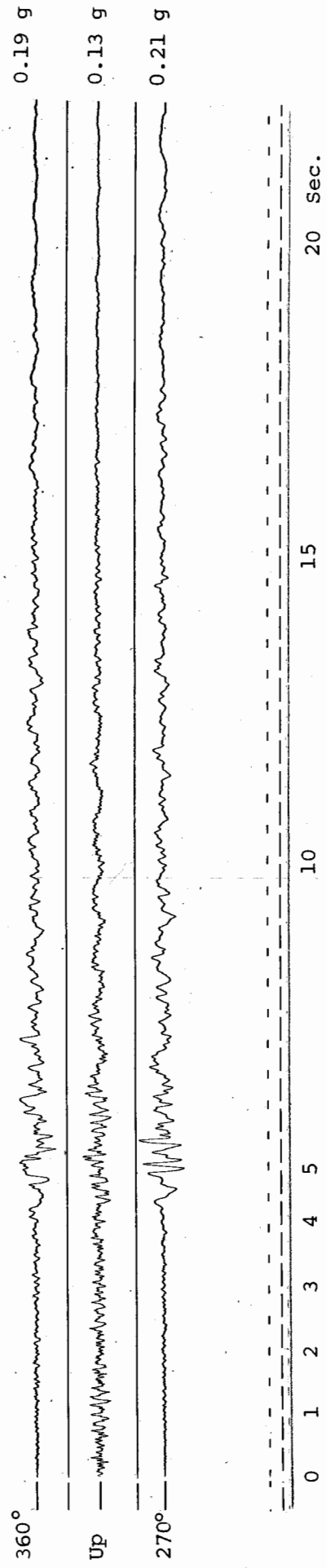
Mainschock

Benton
(CSMIP Station No. 54100)

Record 54100-S2498-86202.02(1)

Max.
Accel.

↑ 14:42:33 GMT



Bishop - LADWP South Street Garage
(CSMIP Station No. 54171)

Record 54171-S1718-86203.03 (1)

Max.
Accel.

14:42:31 GMT

0.18 g

270°

0.14 g

Up

0.25 g

180°

0 1 2 3 4 5 10 15 20 Sec.

Mainshock

Bishop - Paradise Lodge
(CSMIP Station No. 54424)

Record 54424-S1827-86202.02

Max.
Accel.

14:42:31 GMT

0.17 g

160°

0.14 g

Up

0.18 g

70°

0 1 2 3 4 5 10 15 20 Sec.

Lake Crowley - Shehorn Residence
(CSMIP Station No. 54T03)

Record 54T03-S1811-86203.02(1)

Max.
Accel.

↑ 14:42:32 GMT

0.09 g

0.09 g

0.16 g

0 1 2 3 4 5 10 15 20 Sec.

Mainshock

Convict Creek - U.C. Experimental Station
(CSMIP Station No. 54099)

Record 54099-S2593-86203.03

Max.
Accel.

↑ 14:42:34 GMT

0.08 g

0.03 g

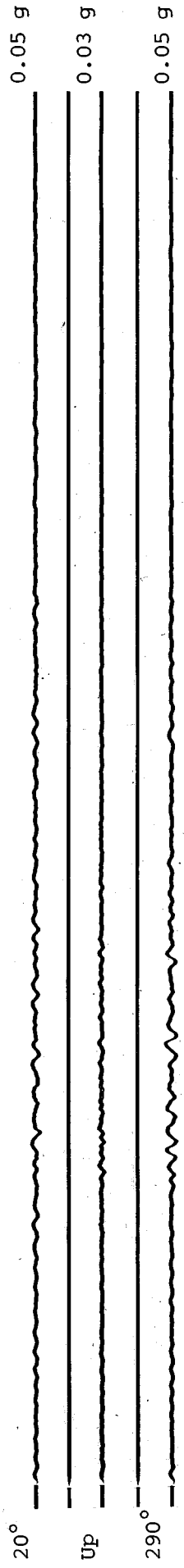
0.06 g

0 1 2 3 4 5 10 15 20 Sec.

Mammoth Lakes - Sheriff Substation
(CSMIP Station No. 54T04)

Record 54T04-S3507-86202.02

Max.
Accel.

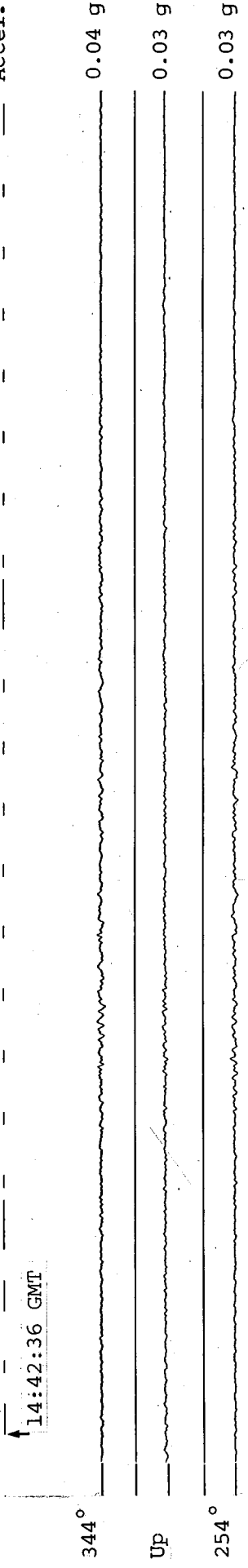


0 1 2 3 4 5 10 15 20 Sec.

Mammoth Lakes - Mammoth High School Free Field
(CSMIP Station No. 54482)

Record 54482-S2455-86202.01

Max.
Accel.



0 1 2 3 4 5 10 15 20 Sec.

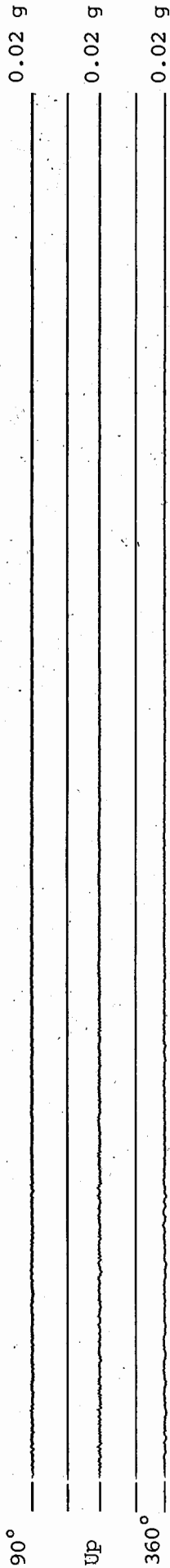
This record also shown on page 36.

Lake Edison - Vermillion Dam Free Field
(CSMIP Station No. 54384)

Record 54384-S1821-86204.02

Max.
Accel.

↑ 14:42:43 GMT



This record also shown on page 44.

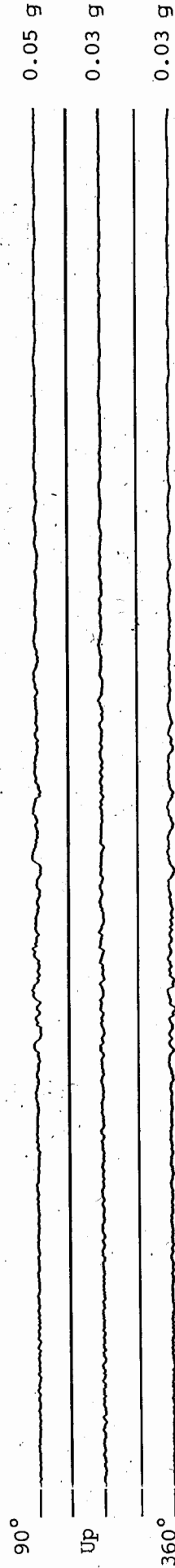
0 1 2 3 4 5 10 15 20 Sec.

Mainshock

Tinemaha Reservoir - Free Field
(CSMIP Station No. 54101)

Record 54101-S1580-86203.03

Max.
Accel.



This record also shown on page 46.

0 1 2 3 4 5 10 15 20 Sec.

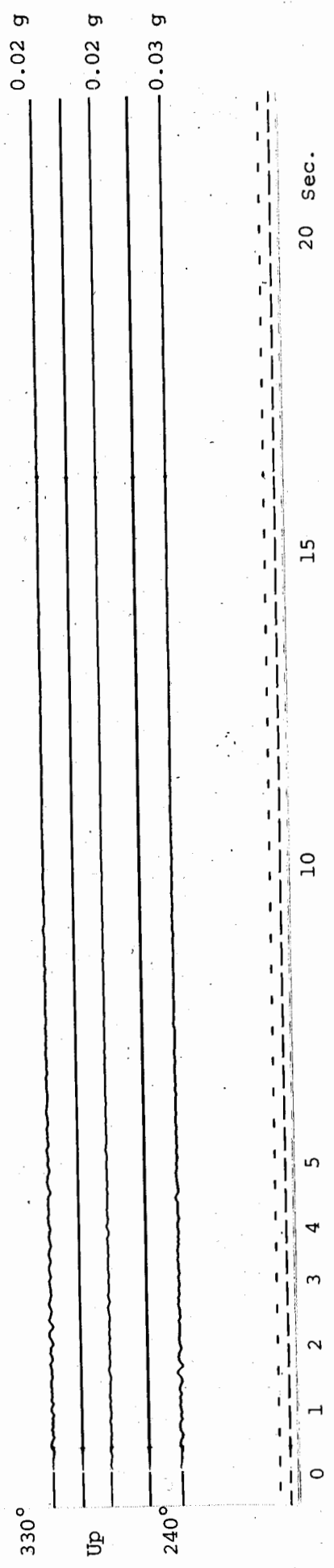
Mainshock

Death Valley - Grapevine
(CSMIP Station No. 43080)

Record 43080-S1583-86203.01

Max.
Accel.

14:43:04 GMT

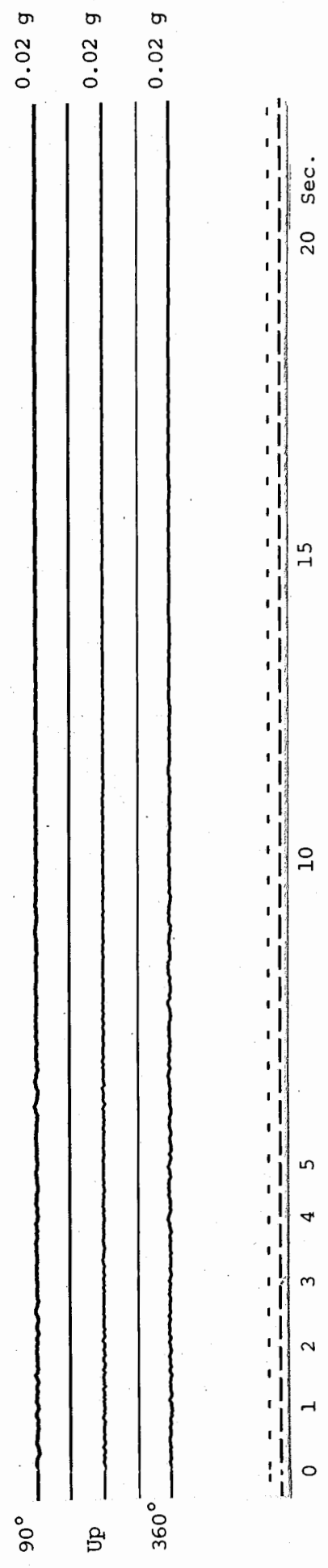


Fresno - California State University
(CSMIP Station No. 45010)

Record 45010-S4832-86204.01

Max.
Accel.

14:43:10 GMT



INDEX TO STRUCTURAL-RESPONSE RECORDS
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MAINSHOCK

<u>Station</u>	<u>Page</u>	<u>Station</u>	<u>Page</u>
		Buildings	
Bishop -	29	Independence -	37
North Main Street Office Bldg.		L.A.D.W.P. Bldg.	
Mammoth Lakes -	33		
Mammoth High School Gym			
		Lifelines	
Lake Crowley -	39	Tiemaha Reservoir -	45
Long Valley Dam		Tiemaha Dam	
Lake Edison -	43		
Vermillion Dam			

Bishop - North Main Street Office Building

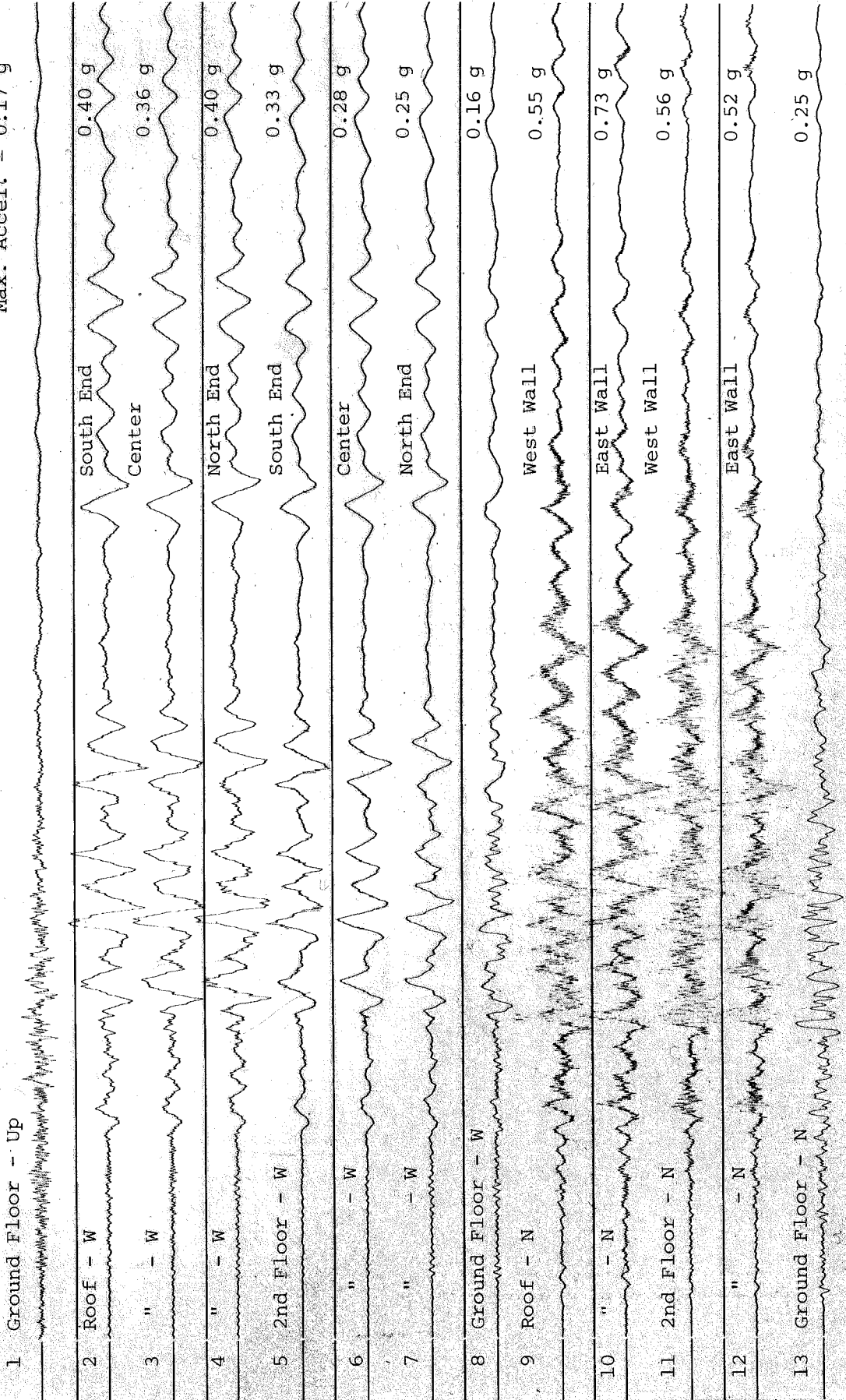


Address: 873 N. Main Street
 Bishop, CA
 No. of stories above/below
 ground: 2/0
 Plan Shape: Rectangular
 Base Dimensions: 100' x 160'
 Typical Floor Dimensions: Same
 Design Date: 1976
 Construction Date: 1976

Vertical Load Carrying System:
 Steel columns, steel trusses, light gauge steel joists,
 concrete slab over metal deck on floor, plywood on roof.
 Lateral Force Resisting System:
 Moment resistant frame of steel columns and trusses
 in transverse direction; steel rod X bracing in exterior
 walls in longitudinal direction.
 Foundation Type:
 Spread footings.

High frequency oscillations in the record (e.g. channels 9-12) may be from localized high frequency vibration of the building's steel frame.

Max. Accel. = 0.17 g



Structural Reference Orientation: N=360°

0 1 2 3 4 5 10 15 20 Sec.

Mammoth Lakes - Mammoth High School Gymnasium



Address: Sierra Park Rd. and Meridian
Blvd., Mammoth Lakes, CA

No. of Stories above/below
ground: 1/0

Plan Shape: Rectangular

Base Dimensions: 110' x 144' plus
low-rise 24' entryway at west end.

Typical Floor Dimensions: N/A

Design Date: 1973

Construction Date: 1974

Vertical Load Carrying System:

Plywood on joists (longitudinal direction) supported
by parallel steel trusses (transverse direction)
on steel columns.

Lateral Force Resisting System:

Horizontal steel bracing in plane of lower chord of
roof trusses; vertical steel bracing encased in
reinforced cast-in-place concrete shear walls.

Foundation Type:

Spread footings.

34

Mammoth Lakes - Mammoth High School Gymnasium
 (CSMIP Station No. 54301)

Record 54301-C0135-86246.02

↑ 14:42:37 GMT (Due to instrument problems time given is approximately + 1 second.)

	Near Center	Max. Accel. =
1 Ground Floor - W		0.03 g
2 " - Up	Near Center	0.03 g
3 Ground Floor - N	Near Center	0.04 g
4 " - N	West Wall	0.04 g
5 Roof - N	West Wall	0.05 g
6 " - N	East Wall	0.04 g
7 " - N	Center of North Wall	0.16 g
8 Roof - W	North Wall	0.03 g
9 " - W	Center of East Wall	0.10 g
10 " - W	South Wall	0.03 g

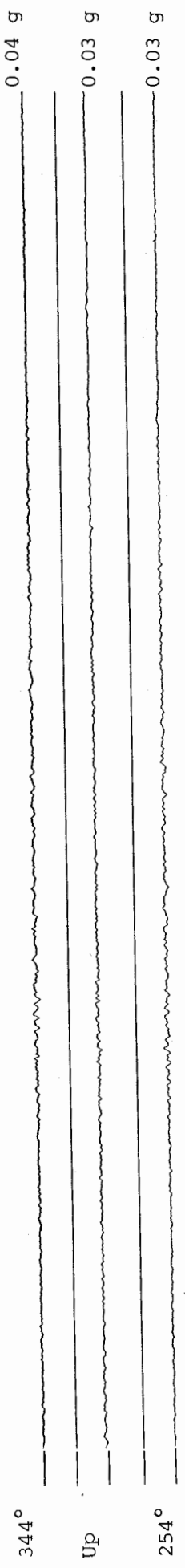
Structural Reference Orientation: N=344°

0 1 2 3 4 5 10 15 20 Sec.

Mammoth Lakes - Mammoth High School Free Field
(CSMIP Station No. 54482)

54482-S2455-86202.01

↑ 14:42:36 GMT



This record also shown on page 24.



Independence - LADWP Building
 1-story, 130 ft. x 130 ft., tilt-up concrete walls, concrete roof diaphragm
 (CSMIP Station No. 44298)

Record 44298-C0136-86203.02

Max. Accel. = 0.02 g

1 Ground Floor - S

2 " - Up 0.02 g

3 " - W 0.02 g

4 Roof - S Center 0.04 g

5 Roof - W Center 0.09 g

6 " - W North Wall 0.03 g

Structural Reference Orientation: S=153°

0 1 2 3 4 5 10 15 20 Sec.

Lake Crowley - Long Valley Dam



Address: Southeast end of Lake Crowley
 on Owens River, Mono County, CA
 Crest Length: 600 ft.
 Height of Dam: 125 ft.
 Construction Date: late 1930s - 1941

Construction: Earthfill dam, compacted earth
 core with rock rip-rap on
 upstream face.
 Foundation: layered, blocky rhyolite deposited
 in flows 2 - 15 feet thick.

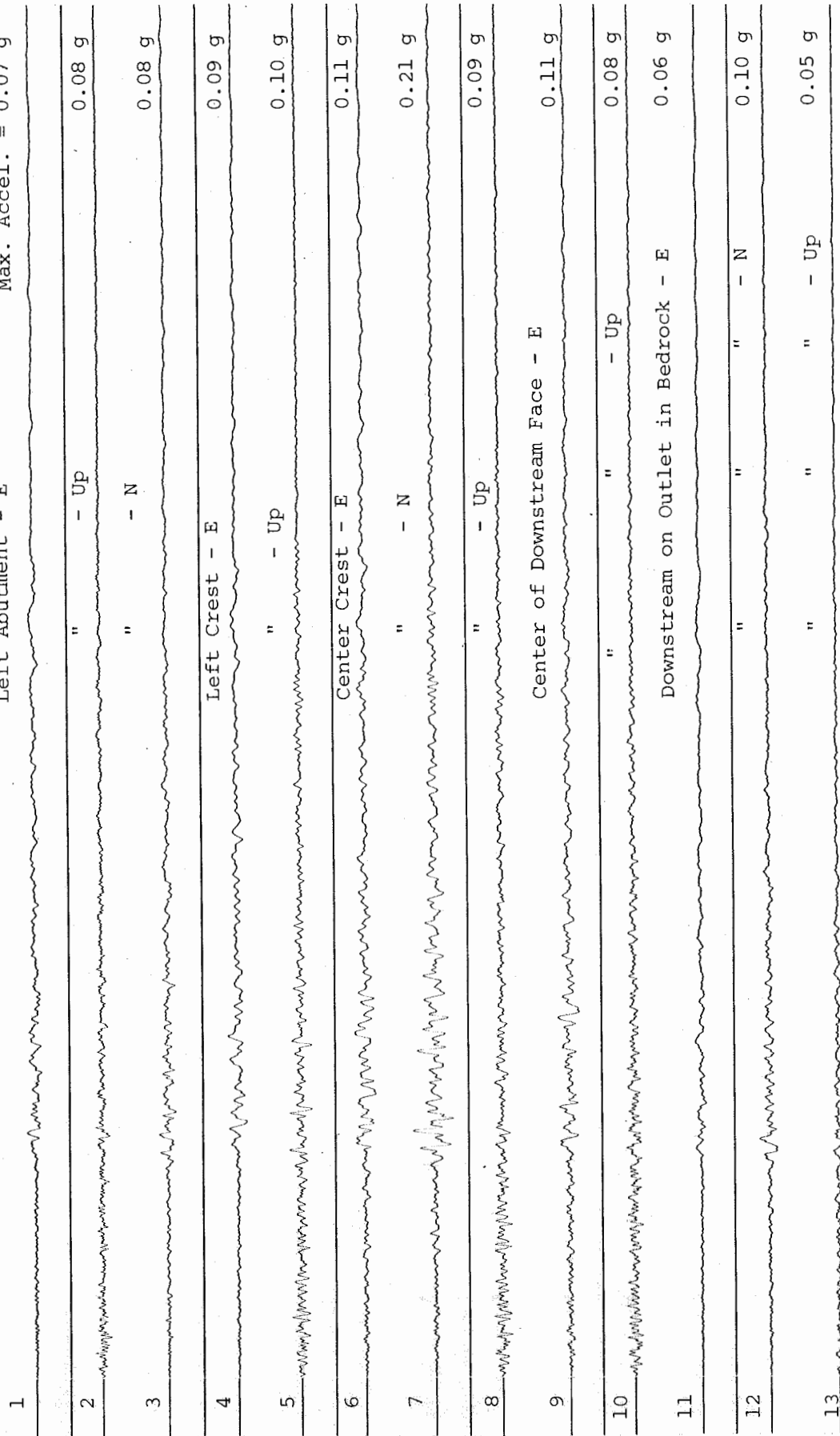
40

Lake Crowley - Long Valley Dam
 CSMIP Station No. 54214)

Record 54214-C0190-86202.03(1)

↑ 14:42:32 GMT

Left Abutment - E Max. Accel. = 0.07 g



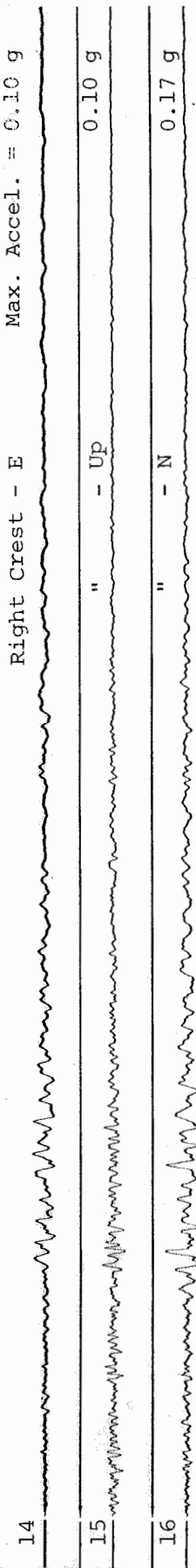
Structural Reference Orientation: N=360°



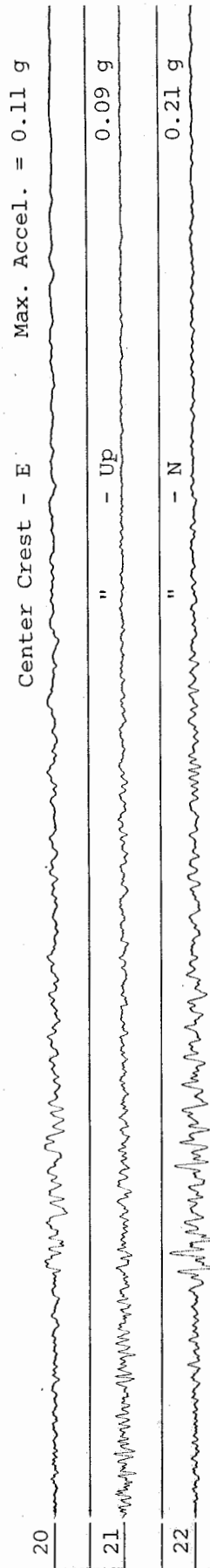
Lake Crowley - Long Valley Dam
(CSMIP Station No. 54214)

↑ 14:42:32 GMT

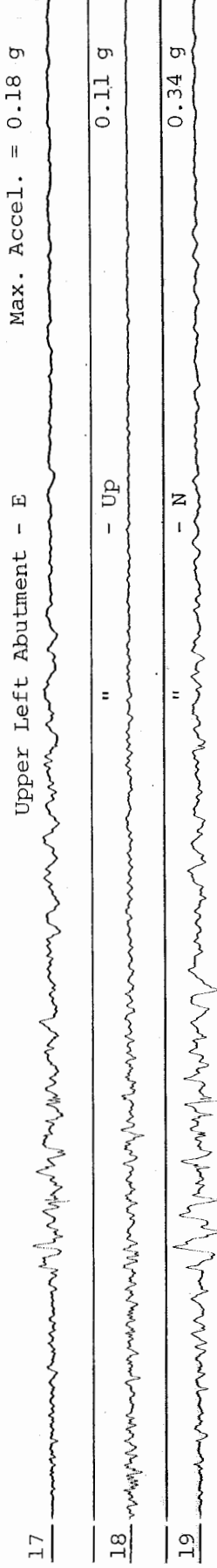
Record 54214-S3506-86202.03(1)



Record 54214-S3504-86202.03(1)

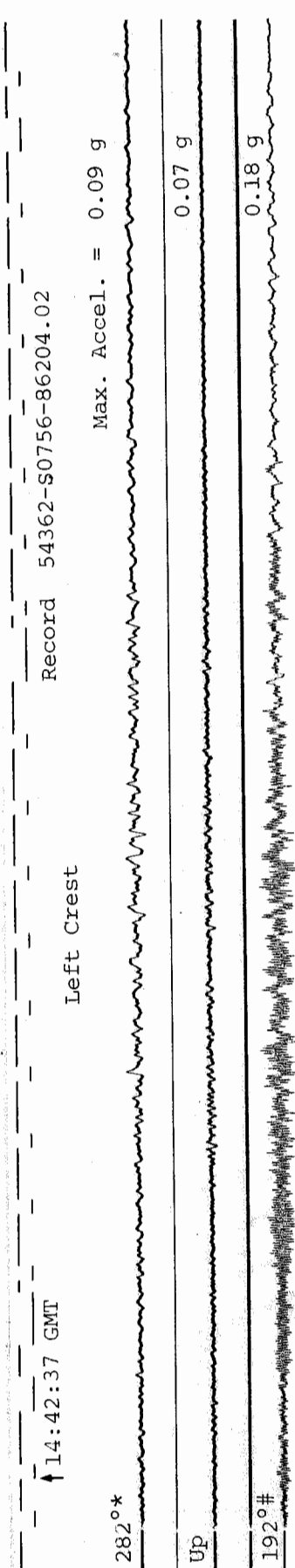


Record 54214-S3484-86202.03(1)

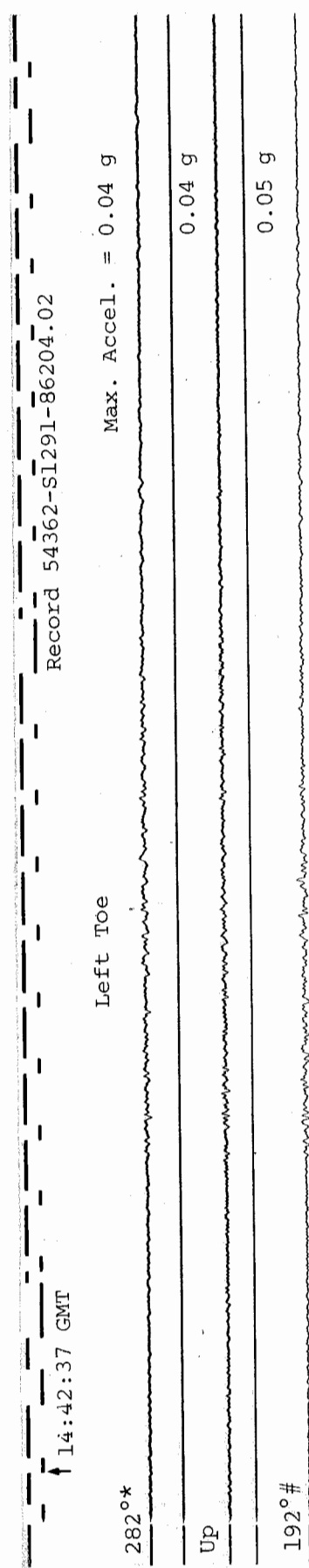
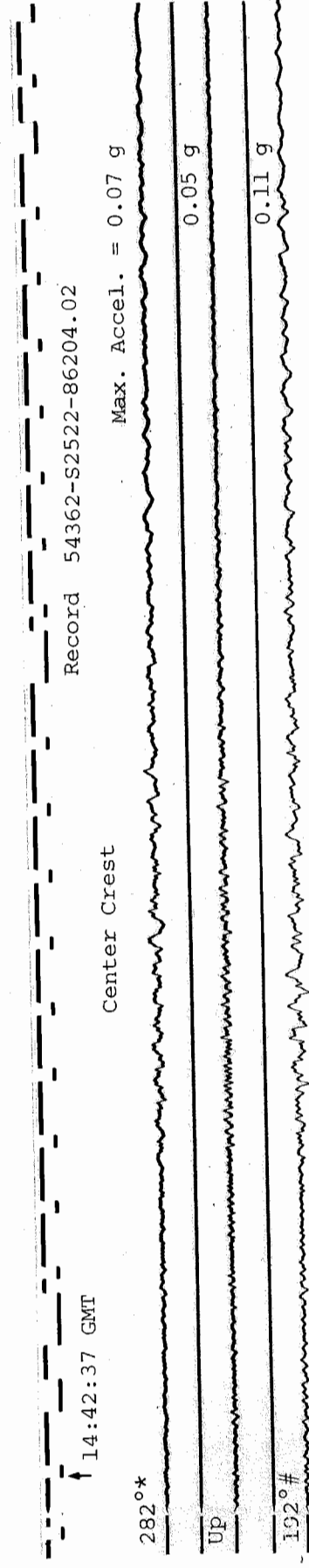


0 1 2 3 4 5 10 15 20 Sec.

Lake Edison - Vermilion Dam
(CSMIP Station No. 54362)



(Loss of damping in this sensor.)



* Parallel to dam crest # Transverse to dam crest

0 1 2 3 4 5 10 15 20 Sec.

Lake Edison - Vermilion Dam
(CSMIP Station No. 54362)

Record 54362-S1700-86204.02

↑ 14:42:43 GMT

Center Toe

Max. Accel. = 0.07 g

282°*

Up

0.05 g

192°#

0.09 g

* Parallel to dam crest

Transverse to dam crest

0	1	2	3	4	5	10	15	20	Sec.
---	---	---	---	---	---	----	----	----	------

Lake Edison - Vermilion Dam Free Field
(CSMIP Station No. 54384)

Record 54384-S1821-86204.02

↑ 14:42:43 GMT

Downstream - Free Field

Max. Accel. = 0.02 g

90°

Up

0.02 g

360°

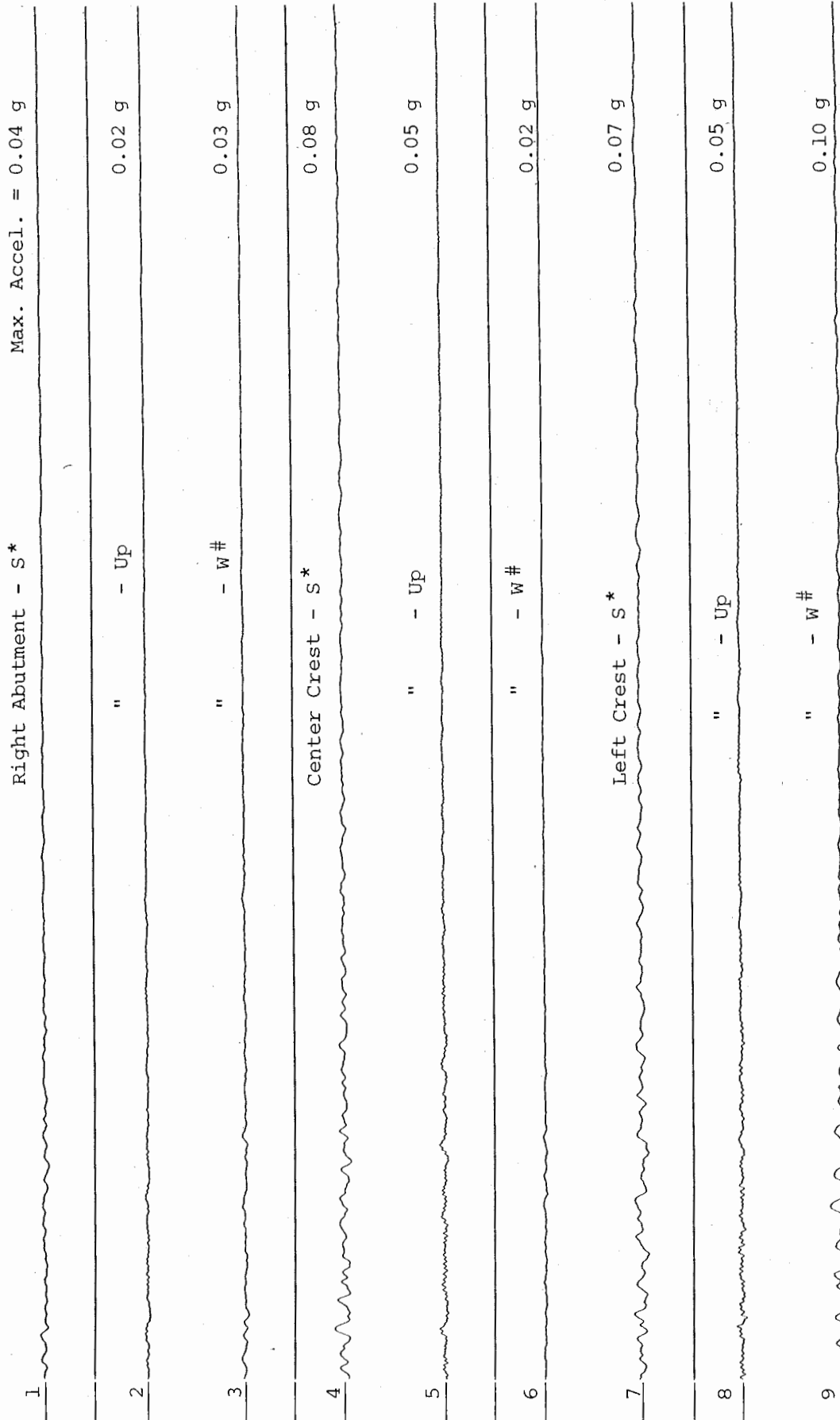
0.02 g

This record also shown on page 25.

0	1	2	3	4	5	10	15	Sec.
---	---	---	---	---	---	----	----	------

Tinemaha Reservoir - Tinemaha Dam
 (CSMIP Station No. 54361)

Record 54361-C0166-86203.03



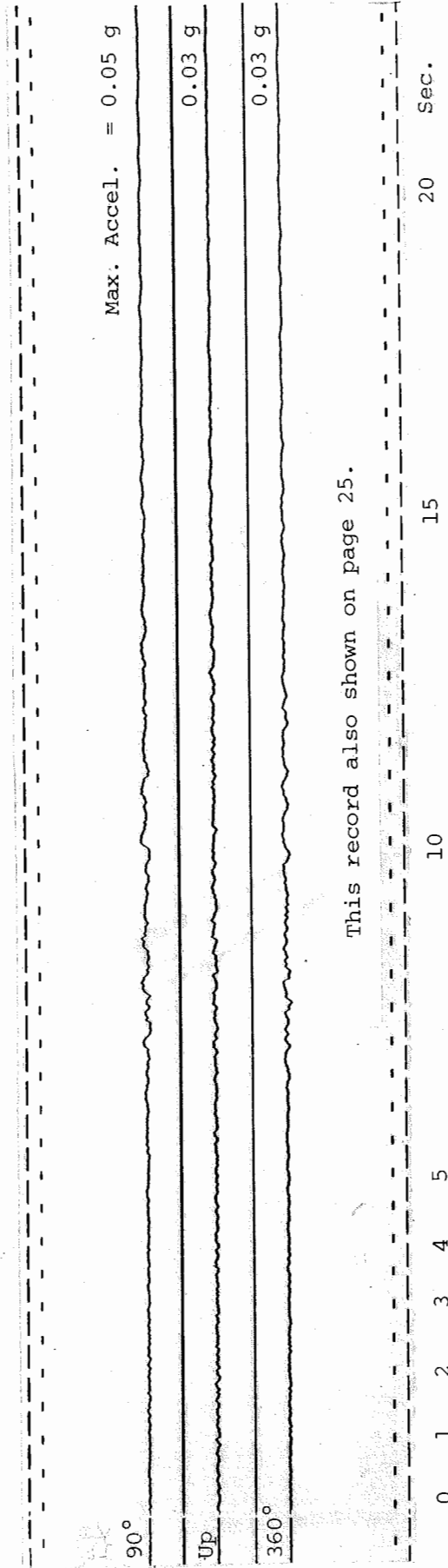
* Transverse to dam crest # Parallel to dam crest

Structural Reference Orientation: S=212°

0 1 2 3 4 5 10 15 20 Sec.

Tinemaha Reservoir - Free Field
(CSMIP Station No. 54101)

Record 54101-S1580-86203.03



This record also shown on page 25.

STRONG-MOTION RECORDS FROM THE FORESHOCK OF

20 JULY 1986

14:29:46 GMT (07:29:46 PDT)

37.57°N

118.45°W

7 km depth

5.9 ML (BRK)

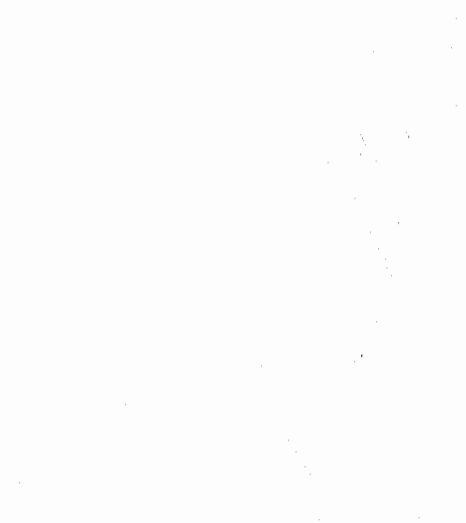


TABLE 6 - Strong-Motion Data - Foreshock of 20 July 1986, 14:29 GMT, 5.9 ML

<u>Name</u>	<u>Station</u>	<u>No.</u>	<u>Structure</u>	<u>Epicerter</u>	<u>Trigger</u>	<u>Max. Acceleration</u>		
						<u>Type, Size*</u>	<u>Dist. **</u>	<u>Time#</u>
Chalfant Zack Brothers Ranch		54428	1-story bldg.	11	29:48.7	360	0.24	51
Bishop Paradise Lodge		54424	1-story bldg.	17	---	160	0.09	52
Bishop North Main Street Office Bldg.		54388	2-story office bldg. (13 sensors)	23	---	360	0.14	54
Bishop- LADWP South Street Garage		54171	1-story bldg.	24	29:51.3	270	0.10	52
Lake Crowley Long Valley Dam		54214	Earth dam (22 sensors)	23	29:51.1	90	0.04	55
Lake Crowley Shehorn Residence		54T03	1-story bldg.	26	29:51.6	99	0.03	53
Benton		54100	1-story bldg.	27	29:51.9	360	0.06	51
Lake Edison Vermillion Dam		54362	Earth dam (12 sensors)	52	29:56.5	282	0.03	57
						Up	0.03	0.02
						192	0.05	0.06

TABLE 6 - Strong-Motion Data - Foreshock of 20 July 1986 (Continued)

Name	Station	No.	Structure Type, Size*	Epicerter Dist. **	Trigger Time#	Max. Acceleration	
						Comp. (g)	Grnd. Struct. (g)
Lake Edison		54384	Inst.	54	30:02.6	90	0.01
Vermillion Dam			Shltr. H			Up	0.01
Free Field						360	0.01

Footnotes:

* - Instrument shelter types:

- Instr. shltr. A - small prefabricated metal building
- Instr. shltr. D - small metal box
- Instr. shltr. H - small fiberglass shelter
(adopted from Switzer et al., 1981)

** - Distance given (in km) relative to the estimated epicenter at 37.572N, 118.447W (USGS). The distance to the nearest point on the fault is not given for this earthquake because the causative faulting associated with this event is not clearly known at this time.

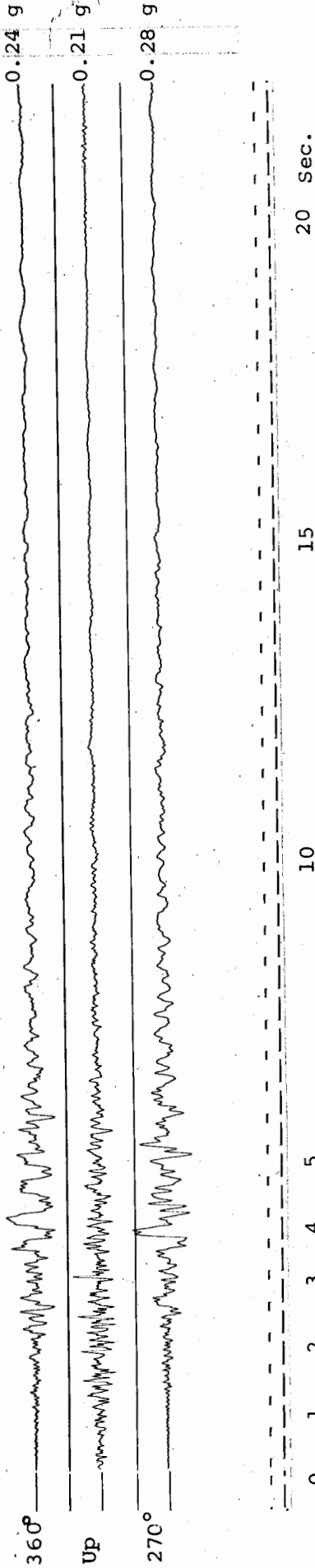
- Accelerograph trigger time, when present, in minutes and seconds after 14:00 GMT on 20 July 1986.

Chalfant - Zack Brothers Ranch
(CSMIP Station No. 54428)

Record 54428-SI702-86202.01(1)

Max.
Accel.

↑ 14:29:49 GMT

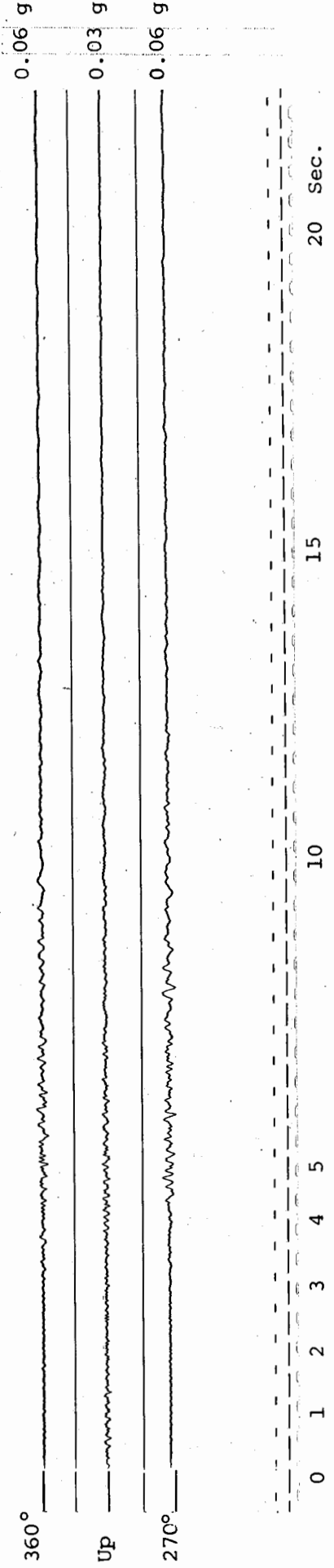


Benton
(CSMIP Station No. 54100)

Record 54100-S2498-86202.01(1)

Max.
Accel.

↑ 14:29:52 GMT

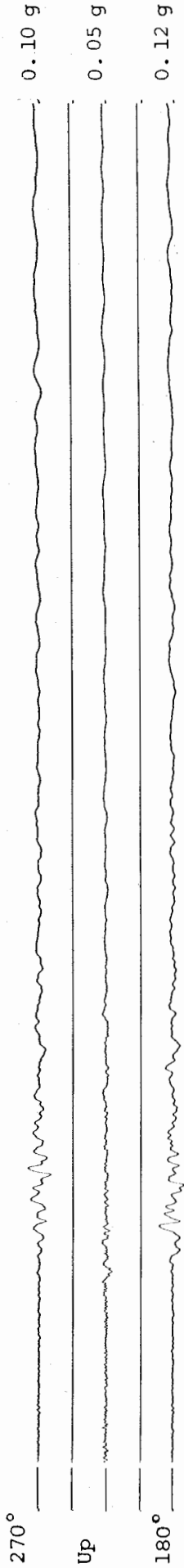


Bishop - LADWP South Street Garage
(CSMIP Station No. 54171)

Record 54171-S1718-86203.01(1)

Max.
Accel.

↑ 14:29:52 GMT



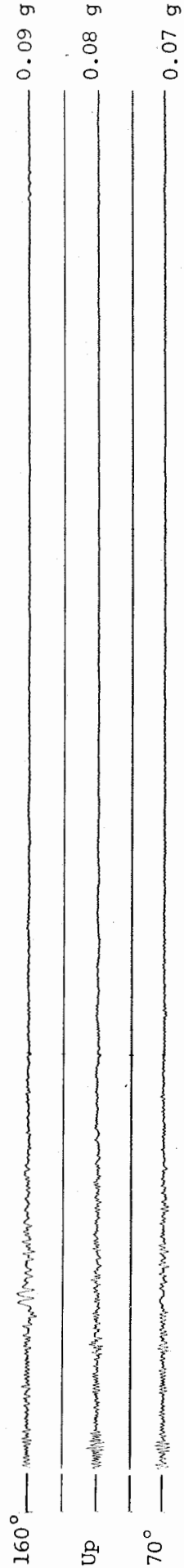
Foreshock

0 1 2 3 4 5 10 15 20 Sec.

Bishop - Paradise Lodge
(CSMIP Station No. 54424)

Record 54424-S1827-86202.01(1)

Max.
Accel.



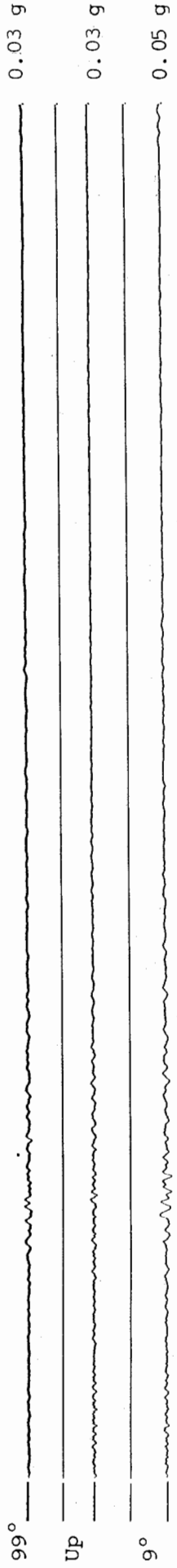
0 1 2 3 4 5 10 15 20 Sec.

Lake Crowley - Shehorn Residence
(CSMIP Station No. 54T03)

Record 54T03-S1811-86203.01(1)

Max.
Accel.

↑ 14:29:52 GMT



Foreshock

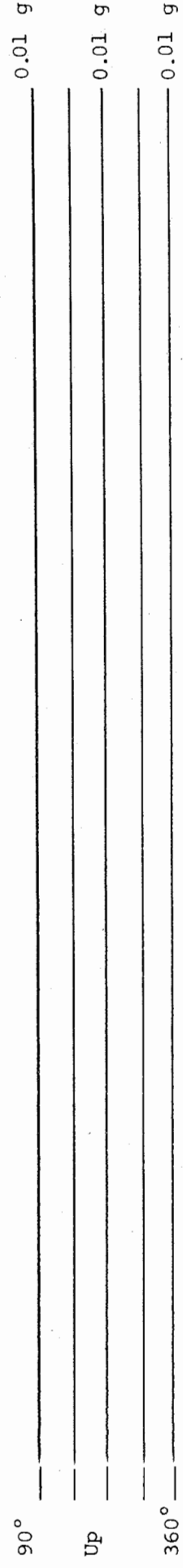
0 1 2 3 4 5 10 15 20 Sec.

Lake Edison - Vermilion Dam Free Field
(CSMIP Station No. 54384)

Record 54384-S1821-86204.01

Max.
Accel.

↑ 14:30:03 GMT



0 1 2 3 4 5 10 15 20 Sec.

This record also shown on page 58.

Bishop - North Main St. Office Building
(CSMIP Station No. 54388)

Record 54388-C0183-86203.04

(Building description and sensor layout on pages 29 and 30.)

Max. Accel. = 0.06 g

1 Ground Floor - Up

2 Roof - W

South End

0.13 g

3 " - W

Center

0.13 g

4 " - W

North End

0.13 g

5 2nd Floor - W

South End

0.09 g

6 " - W

Center

0.09 g

7 " - W

North End

0.09 g

8 Ground Floor - W

0.07 g

9 Roof - N

West Wall

0.28 g

10 " - N

East Wall

0.25 g

11 2nd Floor - N

West Wall

0.18 g

12 " - N

East Wall

0.17 g

13 Ground Floor - N

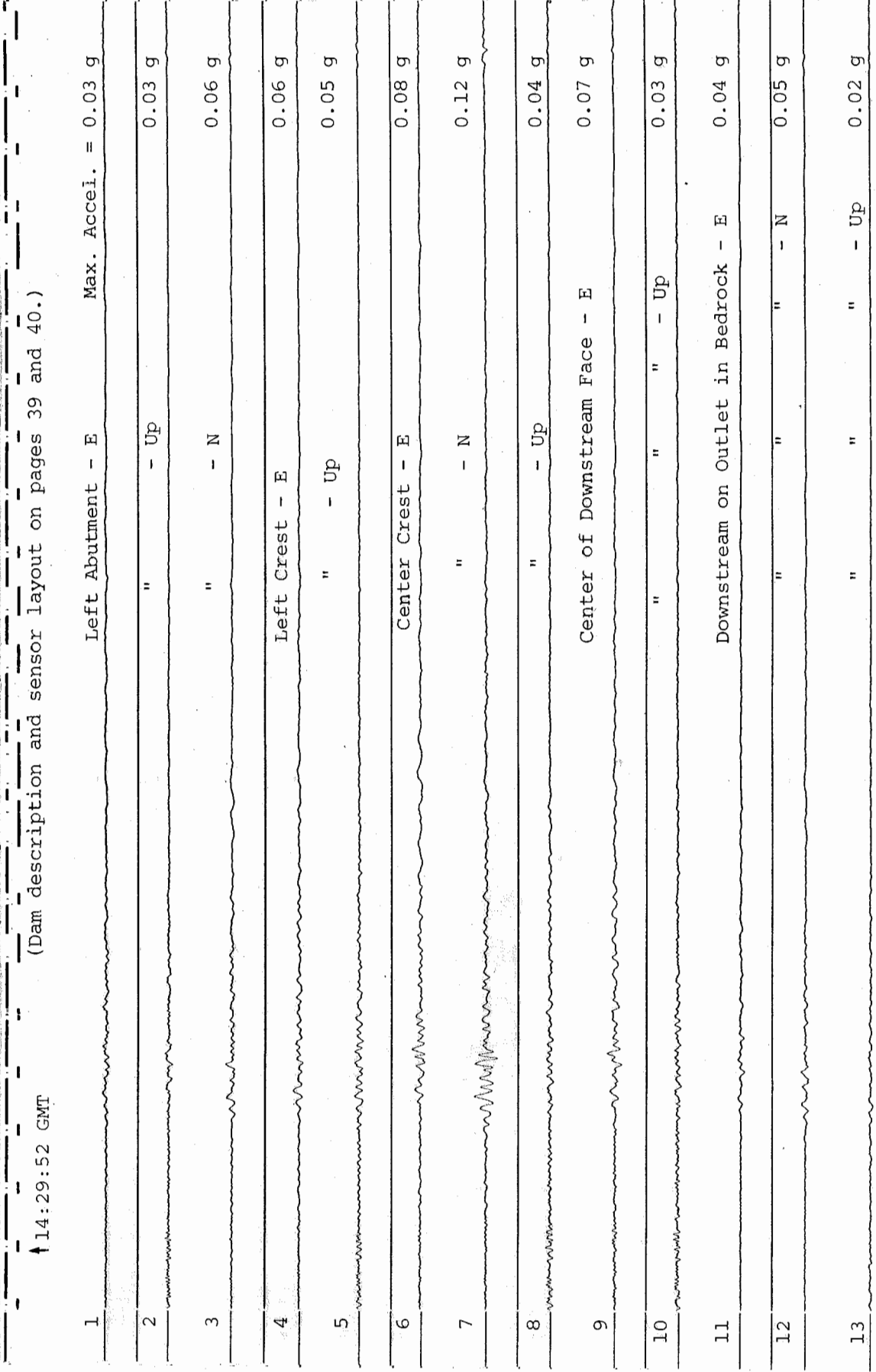
(See page 31 for discussion of high frequency oscillations.)

0.14 g

Structural Reference Orientation: N=360°

Lake Crowley - Long Valley Dam
CSMIP Station No. 54214

Record 54214-C0190-86202.01(1)



↑ 14:29:52 GMT (Dam description and sensor layout on pages 39 and 40.)

Structural Reference Orientation: N=360°



20 Sec.

Lake Crowley - Long Valley Dam
(CSMIP Station No. 54214)

↑ 14:29:52 GMT

Record 54214-S3506-86202.01(1)

Max. Accel. = 0.06 g

Right Crest - E

14

0.06 g

" - Up

15

0.09 g

" - N

16

Record 54214-S3504-86202.01(1)

Max. Accel. = 0.09 g

Center Crest - E

20

0.04 g

" - Up

21

0.12 g

" - N

22

Record 54214-S3484-86202.01(1)

Max. Accel. = 0.07 g

Upper Left Abutment - E

17

0.06 g

" - Up

18

0.15 g

" - N

19

20 Sec.

15

10

5

4

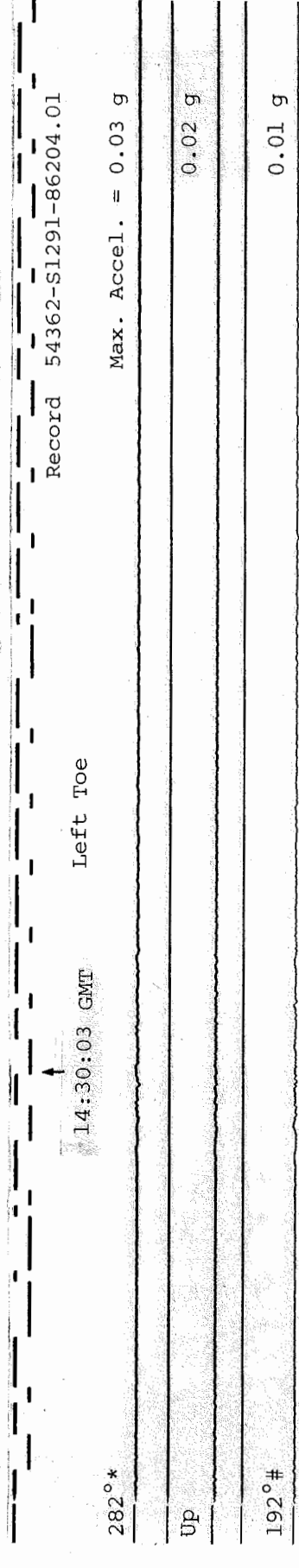
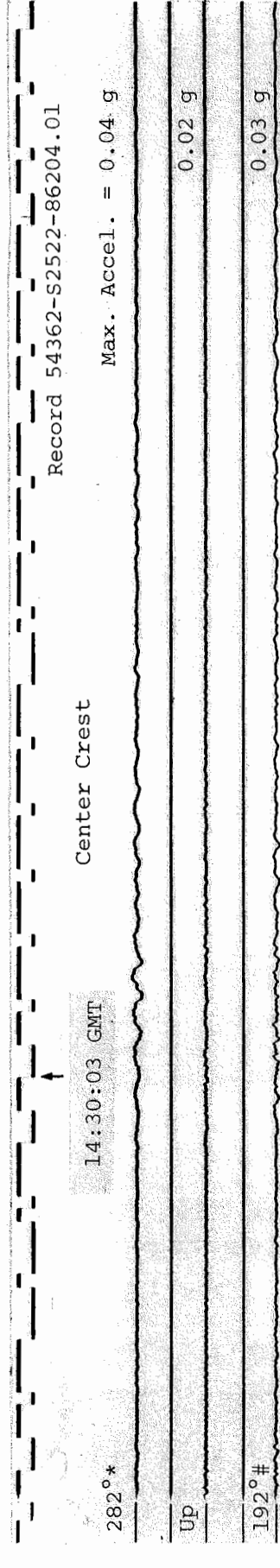
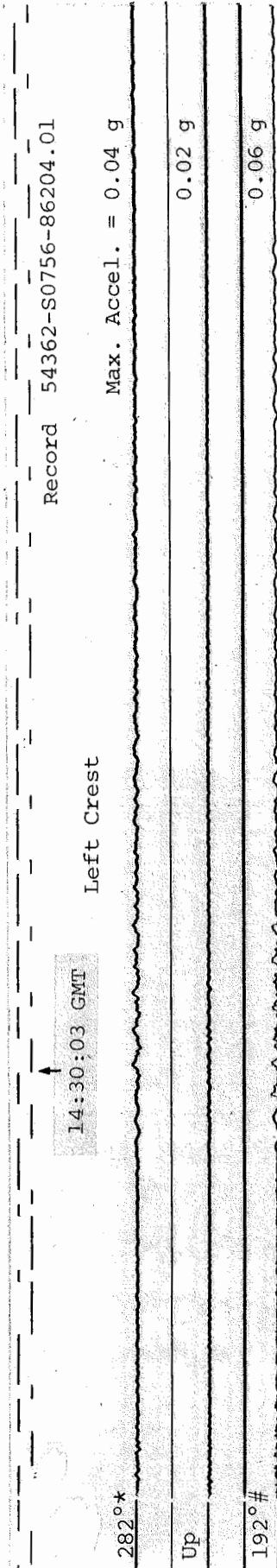
3

2

1

0

Lake Edison - Vermilion Dam
(CSMIP Station No. 54362)



* Parallel to dam crest # Transverse to dam crest

0 1 2 3 4 5 10 15 20 Sec.

Lake Edison - Vermilion Dam
(CSMIP Station No. 54362)

Record 54362-S1700-86204.01

↑ 14:30:03 GMT

Center Toe

282°*

Max. Accel. = 0.02 g

Up

0.03 g

192°#

0.05 g

* Parallel to dam crest # Transverse to dam crest

0 1 2 3 4 5 10 15 Sec.

Lake Edison - Vermilion Dam Free Field
(CSMIP Station No. 54384)

Record 54384-S1821-86204.01

↑ 14:30:03 GMT

Downstream - Free Field

90°

Max. Accel. = 0.01 g

Up

0.01 g

360°

0.01 g

This record also shown on page 53

0 1 2 3 4 5 10 15 Sec.

STRONG-MOTION RECORDS FROM THE AFTERSHOCK #1 OF

21 JULY 1986

14:51:09 GMT (07:51:09 PDT)

37.48°N

118.43°W

19 km depth

5.6 ML (BRK)

TABLE 7 - Strong-Motion Data -Aftershock 1 of 21 July 1986, 14:51 GMT, 5.6 ML

<u>Name</u>	<u>Station</u>	<u>No.</u>	<u>Structure</u> <u>Type, Size*</u>	<u>Epicenter</u> <u>Dist.**</u>	<u>Trigger</u> <u>Time#</u>	<u>Max. Acceleration</u> <u>Grnd. Struct.</u>	<u>Pg.</u>
						<u>Comp. (g)</u>	<u>(g)</u>
Chalfant Zack Brothers Ranch		54428	1-story bldg.	20	51:13.9	360 Up 270	0.09 0.09 0.17
Bishop Paradise Lodge		54424	1-story bldg.	14	51:13.4	160 Up 70	0.08 0.05 0.05
Bishop North Main Street Office Bldg.		54388	2-story office bldg. (13 sensors)	13	---	360 Up 270	0.12 0.07 0.08
Bishop- LADWP South Street Garage		54171	1-story bldg.	14	51:12.9	270 Up 180	0.09 0.07 0.11
Mammoth Lakes Mammoth High School Gym		54301	1-story gym (10 sensors)	50	---	344 Up 254	0.06 0.02 0.03
Mammoth Lakes Mammoth High School Free Field		54482	Inst. Shltr. H	50	51:18.8	344 Up 254	0.04 0.03 0.03

Footnotes:

- * - Instrument shelter types:
 Instr. shltr. A - small prefabricated metal building
 Instr. shltr. D - small metal box
 Instr. shltr. H - small fiberglass shelter
 (adopted from Switzer et al., 1981)

TABLE 7 - Strong-Motion Data -Aftershock 1 of 21 July 1986 (Continued)

** - Distance given (in km) relative to the estimated epicenter at 37.484N, 118.433W (Univ. Nevada-Reno). The distance to the nearest point on the fault is not given for this earthquake because the causative faulting associated with this event is not clearly known at this time.

- Accelerograph trigger time, when present, in minutes and seconds after 14:00 GMT on 21 July 1986.

Chalfant - Zack Brothers Ranch
(CSMIP Station No. 54428)

Record 54428-SI702-86202.09(1)

↑ 14:51:14 GMT

Max.
Accel.



0 1 2 3 4 5 10 15 20 Sec.

Bishop - L.A.D.W.P. South Street Garage
(CSMIP Station No. 54171)

Record 54171-SI718-86203.04(1)

↑ 14:51:13 GMT

Max.
Accel.



0 1 2 3 4 5 10 15 20 Sec.

Bishop - Paradise Lodge
(CSMIP Station No. 54424)

Record 54424-S1827-86202.04

↑ 14:51:14 GMT

Max.
Accel.

0.08 g

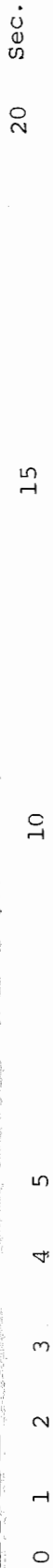
0.05 g

0.05 g

160°

Up

70°



Mammoth Lakes - Mammoth High School Free Field
(CSMIP Station No. 54482)

Record 54482-S2455-86202.02

↑ 14:51:19 GMT

Max.
Accel.

0.04 g

0.03 g

0.03 g

344°

Up

254°



Bishop - North Main St. Office Building
(CSMIP Station No. 54388)

Record 54388-C0183-86203.08 (2)

(Building description and sensor layout on pages 29 and 30)

Max. Accel. = 0.07 g

1 Ground Floor - Up

2 Roof - W

South End

0.12 g

3 " - W

Center

0.12 g

4 " - W

North End

0.13 g

5 2nd Floor - W

South End

0.08 g

6 " - W

Center

0.08 g

7 " - W

North End

0.09 g

8 Ground Floor - W

0.08 g

9 Roof - N

West Wall

0.12 g

10 " - N

East Wall

0.17 g

11 2nd Floor - N

West Wall

0.10 g

12 " - N

East Wall

0.13 g

13 Ground Floor - N

(See page 31 for discussion on high frequency oscillations)

0.12 g

Structural Reference Orientation: N=360°

0 1 2 3 4 5 10 15 20 sec.

Mammoth Lakes - Mammoth High School Gymnasium
(CSMIP Station No. 54301)

Record 54301-C0135-86246.03

↑ 14:51:20 GMT (Building description and sensor layout on pages 33 and 34) See time correction note on page 33

	Near Center	Max. Accel. = 0.03 g
1 Ground Floor - W		
2 " - Up	Near Center	0.02 g
3 Ground Floor - N	Near Center	0.04 g
4 " - N	West Wall	0.06 g
5 Roof - N	West Wall	0.07 g
6 " - N	East Wall	0.06 g
7 " - N	Center of North Wall	0.27 g
8 Roof - W	North Wall	0.03 g
9 " - W	Center of East Wall	0.09 g
10 " - W	South Wall	0.03 g

Structural Reference Orientation: N=344°

0 1 2 3 4 5 10 15 20 Sec.

STRONG-MOTION RECORDS FROM THE AFTERSHOCK #2 OF

31 JULY 1986

07:22:40 GMT (00:22:40 PDT)

37.48°N

118.38°W

9 km depth

5.8 ML (BRK)

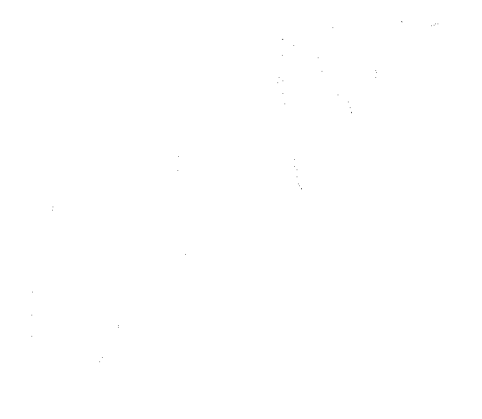


TABLE 8 - Strong-Motion Data -Aftershock 2 of 31 July 1986, 5.8 ML

Name	Station	No.	Structure Type, Size*	Epicenter Dist. **	Trigger Time#	Max. Acceleration		
						Comp. (g)	Grnd. Struct. (g) Pg.	
Chalfant Zack Brothers Ranch		54428	1-story bldg.	21	22:45.3	360 Up 270	0.07 0.05 0.06	71
Bishop North Main Street Office Bldg.		54388	2-story office bldg. (13 sensors)	12	---	360 Up 270	0.22 0.10 0.18	0.55 -- 0.32
Bishop- LADWP South Street Garage		54171	1-story bldg.	13	22:43.3	270 Up 180	0.19 0.08 0.13	71

Footnotes:

* - Instrument shelter types:

Instr. shltr. A - small prefabricated metal building

Instr. shltr. D - small metal box

Instr. shltr. H - small fiberglass shelter

(adopted from Switzer et al., 1981)

** - Distance given (in km) relative to the presently estimated epicenter at 37.478N, 118.376W (USGS). The distance to the nearest point on the fault is not given for this earthquake because the causative faulting associated with this event is not clearly known at this time.

- Accelerograph trigger time, when present, in minutes and seconds after 07:00 GMT on 21 July 1986.

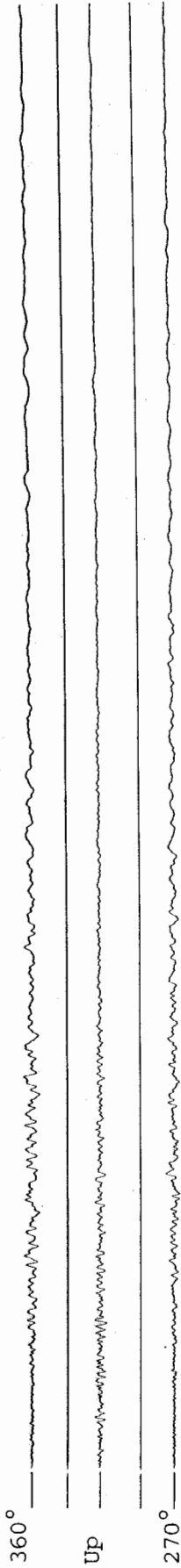


Chalfant - Zack Brothers Ranch
(CSMIP Station No. 54428)

Record 54428-S1702-86213.09

↑07:22:46 GMT

Max.
Accel.
0.07 g



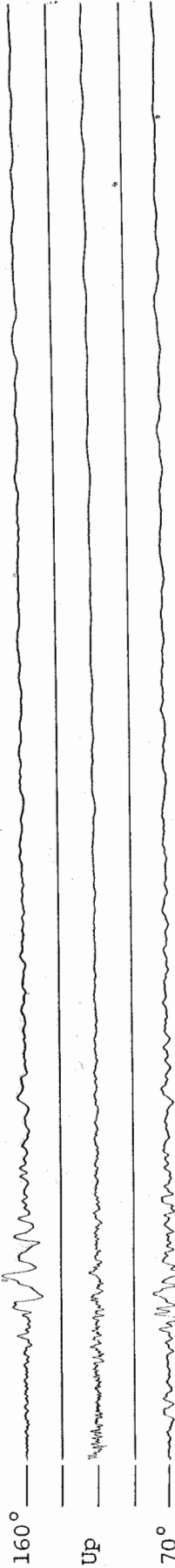
0 1 2 3 4 5 10 15 20 Sec.

Bishop - LADWP South Street Garage
(CSMIP Station No. 54171)

Record 54171-S1718-8646.01

↑07:22:44 GMT

Max.
Accel.
0.19 g



0.08 g
0.13 g

0 1 2 3 4 5 10 15 20 Sec.

Bishop - North Main St. Office Building
(CSMIP Station No. 54388)

Record 54388-C0183-86213.07

(Building description and sensor layout on pages 29 and 30)

Max. Accel. = 0.10 g

1 Ground Floor - Up

2 Roof - W

South End

0.23 g

3 " - W

Center

0.28 g

4 " - W

North End

0.32 g

5 2nd Floor - W

South End

0.14 g

6 " - W

Center

0.14 g

7 " - W

North End

0.14 g

8 Ground Floor - W

0.18 g

9 Roof - N

West Wall

0.37 g

10 " - N

East Wall

0.38 g

11 2nd Floor - N

West Wall

0.51 g

12 " - N

East Wall

0.55 g

13 Ground Floor - N

0.22 g

(See page 31 for discussion of high frequency oscillations)

Structural Reference Orientation: N=360°

0 1 2 3 4 5 10 15 20 sec.

ADDENDUM

LAKE EDISON - VERMILLION DAM*

STRONG-MOTION RECORDS FROM THE EARTHQUAKE OF

23 NOVEMBER 1984

18:08:20 GMT (10:08:20 PST)

37.46°N

118.59°W

13 km depth

5.9 ML (BRK)

* This station is inaccessible during winter months and these records were not included in the CSMIP data report "CSMIP Strong-Motion Records from the Bishop, California Earthquake of 23 November 1984," OSMS 84-12.

1

[Faint, illegible handwritten text, possibly bleed-through from the reverse side of the page]

Lake Edison - Vermilion Dam
(CSMIP Station No. 54362)

Record 54362-S2522-85162.01(1)

↑ 18:07:39 GMT
Center Crest

Max. Accel. = 0.10 g

282°*

Up

0.09 g

192°#

0.14 g

Record 54362-S0756-85162.01(1)

Left Crest

Max. Accel. = 0.13 g

282°*

Up

0.07 g

192°#

0.23 g

(Loss of damping in this sensor)

Record 54362-S1291-85161.01(1)

Left Toe

Max. Accel. = 0.06 g

282°*

Up

0.07 g

192°#

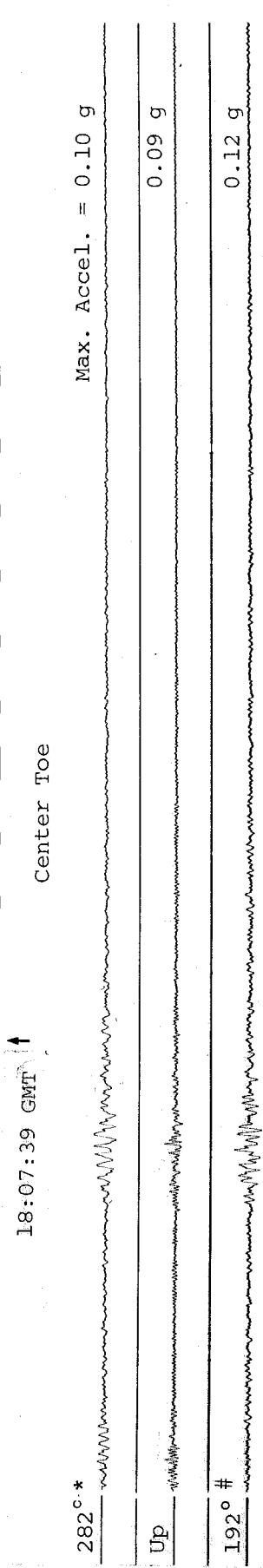
0.06 g

* Parallel to dam crest

Transverse to dam crest

0 1 2 3 4 5 10 15 20 Sec.

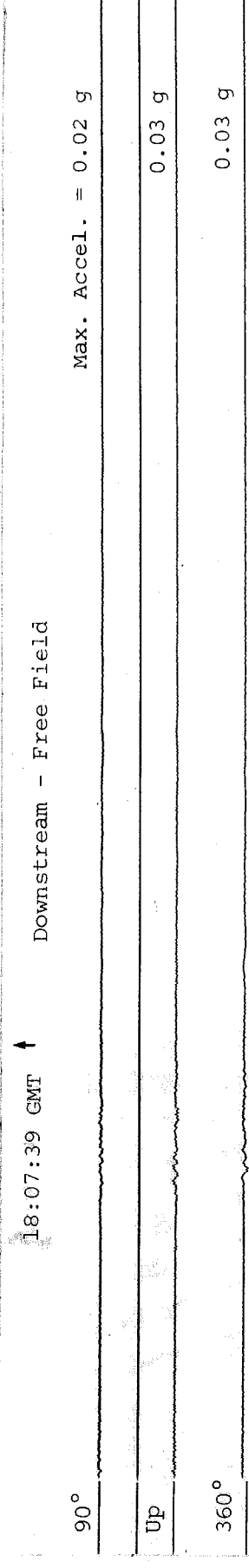
Lake Edison - Vermilion Dam
 (CSMIP Station No. 54362) Record 54362-SL700-85161.01(1)



* Parallel to dam crest # Transverse to dam crest

0	1	2	3	4	5	10	15	20	Sec.
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Lake Edison - Vermilion Dam Free Field
 (CSMIP Station No. 54384) Record 54384-SL821-85160.01(1)



0	1	2	3	4	5	10	15	20	Sec.
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