Flott to Accompany Tape: LIVERMORE 80

Processed Strong-Motion Data for the Livermore Earthquakes of 24 and 26 January 1980

California Strong Motion Instrumentation Program (CSMIP)

GSM 91-15

The attached plots are for the records from 7 stations that recorded the 24 January 1980 Livermore earthquake. These plots are followed by the plots of the records from 8 stations that recorded the 26 January 1980 Livermore earthquake.

The plots for these stations are arranged as follows:

<table>
<thead>
<tr>
<th>Set No.</th>
<th>Station Name</th>
<th>No. of Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 January (19:00 GMT) Earthquake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Antioch</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Fremont - Mission San Jose</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Hayward - CSUH Stadium Grounds</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>San Ramon</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Tracy - Sewage Treatment Plant</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>San Ramon - Eastman Kodak Bldg.</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Walnut Creek - 10-story Commercial Bldg.</td>
<td>16</td>
</tr>
<tr>
<td>27 January (02:33 GMT) Aftershock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Livermore - Fagundes Ranch</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Livermore - Morgan Territory Park</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Antioch</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Fremont - Mission San Jose</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>Hayward - CSUH Stadium Grounds</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>San Ramon</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>San Ramon - Eastman Kodak Bldg.</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>Walnut Creek - 10-story Commercial Bldg.</td>
<td>16</td>
</tr>
</tbody>
</table>

For each station, four sets of plots are presented in the following order:

1. Phase 1 (Vol. 1) data: uncorrected accelerations. The three components of acceleration for the first 22 seconds are plotted with a common amplitude scaling factor for all channels. This plot is followed by another plot of the full processed length of 40 seconds with each component individually scaled.

2. Phase 2 (Vol. 2) data: instrument and baseline-corrected acceleration, velocity and displacement. The data for the full processed length of 40 seconds are plotted with equal scaling for all three channels. The filter frequencies used are indicated on the plots.
The filter bands for each record are indicated on the plots for the Phase 2 and Phase 3 data. The digitized data are processed and filtered using Ormsby filters. The data are first low-pass filtered by a high-frequency filter (typically with a corner frequency of 23 Hz and a roll-off termination frequency of 25 Hz), and then high-pass filtered by a low-frequency filter. The corner frequency of the low-frequency filter may be different for different records. Therefore, the Phase 2 data is the result of the digitized data being filtered by the bandpass filter \( H(f) \) with ramps as shown in the figure:

The usable data bandwidth is defined as the band between frequencies \( f_u \) and \( f_l \), where \( f_u \) and \( f_l \) are the -3 dB points on the high-frequency and low-frequency ramps, respectively. The value of \( H(f) \) is approximately equal to 0.7 for -3 dB (see Notes). The user should only use these data for analyses within this bandwidth.

Notes:

1) The values of \( f_u \) and \( f_l \) can be calculated from the corner frequencies \( (f_{hc}, f_{lc}) \) and the roll-off termination frequencies \( (f_{ht}, f_{lt}) \) used in the processing by using the formulas

\[
f_u = f_{hc} + 0.3 \times (f_{ht} - f_{hc}) \quad \text{and} \quad f_l = f_{lc} - 0.3 \times (f_{lc} - f_{lt})
\]

For example, the usable data bandwidth for data band-pass-filtered with ramps at 0.25 to 0.50 Hz and 23.0 to 25.0 Hz is 0.42 Hz to 23.4 Hz.

2) It is common in signal processing to plot 20 log10[\( H(f) \)] versus frequency, and express the ordinate value in decibels (abbreviation dB). Accordingly, 0 dB corresponds to a value of \( H(f) \) equal to 1; 20 dB is equivalent to \( H(f) = 10 \), and -20 dB corresponds to \( H(f) = 0.1 \). Thus, at the -3 dB frequency point, the amplitude of the transfer function, \( H(f) \), is reduced to 0.7, while the power transmitted by the filter, \( H^2(f) \), is reduced to 0.5.
3. Phase 3 (Vol. 3) data: response spectra. The pseudo-velocity spectra (PSV), the pseudo-acceleration spectra (PSA), the displacement spectra (SD) for 0%, 2%, 5%, 10%, and 20% dampings are presented on a tripartite logarithmic plot for each channel. The spectra are plotted for periods within the usable data bandwidth.

4. Phase 3 (Vol. 3) data: response spectra. The absolute acceleration spectra (SA) for 0%, 2%, 5%, 10% and 20% dampings are plotted against period with linear-linear scaling.

Note: For the Fremont-Mission San Jose station the record length is 18 seconds for the 24 January earthquake and 15 seconds for the 26 January earthquake.
LIVERMERE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
ANTIOCH
UNCORRECTED ACCELEROMGRAM  67070-5189-00025.01  102171.1628-QL80A070

CHN 1: 360 DEG  MAX = 0.020 G

CHN 2: UP  MAX = 0.011 G

CHN 3: 270 DEG  MAX = 0.042 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
ANTIOCH  CHN 2: UP
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 30–60 TO 23.0–25.0 Hz.  67070-51589-60023.01  102271.101-1QL80A070

MAX = 11.3

MAX = 1.16

MAX = 0.18

ACCELERATION (CM/SEC^2)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  71:00 PST
ANTIOCH  CHN 3: 270 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .30-6.0 TO 23.0-25.0 HZ.  67070-51589-80025.01  102271.1011-QL80A070

MAX = 42.3

MAX = 5.03

MAX = 0.53

TIME (SEC)
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST

ANTIOCH

CHN 1: 360 DEG
ACCELEROMETER BANDPASS-FILTERED WITH PAMPS AT 0.5-6.0 TO 23-9-25.0 Hz.
67070-S1598-00025.01 102371.1628-QL80A670

RESPONSE SPECTRA: PSA, PSA & SD

FOURIER AMPLITUDE SPECTRUM: FS

DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
ANTIOCH
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .30-60 TO 23.0-25.0 HZ.
67907-51589-80025.01 102371-1628-QLBQA070

RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
ANTIOCH
CHN 3: 270 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RIFFS AT .30-.60 TO 23.0-25.0 HZ.
67070-S1038-800028.01 102371.1618-QL80A070

RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
FREMONT - MISSION SAN JOSE  CHN 1: 75 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 30-60 TO 23.0-25.0 HZ.  57064-R0553-80025.01  110471.1748-0L80A064

ACCELERATION (CM/SEC/SEC)

MAX = -44.4

VELOCITY (CM/SEC)

MAX = 3.60

DISPLACEMENT (CM)

MAX = -0.54
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
FREMONT - MISSION SAN JOSE CHN 2: UP
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .30-.60 TO 23.0-25.0 HZ.
57064-R0553-50025.01 119471.1746-QL80A064

MAX = -25.7

MAX = -2.10

MAX = 0.39
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
FREMONT – MISSION SAN JOSE
CHN 1: 75 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RANGES AT .30-.60 TO 23.0-25.0 HZ
57064-R0553-80025.01  110671.1603-QLBA064

RESPONSE SPECTRA: PSS, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PSA (G)

SD (IN)

SD (CM)

PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
FREMONT - MISSION SAN JOSE
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAPS AT .30 -.60 TO 23.0-25 0 HZ.
57084-R0553-B0025.01  110671.1603-QL80A064

RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: TS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
HAYWARD - CSUH STADIUM GROUNDS  CHN 1: 236 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  .30-60 TO 23.0-25.0 HZ.  N8219-51809-80025.04  102271.0318-Q8DA219

ACCELERATION (CM/SEC^2)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

TIME (SEC)

MAX = 55.1

MAX = -2.36

MAX = -0.21
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
HAYWARD – CSUH STADIUM GROUNDS CHN 3: 146 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 0.0-60 TO 23.0-25.0 Hz. S8219-S1809-B0025.04 102271.0318-Q80A219

ACCELERATION (G/SEC/SEC)
MAX = -99.9

VELOCITY (G/SEC)
MAX = 3.29

DISPLACEMENT (CM)
MAX = -0.37

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
HAYWARD - CSUH STADIUM GROUNDS
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAPS AT .30-60 TO 23.0-25.0 HZ.
58219-51809-80025.04  102471.7813-QL80A219

RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
HAYWARD - CSUH STADIUM GROUNDS
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 30-60 TO 23-0-25.0 HZ.
58219-51898-85025.54  102471.0813-QL80A279

CHN 1: 236 DEG
DAMPING VALUES: 0.2, 5.10, 20%

CHN 2: UP
DAMPING VALUES: 0.2, 5.10, 20%

CHN 3: 140 DEG
DAMPING VALUES: 0.2, 5.10, 20%

ABSOLUTE ACCELERATION, SA (g)
PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON  CHN 2: UP
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .30-60 TO 23.0-25.0 HZ.  57134-52522-80030.01  102171.1919-QL80A134

ACCELERATION (G/SEC/SEC)

MAX = 15.8

VELOCITY (CM/SEC)

MAX = -1.61

DISPLACEMENT (CM)

MAX = -0.28
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON  CHN 3: 340 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .30-60 TO 23.0-25.0 Hz.  57134-52522-80030.01  102171.1919-QL80A134

ACCELERATION (G/SEC/SEC)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON
CHN 1: 70 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 0.30--60 TO 0.0--25.0 HZ.
97134-52522-00030.01  102371.1529-QL80A134

RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER Amplitude Spectrum: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON
CHN 3:  340 DEG
ACCELEROMGRAM BANDPASS-FILTERED WITH RAMPS AT .30-.60 TO 23.0-25.0 HZ.
57134-51522-B0000.01  1023771.1529-QL0A134

RESPONSE SPECTRA:  PSV, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM:  FS
DAMPING VALUES:  0, 2, 5, 10  20%
LIVERMORE EARTHQUAKE  JUNE 24, 1980  11:00 PST
TRACY - SEWAGE TREATMENT PLANT  CHN #: 183 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 30-60 TO 23.0-25.0 Hz  57063-R0555-B0025.01  103271.1853-QL80A63

ACCELERATION (G/M SEC)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

MAX = -76.3

MAX = -6.12

MAX = -0.95

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
TRACY - SEWAGE TREATMENT PLANT  CHN 3:  93 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  30–60 TO 23.0–25.0 Hz.  57063-R0555-80025.01  102271.1853-Q.60A063

ACCELERATION (cm/sec^2)

VELOCITY (cm/sec)

DISPLACEMENT (cm)

TIME (SEC)

MAX = 46.6

MAX = 5.88

MAX = -1.17
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
TRACY - SEWAGE TREATMENT PLANT
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .30-60 TO 23.0-25.0 Hz.
57063-R0555-B0025.01 102371.1428-QL80A063

RESPONSE SPECTRA: PSV, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON - EASTMAN KODAK BLDG.
UNCORRECTED ACCELEROMETER 57187-C0105-80025.02  090188.1817-QL80A187

CHN 4: 180 DEG
(GROUND FLOOR, AT CENTER)  MAX = -0.150 G

CHN 5: UP
(GROUND FLOOR, AT CENTER)  MAX = 0.037 G

CHN 6: 270 DEG
(GROUND FLOOR, AT CENTER)  MAX = 0.065 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON - EASTMAN KODAK BLDG. CHN 2: 360 DEG (ROOF AT WEST WALL)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 0.15 - 30 TO 23.0 - 25.0 Hz.
57187-C0105-00025 02 090288.1249-QL80A157

**Acceleration**
- MAX = 234.8

**Velocity**
- MAX = -24.7

**Displacement**
- MAX = -6.13

TIME (SEC)

0  5  10  15  20
LIJERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
SAN RAMON - EASTMAN KODAK BLDG. CHN 3: 90 DEG (ROOF, AT CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 15-30 TO 23.0-25.0 Hz. 57187-C0105-80025.02 090288.1249-QL80A187

ACCELERATION (CM/SEC/SEC)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON - EASTMAN KODAK QLDG.
CHN 1: 360 DEG  (ROOF, AT CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .15-.30 TO 23.0-25.0 HZ.
57187-C0105-80025.02  040788.0951-Q80A187

RESPONSE SPECTRA: PSV, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2.5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PERIOD (SEC)

PSA (O)

SD (IN)

SD (CM)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON – EASTMAN KODAK BLDG.
CHN 2: 360 DEG  [ROOF AT WEST WALL]
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .15-3.0 TO 23.0-25.0 HZ.
57187-C0105-80035.02  090788.0951-QL8A187

--- RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
SAN RAMON - EASTMAN KODAK BLDG.
CHN 3: 90 DEG (ROOF, AT CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .15-30 TO 23.0-25.0 HZ.
57187-C0105-B0025.02 090788.0951-Q90A187

RESPONSE SPECTRA: PSV, PSA & SD  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
SAN RAMON - EASTMAN KGDAK BLDG.
CHN 4: 180 DEG  (GROUND FLOOR, AT CENTER)
ACCELEROMGRAM BANDPASS-FILTERED WITH RAMPS AT .15- .30 TO 23.0-25.0 HZ.
57187-00105-60025. 02  090788.0651-QL80A187

RESPONSE SPECTRA: PSV, PSA & SD  —— FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
SAN RAMON - EASTMAN KODAK BLDG.
CHN 5: UP (GROUND FLOOR, AT CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .15- - 30 TO 23.0-25.0 HZ.
57187-0105-80025.02 090788 0951-0L60A187

RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
SAN RAMON – EASTMAN KODAK BLDG.
CHAN 6: 270 DEG (GROUND FLOOR AT CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .15–.30 TO 23.0–25.0 HZ.
57187-D0105-B0025.02 090788.0951–QGDA187

RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSA (G)

SD (IN)

SD (CM)

PSV/FS (g)(sec)

PSV/FS (g)(sec)

PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK — 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMETER 58364-C0194-B0025.01  110471.1550-QLBA364C

CHN 13: UP  (GRND FLOOR, EAST WALL OF CNTR CORE) MAX = 0.023 G

ACCELERATION (G)

0  5  10  15  20
TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROSGRAM 58364-53490-50025-01 110671.1721-QL80A364

CHN 1  (STA CHN 14): 180 DEG  (GROUND FLOOR, NEAR CENTER)  MAX = -0.030 G

CHN 2  (STA CHN 15): UP  (GROUND FLOOR, NEAR CENTER)  MAX = 0.022 G

CHN 3  (STA CHN 16): 90 DEG  (GROUND FLOOR, NEAR CENTER)  MAX = -0.033 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMGRAM 58364-C0194-00025.01  110471.1550-QL80A364C

CHN 4:  90 DEG  (ROOF, SOUTH WALL)  MAX = 0.139 G

CHN 5:  180 DEG  (ROOF, NEAR CENTER)  MAX = 0.116 G

CHN 6:  90 DEG  (8TH FLOOR, NORTH WALL)  MAX = 0.126 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK — 10-STOREY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMGRAM  5836/-CD194-00225.01  110471.1550-QL80A364C

CHN 10:  90 DEG
(3RD FLOOR, NEAR CENTER)  MAX = 0.039 G

CHN 11:  180 DEG
(3RD FLOOR, NEAR CENTER)  MAX = -0.035 G

CHN 12:  UP
(GRND FLOOR, WEST WALL OF CNTR CORE)  MAX = 0.022 G
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG. CHN 2: 90 DEG (ROOF, NORTH WALL)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .50-1.00 TO 23.0-25.0 HZ. 58364-C0194-00025.01 110671.1923-QL80A364C

MAX = 156.7

MAX = 15.8

MAX = -1.54
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STOREY COMMERCIAL BLDG. CHN 3: 90 DEG (ROOF, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .50-1.00 TO 23.0-25.0 Hz.  58364-C0194-80025.01  110671.1923-0803A384C

MAX = 105.6

MAX = 10.9

MAX = -1.18
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG. CHN 4: 90 DEG (ROOF, SOUTH WALL)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50-1.00 TO 23.0-25.0 HZ. 58364-C0194-80025.01 110671.1923-QL80A384D

Max = 133.9

Max = 11.2

Max = -1.21
LIVERMORE EARTHQUAKE  
JANUARY 24, 1980  11:00 PST

WALNUT CREEK - 10-STORY COMMERCIAL BLDG.  CHN 6: 90 DEG (8TH FLOOR, NORTH WALL)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  50-1.00 TO 23.0-25.0 HZ.  58584-CD194-80025.01  110671.1923-QL80A364C

MAX = 125.0

MAX = 11.5

MAX = -1.17
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-PROPERTY COMMERCIAL BLDG.  CHN 8: 180 DEG (8TH FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  0.01-1.00  TO  23.0-25.0 HZ,  58364-C0194-B0025.01  1106/7/1923-QL8D3464C

-300
0
300
ACCELERATION
(GRAIN/SEC/SEC)

-3
0
3
DISPLACEMENT
(CM)

-20
0
20
VELOCITY
(DES/SEC)

MAX = 82.7

MAX = -6.70

MAX = -0.63

TIME (SEC)
0 5 10 15 20 25 30 35 40
LIVERMORE EARTHQUAKE JANUARY 26, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG. CHN 10: 90 DEG (3RD FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50-1.00 TO 23.0-25.0 Hz. 5834-C0194-80025.01 110671.1923-0.89384C

MAX = 39.7

MAX = 2.63

MAX = -0.30
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.  CHN 1 (STA CHN 14): 180 DEG (GROUND FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  50-1.00 TO 23.0-25.0 HZ.  58364-S3490-80025.01  110671.1740-QL80A364

ACCELERATION (cm/sec^2)

VELOCITY (cm/sec)

DISPLACEMENT (cm)

TIME (SEC)
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 1: 90 DEG (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BANDPA03-FILTERED WITH RAMPS AT 50-1.00 TO 23.0-25.0 HZ.
58364-C0104-00025.01 110771.1016-QL0A364c

RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 2: 90 DEG  (ROOF, NORTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 Hz.
5B564-C0144-50025.01  110771.1016-QLB0A364C

- RESPONSE SPECTRA: PSV, PSA & SD
- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSA (G)

SD (IN)

SD (CM)

PSV, FS (IN/SEC)

PSV, FS (CM/SEC)

PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHAN 3: 90 DEG (ROOF, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
58364-00194-80025.01  110771.1016-QL80A364C

RESPONSE SPECTRA: PSV, PSA & SD  --  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PSA (G)

SD (IN)

SD (CM)

PERIOD (SEC)

PSV/FS (CM/SEC)

10

10^-1

10^-2

10^-3

10^-4

10^-5

10^-6

10^-7

10^-8

10^-9

10^-10
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK — 10- STORY COMMERCIAL BLDG.
CHN 4: 90 DEG  (ROOF, SOUTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
58364-C0194-80025.01  110771.1016-QL80A364C

RESPONSE SPECTRA: PSV, PSA & SD  —  FOURIER Amplitude Spectrum: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 5: 180 DEG (ROOF, NEAR CENTER)
ACCELEROGRAV BANDPASS-FILTERED WITH RAMP S AT .50-1.00 TO 23.0-25.0 HZ.
S8364-C0194-60025.01 11D771.1016-QLBOA364C

RESPONSE SPECTRA: PSV, PSA & SD — FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0.2, 5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PSA (G)

SD (IN)

SD (CM)

PERIOD (SEC)

PSV/FS (CM/SEC)

10
100
1000
10
10
10
10
10
10
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 6: 90 DEG (8TH FLOOR, NORTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RANTS AT .50-1.00 TO 23.0-25.0 HZ.
58364-00194-00025.01 110171.1016-QLB0A364C

RESPONSE SPECTRA: PSV, PSA & SD — FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

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[Diagram showing response spectra and Fourier amplitude spectrum with data points and labels for frequencies and periods in hertz and seconds, respectively.]
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 7: 90 DEG (8TH FLOOR, NEAR CENTER)
ACCELEROGRAV BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
58364-C0194-B0025.01  110771.1016-QL80A364C

RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 8: 180 DEG  (8TH FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
5B364-C0194-B0025.01  110771.1016-QLB0A364C

RESPONSE SPECTRA: PSV, PSA & SD  ---  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSV/FS (IN/SEC)

PERIOD (SEC)

PSA (G)
SD (IN)
SD (CM)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 9: 90 DEG (3RD FLOOR, NORTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
58364-C0184-B0023.01  110771. 1216-QLBOA364C

RESPONSE SPECTRA: PSV, PSA & SD ---- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK – 10-STORY COMMERCIAL BLDG.
CHN 10: 90 DEG (3RD FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMP AT .50–1.00 TO 23.0–25.0 HZ.
58364-00194-80025.01  115777.1016-QL80A364C

RESPONSE SPECTRUM: PSV, PSA & SD  —— FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSV:FS (IN/SEC)

PSA (G)

SD (IN)

SD (CM)

PERIOD (SEC)
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 12: UP (GRND FLOOR, WEST WALL OF CNTR CORE)
ACCELEROMETER BANDPASS-FILTERED WITH RANPS AT .5-1.00 TO 23.0-25.0 HZ.
S364-C0194-80025.01  110771.1010-QLB0A364C

RESPONSE SPECTRA: PSV, PSA, & SD —— FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 13: UP  (GRND FLOOR, EAST WALL OF CNTR CORE)
ACCELEROMETER BANDPASS-FILTERED WITH RAPPS AT .50-1.00 TO 23.0-25.0 HZ.
5B364-C0194-B0025.01  110771.1016-QLB0A364C

RESPONSE SPECTRA: PSA, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 1 (STA CHN 14): 180 DEG (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 HZ.
58364-53490-80025 01 110771.0811-QL.80A364

RESPONSE SPECTRA: PSV, PSA & SD — FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMplitude SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 3 (STA CHN 16): 90 DEG  (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 0.01-1.00 TO 20-0-20.0 HZ.
58354-53490-50025.01  110771.0811-QL80A364

RESPONSE SPECTRA: PSV, PSA & 5D  — FOURIER AMPLITUDE SPECTRUM: FS
RAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (Hz)

PSA (G)

SD (IN)

10

SD (CM)

10

10

PSV, FS (IN/SEC)

PSV, FS (CM/SEC)

PERIOD (SEC)
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BDG.
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 3.0-1.0 TO 23.0-25.0 HZ.
58364-D3194-B0025.01 110771.1016-QL80A384C

**CHN 4: 90 DEG**
ROOF, SOUTH WALL

**CHN 5: 180 DEG**
ROOF, NEAR CENTER

**CHN 6: 90 DEG**
8TH FLOOR, NORTH WALL

**DAMPING VALUES: 0, 2, 5, 10, 20%**
LIVERMORE EARTHQUAKE JANUARY 24, 1980 11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
ACCELEROMETER BANDPASS-FILTERED WITH RAPS AT 50-1.00 TO 23.0-25.0 Hz.
58364-C0394-80025, XI 110771.1016-QL.B.RN34C

CHN 7: 90 DEG
8TH FLOOR, NEAR CENTER
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 8: 180 DEG
8TH FLOOR, NEAR CENTER
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 9: 02 DEG
3RD FLOOR, NORTH WALL
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE EARTHQUAKE  JANUARY 24, 1980  11:00 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
ACCELEROMETER BANDPASSED FILTERED WITH RAMPS AT 0.02-1.00 TO 23.0-25.0 Hz.
S8564-CD194-80025.01  110771.1016-QL80A364C

CHN 13: UP
5TH FLOOR, EAST WALL OF CNTR CORE

DAMPING VALUES: 0.2, 5, 10, 20%

PERIOD (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
LIVERMORE - FAGUNDES RANCH
CHN 1: 360 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .35-60 TO 23.0-25.0 HZ.
57701-52524-80029.01  102371.1559-Q808701

RESPONSE SPECTRA: PSV, PSA & SD
- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSA (G)

SD (IN)

SD (CM)

PSV/FS (IN/SEC)

PSV/FS (CM/SEC)

PERIOD (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
LIVERMORE - MORGAN TERRITORY PARK
CHN 1: 355 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .30 - 60 TO 23.0-25.0 HZ.
57702-52589-80029.01  102371.1438-QL800702

--- RESPONSE SPECTRA: PSV, PSA & SD --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
LIVERMORE - MORGAN TERRITORY PARK
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RANPS AT .30-60 TO 0-25.0 Hz.
57702-32589-80029.01  102371.1458-QL-80BT02

--- RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK JANUARY 26, 1980 16:33 PST
LIVERMORE – MORGAN TERRITORY PARK
CHN 3: 165 DEG
ACCELEROMETER BANDPASS-FILTERED WITH RMS AT 0.3-60 TO 23.0-25.0 HZ.
57702-52589-80029.01 102371.145B-QLBO0BT02

Response Spectra: PSV, PSA & SD
Fourier Amplitude Spectrum: FS
Damping Values: 0, 1, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
ANTIOCH   CHN 3: 270 DEG

INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  0.0-60  TO  23.0-25.0 HZ.  87070-51598-80029.01  102271.1251-QL80B070

MAX = -108.9

MAX = 6.45

MAX = 0.62

TIME (SEC)

ACCELERATION (G/SEC/SEC)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)
RESPONSE SPECTRA: PSV, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM: FS  
DAMPING VALUES: 0, 2, 5, 10, 20%

FREQUENCY (HZ)

PSA (G)

SD (IN)

SD (CM)

PSV/FS (IN/SEC)

DCS (IN/SEC)

PERIOD (SEC)
RESPONSE SPECTRA: PSV, PSA & SD

FOURIER AMPLITUDE SPECTRUM: FS

DAMPING VALUES: 0, 1, 5, 10, 20%

FREQUENCY (Hz)

PERIOD (SEC)
RESPONSE SPECTRA: PSV, PSA & SD —— FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
FREMONT - MISSION SAN JOSE
UNCORRECTED ACCELEROGRAM  57064-R0553-80029.01  110471.1643-QL80B064

| CHN 1: 75 DEG | MAX = -0.036 G |
| CHN 2: UP     | MAX = 0.018 G  |
| CHN 3: 345 DEG| MAX = 0.038 G  |

ACCELERATION (G)

TIME (SEC)

0  2  4  6  8  10  12  14
RESPONSE SPECTRA: PSV, PSA & SD

FOURIER AMPLITUDE SPECTRUM: FS

DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
FREMONT - MISSION SAN JOSE
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 40.0 TO 23.0 - 25.0 HZ.
57564-R0553-80029.01 110771.1E29-QL808064

RESPONSE SPECTRA: PSV, PSA & SD  ---  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2.5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 1, 5, 10, 20%
LIVERMORE AFTERSHOCK: JANUARY 28, 1980 18:33 PST
FREMONT-MISSION SAN JOSE
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 4.0 TO 23.0-25.0 Hz.
ST04-R0553-88029.01 110771.1829-Q.0B064

CHN 1: 75 DEG
DAMPING VALUES: 0.2, 5, 10, 20%

CHN 2: UP
DAMPING VALUES: 0.2, 5, 10, 20%

CHN 3: 345 DEG
DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
HAYWARD - CSUH STADIUM GROUNDS
UNCORRECTED ACCELEROMETER  58219-11809-80030 01  102171.1153-QL808219

CHN 1:  236 DEG  MAX = -0.029 G

CHN 2:  UP  MAX = 0.016 G

CHN 3:  146 DEG  MAX = -0.057 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE AFTERSHOCK JANUARY 26, 1980 18:33 PST
HAYWARD - CSUH STADIUM GROUNDS CHN 3: 146 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 30-60 TO 23.0-25.0 HZ. 56219-51809-80030.01 102271.0739-QL809219

ACCELERATION (GM/SEC^2)

MAX = -55.8

VELOCITY (CM/SEC)

MAX = -4.02

DISPLACEMENT (CM)

MAX = -5.86

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
HAYWARD - CSUH STADIUM GROUNDS
CHN 1: 236 DEG
ACCELEGRAM BANDPASS-FILTERED WITH RAMPS AT .30-.60 TO 23.0-25.0 HZ.
58219-51809-80030.01  102471.0837-QL808219

RESPONSE SPECTRA: PSV, PSA & SD  ---  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD  --  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK   JANUARY 26, 1980   18:33 PST
SAN RAMON   CHN 2: UP
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: .50—60 TO 23.0—25.0 HZ.   57134-52522-80030.02   102271.0556-QL808134

MAX = -17.7

MAX = 1.25

MAX = 0.18

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
SAN RAMON  CHN 3: 340 DEG
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 0.30 TO 23.0-25.0 Hz.  57174-92922-80030.02  102271.0558-0L808134

ACCELERATION (G/SEC^2)

VELOCITY (G/SEC)

DISPLACEMENT (CM)

MAX = 52.3

MAX = -3.87

MAX = 0.38

TIME (SEC)
RESPONSE SPECTRA: PSV, PSA & SD  —  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
SAN RAMON
CHN 2: UP
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 0.30-60 TO 23.0-25.0 HZ.
57134-52522-80030.02  102471.0904-QL808134

--- RESPONSE SPECTRA: PSV, PSA & SD --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
SAN RAMON
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .30-.60 TO 23.0-25.0 Hz.
57/34-5252-80030-02  102471.0904-Q.809134

CHN 1: 70 DEG

DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 2: UP

DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 1: 340 DEG

DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 2: DOWN

DAMPING VALUES: 0, 2, 5, 10, 20%

PERIOD (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
SAN RAMON – EASTMAN KODAK BLDG. CHN 5: UP (GROUND FLOOR, AT CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 0.20–4.0 TO 23.0–25.0 HZ.  57187-C0105-B0030.01  090288.1058-QL80B187

Accleration (g) vs. Time (sec)
MAX = -41.1

Velocity (cm/sec) vs. Time (sec)
MAX = 3.61

Displacement (cm) vs. Time (sec)
MAX = 0.49
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2.5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD

FOURIER AMPLITUDE SPECTRUM: FS

DAMPING VALUES: 0.2, 5, 10, 20%
RESPONSE SPECTRA: PSA, PSA & SD  ---  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
CHN 4: 180 DEG
GROUND FLOOR, AT CENTER
DAMPING VALUES: 0.2.5.10.20%

CHN 5: UP
GROUND FLOOR, AT CENTER
DAMPING VALUES: 0.2.5.10.20%

CHN 6: 270 DEG
GROUND FLOOR, AT CENTER
DAMPING VALUES: 0.2.5.10.20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK  10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMETER  58364-C0194-B0030.01  110571.1532-QLBBB364C

**CHN 4: 90 DEG**
- Acceleration (G): 0.200 G
- Location: ROOF, SOUTH WALL
- Time (Sec): 0 to 20

**CHN 5: 180 DEG**
- Acceleration (G): -0.137 G
- Location: ROOF, NEAR CENTER
- Time (Sec): 0 to 20

**CHN 6: 90 DEG**
- Acceleration (G): 0.131 G
- Location: 8TH FLOOR, NORTH WALL
- Time (Sec): 0 to 20
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMGRAM  58364-C0194-B0030.01  110571.1532-QL80B364C

CHN 7: 90 DEG  (8TH FLOOR, NEAR CENTER)  MAX = 0.120 G

CHN 8: 180 DEG  (8TH FLOOR, NEAR CENTER)  MAX = 0.096 G

CHN 9: 90 DEG  (3RD FLOOR, NORTH WALL)  MAX = -0.062 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMETER 5B364-CD194-B0030.01  110571.1532-QL80364C

CHN 10: 90 DEG  (3RD FLOOR, NEAR CENTER)  MAX = 0.051 G

CHN 11: 180 DEG  (3RD FLOOR, NEAR CENTER)  MAX = 0.072 G

CHN 12: UP  (GRND FLOOR, WEST WALL OF CNTR CORE)  MAX = 0.024 G

ACCELERATION (G)

TIME (SEC)
LIVERMORE AFTershock  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
UNCORRECTED ACCELEROMETER 58064-53490-00030.01  110671.1653-QL80B364

CHN 1 (STA CHN 14): 180 DEG  (GROUND FLOOR, NEAR CENTER) MAX = 0.061 G

CHN 2 (STA CHN 15): UP  (GROUND FLOOR, NEAR CENTER) MAX = 0.022 G

CHN 3 (STA CHN 16): 90 DEG  (GROUND FLOOR, NEAR CENTER) MAX = 0.048 G

0  5  10  15  20  TIME (SEC)

ACCELERATION (G)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STOREY COMMERCIAL BLDG.

UNCORRECTED ACCELEROMETER 58364-C0194-00030.01  110571.1532-QL08B3#4C

CHN 4:  90 DEG  (ROOF, SOUTH WALL)  MAX = 0.200 G

CHN 5:  180 DEG  (ROOF, NEAR CENTER)  MAX = -0.137 G

CHN 6:  90 DEG  (8TH FLOOR, NORTH WALL)  MAX = 0.131 G

ACCELERATION (g)

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.  CHN 2: 90 DEG (ROOF, NORTH WALL)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50-1.00 TO 23.0-25.0 Hz.  58364-C0194-80030.01  110671.2046-QL80B364C

![Graphs showing acceleration, velocity, and displacement over time.](image-url)
WALNUT CREEK - 10-STORY COMMERCIAL BLDG. CHN 7: 90 DEG (8TH FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50-1.00 TO 23.0-25.0 Hz. 58364-C0194-80030.01 110671.2046-QL08B364C

ACCELERATION (CM/SEC^2)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)

TIME (SEC)
LIVERMORE AFTERSHOCK    JANUARY 26, 1980    18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.  CHN 10: 90 DEG (3RD FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND:  50-1.00 TO 23.0-25.0 HZ.  58364-C0194-80030.01  110671.2046-QL80B364C

MAX = 51.9

MAX = -3.56

MAX = -0.48

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK – 10-STORY COMMERCIAL BLDG.  CHN 11: 180 DEG (3RD FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 0.1-1.00 TO 23.0-25.0 HZ.  58364-C0194-60030.01  110471.2046-QL8093640

MAX = 62.5

MAX = 6.20

MAX = -0.71

TIME (SEC)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.  CHN 13: UP (GRND FLOOR, EAST WALL OF CNTR CORR)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50 TO 1.00 TO 23.0 TO 25.0 HZ.  58364-C0194-80030.01  110671.2046-QL09364C

MAX = 16.6

MAX = 1.30

MAX = 0.11

TIME (SEC)

ACCELERATION (G/SEC/SEC)

VELOCITY (CM/SEC)

DISPLACEMENT (CM)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST

WALNUT CREEK - 10-STORY COMMERCIAL BLDG. CHN 1 (STA CHN 14): 180 DEG  (GROUND FLOOR, NEAR CENTER)
INSTRUMENT-CORRECTED AND BANDPASS-FILTERED ACCELERATION, VELOCITY AND DISPLACEMENT
FILTER BAND: 50-1.00 TO 23.0-25.0 Hz.  58364-53400-80030.01  110671.1800-QL80B364

MAX = 54.4

MAX = -4.43

MAX = -0.59

TIME (SEC)

ACCELERATION (G/SEC²)

VELOCITY (G/SEC)

DISPLACEMENT (CM)

0  5  10  15  20  25  30  35  40
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  19:33 PST
WALNUT CREEK - 10-Story Commercial Bldg.
CHN 1: 90 DEG  (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 0.50 - 7.00 TO 23.0 - 25.0 Hz.
58364-C0194-B0030.01 110771.1228-QL08364C

RESPONSE SPECTRA: PSV, PSA & SD  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
Livermore Aftershock January 26, 1980 18:33 PST
Walnut Creek - 10-Story Commercial Bldg.
CHN 3: 90 deg (Roof, Near Center)
Accelerogram Bandpass-Filtered with Ramps at .50-1.00 to 23.0-25.0 Hz.
58364-C0194-00035.01 110771.1228-QL809364C

Response Spectra: PSV, PSA & SD
Fourier Amplitude Spectrum: FS
Damping Values: 0, 2, 5, 10, 20%

Frequency (Hz)

PSA (G)

SD (IN)

SD (CM)

PSV, FS (IN/sec)

Period (Sec)

10

10

10

10

10

10
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 4: 90 DEG (ROOF, SOUTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-1.00 TO 23.0-25.0 Hz.
58364-C0194-80030.01  110771.1228-DL088364C

RESPONSE SPECTRA: PSV, PSA & SD  --- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSV, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 6: 90 DEG  (8TH FLOOR, NORTH WALL)
ACCELEROMETER BANDPASS-FILTERED WITH RAMP AT .50-1.00 TO 23.0-25.0 HZ.
58366-CD194-80030.01  110771.1228-QL800564C

RESPONSE SPECTRA: PSV, PSA & SD  FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 1, 5, 10, 20%

FREQUENCY (Hz)

PSV/FS (IN/SEC)

PSL/FS (IN/SEC)

PSA (G)

SD (IN)

SD (CM)

PERIOD (SEC)
RESPONSE SPECTRA: PSV, PSA & SD  -- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PSA, PSA & SD
FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 1 (STA CHN 14): 180 DEG  (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT .50-.1.00 TO 23.0-25.0 HZ.
58364-53490-B0330.01  11077.1.0857-QL880364

RESPONSE SPECTRA: PSA, PSA & SD  -- FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
RESPONSE SPECTRA: PIV, PSA & SD
- - FOURIER AMPLITUDE SPECTRUM: FS
DAMPING VALUES: 0, 2, 5, 10, 20%
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
CHN 3 (STA CHN 16): 90 DEG  (GROUND FLOOR, NEAR CENTER)
ACCELEROMETER BAND-PASS-FILTERED WITH RAMPS AT .50-.1.00 TO 23.0-25.0 HZ.
58364-53490-60030.01  110711.0057-QL083564

--- RESPONSE SPECTRA: PSV, PSA & SD ---
--- FOURIER AMPLITUDE SPECTRUM: FS

DAMPING VALUES: 0, 2, 5, 10, 20%
CHN 1: 90 DEG
GROUND FLOOR, NEAR CENTER
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 2: 90 DEG
ROOF, NORTH WALL
DAMPING VALUES: 0, 2, 5, 10, 20%

CHN 3: 90 DEG
ROOF, NEAR CENTER
DAMPING VALUES: 0, 2, 5, 10, 20%
Livermore Aftershock  January 26, 1980  18:33 PST
Walnut Creek - 10-Story Commercial Bldg.
Accelerogram Bandpass-Filtered with NARF at 5.0-1.0 to 23.0-25.0 Hz.
58364-0034-00000 01 117771 1228-QL00B14C

CHN 4: 90 Deg  Roof, South Wall
Damping Values: 0.2, 0.5, 1.0, 20%

CHN 5: 180 Deg  Roof, Near Center
Damping Values: 0.2, 0.5, 1.0, 20%

CHN 8: 90 Deg  8th Floor, North Wall
Damping Values: 0.2, 0.5, 1.0, 20%

Absolute Acceleration, Aa (g)
LIVERMORE AFTERSHOCK  JANUARY 26, 1980  18:33 PST
WALNUT CREEK — 10-STOREY COMMERCIAL BLDG.
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 50-1 00 TO 23.0-25.0 Hz.
58364-00194-80030.01  110771.1228-Q.088364C

CHN 10: 90 DEG  3RD FLOOR, NEAR CENTER

DAMPING VALUES: 0.2, 5, 10, 20%

CHN 11: 180 DEG  3RD FLOOR, NEAR CENTER

DAMPING VALUES: 0.2, 5, 10, 20%

CHN 12: 00 DEG  GRND FLOOR, WEST WALL OF CNTR CORE

DAMPING VALUES: 0.2, 5, 10, 20%
LIVERMORE EARTHQUAKE JANUARY 25, 1980 18:33 PST
WALNUT CREEK - 10-STORY COMMERCIAL BLDG.
ACCELEROMETER BANDPASS-FILTERED WITH RAMPS AT 10-1.0 TO 23.0-25.0 Hz.
58864-C0194-80330.01 110771.1228-QL800864C

CHN 13: UP 1st FLOOR, EAST WALL OF CNTR CORE

DAMPING VALUES: 0.2, 5, 10, 20%