APPENDIX A

RESPONSE SPECTRA FOR THIRTEEN SELECTED UNITED STATES AND ITALY EARTHQUAKES

LIST OF FIGURES (FOR APPENDIX A)

A-1	Response Spectra for Helena, Montana Earthquake	October 31, 1935	Carroll College Record,	N00E
A-2	Response Spectra for Helena, Montana Earthquake	October 31, 1935	Carroll College Record,	N90E
A-3	Response Spectra for San Francisco, California Earthquake	March 22, 1957	Golden Gate Record,	N10E
A-4	Response Spectra for San Francisco, California Earthquake	March 22, 1957	Golden Gate Record,	S80E
A-5	Response Spectra for Parkfield, California Earthquake	June 27, 1966	Temblor Record,	N65W
A-6	Response Spectra for Parkfield, California Earthquake	June 27, 1966	Temblor Record,	S25W
A-7	Response Spectra for Lytle Creek, California Earthquake	Sept. 12, 1970	Allen Ranch Record,	S15W
A-8	Response Spectra for Lytle Creek, California Earthquake	Sept. 12, 1970	Allen Ranch Record	S85E
A-9	Response Spectra for Lytle Creek, California Earthquake	Sept. 12, 1970	Devils Canyon Record,	S10E
A-10	Response Spectra for Lytle Creek, California Earthquake	Sept. 12, 1970	Devils Canyon Record	S90E
A-11	Response Spectra for Oroville, California Earthquake	August 1, 1975	Oroville Dam Record,	N37E
A-12	Response Spectra for Oroville, California Earthquake	August 1, 1975	Oroville Dam Record,	N53W
A-13	Response Spectra for Friuli, Italy Earthquake	May 6, 1976	Tolmezzo Record (038)	N-S
A-14	Response Spectra for Friuli, Italy Earthquake	May 6, 1976	Tolmezzo Record (038)	E-W

A-15	Response Spectra for Friuli, Italy Earthquake	May 9, 1976	Tolmezzo Record (054)	N-S
A-16	Response Spectra for Friuli, Italy Earthquake	May 9, 1976	Tolmezzo Record (054)	E-W
A-17	Response Spectra for Friuli, Italy Earthquake	May 11, 1976	Tolmezzo Record (063)	N-S
A-18	Response Spectra for Friuli, Italy Earthquake	May 11, 1976	Tolmezzo Record (063)	E-W
A-19	Response Spectra for Friuli Italy Earthquake	Sept. 11, 1976 (16:31)	S. Rocco Record (132)	N-S
A-20	Response Spectra for Friuli, Italy Earthquake	Sept. 11, 1976 (16:31)	S. Rocco Record (132)	E-W
A-21	Response Spectra for Friuli, Italy Earthquake	Sept. 11, 1976 (16:35)	S. Rocco Record (139)	N-S
A-22	Response Spectra for Friuli, Italy Earthquake	Sept. 11, 1976 (16:35)	S. Rocco Record (139)	E-W
A-23	Response Spectra for Friuli, Italy Earthquake	Sept. 15, 1976 (3:15)	S. Rocco Record (153)	N-S
A-24	Response Spectra for Friuli, Italy Earthquake	Sept. 15, 1976 (3:15)	S. Rocco Record (153)	E-W
A-25	Response Spectra for Friuli, Italy Earthquake	Sept. 15, 1976 (9:21)	S. Rocco Record (169)	N-S
A-26	Response Spectra for Friuli, Italy Earthquake	Sept. 15, 1976 (9:21)	S. Rocco Record (169)	E-W
A-27	Composite Response Spectra Plot of Six United States Earthquakes - 4% Damping			
A-28	Composite Response Spectra Plot of Six United States Earthquakes - 7% Damping			
A-29	Composite Response Spectra Plot of Seven Friuli, Italy Earthquakes - 4% Damping			
A-30	Composite Response Spectra Plot of Seven Friuli, Italy Earthquakes - 7% Damping			
A-31	Composite Response Spectra Plot of Thirteen Unites and Italy Earthquakes - 4% Damping			
A-32	Composite Response Spectra Plot of Thirteen United States and Italy Earthquakes - 7% Damping			

A-33 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Six United States Earthquakes - 4% Damping

A-34 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Six United States Earthquakes - 7% Damping

A-35 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Seven Friuli, Italy Earthquakes - 4% Damping

A-36 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Seven Friuli, Italy Earthquakes - 7% Damping

A-37 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Thirteen United States and Italy Earthquakes - 4% Damping

A-38 Mean, Mean plus One Standard Deviation, Maximum, and Minimum Response Spectra for Thirteen United States and Italy Earthquakes - 7% Damping

HELENA, MONTANA EARTHQUAKE 10-31-35 1138 HRS

STATION: CARROLL COLLEGE RECORD ID: B025 DURATION: 50.920 SEC

COMPONENT: NOOE TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

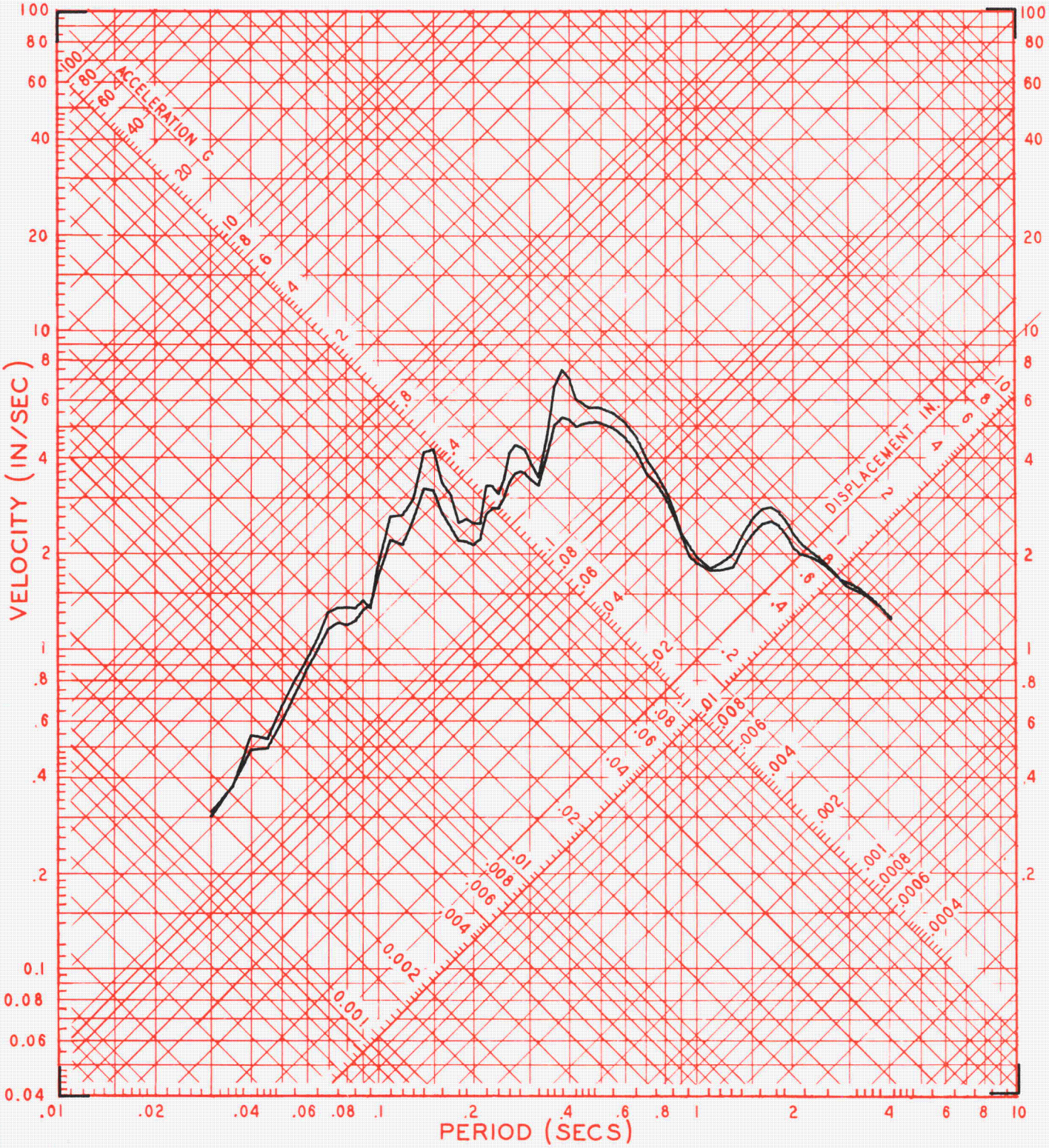

FIGURE A-1

HELENA, MONTANA EARTHQUAKE 10-31-35 1138 HRS

STATION: CARROLL COLLEGE RECORD ID: B025 DURATION: 51.020 SEC

COMPONENT: N90E TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

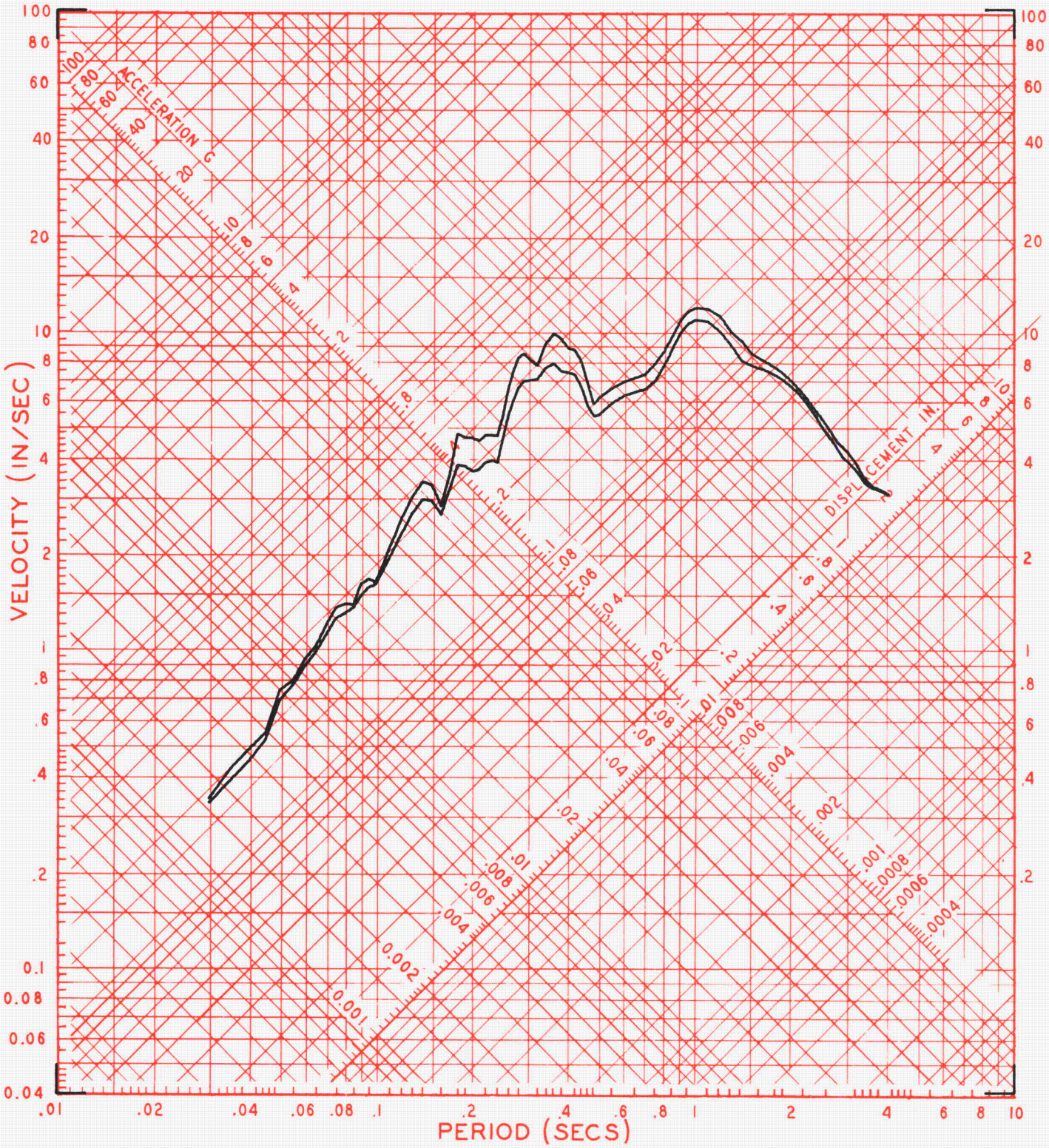

FIGURE A-2

SAN FRANCISCO EARTHQUAKE 3-22-57 1144 HRS

STATION: GOLDEN GATE PARK RECORD ID: A015 DURATION: 39.880 SEC

COMPONENT: N10E TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

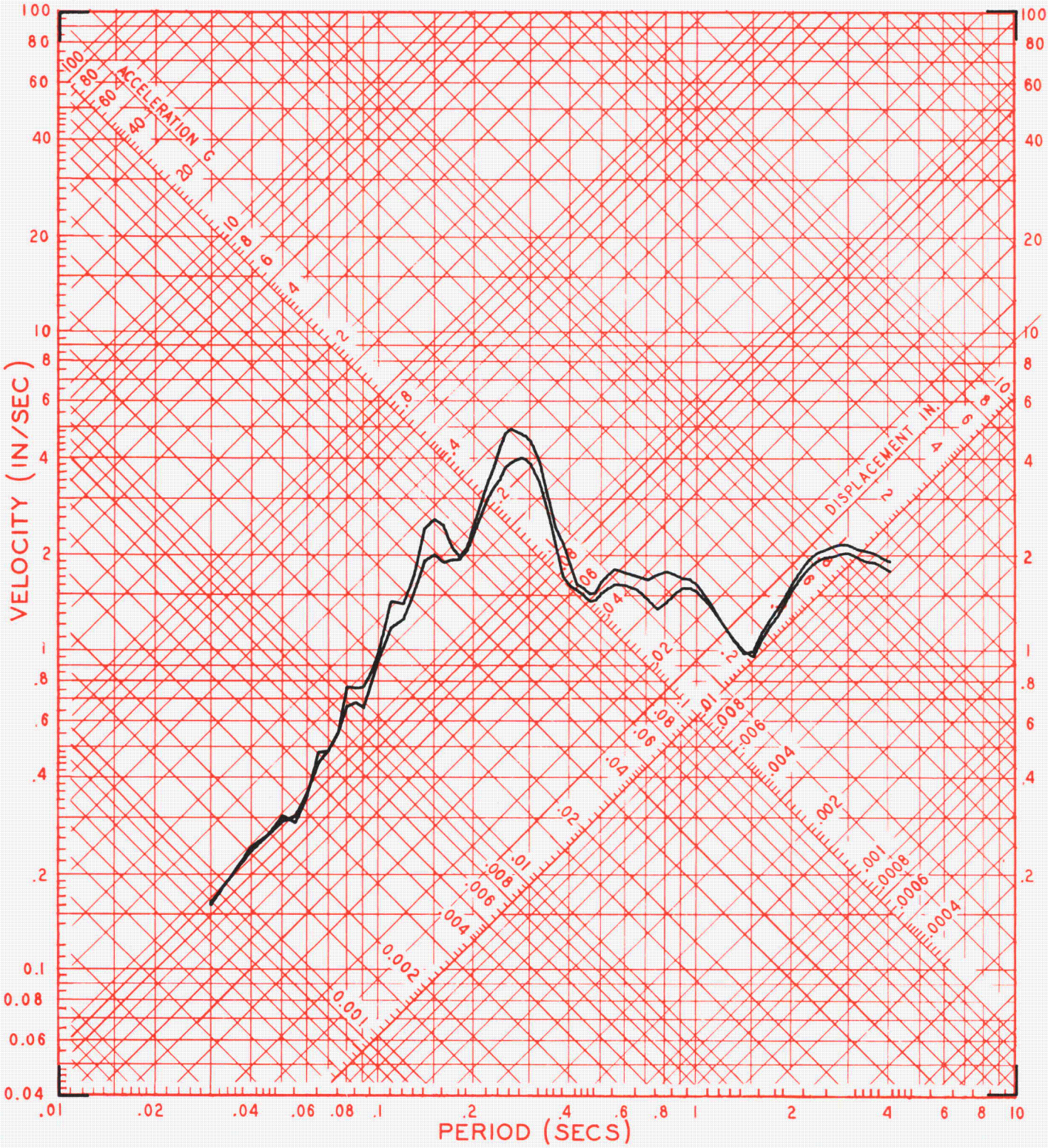

FIGURE A-3

SAN FRANCISCO EARTHQUAKE 3-22-57 1144 HRS

STATION: GOLDEN GATE PARK RECORD ID: A015 DURATION: 39.880 SEC

COMPONENT: S80E TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

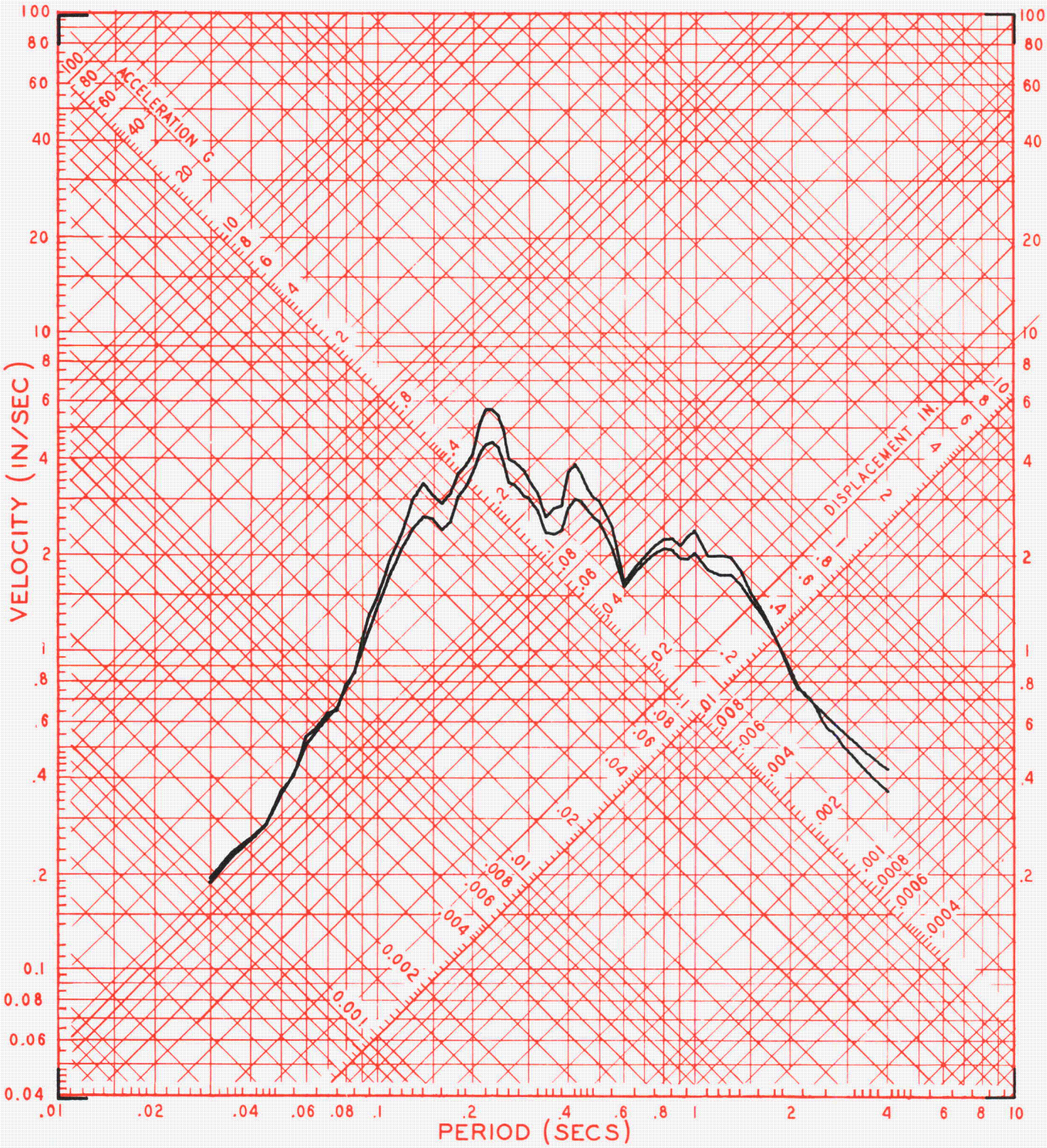

FIGURE A-4

PARKFIELD, CALIFORNIA EARTHQUAKE 6-27-66 2026 HRS

STATION: TEMBLOR RECORD ID: B037 DURATION: 30.360 SEC

COMPONENT: N65W TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

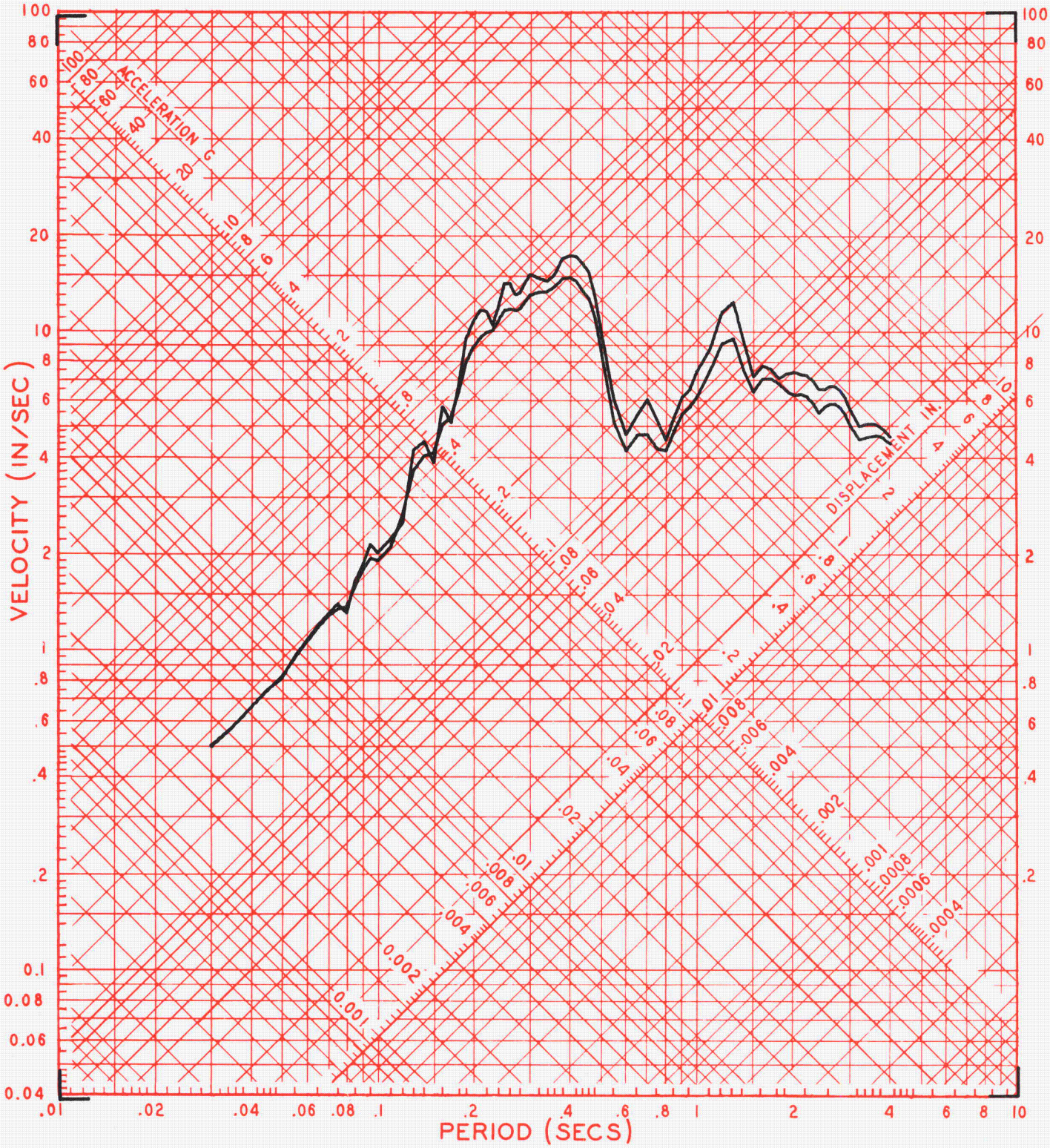

FIGURE A-5

PARKFIELD, CALIFORNIA EARTHQUAKE 6-27-66 2026 HRS

STATION: TEMBLOR RECORD ID: B037 DURATION: 30.400 SEC

COMPONENT: S25W TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

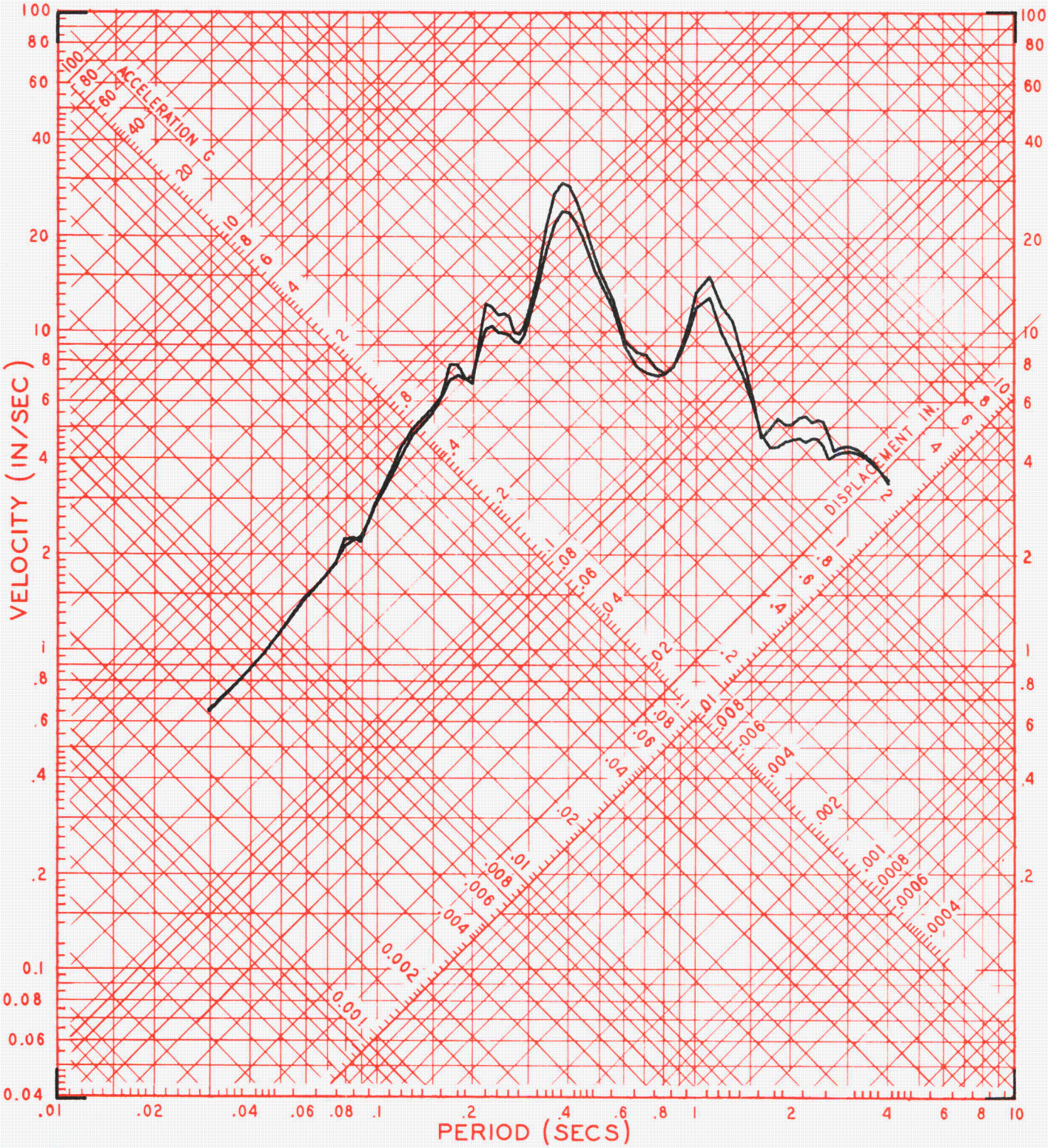

FIGURE A-6

LYTLE CREEK EARTHQUAKE 9-12-70 0600 HRS

STATION: ALLEN RANCH RECORD ID: W335 DURATION: 38.140 SEC

COMPONENT: S05W TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

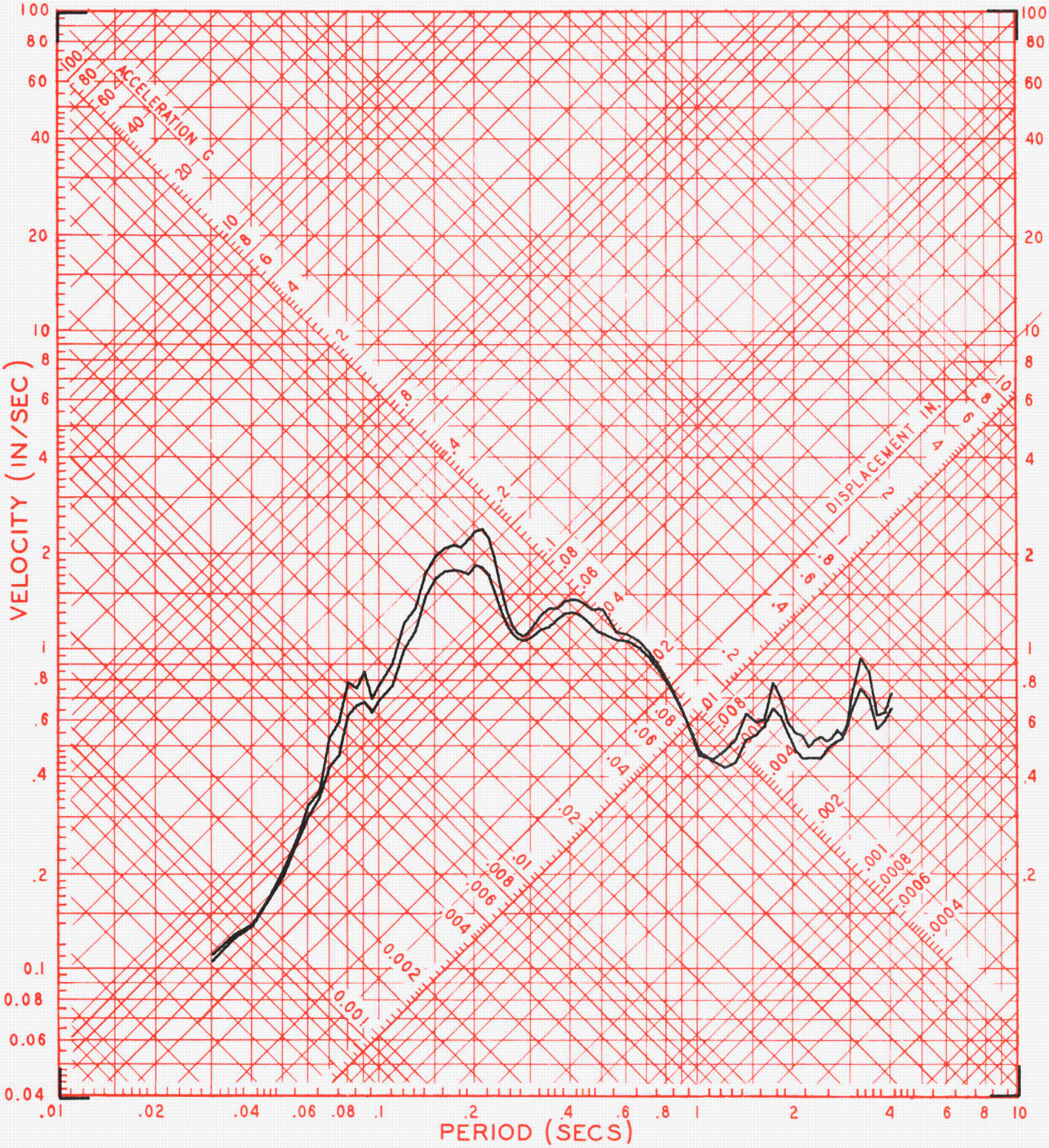

FIGURE A-7

LYTLE CREEK EARTHQUAKE 9-12-70 0600 HRS

STATION: ALLEN RANCH RECORD ID: W335 DURATION: 38.140 SEC

COMPONENT: S85E TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

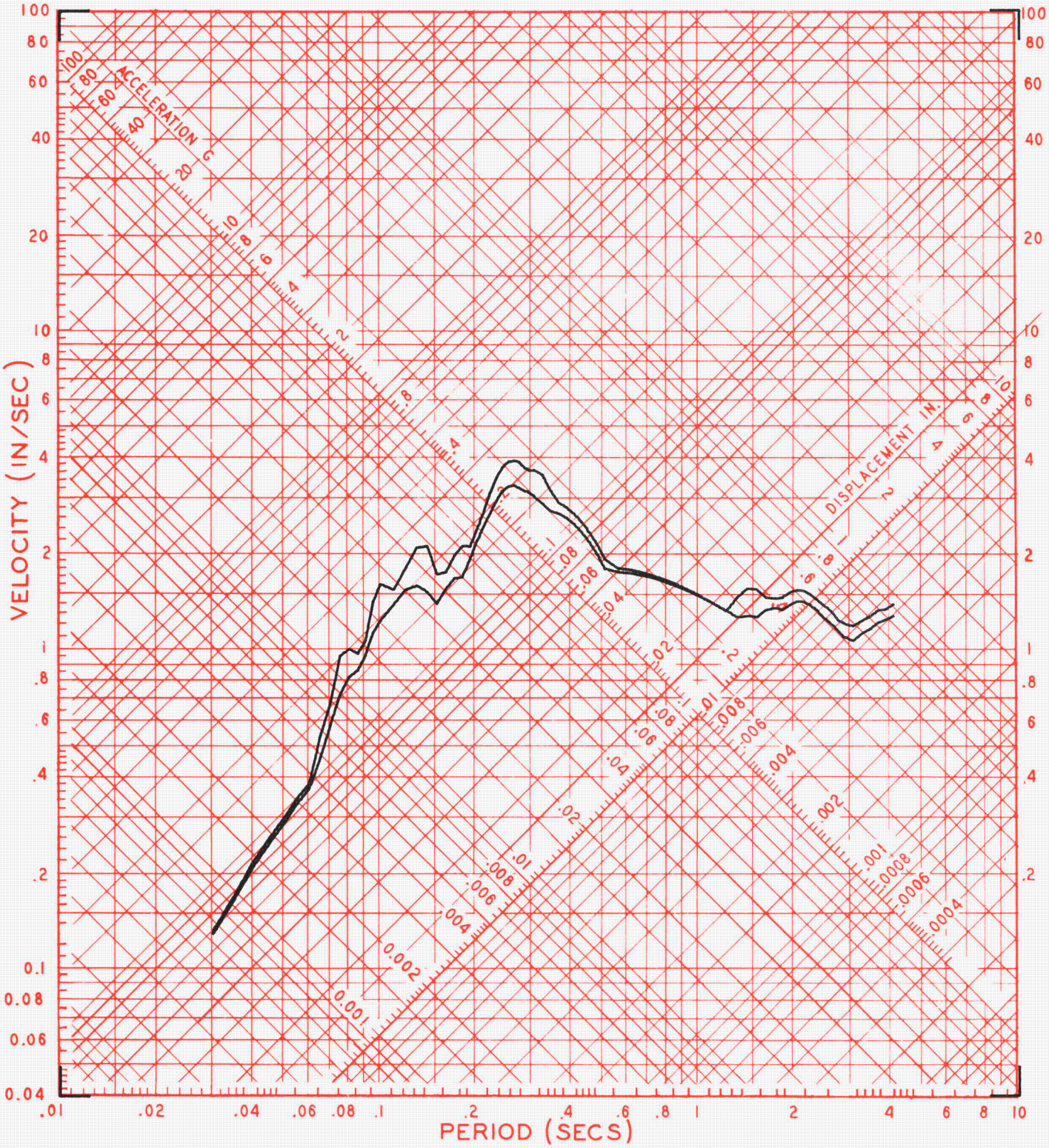

FIGURE A-8

LYTLE CREEK EARTHQUAKE 09-12-70 0600 HRS

STATION: DEVILS CANYON RECORD ID: W337 DURATION: 13.620 SEC

COMPONENT: SOUTH TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

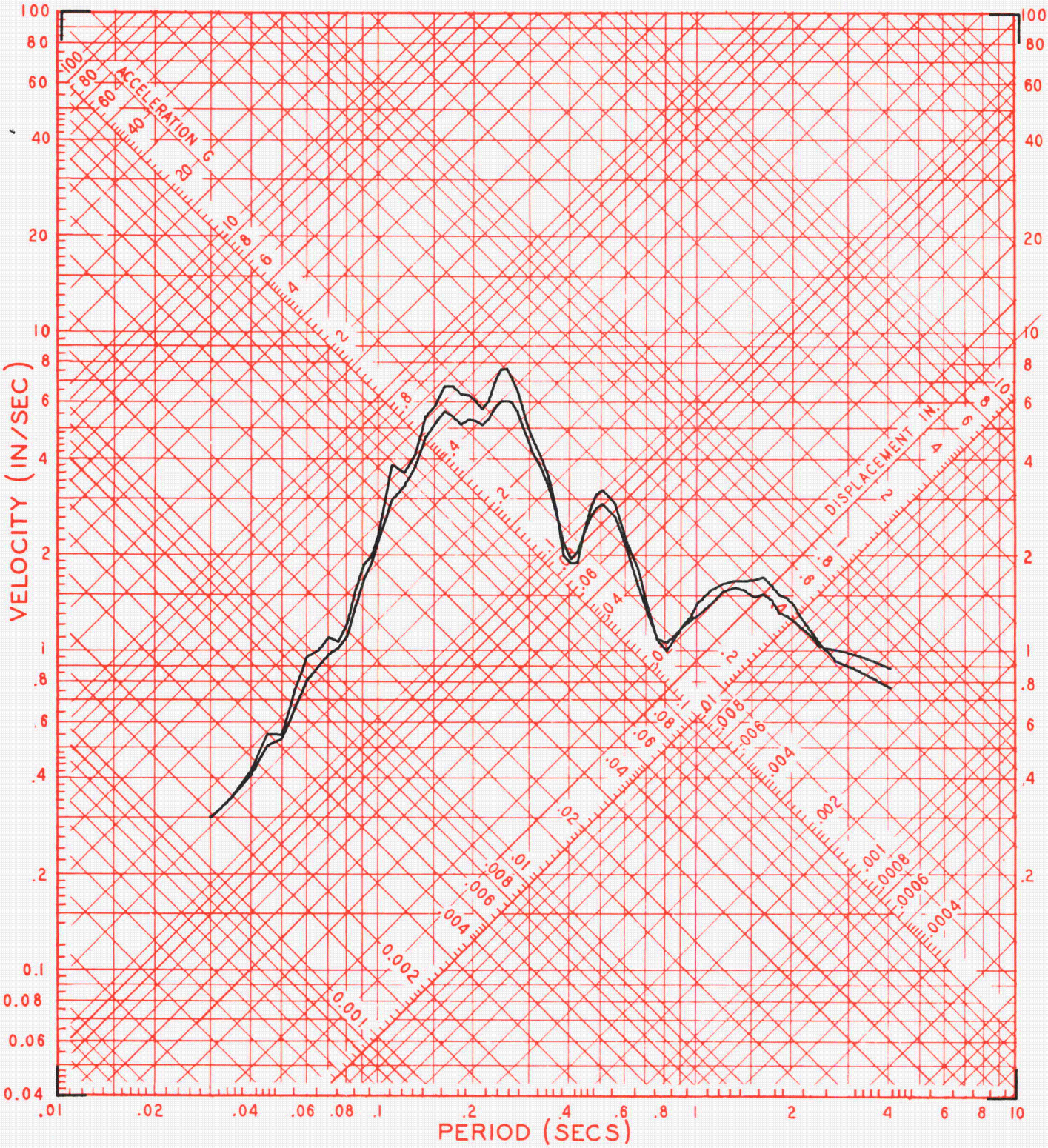

FIGURE A-9

LYTLE CREEK EARTHQUAKE 09-12-70 0600 HRS

STATION: DEVILS CANYON RECORD ID: W337 DURATION: 13.630 SEC

COMPONENT: EAST TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

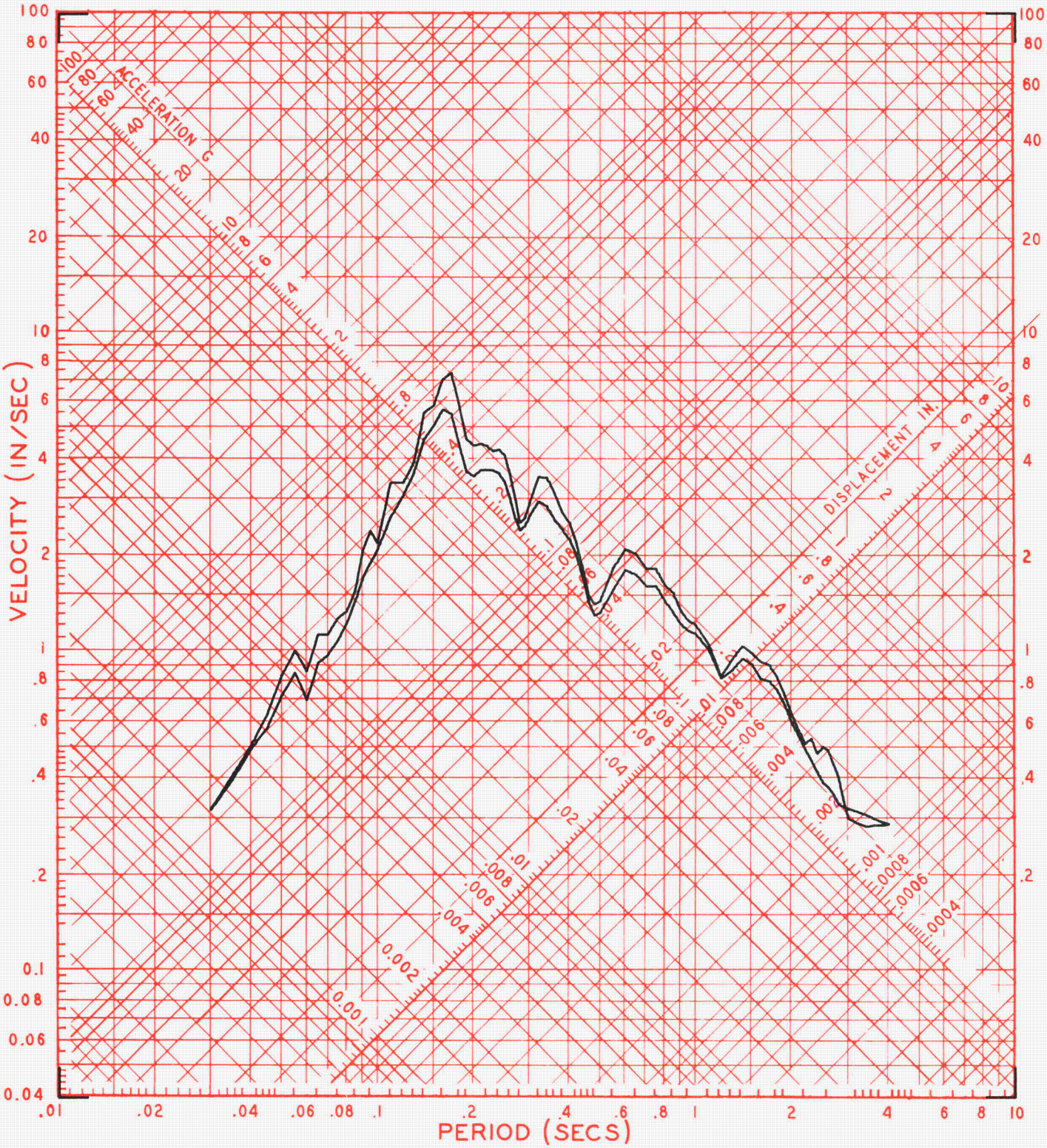

FIGURE A-10

OROVILLE, CALIFORNIA EARTHQUAKE 8-1-75 2020 HRS

STATION: OROVILLE DAM RECORD ID: DURATION: 12.195 SEC

COMPONENT: N37E TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

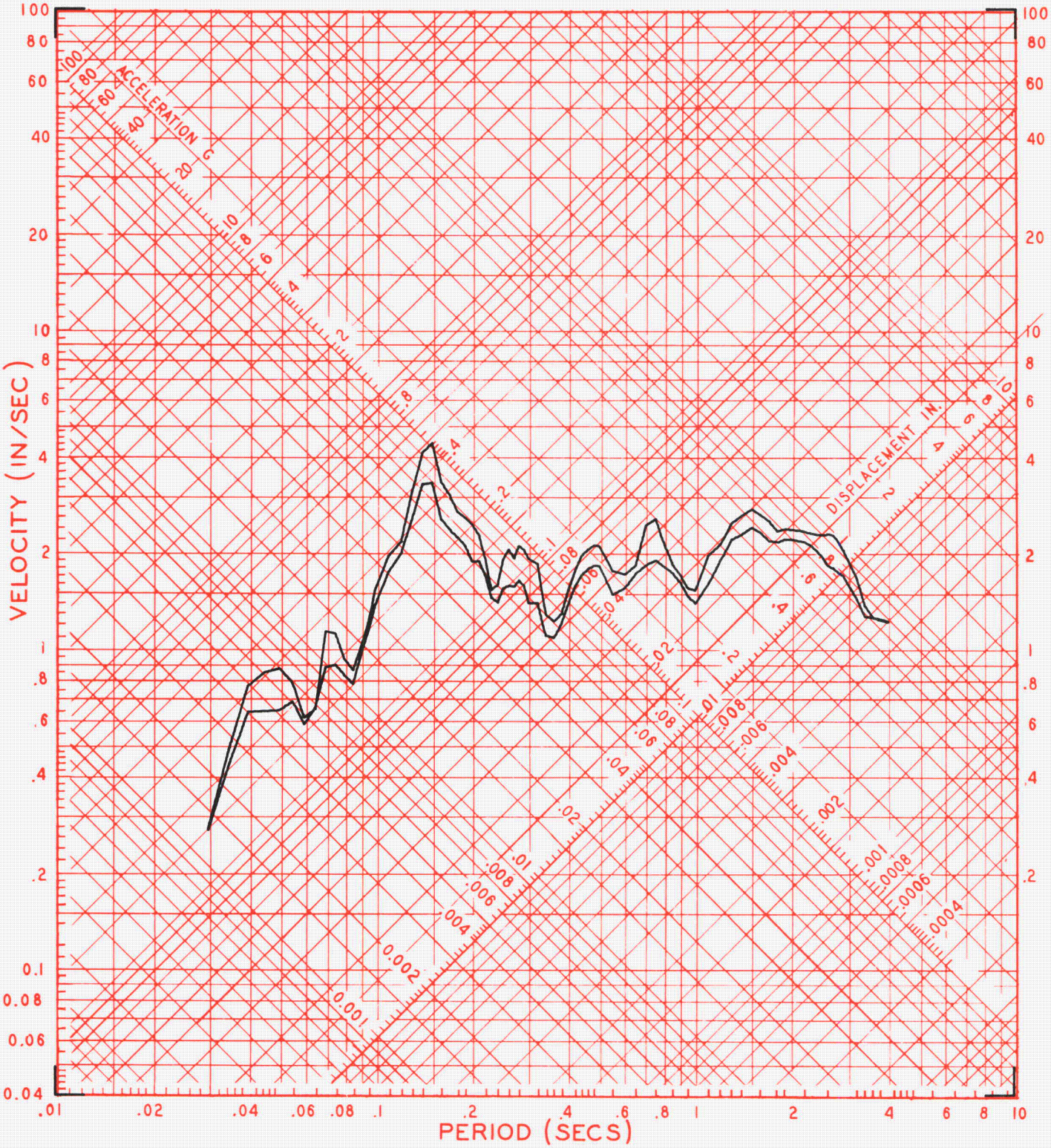

FIGURE A-11

OROVILLE, CALIFORNIA EARTHQUAKE 8-1-75 2020 HRS

STATION: OROVILLE DAM RECORD ID: DURATION: 12.225 SEC

COMPONENT: N53W TIME STEP: 0.005 SEC

DAMPING RATIOS: 0.04 0.07

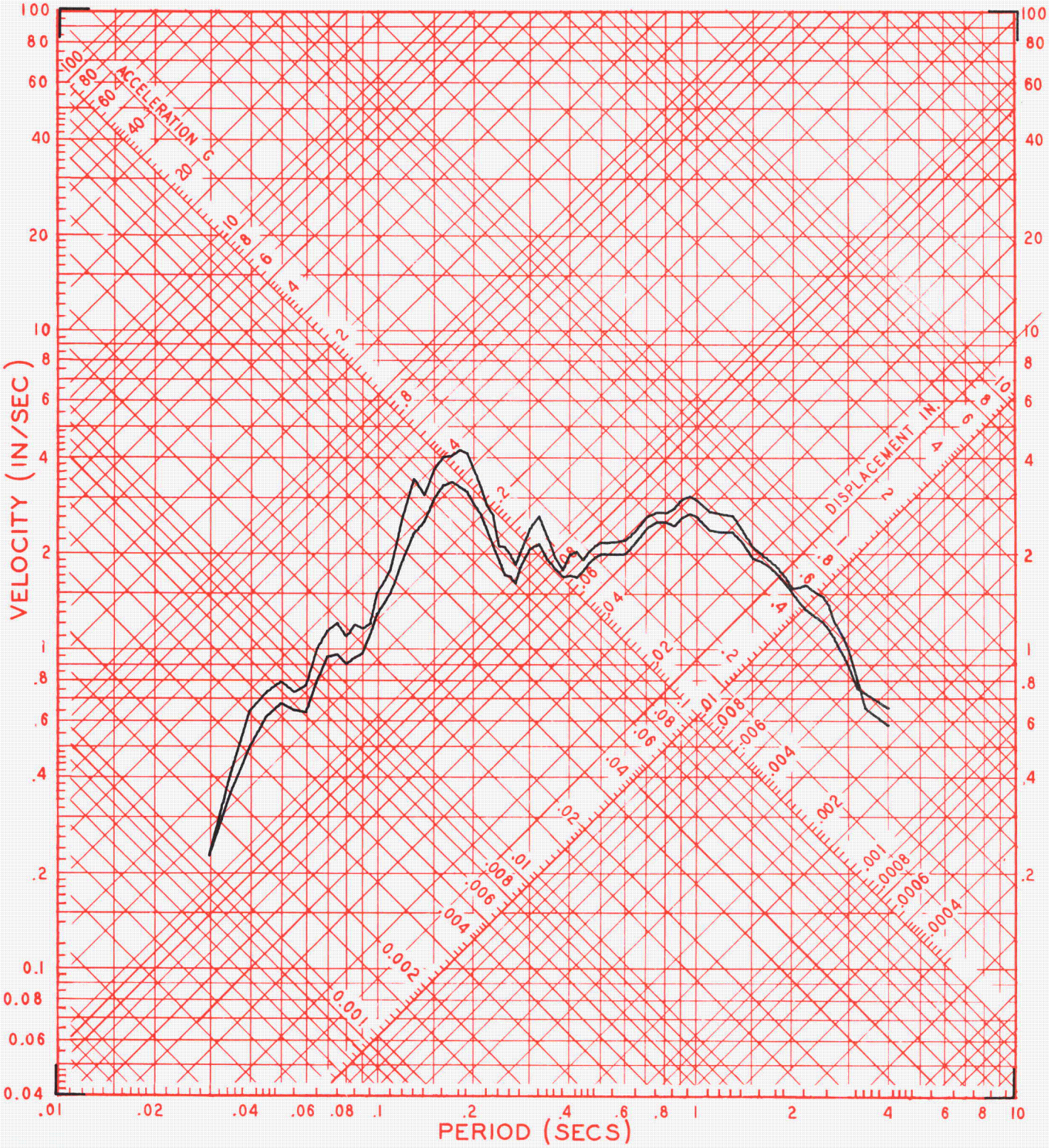

FIGURE A-12

FRIULI, ITALY EARTHQUAKE SERIES 05-06-76 2000 HRS

STATION: TOLMEZZO RECORD ID: 038 DURATION: 36.590 SEC

COMPONENT: N-S TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

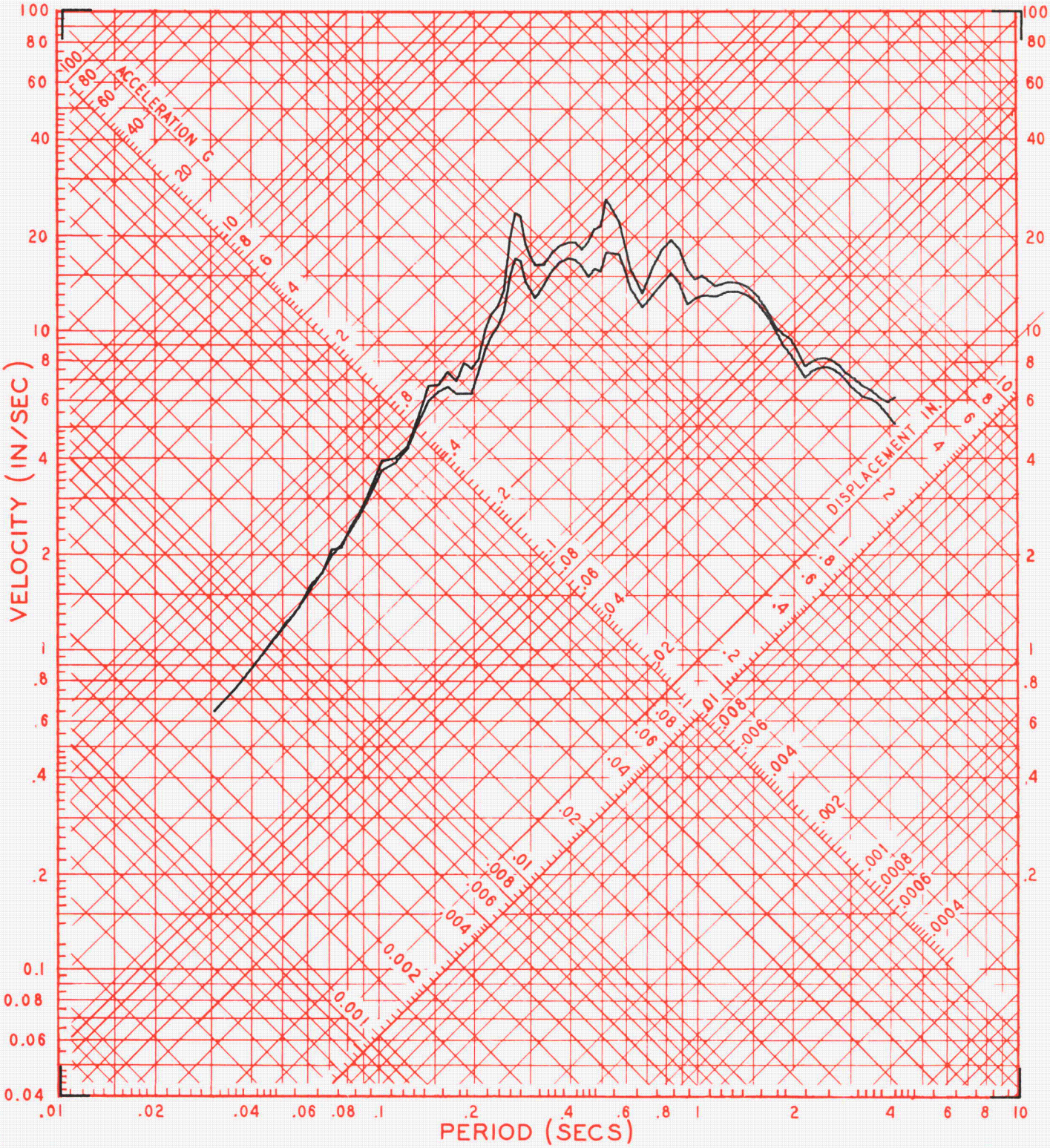

FIGURE A-13

FRIULI, ITALY EARTHQUAKE SERIES 05-06-76 2000 HRS

STATION: TOLMEZZO RECORD ID: 038 DURATION: 35.500 SEC

COMPONENT: E-W TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

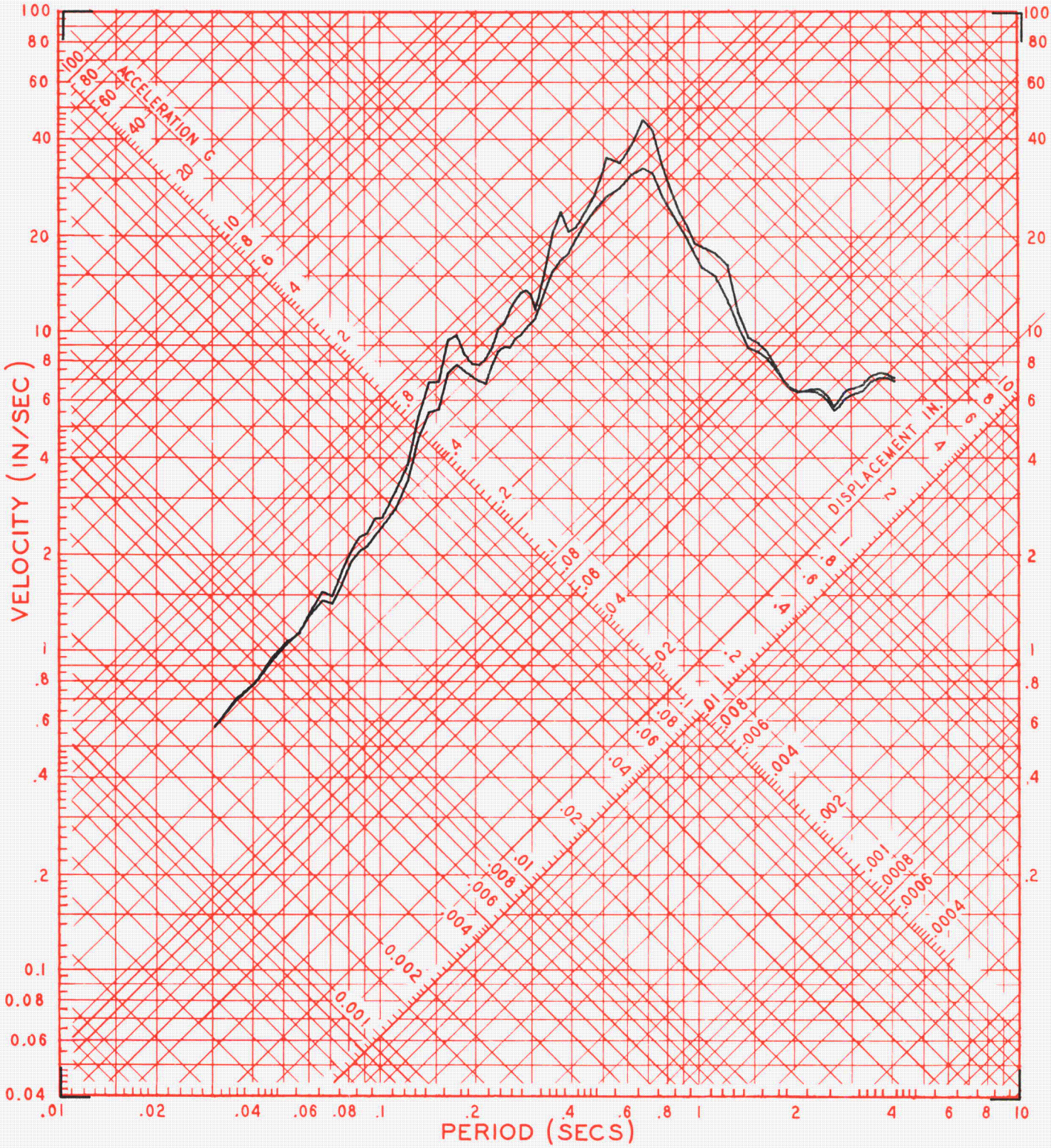

FIGURE A-14

FRIULI, ITALY EARTHQUAKE SERIES 05-09-76 0053 HRS

STATION: TOLMEZZO RECORD ID: 054 DURATION: 11.060 SEC

COMPONENT: N-S TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

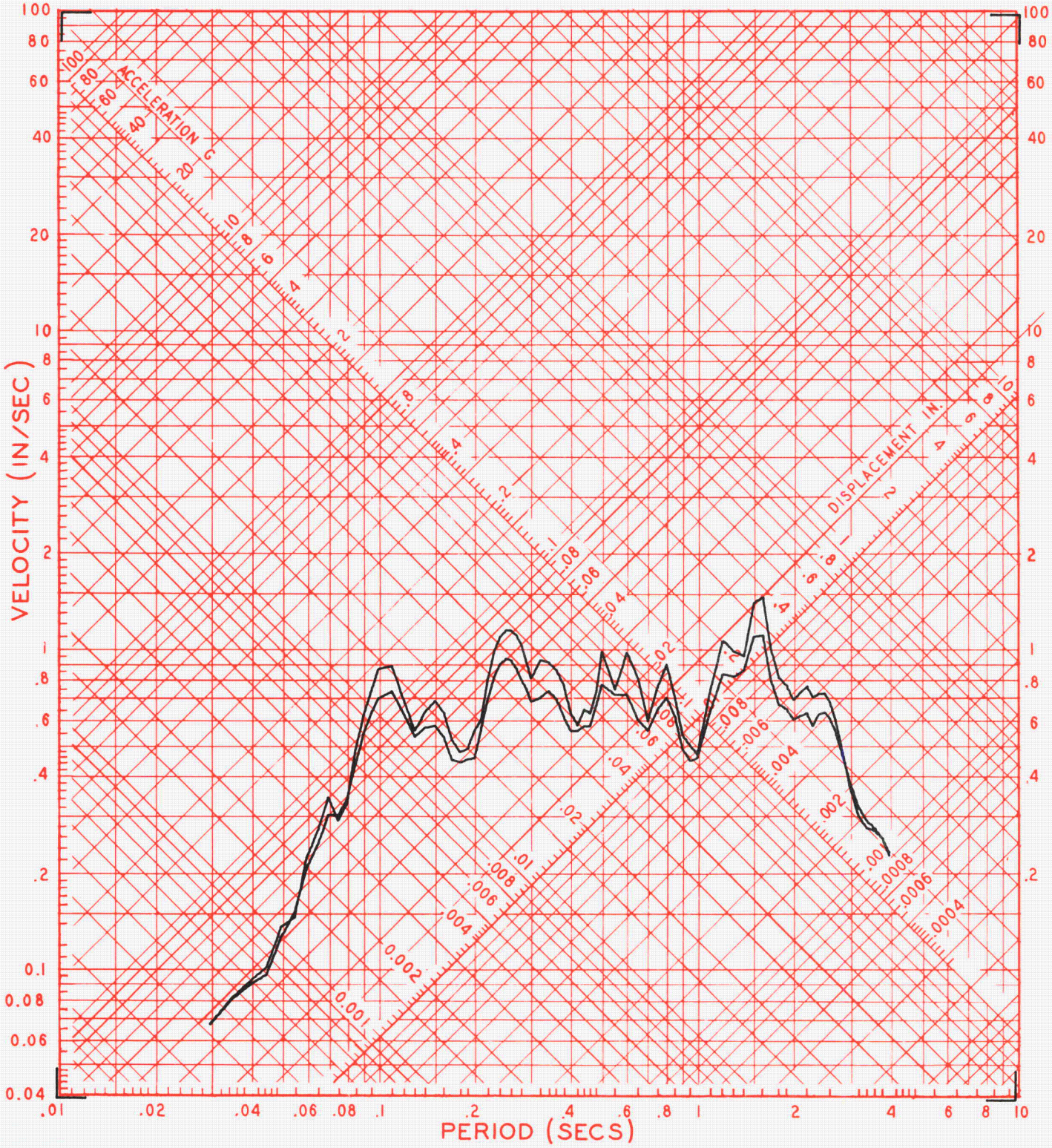

FIGURE A-15

FRIULI, ITALY EARTHQUAKE SERIES 05-09-76 0053 HRS

STATION: TOLMEZZO RECORD ID: 054 DURATION: 13.650 SEC

COMPONENT: E-W TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

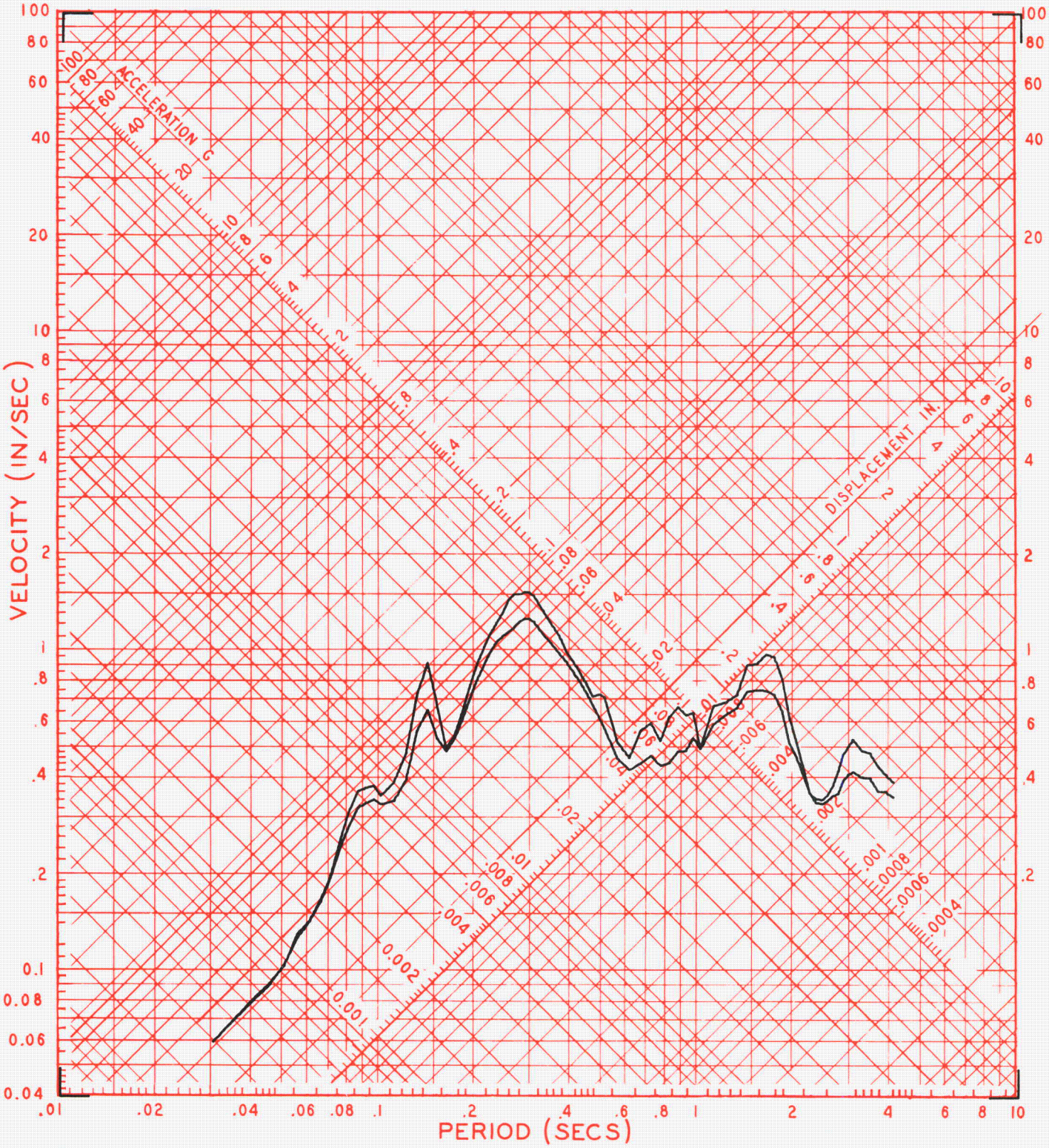

FIGURE A-16

FRIULI, ITALY EARTHQUAKE SERIES 05-11-76 2244 HRS

STATION: TOLMEZZO RECORD ID: 063 DURATION: 17.560 SEC

COMPONENT: N-S TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

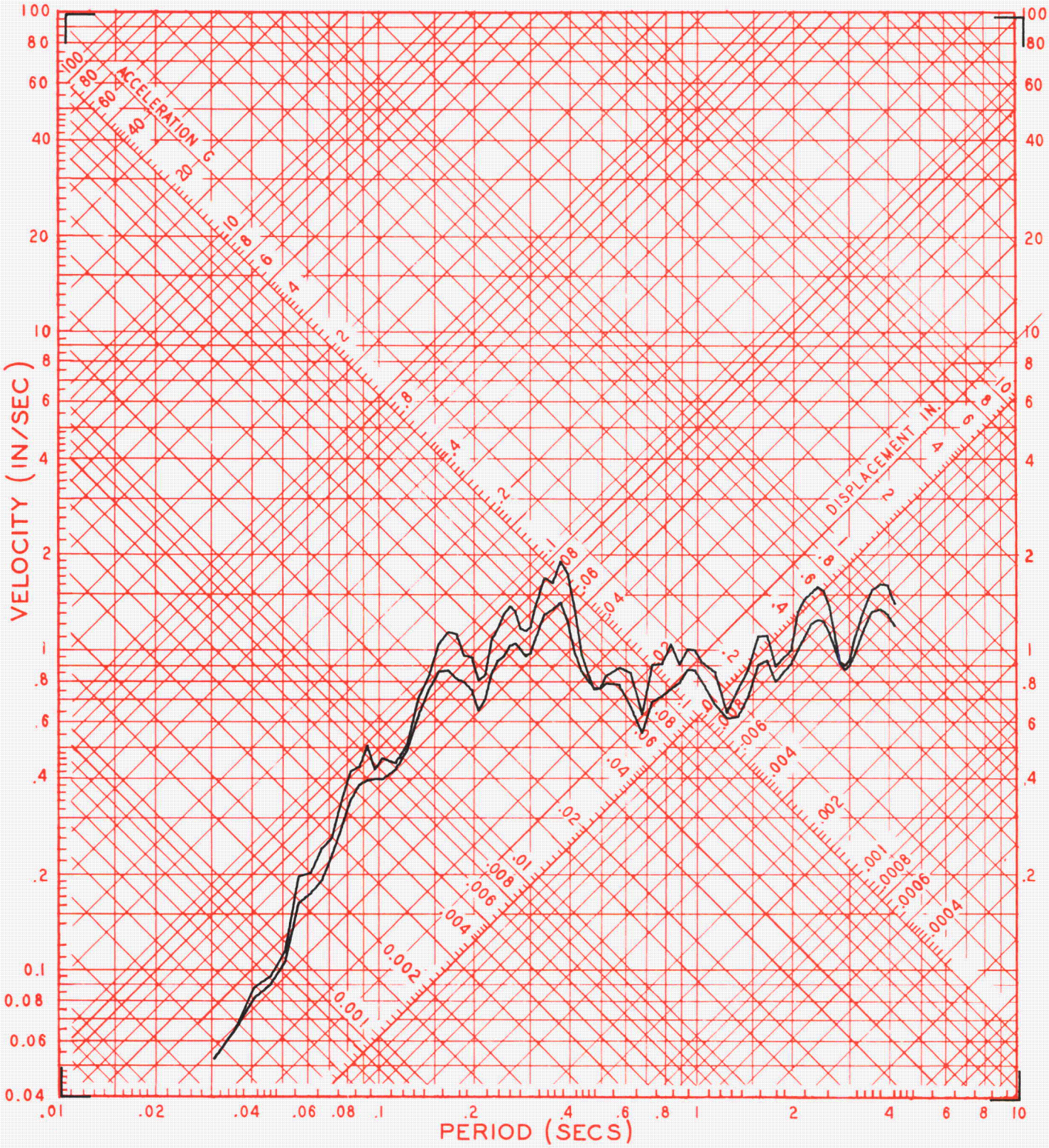

FIGURE A-17

FRIULI, ITALY EARTHQUAKE SERIES 05-11-76 2244 HRS

STATION: TOLMEZZO RECORD ID: 063 DURATION: 17.560 SEC

COMPONENT: E-W TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

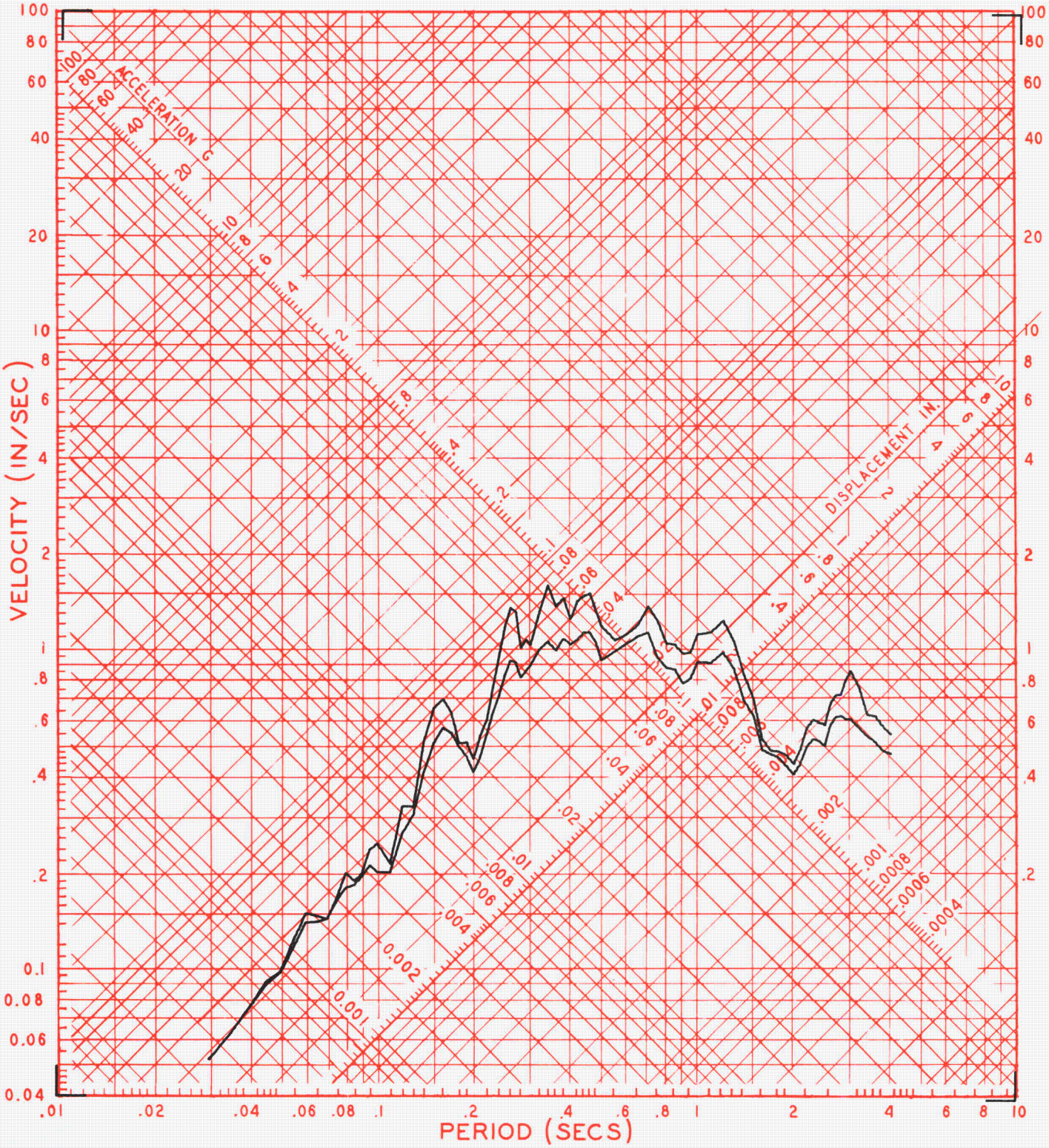

FIGURE A-18

FRIULI,ITALY EARTHQUAKE SERIES 09-11-76 1631 HRS

STATION: S.ROCCO RECORD ID: 132 DURATION: 10.650 SEC

COMPONENT: N-S TIME STEP: 0.010 SEC

DAMPING RATIOS: 0.04 0.07

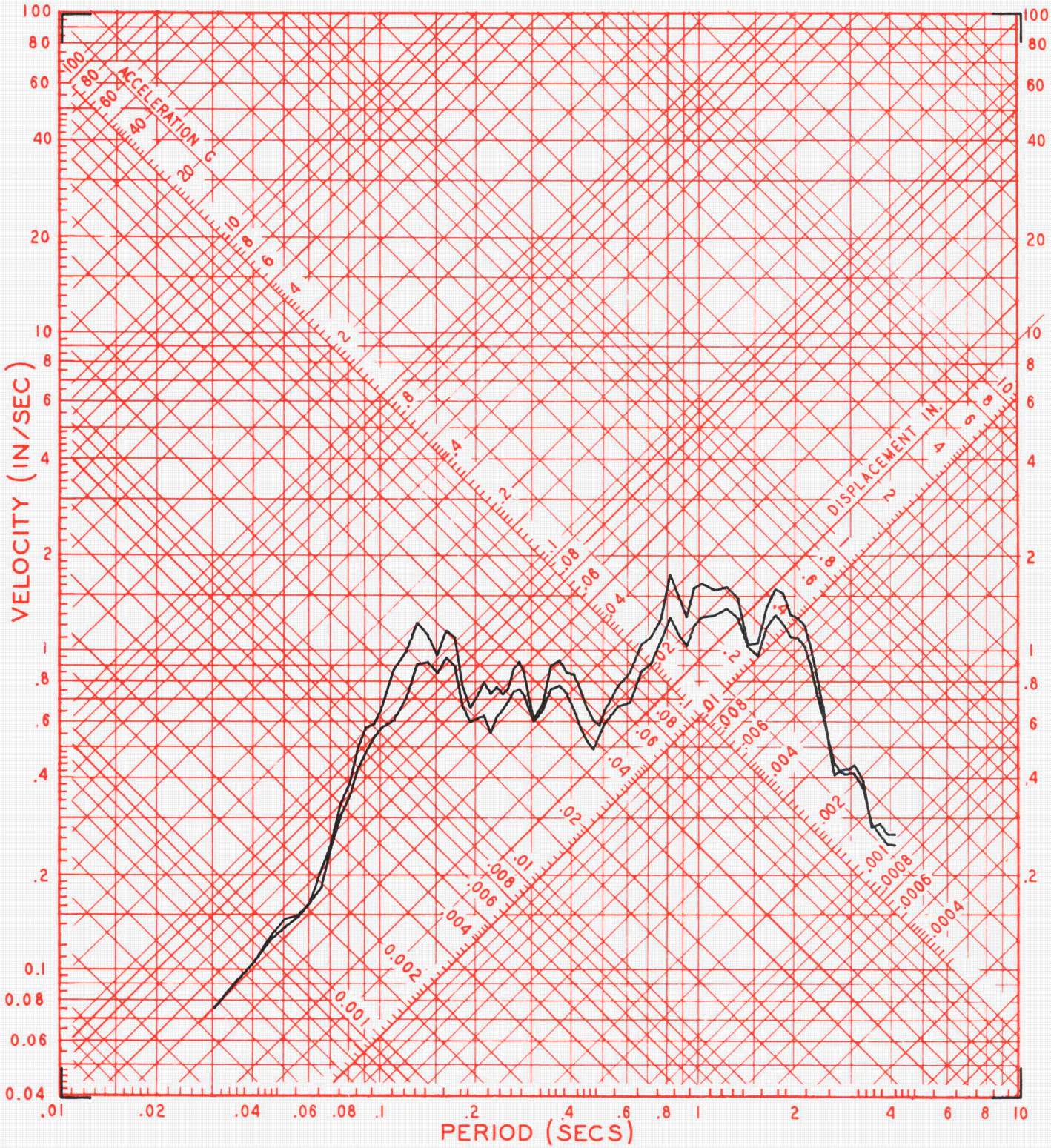

FIGURE A-19