YUCCA MOUTAIN GROUND MOTION STUDY

REGRESSION MODELS, REVISION 3
VOLUME 11C

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Civilian Radioactive Waste Management System
Management & Operating Contractor

Chapter 11
Total System Performance Assessment-Viability Assessment (TSPA-VA) Analyses Technical Basis Document

Summary and Conclusions

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Yucca Mountain Ground Motion Data Package

Regression Models
Rev 3

Expert: Campbell

Vol 11 C

7/97

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1. Introduction

This volume provides the results of the regression fits to Campbell's expert point estimates (Revision 2) using regression model 3 described below. Regression model 3 includes a sqrt($R^2+a_8^2$) term inside the log as opposed to a ($R+ a_8$) as was used in model 2. The distance dependence of σ and σ_σ was removed since this was not significant.

Notes:
Based on reviews from Campbell of regression model 2 (vol 10C), additional saturation of the high frequency ground motion at short distances was included in the model. The distinction between footwall and hanging wall sites was not included in the median model (a9=0, a10=0). It is accomodated in the aleatory standard deviation.

1.1 Functional Form of Regression

Regression model 3 is based on the functional forms given below. The independent variables are:

M =	moment magnitude
R =	distance (in km). This is dependent on the expert's selected distance measure.
F =	mechanism flag (0=strike-slip, 1 = normal)
HW =	Hanging wall flag (1=hanging wall, 0 = not hanging wall)
FW =	Footwall flag (1=footwall, 0=not footwall)

The resulting values for μ are in natural logarithm of g for spectral acceleration and natural logarithm of cm/s for peak velocity. The σ, σ_μ , σ_σ are all in natural log units.

Mu:

For $M < a_{11}$

$$\mu = a_1 + a_2*(M-a_{11}) + a_6*(8.5-M)^2 + [a_3+a_5*(M-a_{11})] *\ln(\mathrm{sqrt}(R^2+a_8^2)) + a_7*F + a_9*f_1(M,R)*HW + a_{10}*f_1(M,R)*FW$$

For $M > a_{11}$

$$\mu = a_1 + a_4*(M-a_{11}) + a_6*(8.5-M)^2 + [a_3+a_5*(M-a_{11})] *\ln(\mathrm{sqrt}(R^2+a_8^2)) + a_7*F + a_9*f_1(M,R)*HW + a_{10}*f_1(M,R)*FW$$

where $f_1(M,R) =$

$$f1(M,R) = \begin{cases} 0 & \text{for } R \le x_1 \\ \dfrac{(R-x_1)}{(x_2-x_1)} & \text{for } x_1 > R > x_2 \\ 1 & \text{for } x_2 \ge R \le x_3 \\ \dfrac{(x_4-R)}{(x_4-x_3)} & \text{for } x_3 > R > x_4 \\ 0 & \text{for } R \ge x_4 \end{cases} * \begin{cases} 0 & \text{for } M < a_{11} \\ \dfrac{M-a_{11}}{a_{12}-a_{11}} & \text{for } a_{11} \le M \le a_{12} \\ 1 & \text{for } M > a_{12} \end{cases}$$

Sigma:

For $M < b_4$

$$\sigma = b_1 + b_2*(M-b_4)$$

For $M \ge b_4$

$$\sigma = b_1$$

Sigma Mu:

$$\sigma_\mu = c_1 + c_2*(M-c_6) + c_3*\ln(R+1) + c_4*[\ln(R+1)]^2 + c_5*F$$

Sigma Sigma:

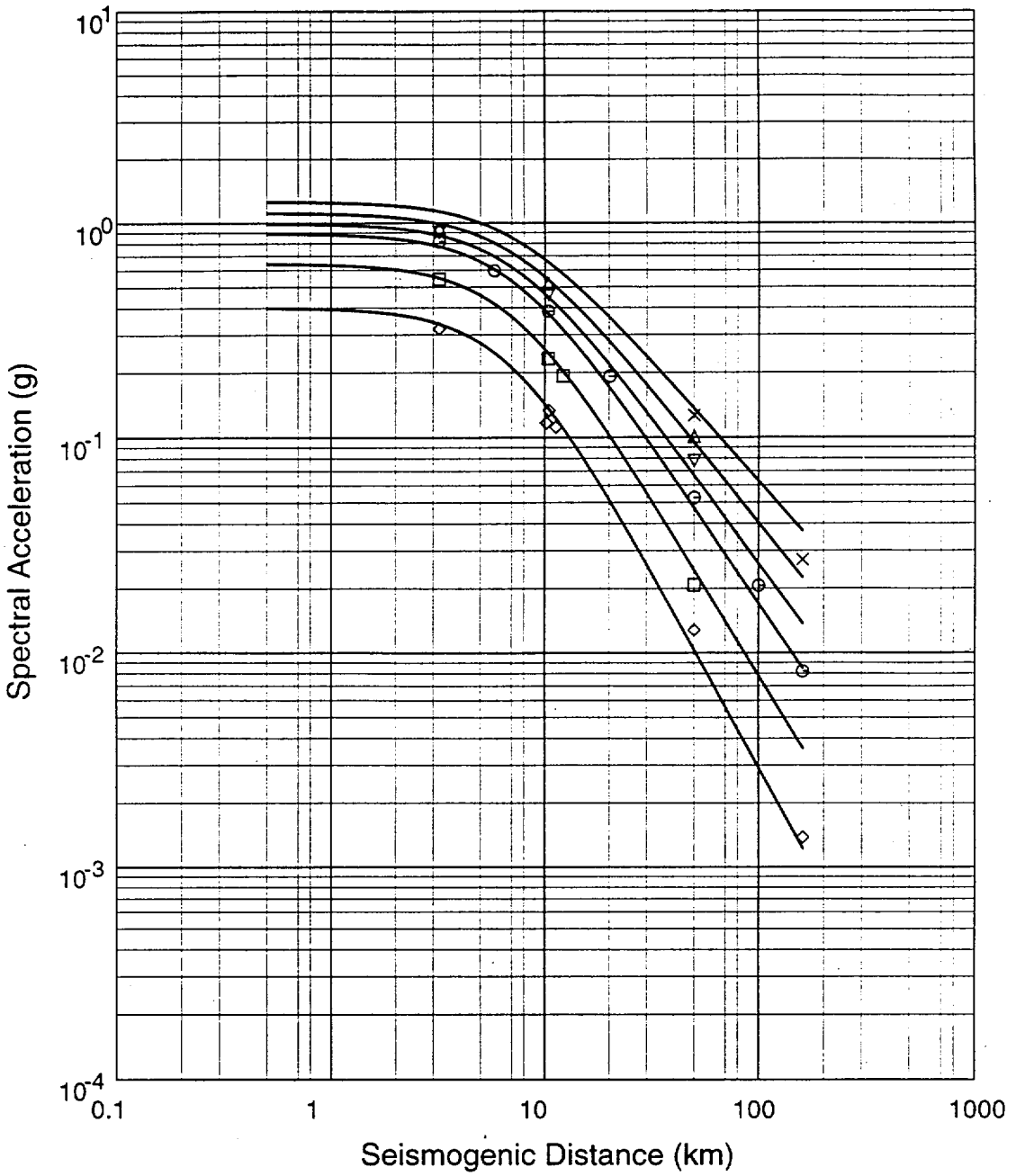
For $M < d_4$

$$\sigma_\sigma = d_1 + d_2*(M-d_4)$$

For $M \geq d_4$

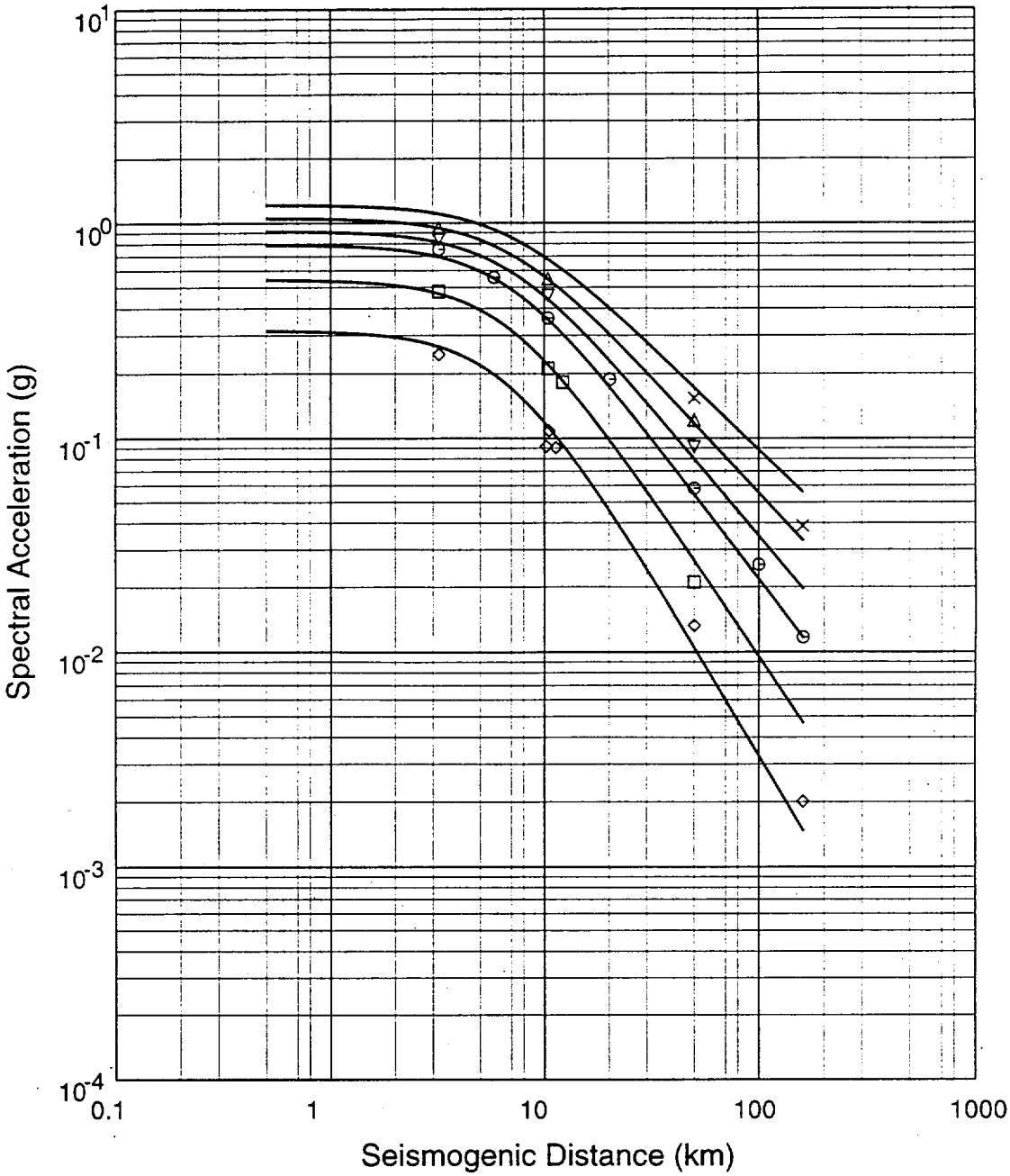
$$\sigma_\sigma = d_1$$

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 10.0 Hz



◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 5.0 Hz



◇ M 5.0, SS
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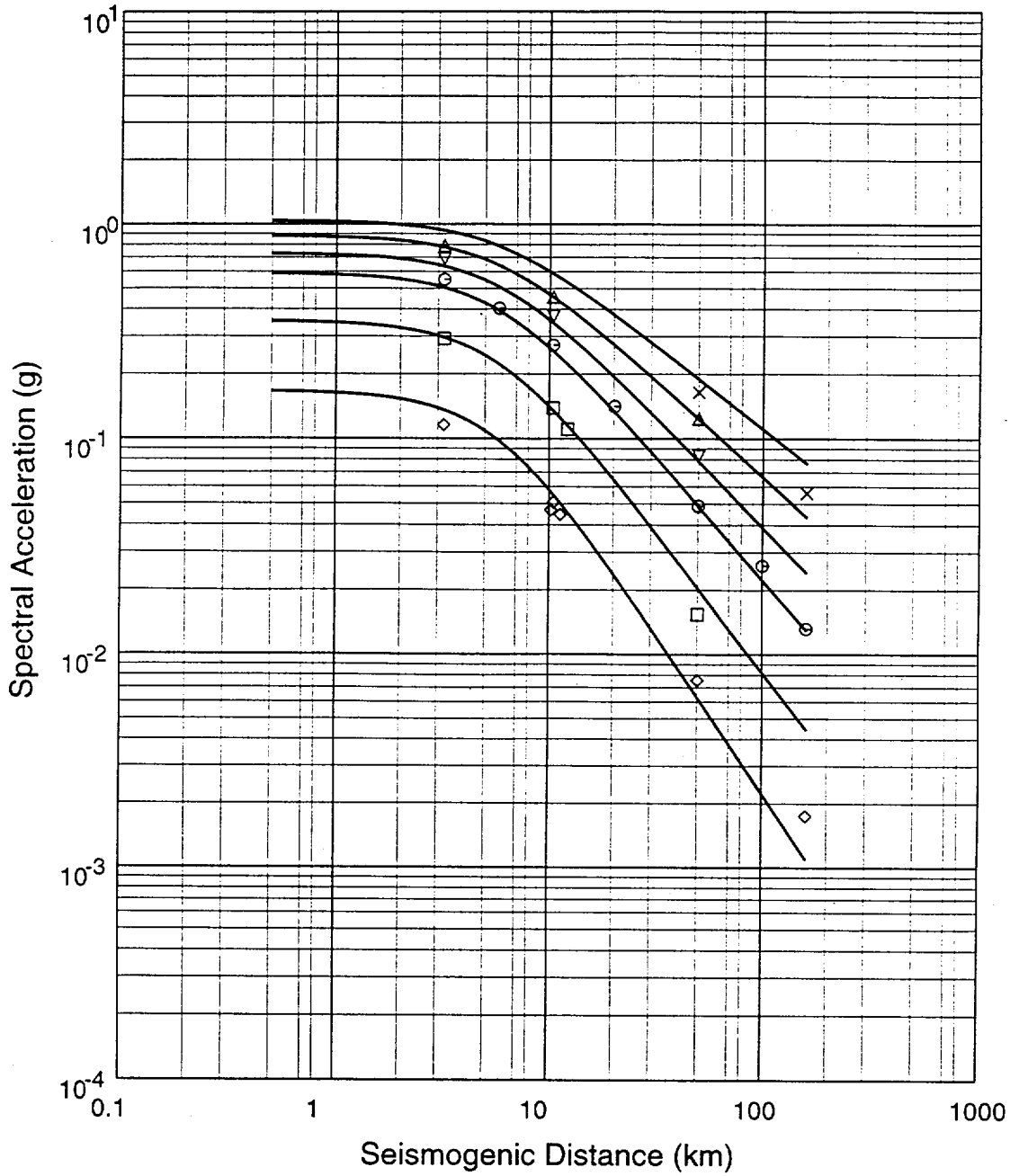
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 2.0 Hz



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▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

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Strike-Slip Faulting Attenuation, Horizontal Comp
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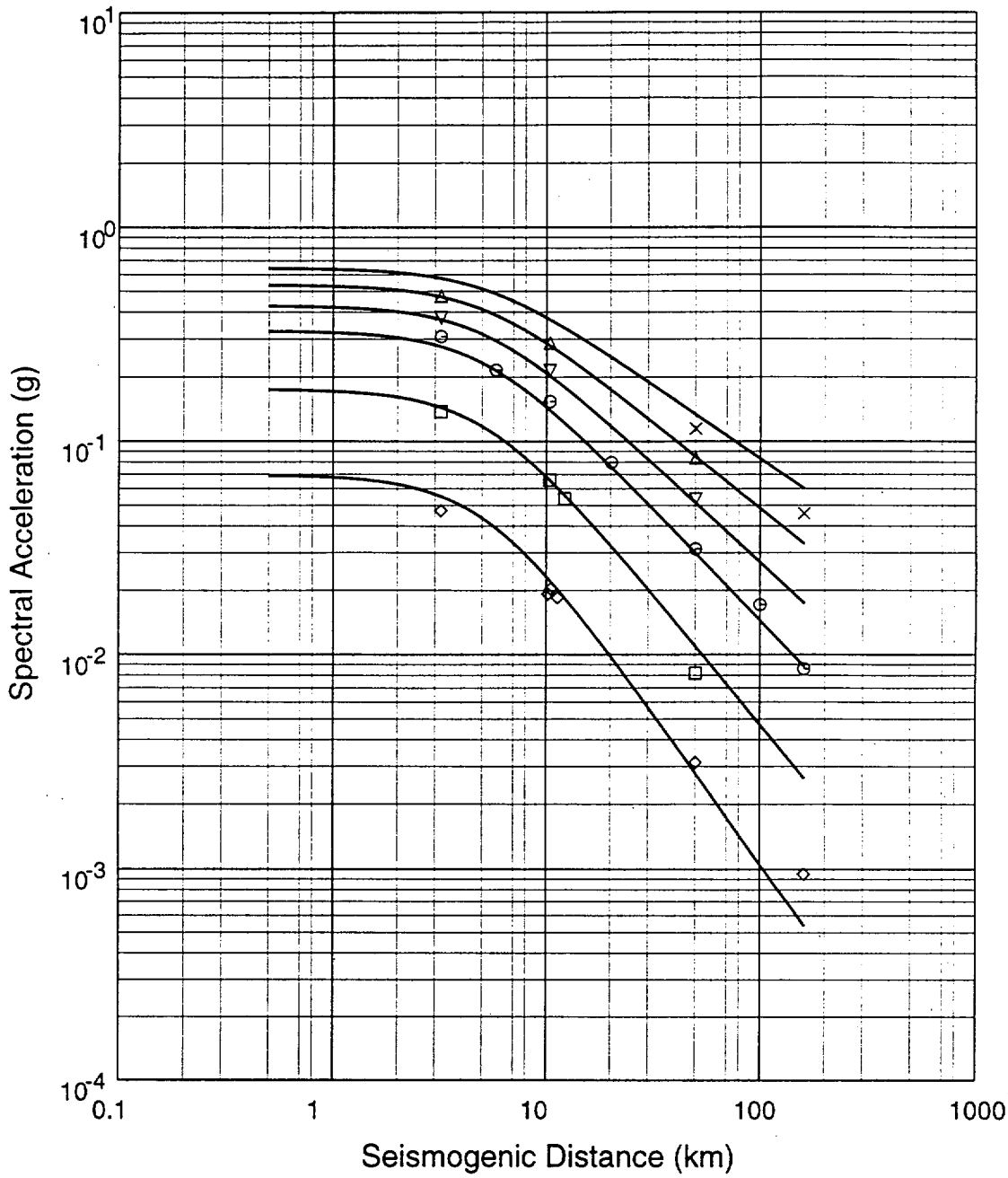

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× M 8.0, SS

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Strike-Slip Faulting Attenuation, Horizontal Comp
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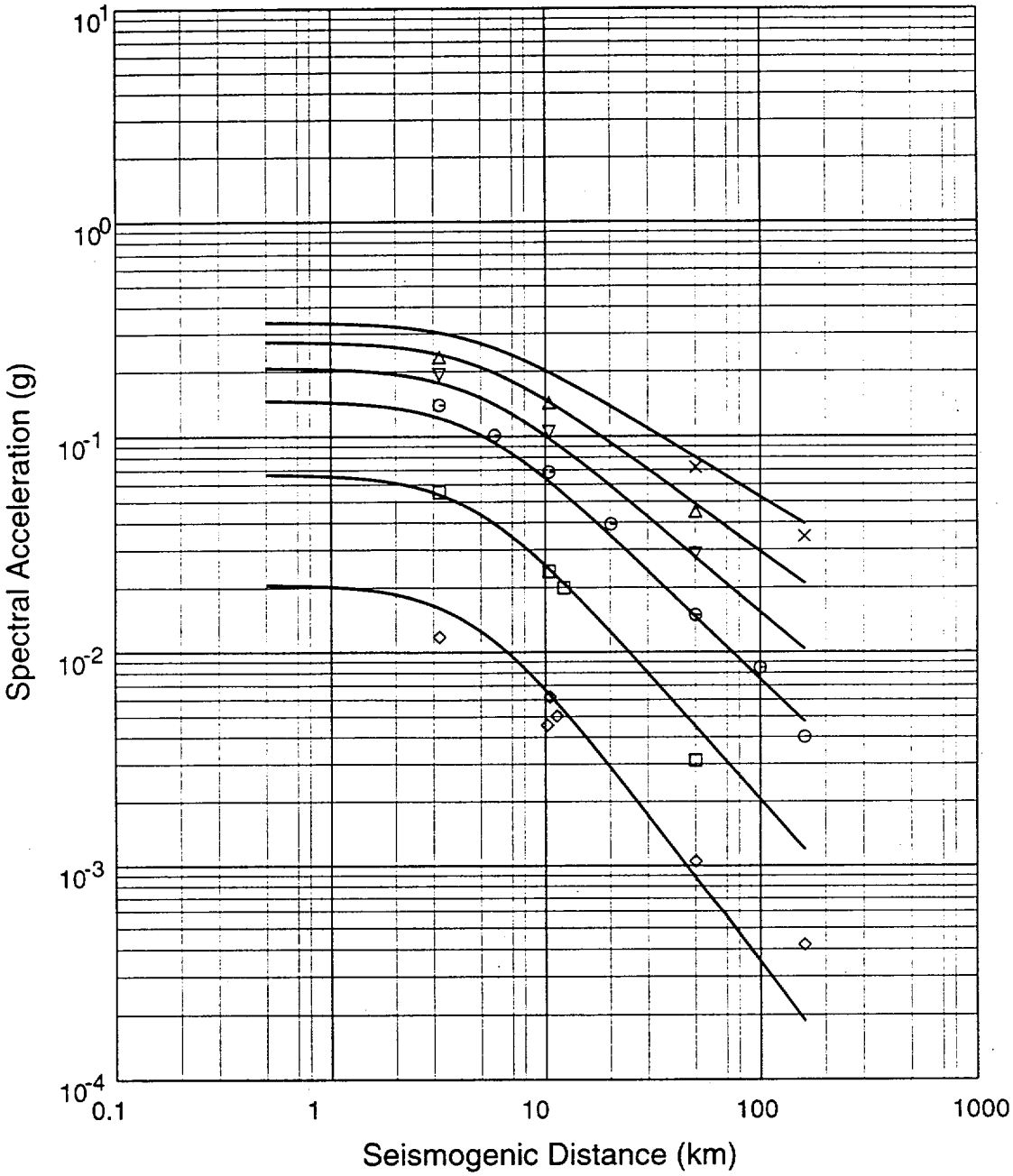

◇ M 5.0, SS
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⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
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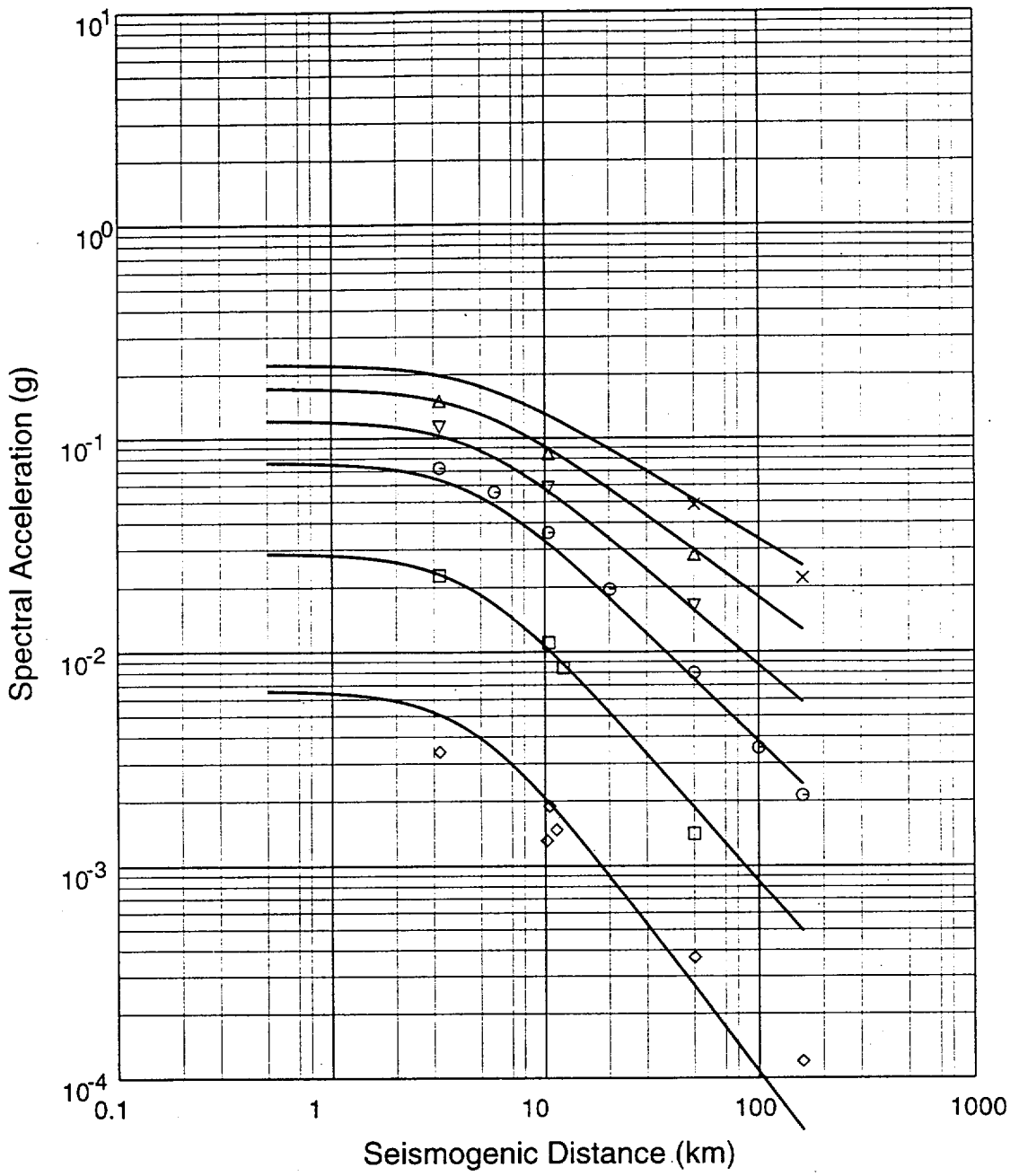

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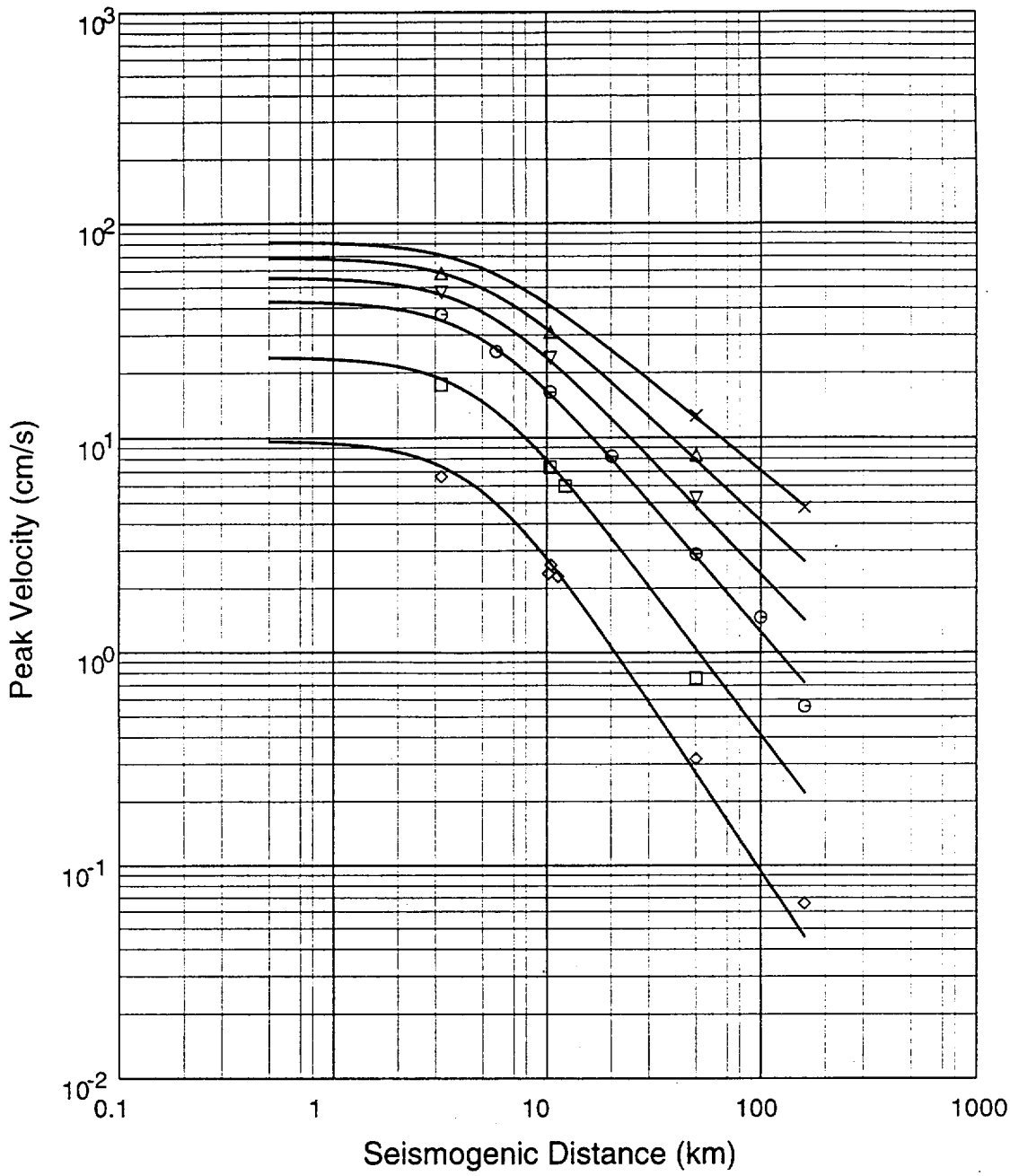
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Peak Velocity



◇ M 5.0, SS
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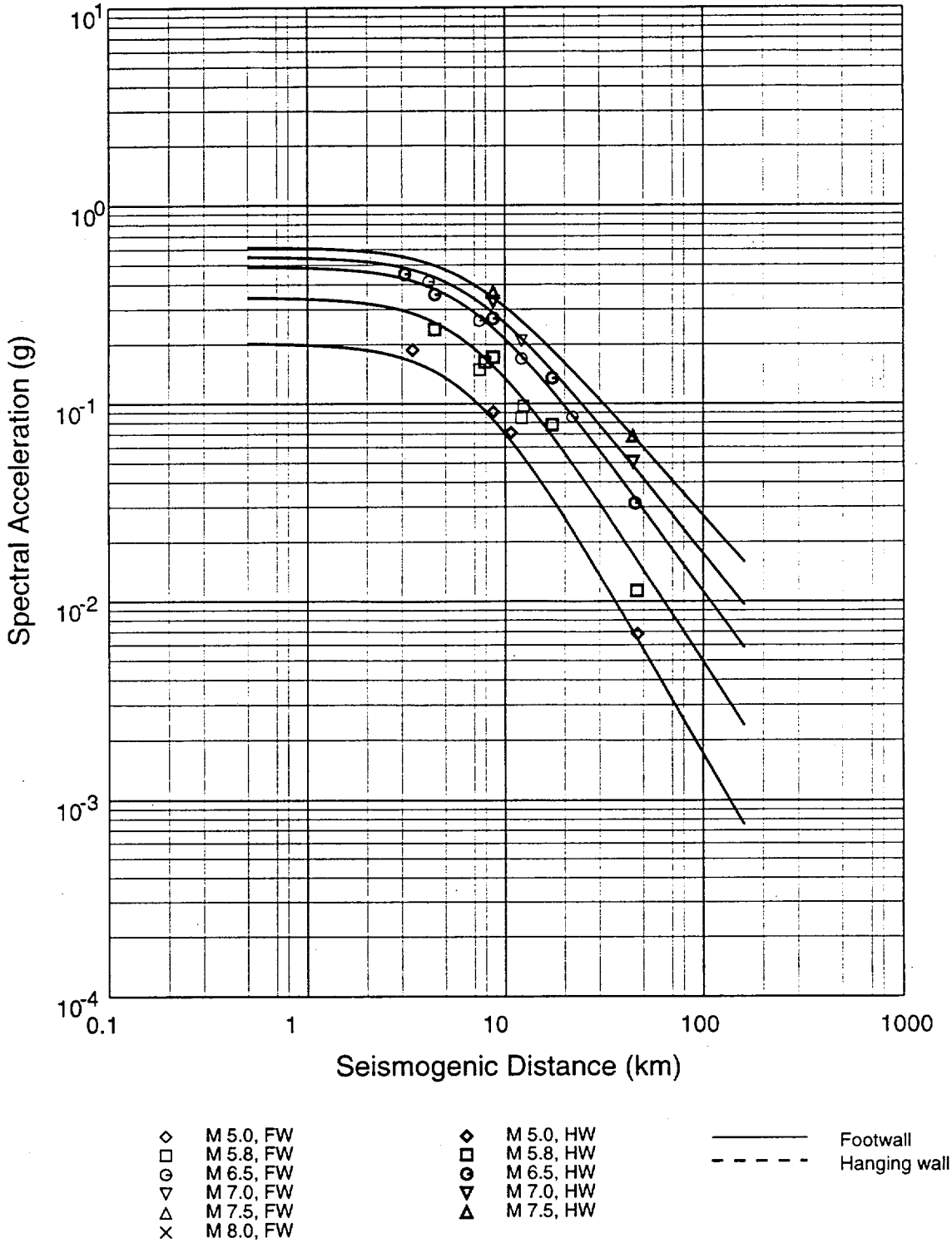
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 100.0 Hz



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Normal Faulting Attenuation, Horizontal Comp
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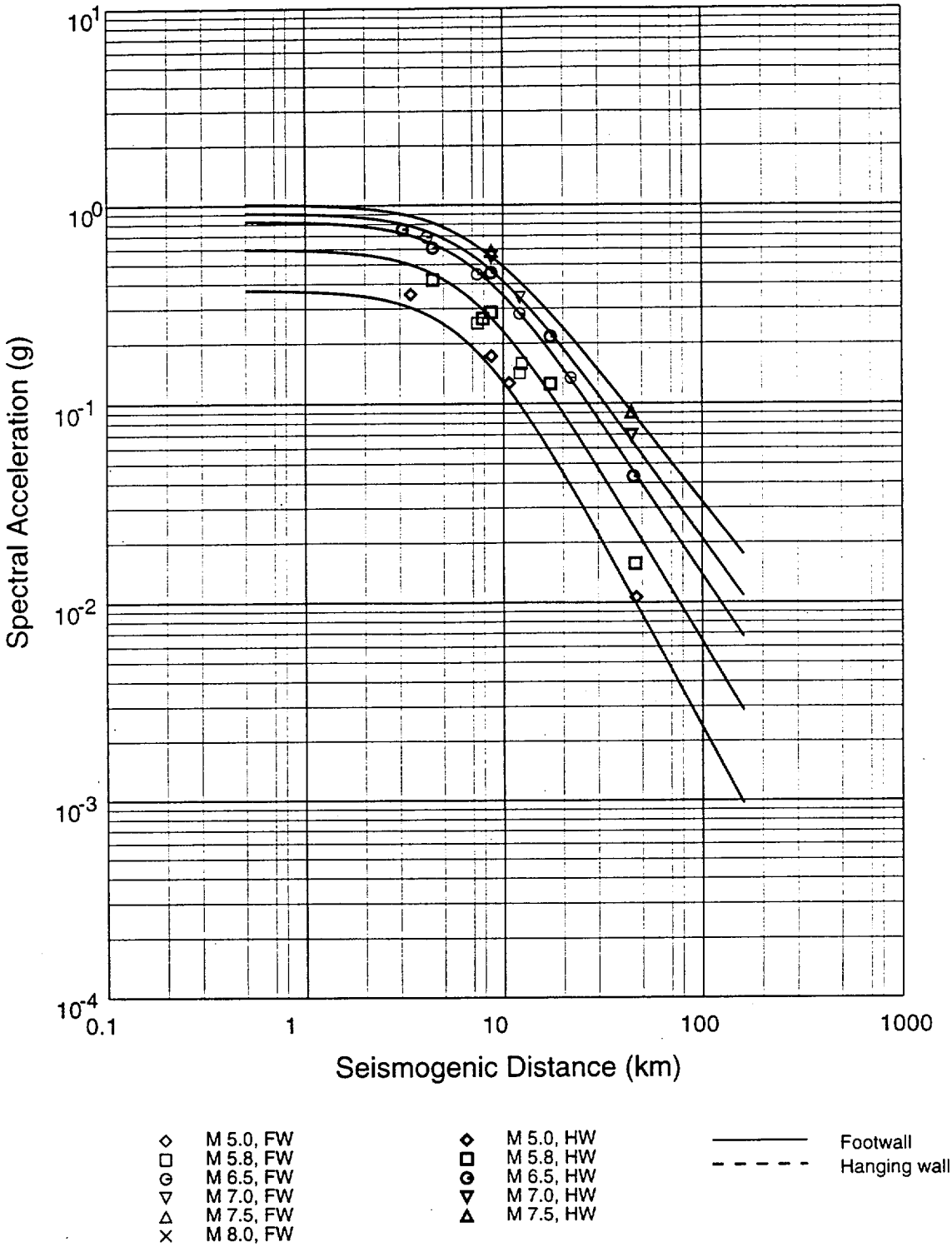

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Normal Faulting Attenuation, Horizontal Comp
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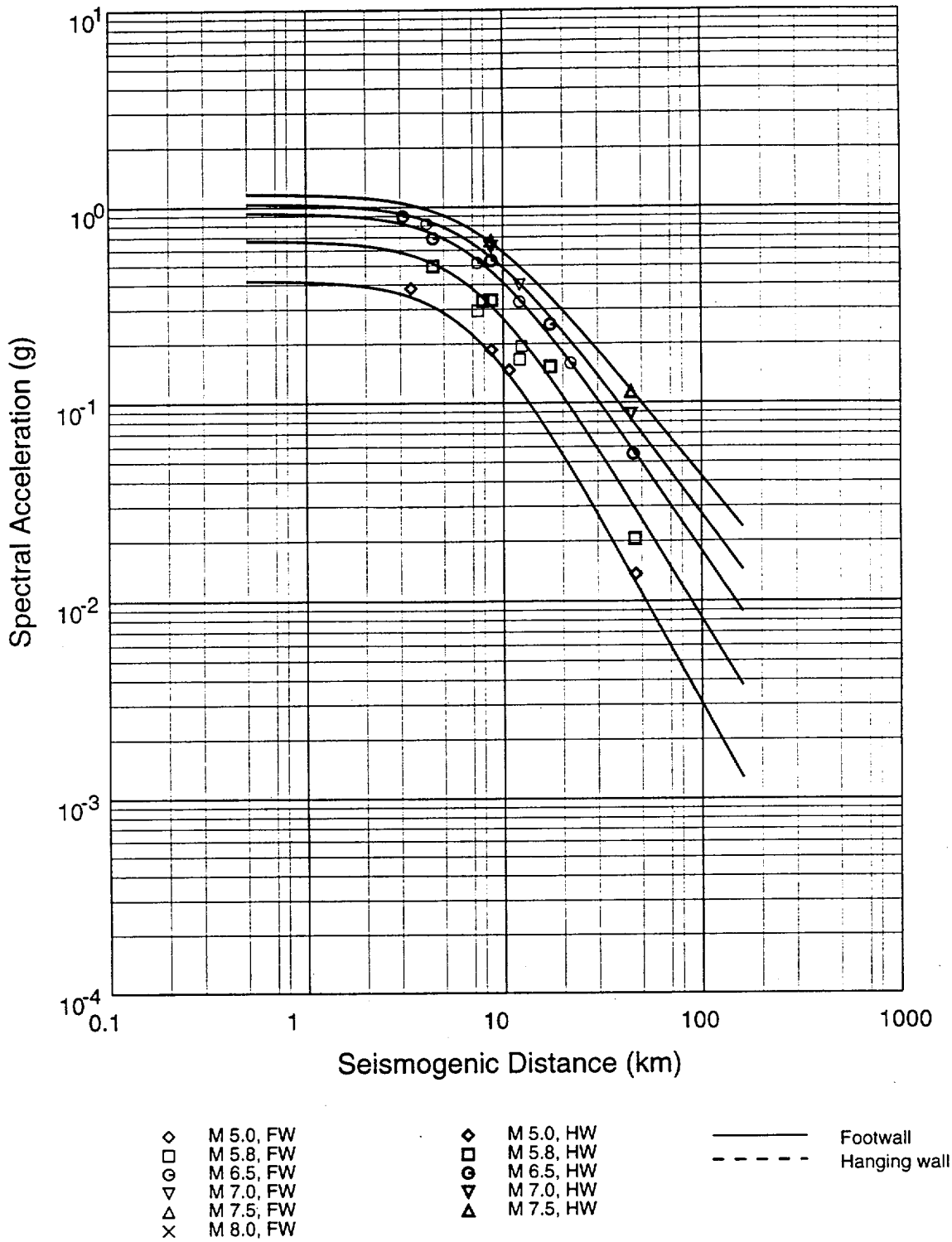
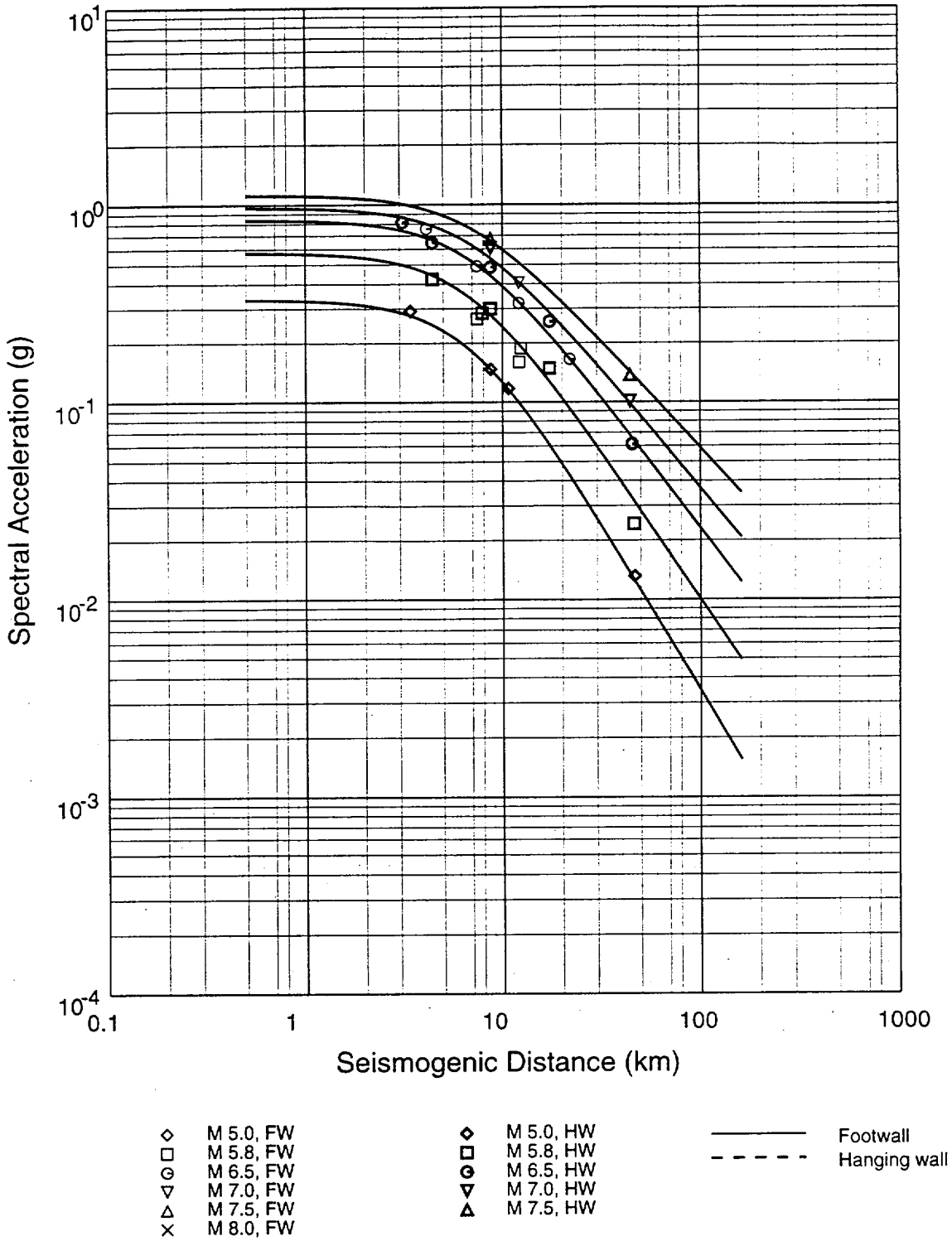


Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 5.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
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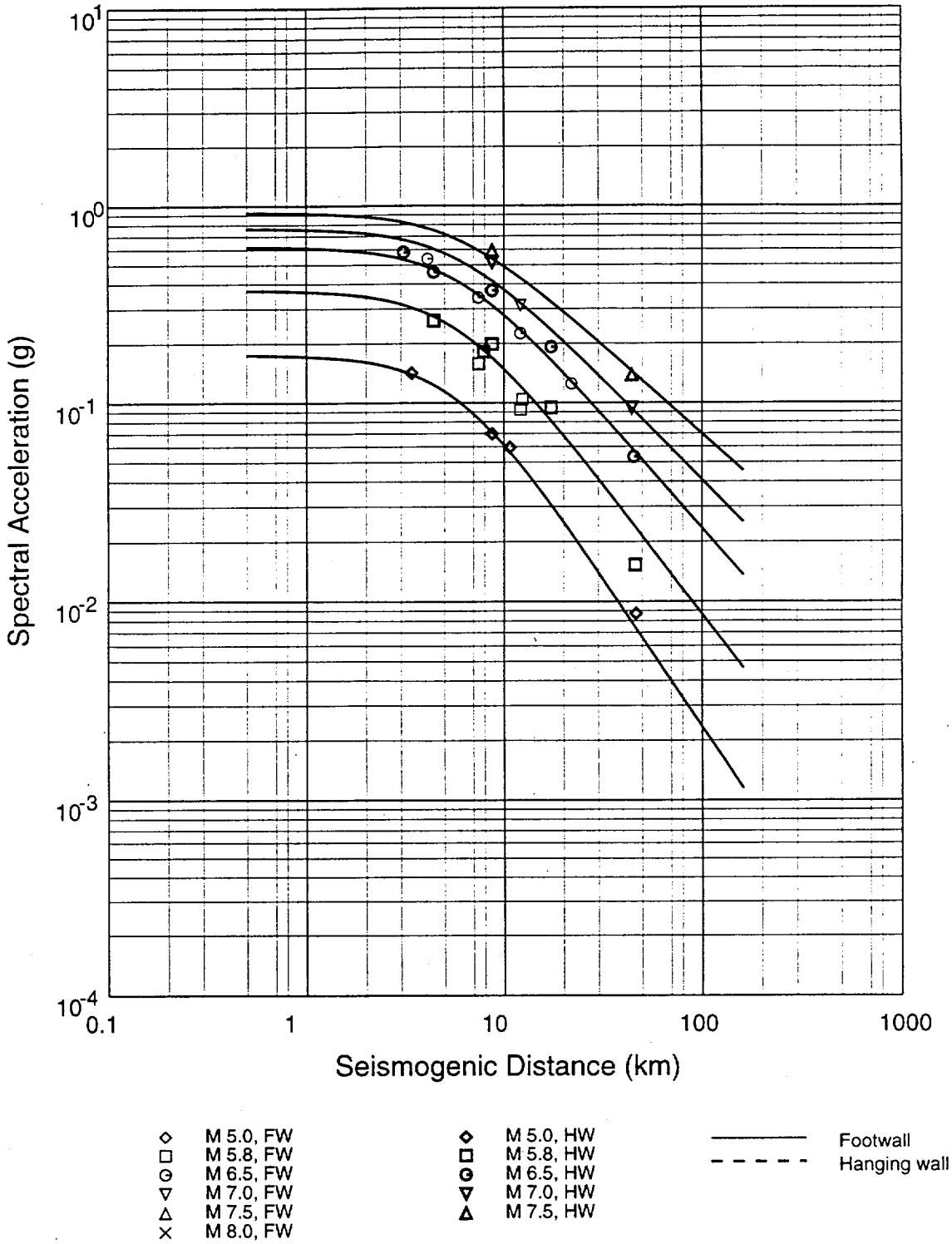

Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
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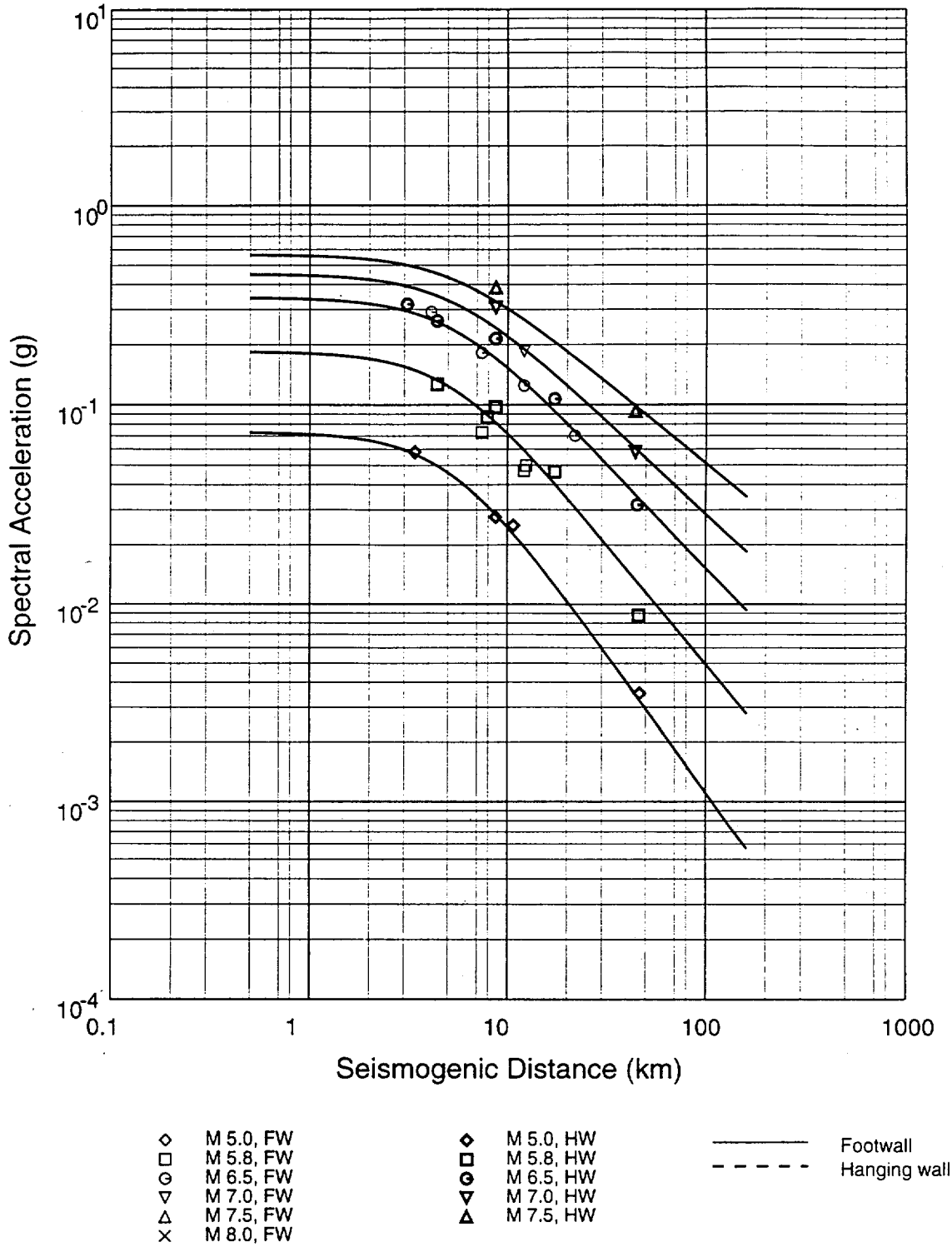
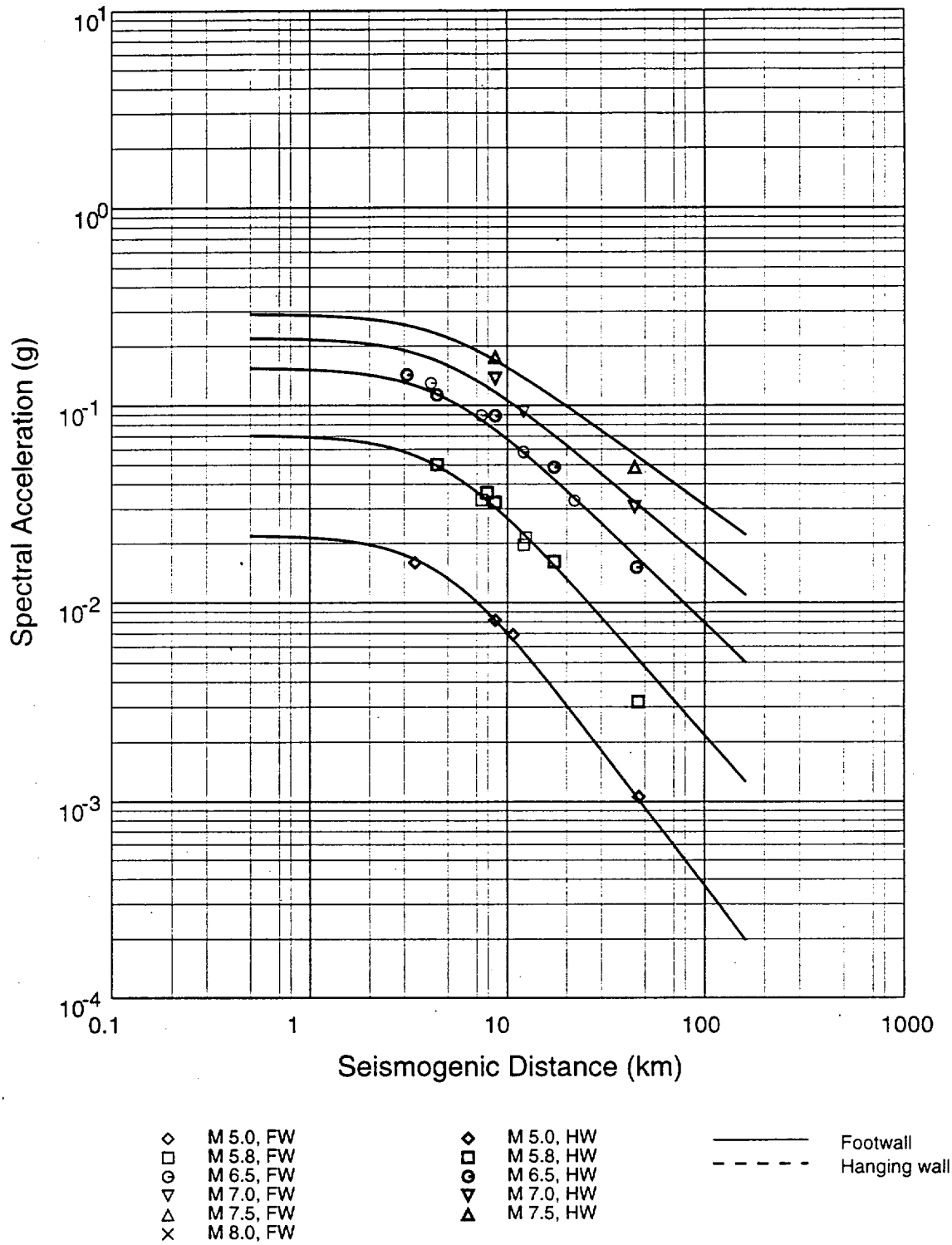
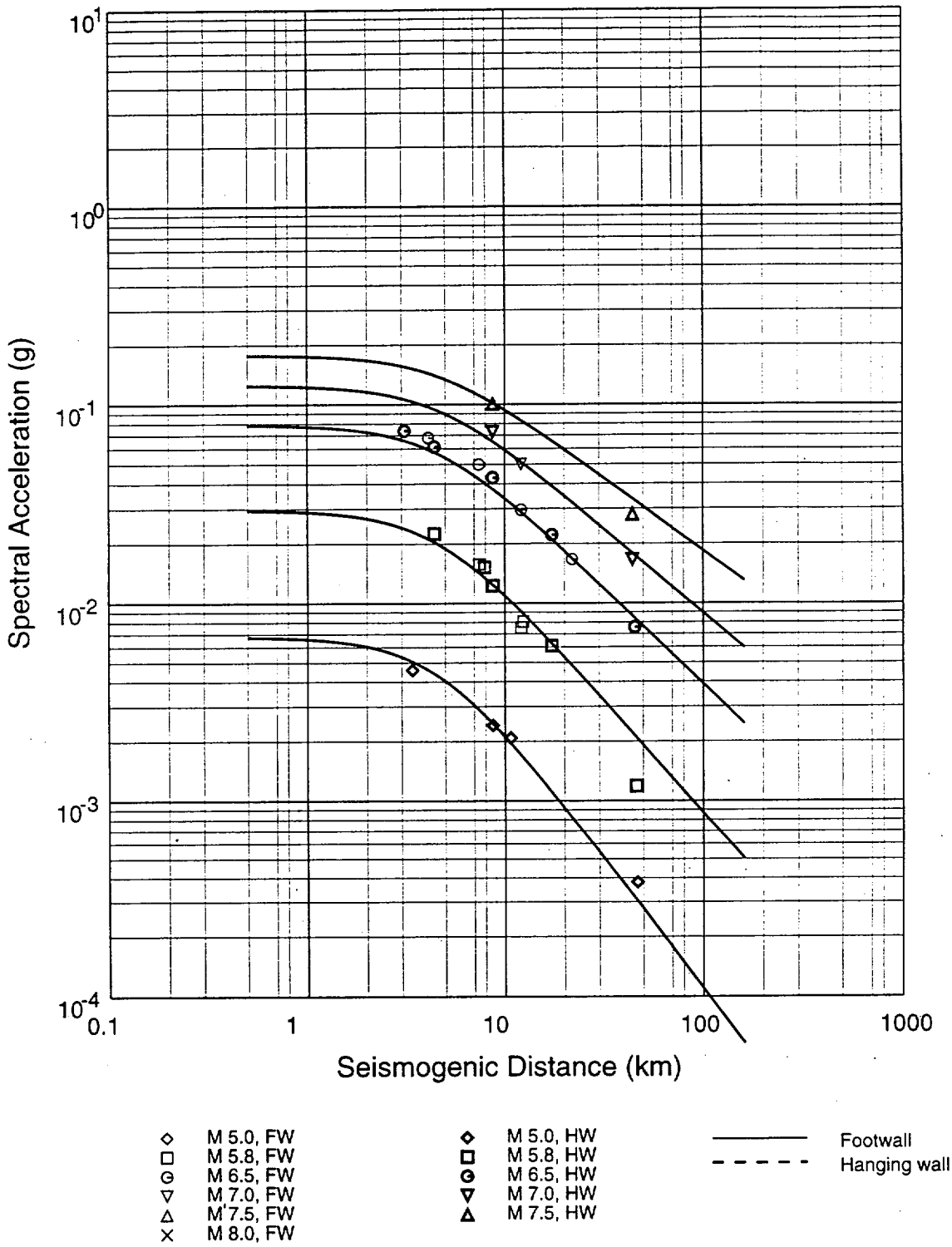


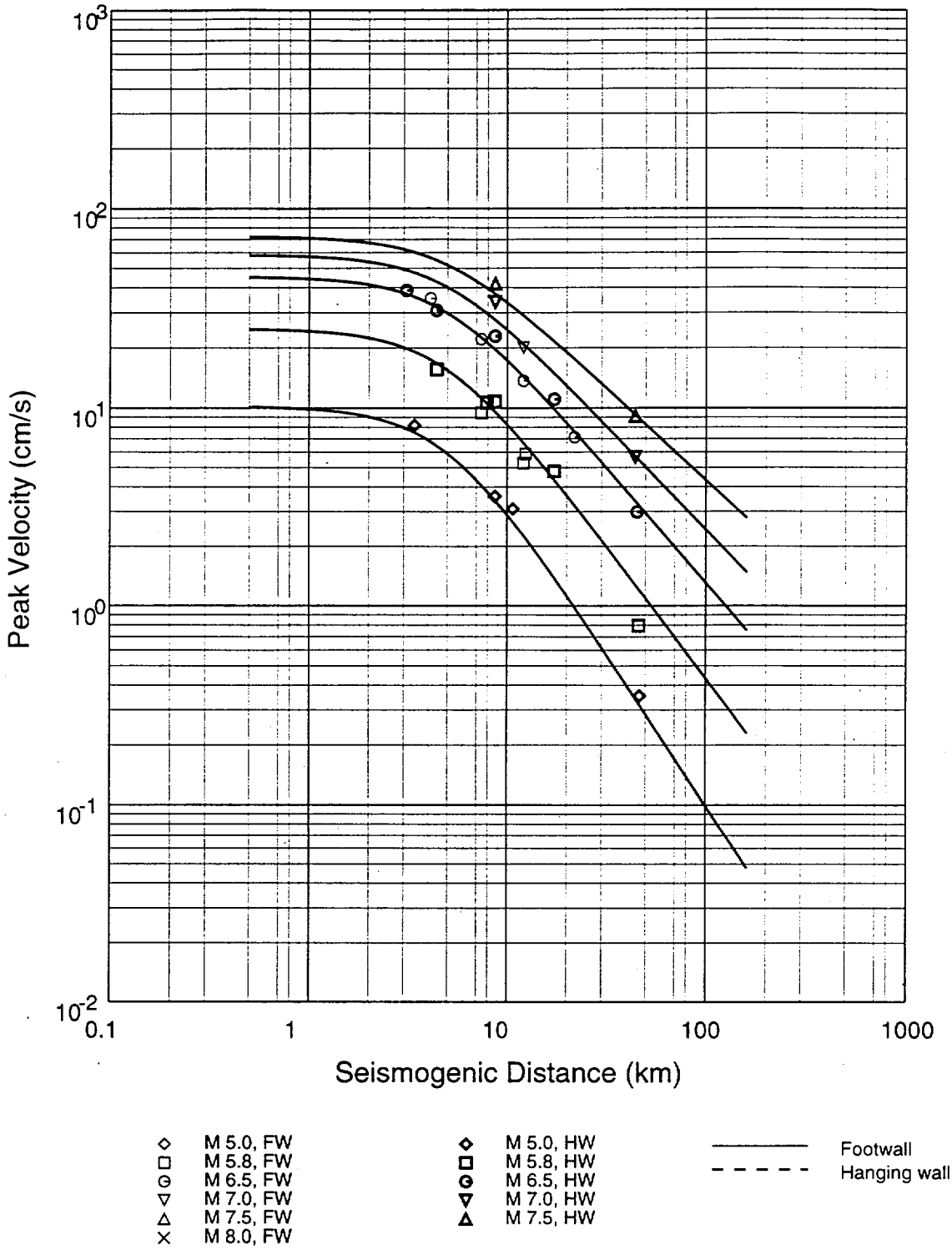
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 0.5 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 0.3 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Peak Velocity



Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
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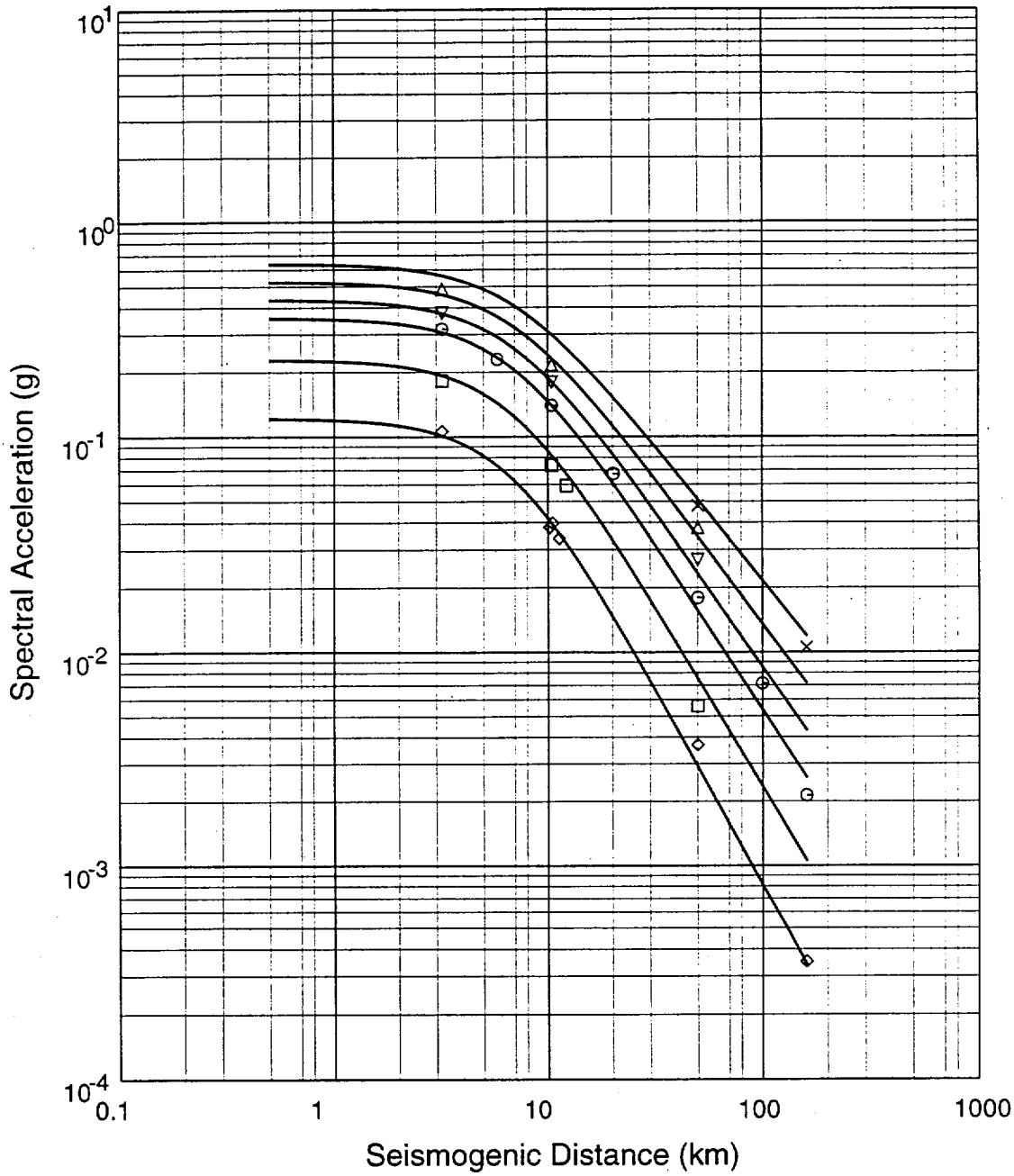
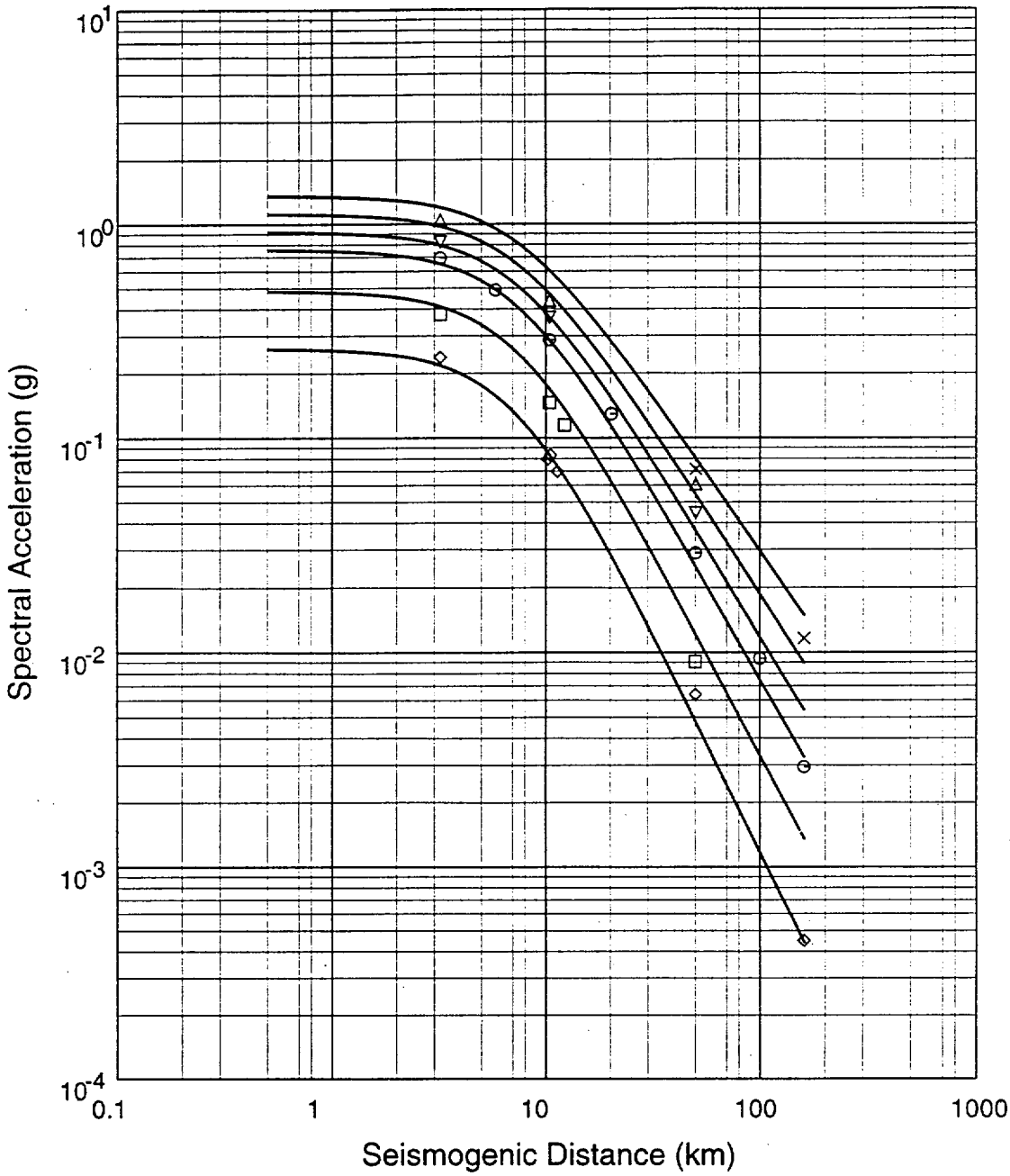


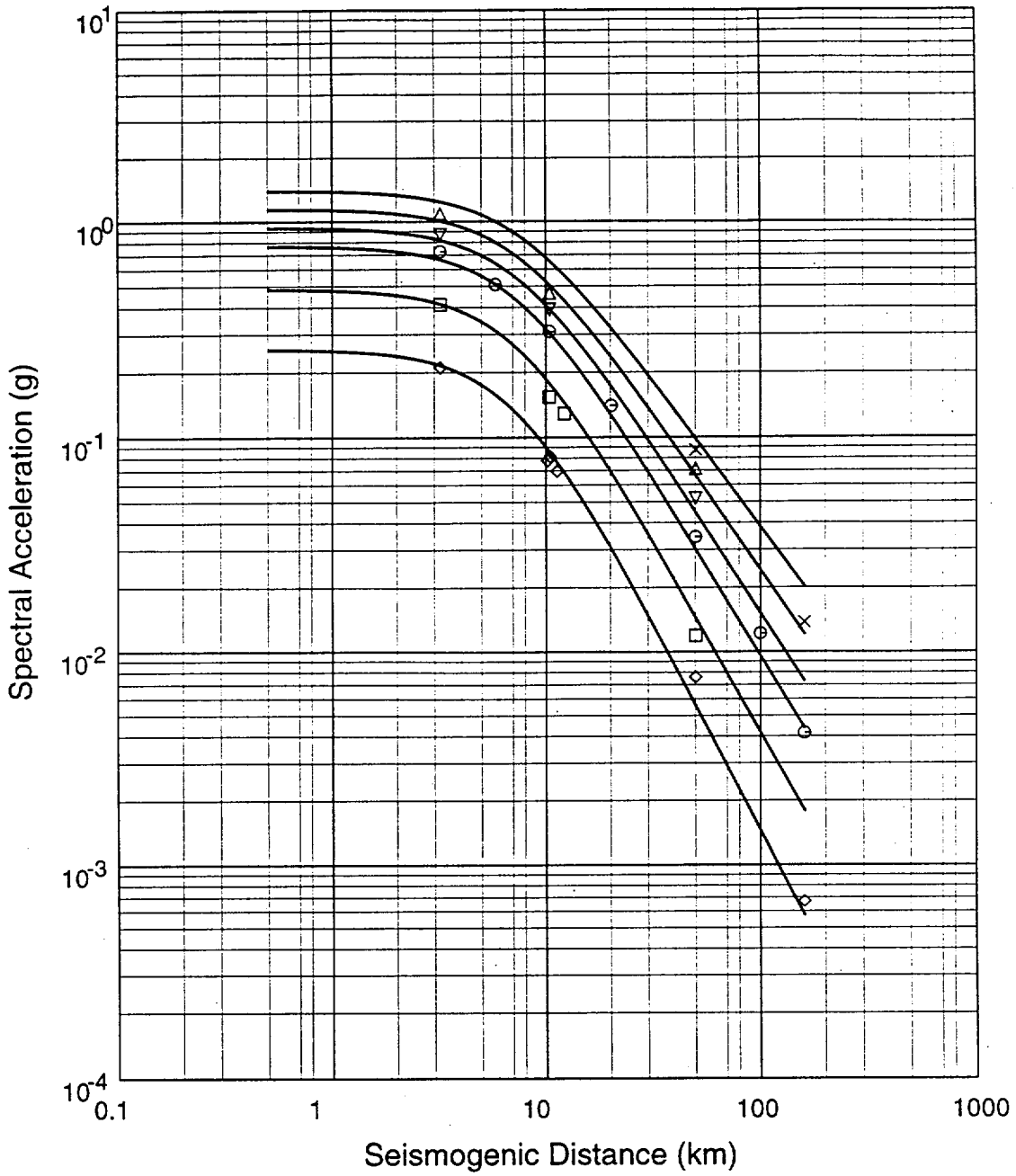
◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 20.0 Hz



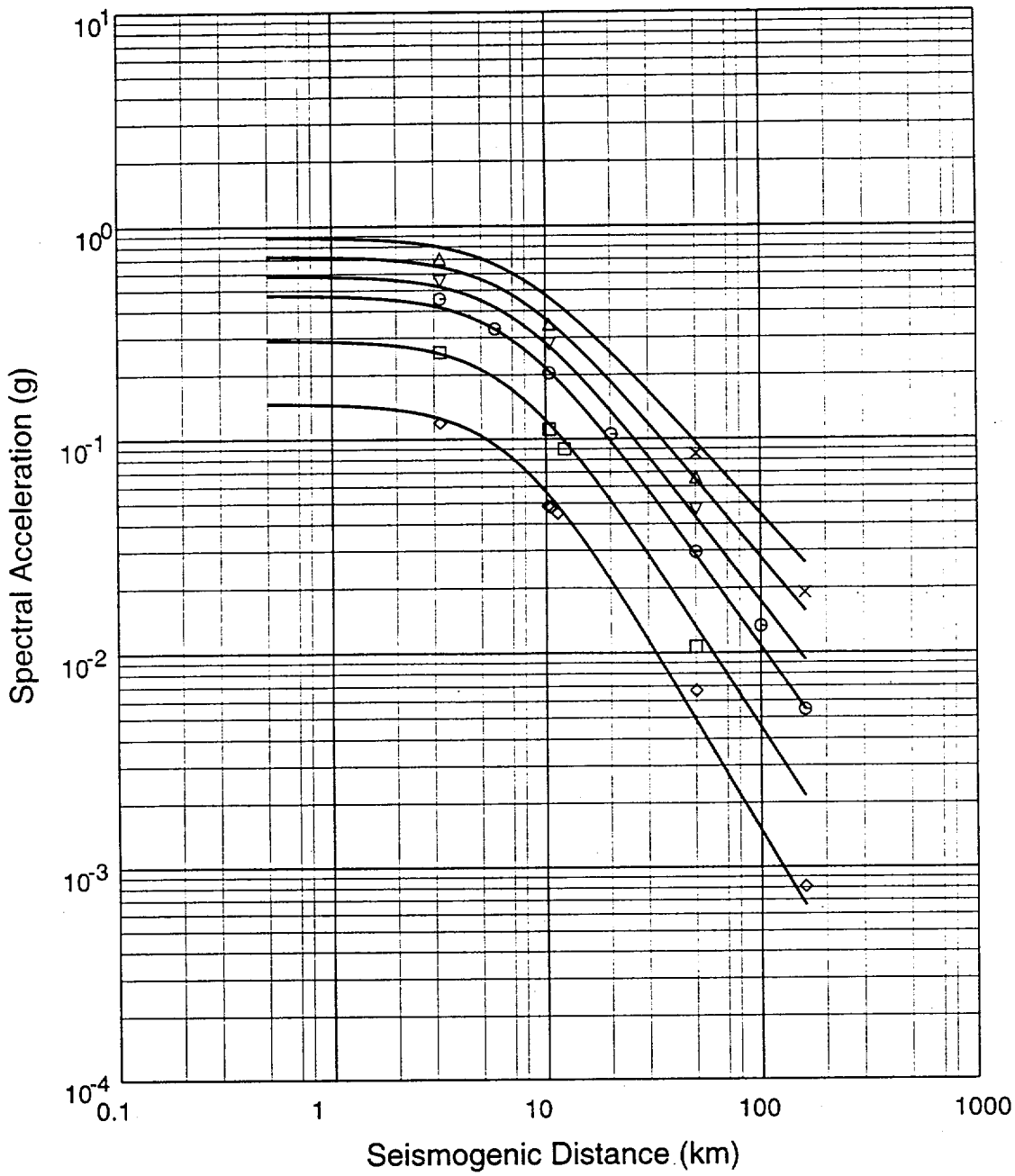
◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 10.0 Hz



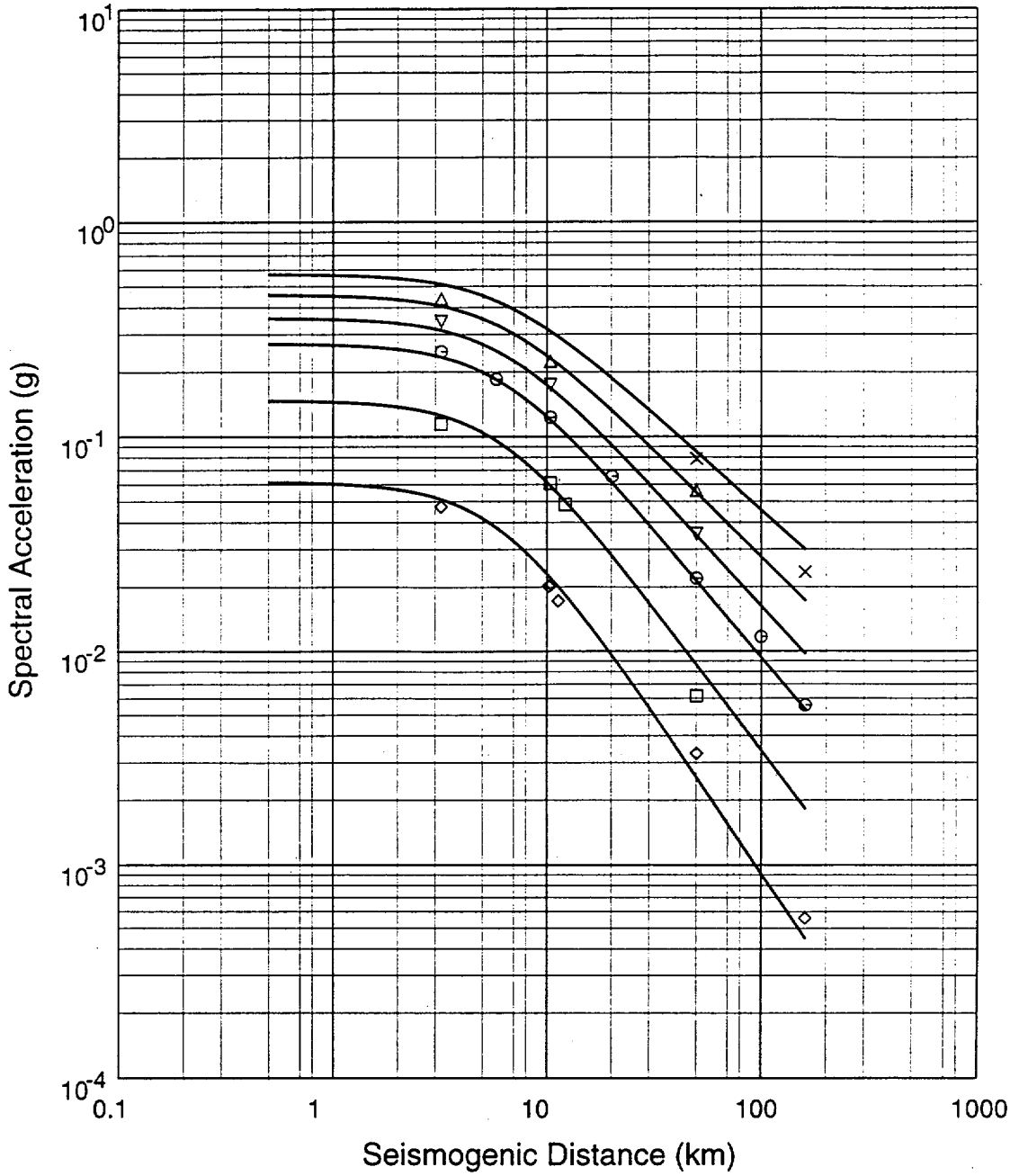
◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 5.0 Hz



◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 2.0 Hz



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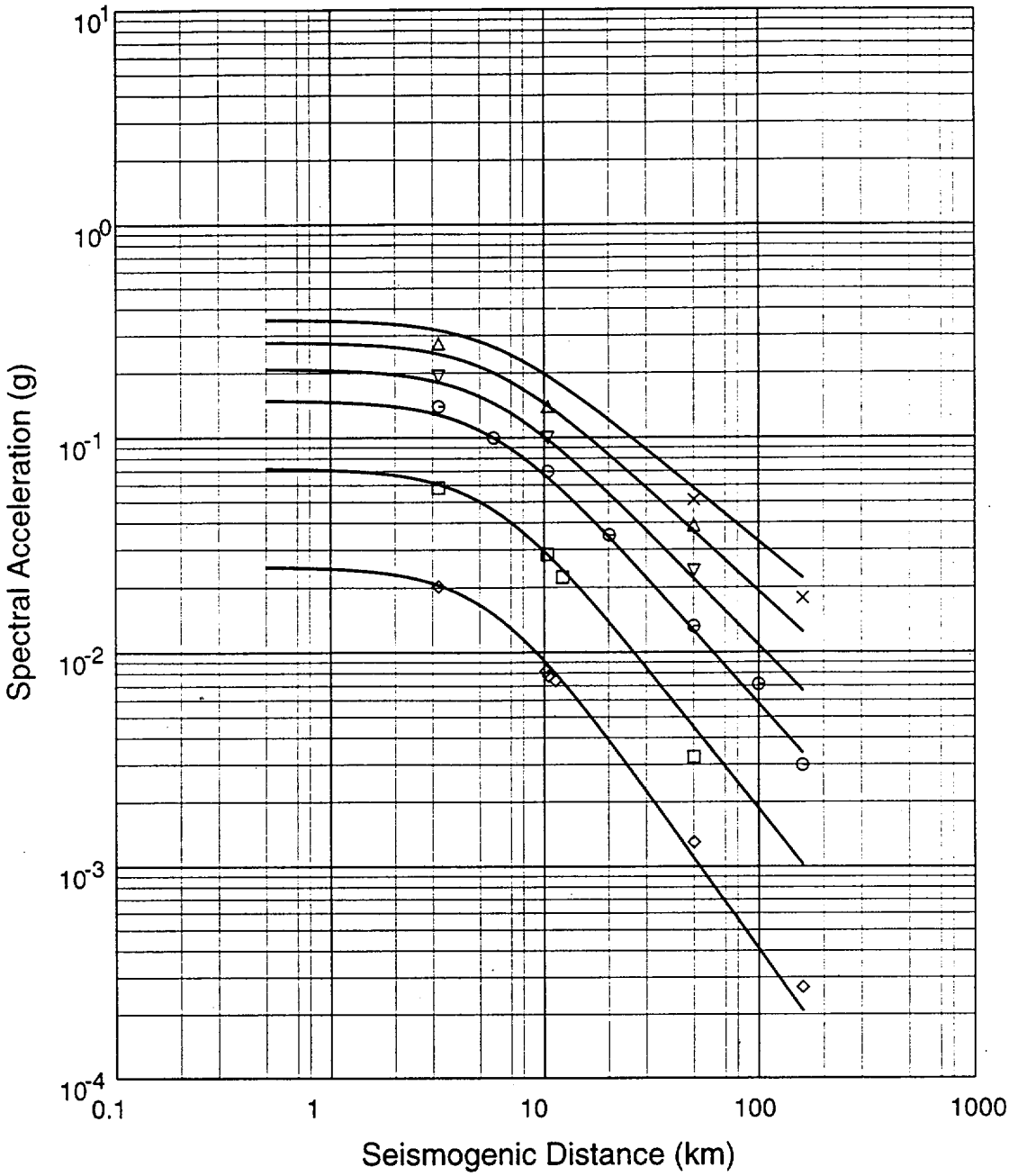
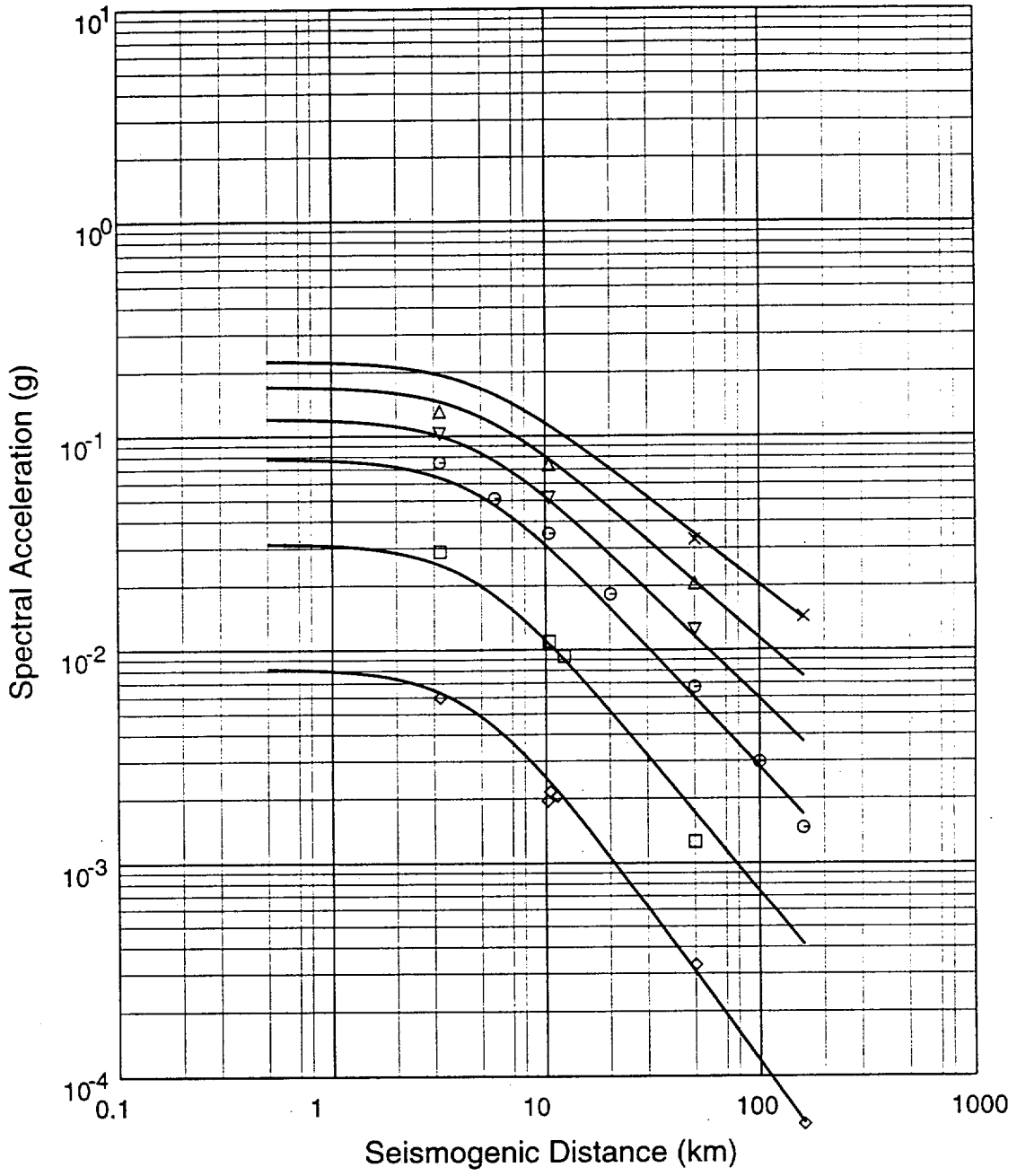
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 1.0 Hz



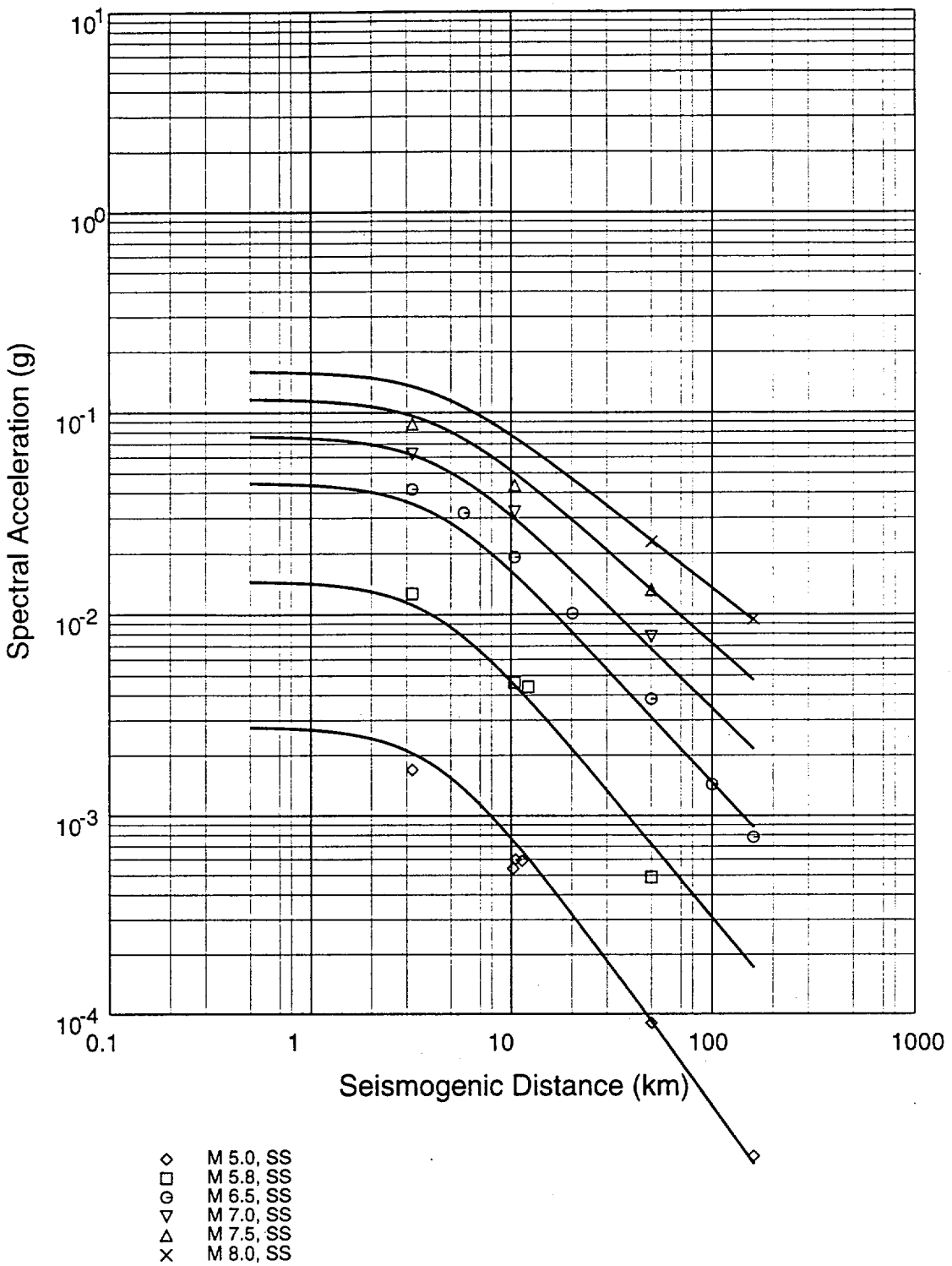
◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 0.5 Hz

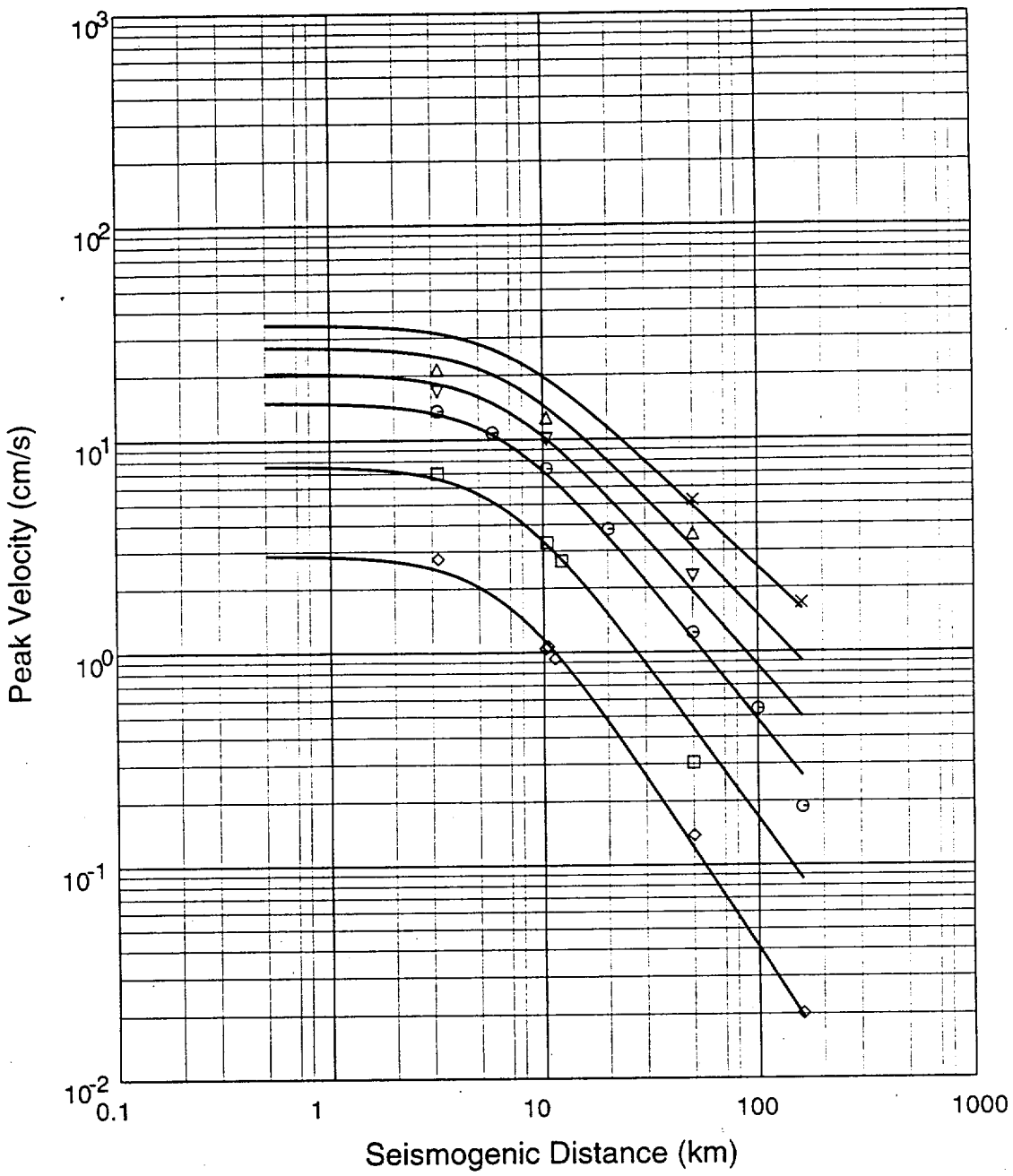


◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 0.3 Hz

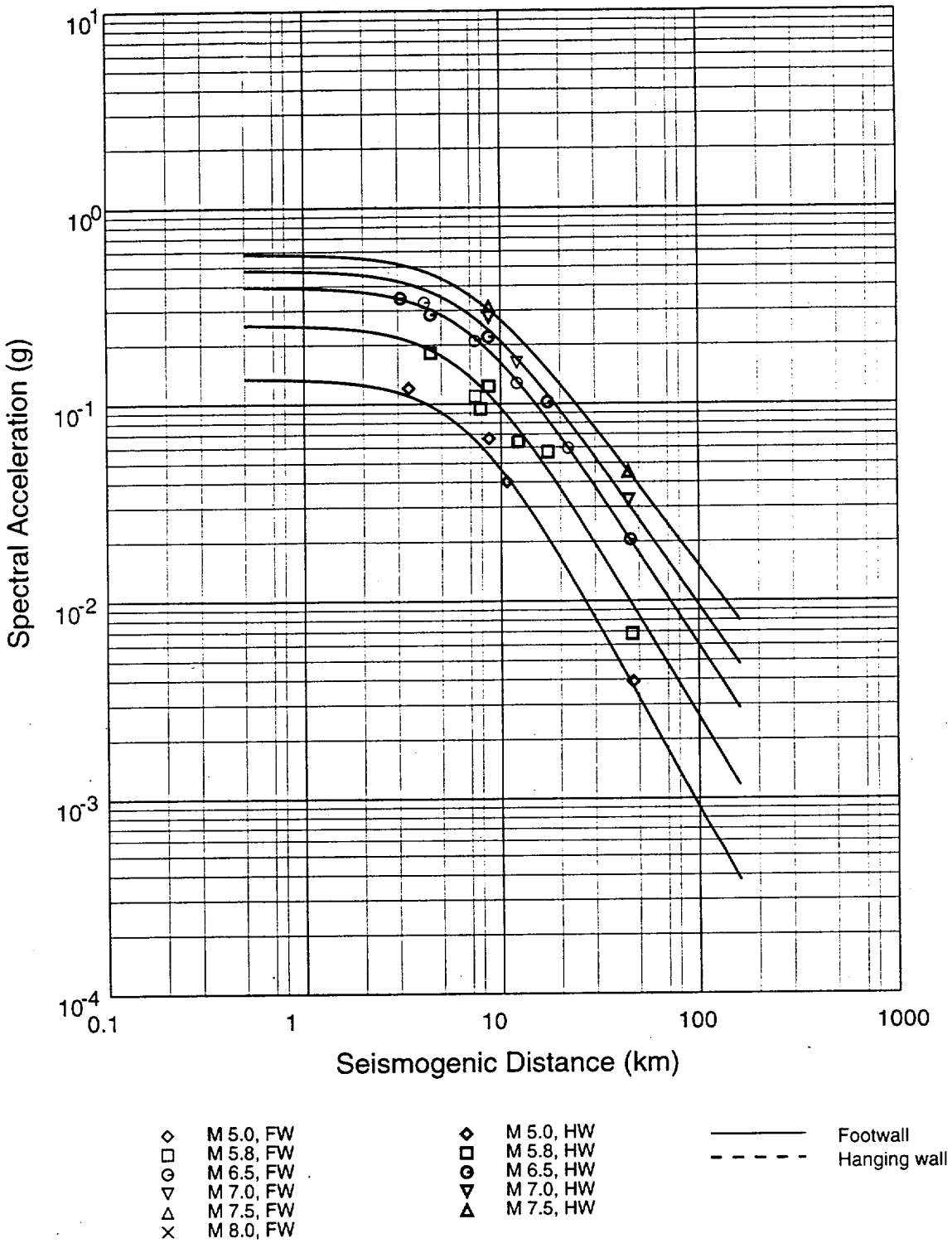


Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Peak Velocity



◇ M 5.0, SS
□ M 5.8, SS
⊖ M 6.5, SS
▽ M 7.0, SS
△ M 7.5, SS
× M 8.0, SS

Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 100.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
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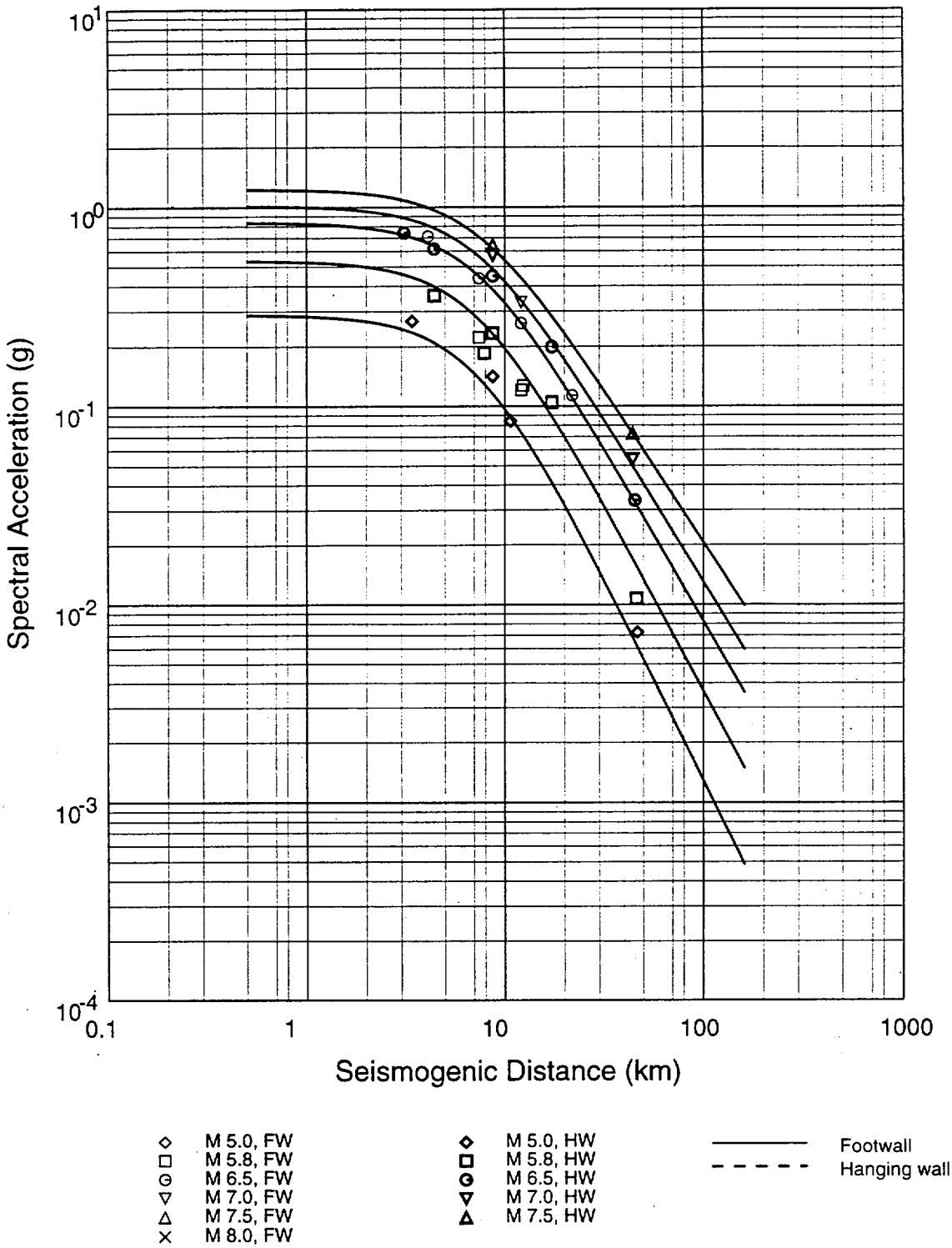
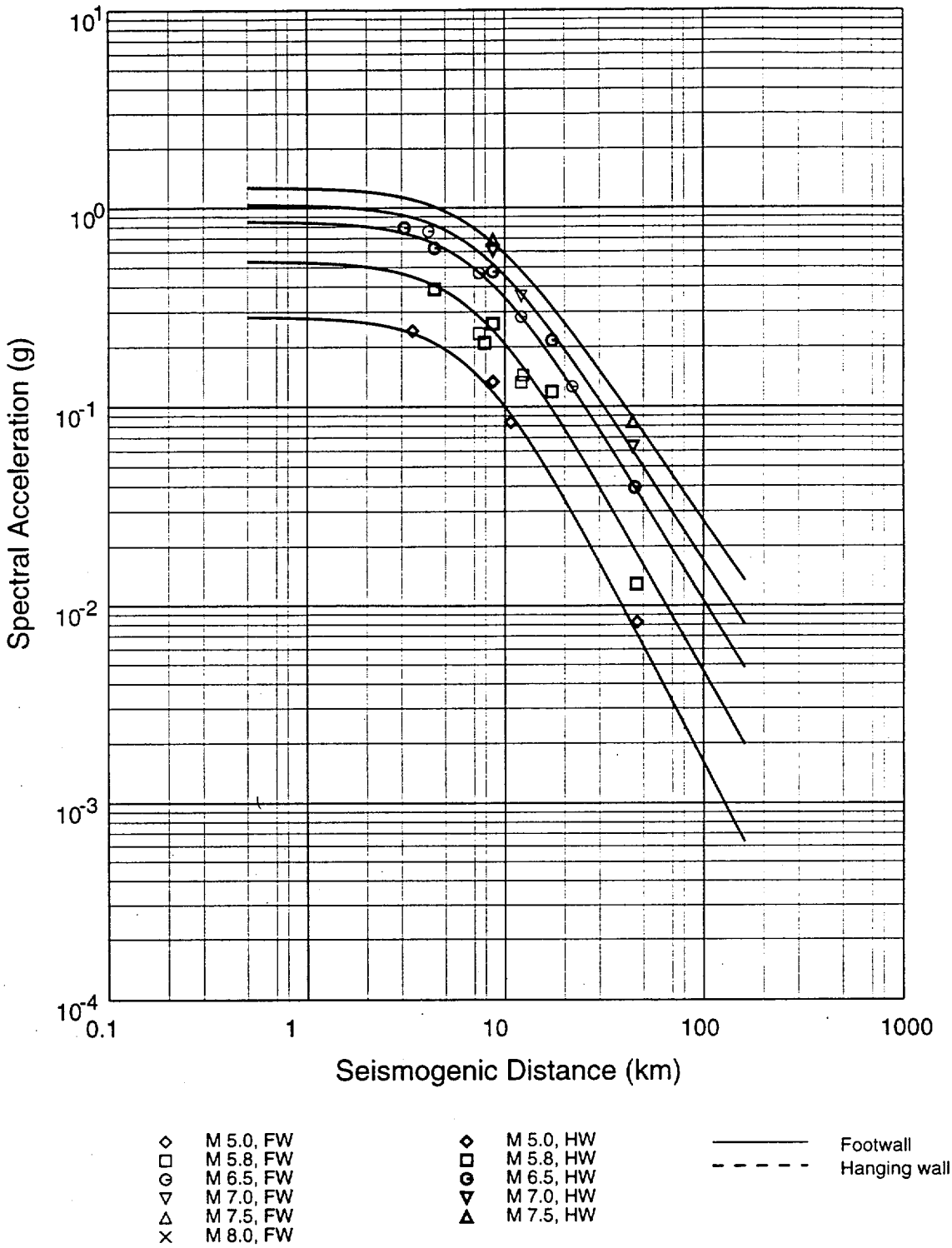
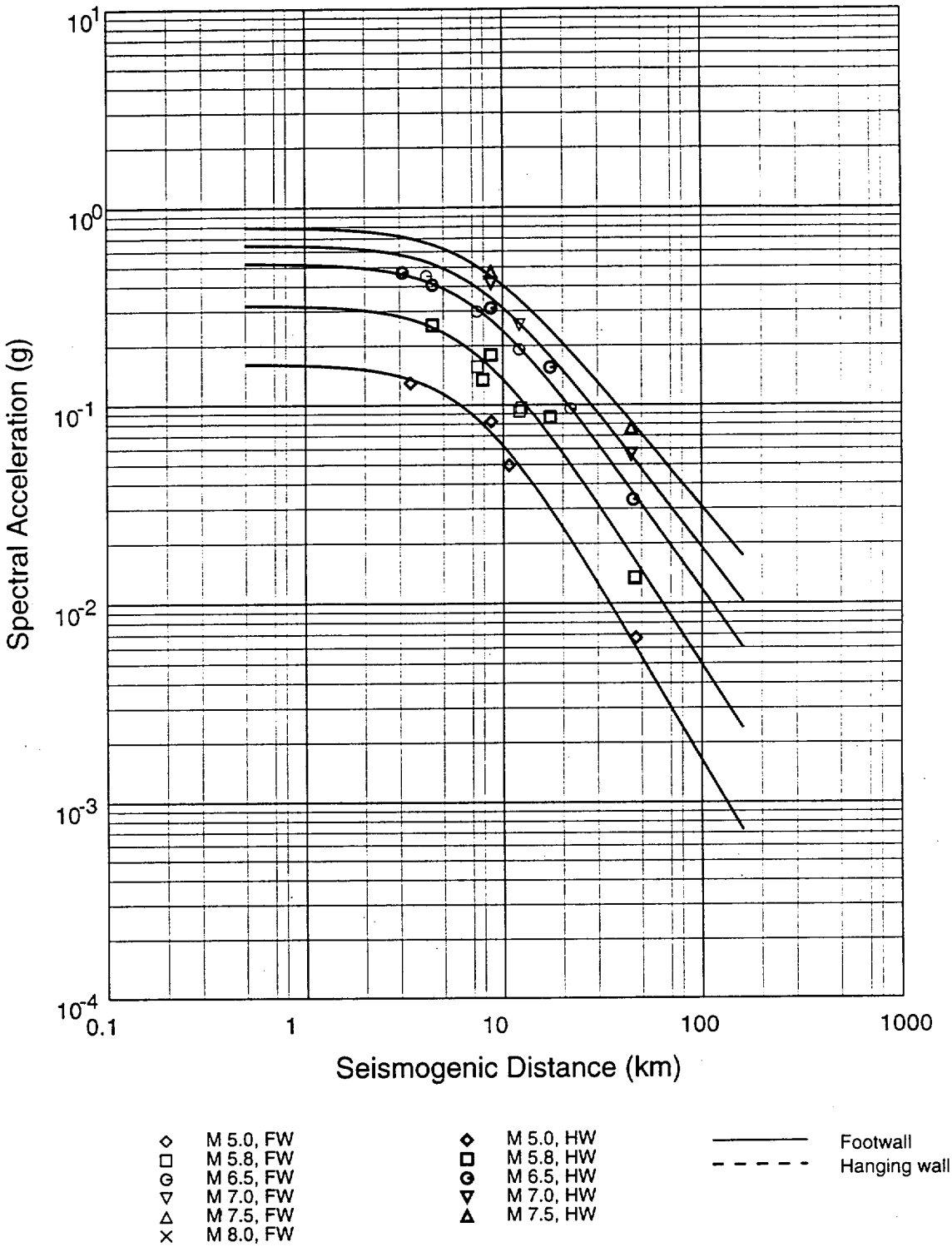


Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 10.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 5.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
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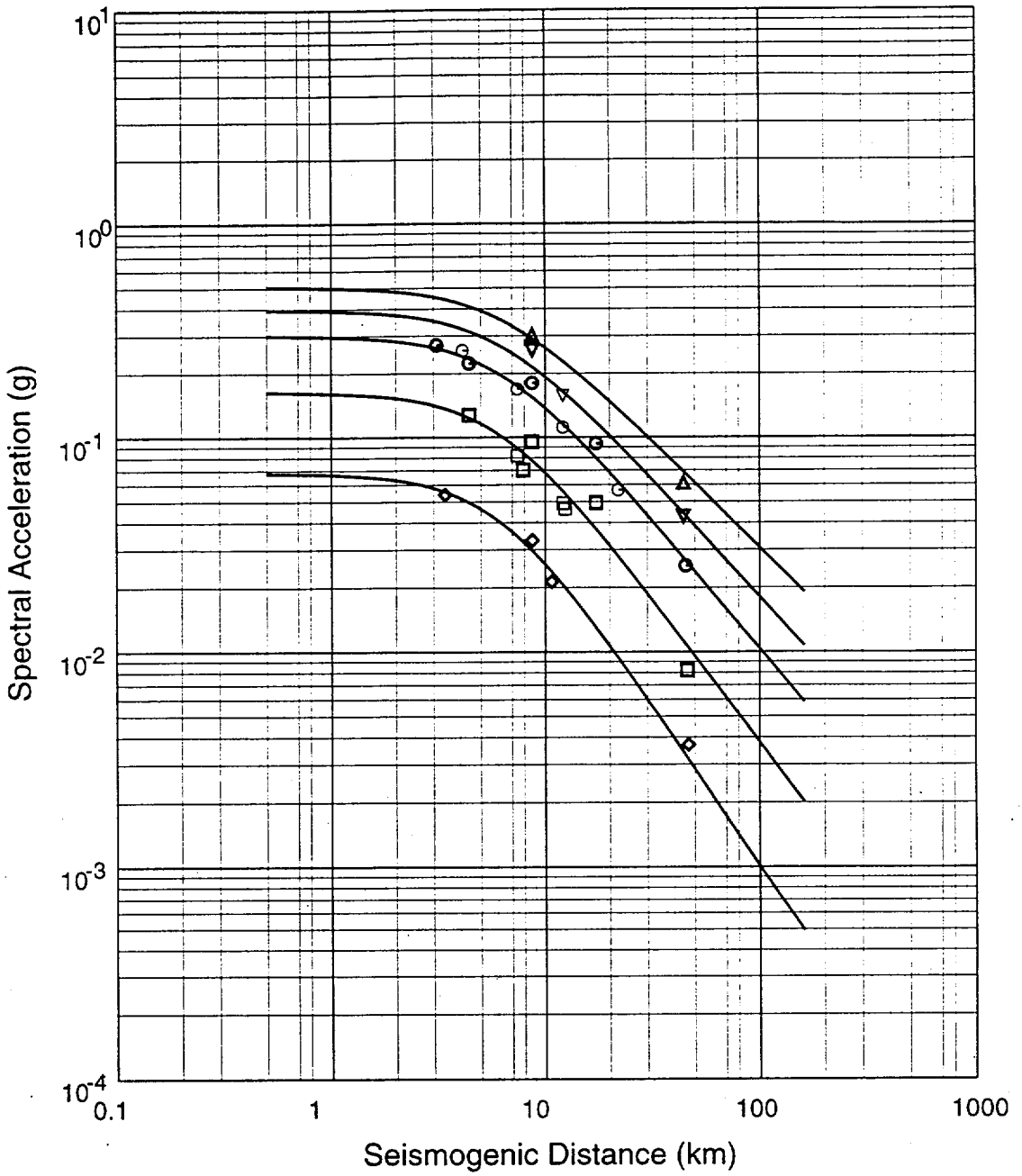
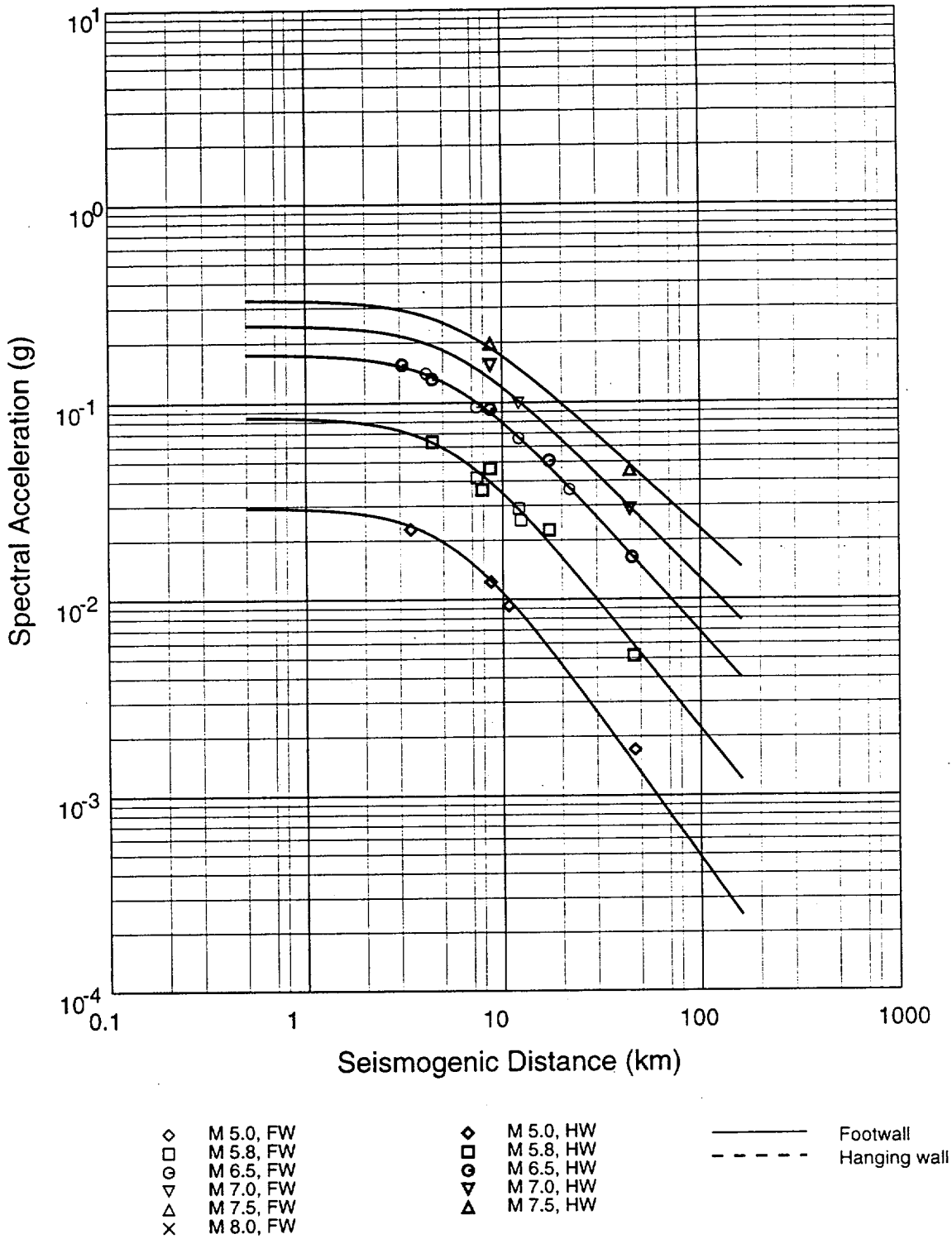


◇ M 5.0, FW
□ M 5.8, FW
⊖ M 6.5, FW
▽ M 7.0, FW
△ M 7.5, FW
× M 8.0, FW

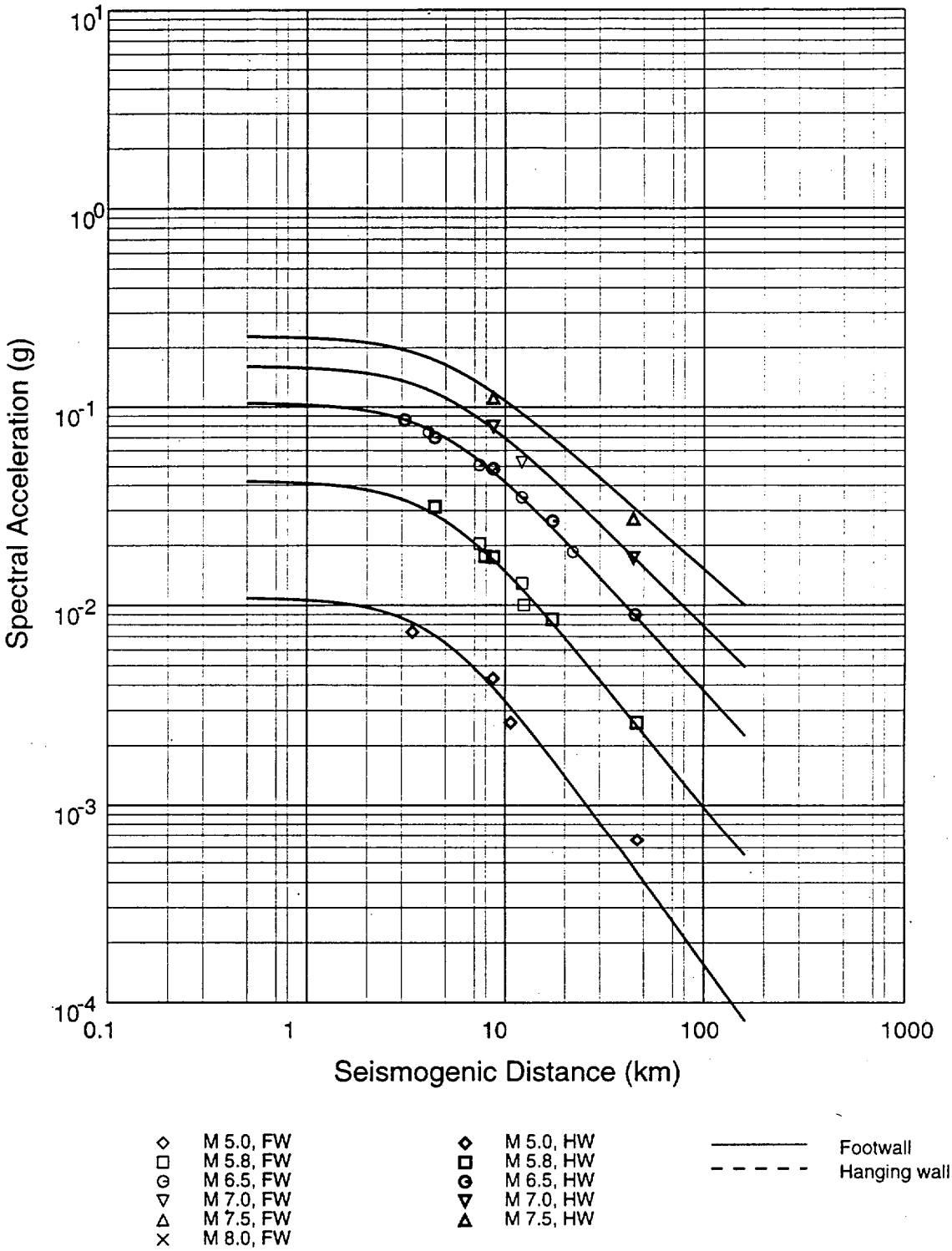
◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

——— Footwall
- - - - Hanging wall

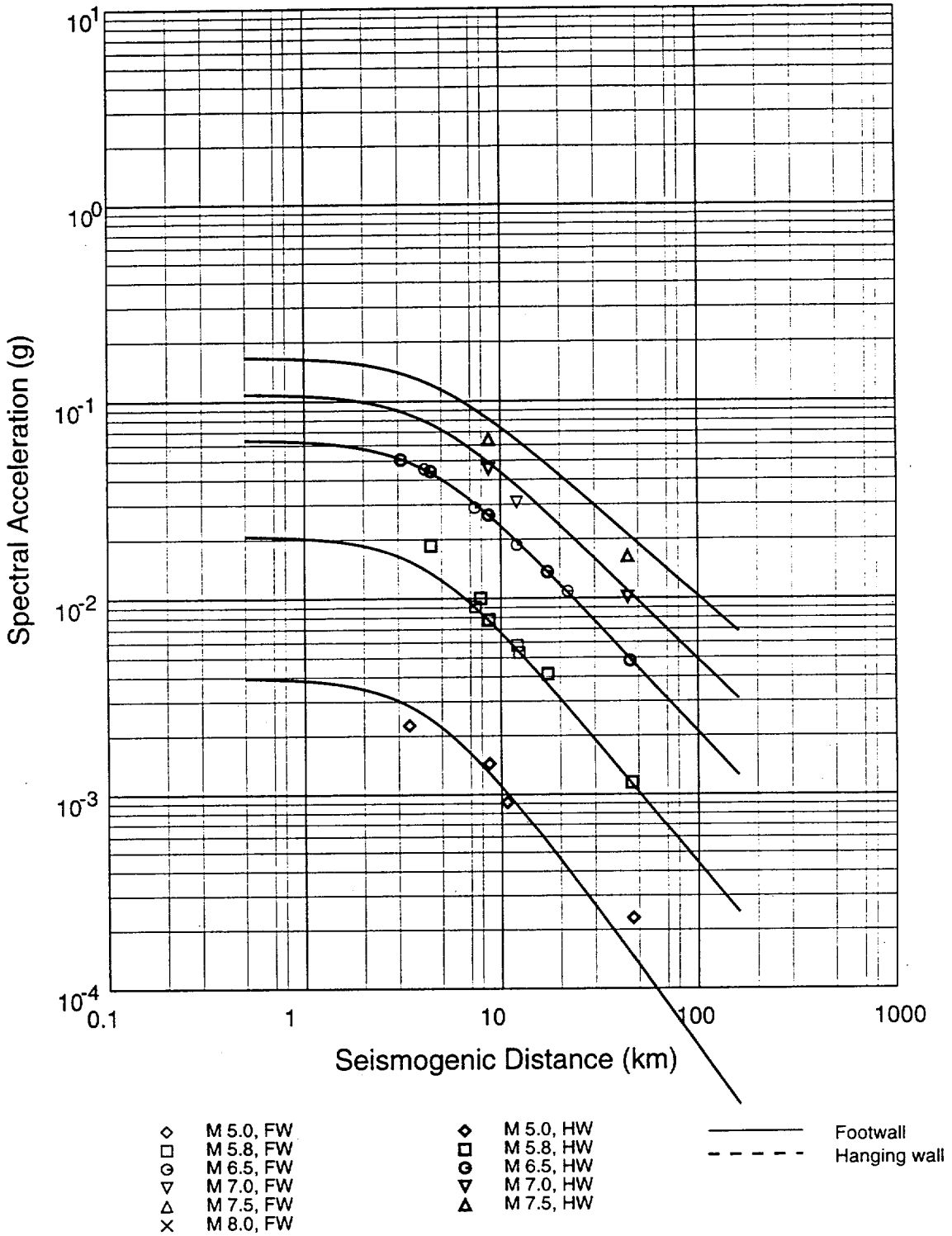
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 1.0 Hz



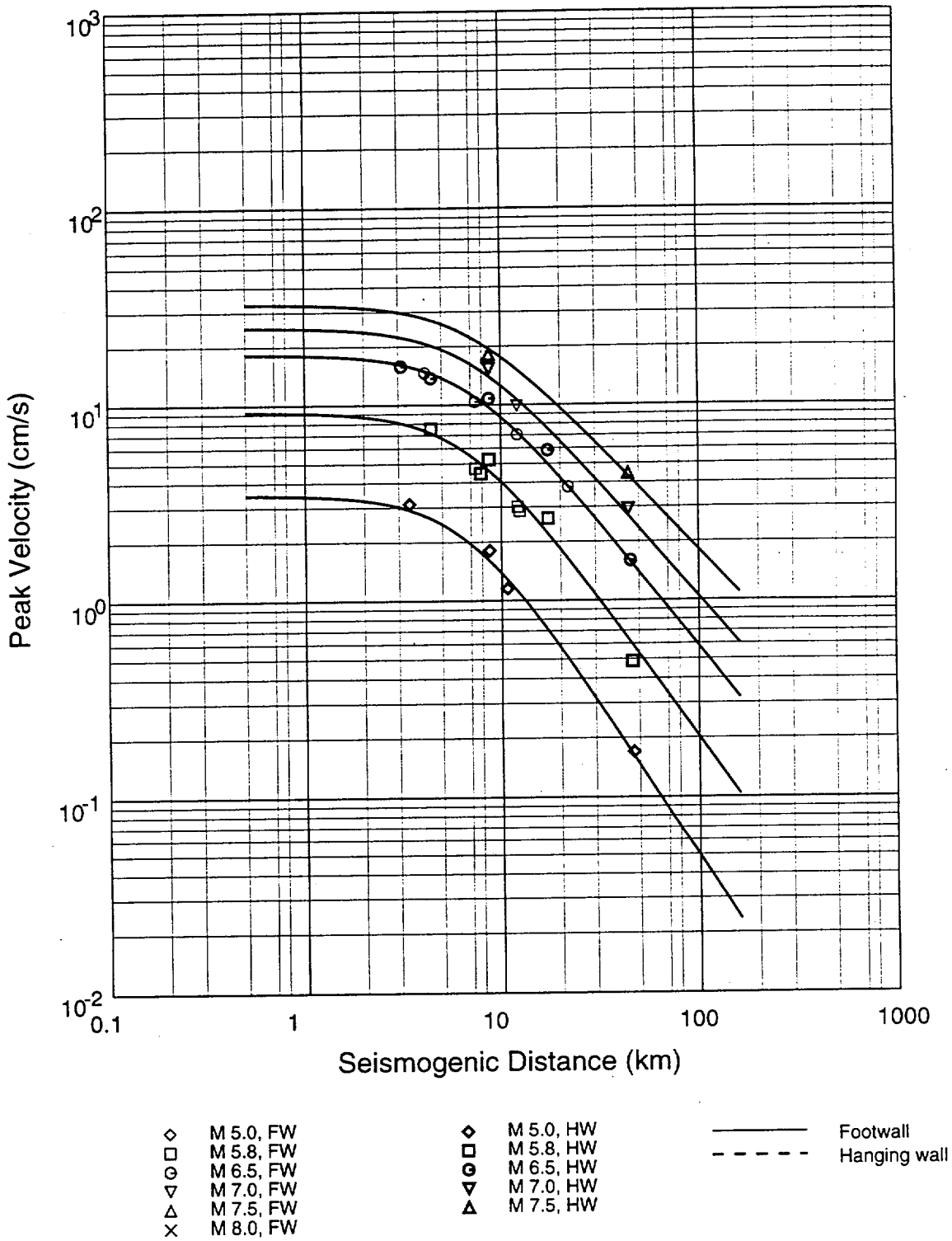
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 0.5 Hz



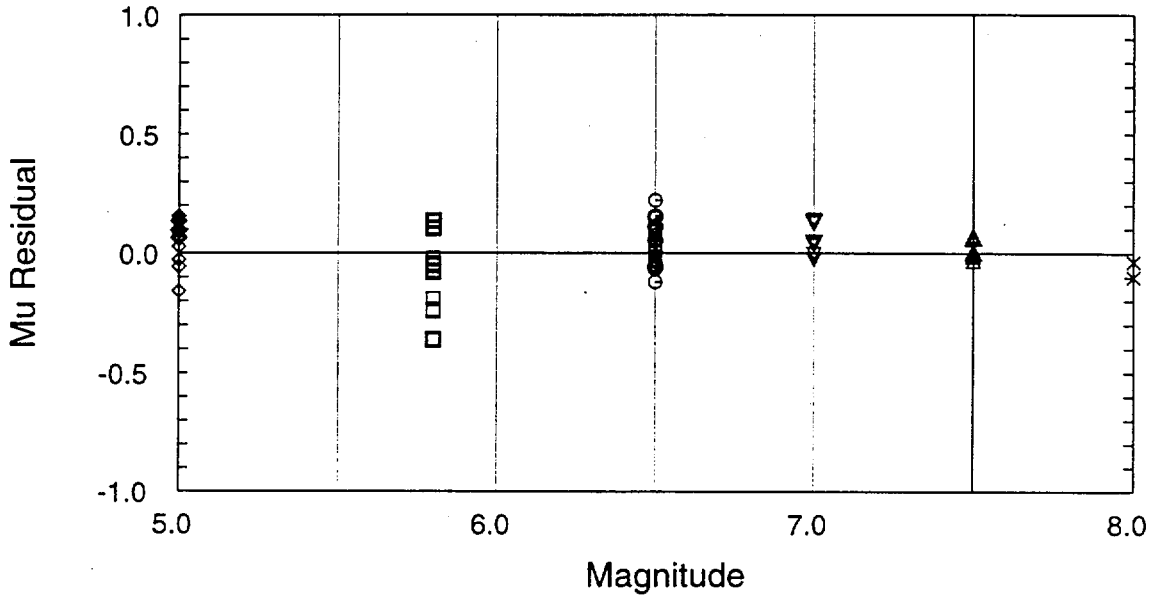
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 0.3 Hz

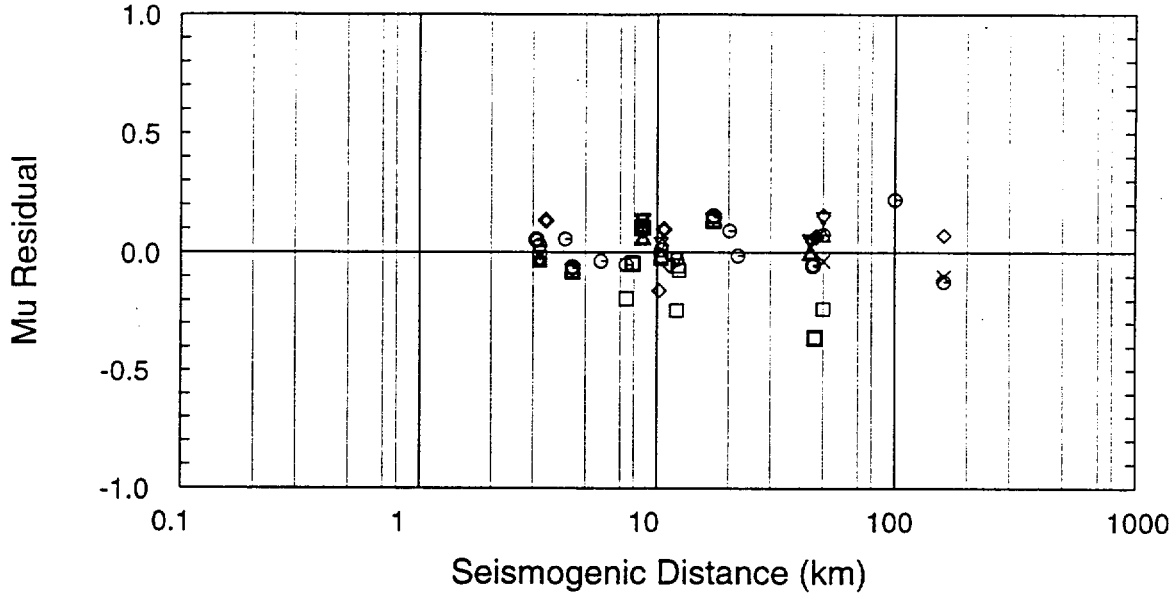


Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Peak Velocity



Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 100.0 Hz

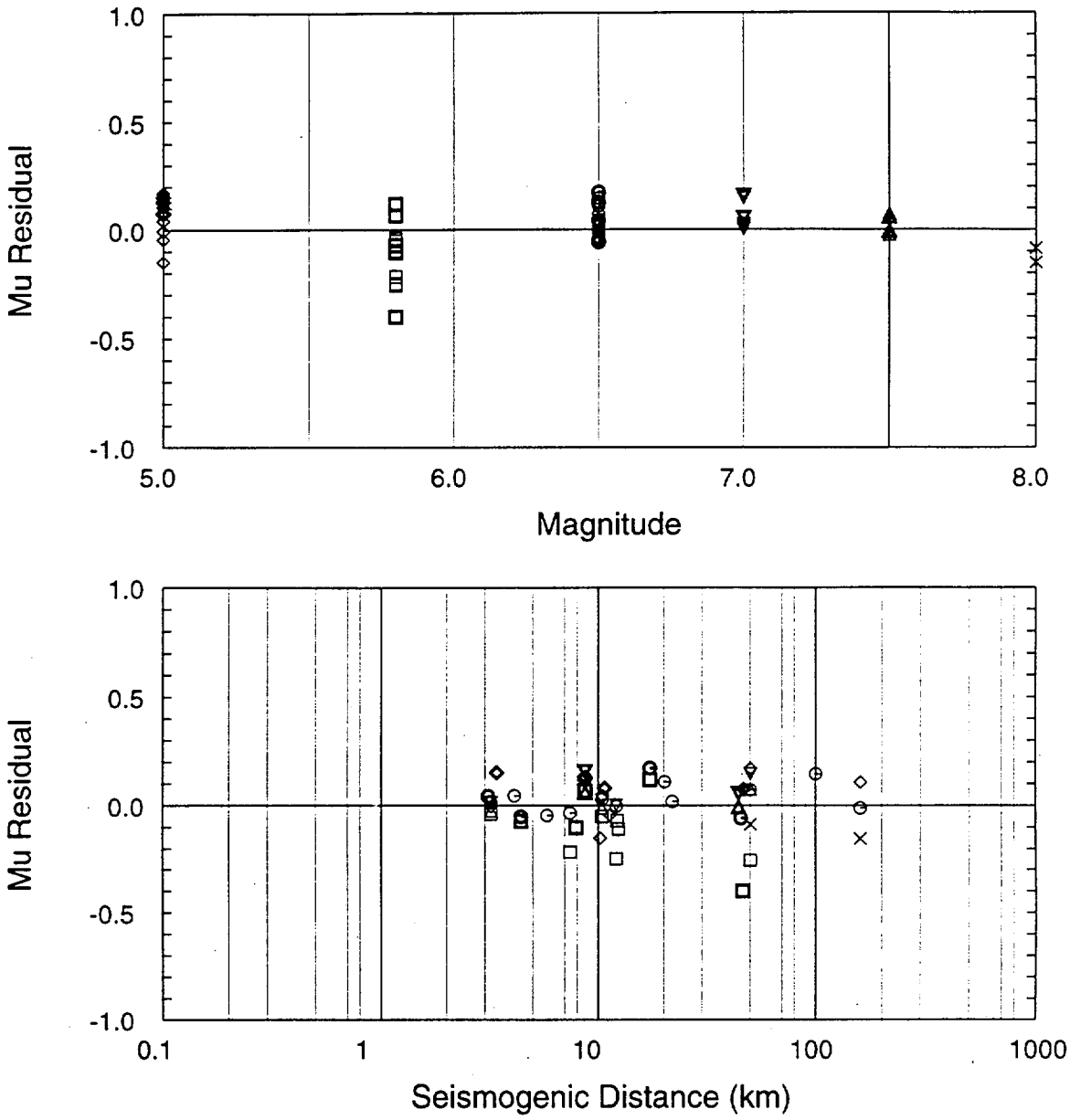




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

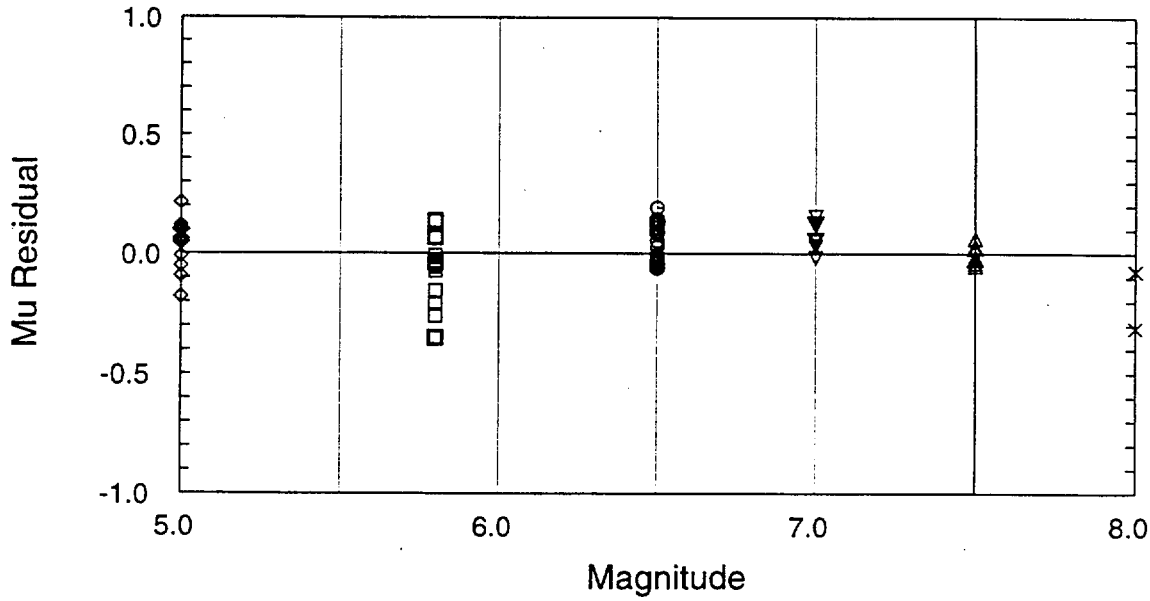
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 20.0 Hz

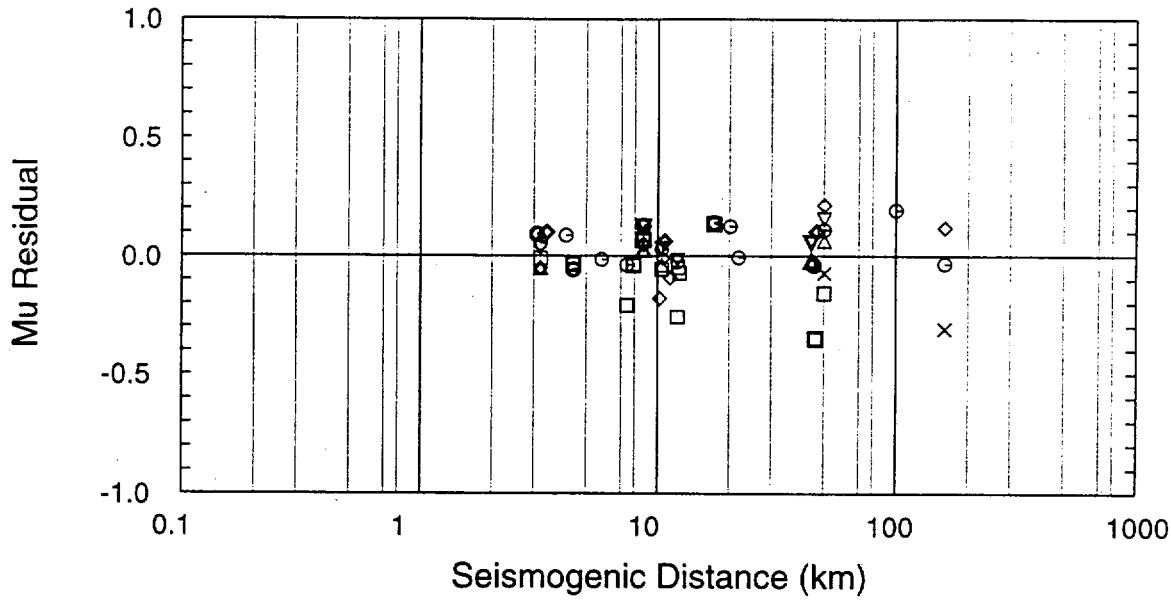


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊙ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 10.0 Hz

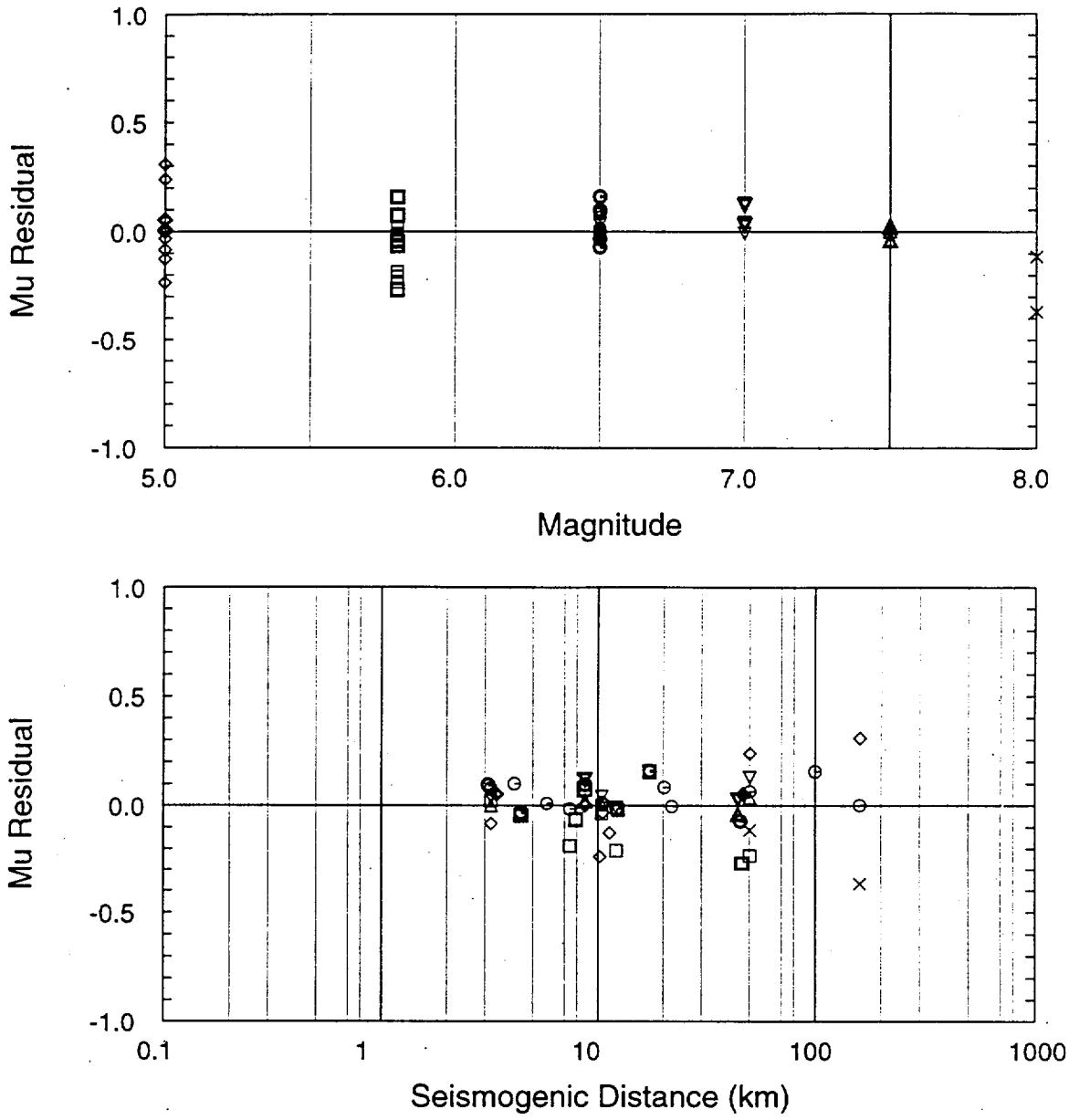




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

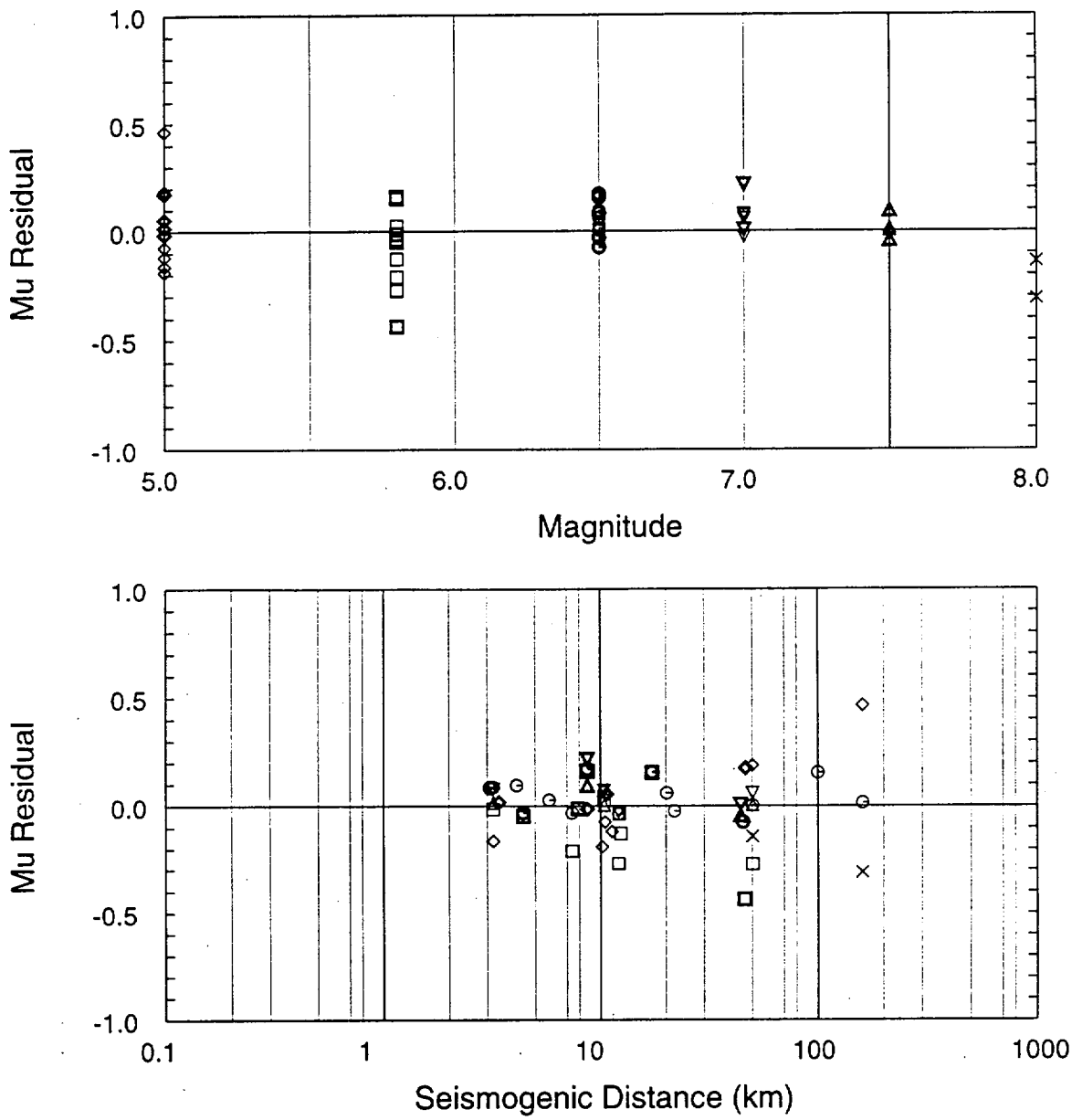
◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 5.0 Hz



◇ M 5.0, SS and FW	◇ M 5.0, HW
□ M 5.8, SS and FW	□ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▽ M 7.0, HW
△ M 7.5, SS and FW	△ M 7.5, HW
× M 8.0, SS and FW	

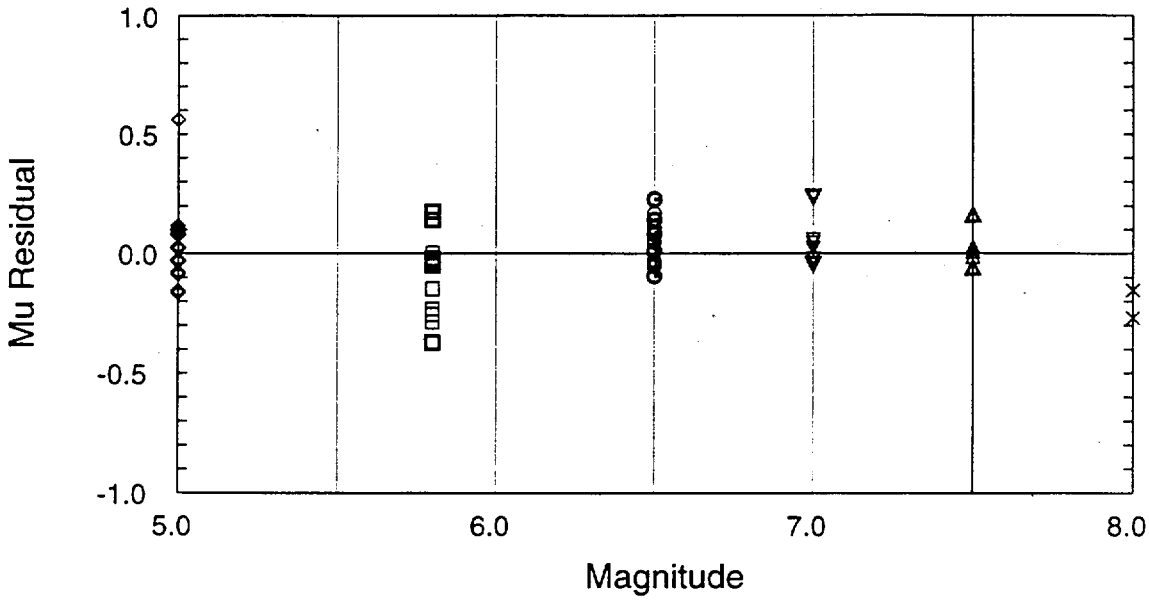
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 2.0 Hz

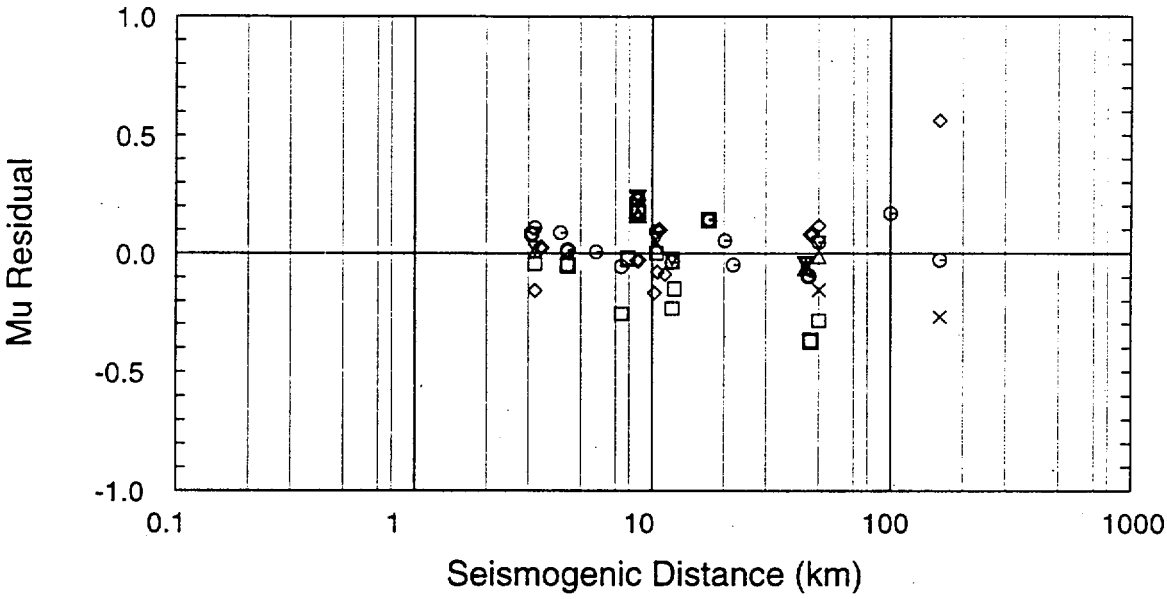


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 1.0 Hz

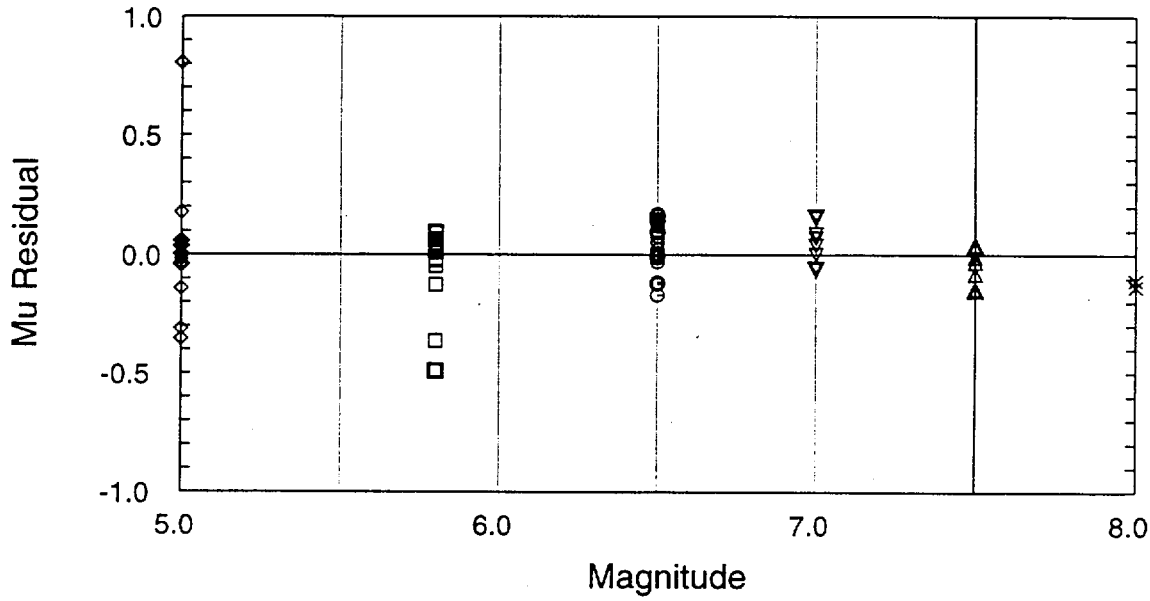


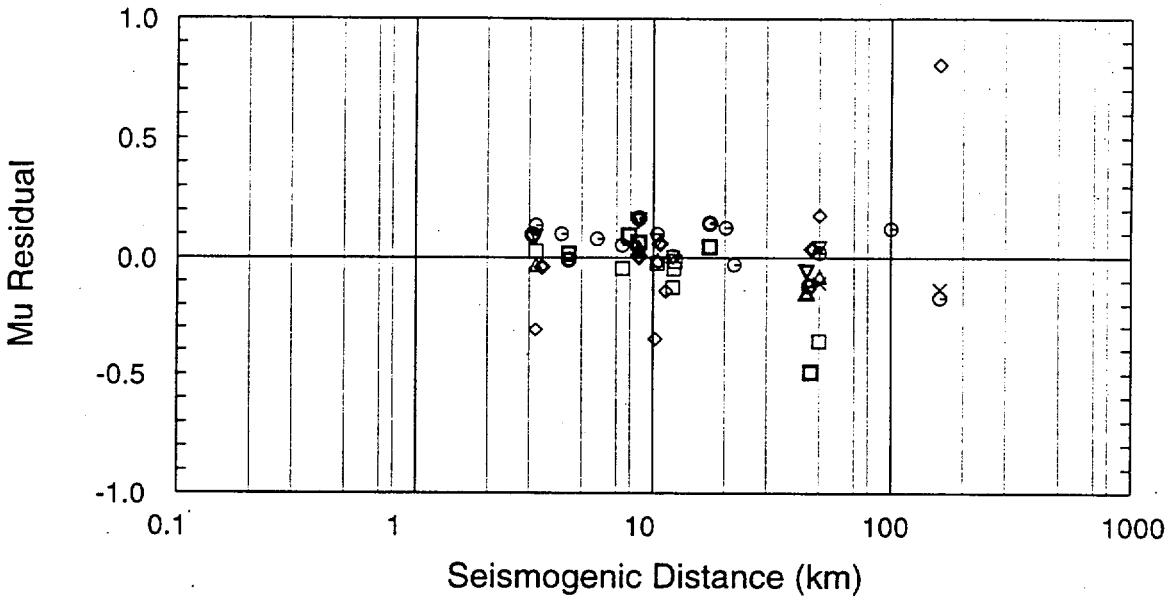


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.5 Hz

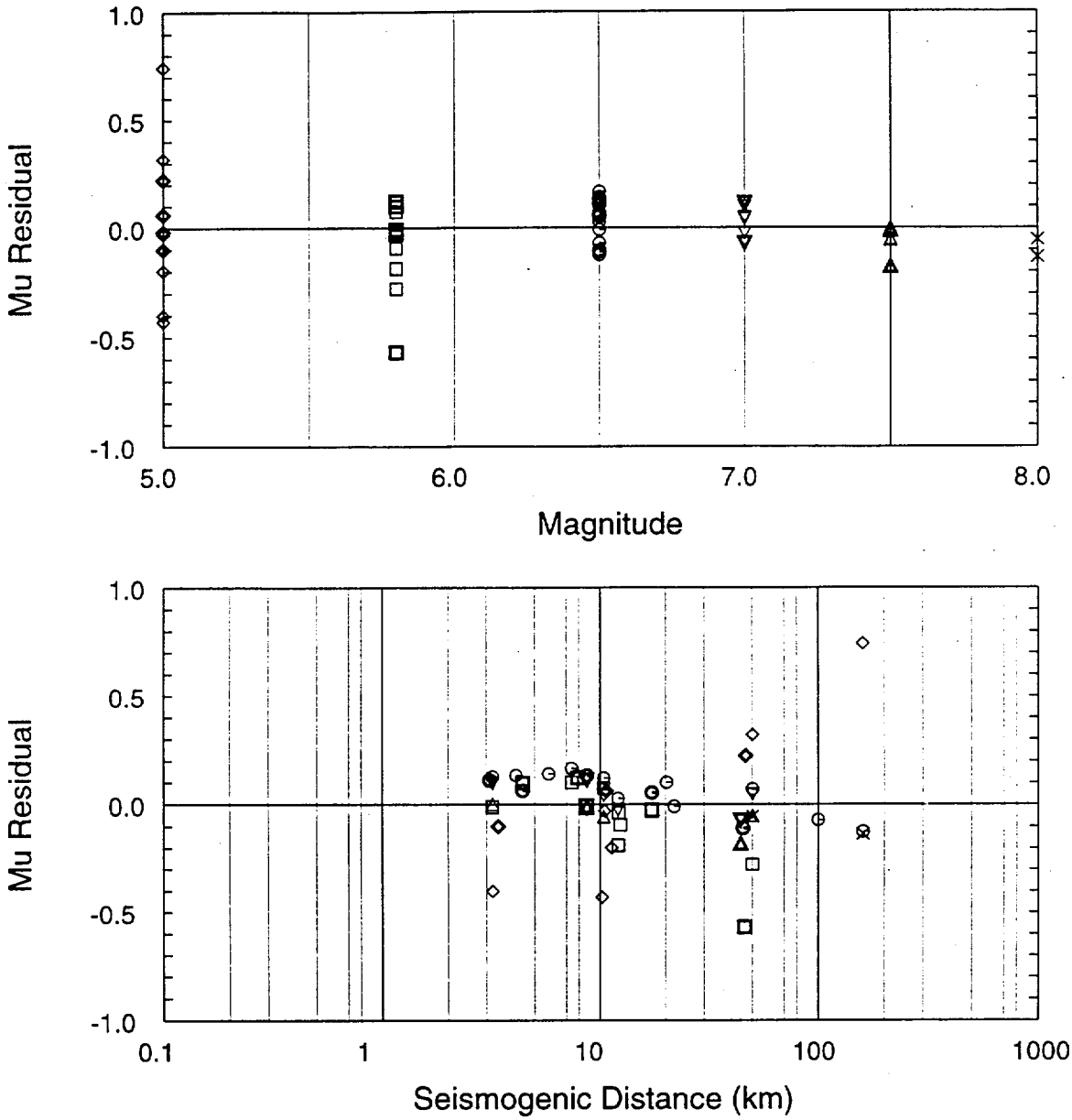




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊖ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

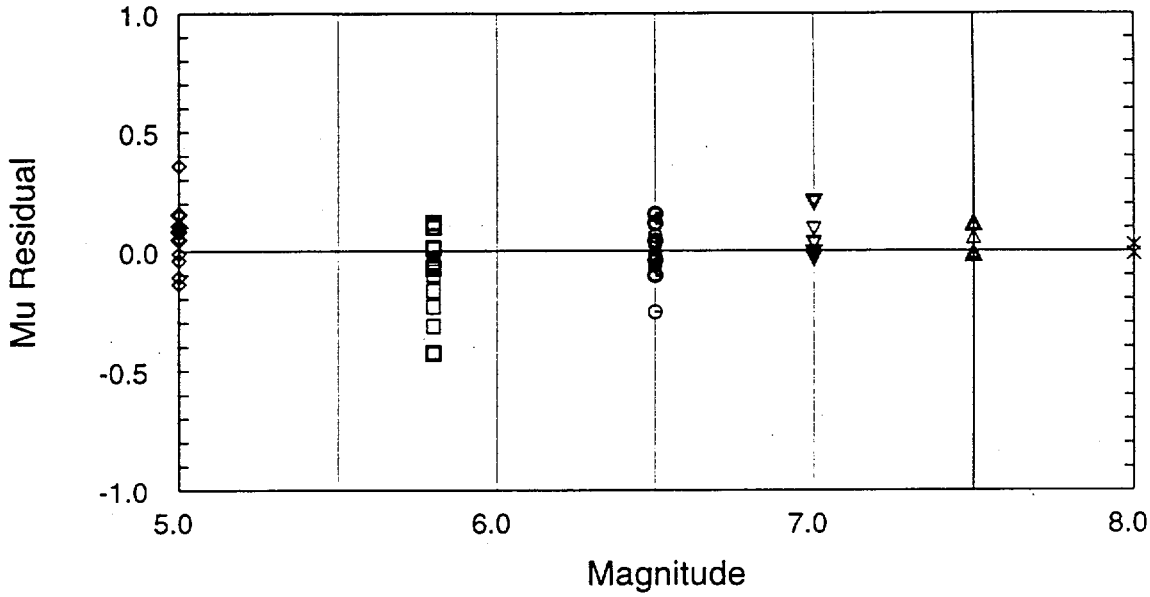
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.3 Hz

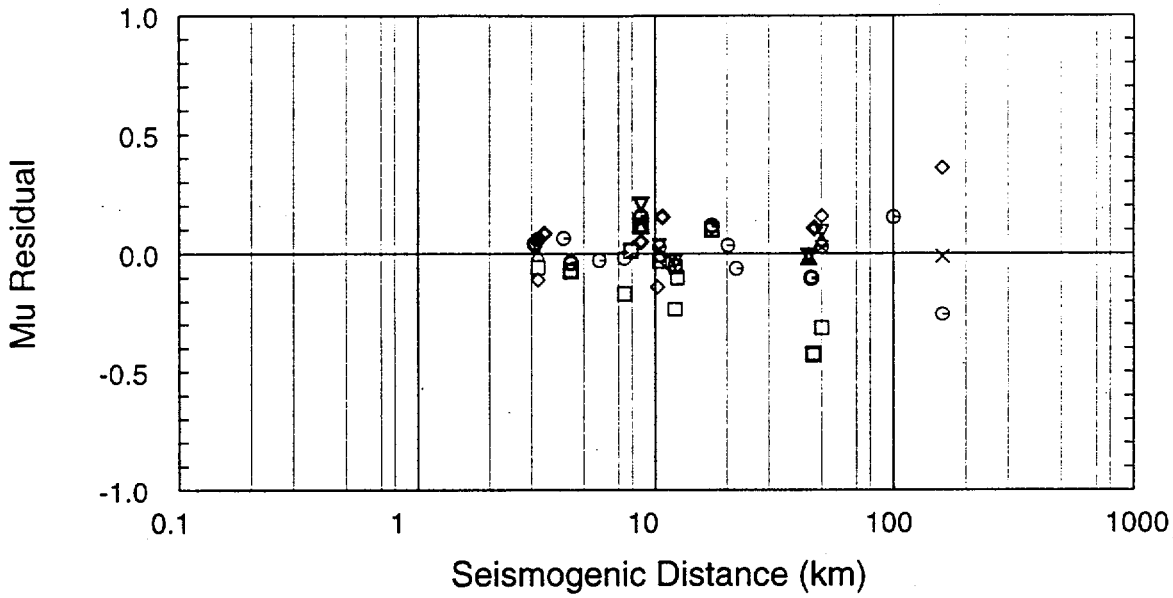


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

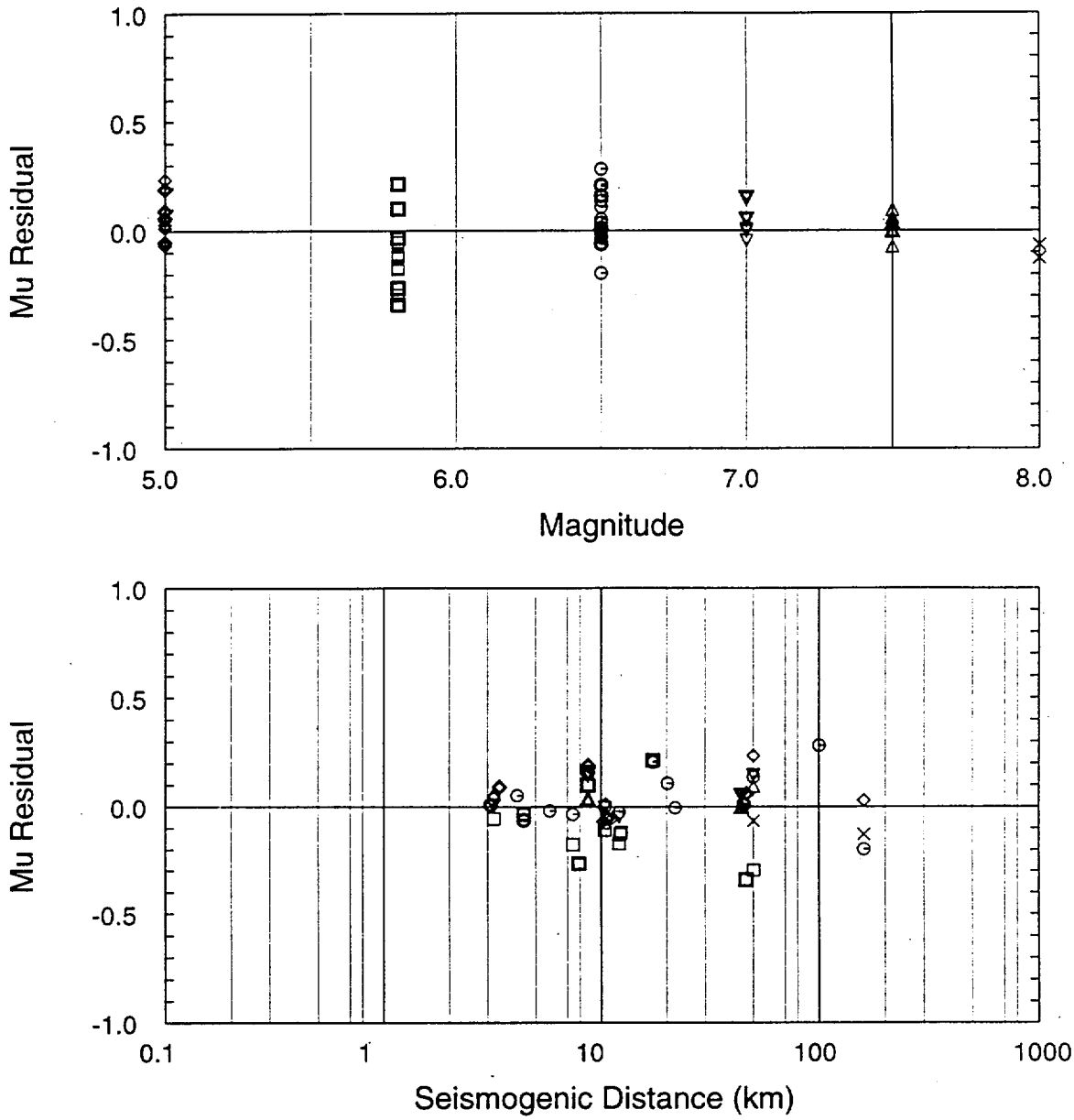
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Peak Velocity





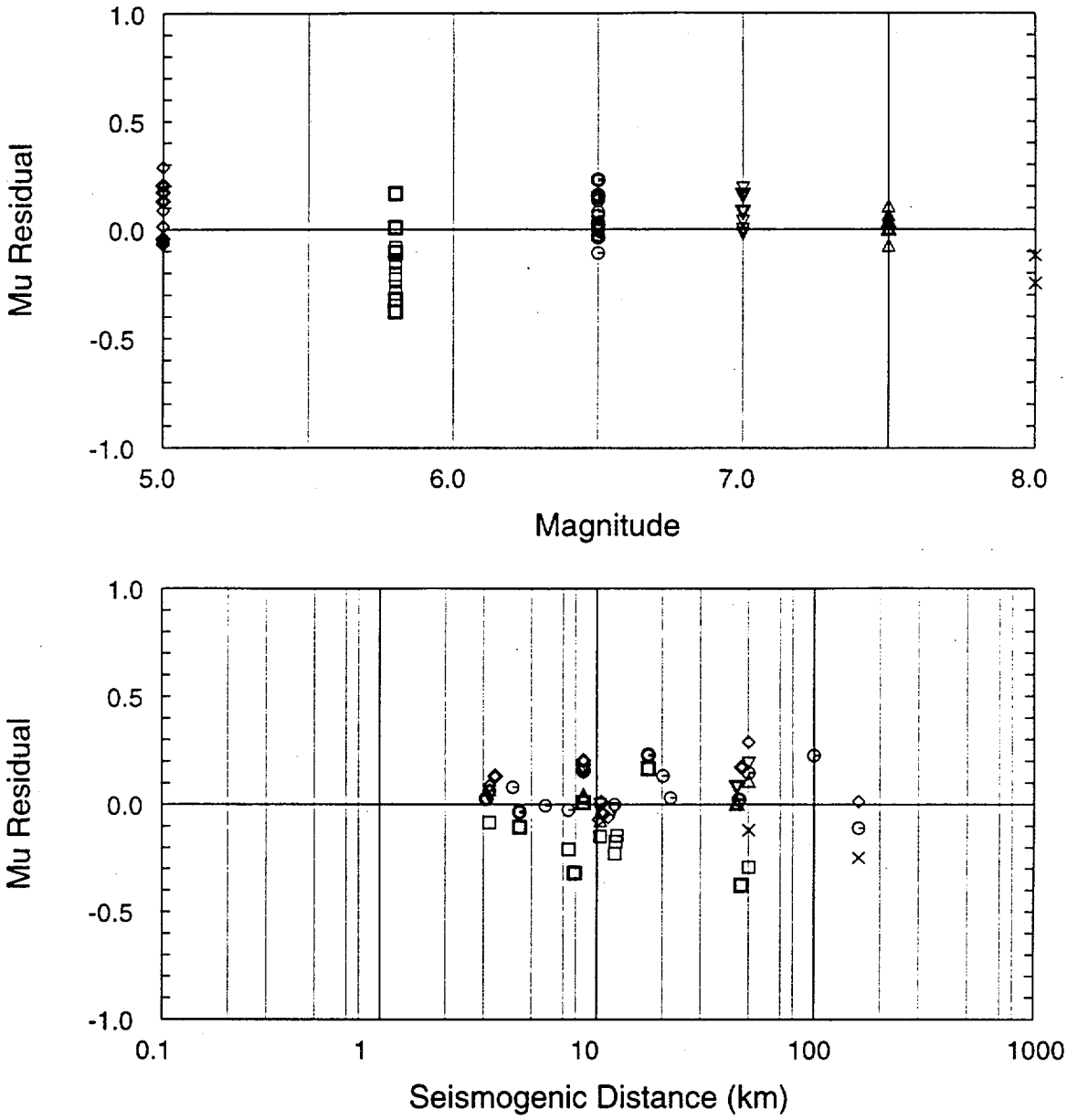
◇ M 5.0, SS and FW	◇ M 5.0, HW
□ M 5.8, SS and FW	□ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▽ M 7.0, HW
△ M 7.5, SS and FW	△ M 7.5, HW
× M 8.0, SS and FW	

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 100.0 Hz



◇ M 5.0, SS and FW	◆ M 5.0, HW
□ M 5.8, SS and FW	■ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▼ M 7.0, HW
△ M 7.5, SS and FW	▲ M 7.5, HW
× M 8.0, SS and FW	

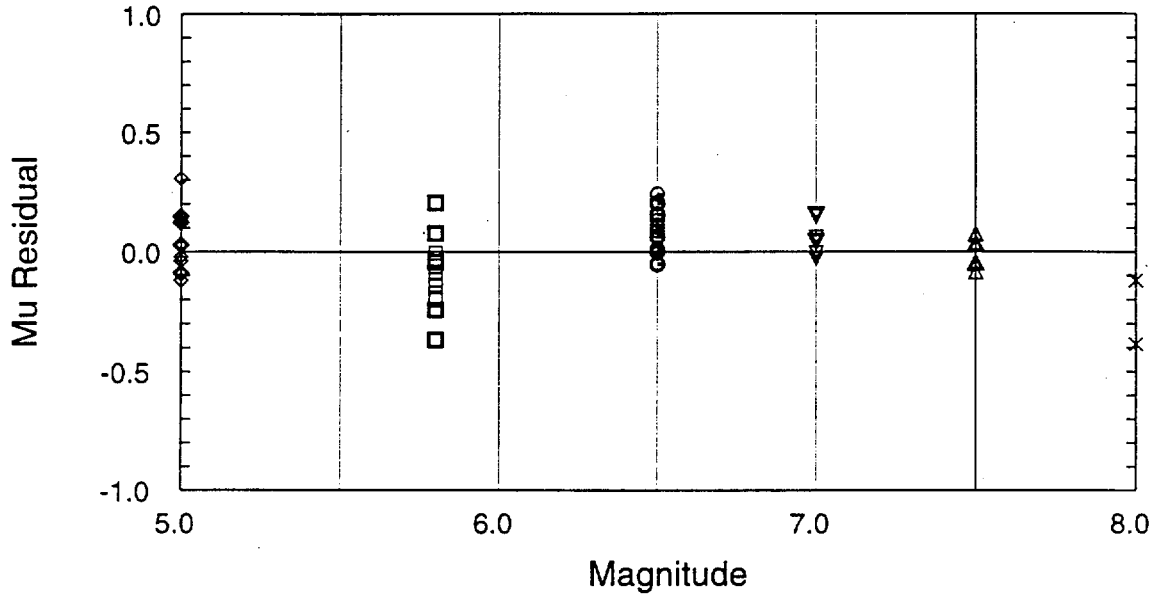
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 20.0 Hz

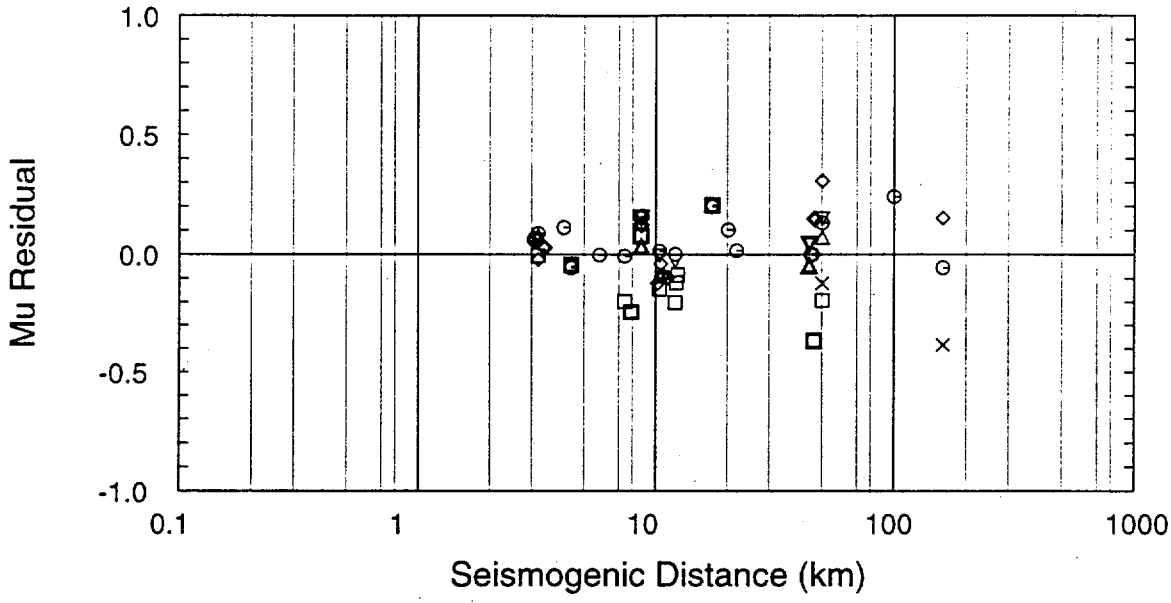


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 10.0 Hz

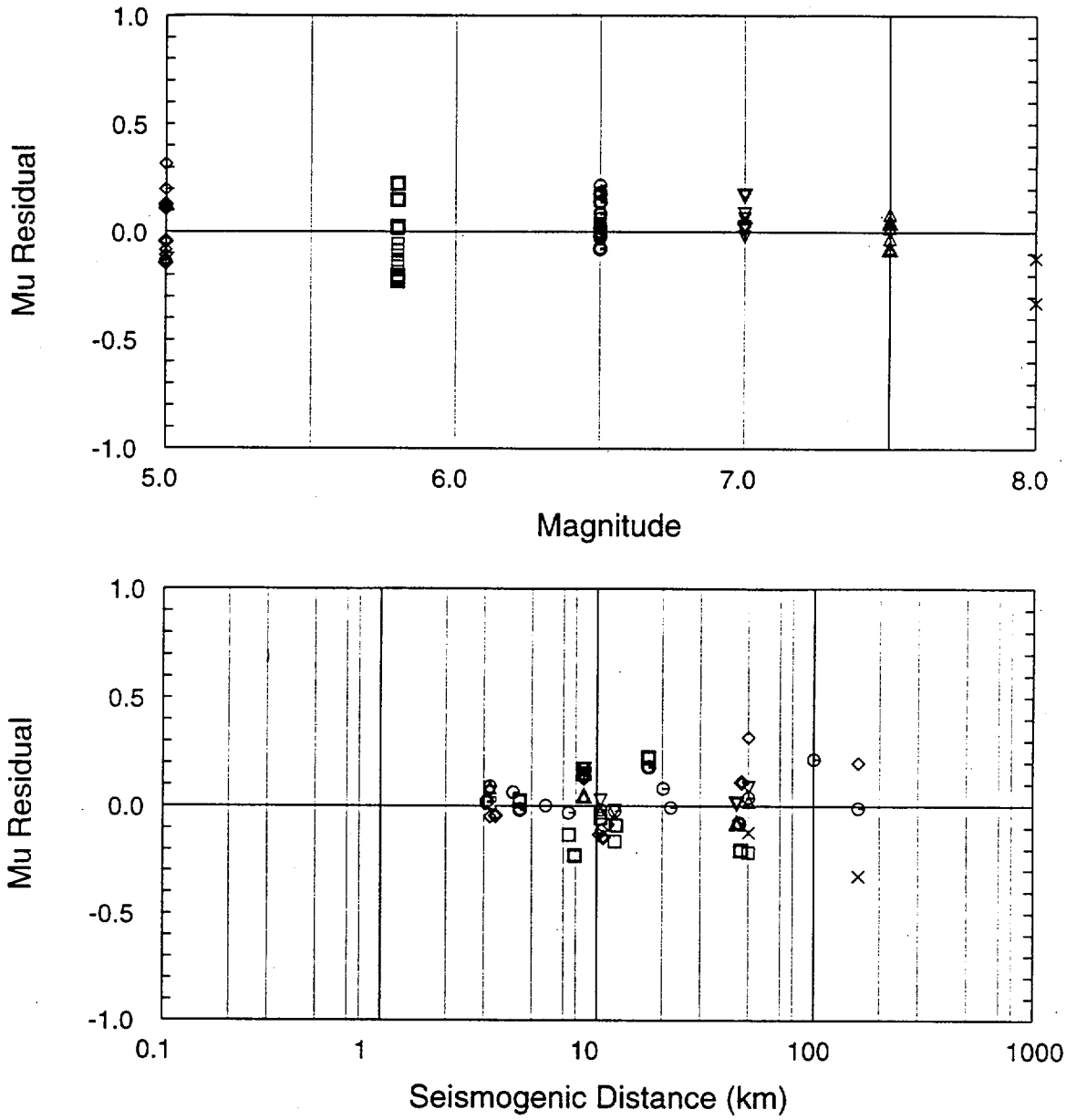




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

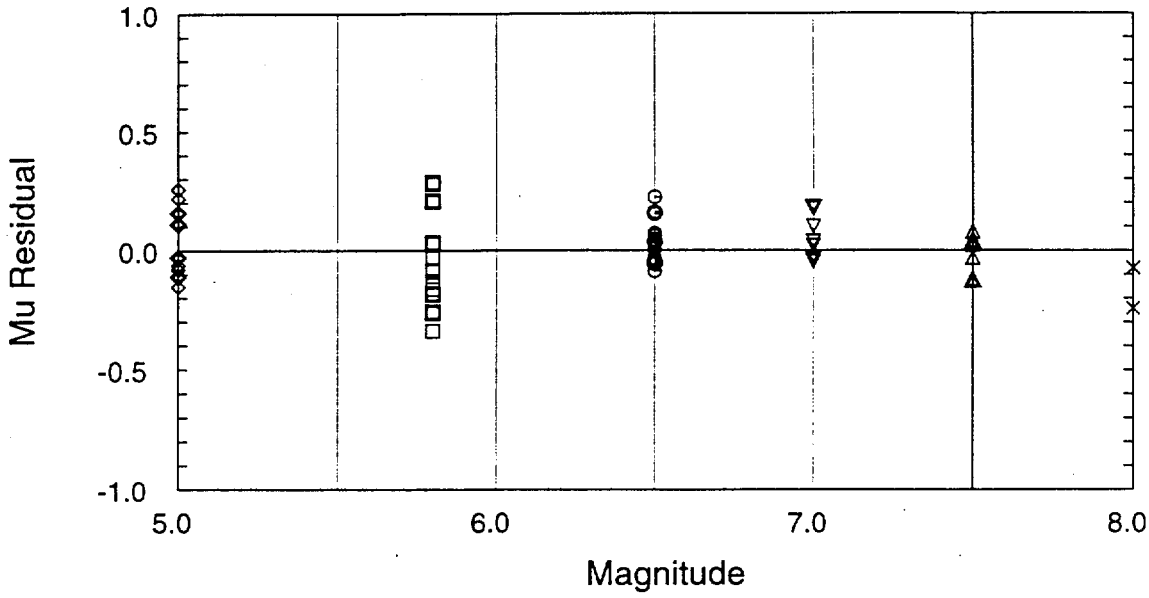
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 5.0 Hz

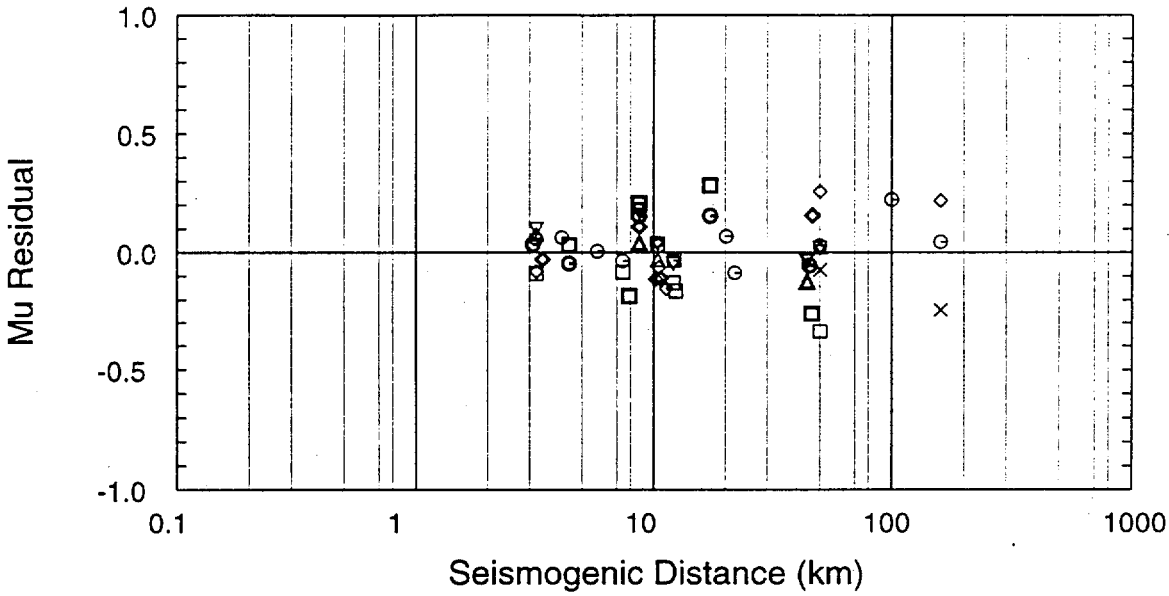


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 2.0 Hz

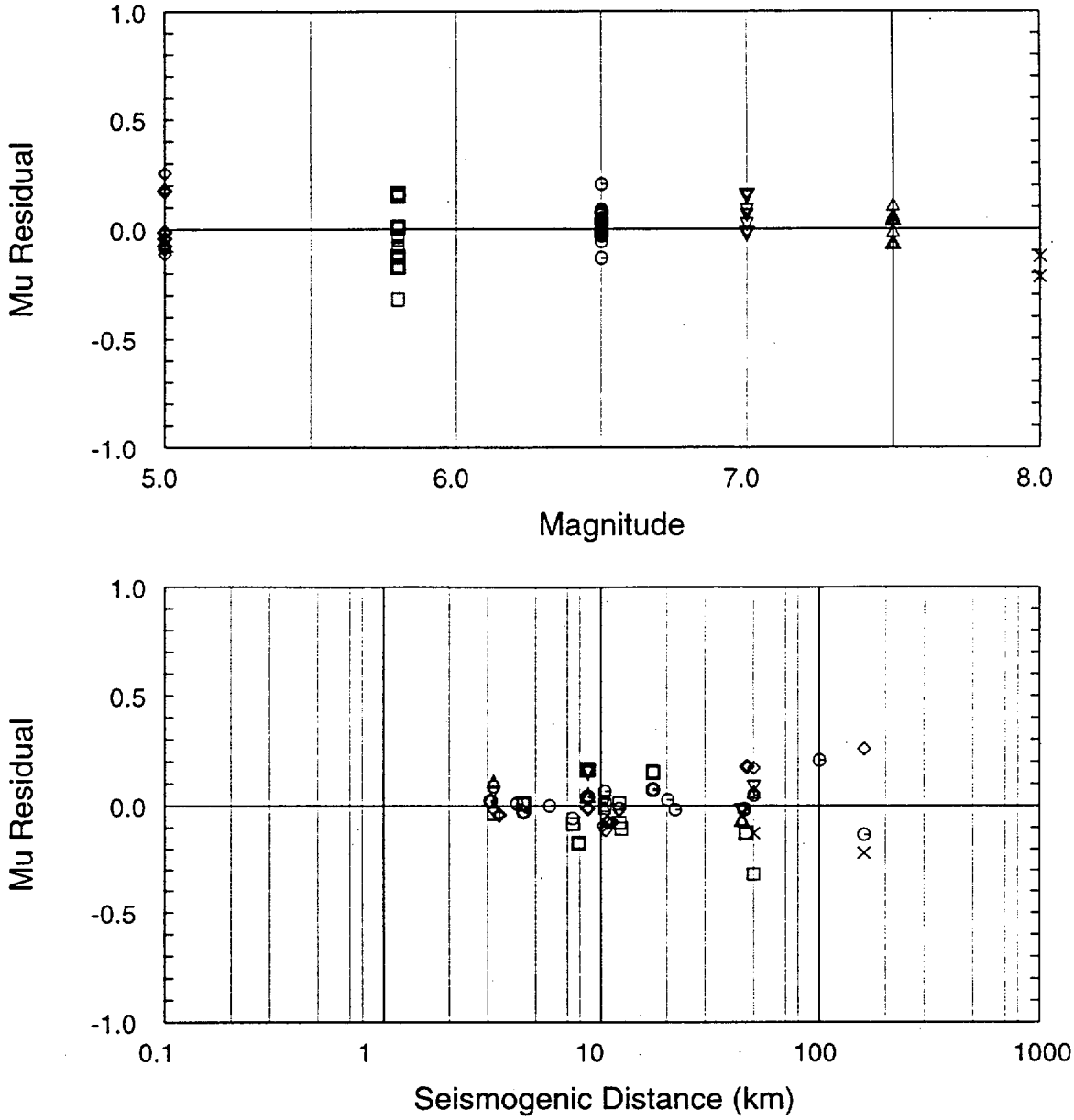




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

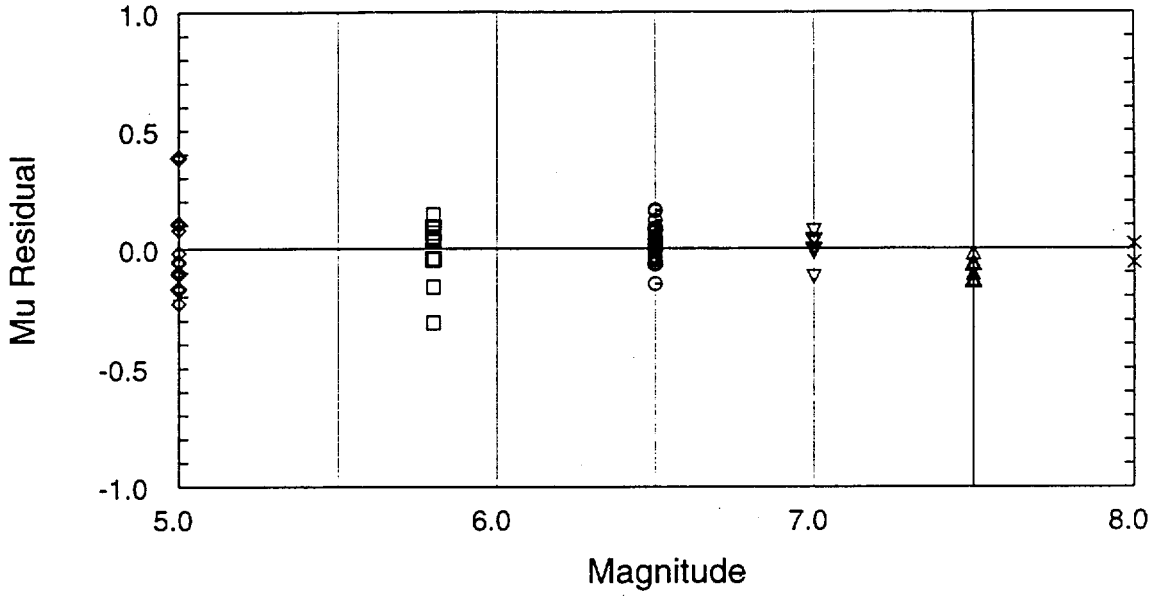
◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

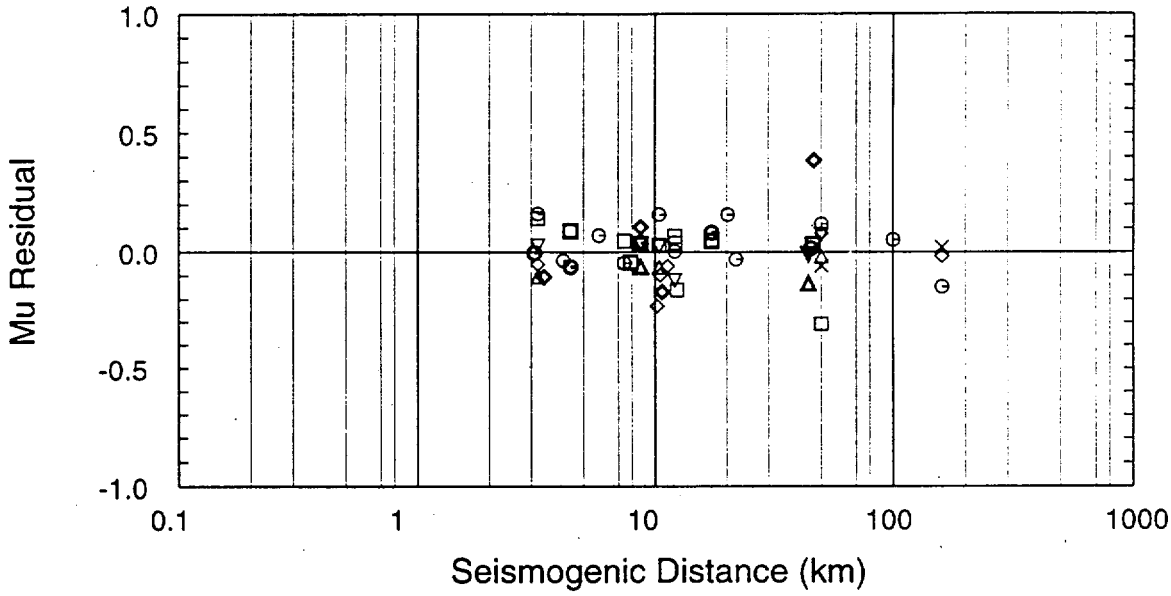
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 1.0 Hz



◇ M 5.0, SS and FW	◆ M 5.0, HW
□ M 5.8, SS and FW	■ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▼ M 7.0, HW
△ M 7.5, SS and FW	▲ M 7.5, HW
× M 8.0, SS and FW	

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.5 Hz

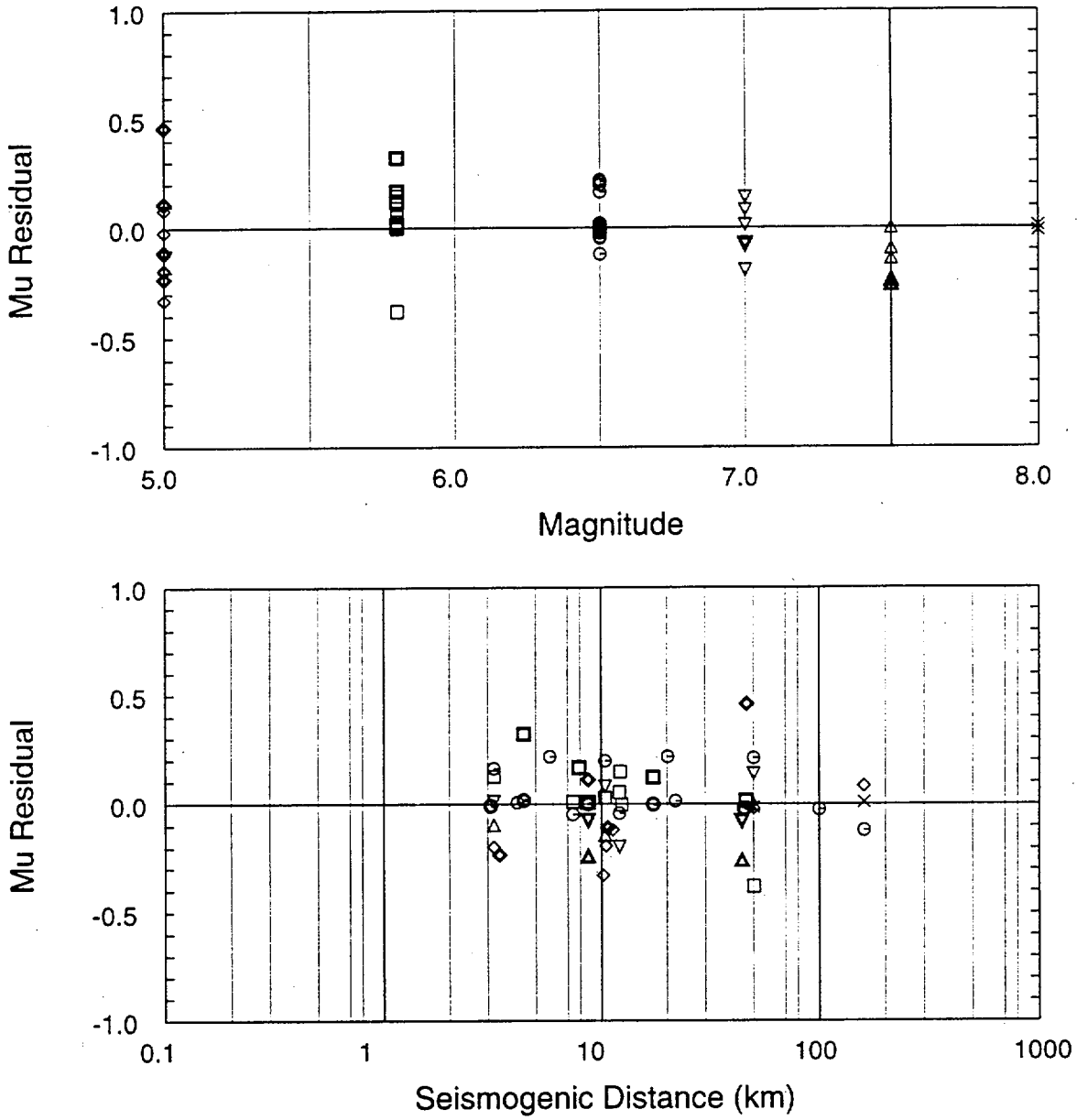




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊖ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

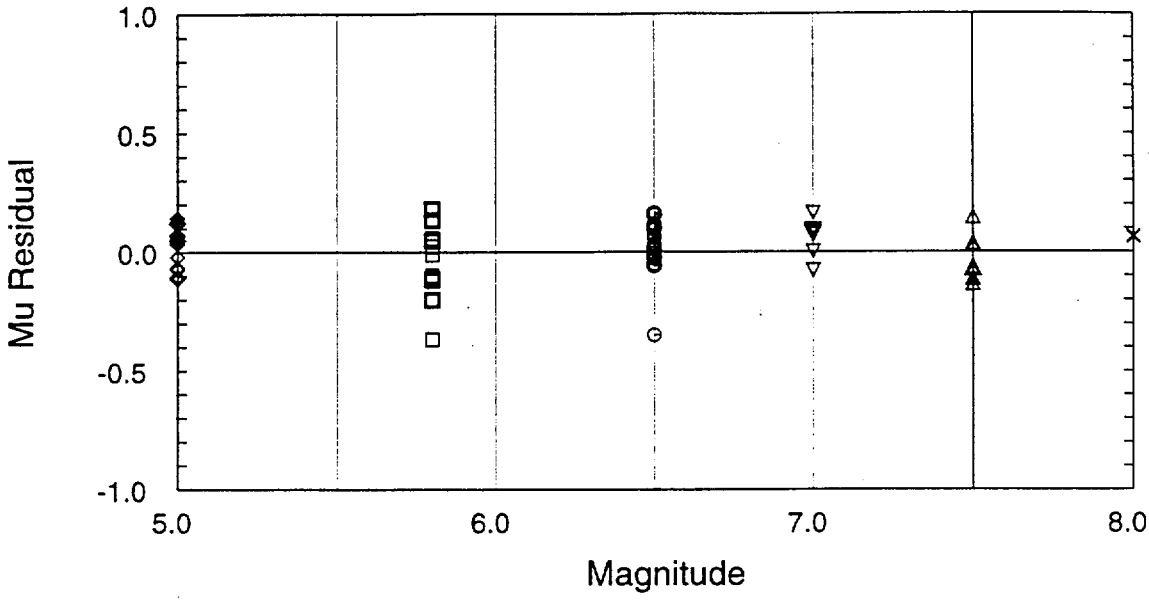
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.3 Hz

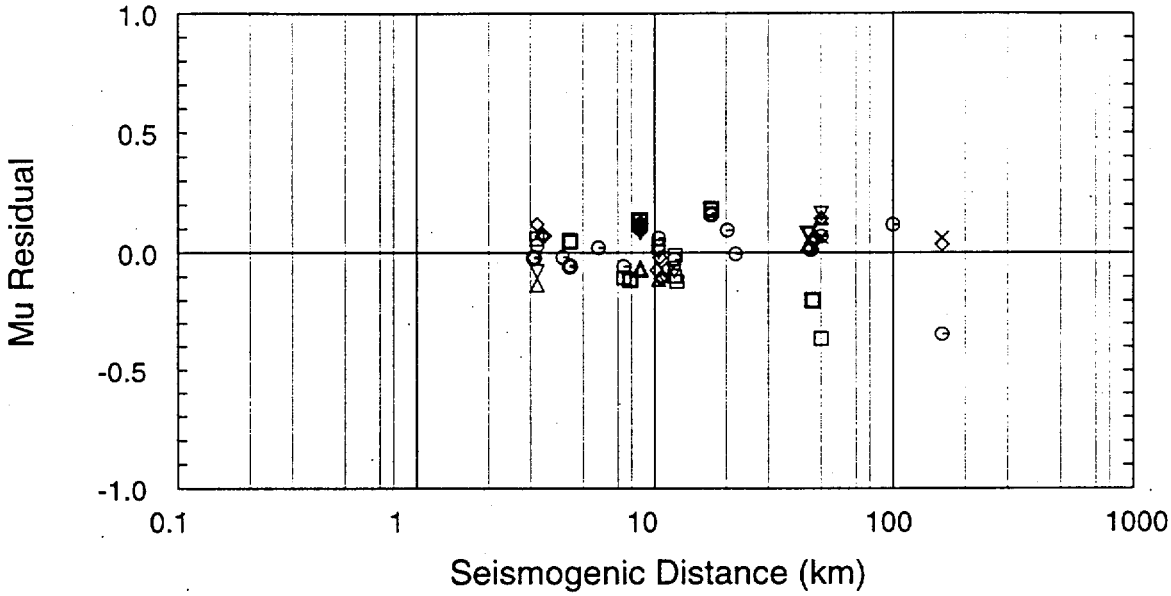


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Peak Velocity

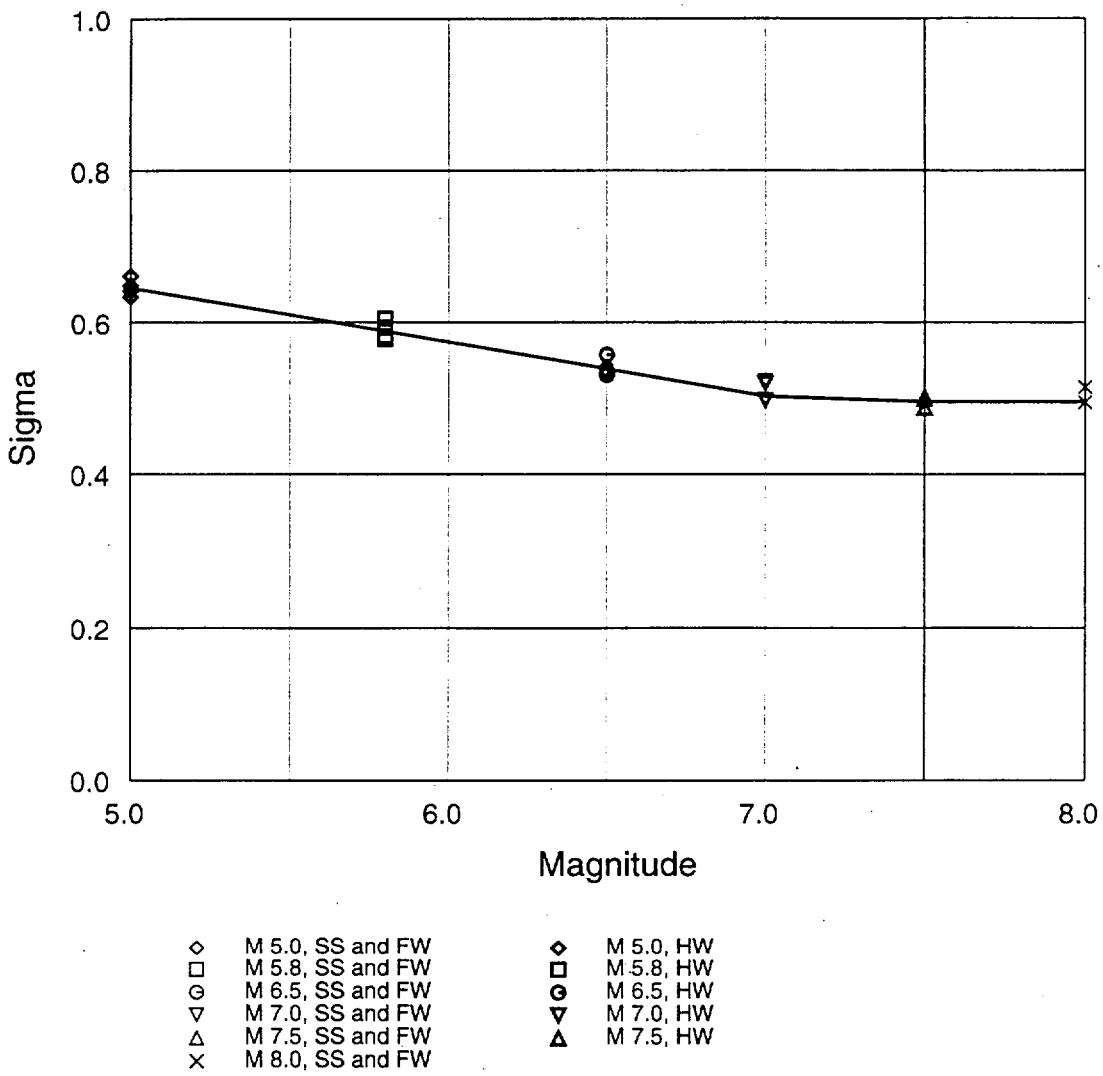




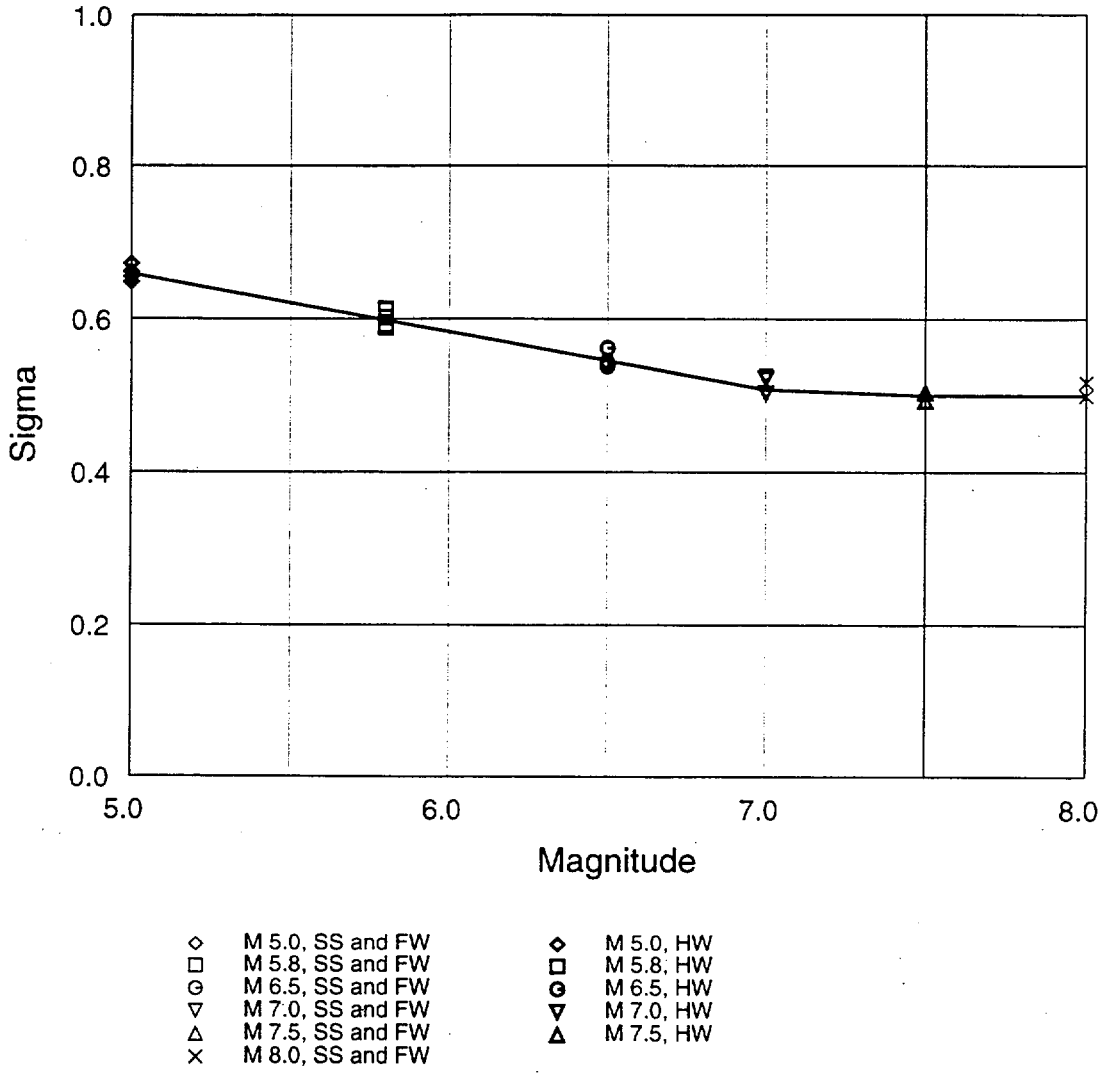
◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

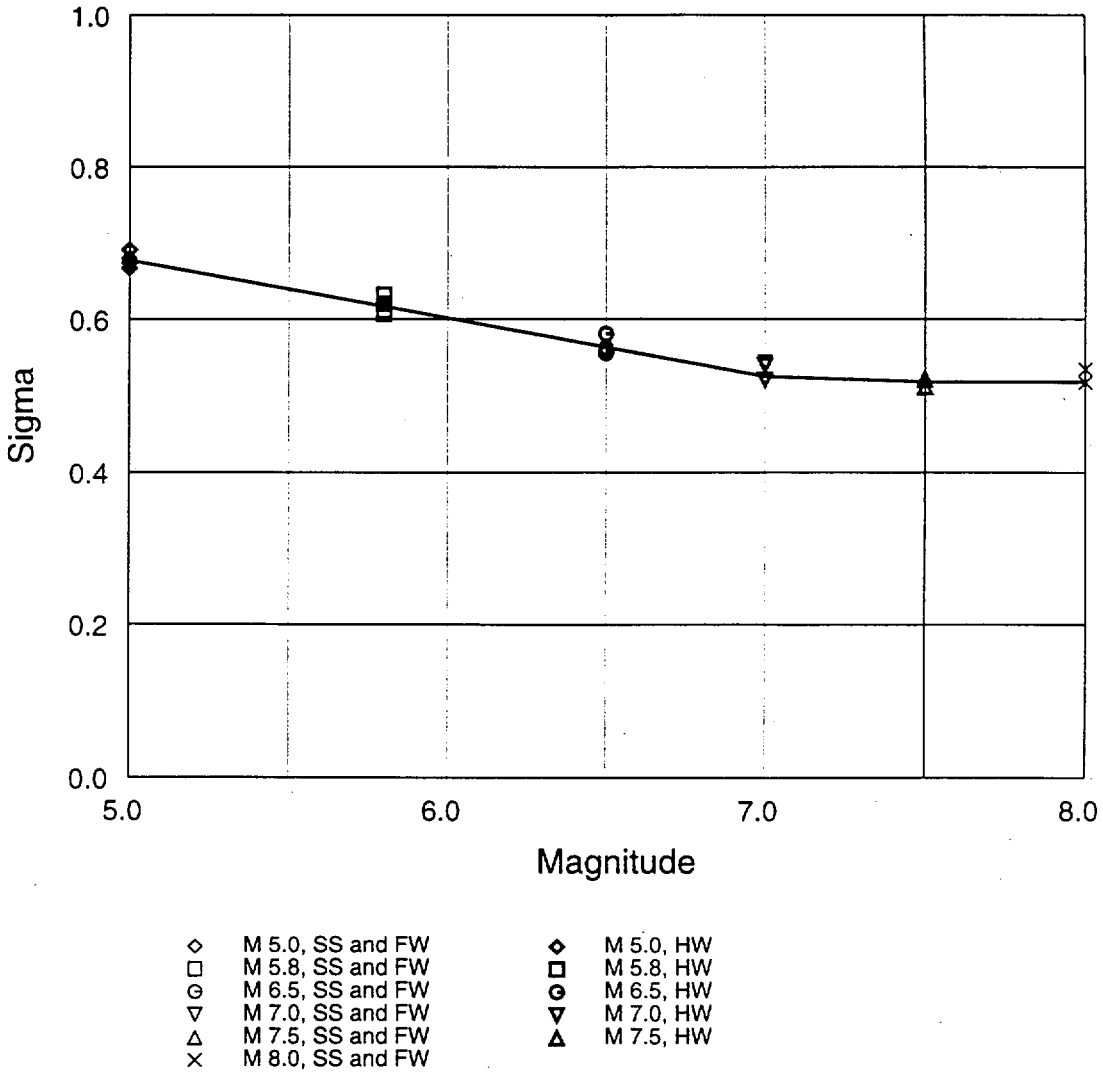
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 100.0 Hz



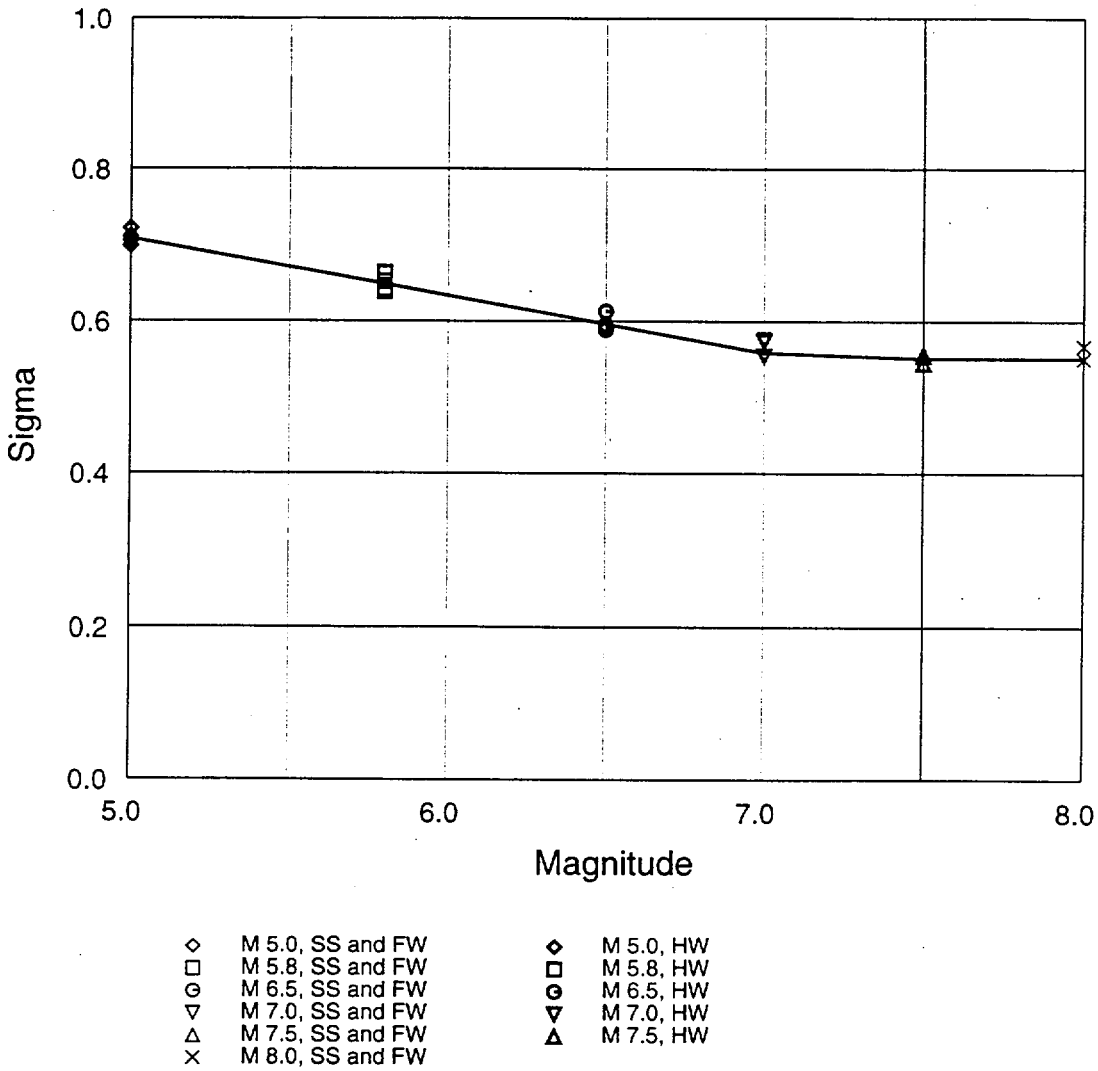
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 20.0 Hz



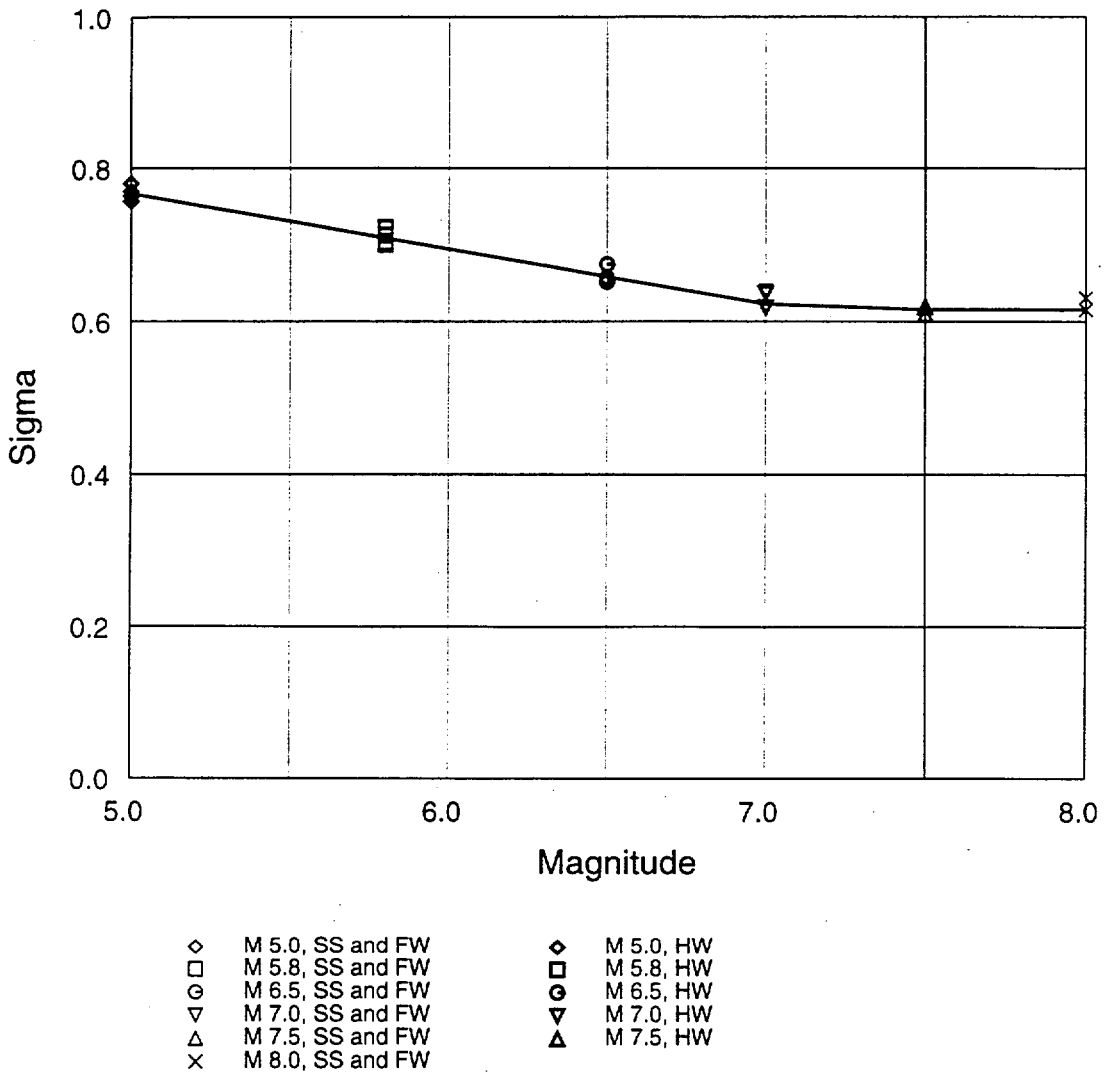
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 10.0 Hz



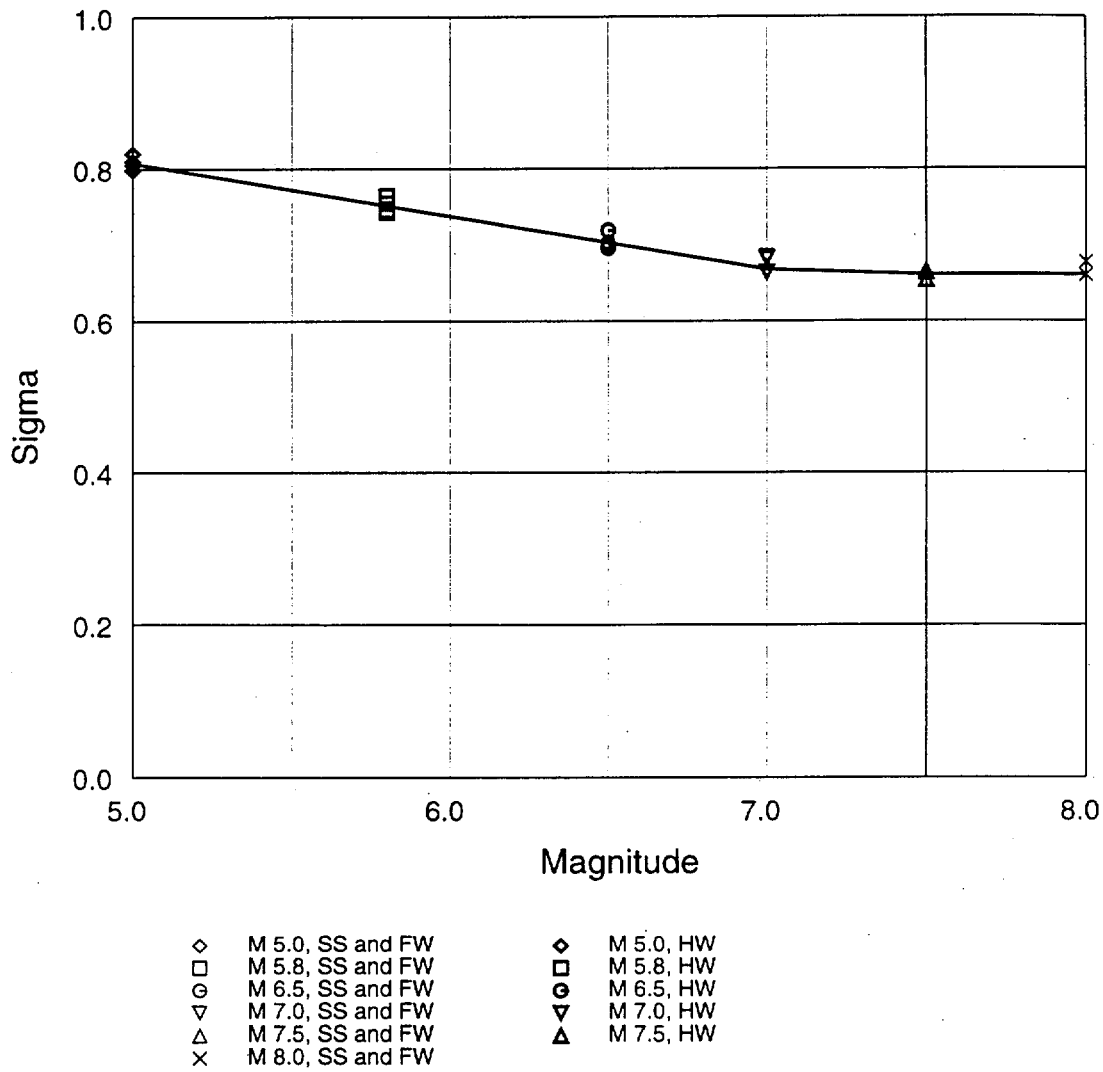
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 5.0 Hz



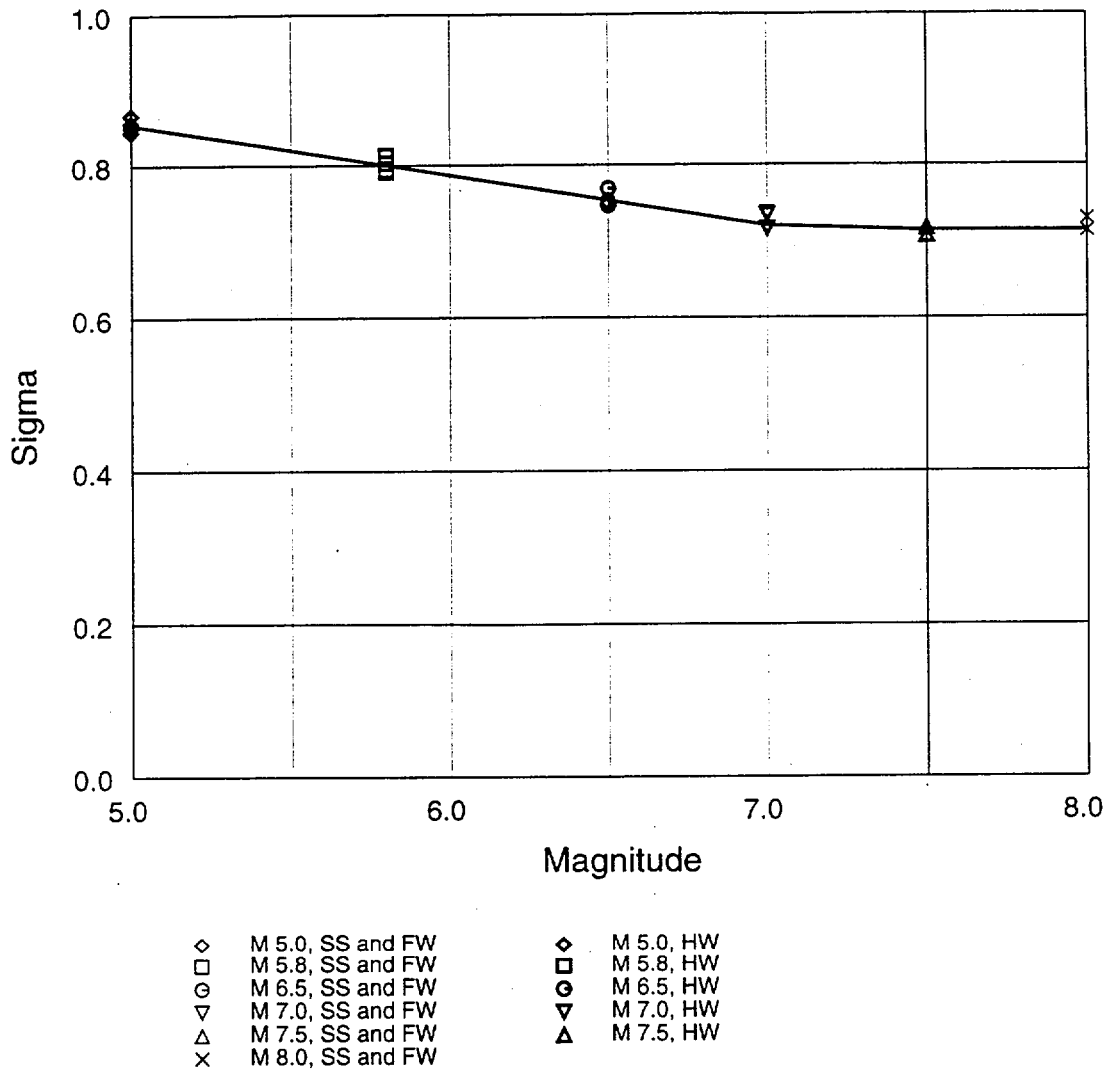
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 2.0 Hz



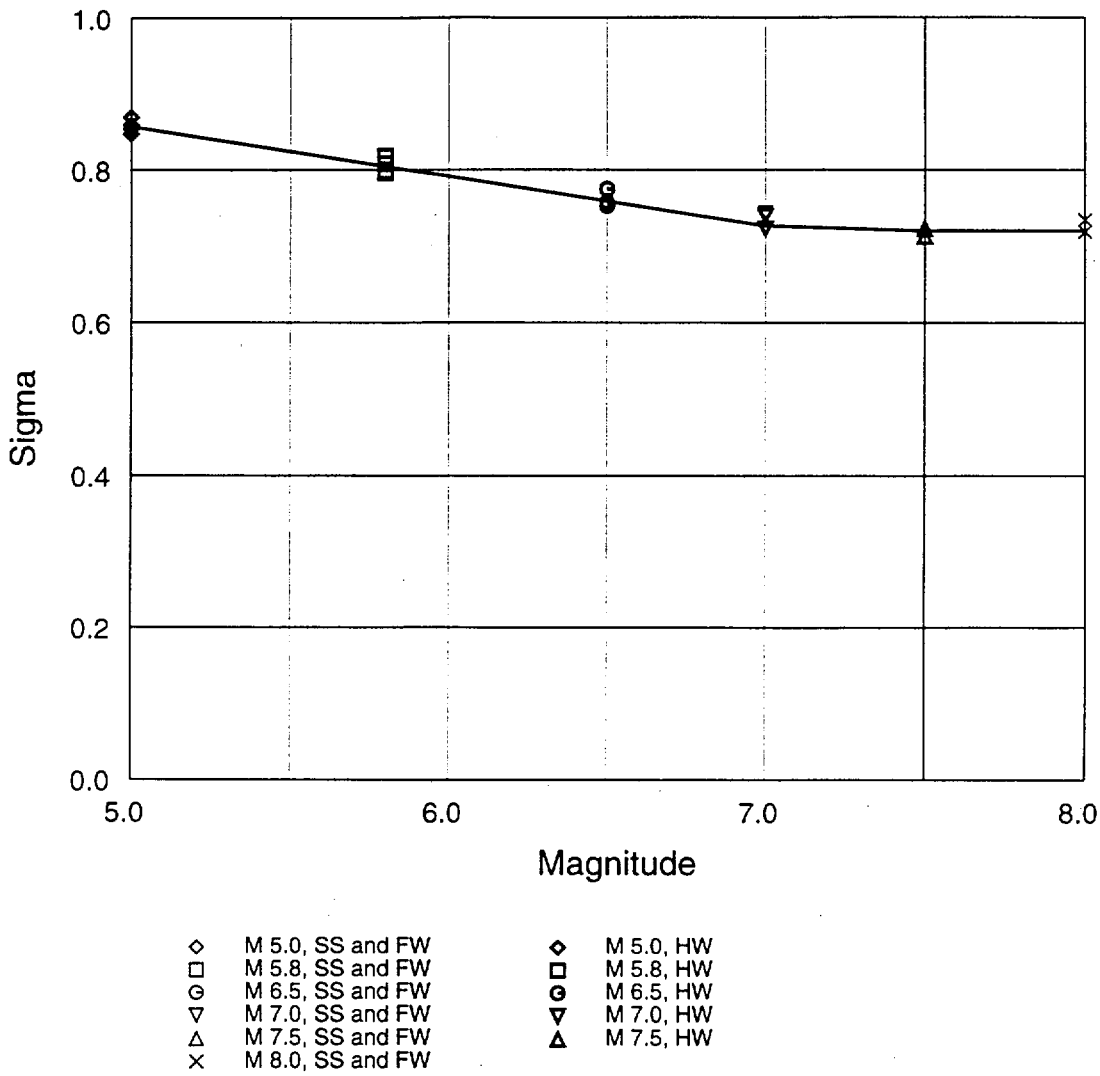
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 1.0 Hz



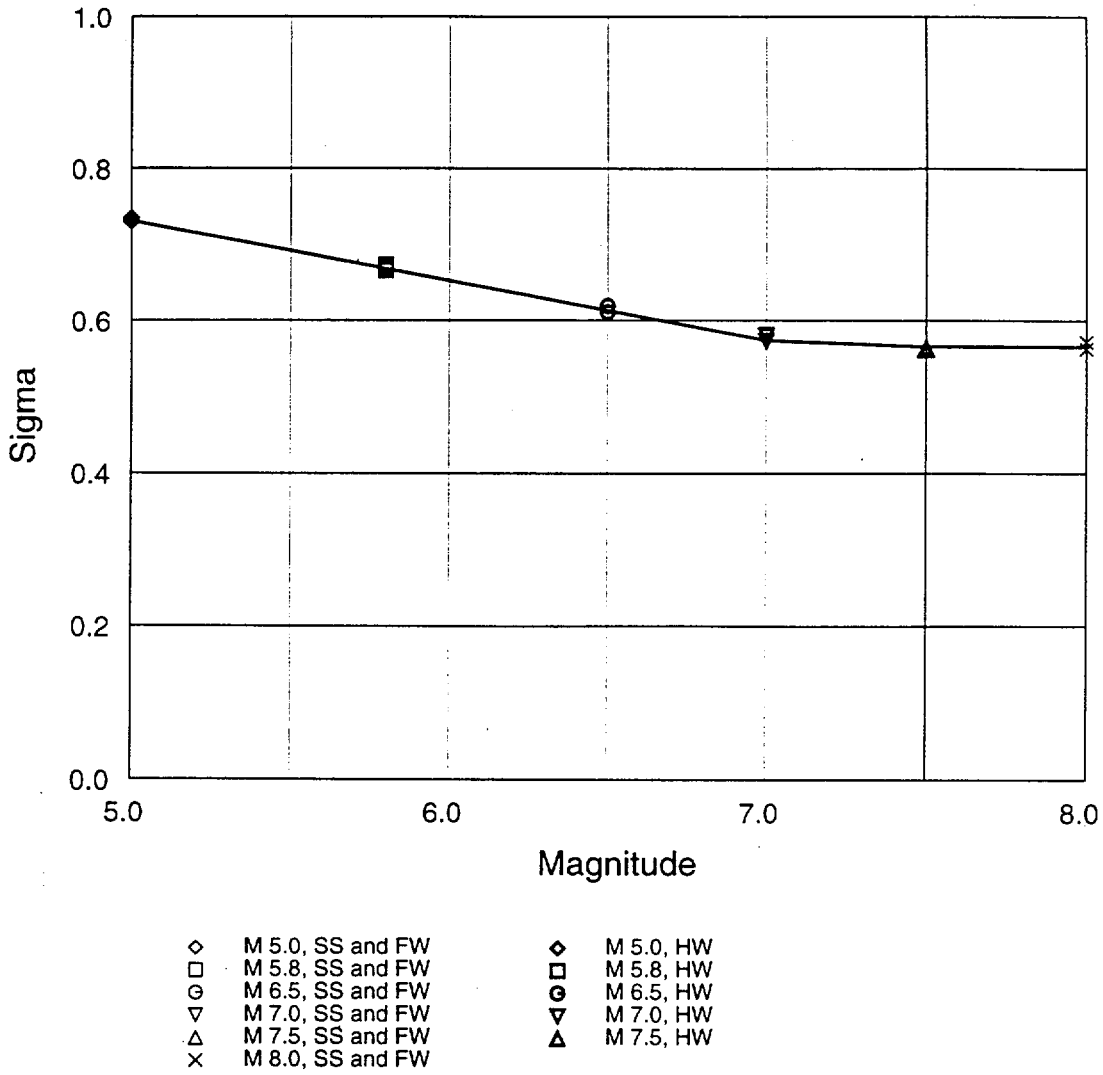
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.5 Hz



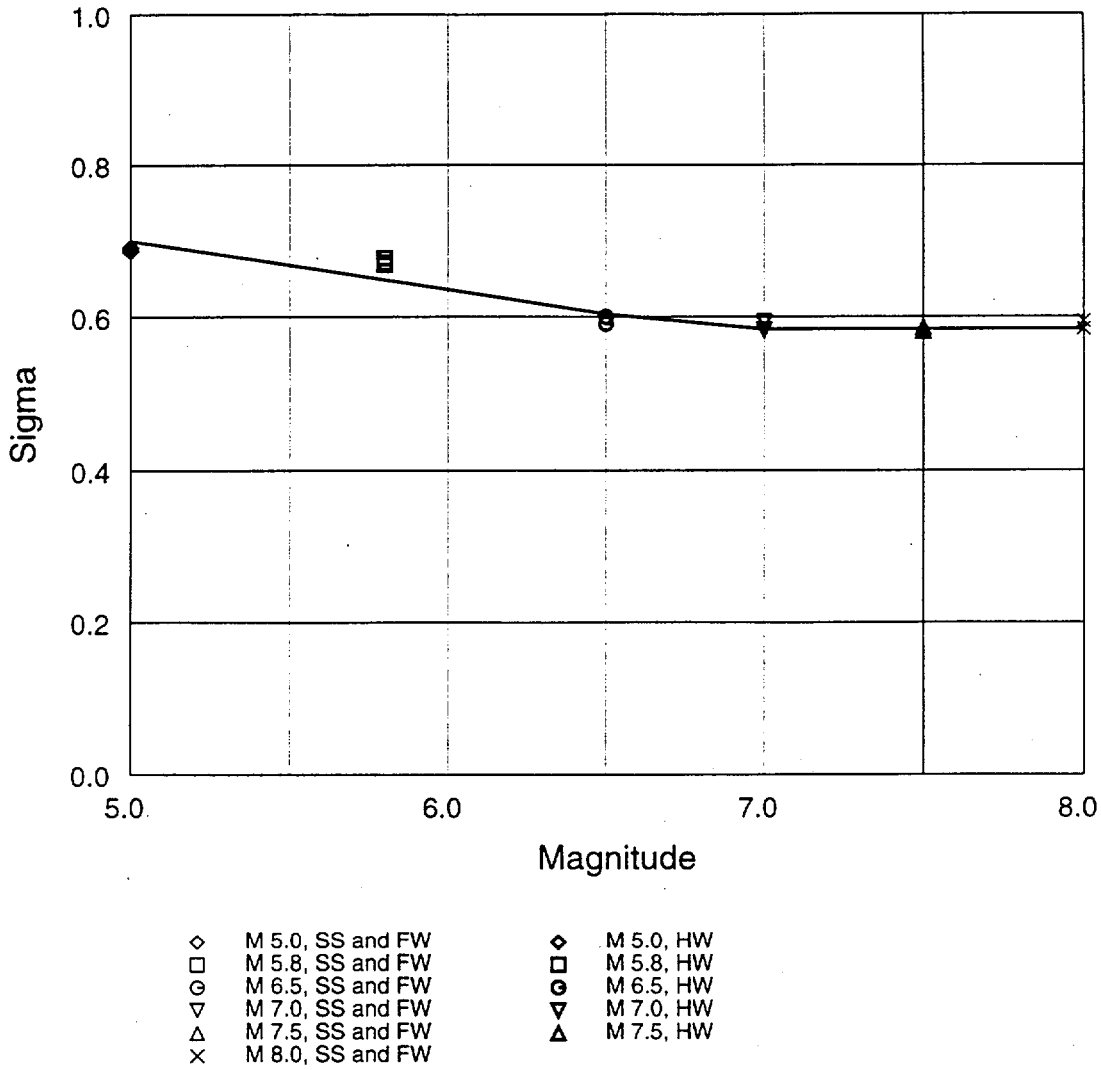
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.3 Hz



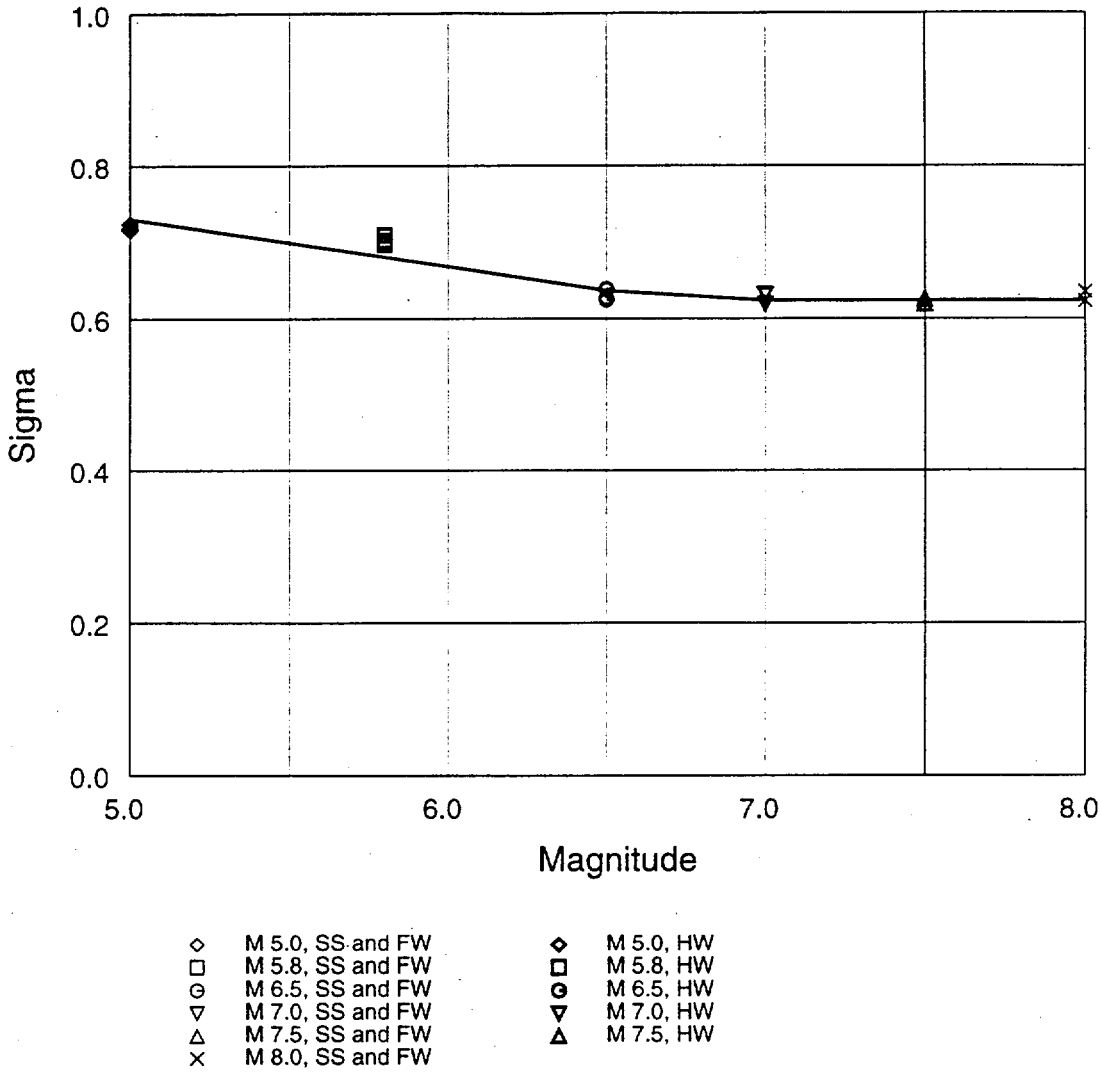
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Peak Velocity



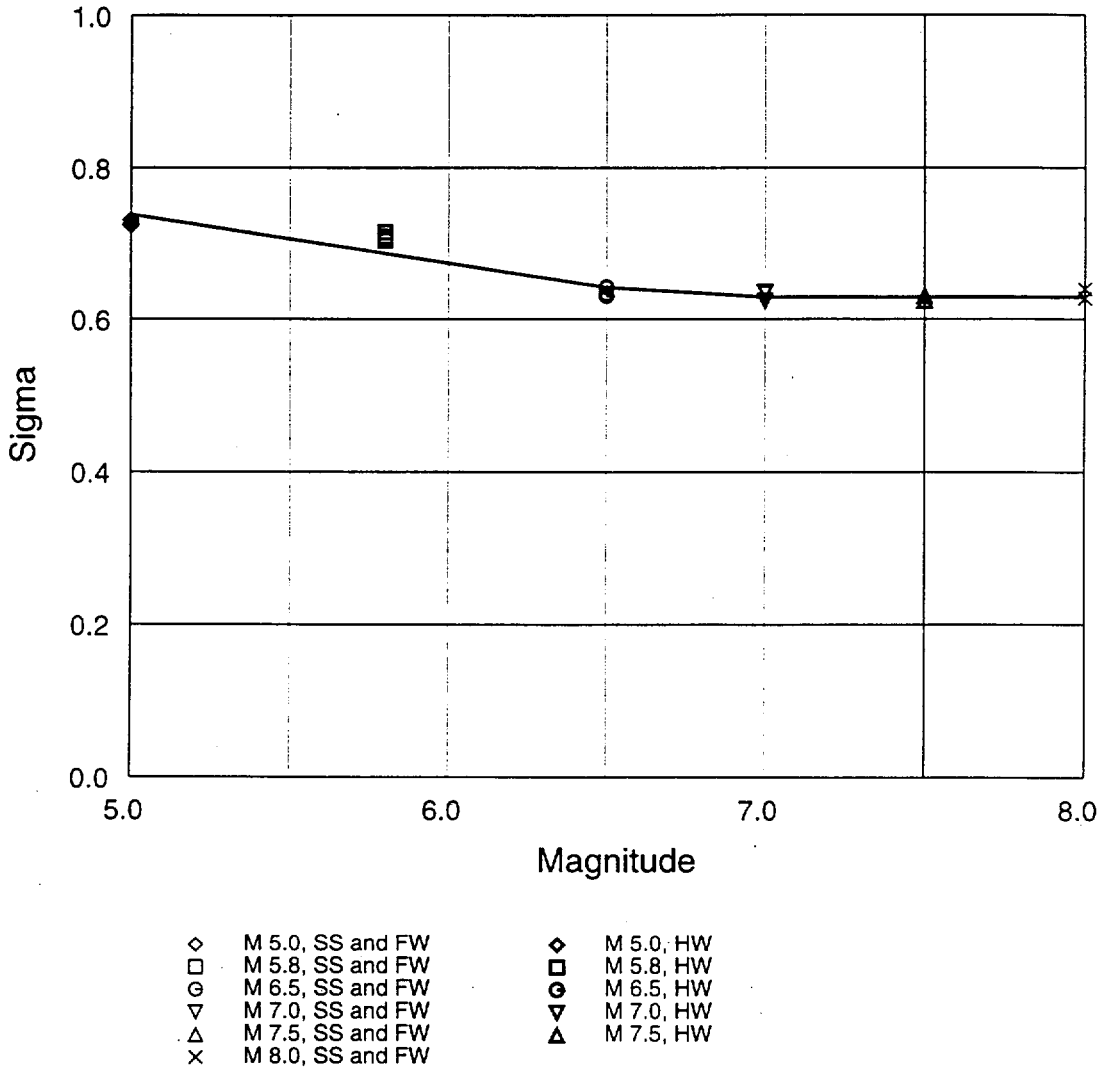
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 100.0 Hz



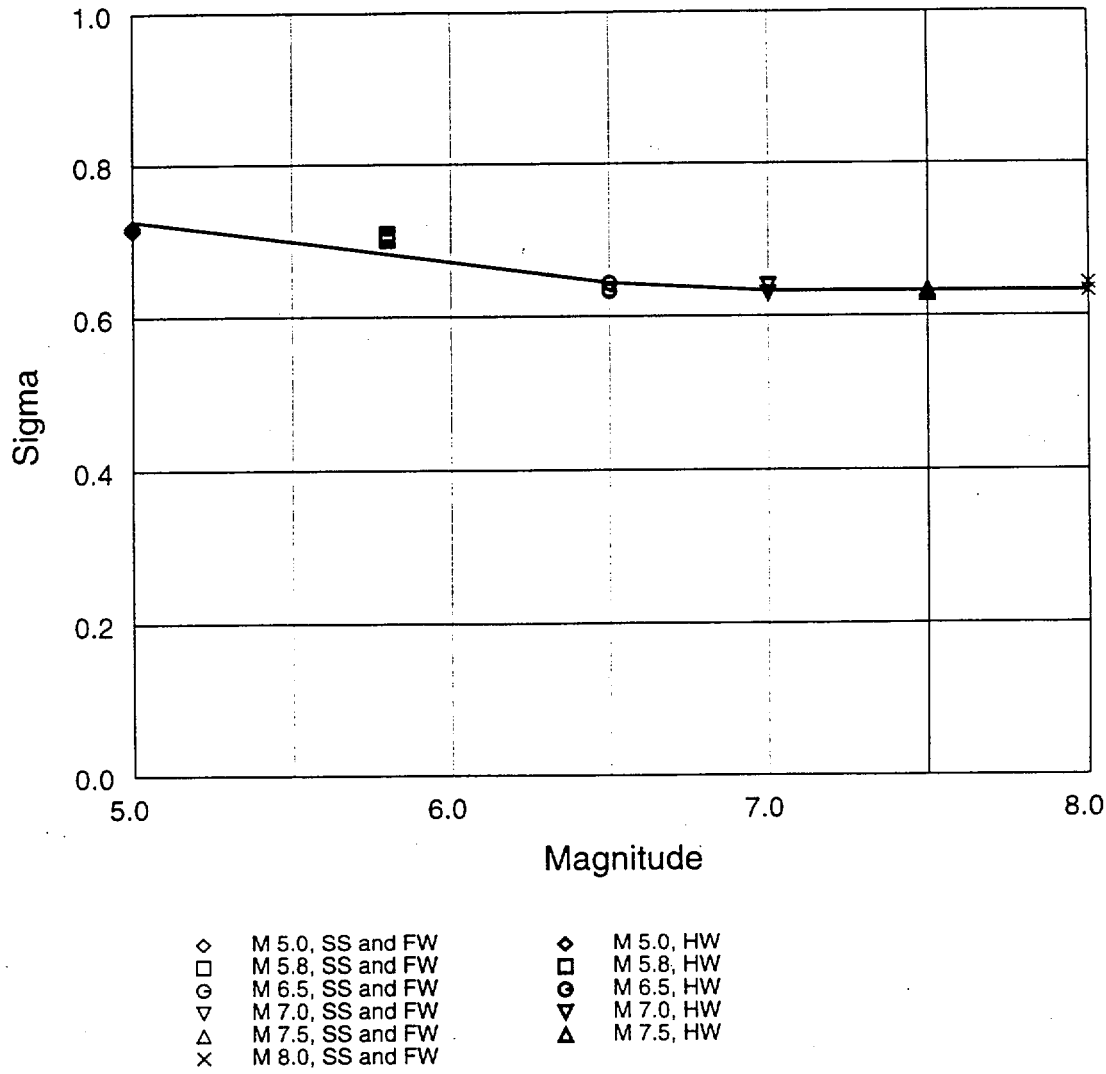
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 20.0 Hz



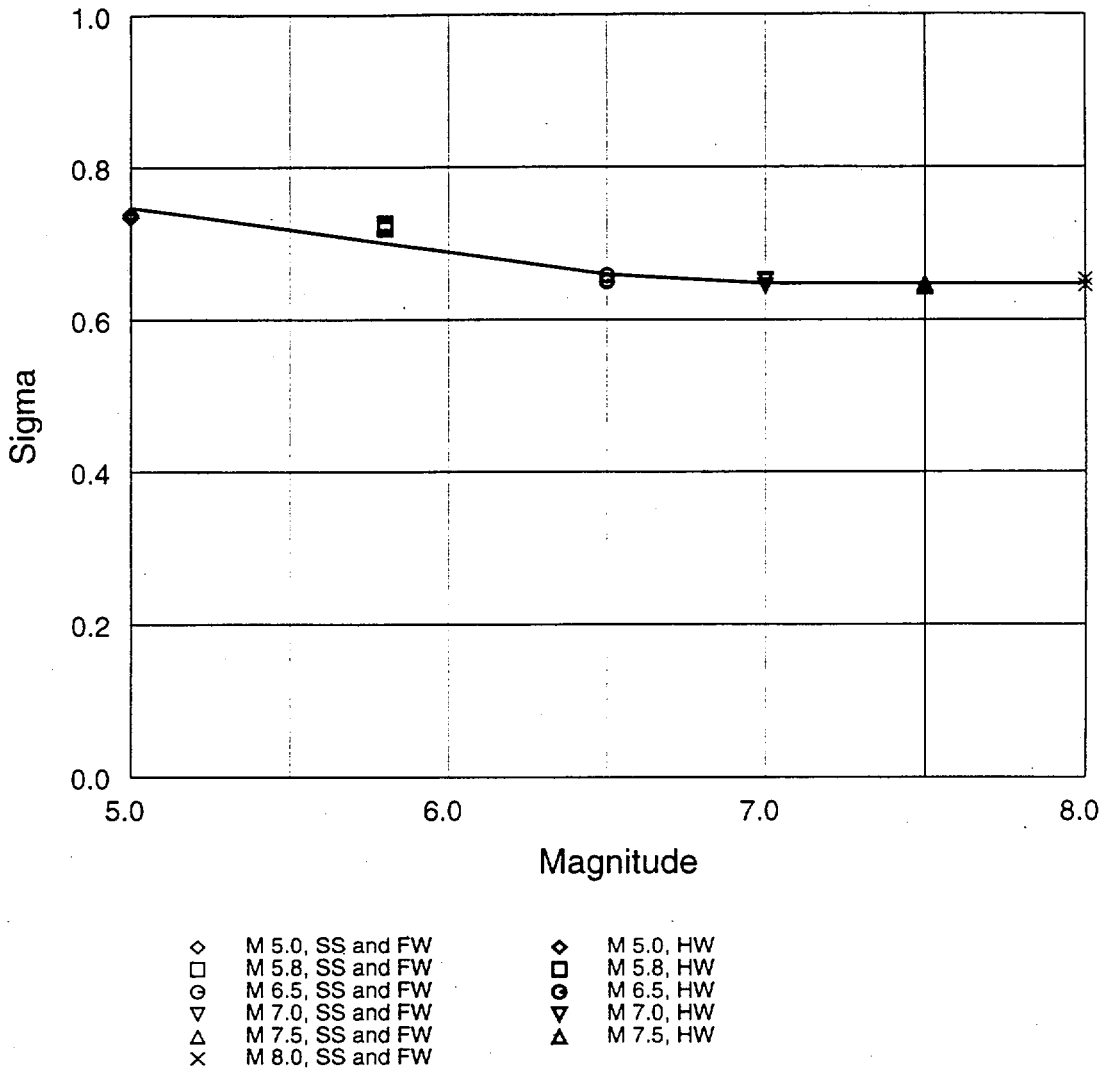
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 10.0 Hz



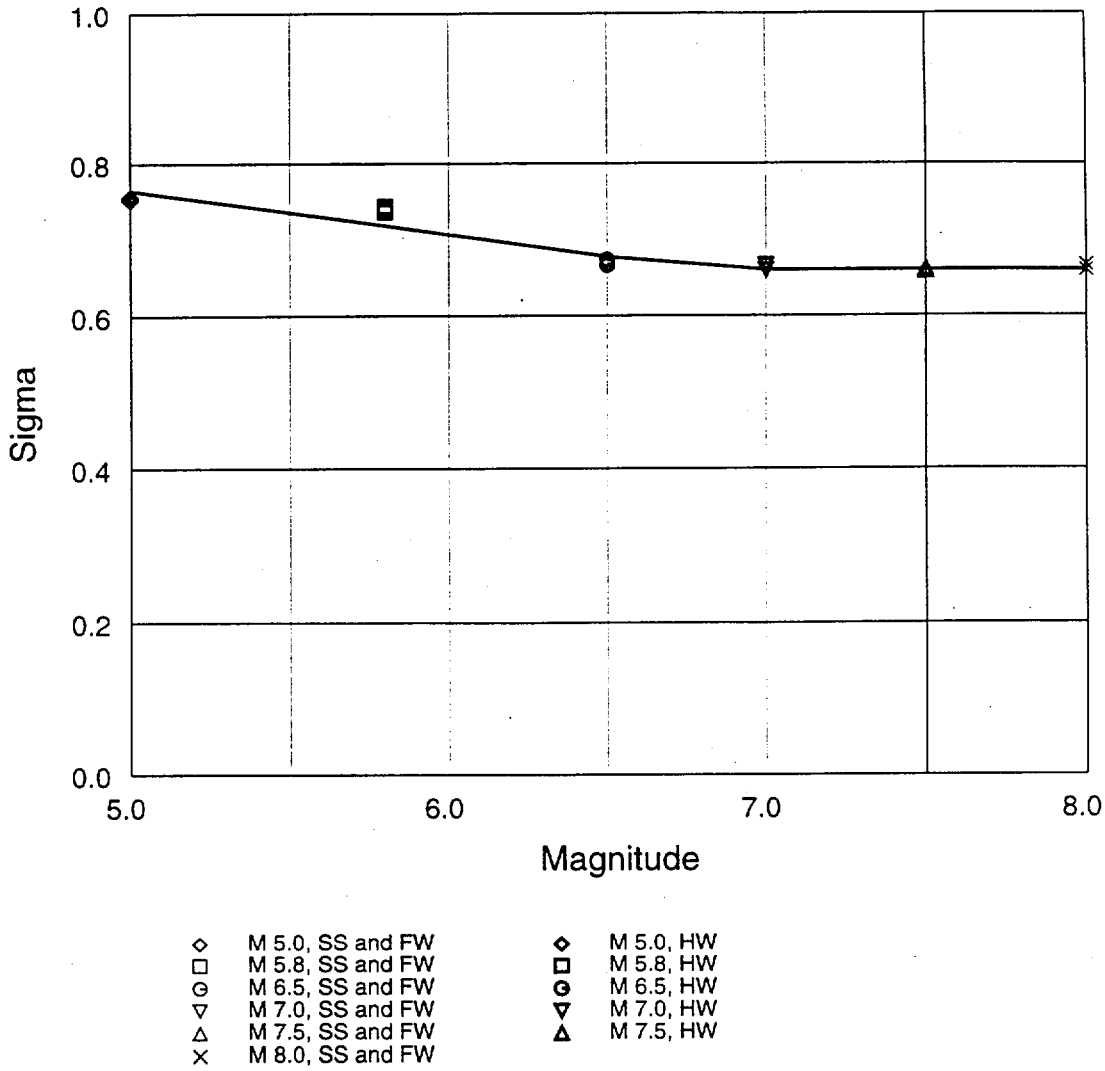
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 5.0 Hz



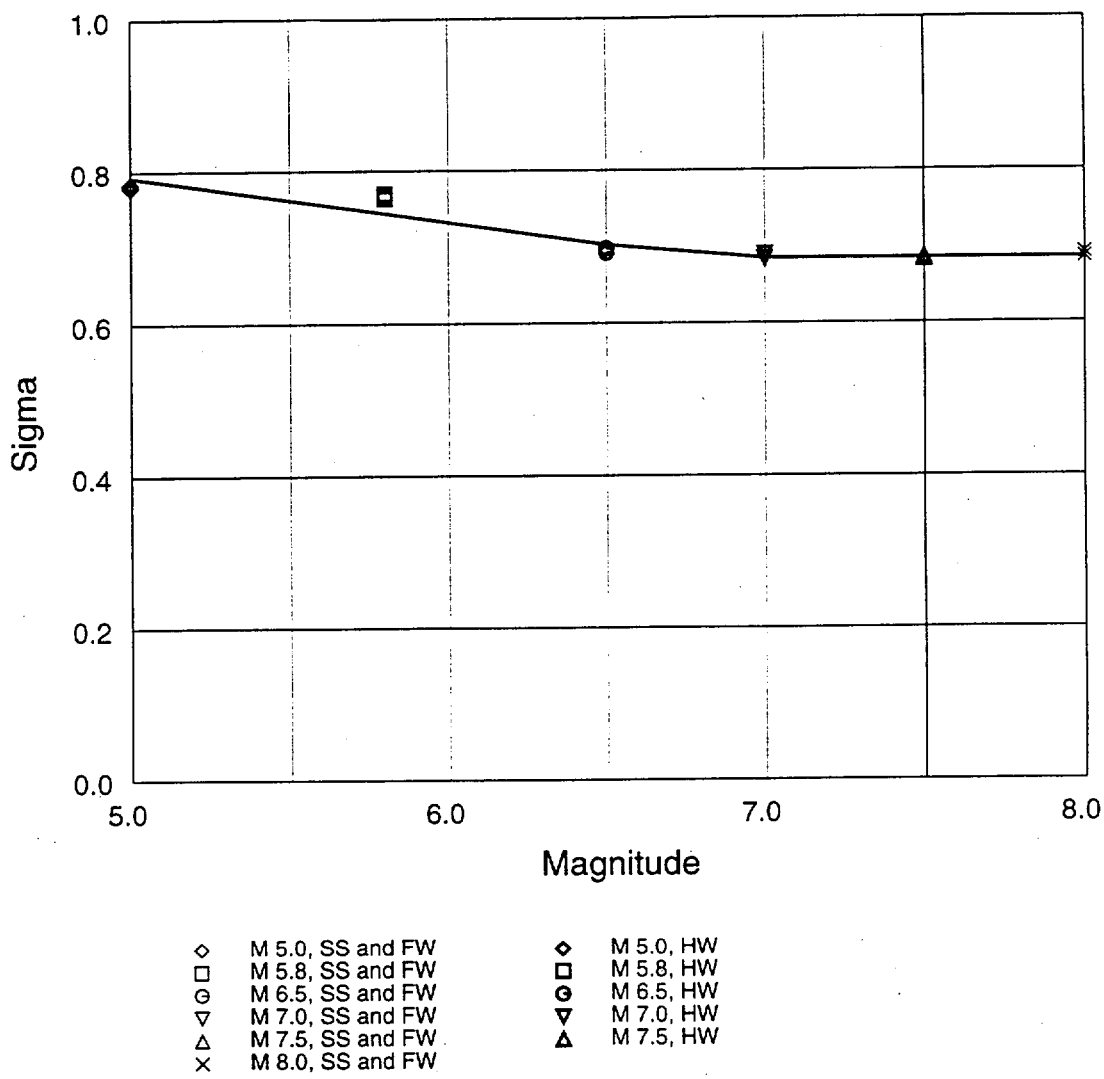
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 2.0 Hz



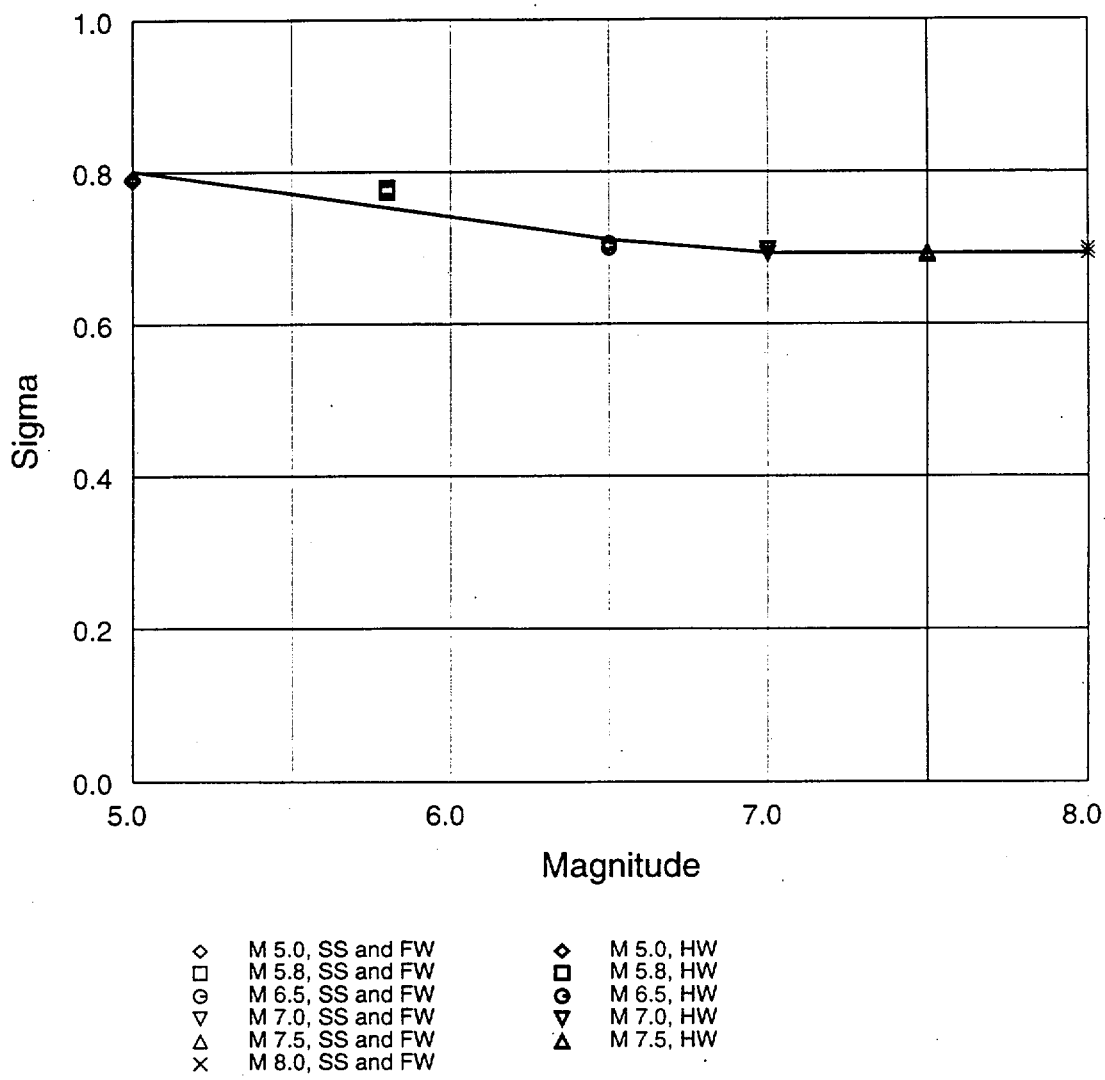
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 1.0 Hz



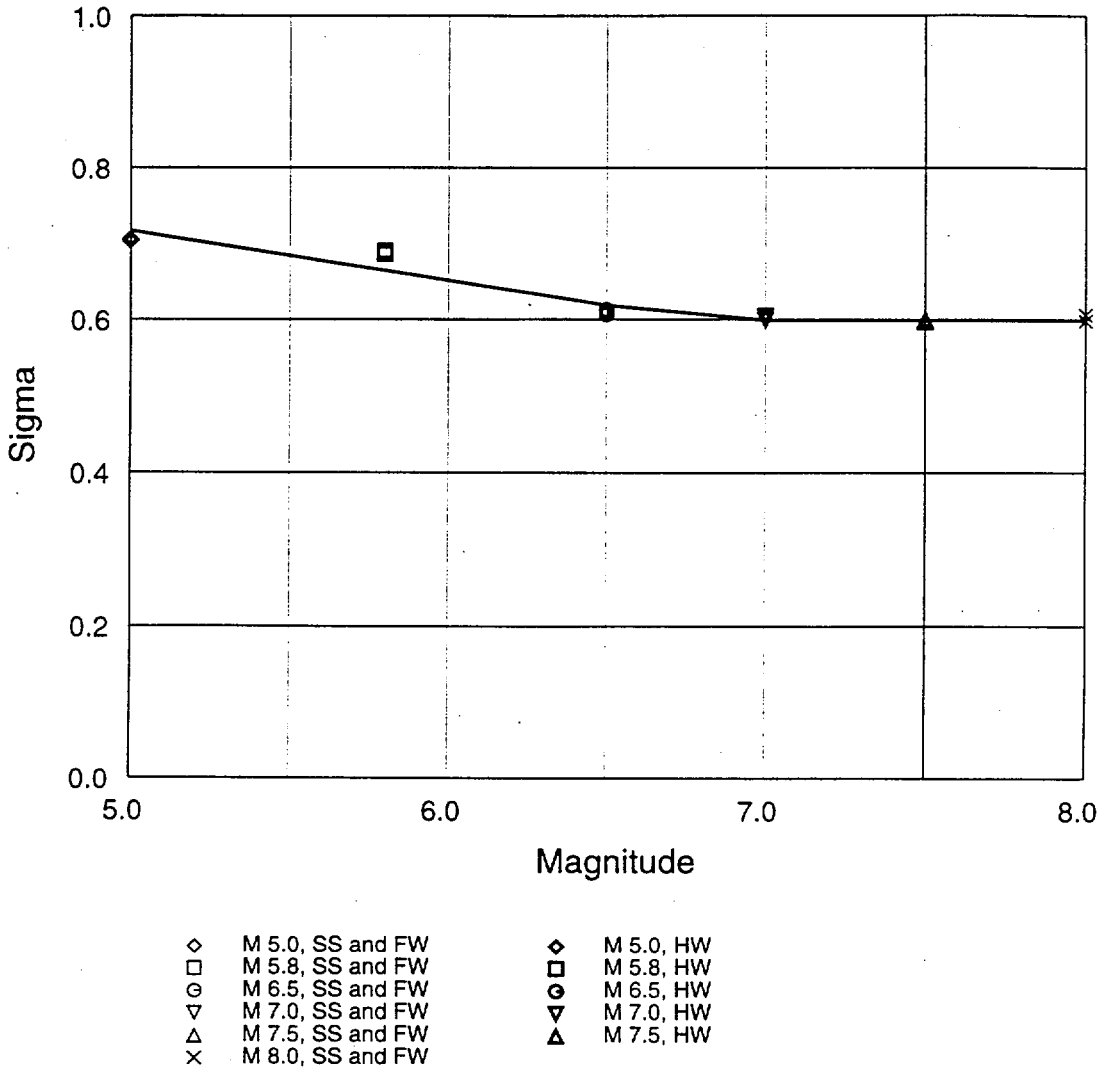
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.5 Hz



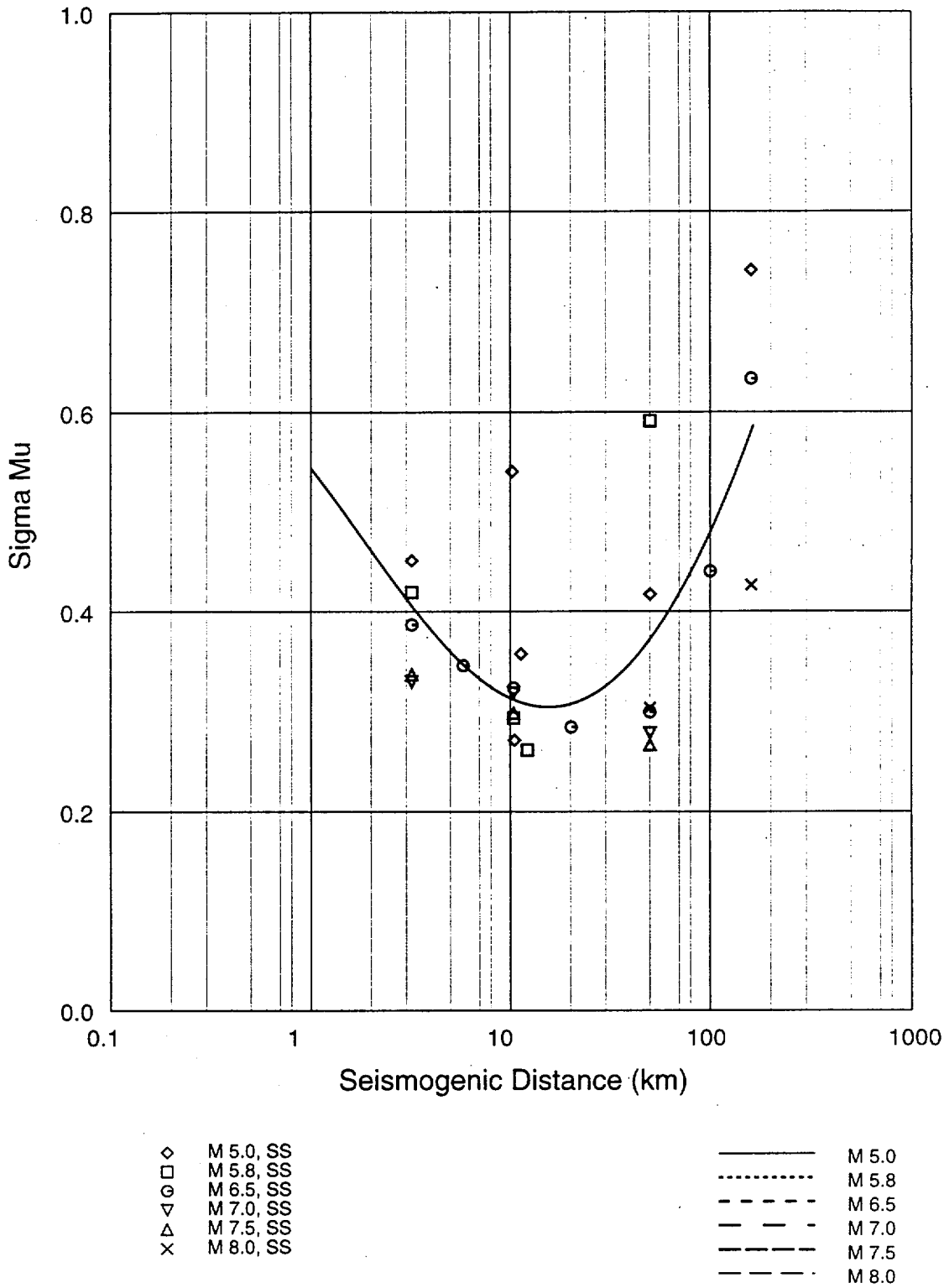
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.3 Hz



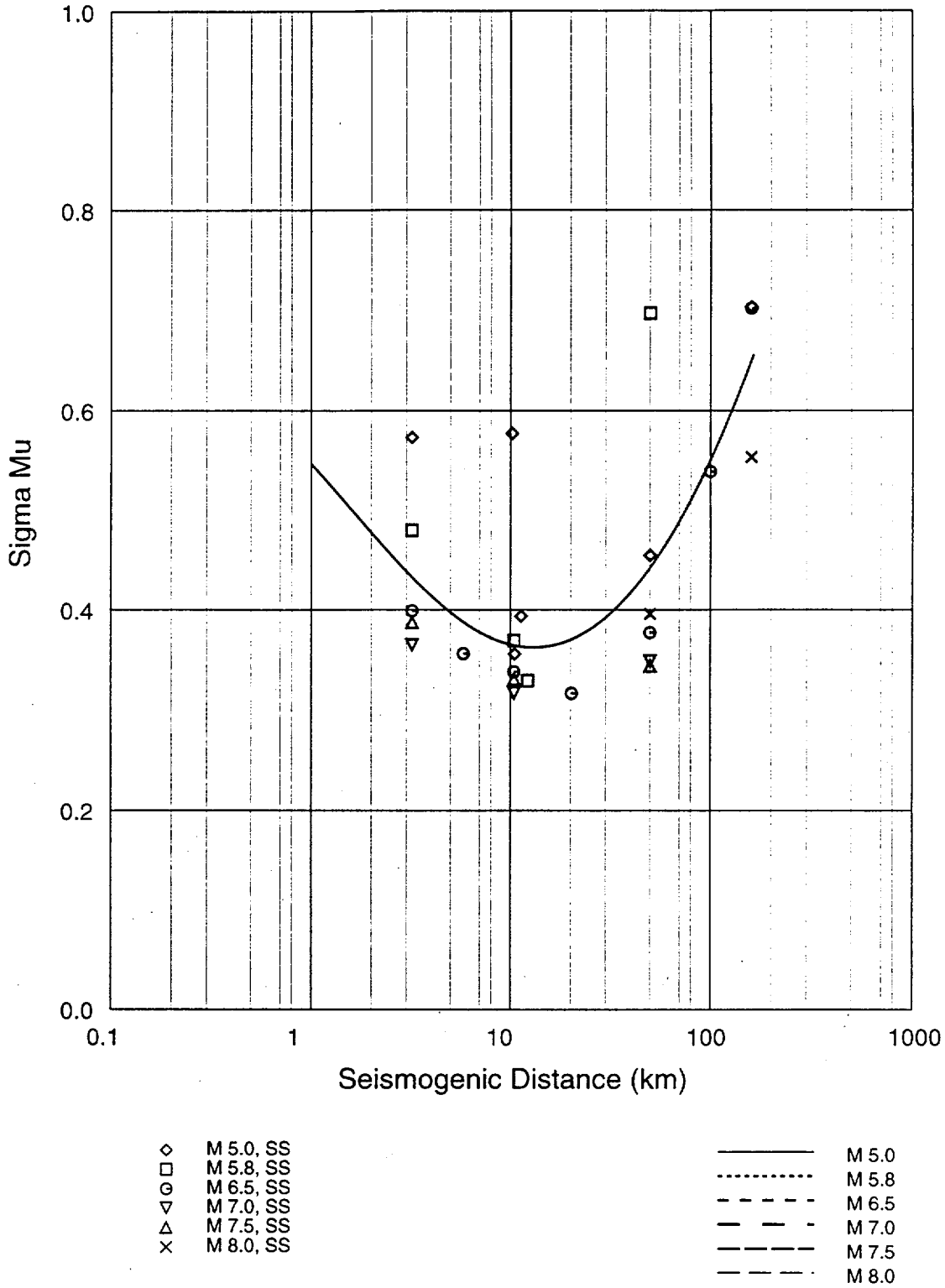
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Peak Velocity



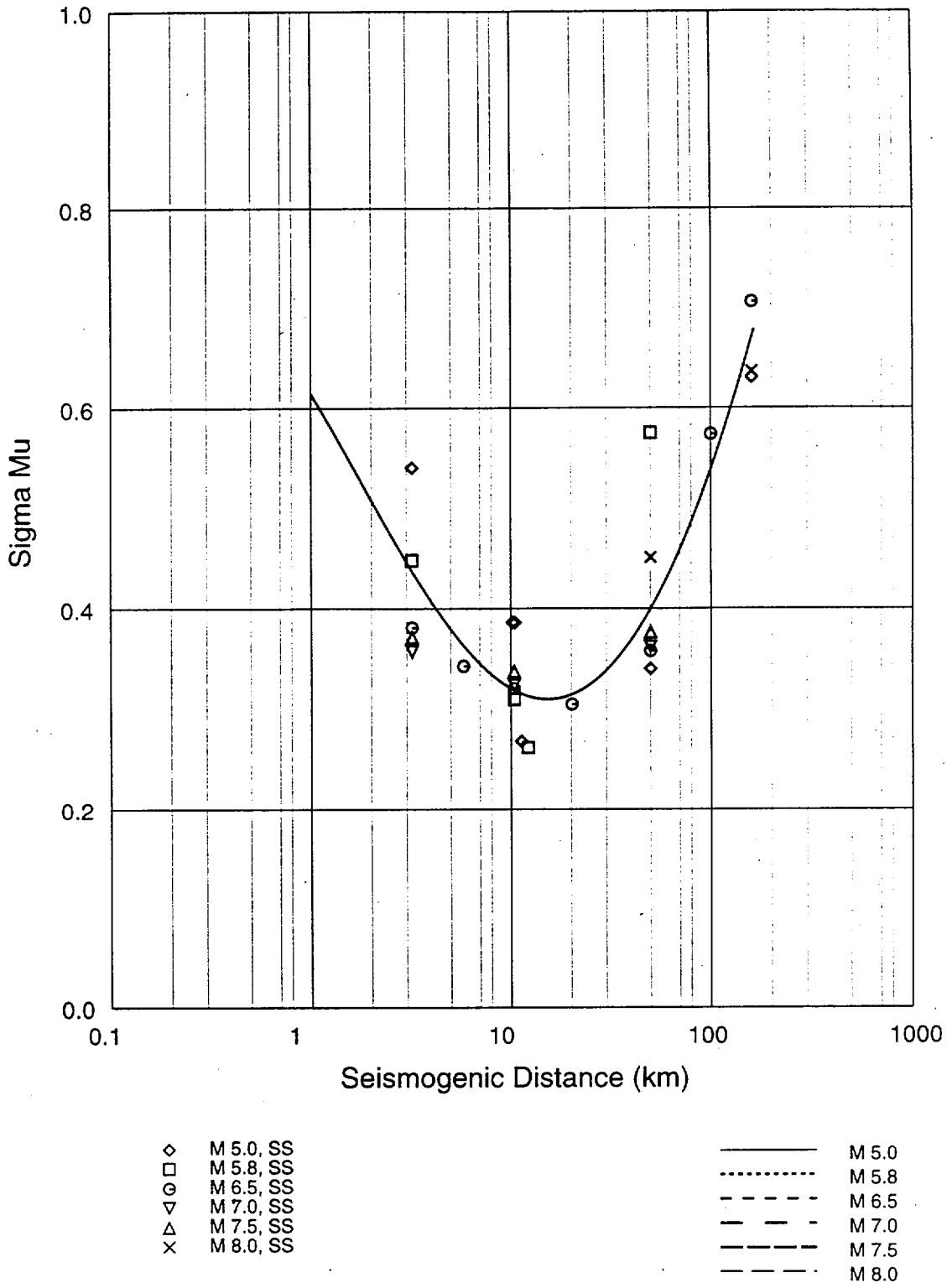
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 100.0 Hz



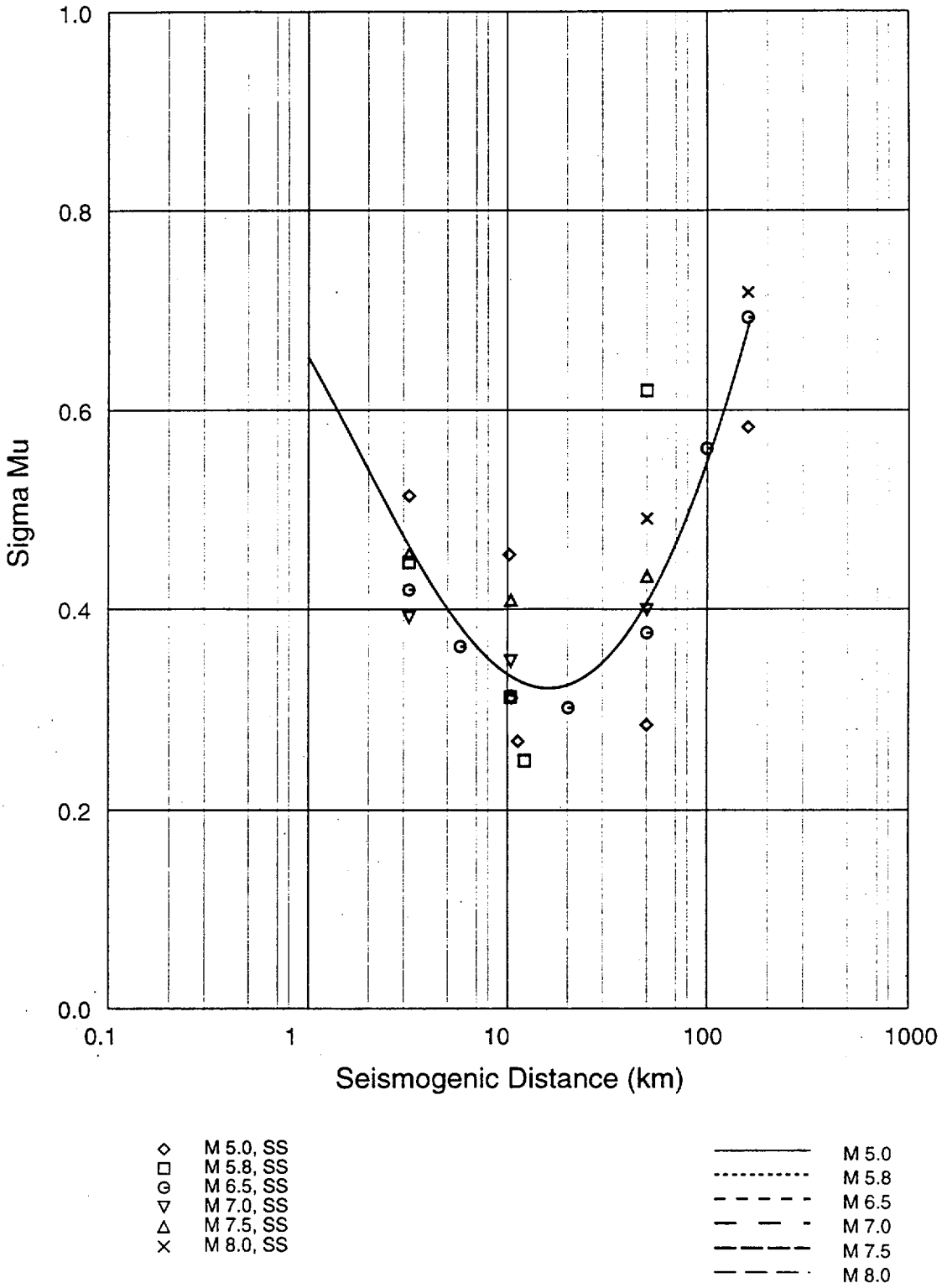
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 20.0 Hz



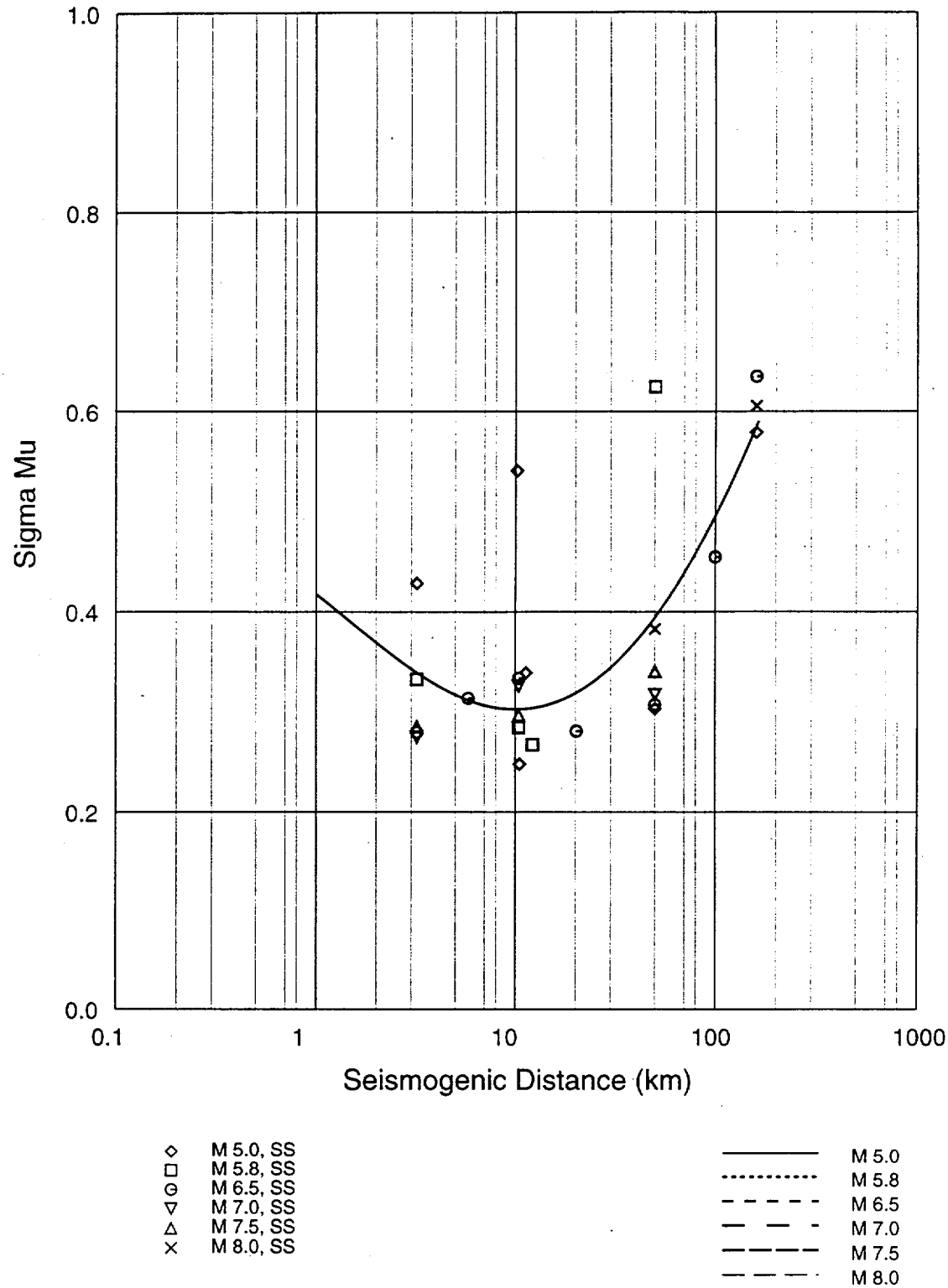
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 10.0 Hz



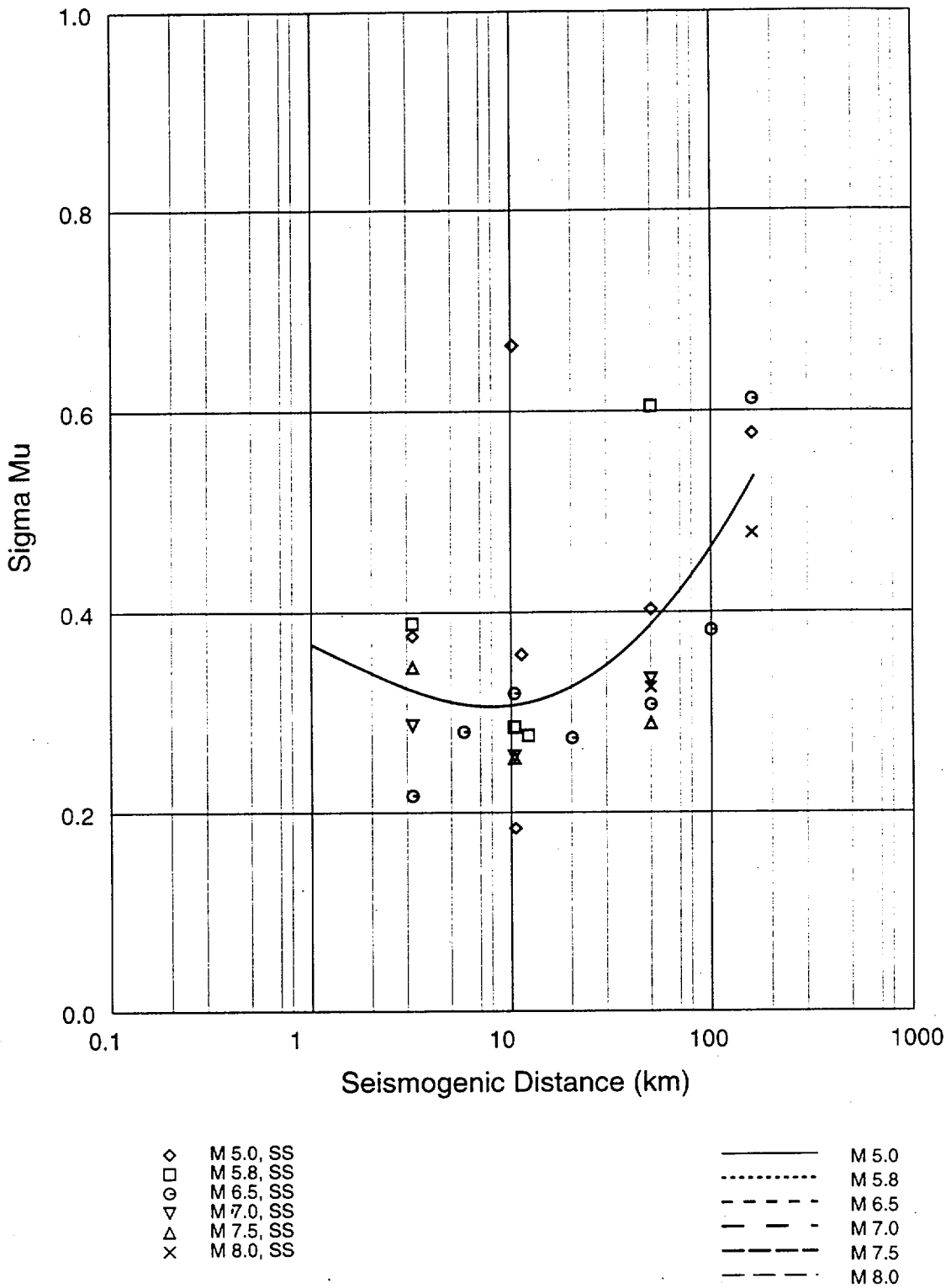
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 5.0 Hz



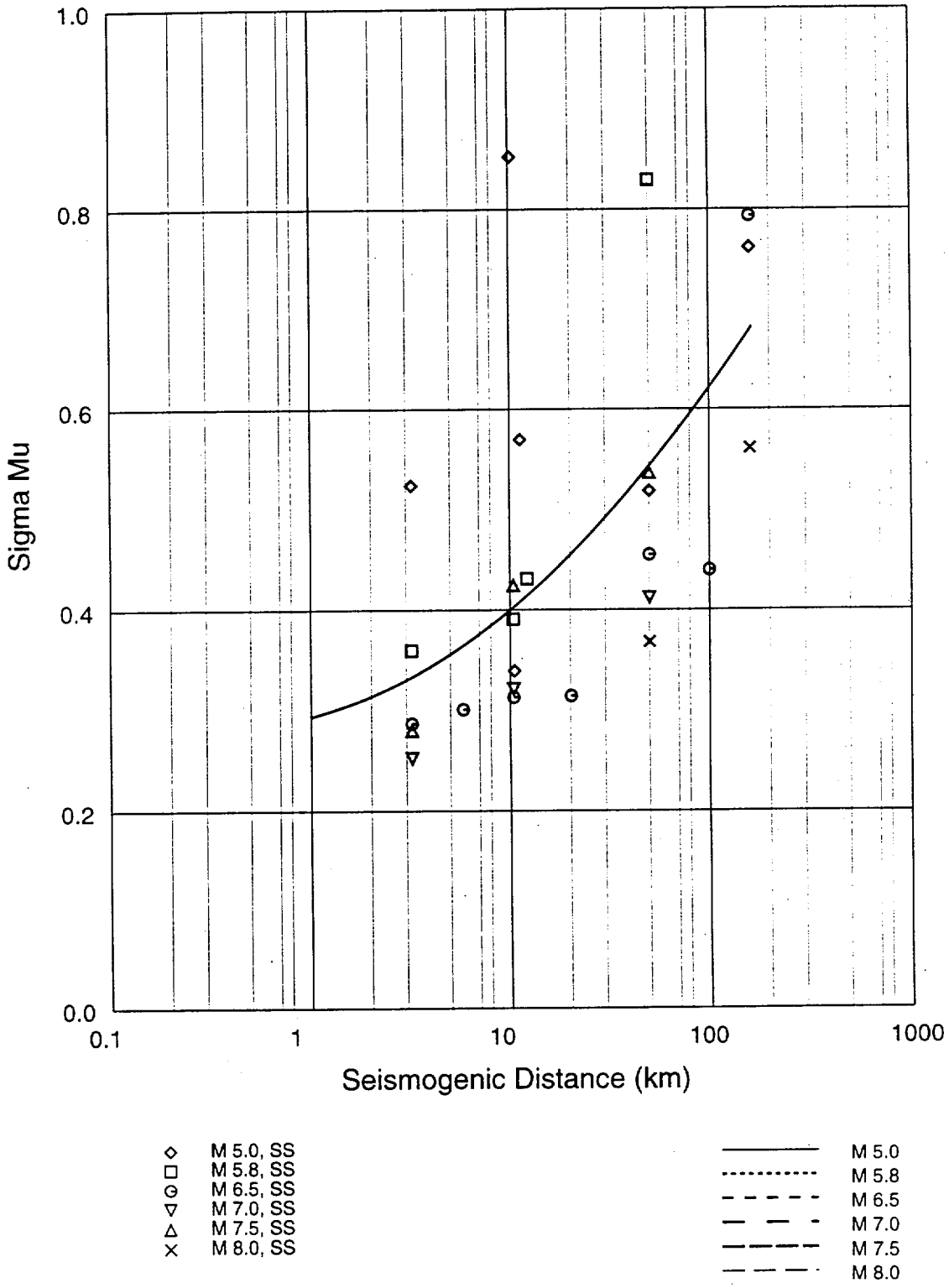
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 2.0 Hz



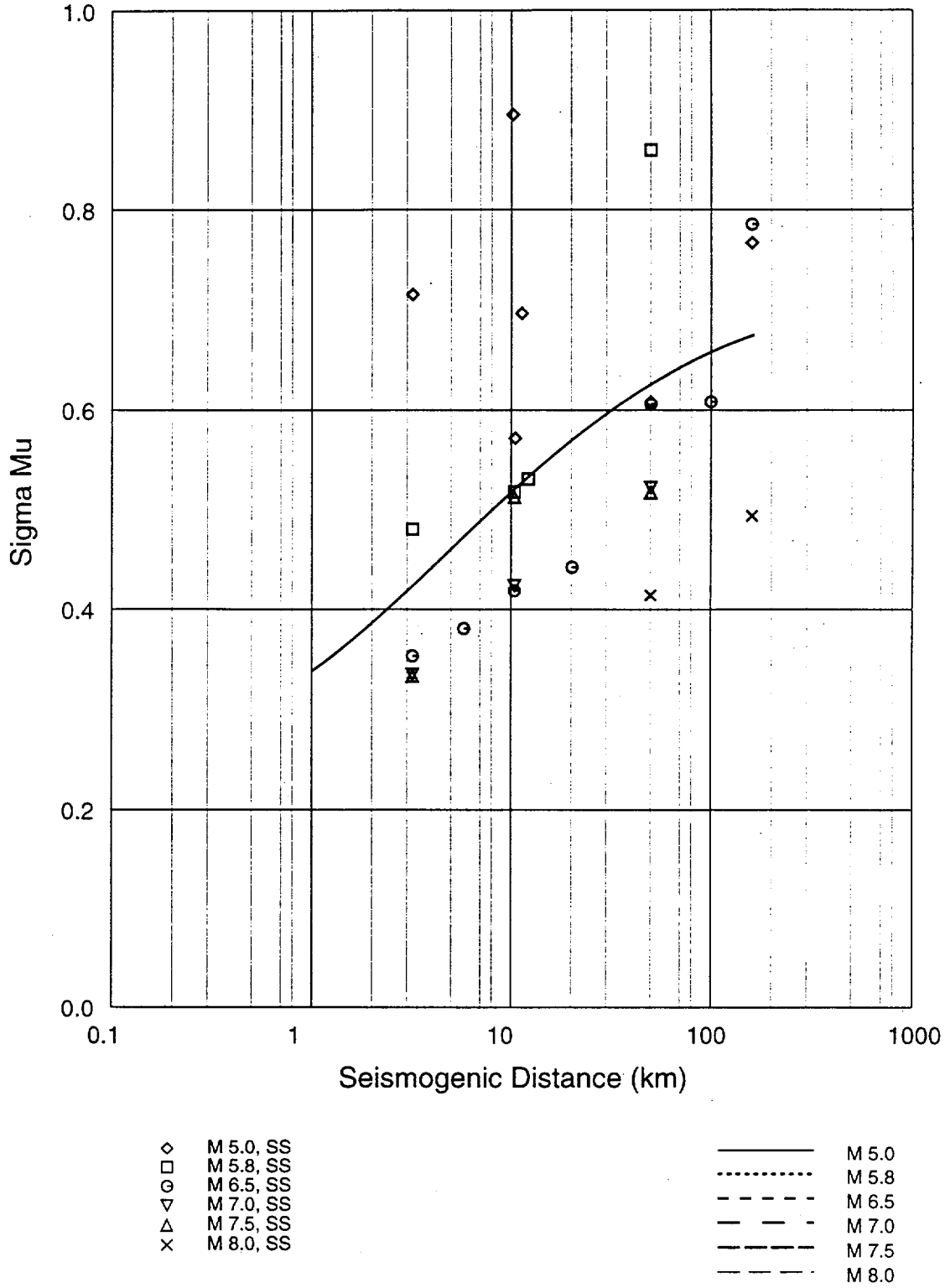
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 1.0 Hz



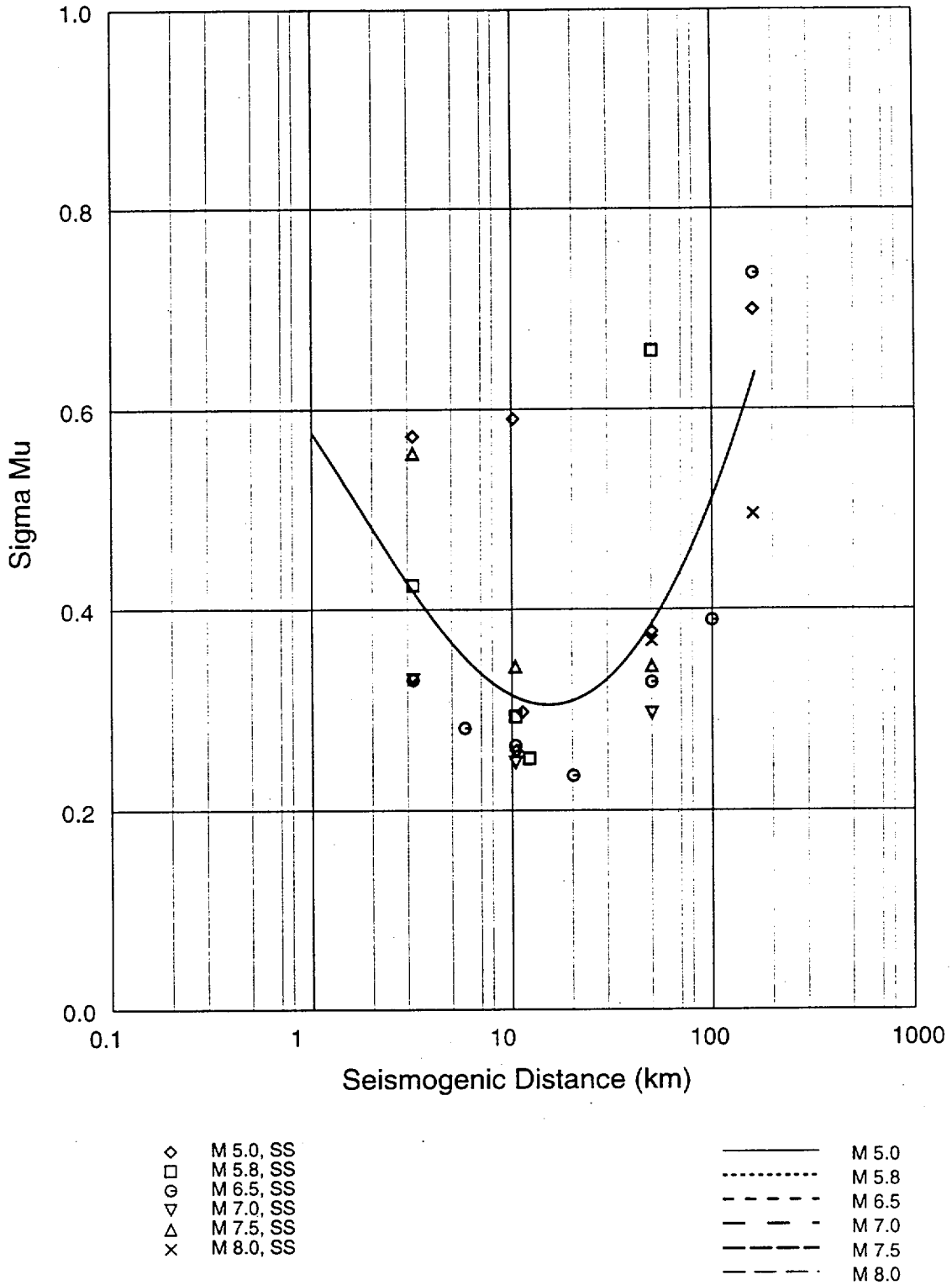
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 0.5 Hz



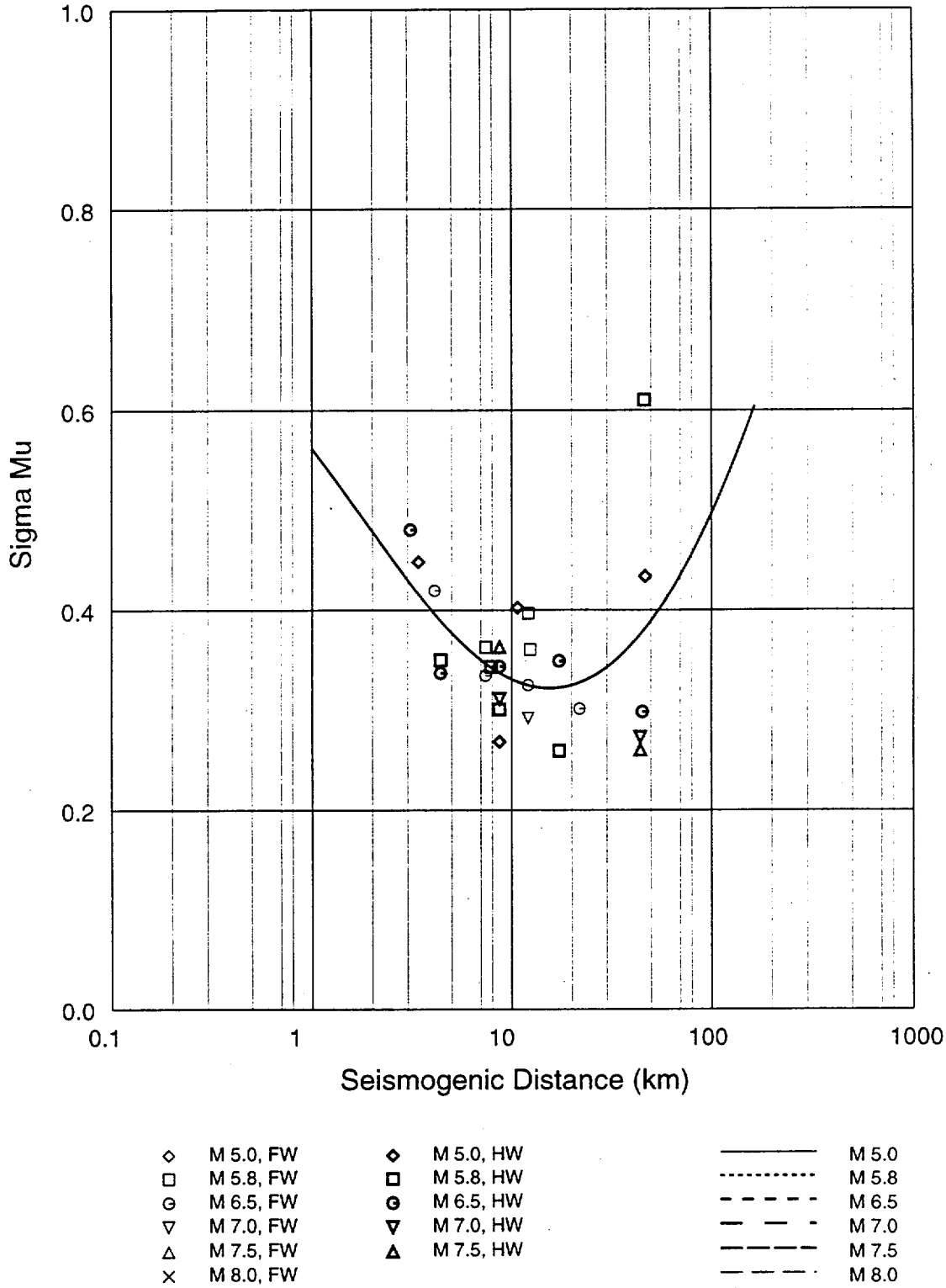
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Frequency = 0.3 Hz



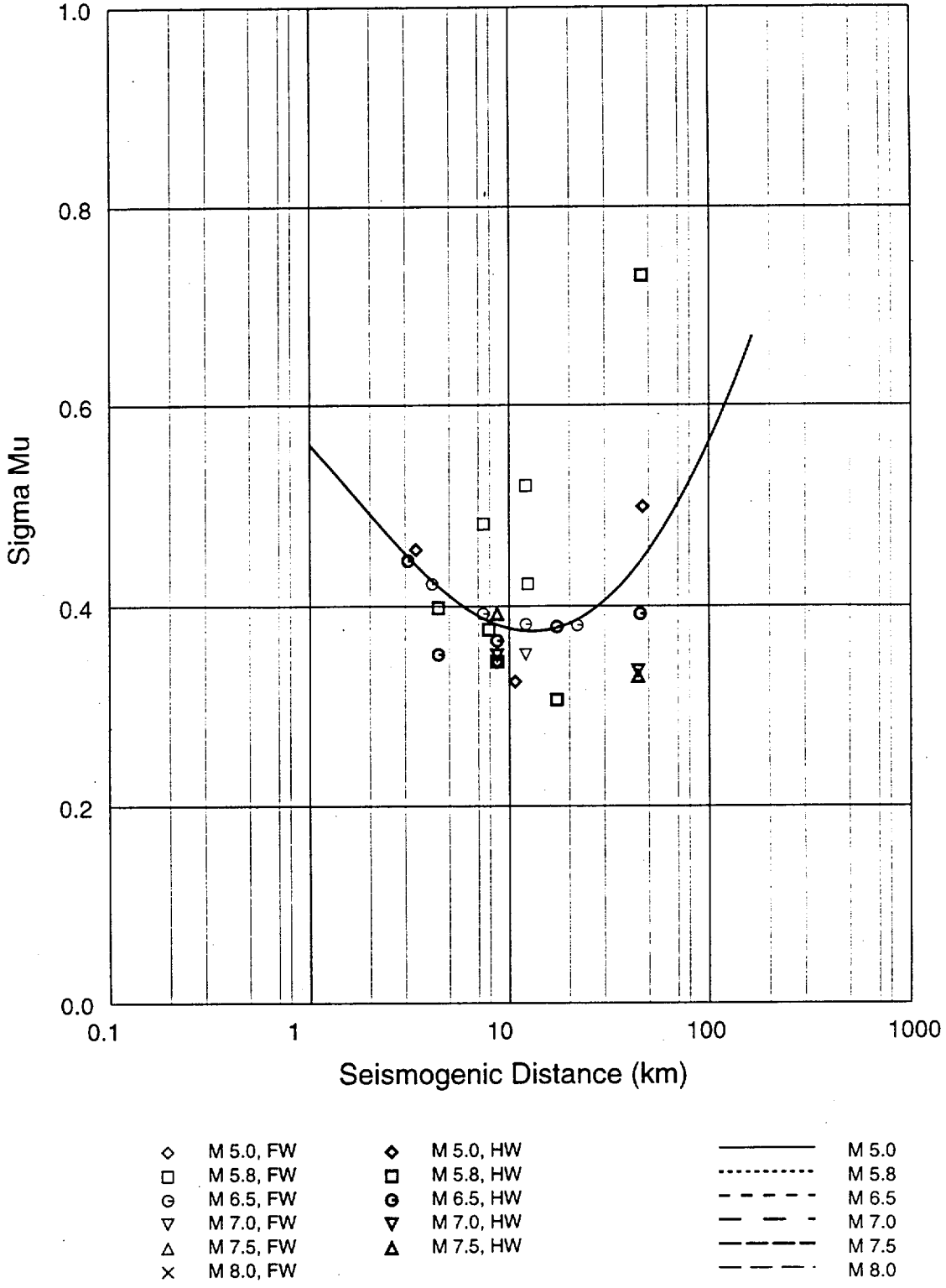
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Horizontal Comp
Peak Velocity



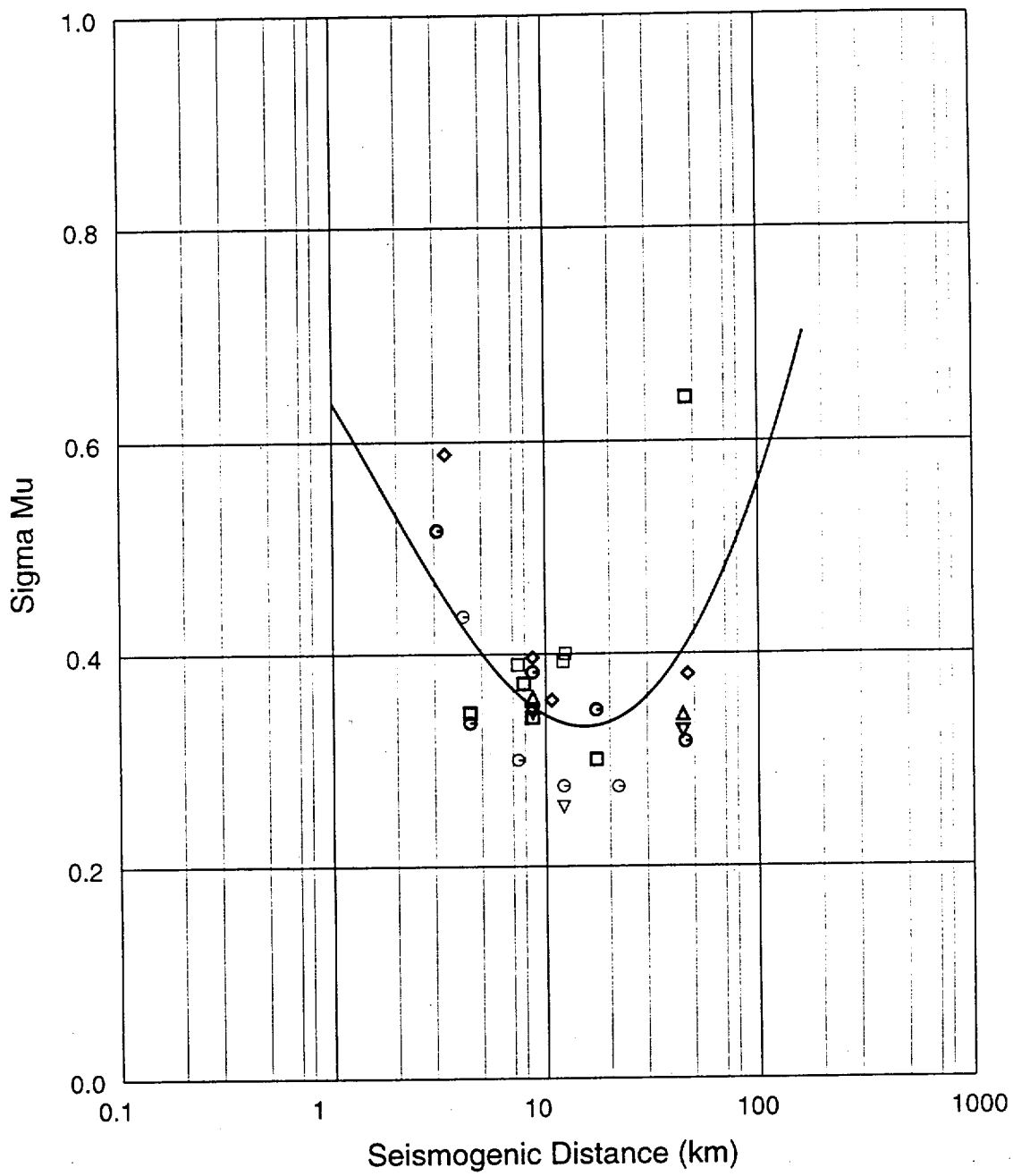
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 100.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 20.0 Hz

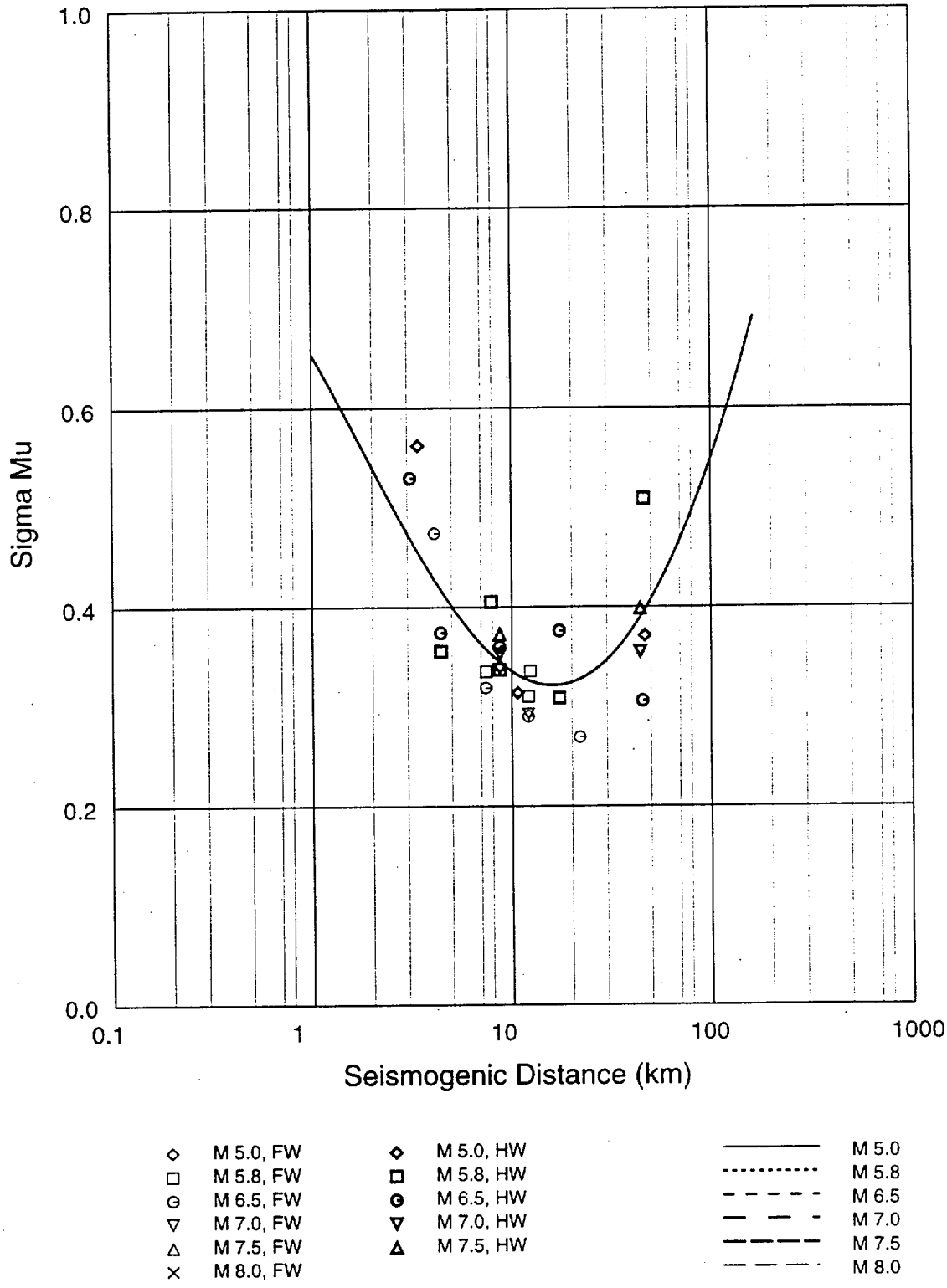


Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 10.0 Hz

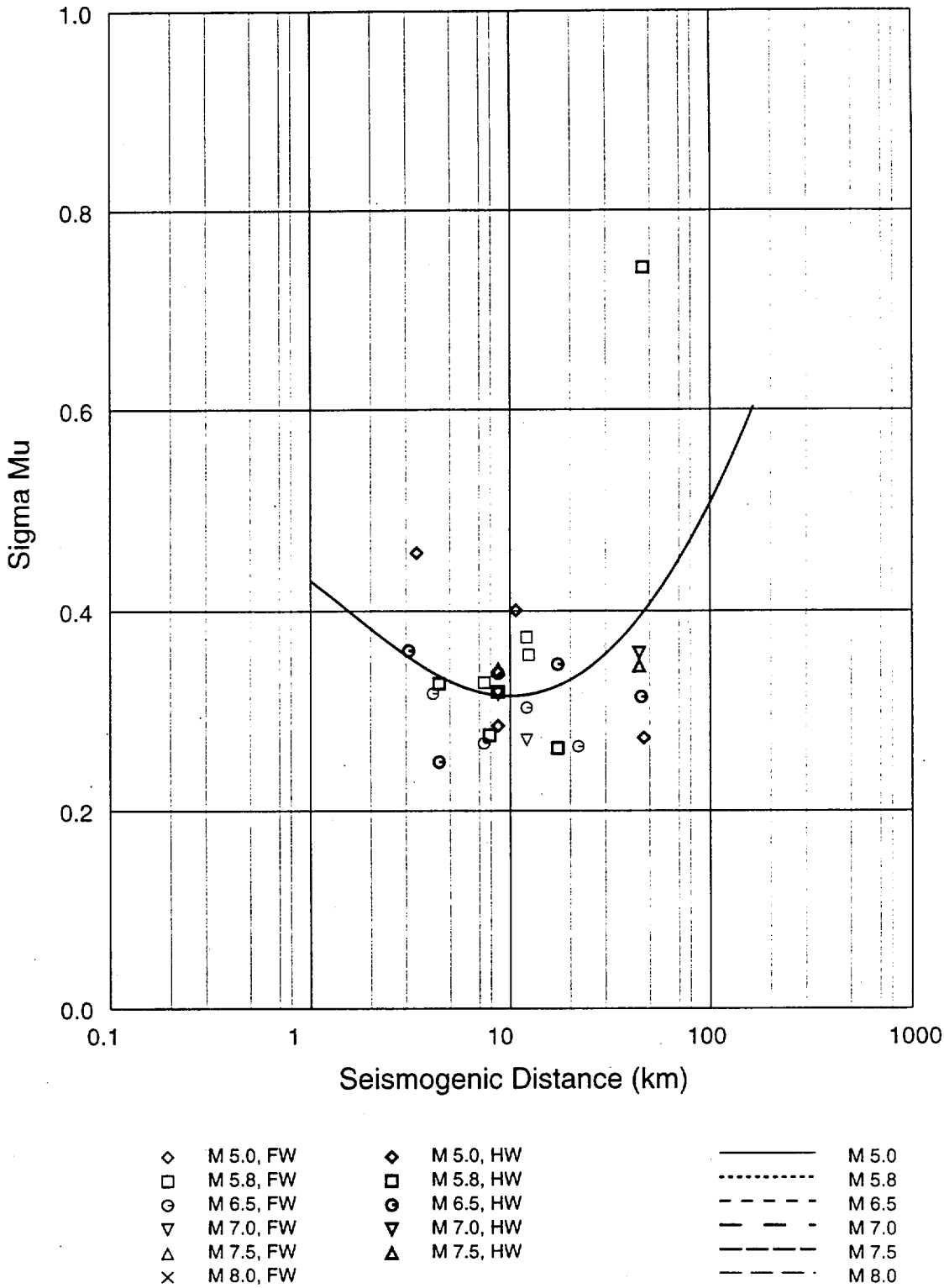


◇	M 5.0, FW	◆	M 5.0, HW	———	M 5.0
□	M 5.8, FW	■	M 5.8, HW	·····	M 5.8
⊖	M 6.5, FW	⊖	M 6.5, HW	- - - -	M 6.5
▽	M 7.0, FW	▼	M 7.0, HW	— — -	M 7.0
△	M 7.5, FW	▲	M 7.5, HW	—— ——	M 7.5
×	M 8.0, FW			— — — ·	M 8.0

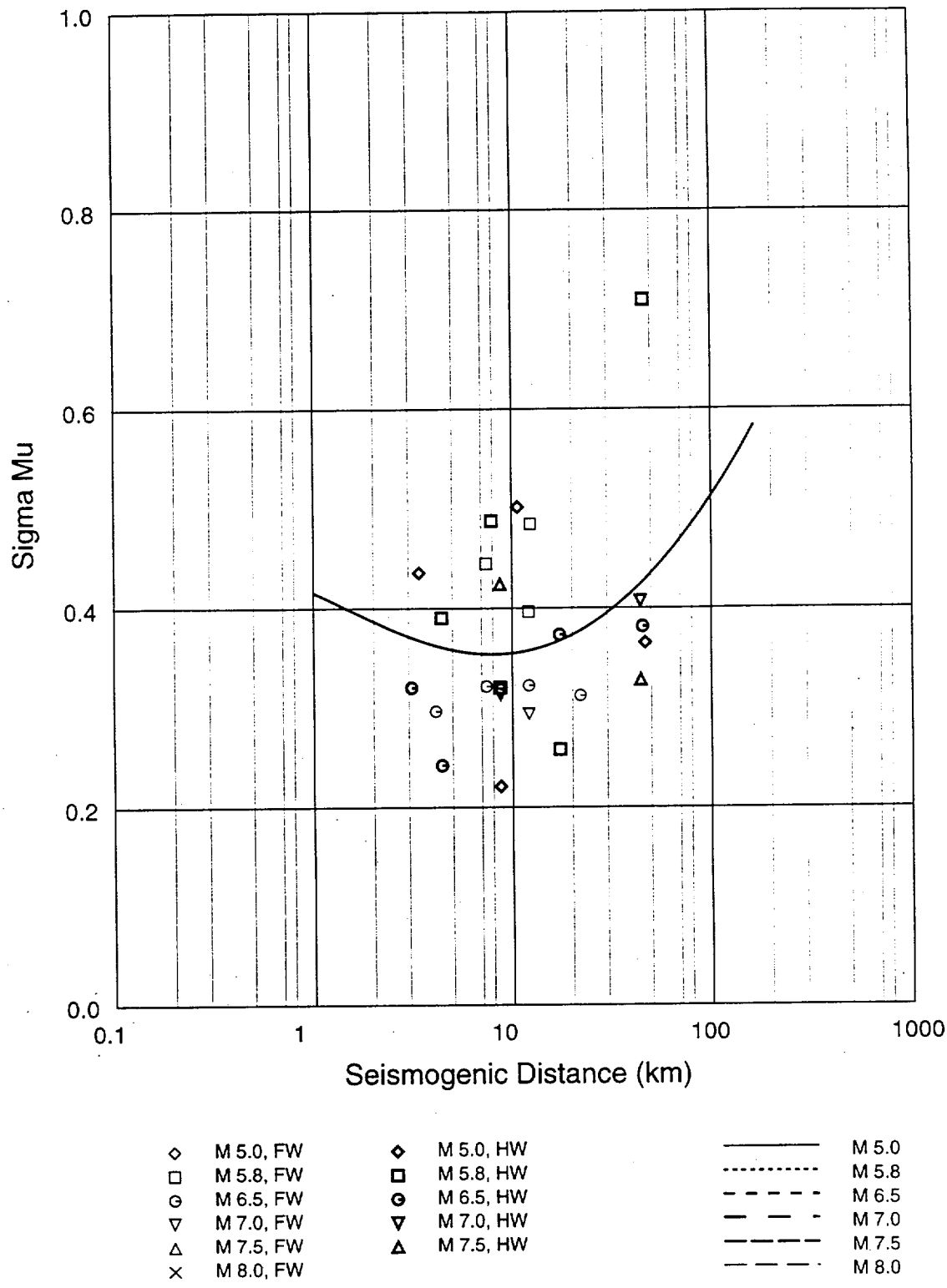
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 5.0 Hz



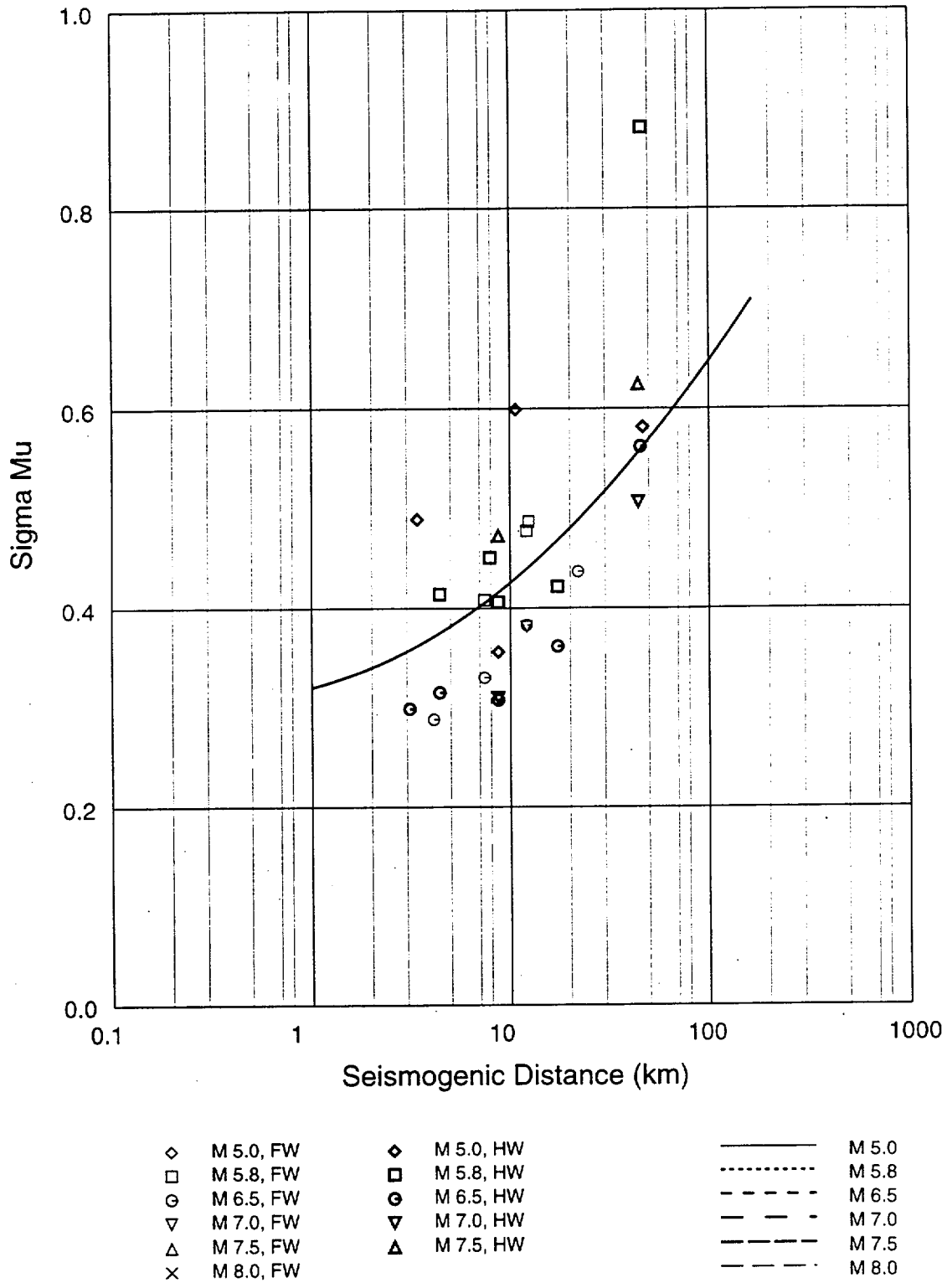
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 2.0 Hz



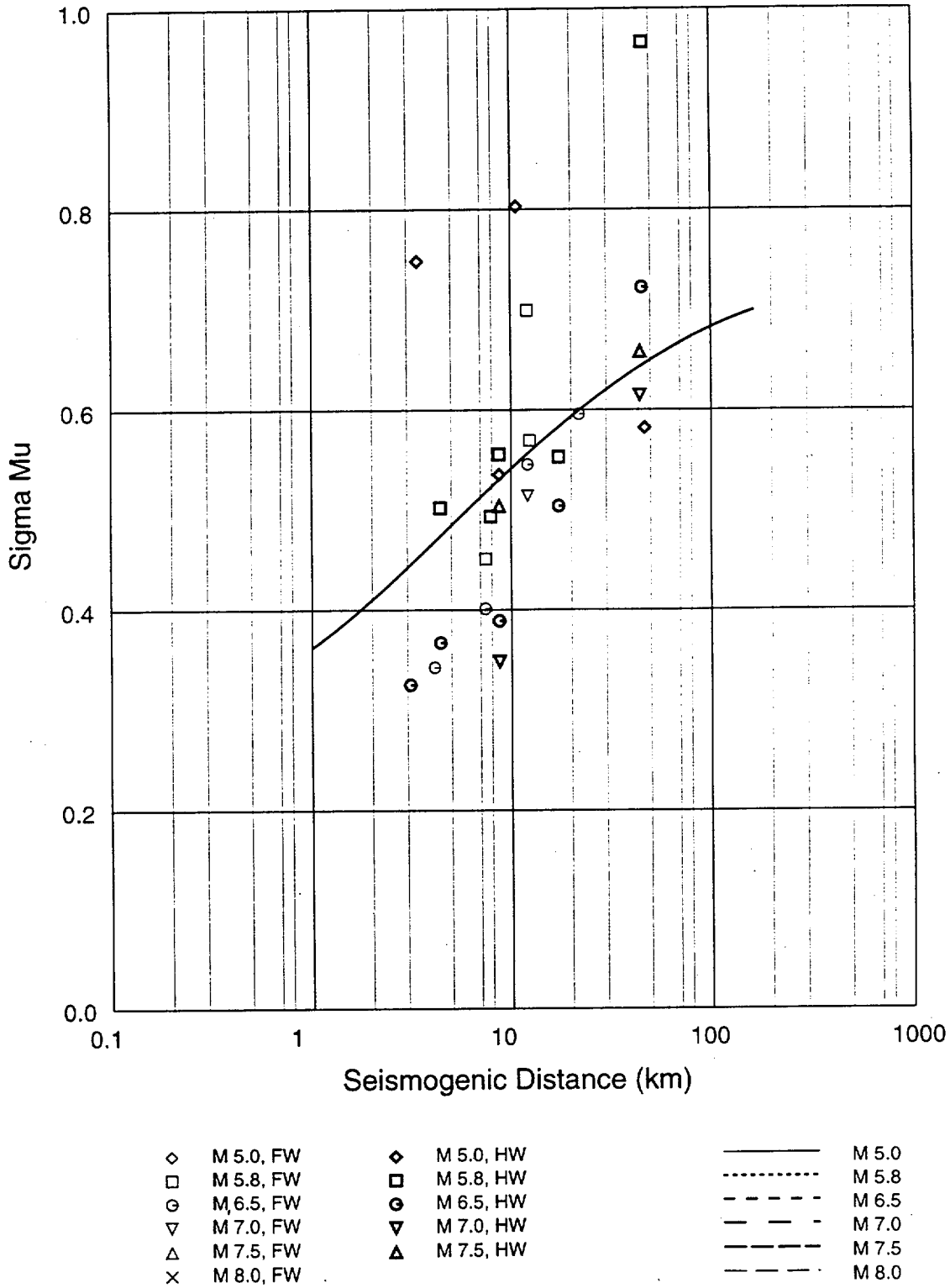
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 1.0 Hz



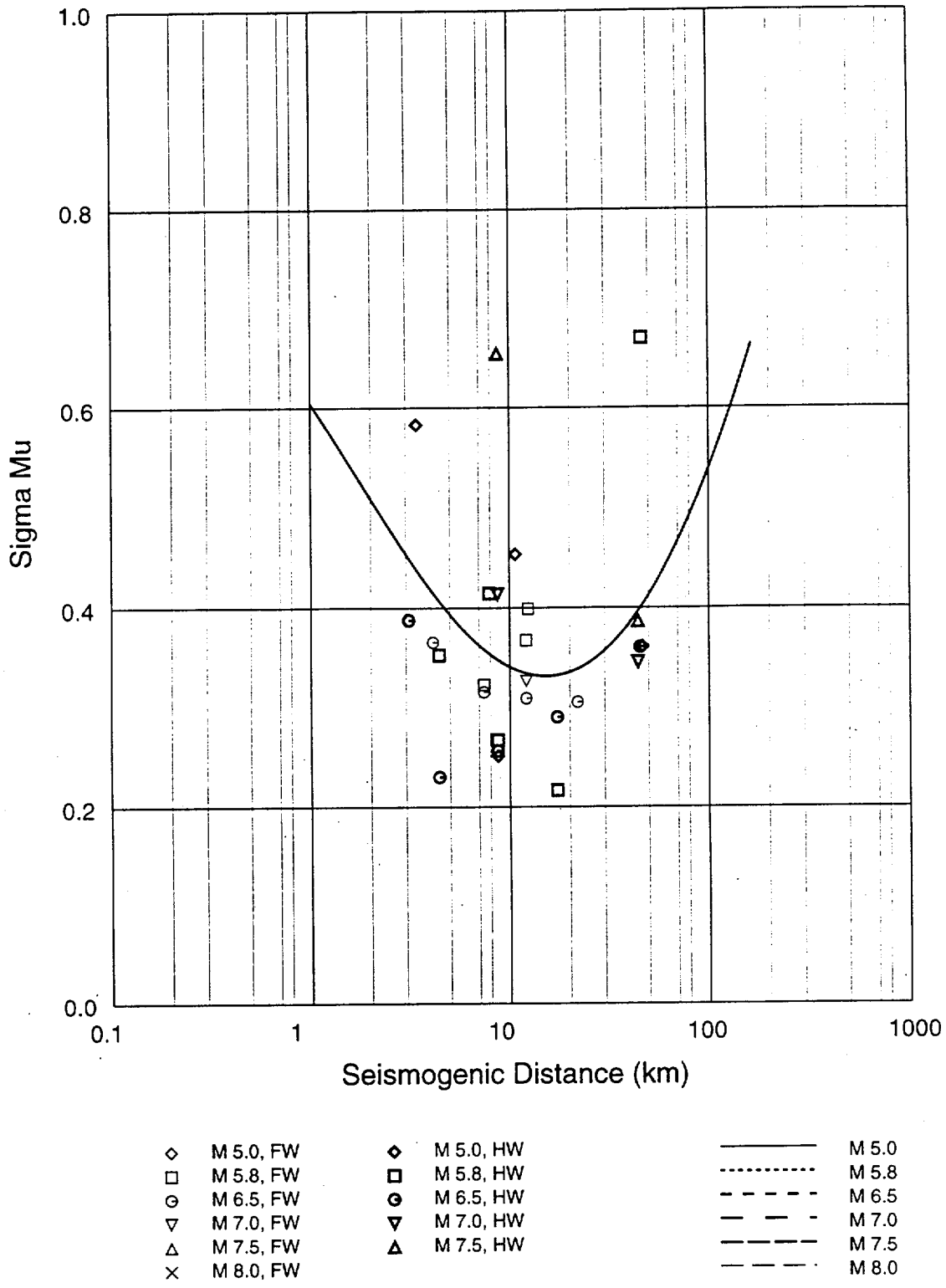
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 0.5 Hz



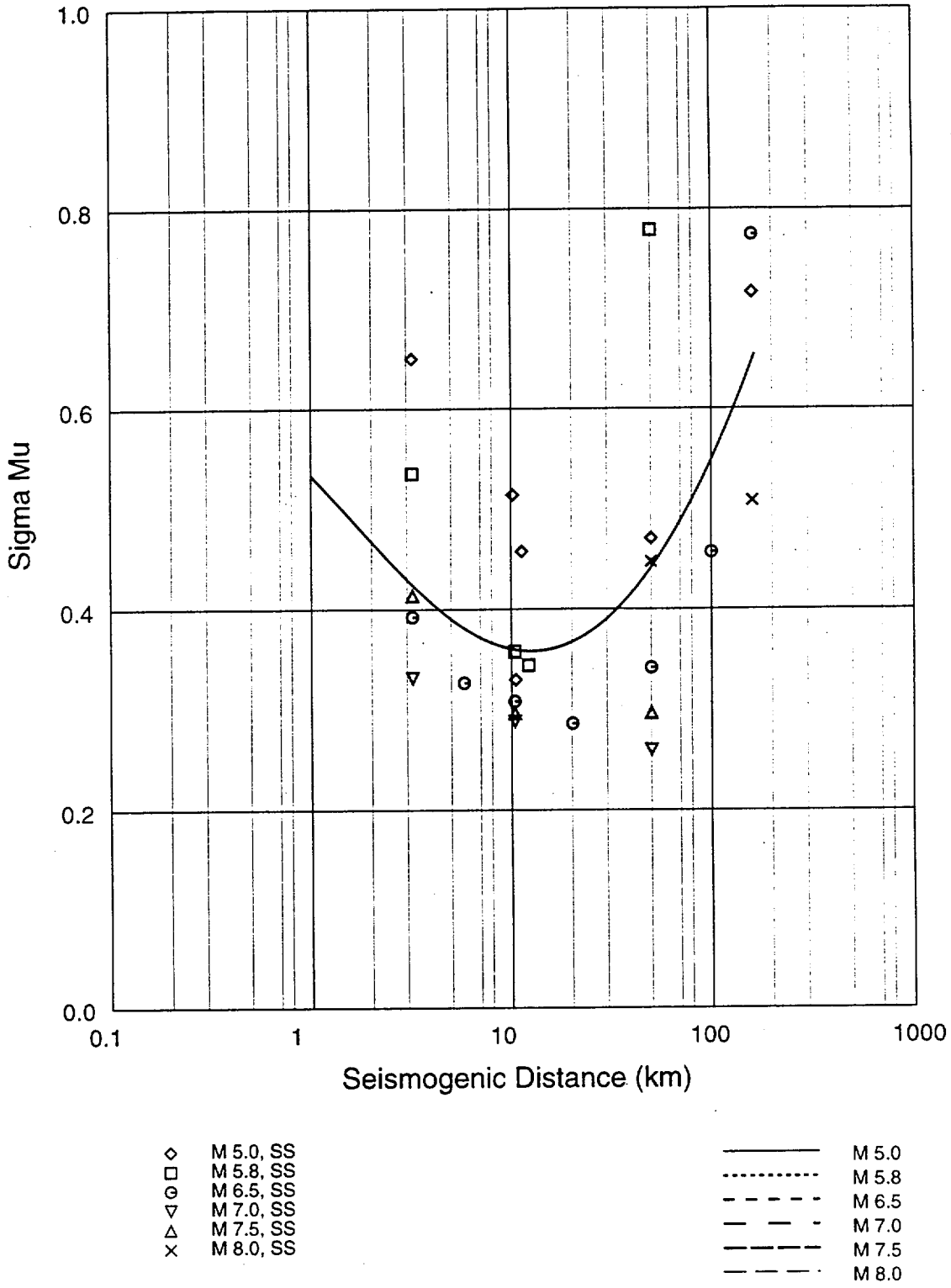
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Frequency = 0.3 Hz



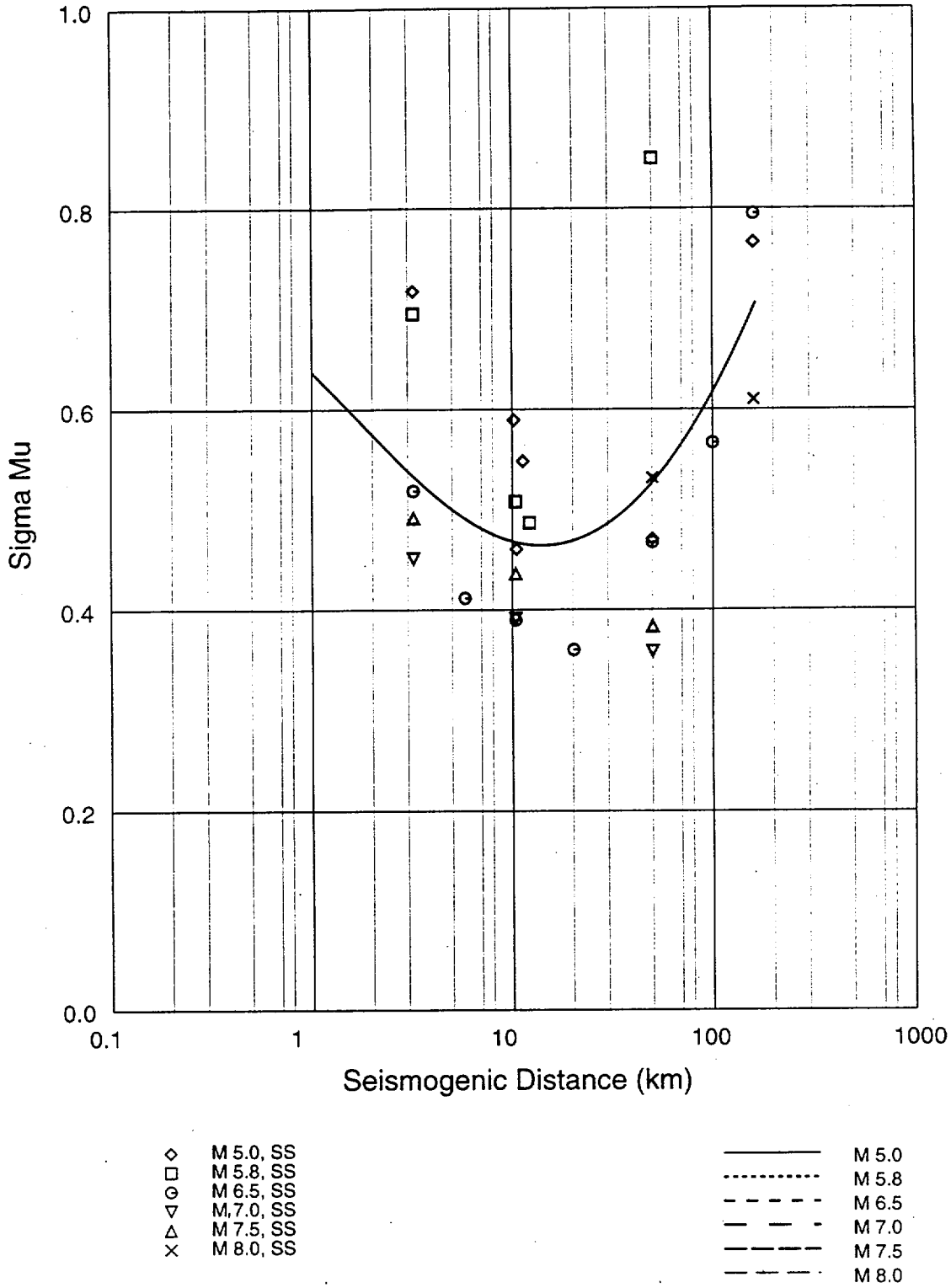
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Horizontal Comp
Peak Velocity



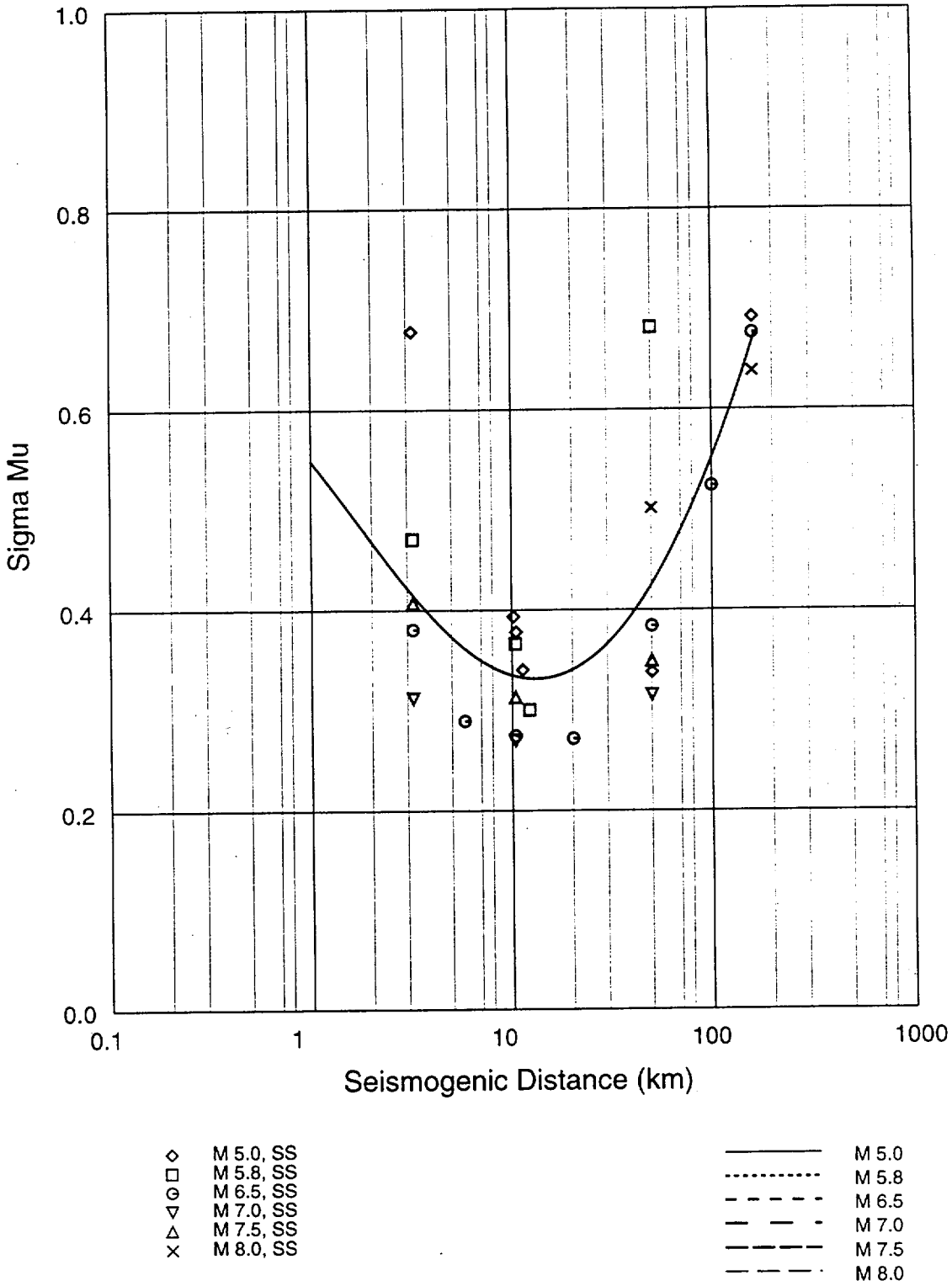
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 100.0 Hz



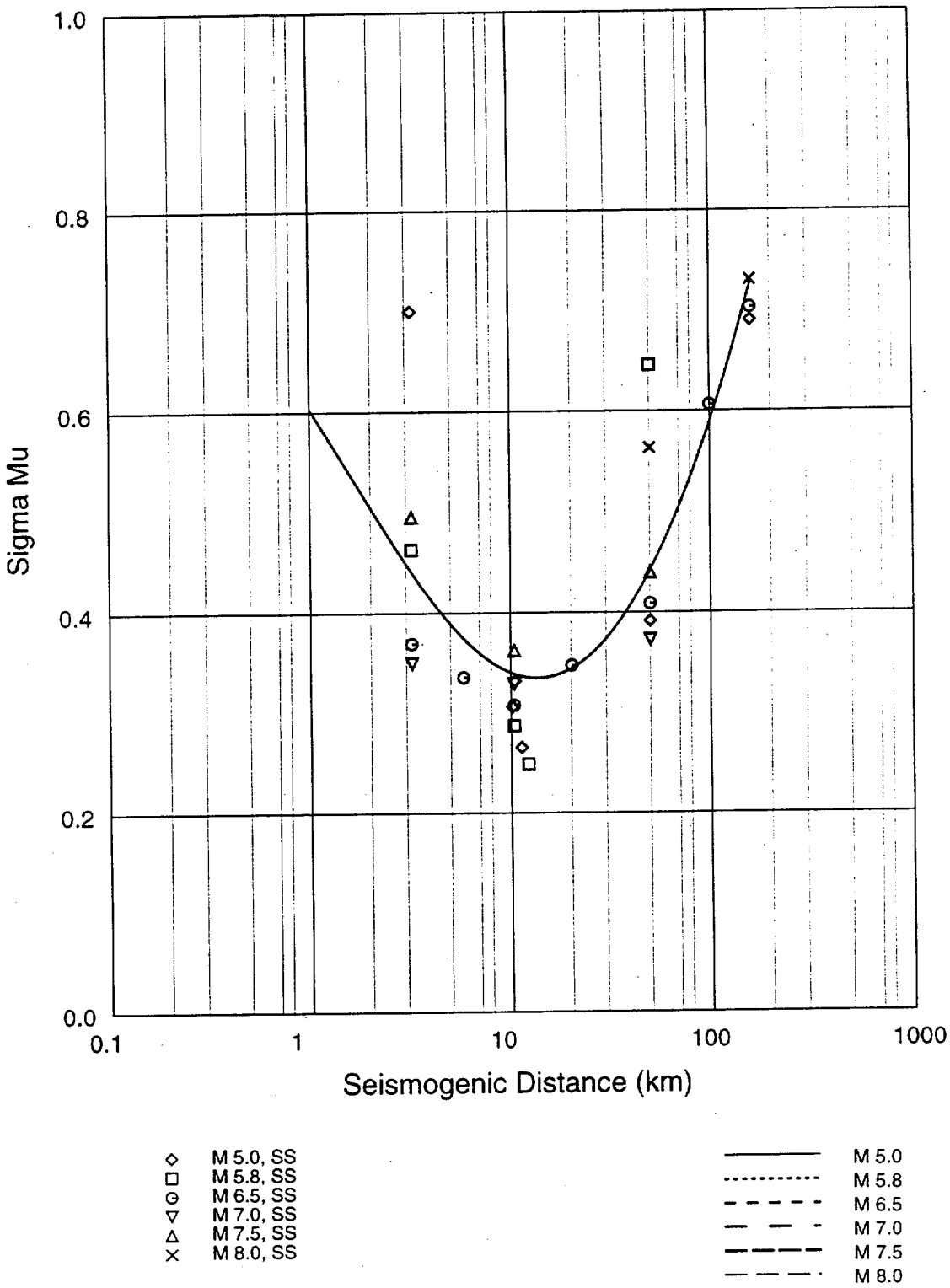
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 20.0 Hz



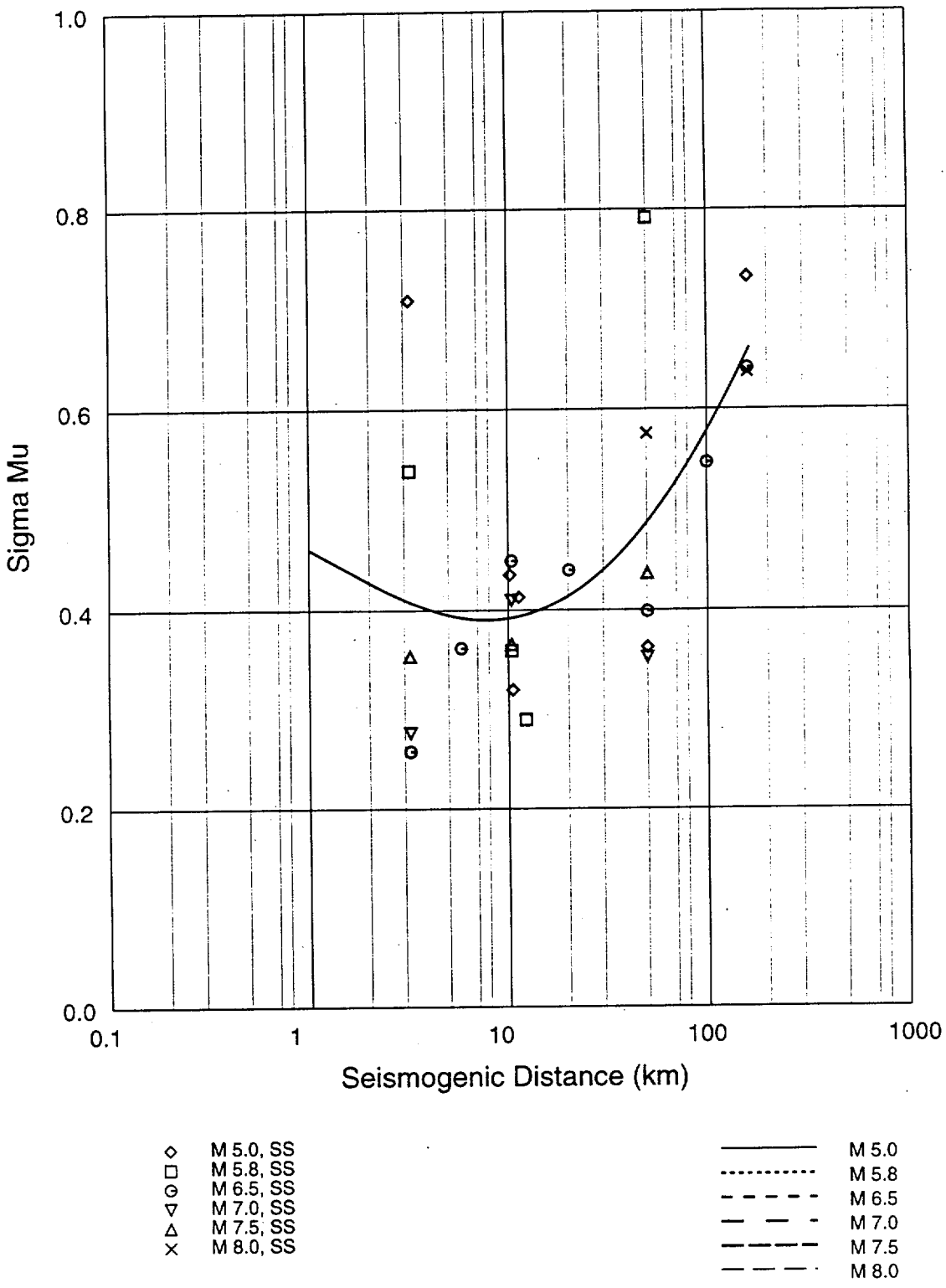
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 10.0 Hz



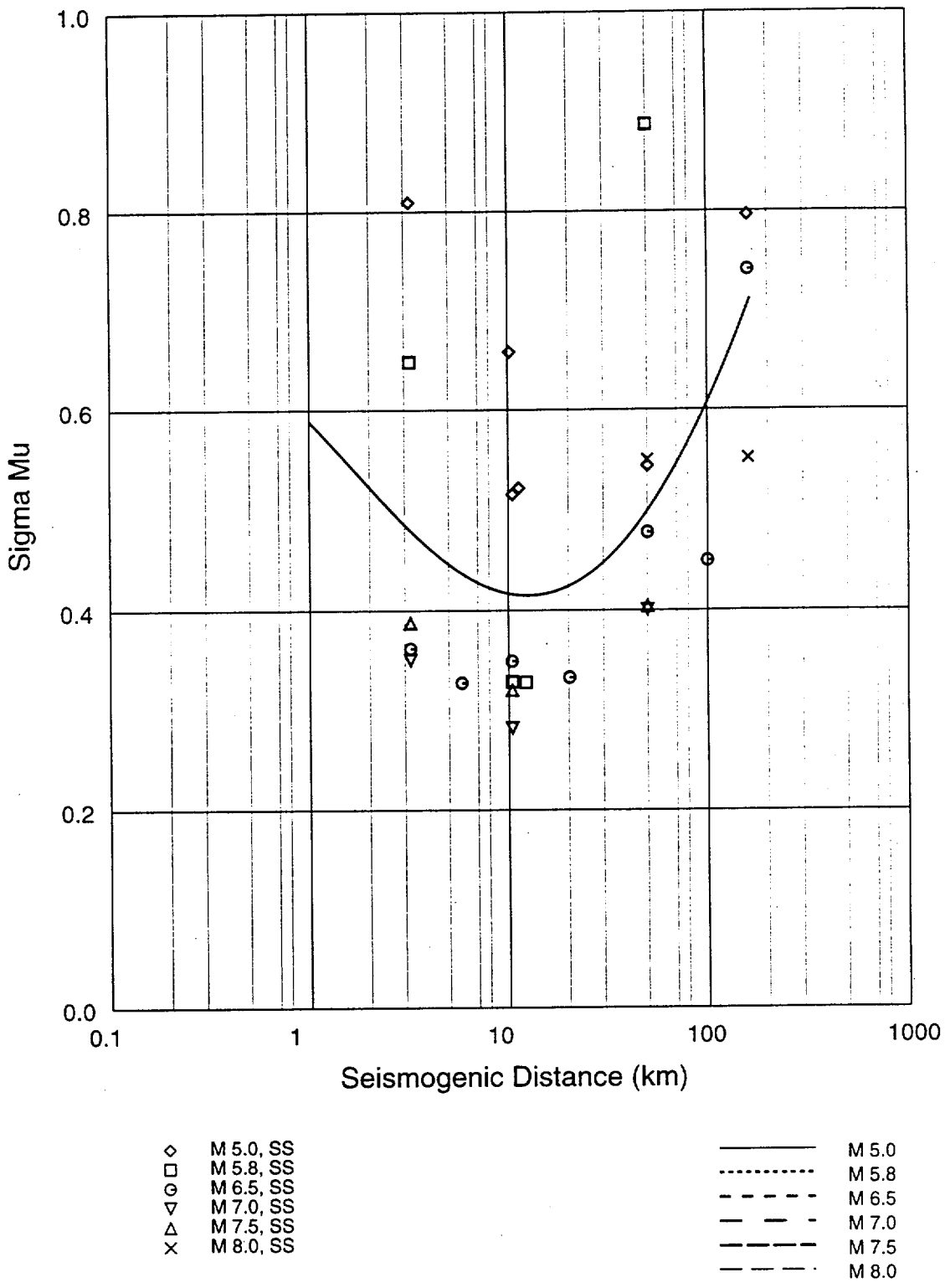
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 5.0 Hz



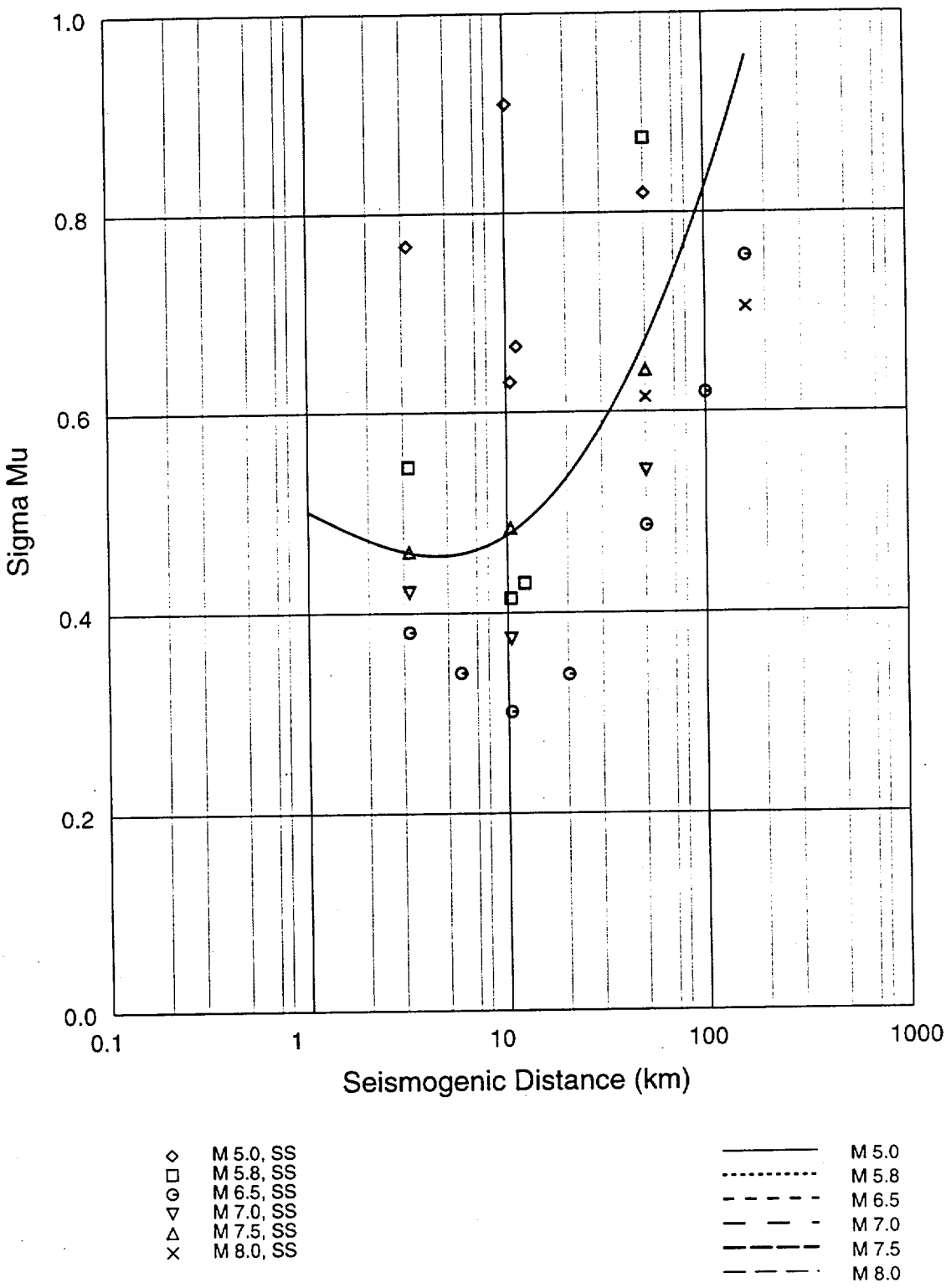
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 2.0 Hz



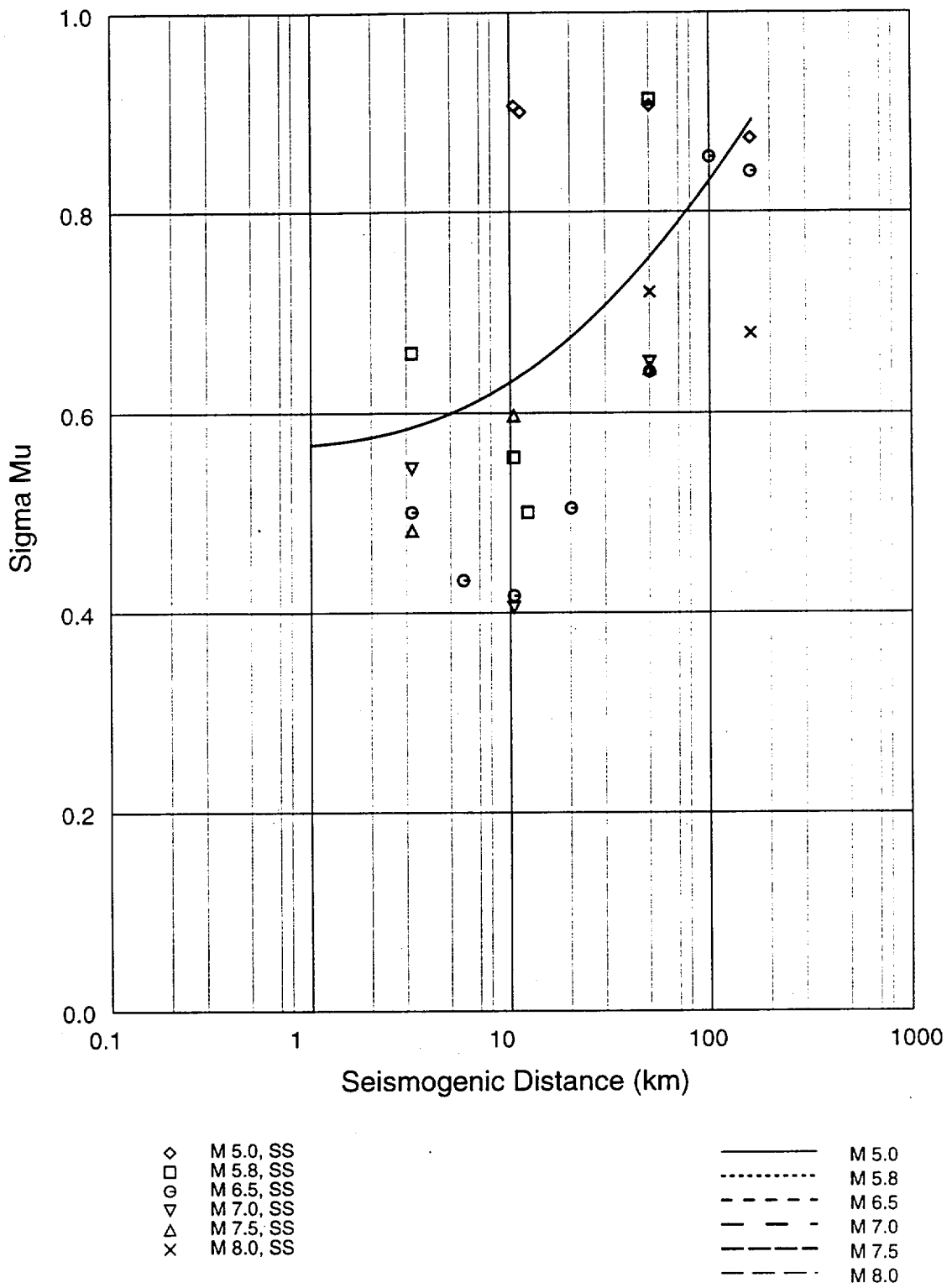
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 1.0 Hz



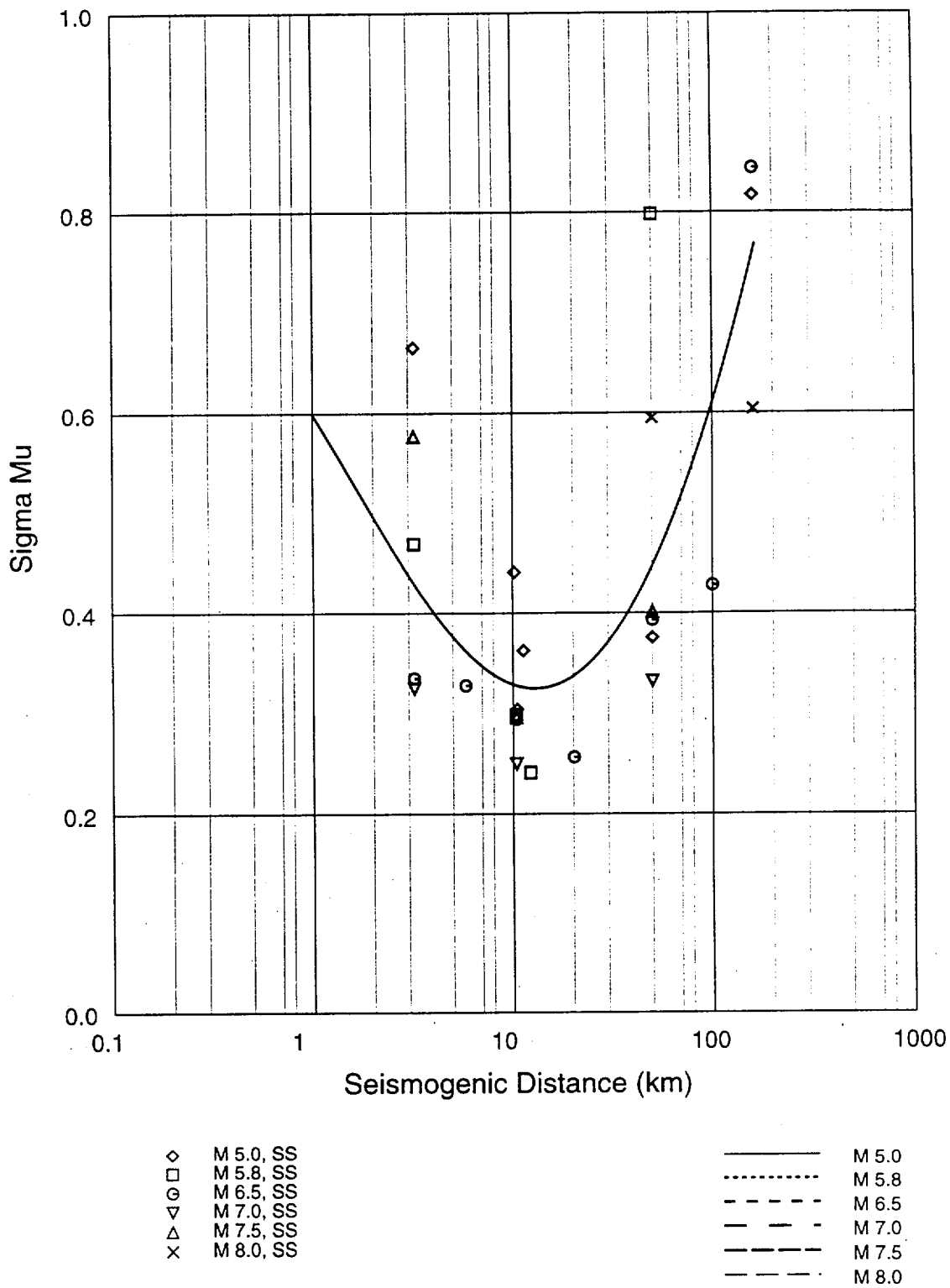
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 0.5 Hz



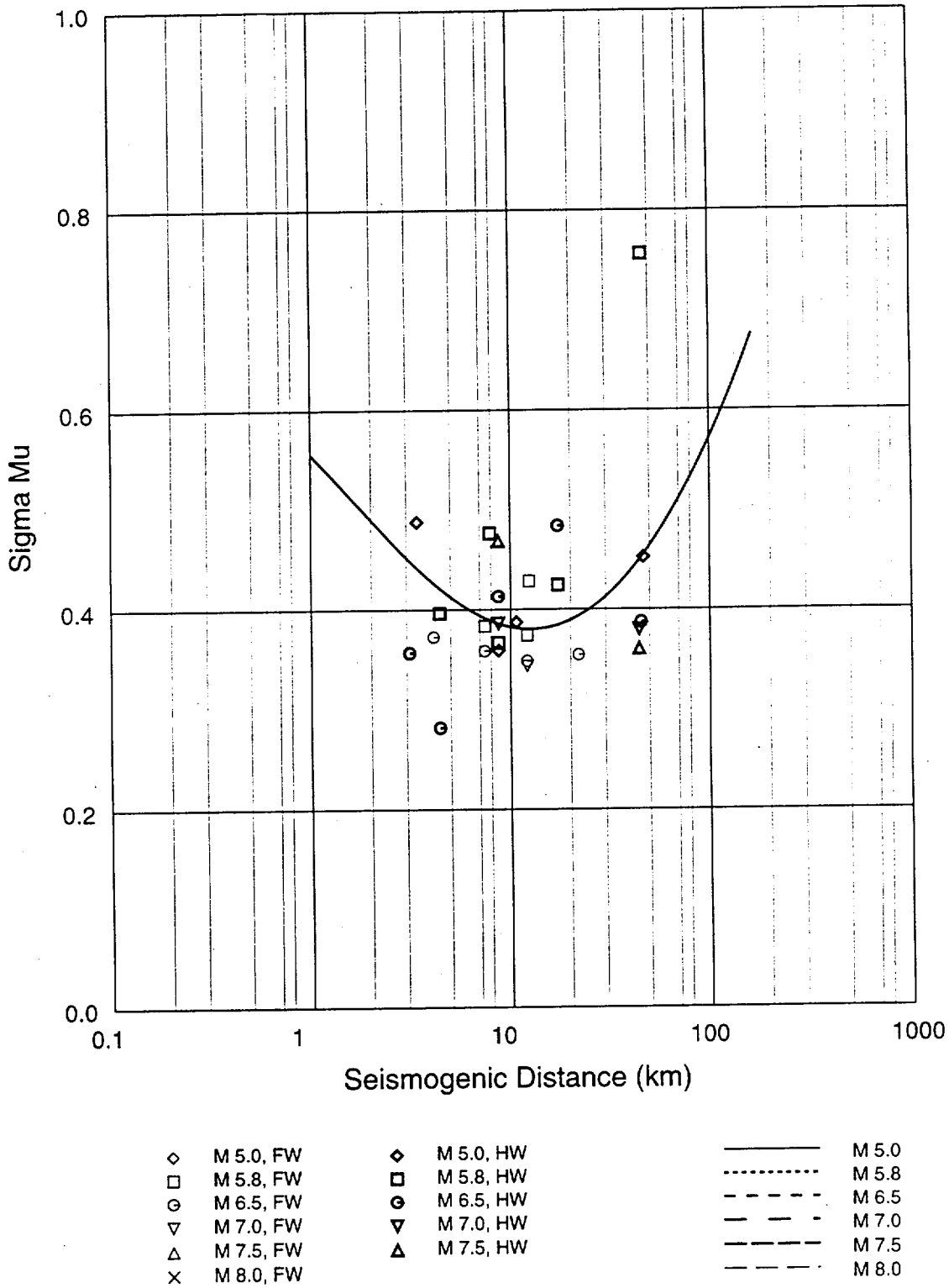
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Frequency = 0.3 Hz



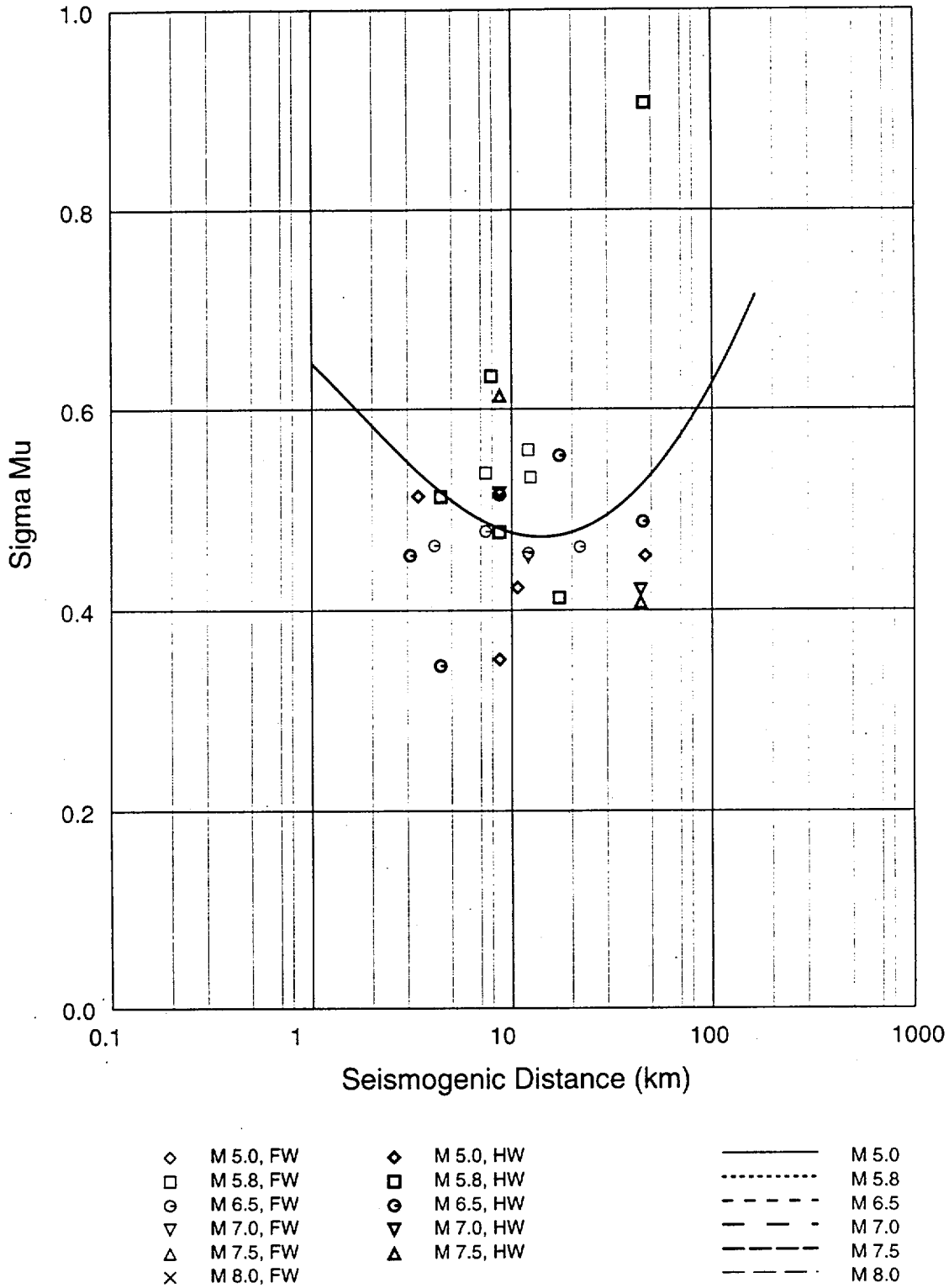
Campbell Rev3, (Pt Est Rev2), 7/6/97
Strike-Slip Faulting Attenuation, Vertical Comp
Peak Velocity



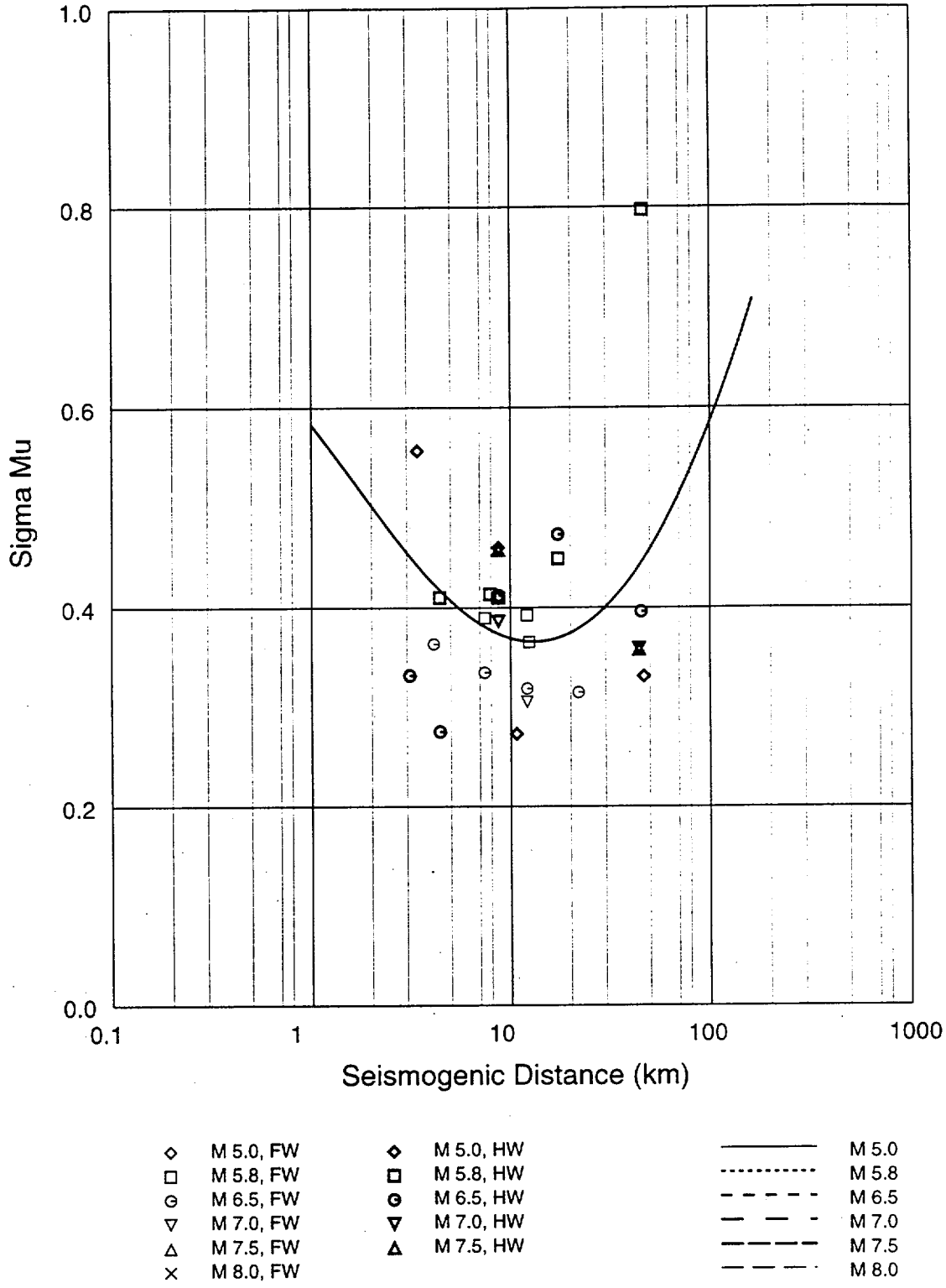
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 100.0 Hz



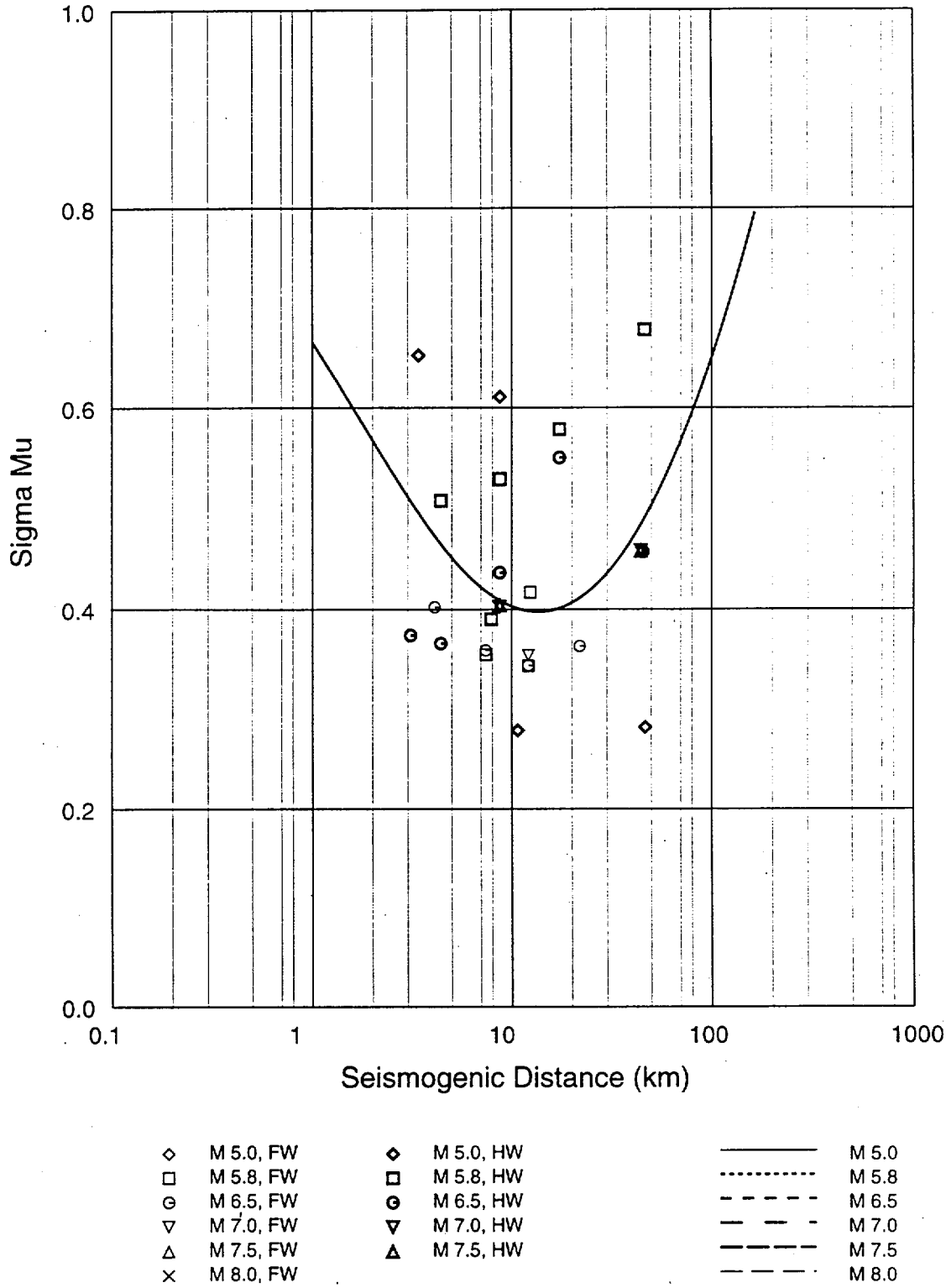
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 20.0 Hz



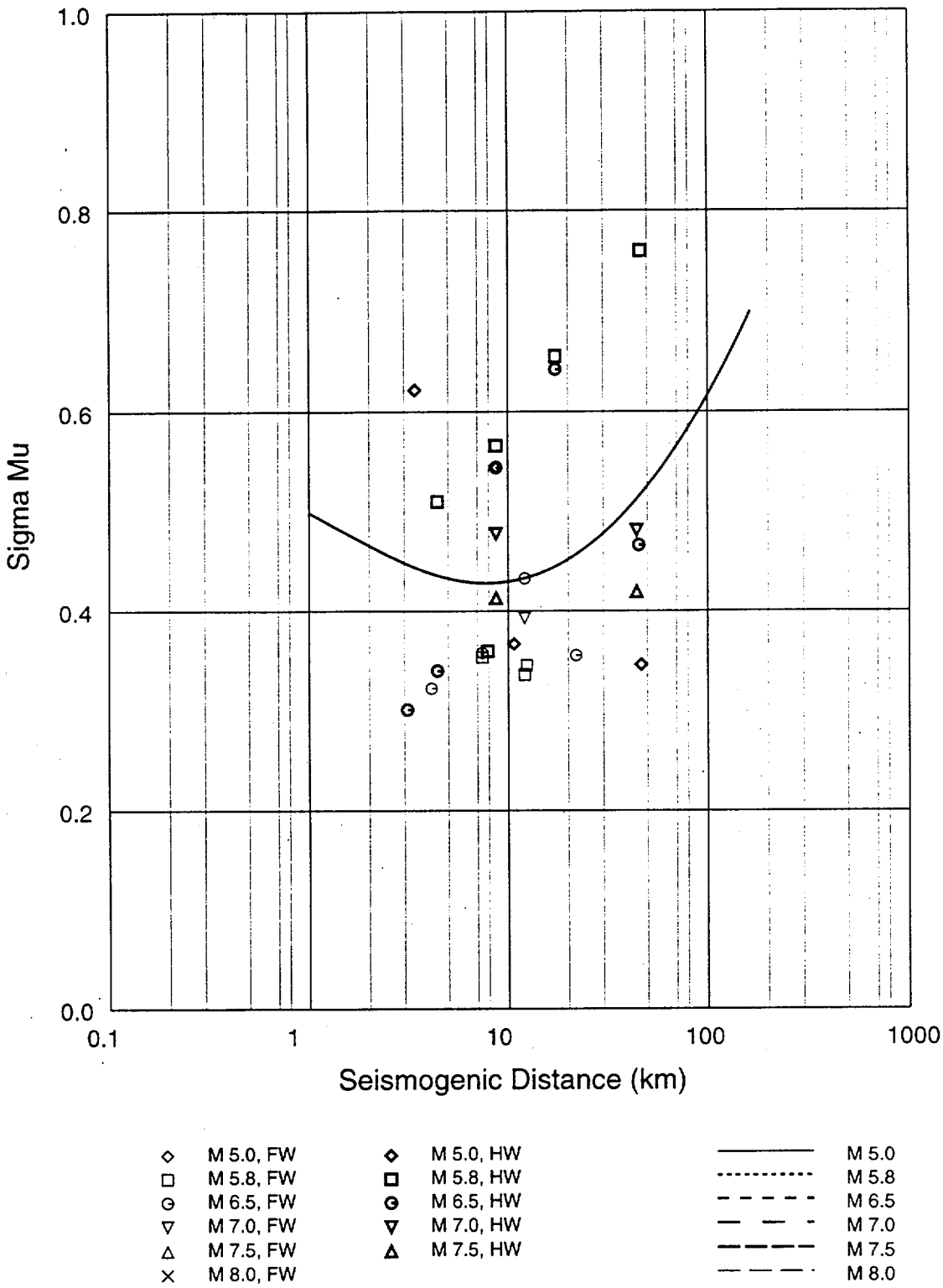
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 10.0 Hz



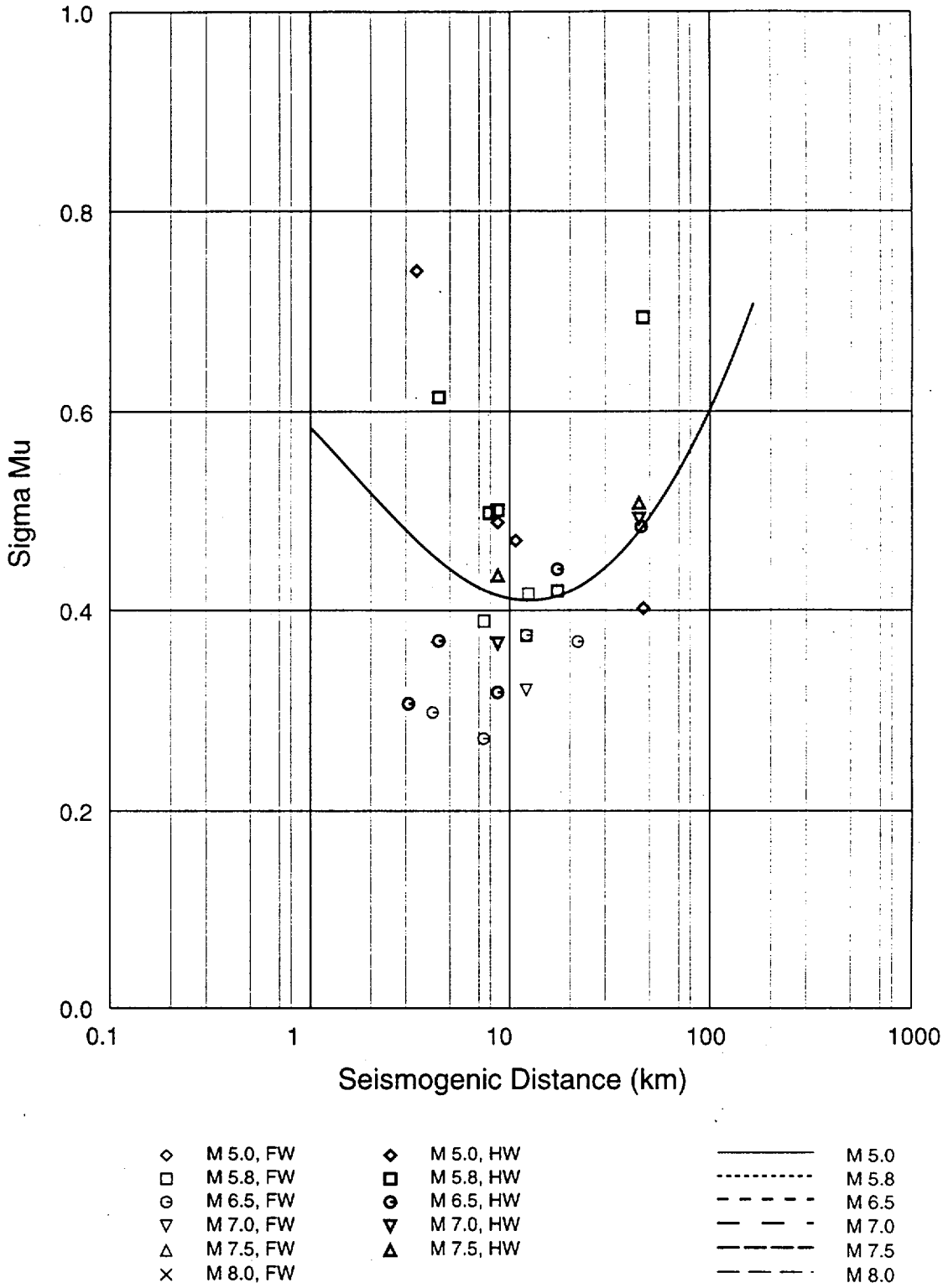
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 5.0 Hz



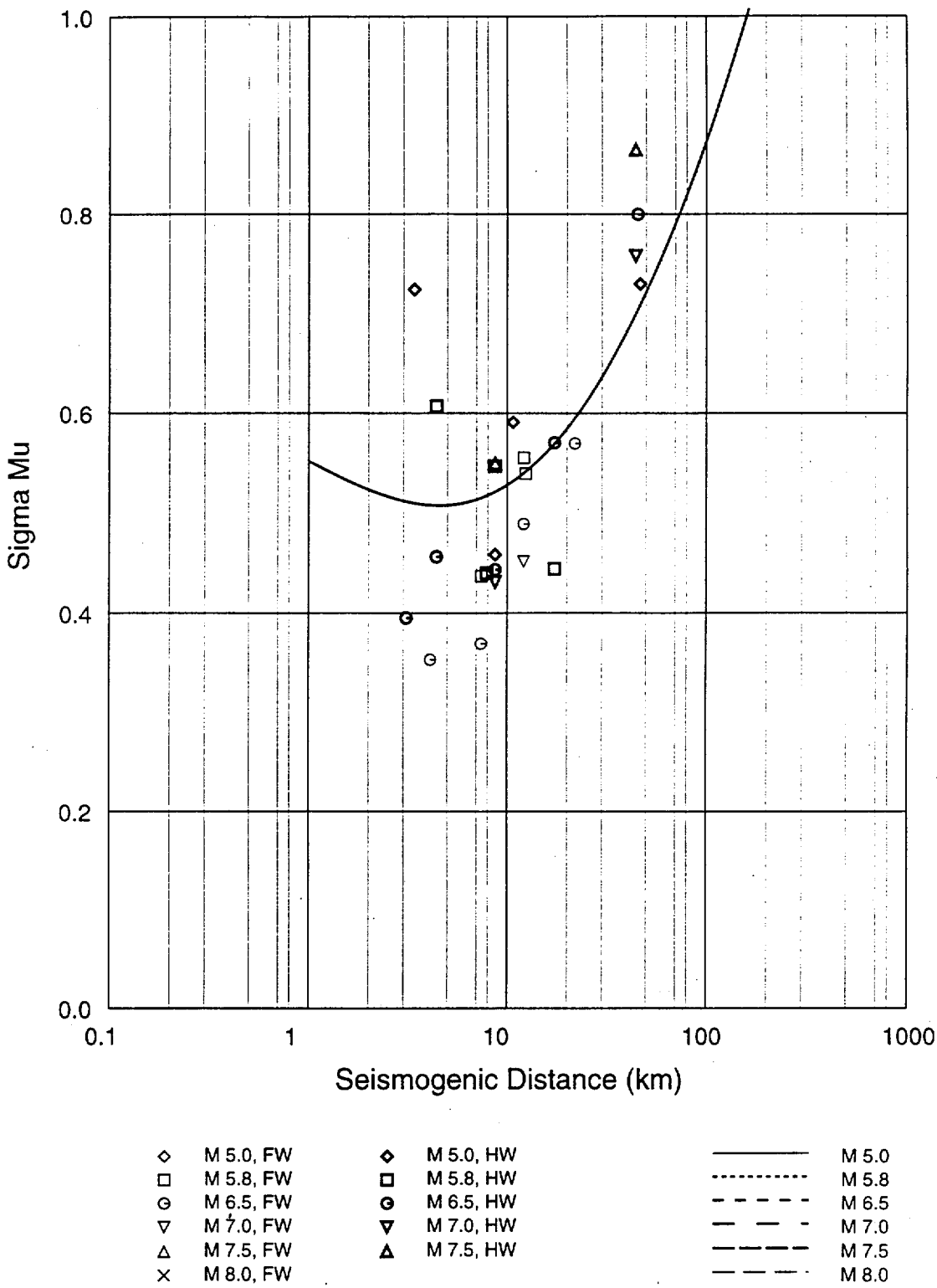
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 2.0 Hz



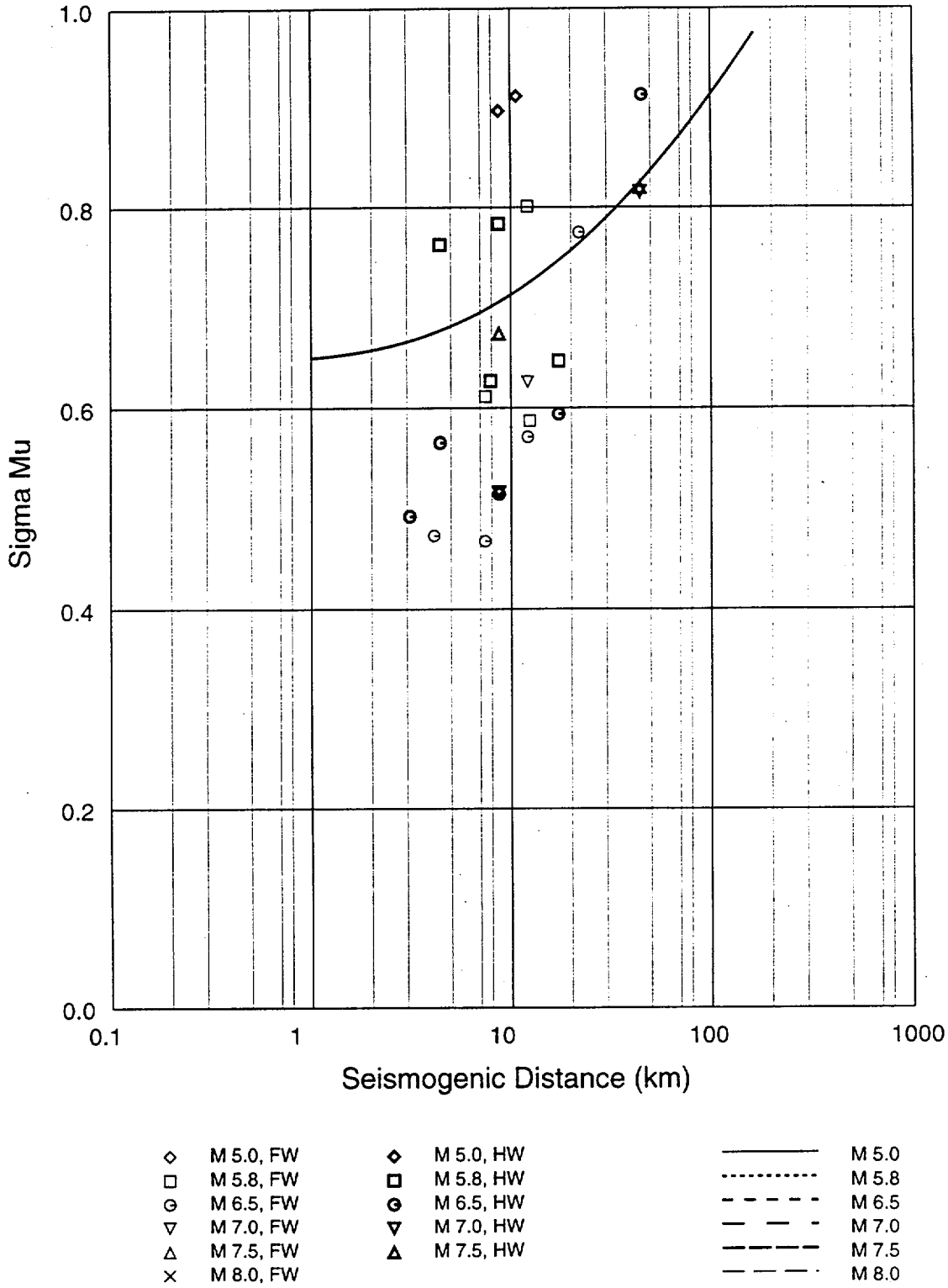
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 1.0 Hz



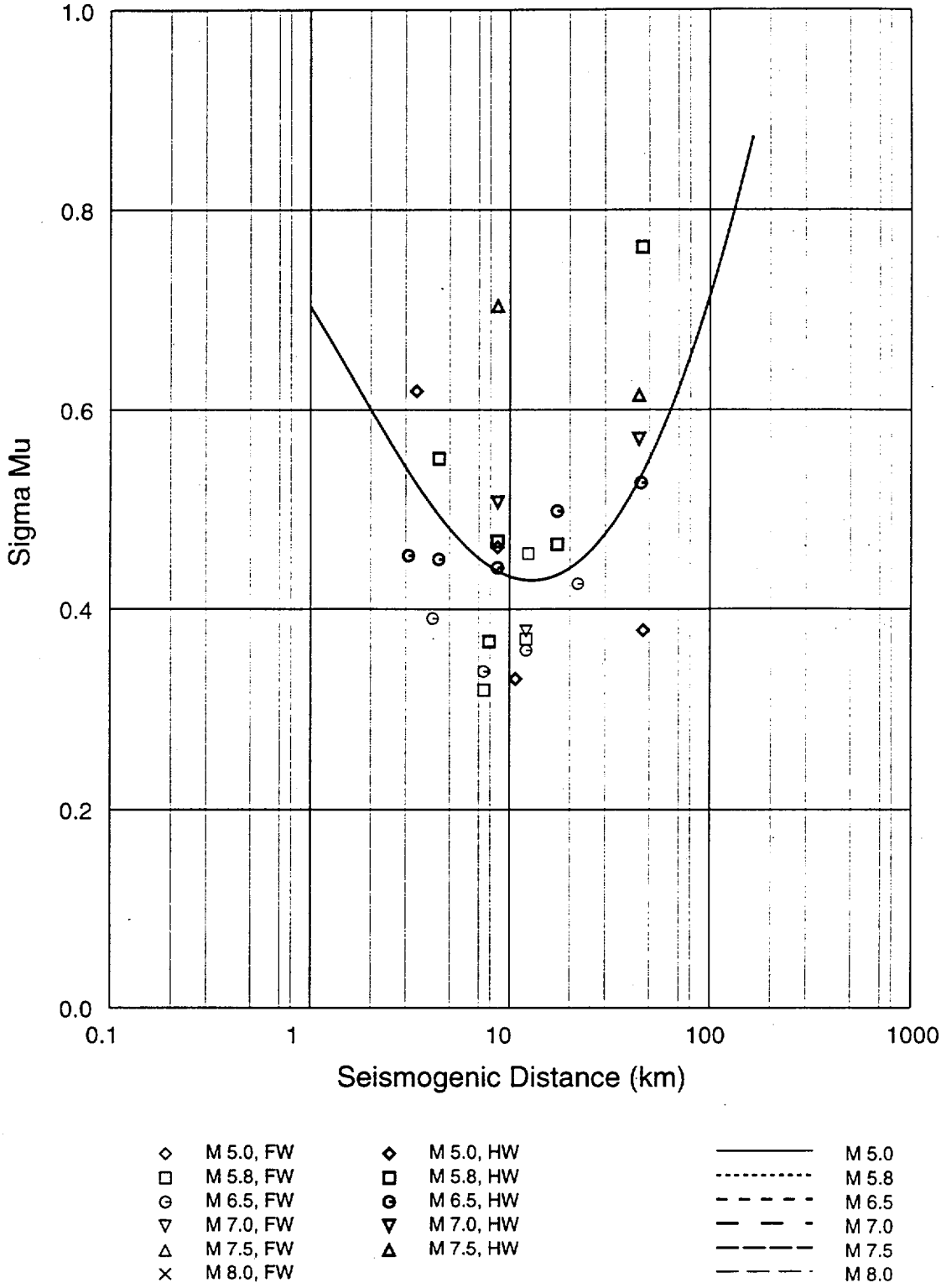
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 0.5 Hz



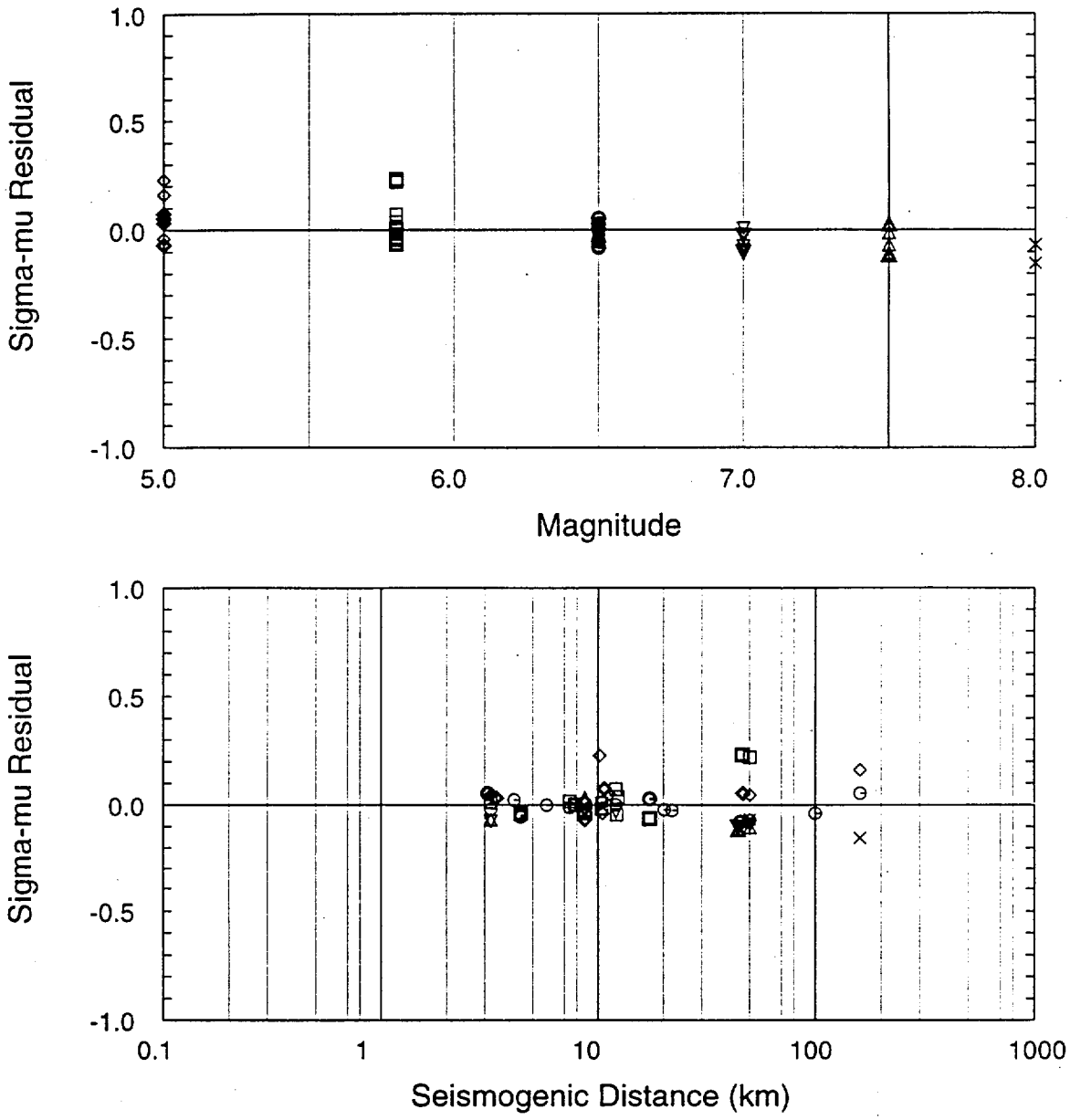
Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Frequency = 0.3 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Normal Faulting Attenuation, Vertical Comp
Peak Velocity

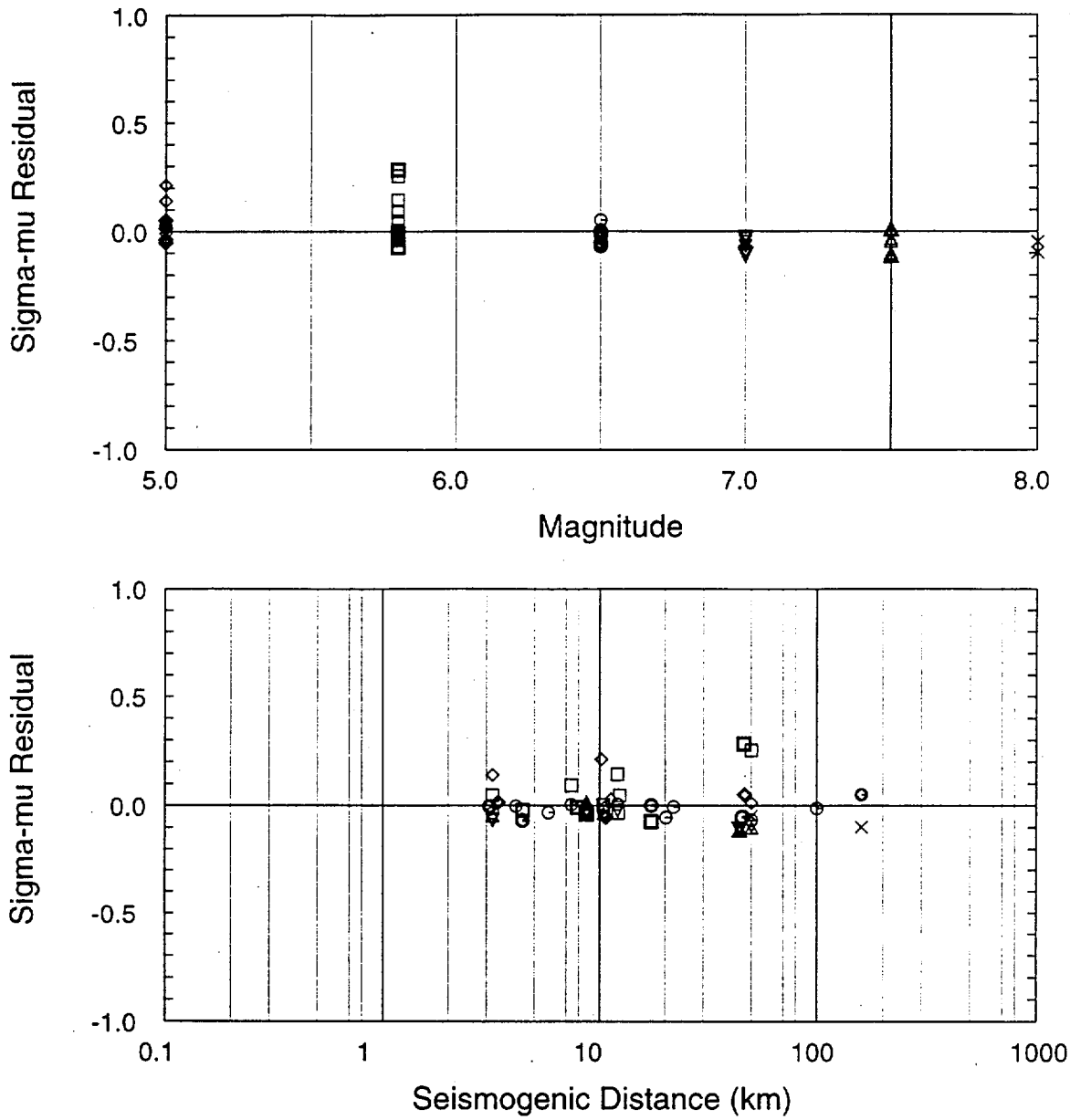


Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 100.0 Hz



◇ M 5.0, SS and FW	◇ M 5.0, HW
□ M 5.8, SS and FW	□ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▽ M 7.0, HW
△ M 7.5, SS and FW	△ M 7.5, HW
× M 8.0, SS and FW	

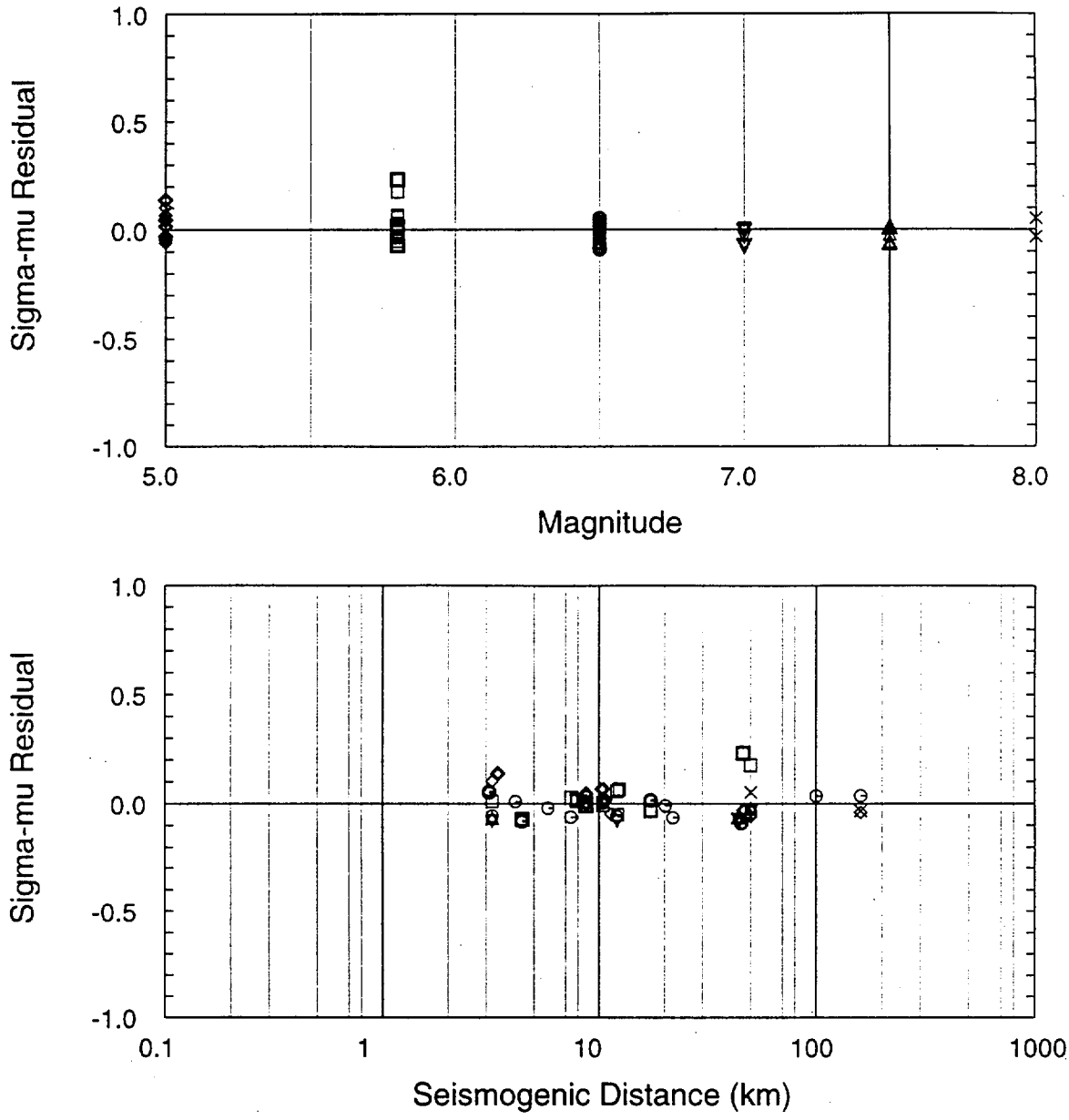
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 20.0 Hz



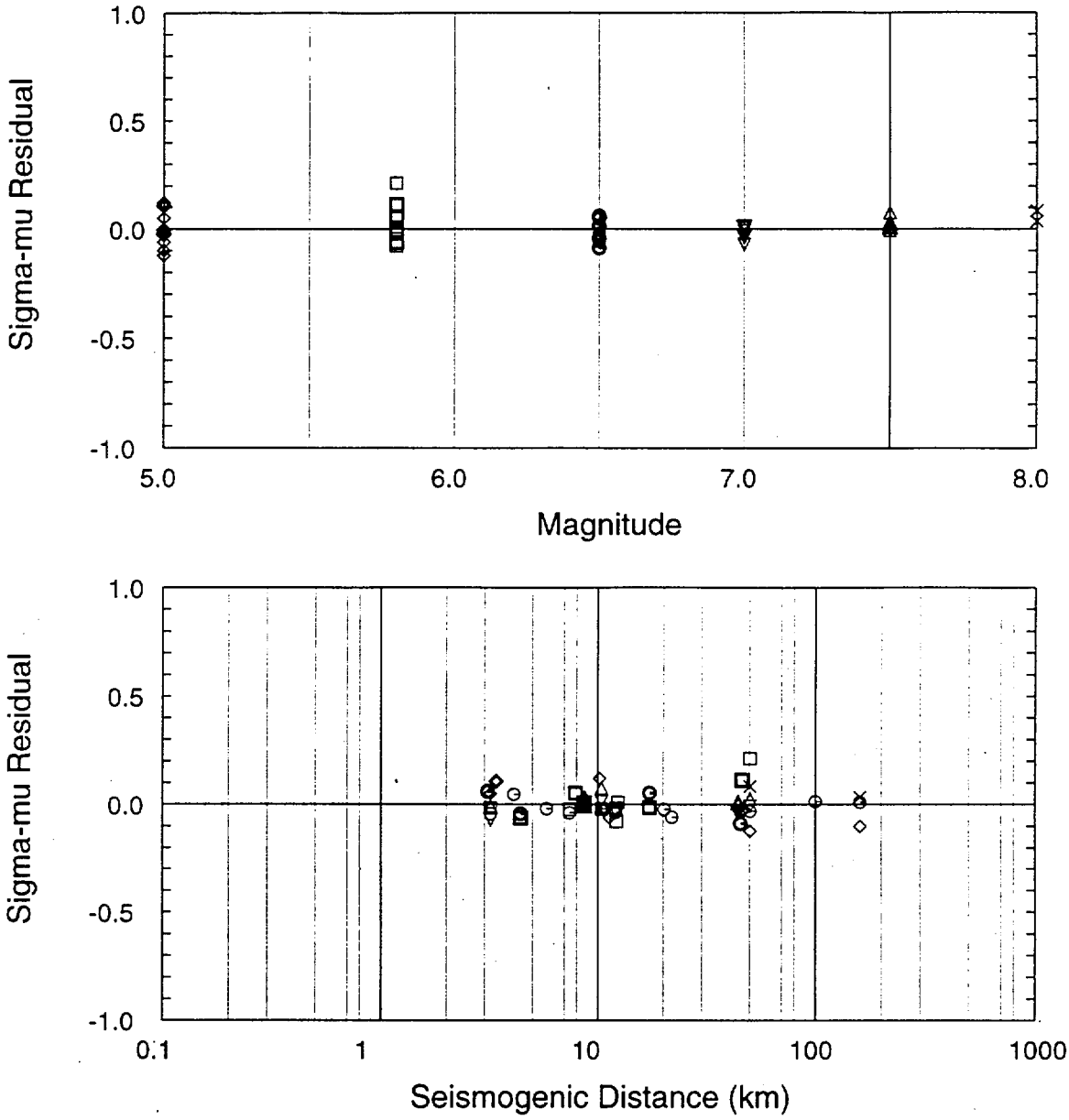
◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 10.0 Hz

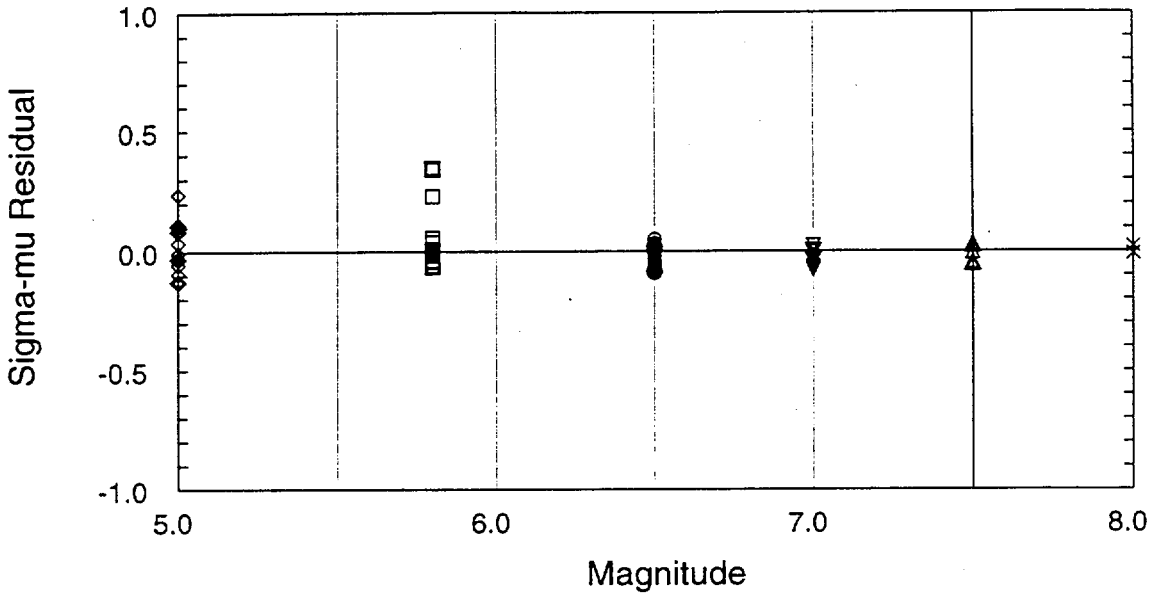


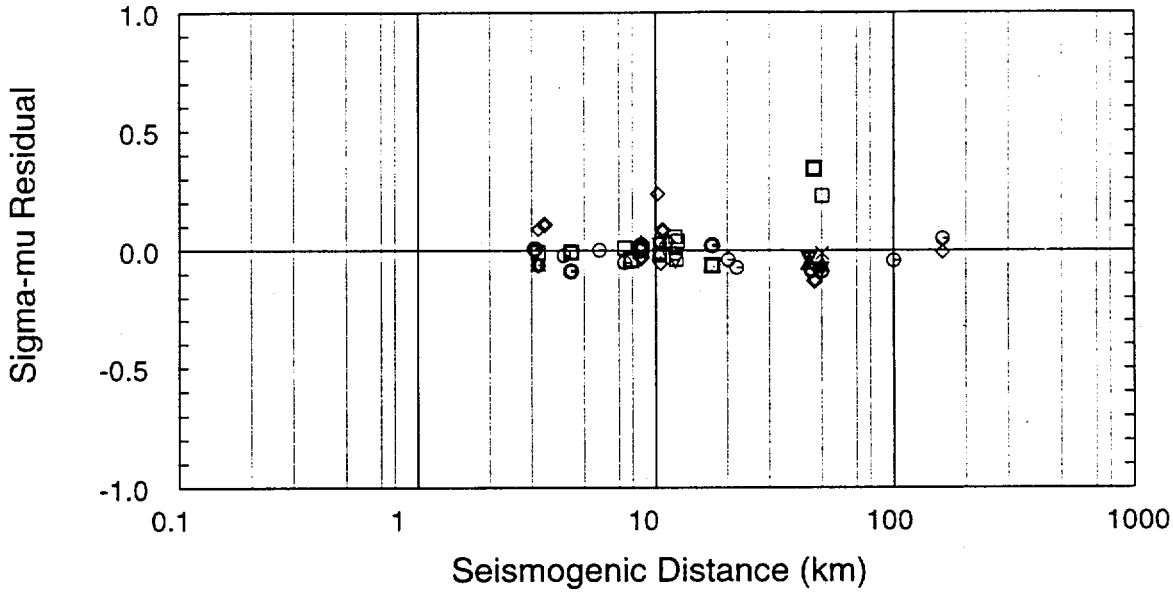
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 5.0 Hz



◇ M 5.0, SS and FW	◆ M 5.0, HW
□ M 5.8, SS and FW	■ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▼ M 7.0, HW
△ M 7.5, SS and FW	▲ M 7.5, HW
× M 8.0, SS and FW	

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 2.0 Hz

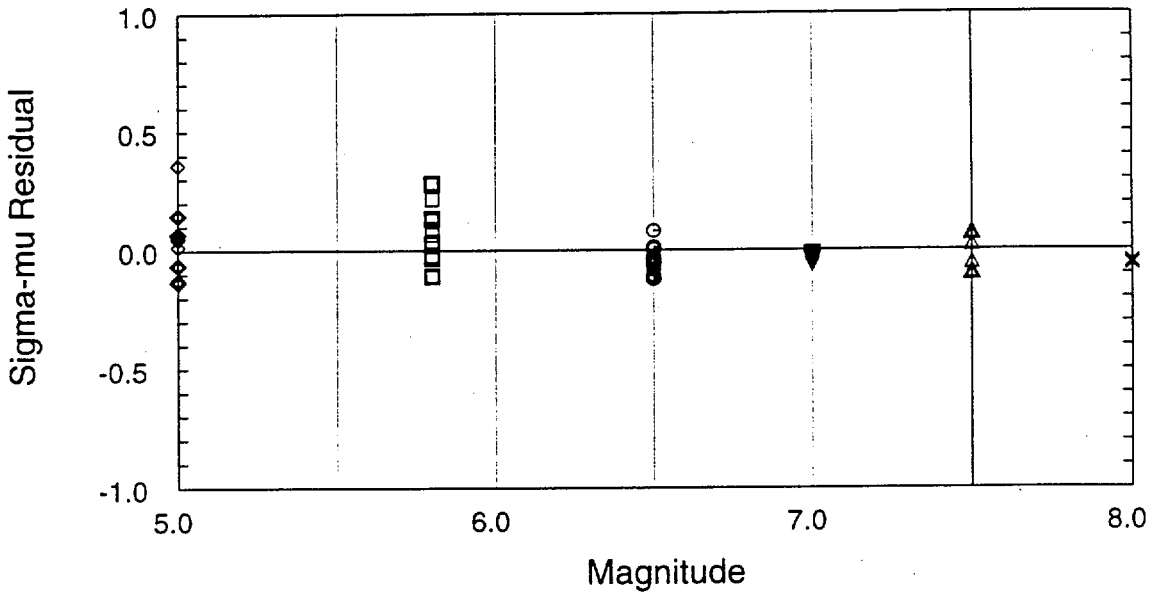


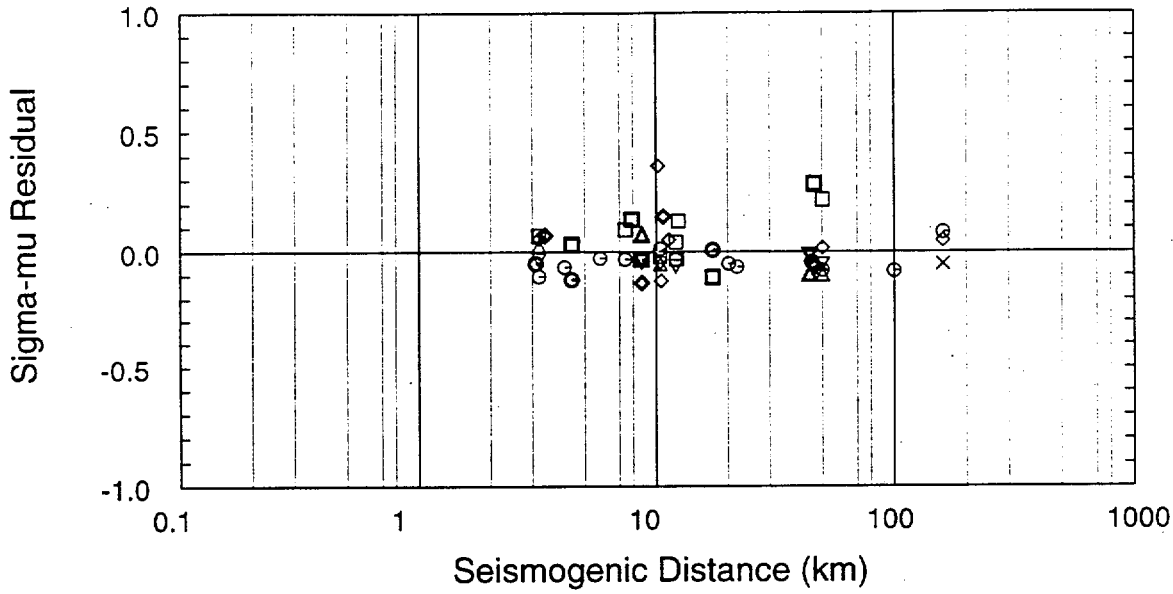


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 1.0 Hz

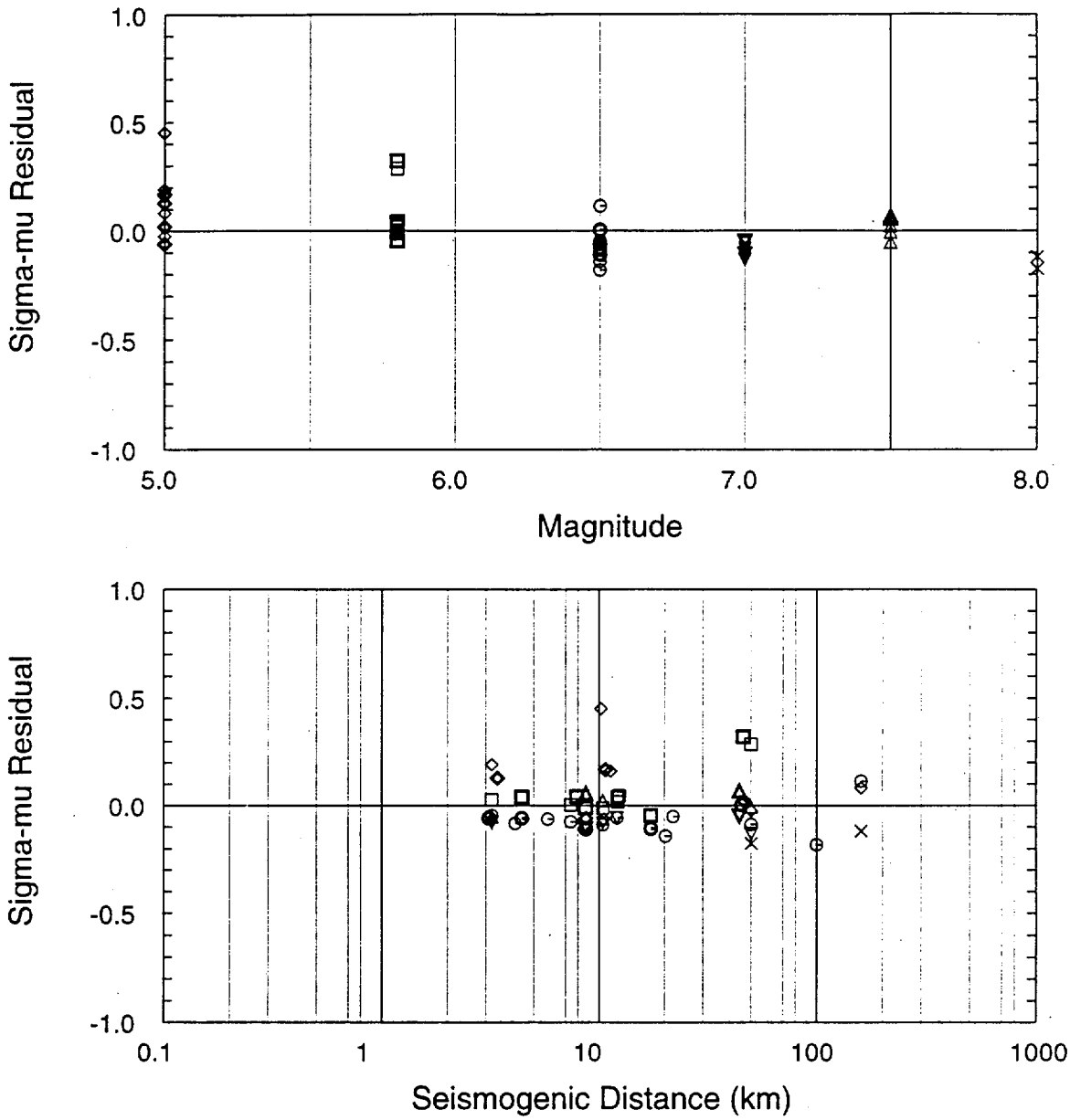




◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

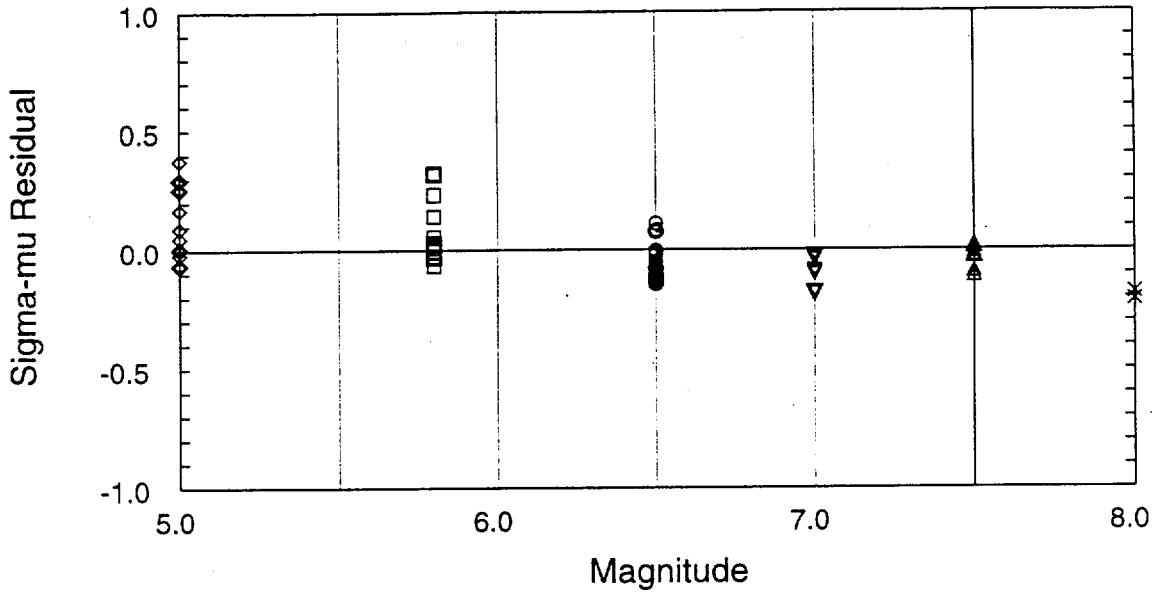
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.5 Hz

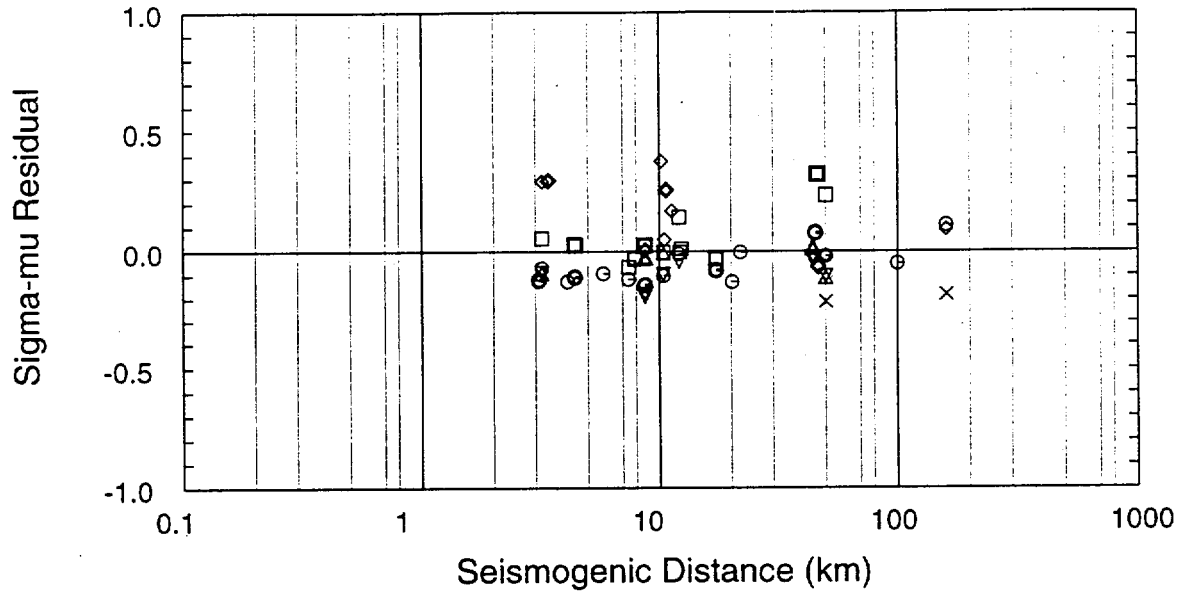


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.3 Hz

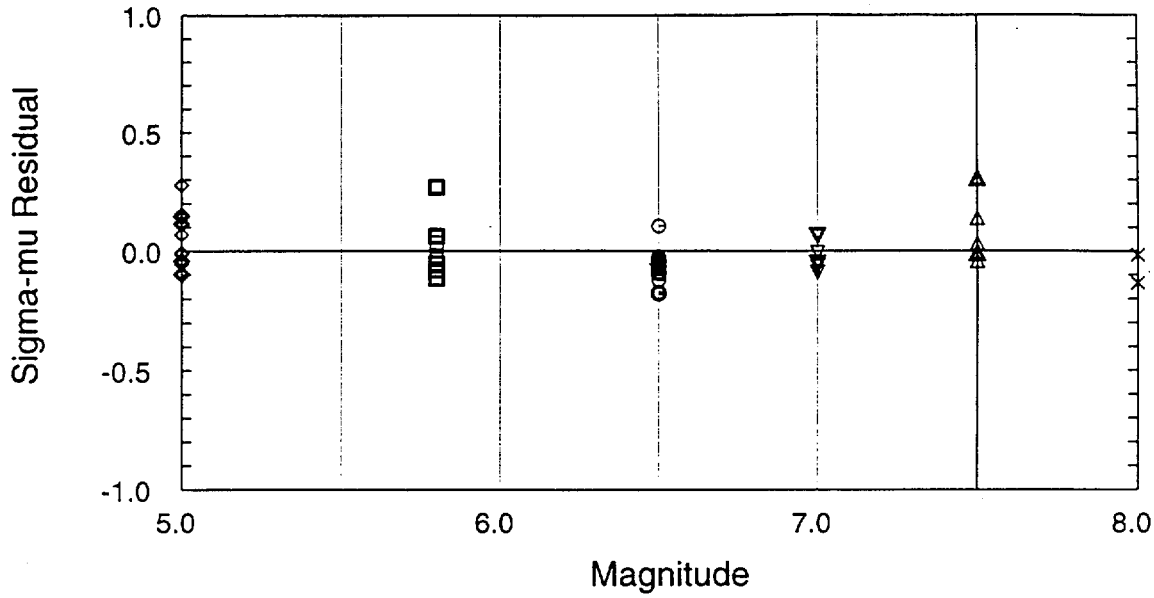


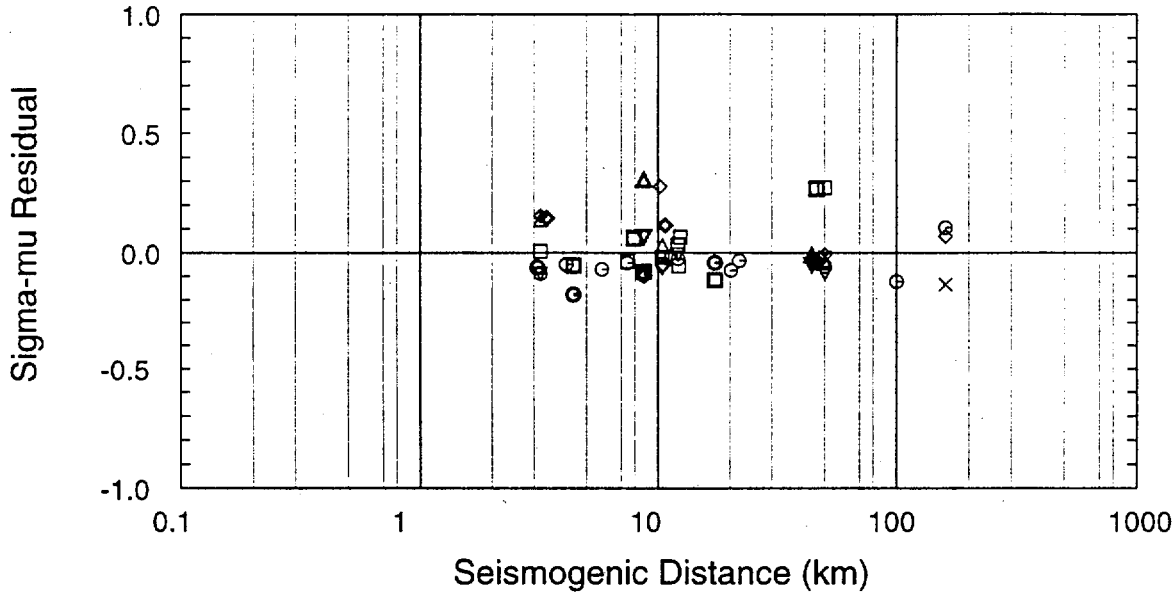


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

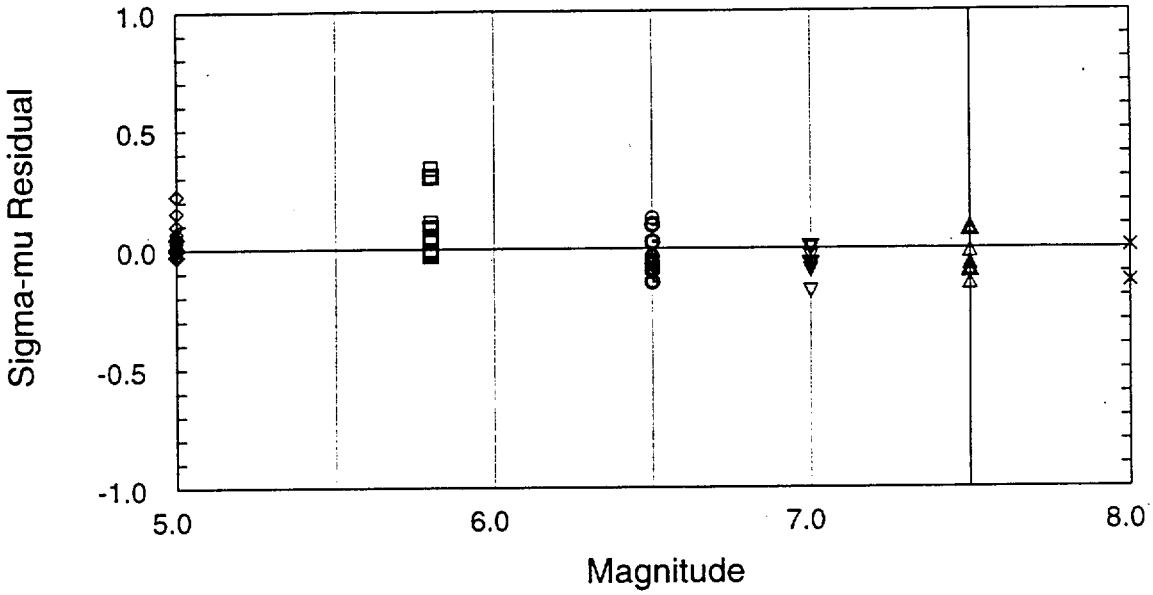
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Peak Velocity

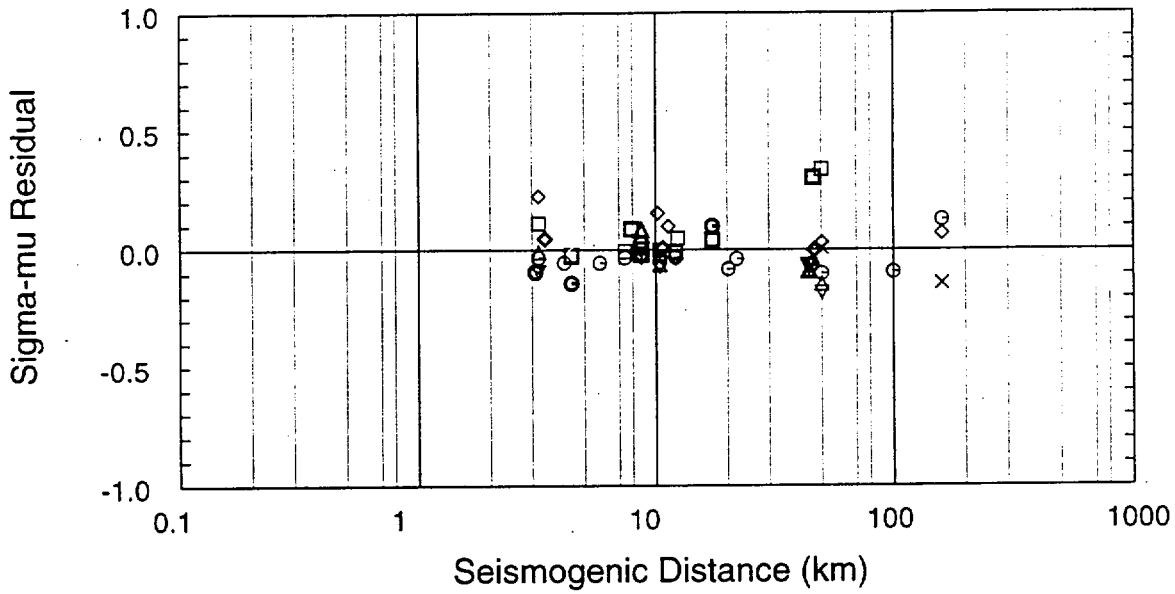




◇ M 5.0, SS and FW	◆ M 5.0, HW
□ M 5.8, SS and FW	■ M 5.8, HW
⊖ M 6.5, SS and FW	⊖ M 6.5, HW
▽ M 7.0, SS and FW	▼ M 7.0, HW
△ M 7.5, SS and FW	▲ M 7.5, HW
× M 8.0, SS and FW	

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 100.0 Hz

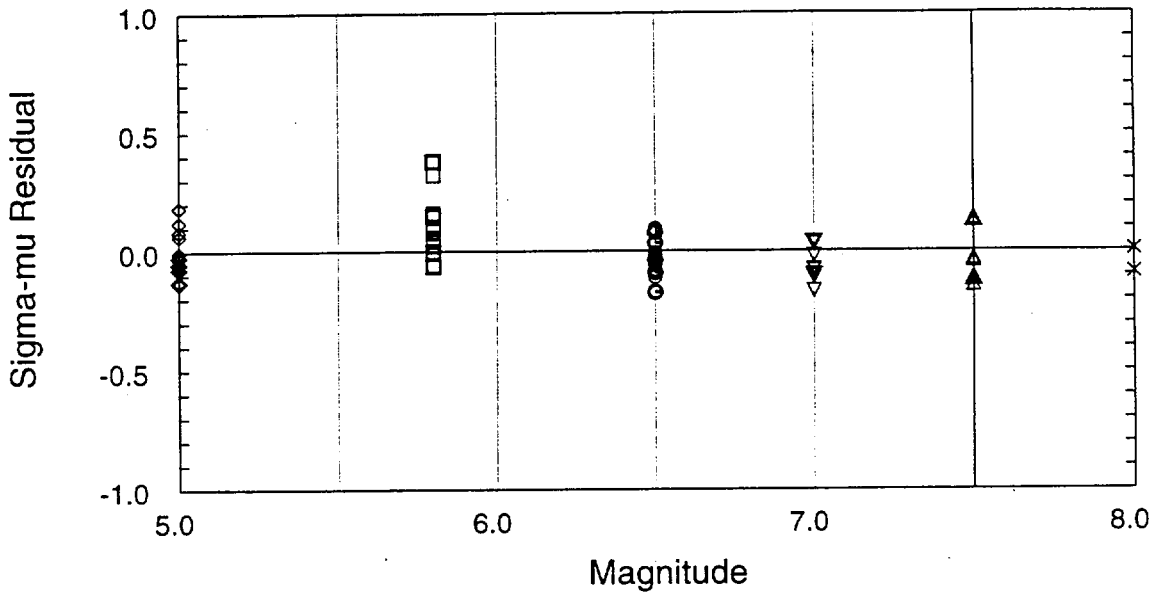


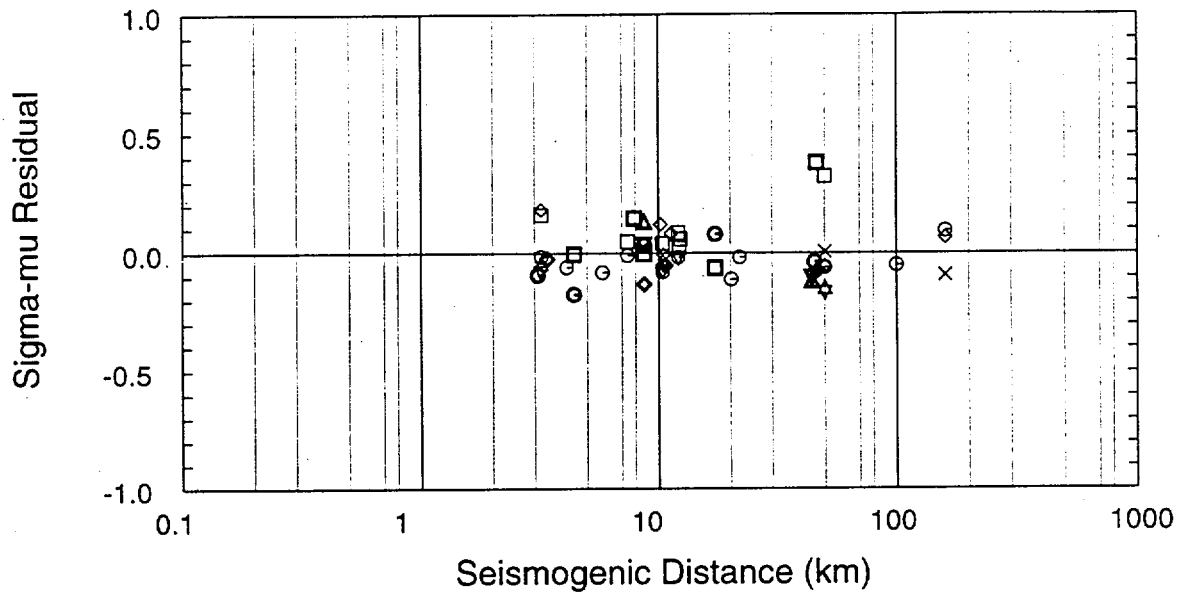


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 20.0 Hz

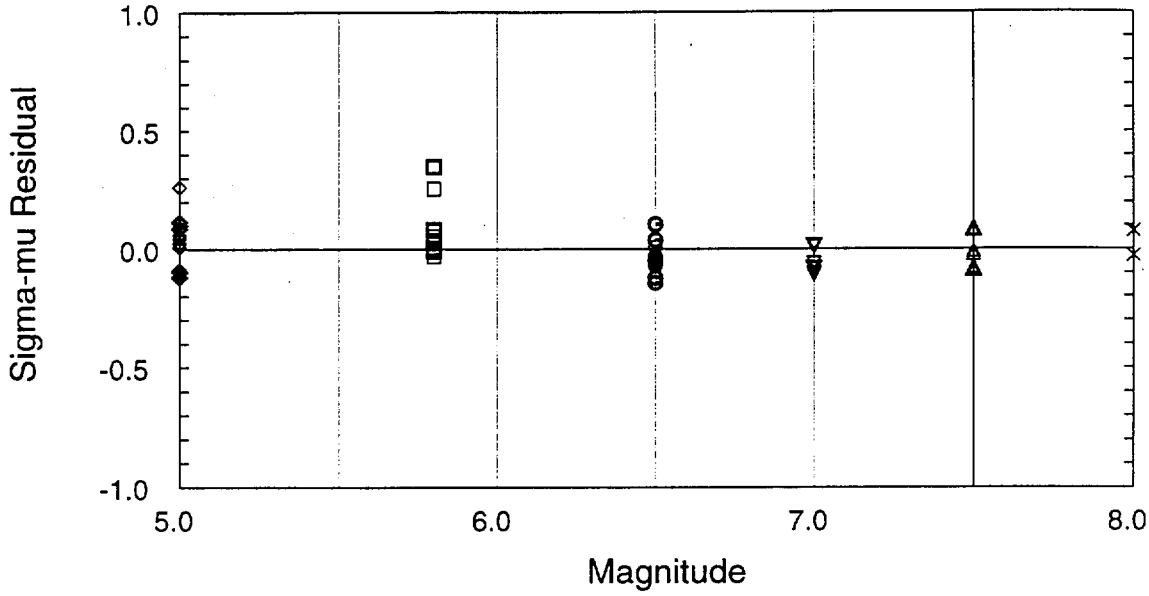


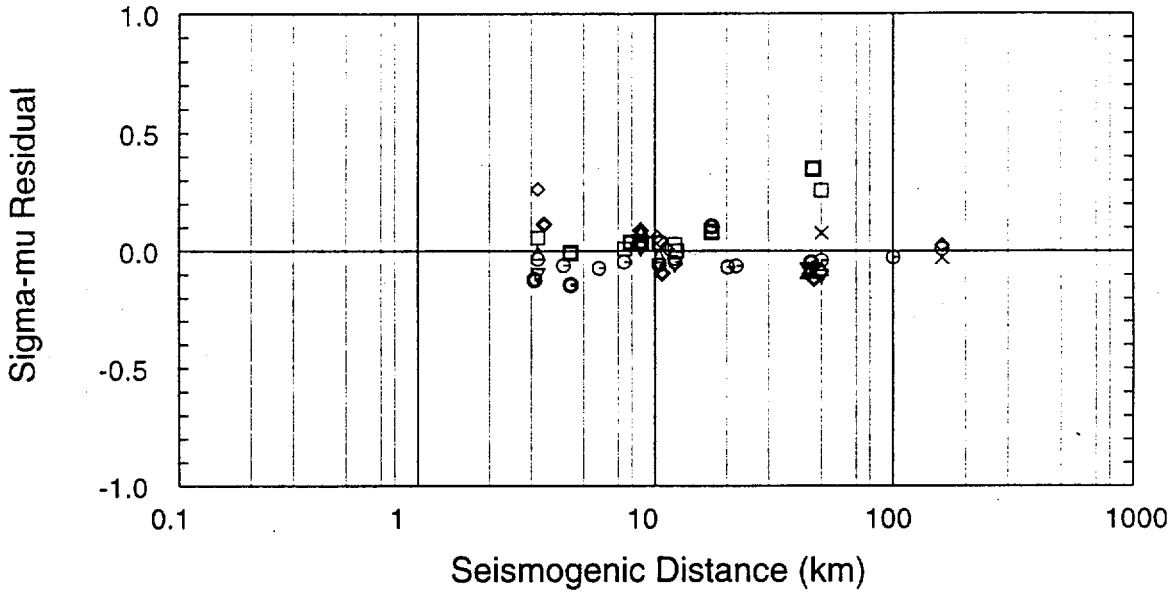


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊖ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 10.0 Hz

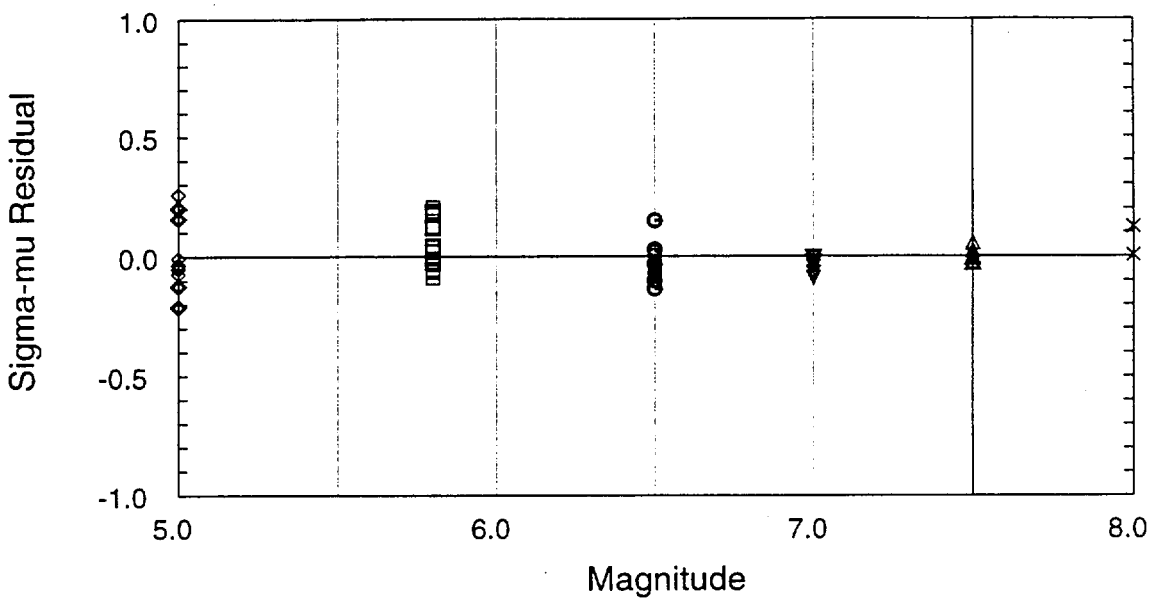


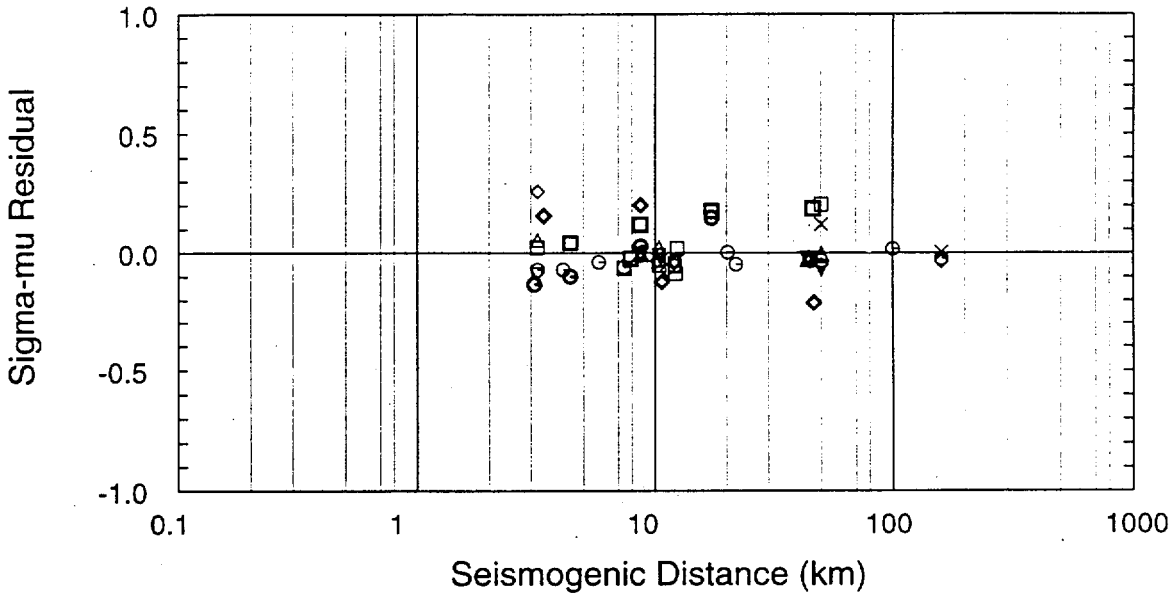


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 5.0 Hz

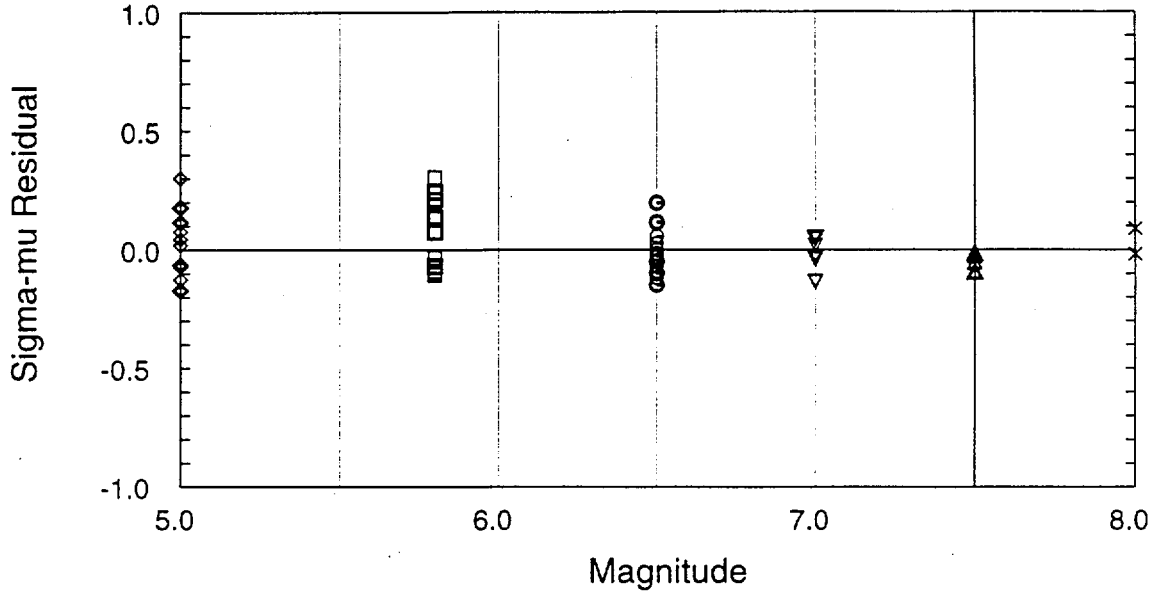


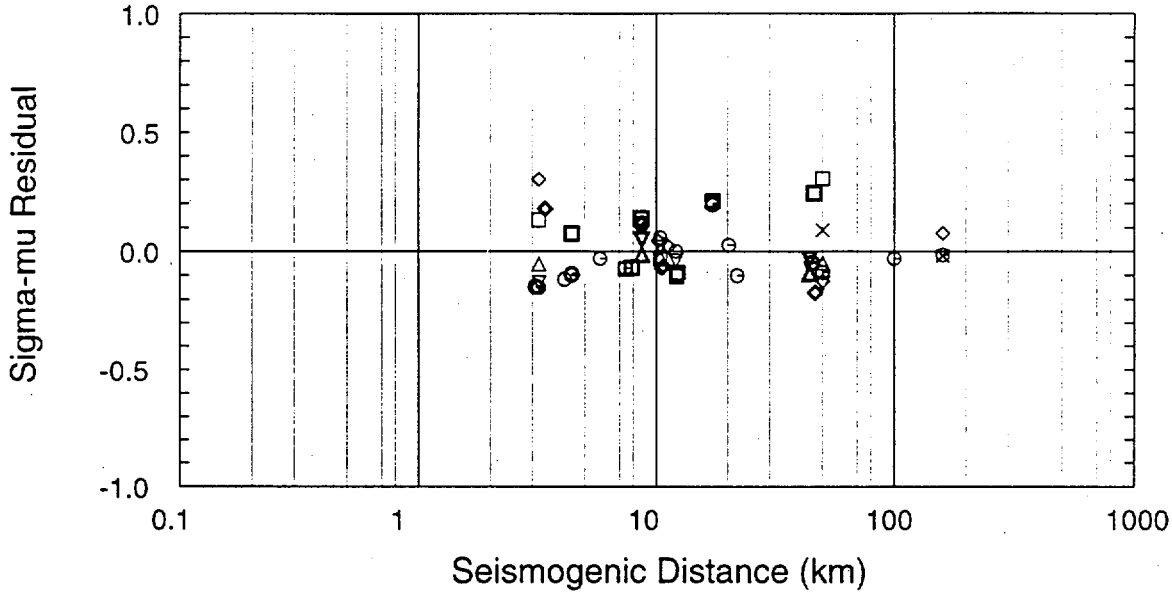


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 2.0 Hz

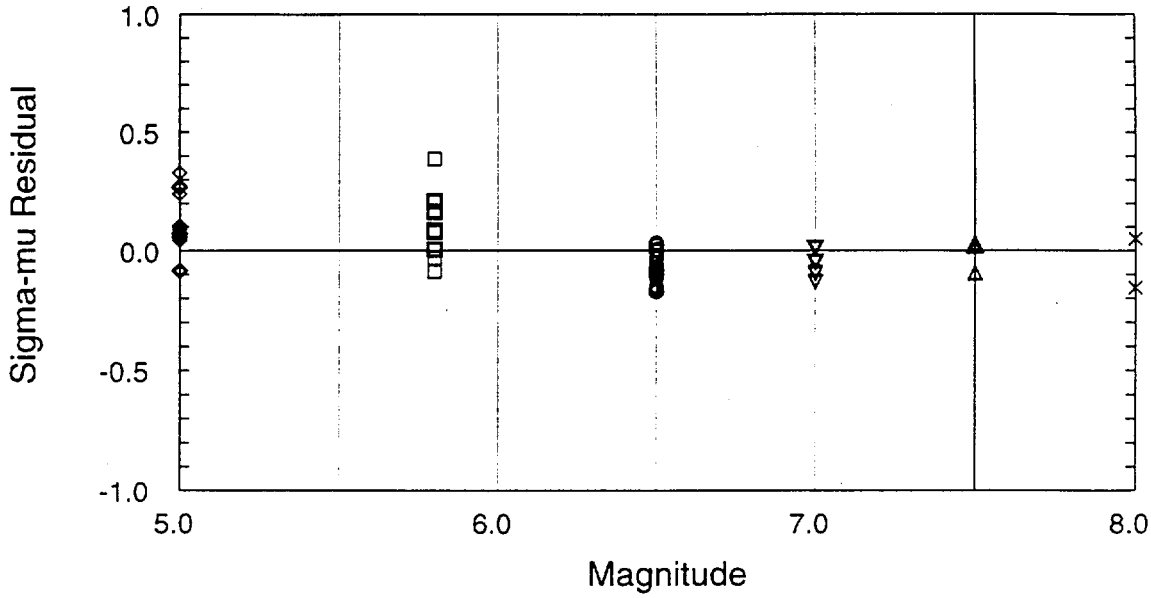


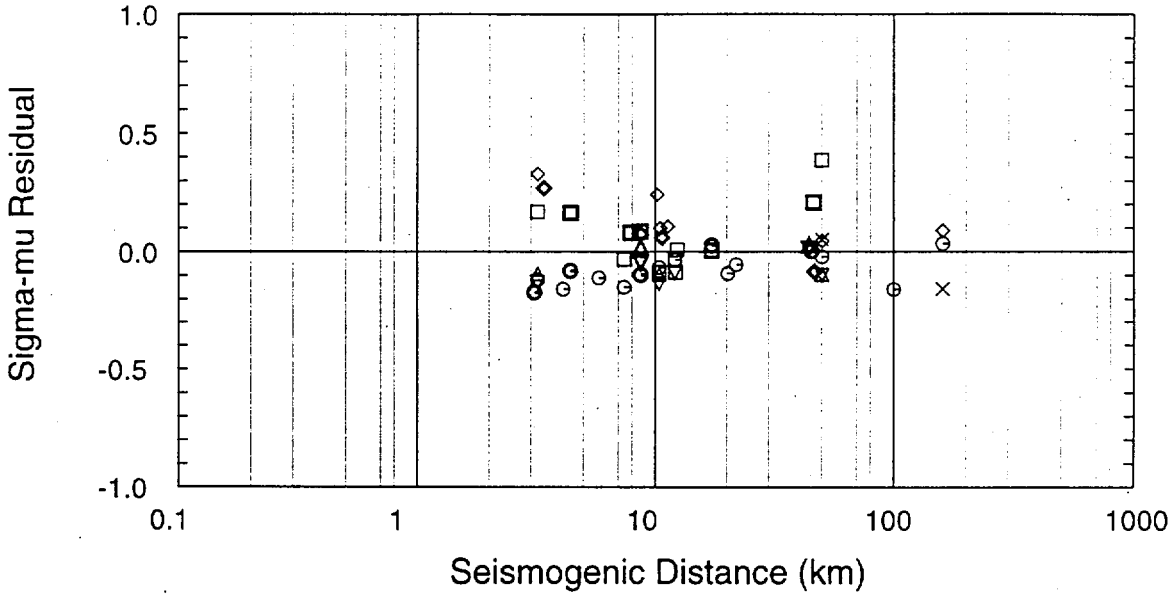


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊙ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 1.0 Hz

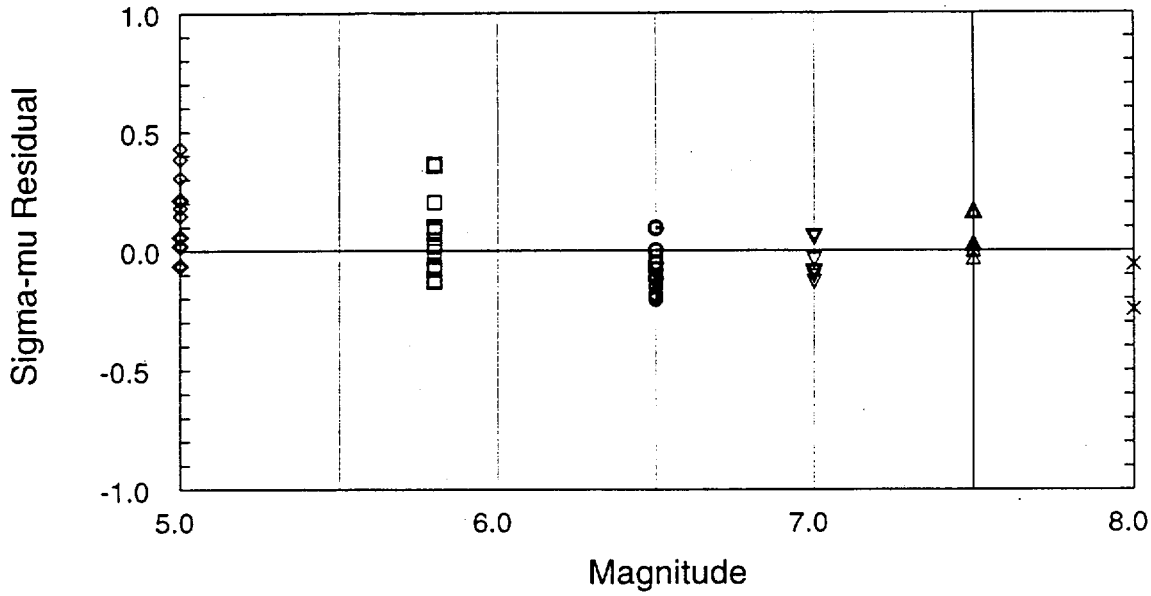


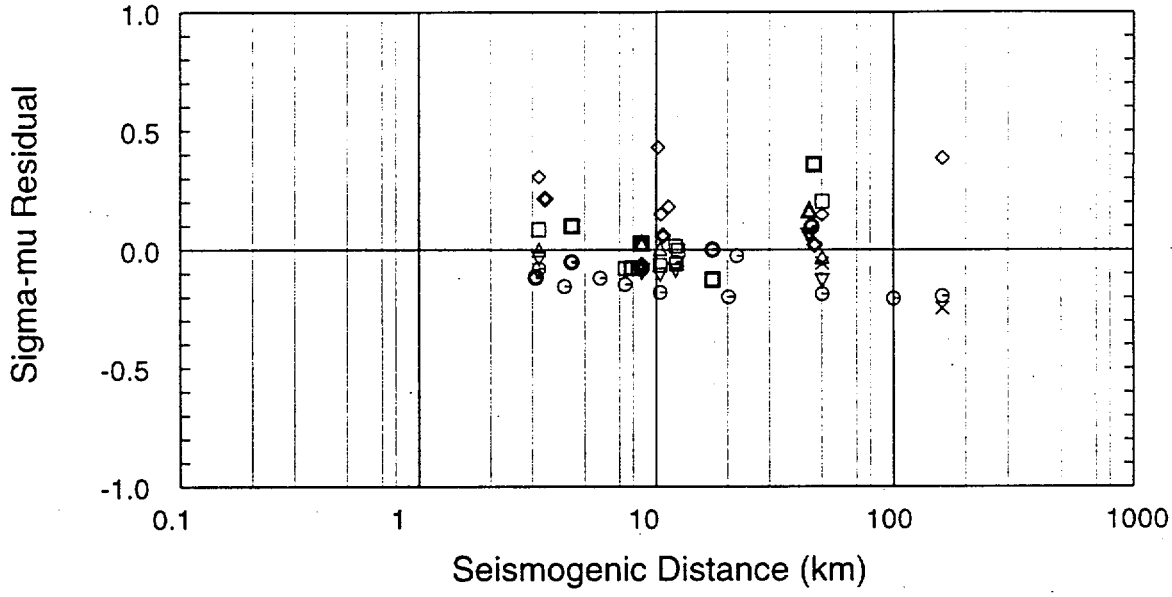


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.5 Hz

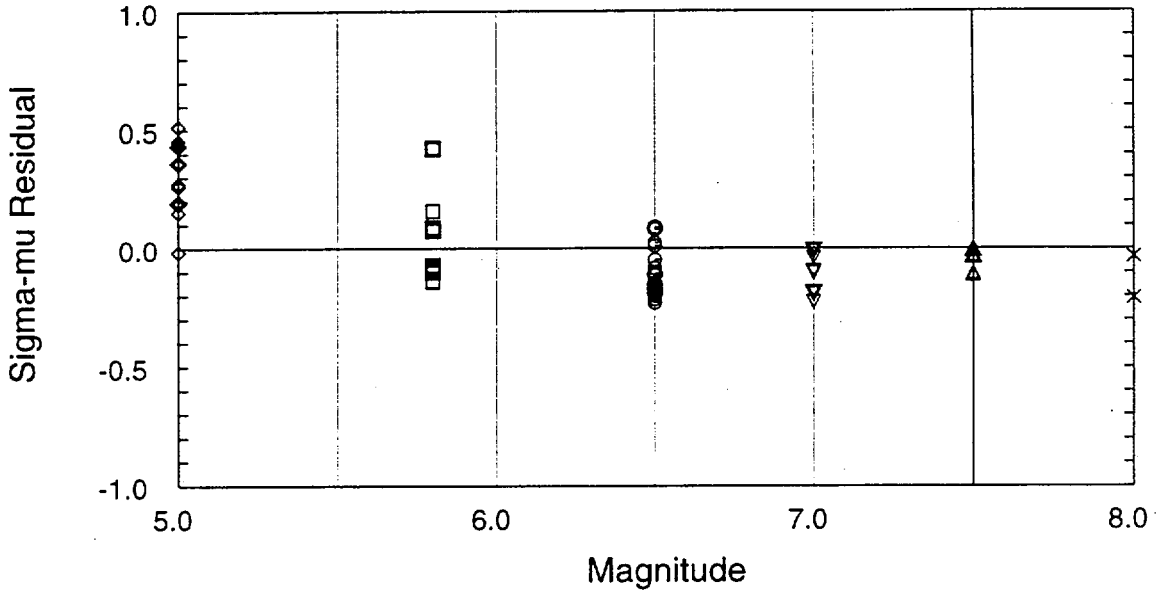


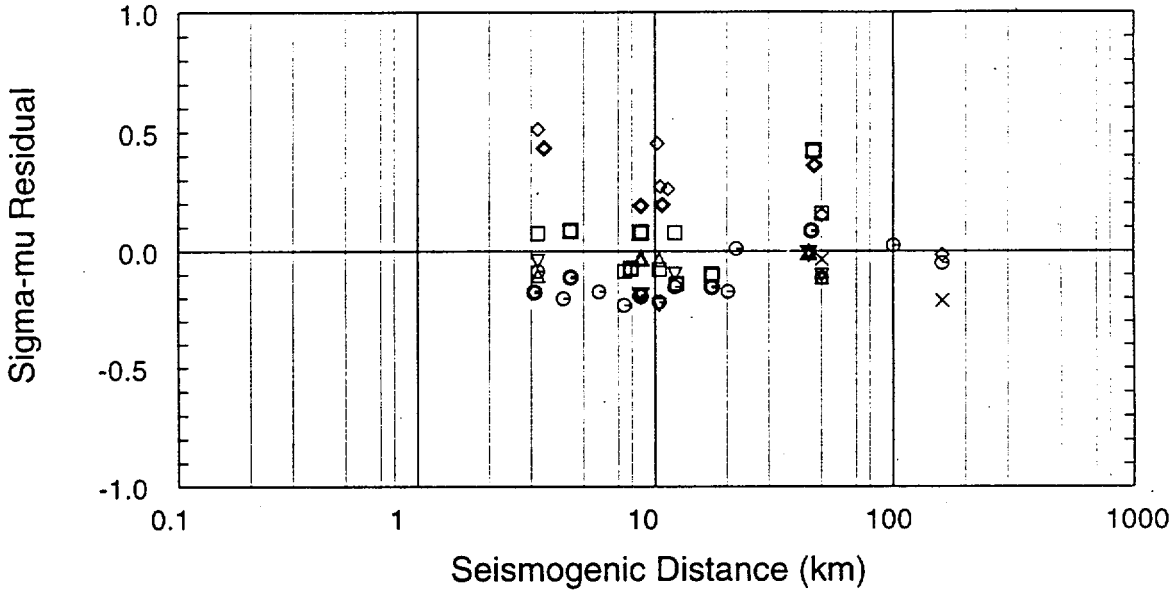


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◇ M 5.0, HW
□ M 5.8, HW
⊖ M 6.5, HW
▽ M 7.0, HW
△ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.3 Hz

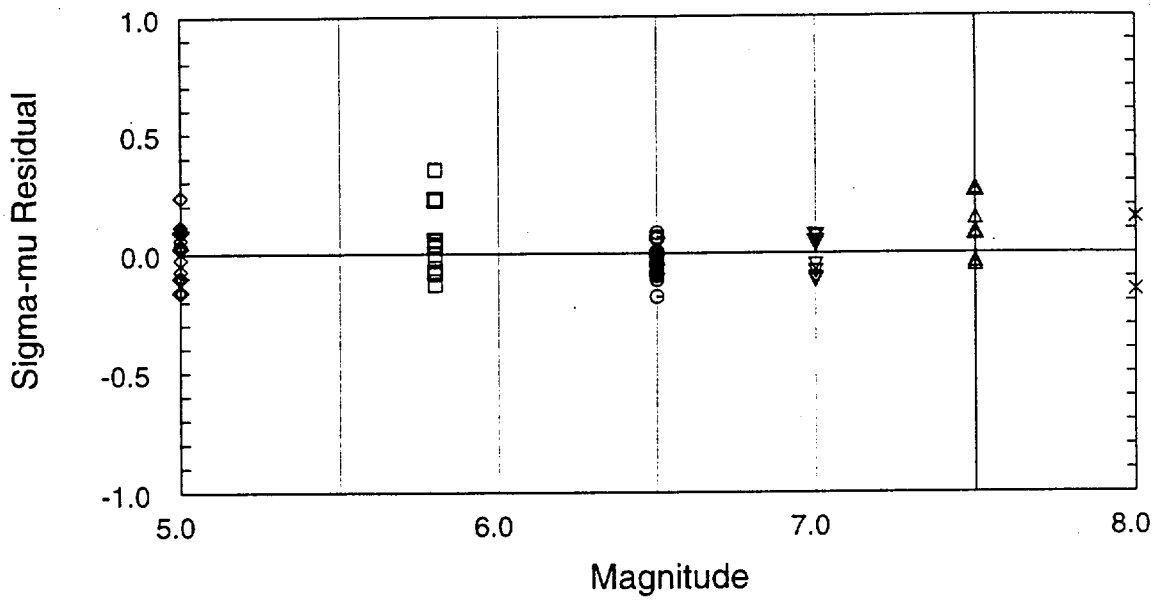


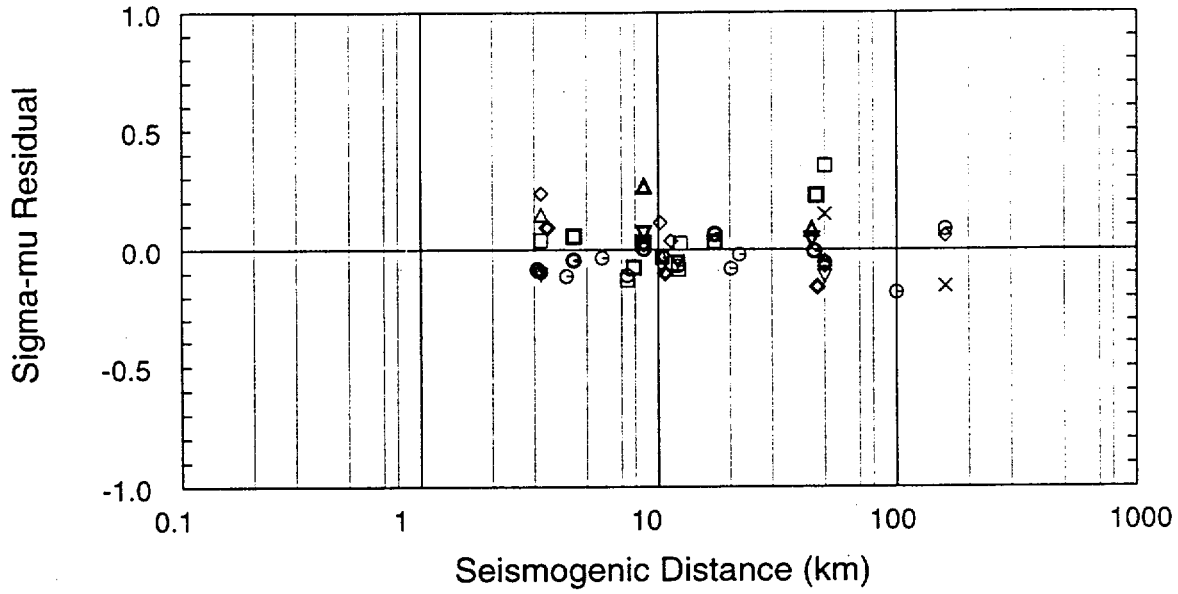


◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
⊙ M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Peak Velocity

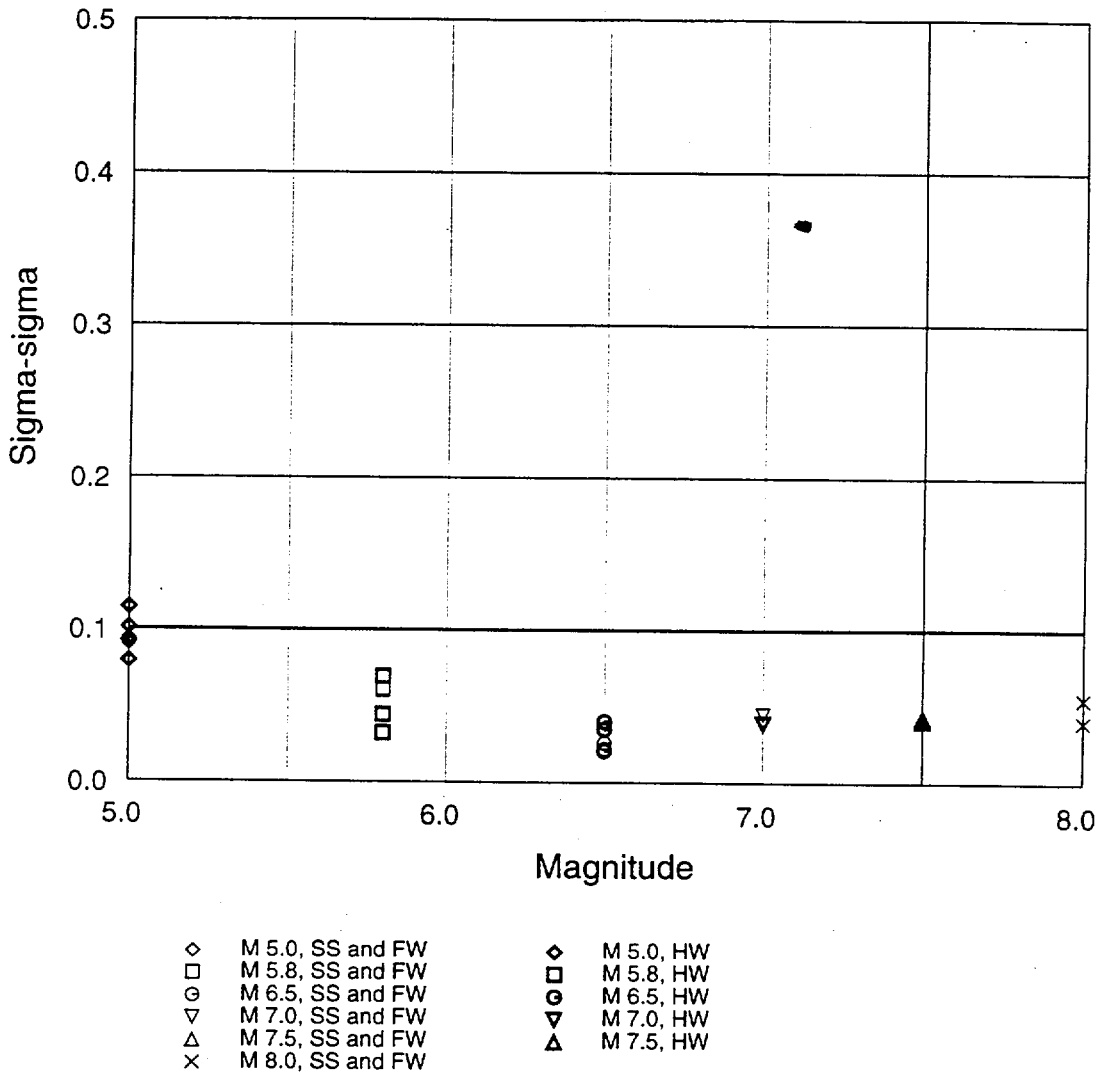




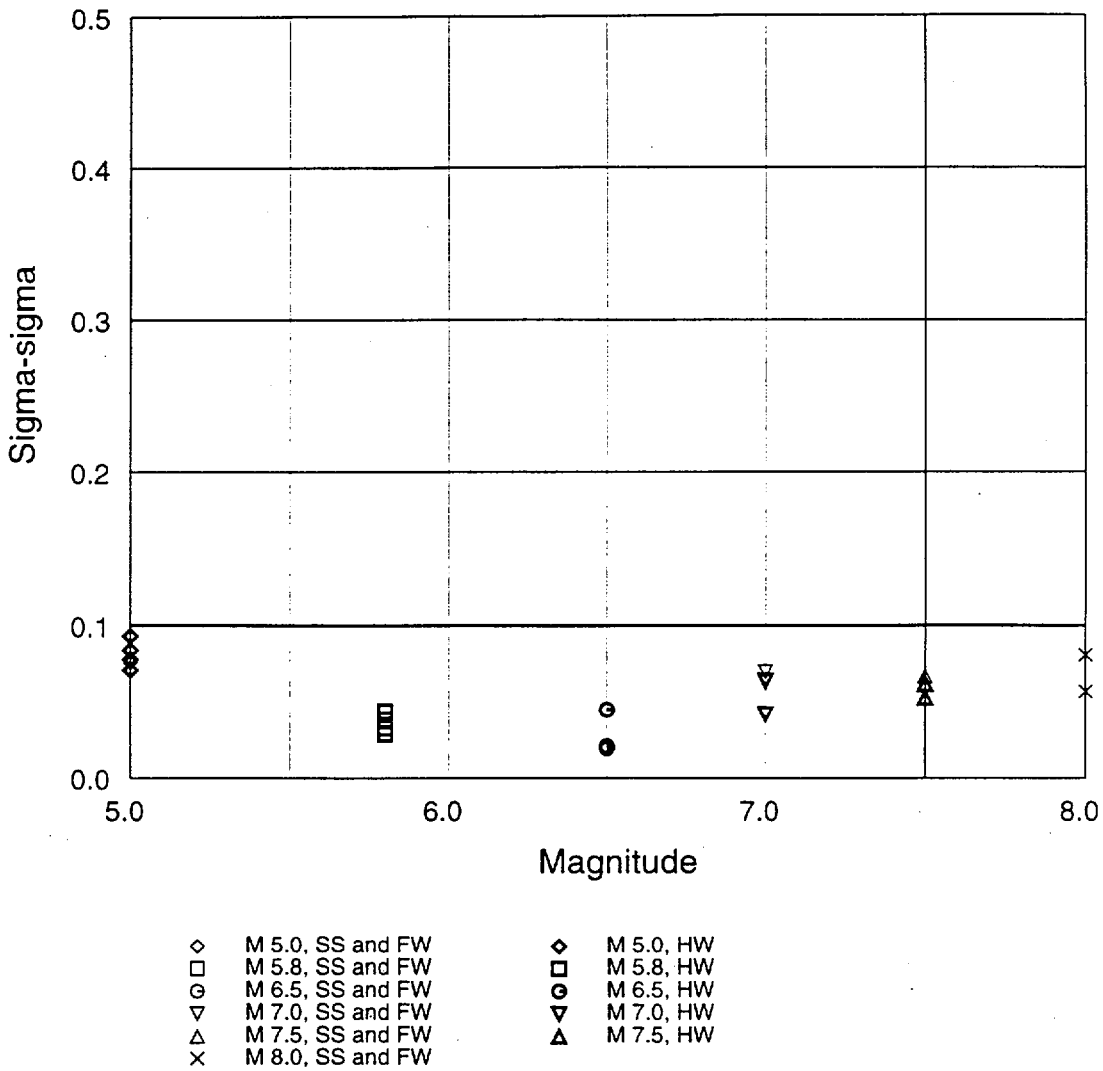
◇ M 5.0, SS and FW
□ M 5.8, SS and FW
⊖ M 6.5, SS and FW
▽ M 7.0, SS and FW
△ M 7.5, SS and FW
× M 8.0, SS and FW

◆ M 5.0, HW
■ M 5.8, HW
● M 6.5, HW
▼ M 7.0, HW
▲ M 7.5, HW

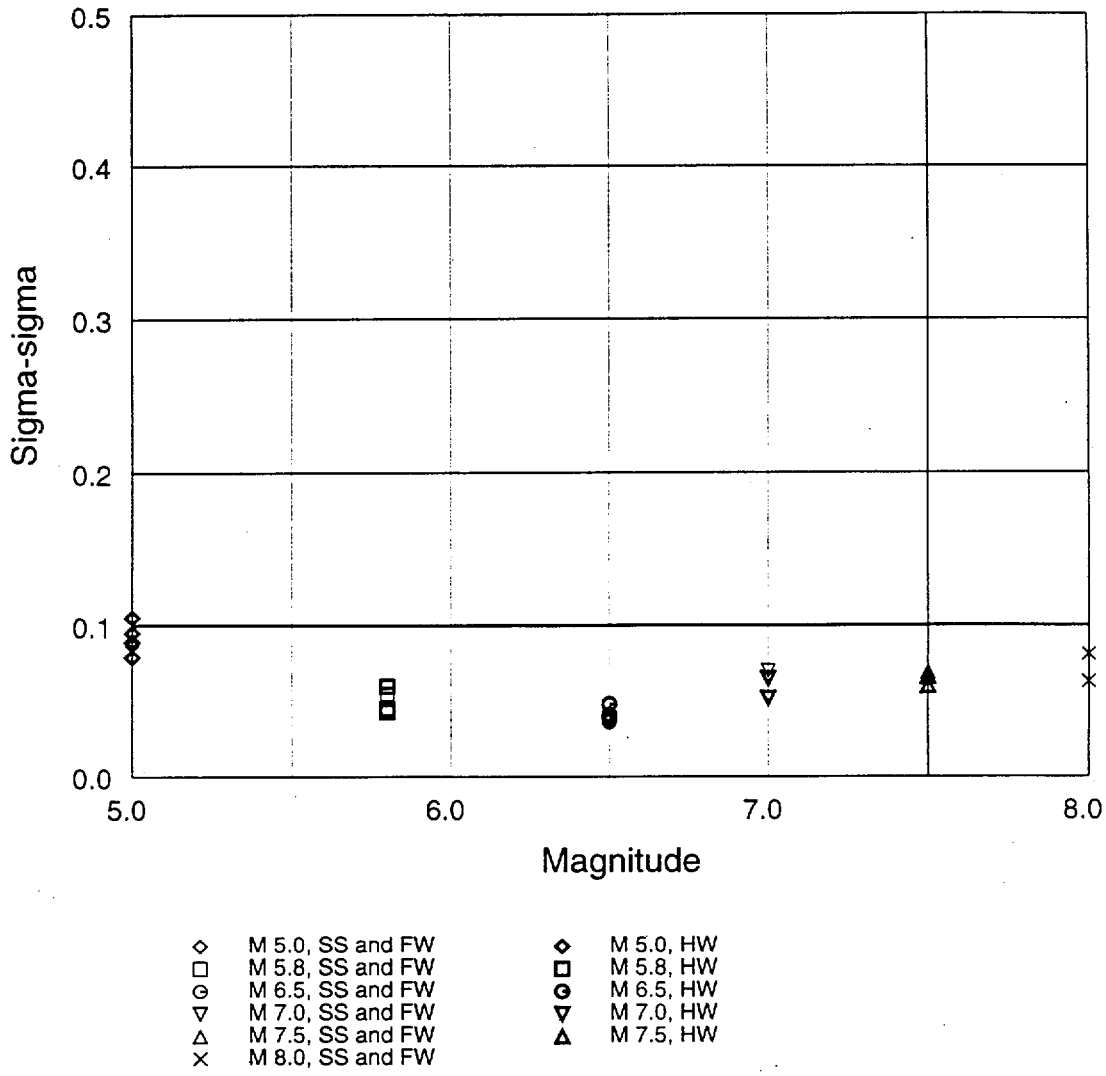
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 100.0 Hz



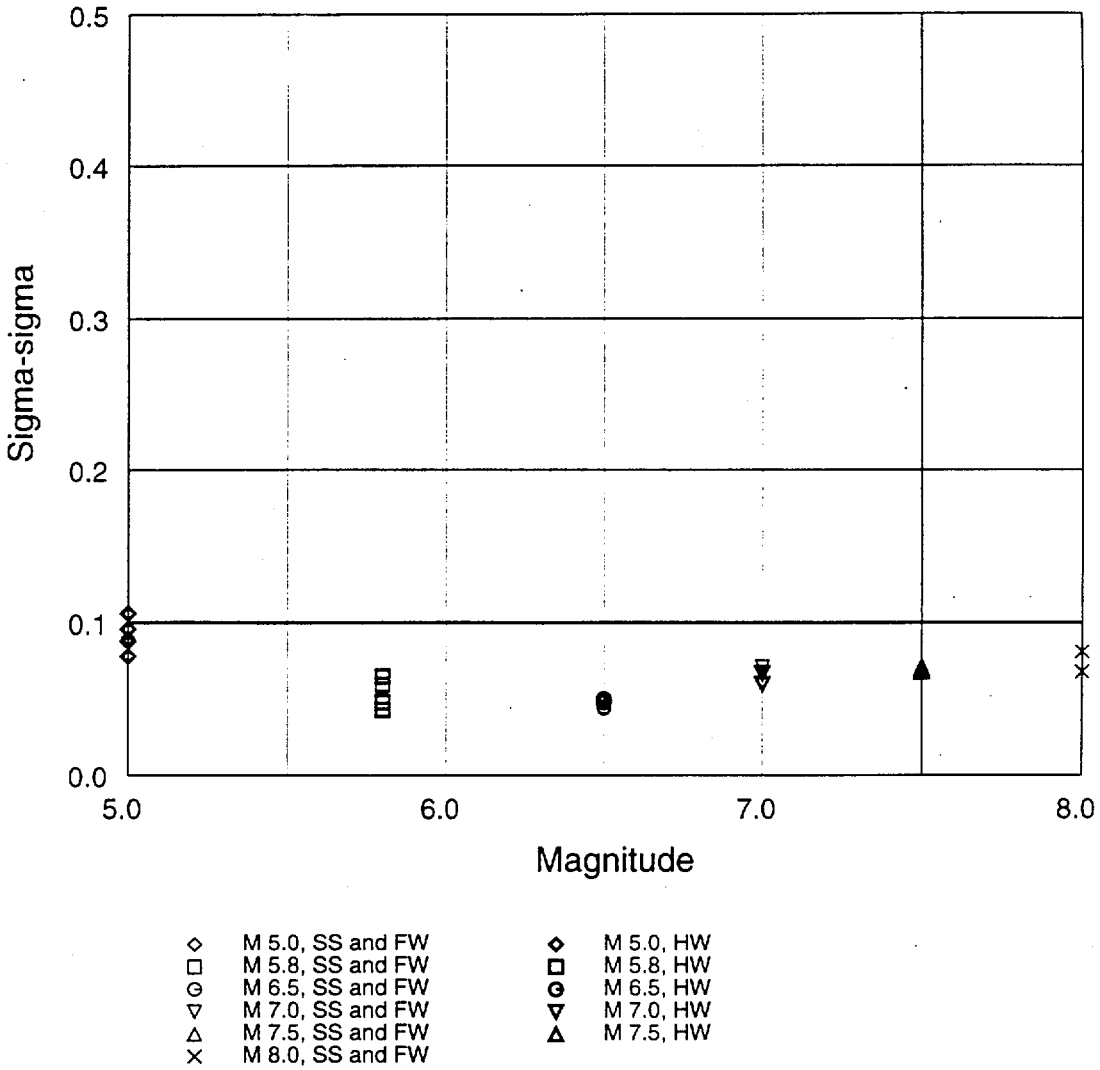
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 20.0 Hz



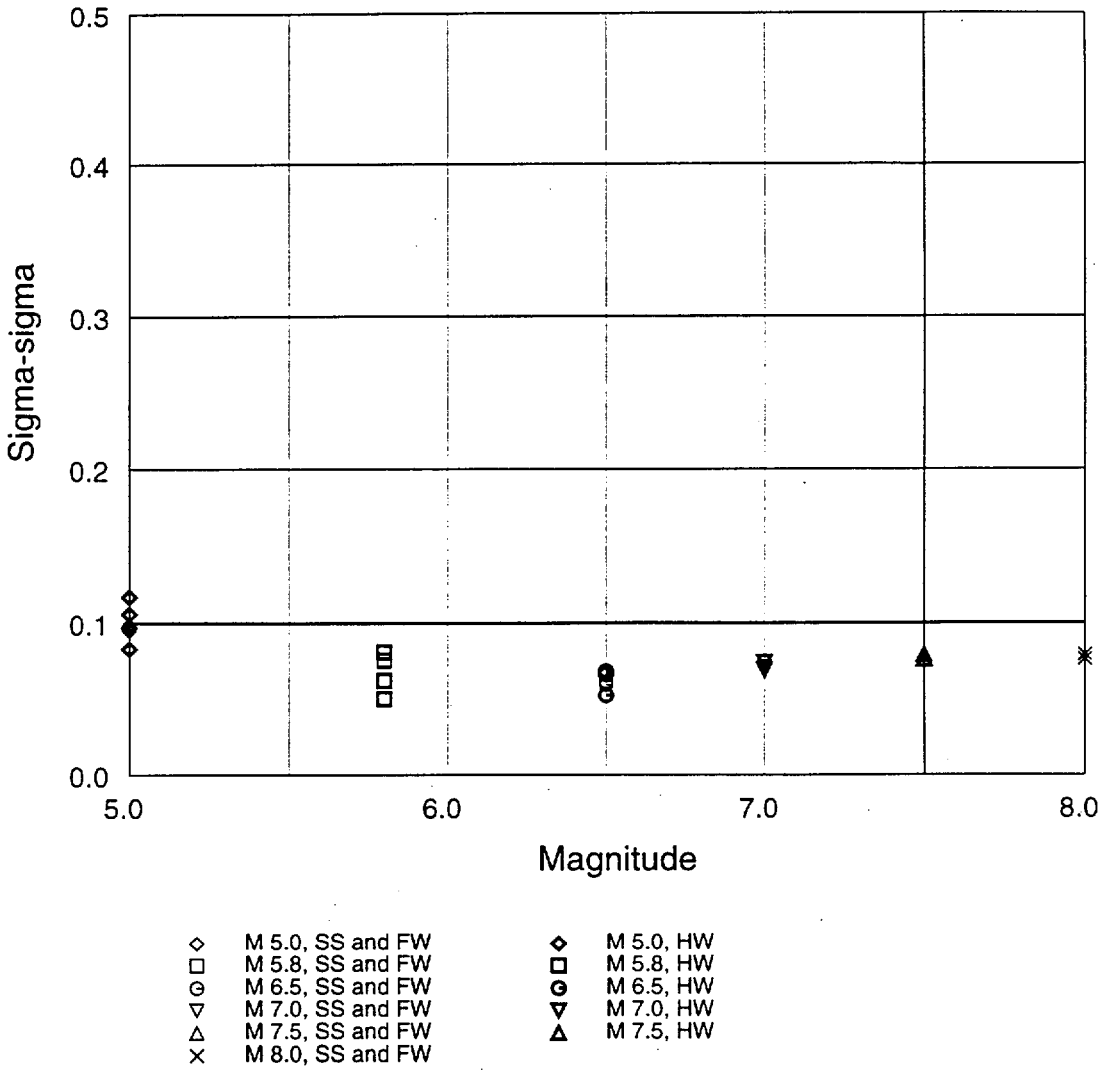
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 10.0 Hz



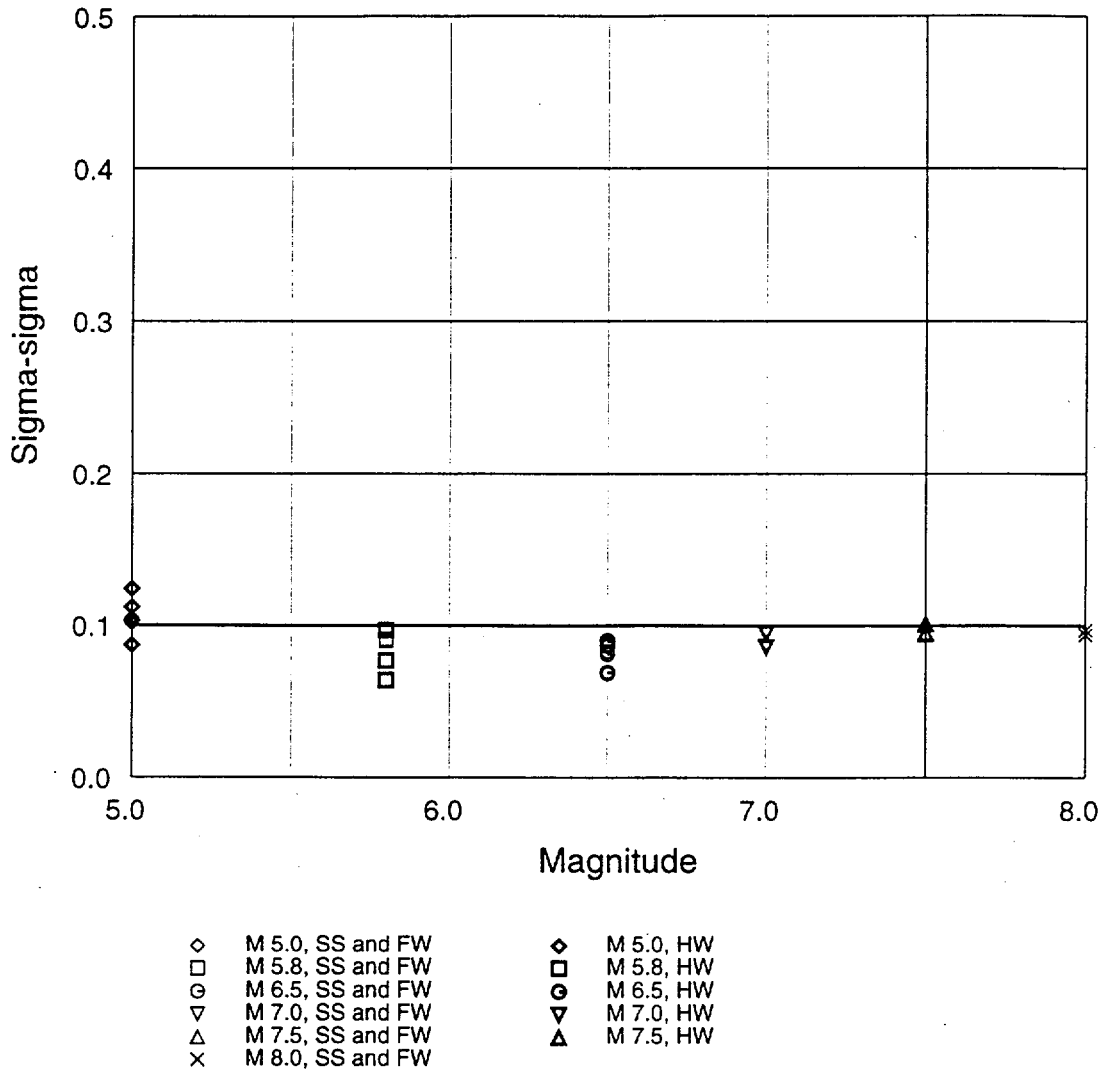
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 5.0 Hz



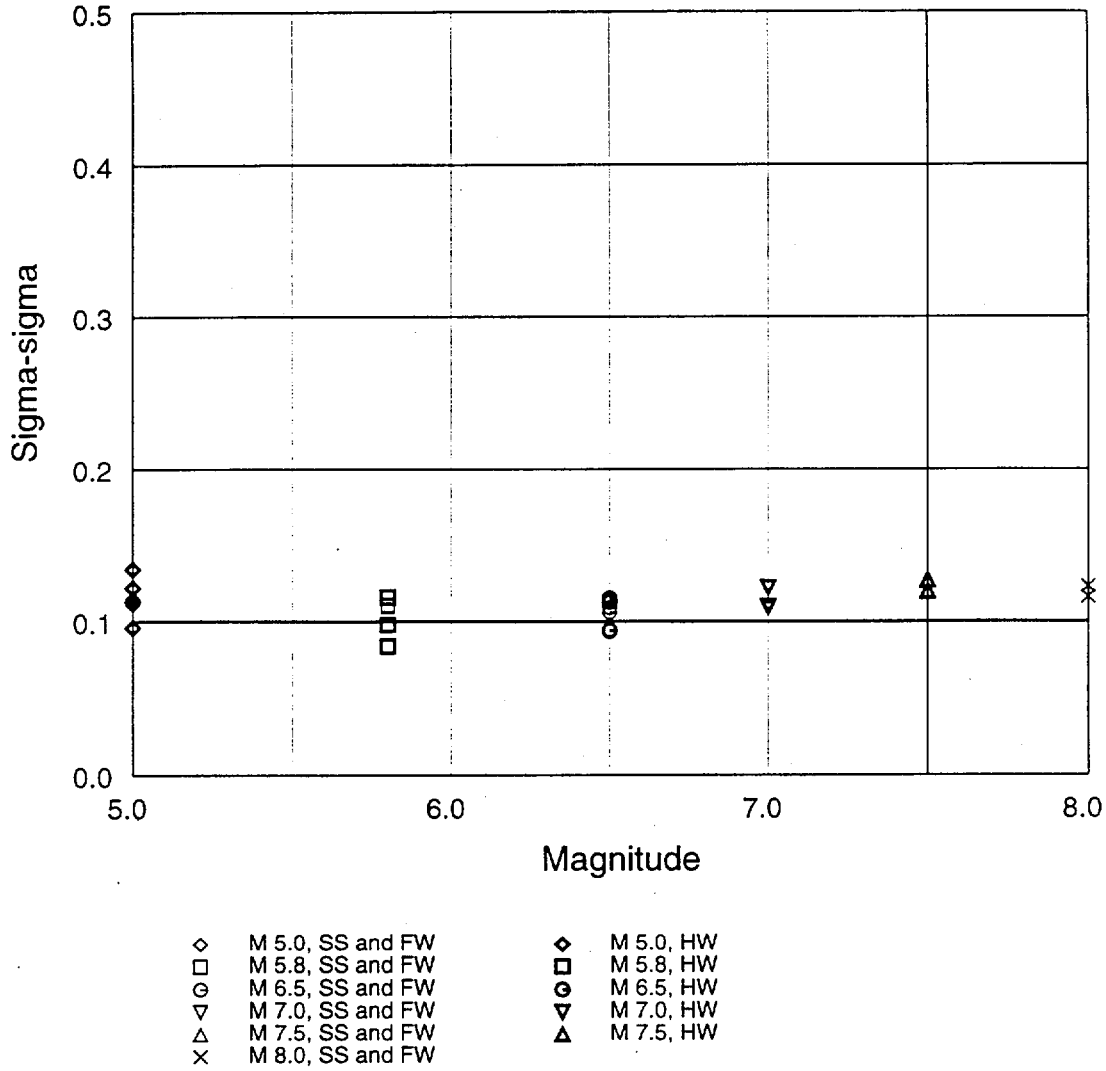
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 2.0 Hz



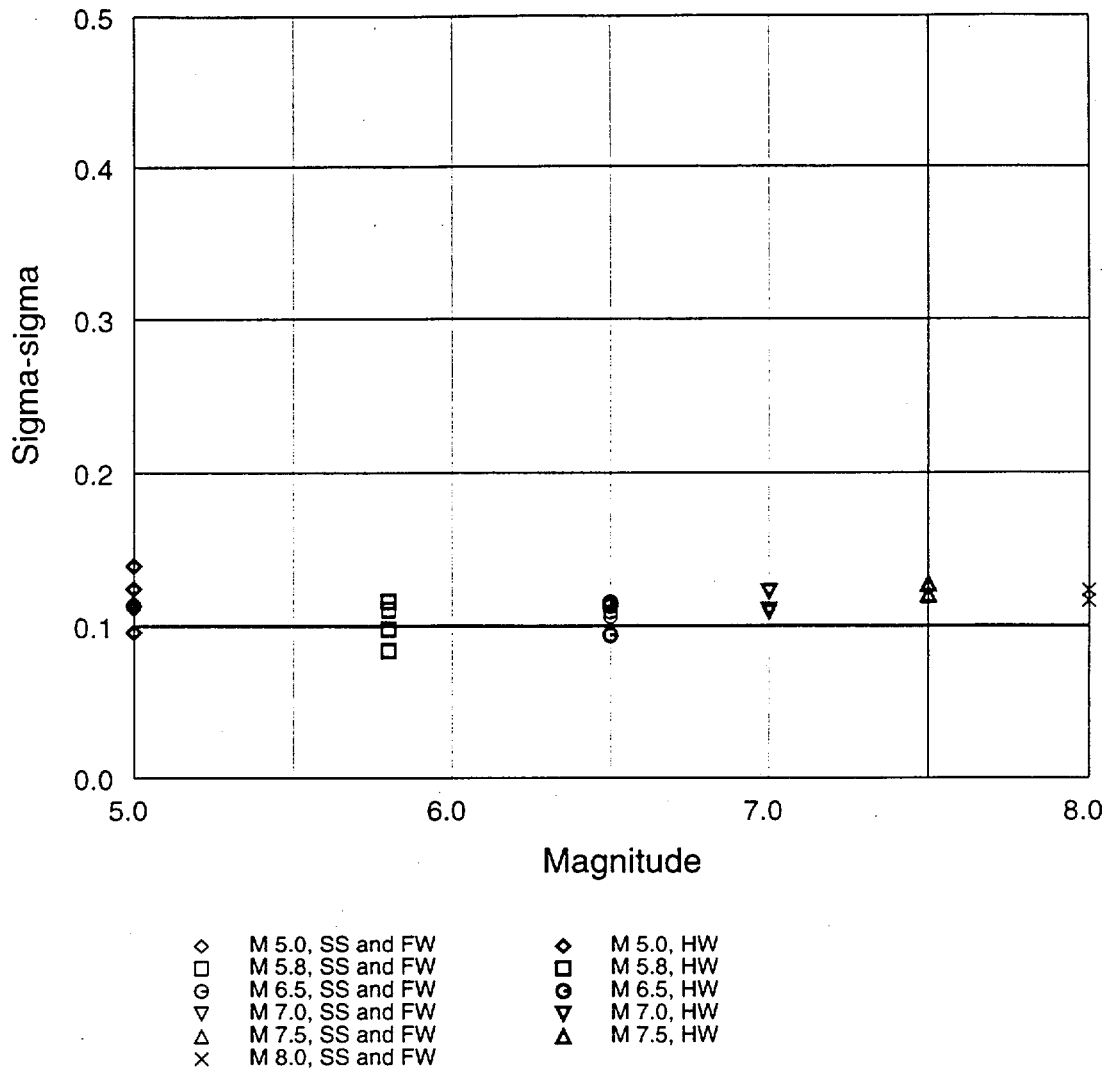
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 1.0 Hz



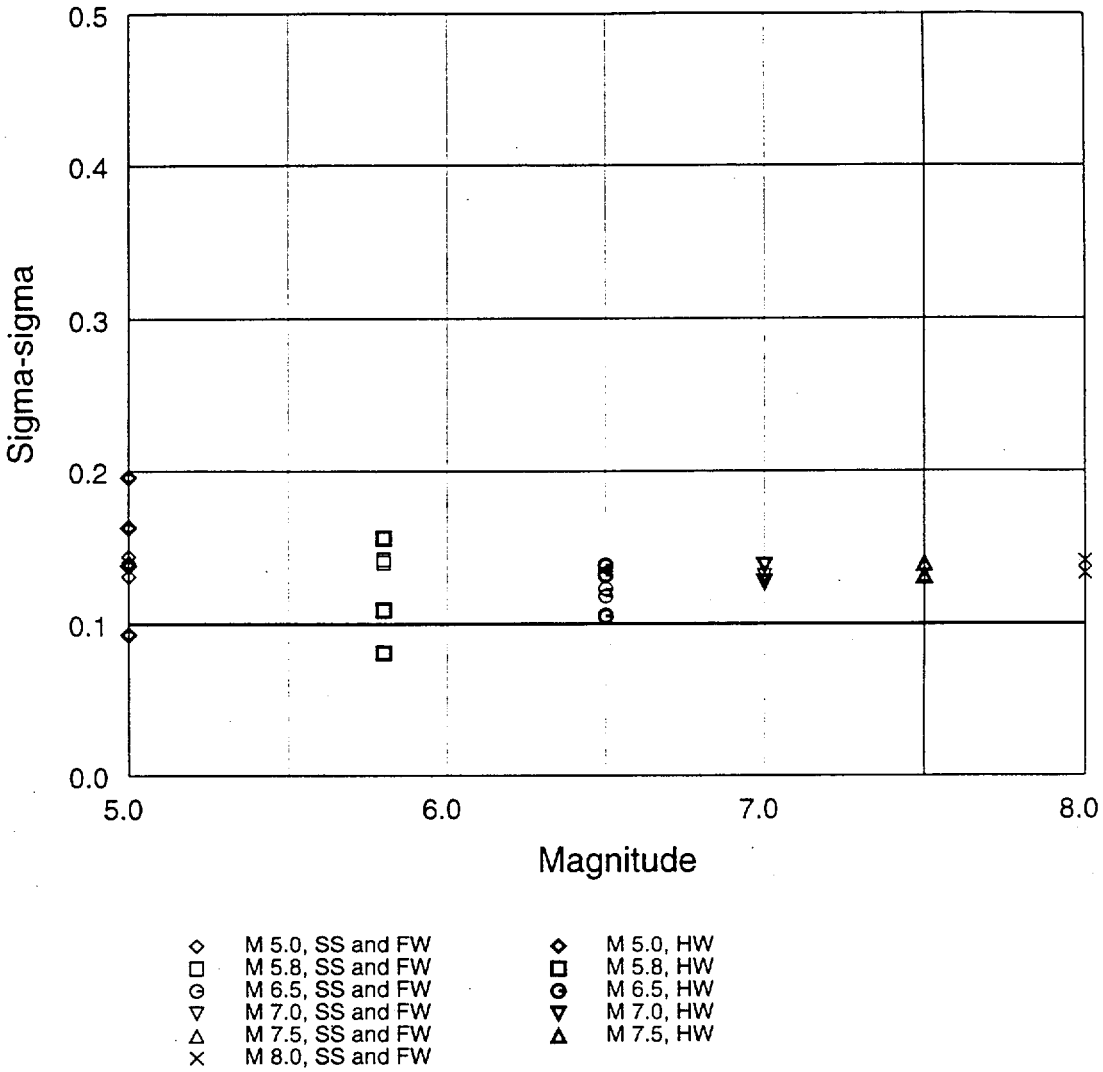
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.5 Hz



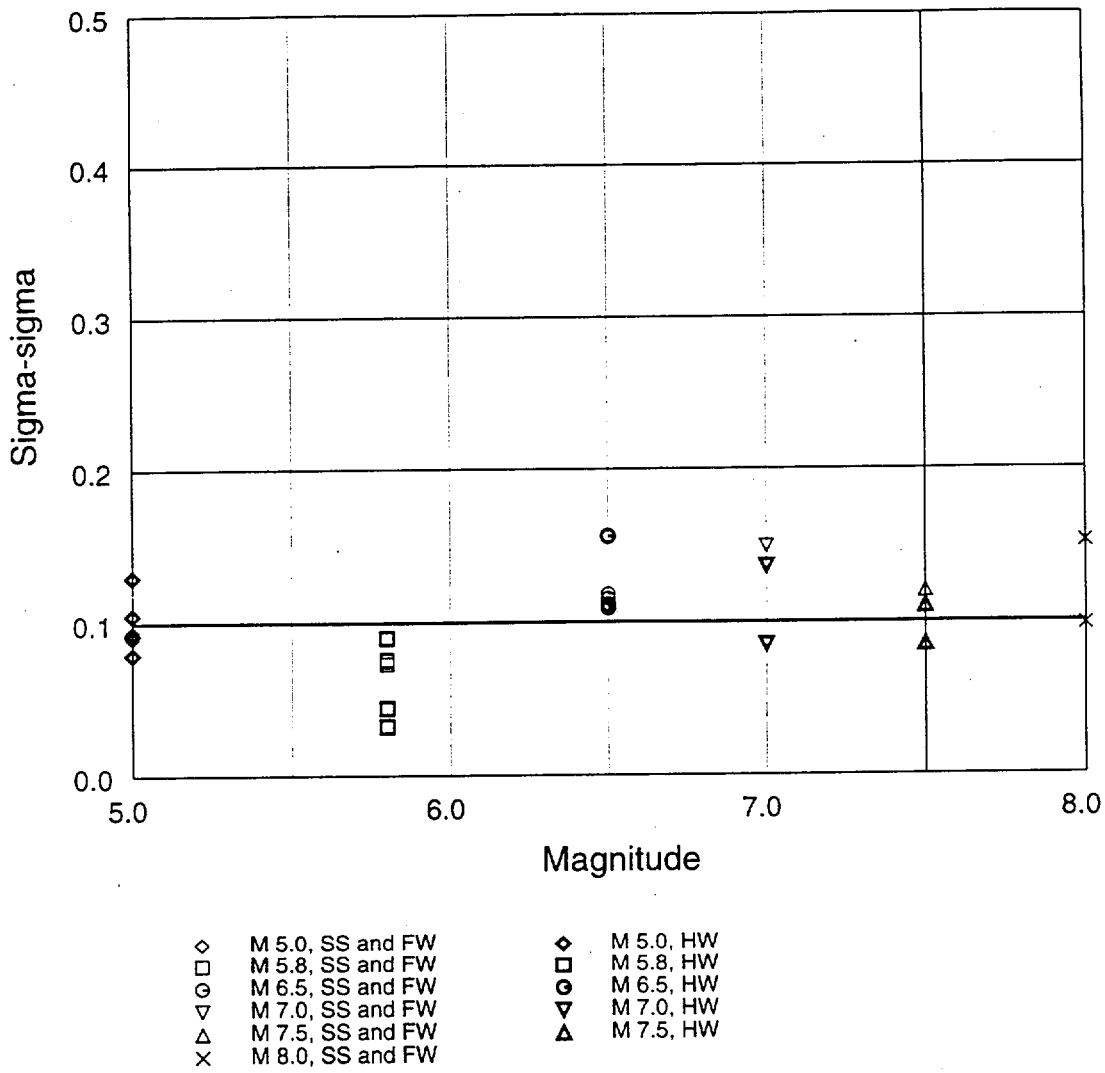
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Frequency = 0.3 Hz



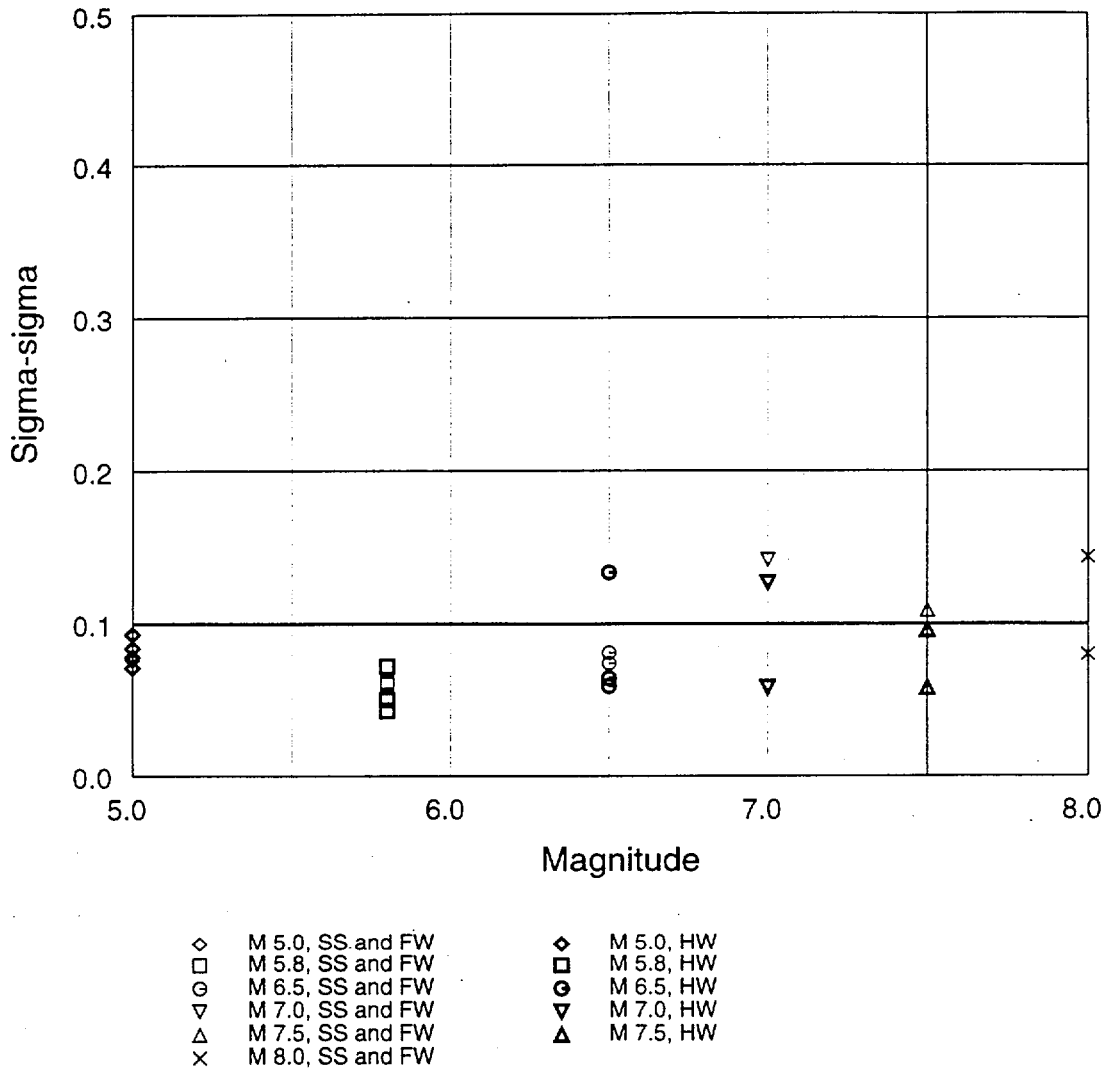
Campbell Rev3, (Pt Est Rev2), 7/6/97
Horizontal Comp
Peak Velocity



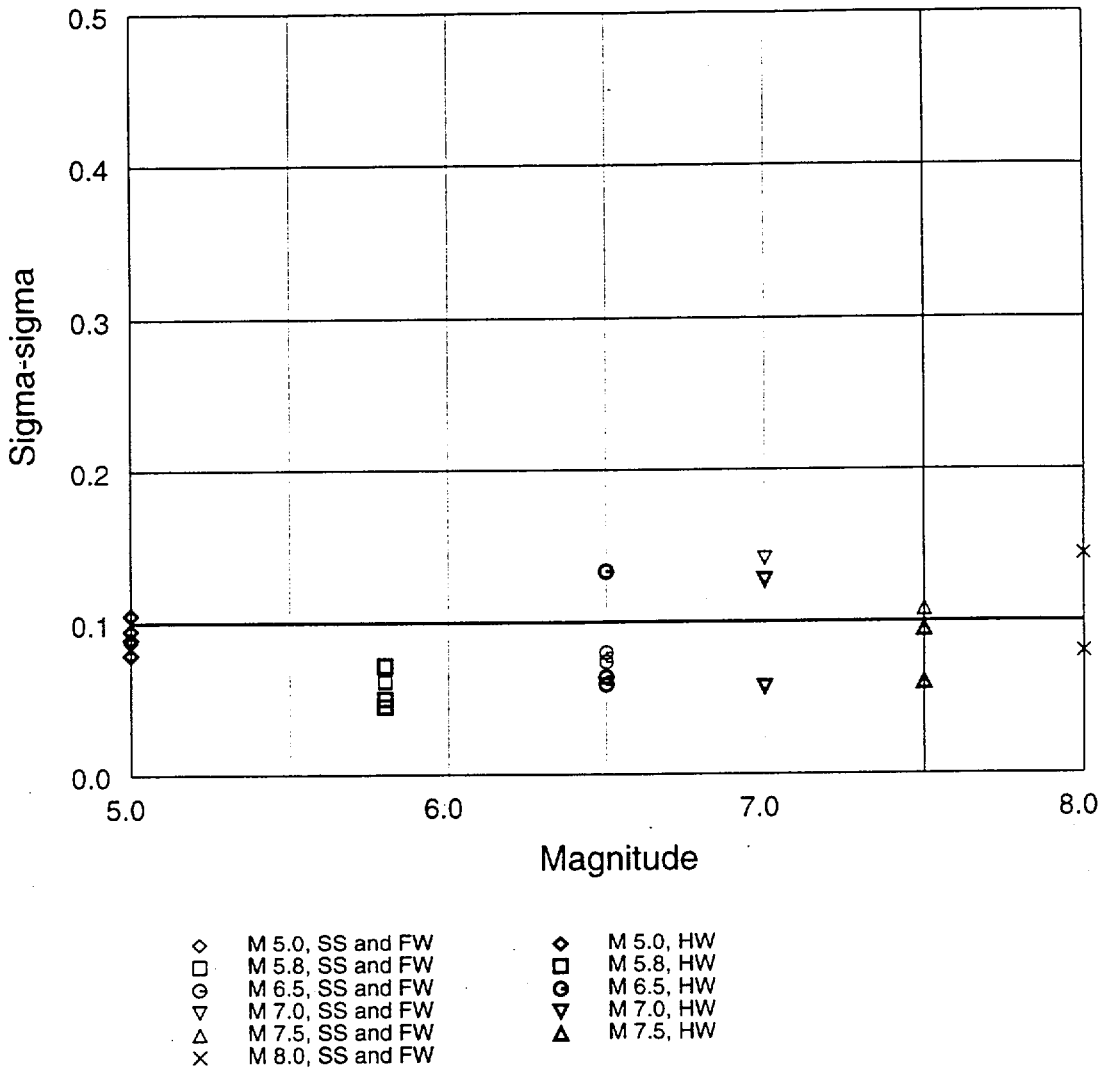
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 100.0 Hz



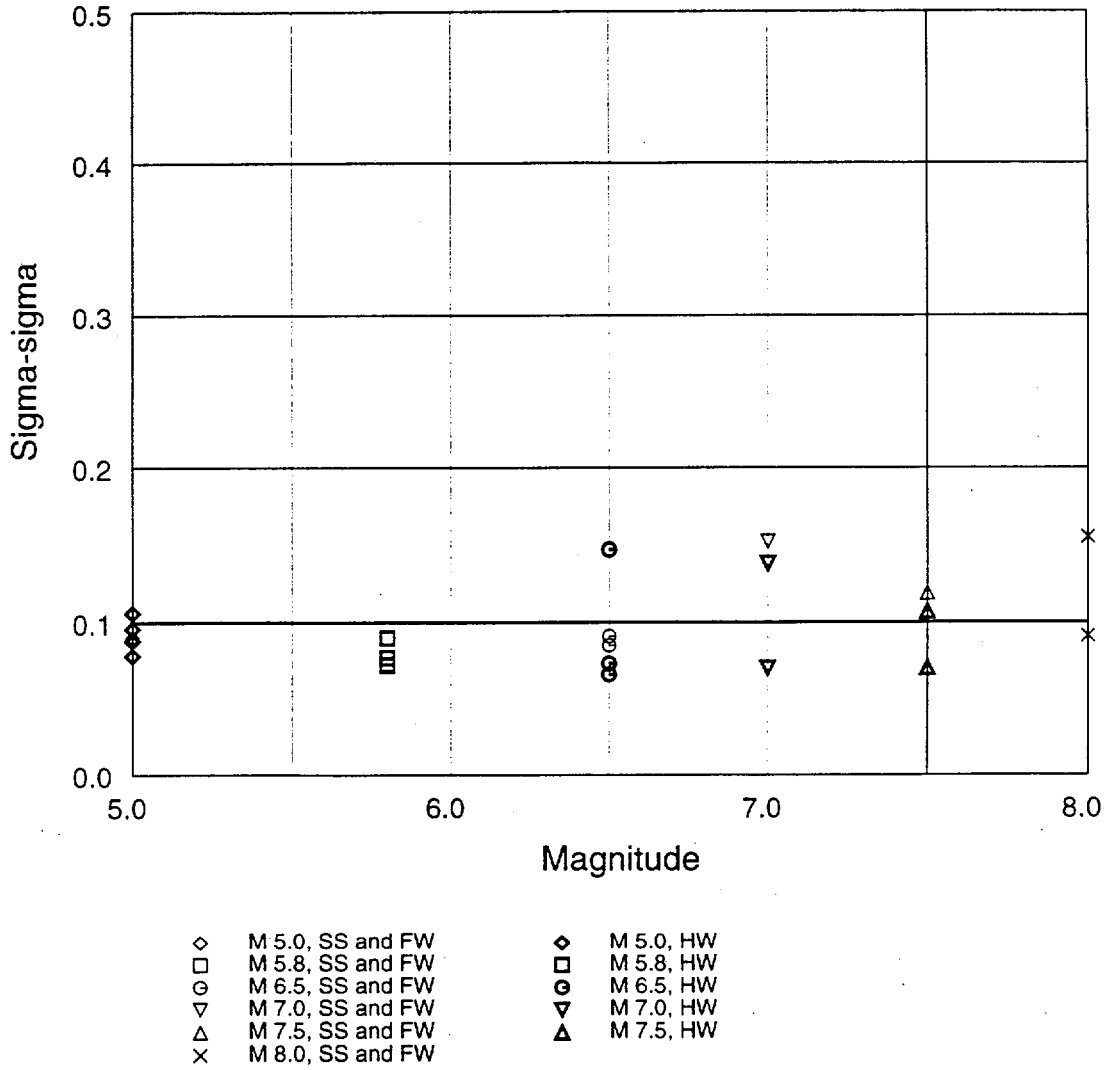
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 20.0 Hz



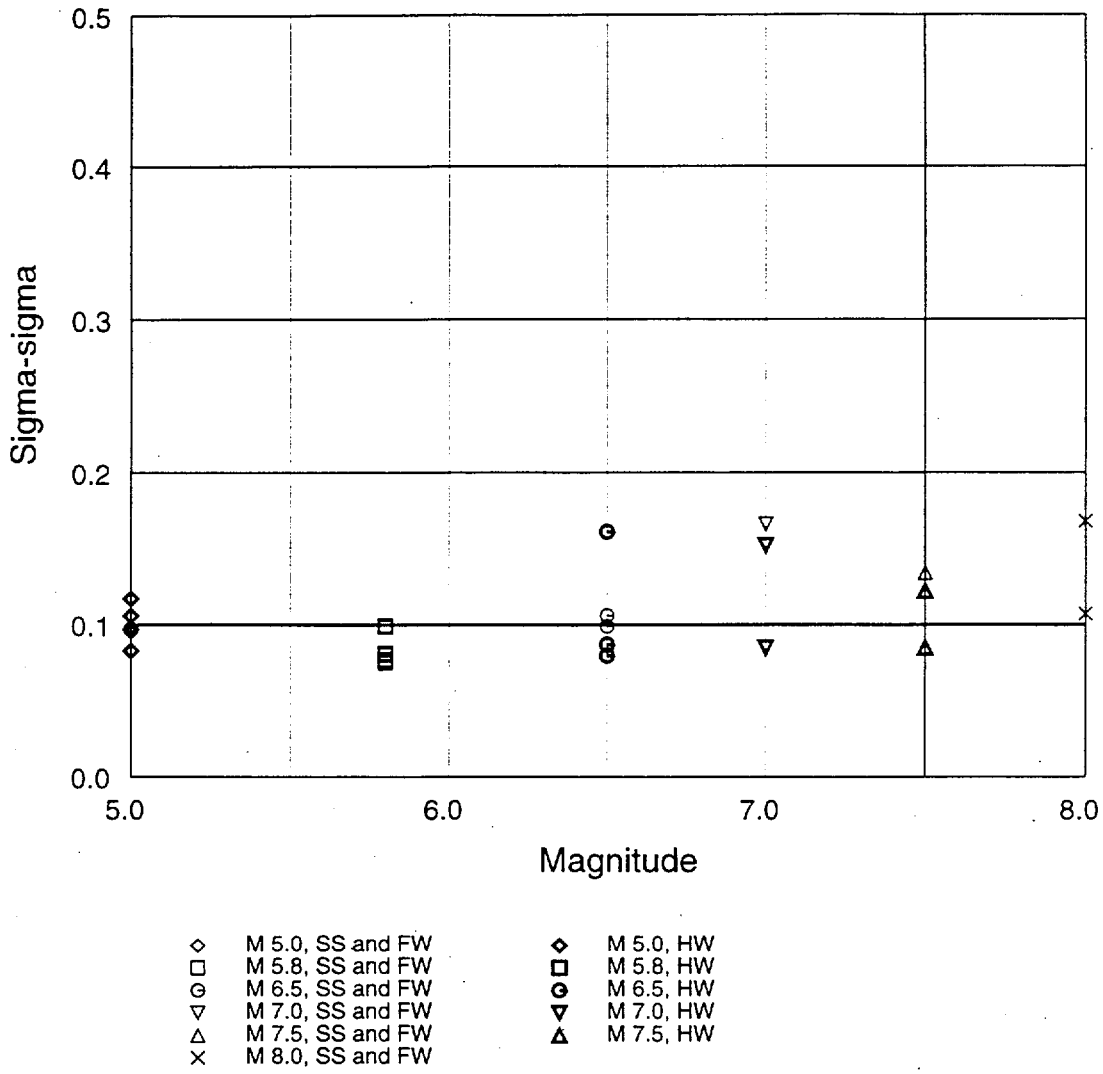
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 10.0 Hz



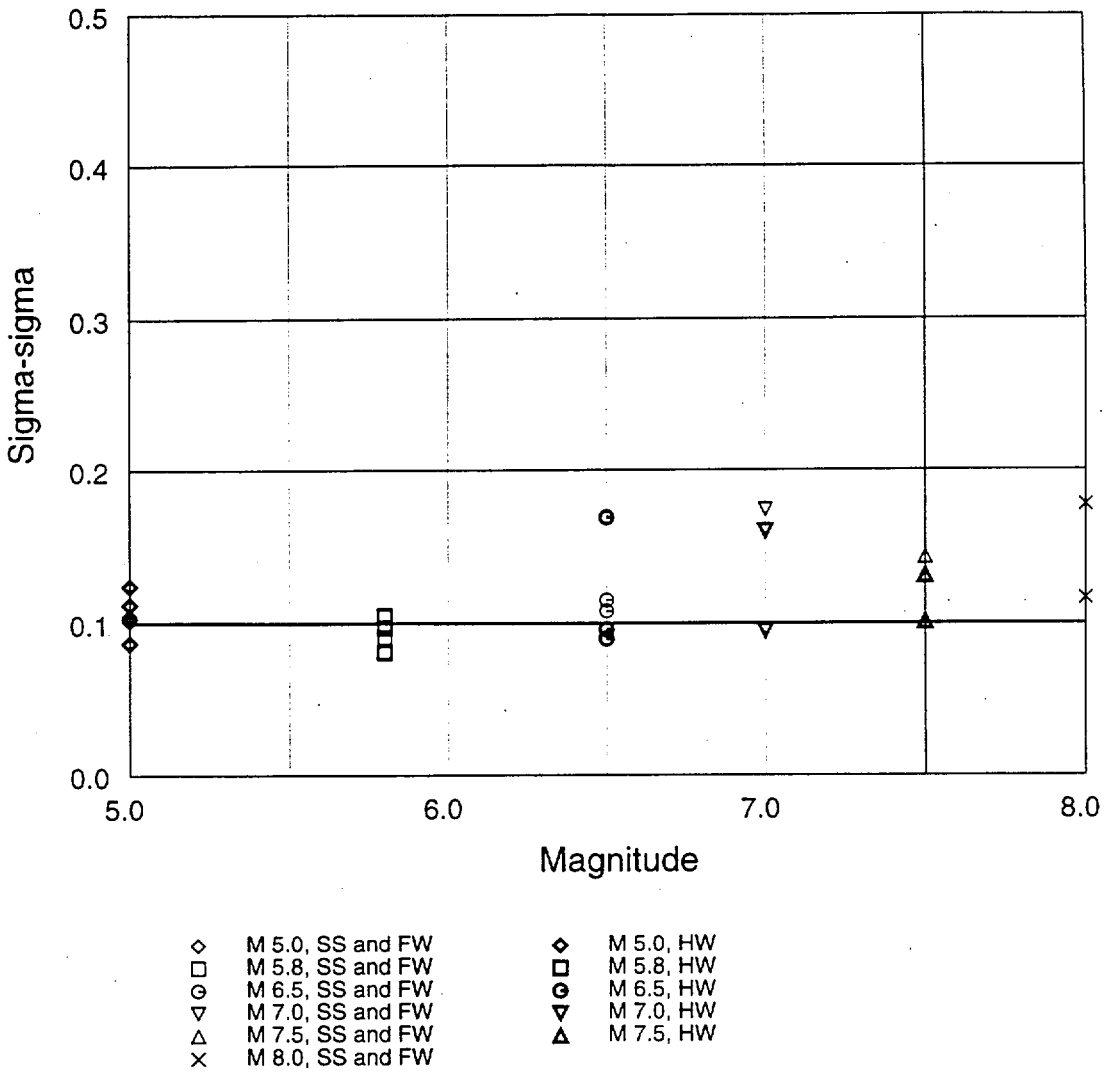
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 5.0 Hz



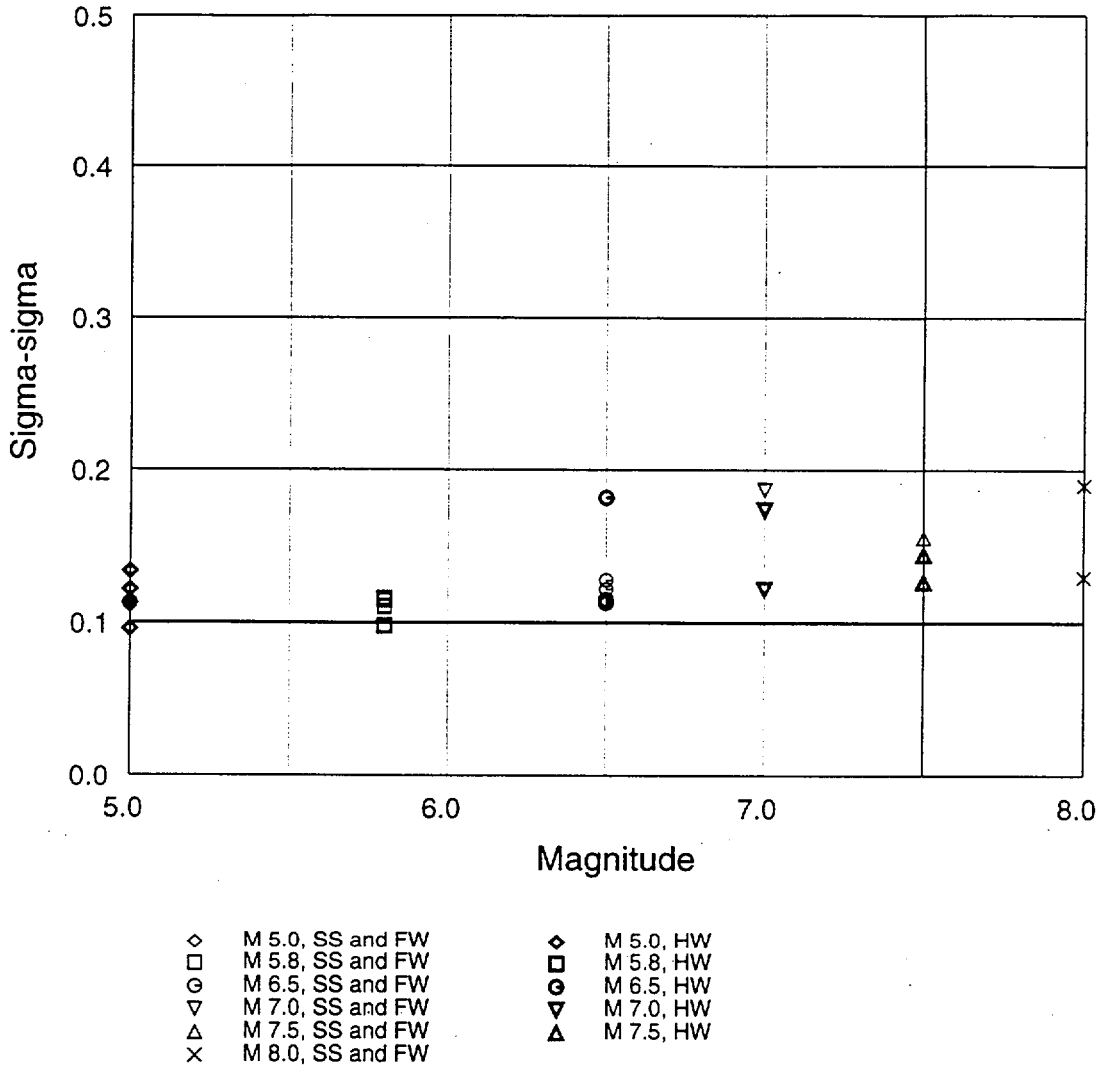
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 2.0 Hz



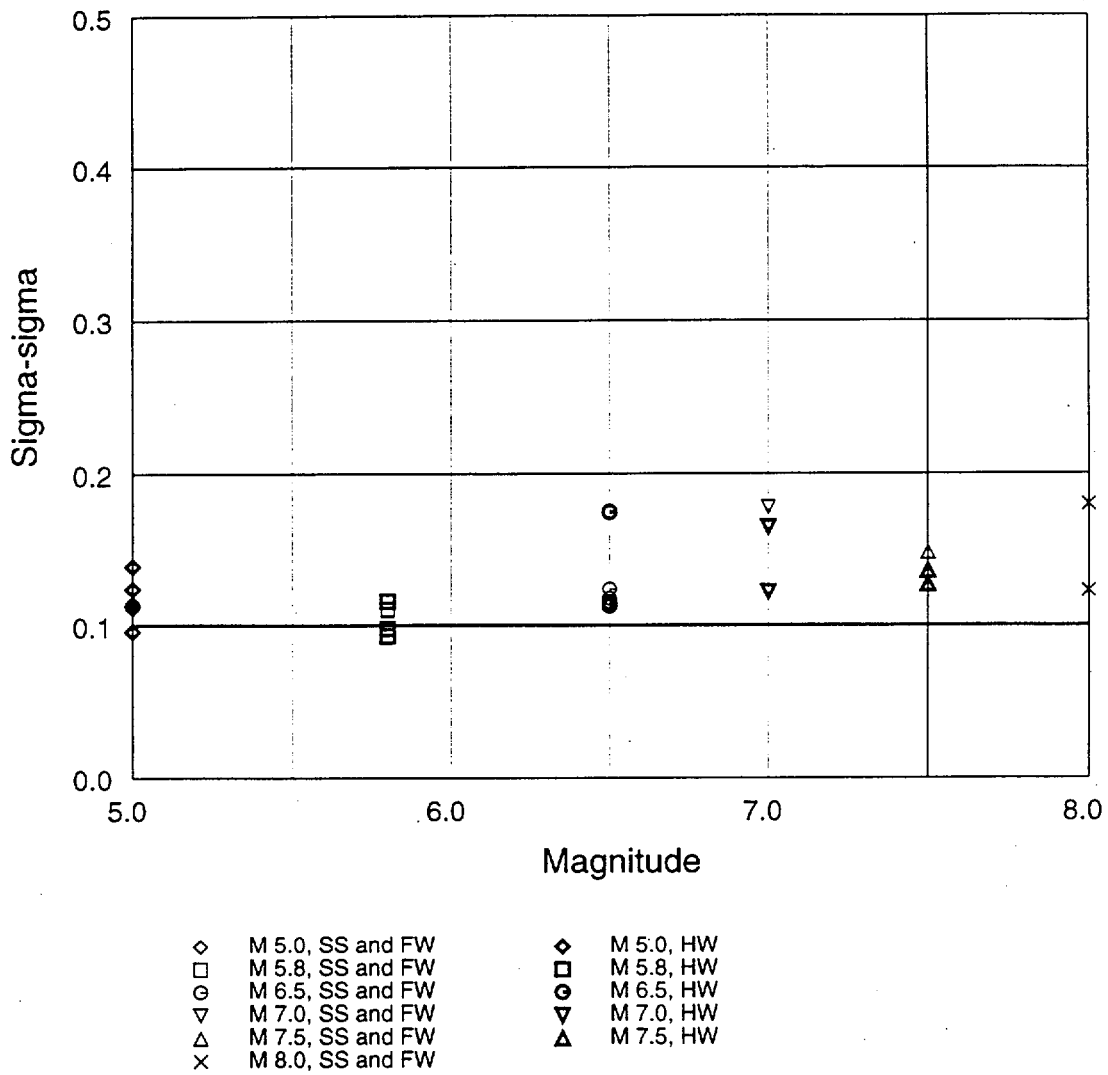
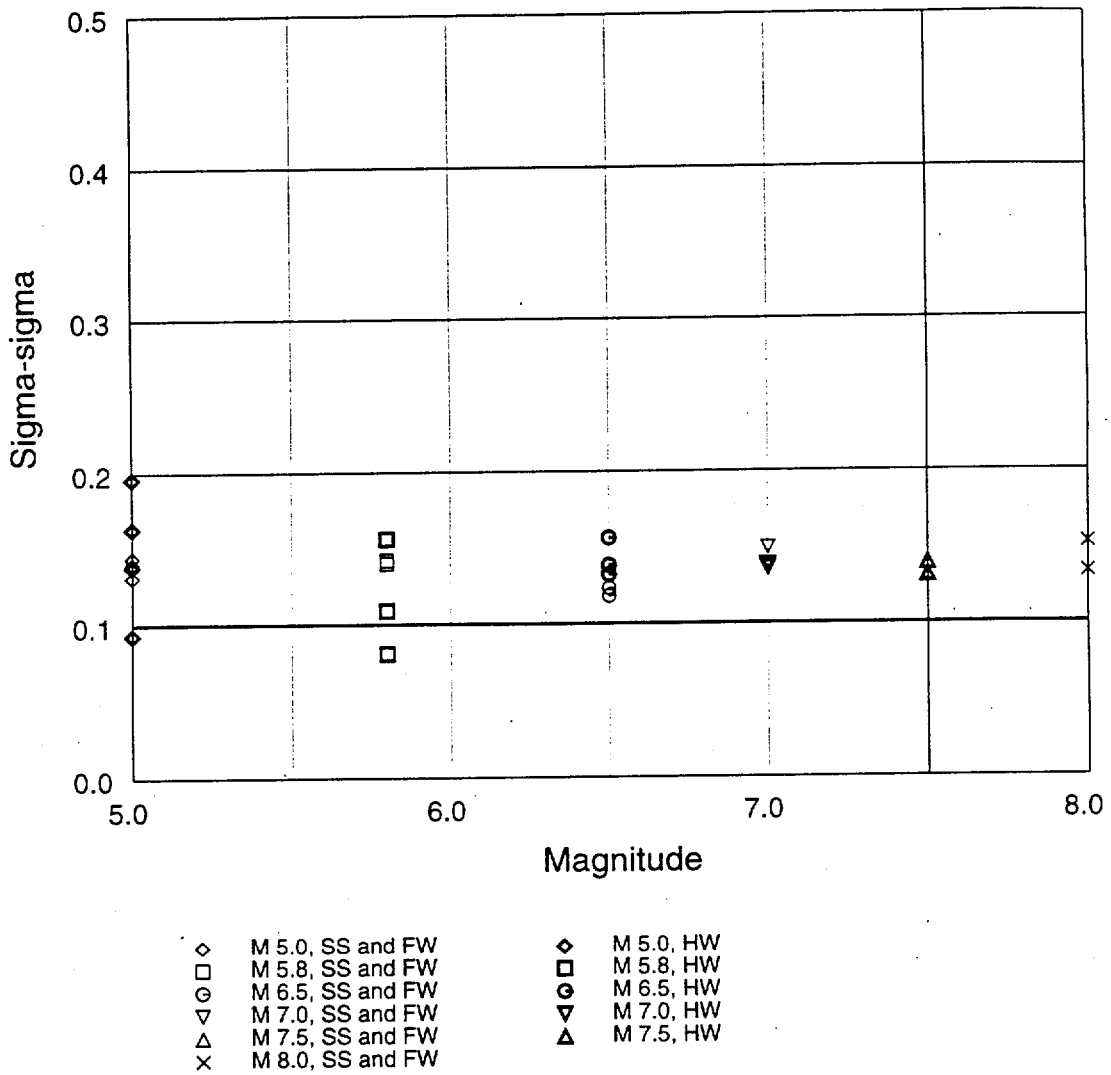
Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 1.0 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.5 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Frequency = 0.3 Hz



Campbell Rev3, (Pt Est Rev2), 7/6/97
Vertical Comp
Peak Velocity