

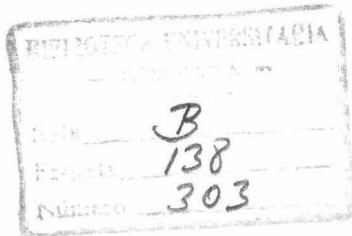
~~TP. 4/10~~

T 6/132-2



TOMO II

R.52.299



APENDICES



APENDICE I

Cálculo de la integral
$$\int_{-\infty}^{\infty} (a_0 + a_1 t + a_2 t^2) e^{-i\omega t} dt$$

Antes de dar el valor de la anterior integral, conviene recordar dos conceptos matemáticos de suma importancia:

1º Si

$$\mathcal{F}[f(t)] = F(\omega)$$

$$\Rightarrow \mathcal{F}[f'(t)] = i\omega F(\omega)$$

y

$$\mathcal{F}\left[\int_{-\infty}^t f(t) dt\right] = \frac{1}{i\omega} F(\omega) + \pi F(0) \delta(\omega)$$

donde $\mathcal{F}$ se refiere a la transformada de Fourier.

2º La función $\delta(\omega)$ conocida como función impulso unitario se define como:

$$\delta(\omega) = \begin{cases} 0 & \text{si } \omega \neq 0 \\ \infty & \text{si } \omega = 0 \end{cases}$$

y la

$$\int_{-\infty}^{\infty} \delta(t) dt = \int_{-\epsilon}^{\epsilon} \delta(t) dt = 1$$

La función $\delta(t)$ y sus derivadas son funciones generalizadas, que se pueden tratar como funciones ordinarias en las que nunca se hablará de su valor, pero si de los valores de las integrales en las que aparezcan. Así, $\delta(t)$ se puede definir como una función simbólica por la relación:

$$\int_{-\infty}^{\infty} \delta(t) \phi(t) dt = \phi(0)$$

donde $\phi(t)$ (función de prueba) es una función continua, que se anula fuera de algún intervalo finito. Finalmente las

de esta función se definirán en la forma:

$$\int_{-\infty}^{\infty} \delta'(t) \phi(t) dt = \int_{-\infty}^{\infty} \delta(t) \phi'(t) dt = -\phi'(0)$$

$$\int_{-\infty}^{\infty} \delta^{(n)}(t) \phi(t) dt = (-1)^n \phi^{(n)}(0)$$

En consecuencia el valor de la integral mencionada en primer lugar será:

$$\int_{-\infty}^{\infty} (a_0 + a_1 t + a_2 t^2) dt =$$

$$a_0 2\pi \delta(\omega) + a_1 2\pi i \delta'(\omega) + a_2 2\pi i^2 \delta^{(2)}(\omega) =$$

$$2\pi [a_0 \delta(\omega) - a_2 \delta^{(2)}(\omega)] + 2\pi a_1 \delta'(\omega) i$$

APENDICE II

Cálculo de la integral $\int_{-\infty}^{\infty} A e^{-\alpha t} \operatorname{sen}(\omega_0 t) e^{-i\omega t} dt$

$$\int_{-\infty}^{\infty} A e^{-\alpha t} \operatorname{sen}(\omega_0 t) e^{-i\omega t} dt = F(\omega) = \mathcal{F}[A e^{-\alpha t} \operatorname{sen}(\omega_0 t)]$$

como la función $y = A e^{-\alpha t} \operatorname{sen}(\omega_0 t)$ está definida en el intervalo $(0, T)$ lo anterior equivale a calcular:

$$\mathcal{F}[A e^{-\alpha t} u(t) \operatorname{sen}(\omega_0 t)]$$

donde $u(t)$ es la función unitaria de Heaviside, definida por:

$$u(t) = \begin{cases} 1 & \text{para } t > 0 \\ 0 & \text{" } t < 0 \end{cases}$$

Entonces, teniendo en cuenta que si la transformada de Fourier ($\mathcal{F}$) de la función $f(t)$ es $F(\omega)$ la de $f(t) \operatorname{sen}(\omega_0 t)$ es:

$$\frac{1}{2i} [F(\omega - \omega_0) - F(\omega + \omega_0)]$$

y la de $e^{-\alpha t} u(t)$

$$\frac{1}{\alpha + \omega i}$$

resultará que:

$$\mathcal{F}[A e^{-\alpha t} u(t) \operatorname{sen}(\omega_0 t)] = \frac{A}{2i} \left[\frac{1}{\alpha + (\omega - \omega_0)i} - \frac{1}{\alpha + (\omega + \omega_0)i} \right]$$

luego/...

luego

$$F(\omega) = \frac{A\omega_0}{[(\alpha^2 + \omega_0^2) - \omega^2] + 2\alpha\omega i} =$$
$$\left[\frac{\alpha^2 + \omega_0^2 - \omega^2 - 2\alpha\omega i}{(\alpha^2 + \omega_0^2 - \omega^2)^2 + 4\alpha^2\omega^2} \right] A\omega_0$$

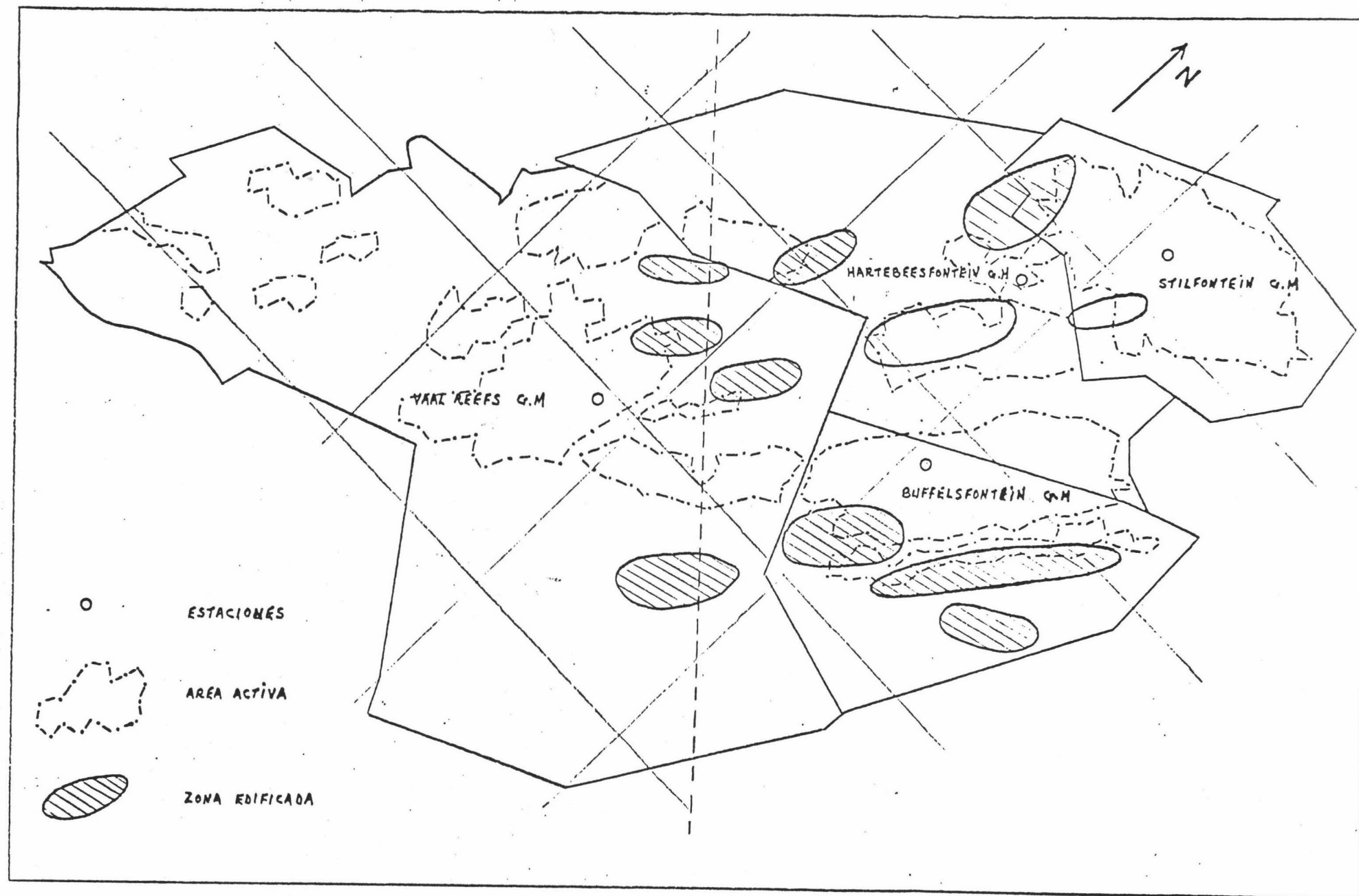
finalmente el módulo de esta función o espectro de amplitud vendrá dado por:

$$|F(\omega)| = \frac{|A\omega_0|}{[(\alpha^2 + \omega_0^2 - \omega^2)^2 + 4\alpha^2\omega^2]^{1/2}}$$

Nota: En nuestros cálculos en el apartado N°5 por sencillez de escritura consideramos $A=1$.

FIGURAS

FIGURA 2.1



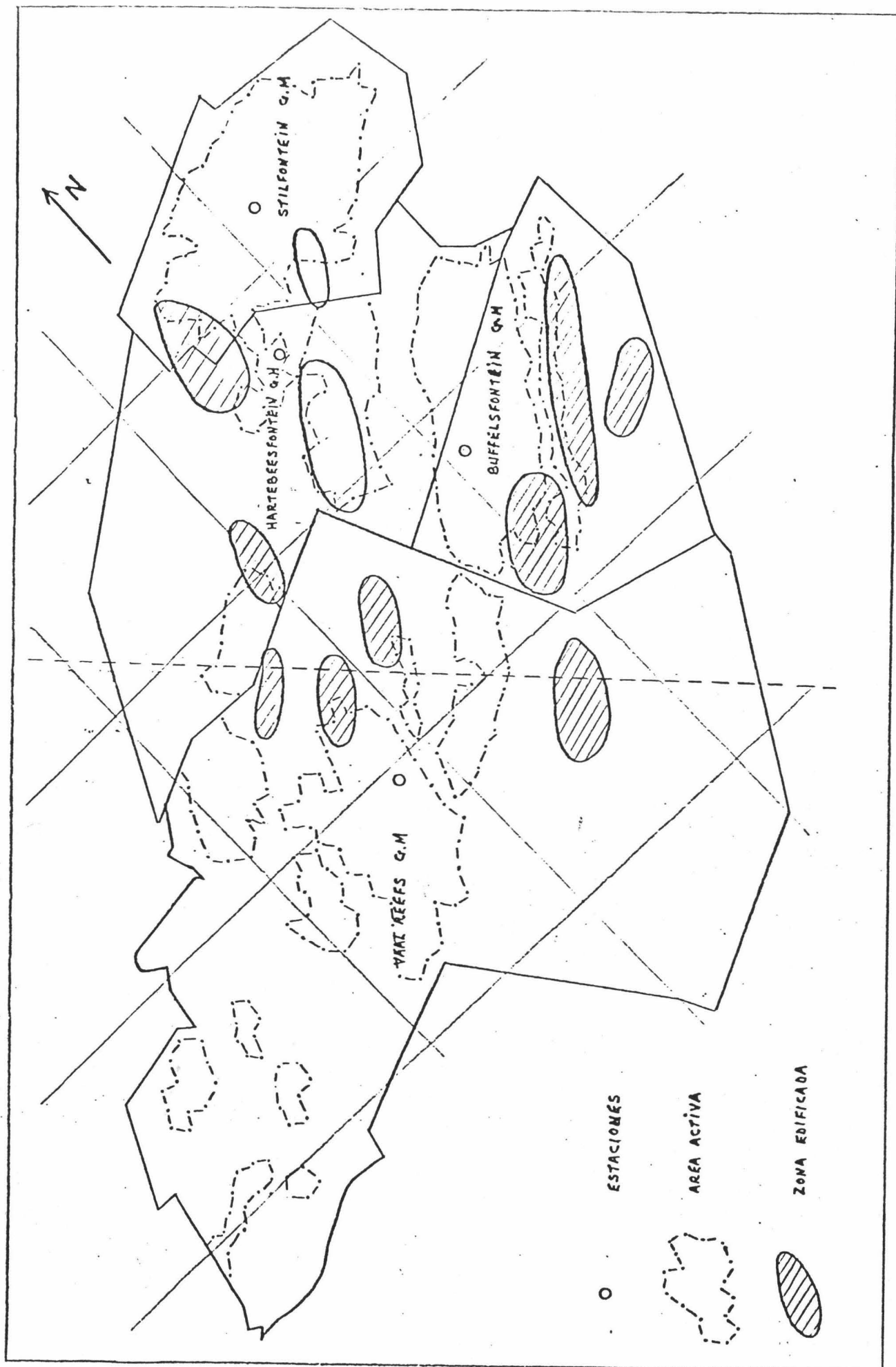
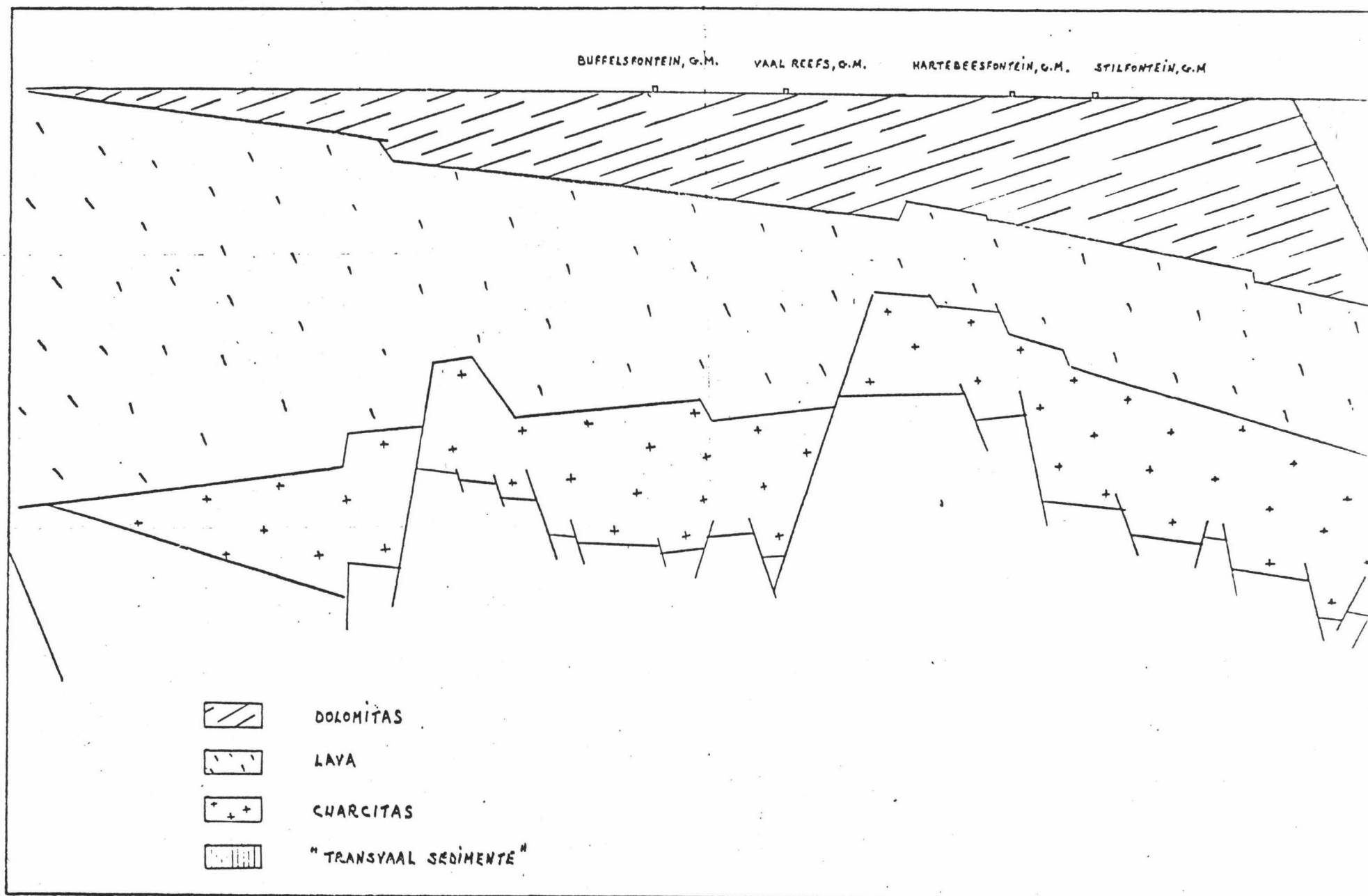


FIGURA 2.1

FIGURA 2.2



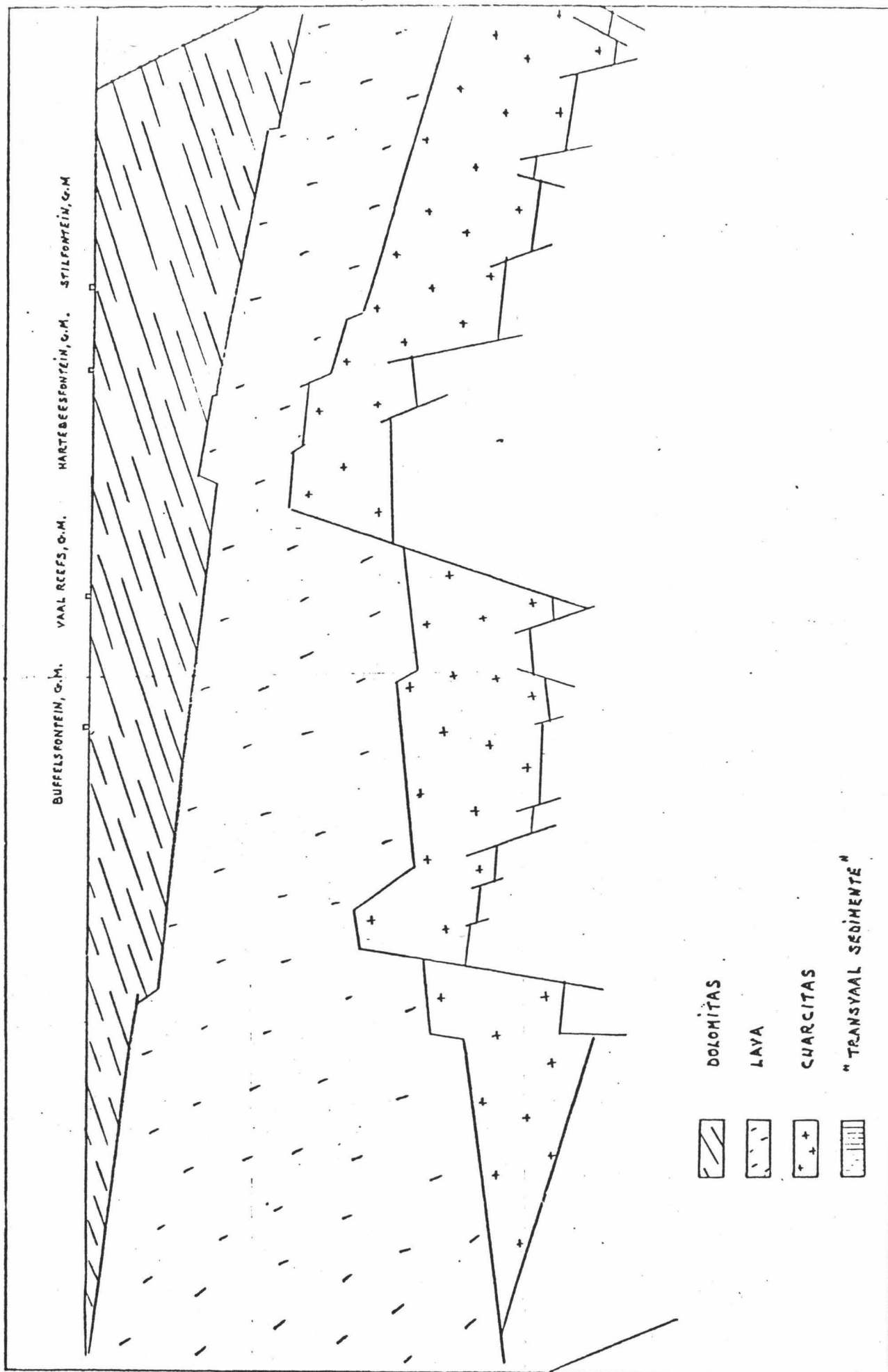


FIGURA 2.2

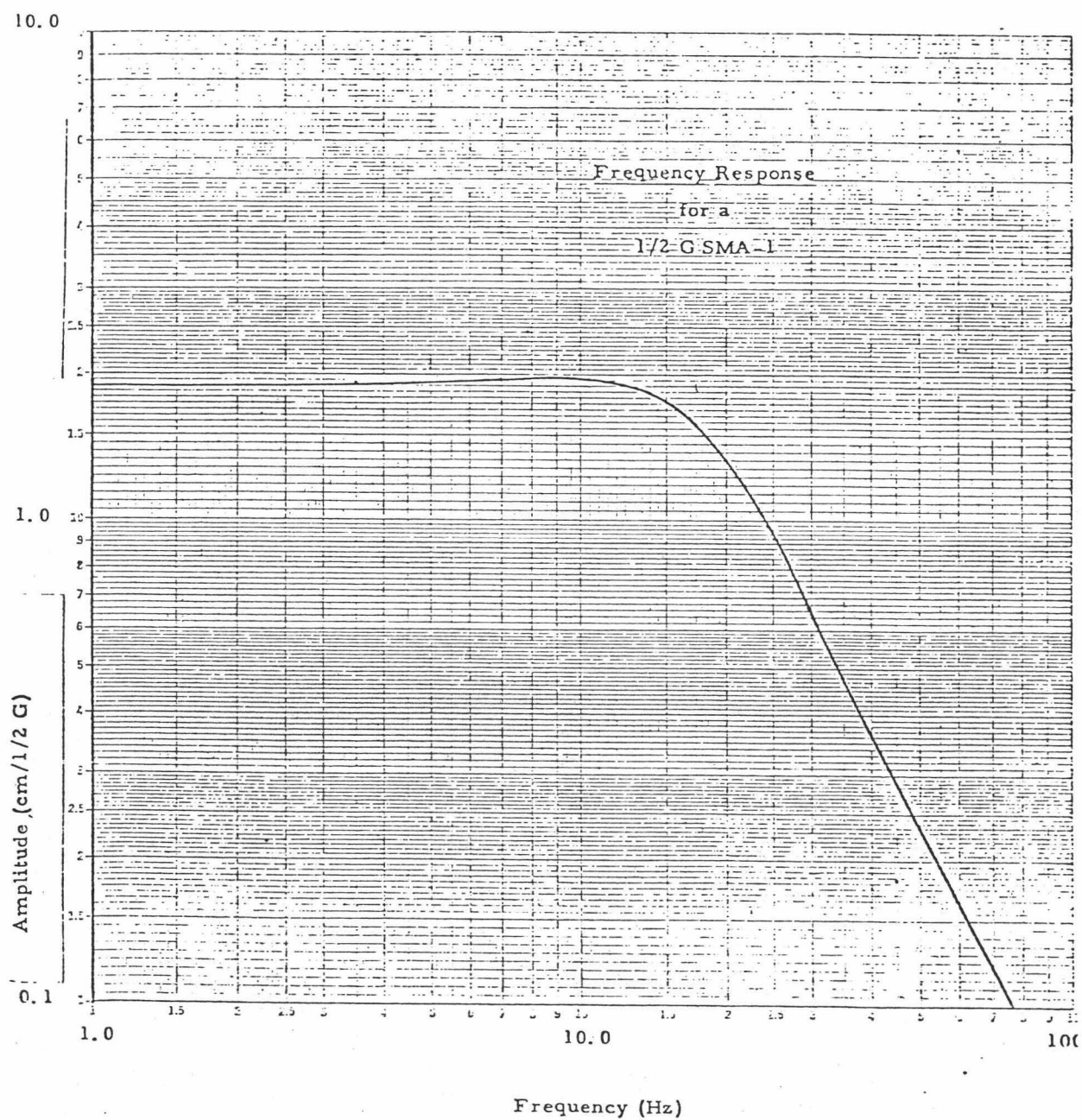


FIGURA 2.3

VAAL REEFS (67/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P254I)

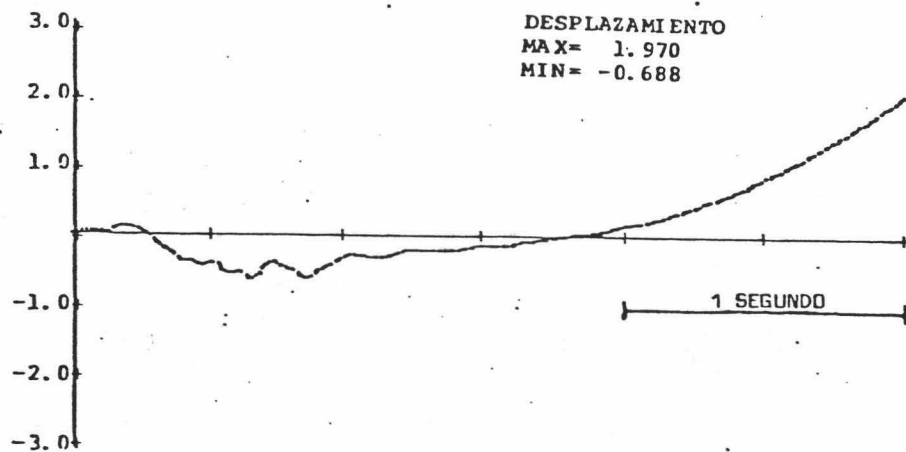
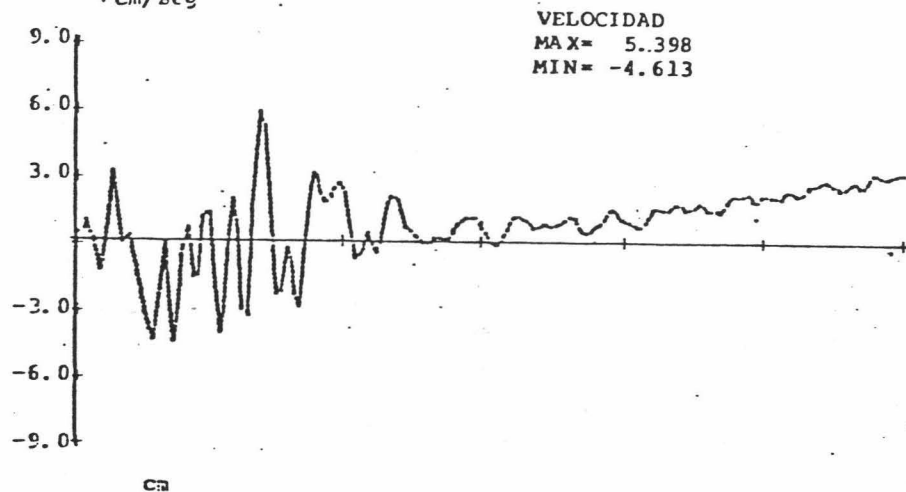
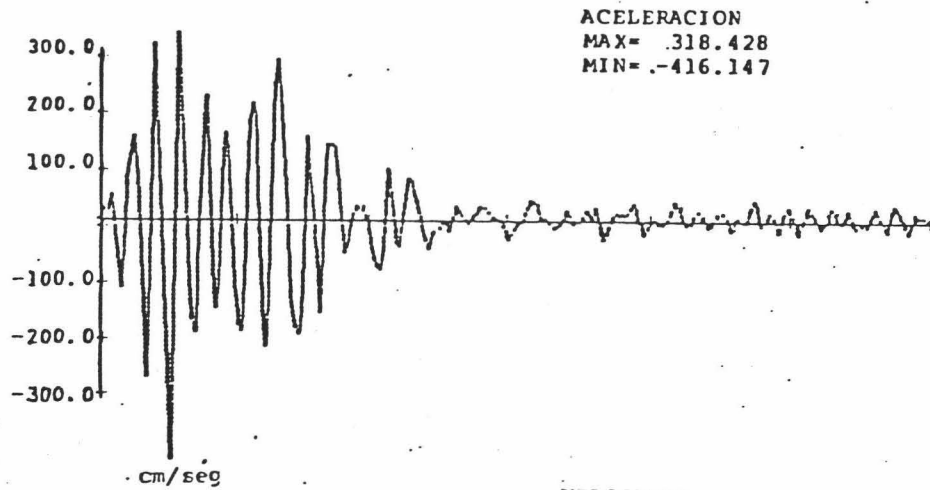
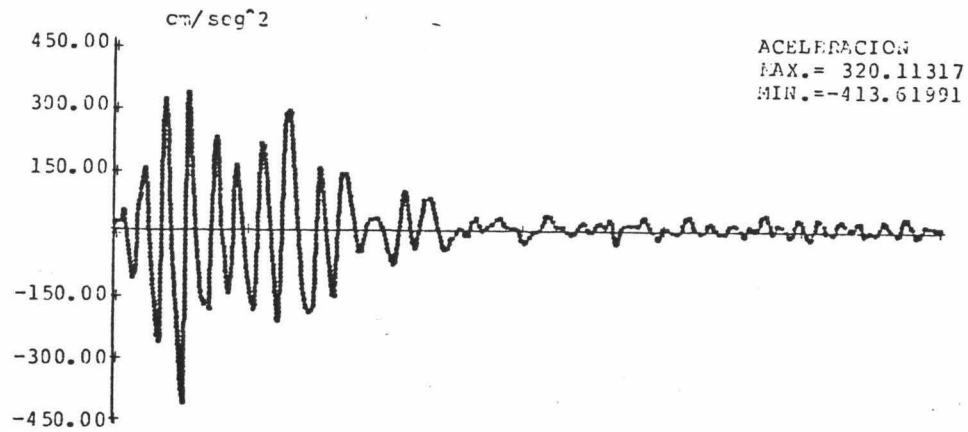
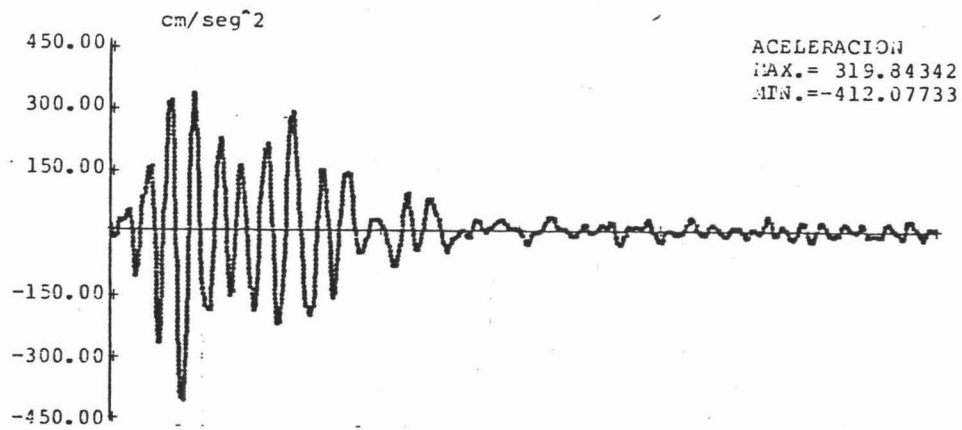


FIGURA 5.1

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P355I)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P601I)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P600I)

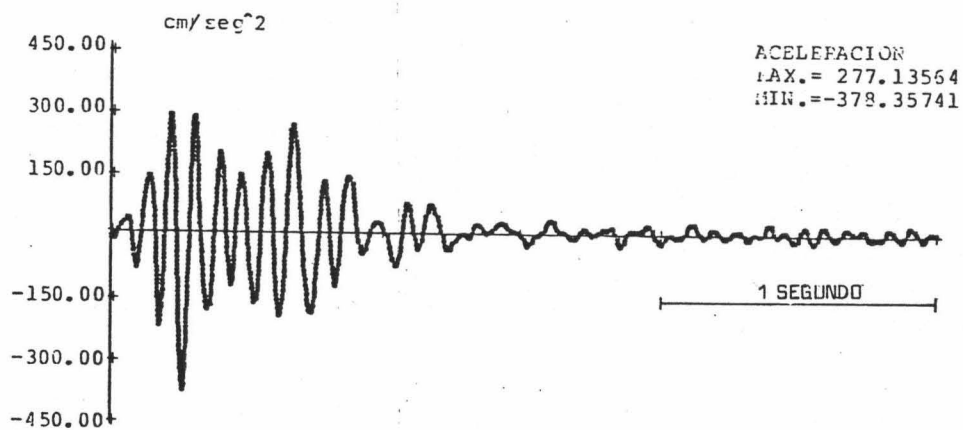
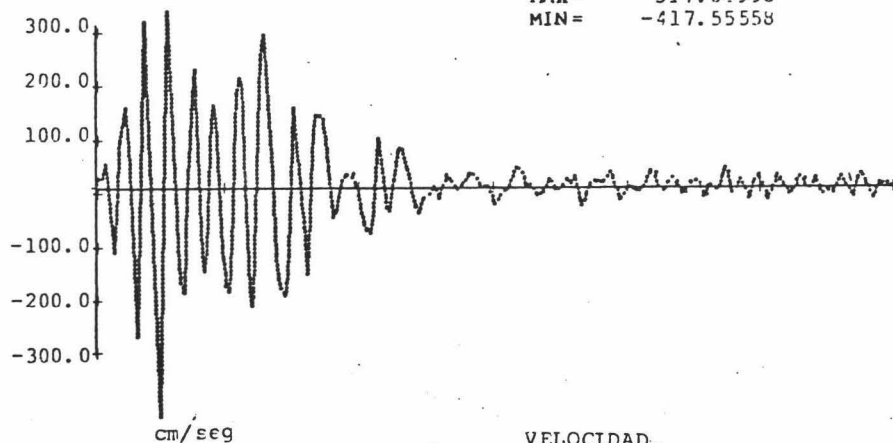


FIGURA 5.2

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P261I)
cm/sec²

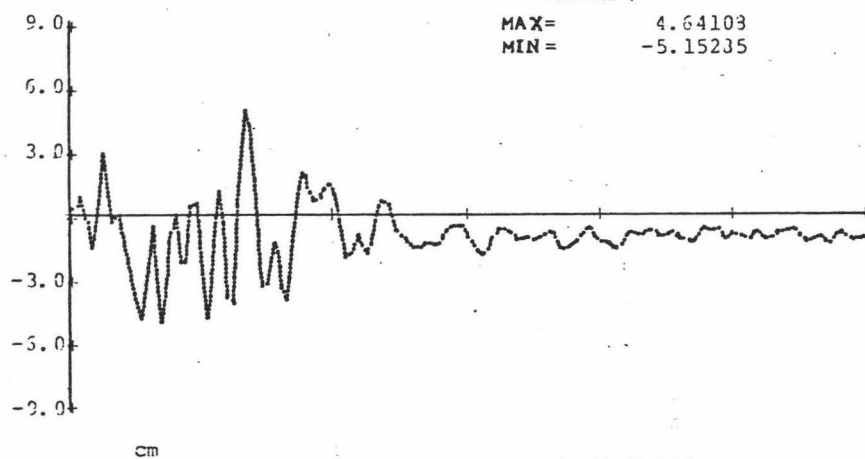
ACELFRACION

MAX= 317.04998
MIN= -417.55558



VELOCIDAD

MAX= 4.64103
MIN= -5.15235



DESPLAZAMIENTO

MAX= 0.04143
MIN= -3.29761

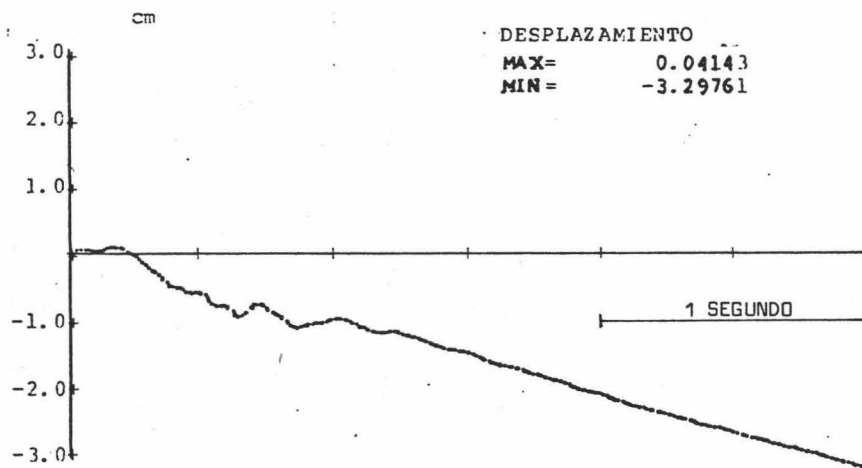


FIGURA 5.3

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P190C)

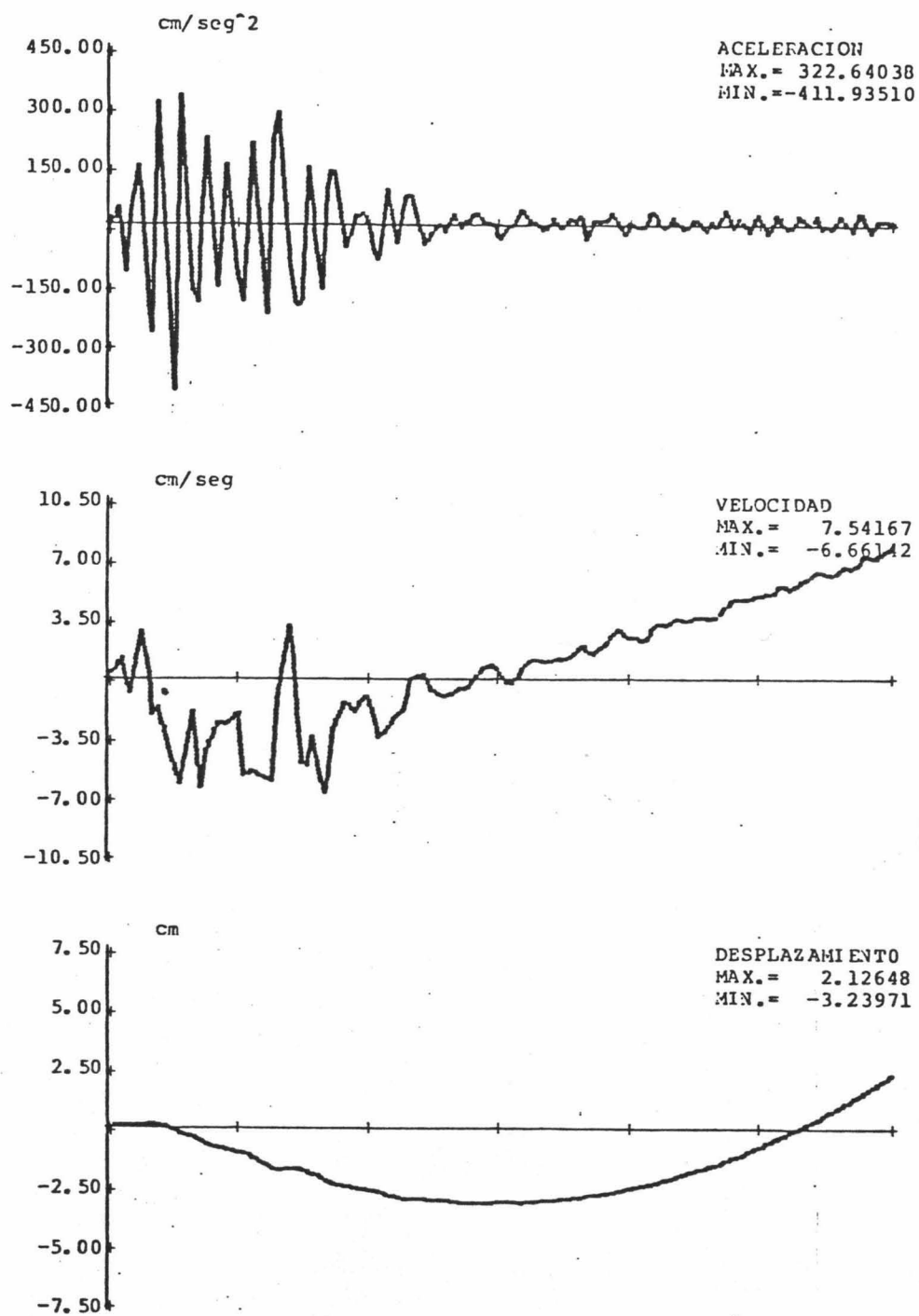


FIGURA 5.4

$Y=220 \cdot \text{SEN}(2 \cdot \pi \cdot 10 \cdot T)$ CON 200 MUESTRAS POR SEGUNDO

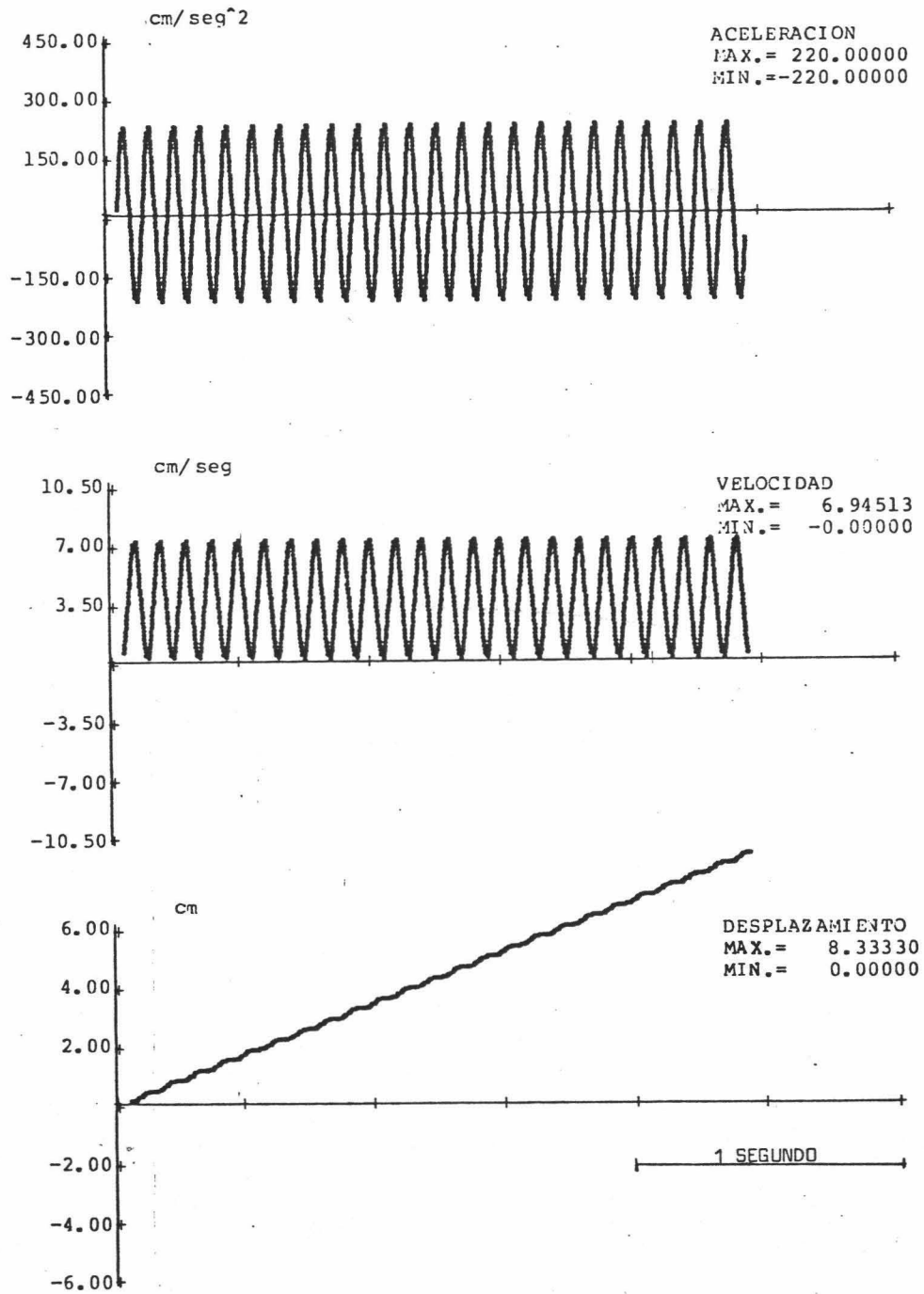


FIGURA 5.5

HARTEBEESFONTEIN (06/03/77) COMPONENTE TRANSVERSAL M=3.9 (3p287C)

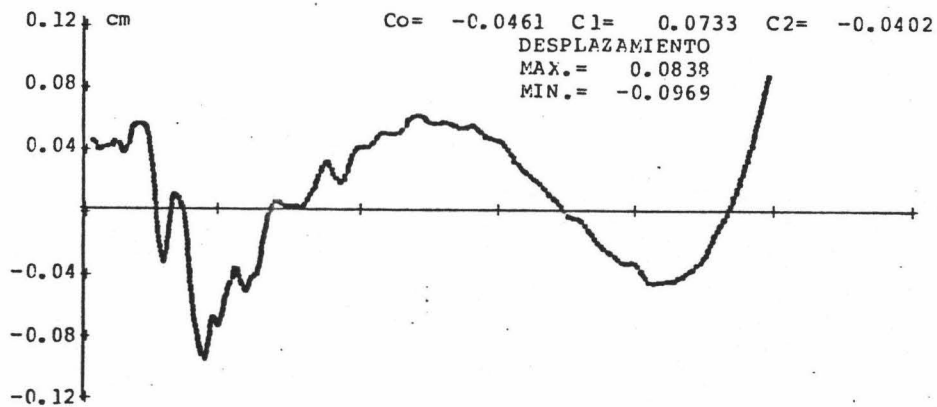
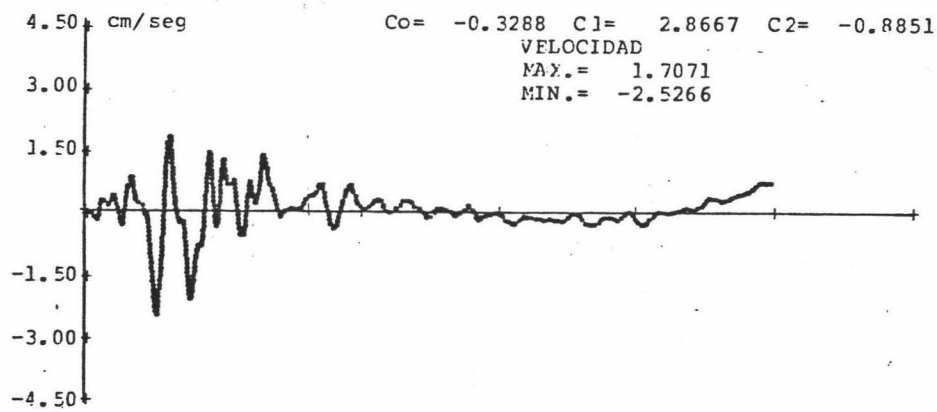
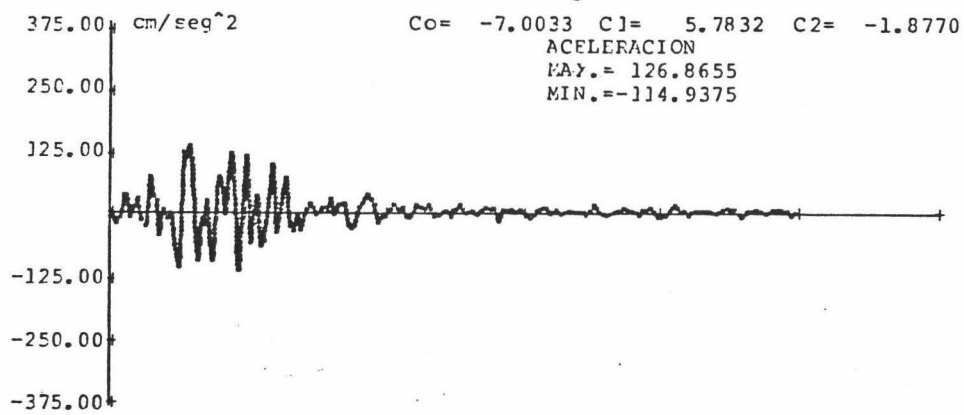


FIGURA 5.6



HARTEBEEFONTEIN (06/03/77) COMPONENTE TRANSVERSAL M=3.9 (3p216C)

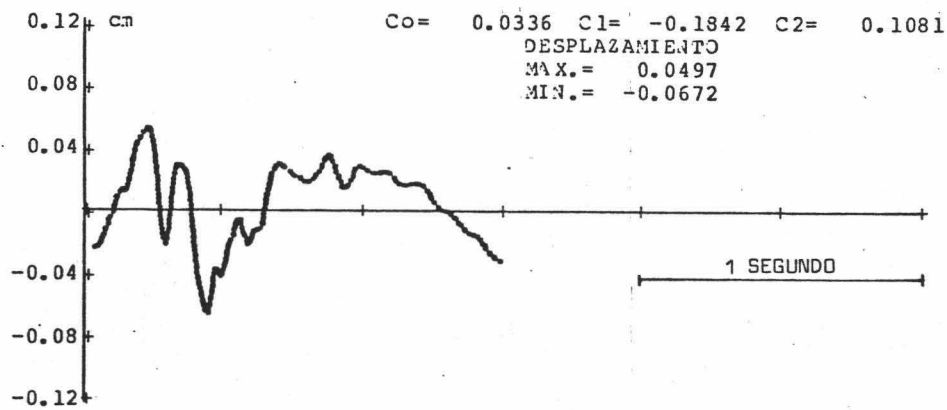
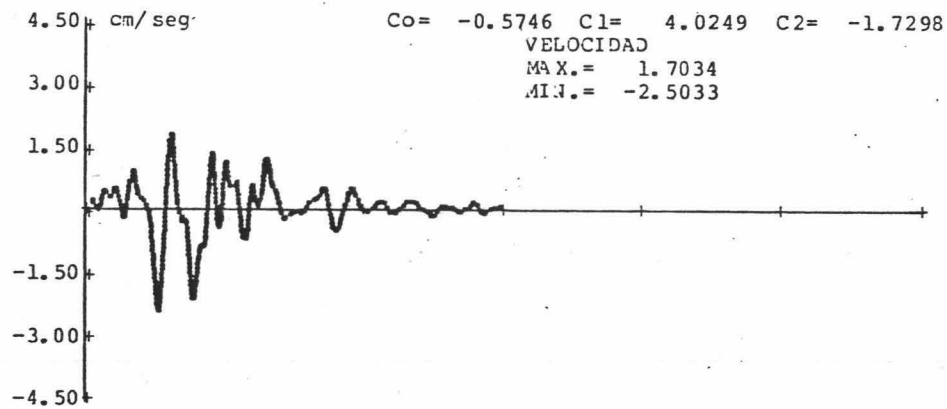
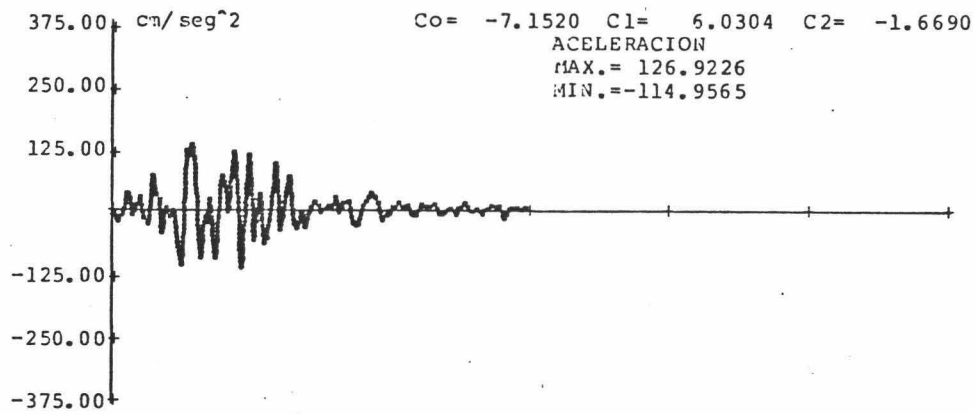
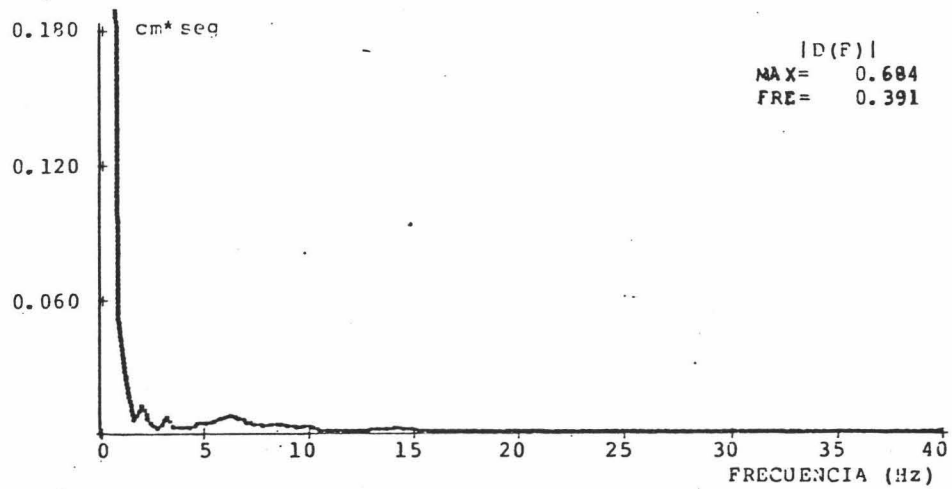
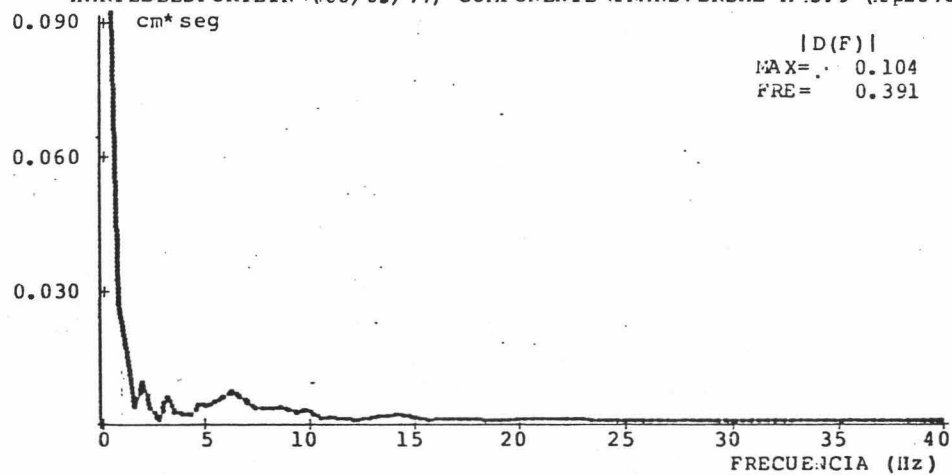


FIGURA 5.7

HARTEBEEFONTEIN (06/03/77) COMPONENTE TRANSVERSAL M=3.9 (3p287I.)



HARTEBEEFONTEIN (06/03/77) COMPONENTE TRANSVERSAL M=3.9 (3p287C)



HARTEBEEFONTEIN (06/03/77) COMPONENTE TRANSVERSAL M=3.9 (3p216C)

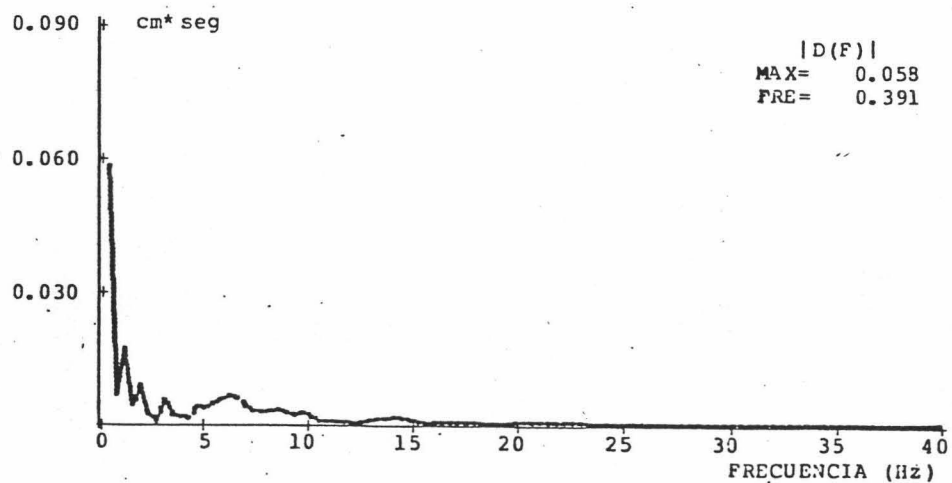


FIGURA 5.8

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (3L331I)

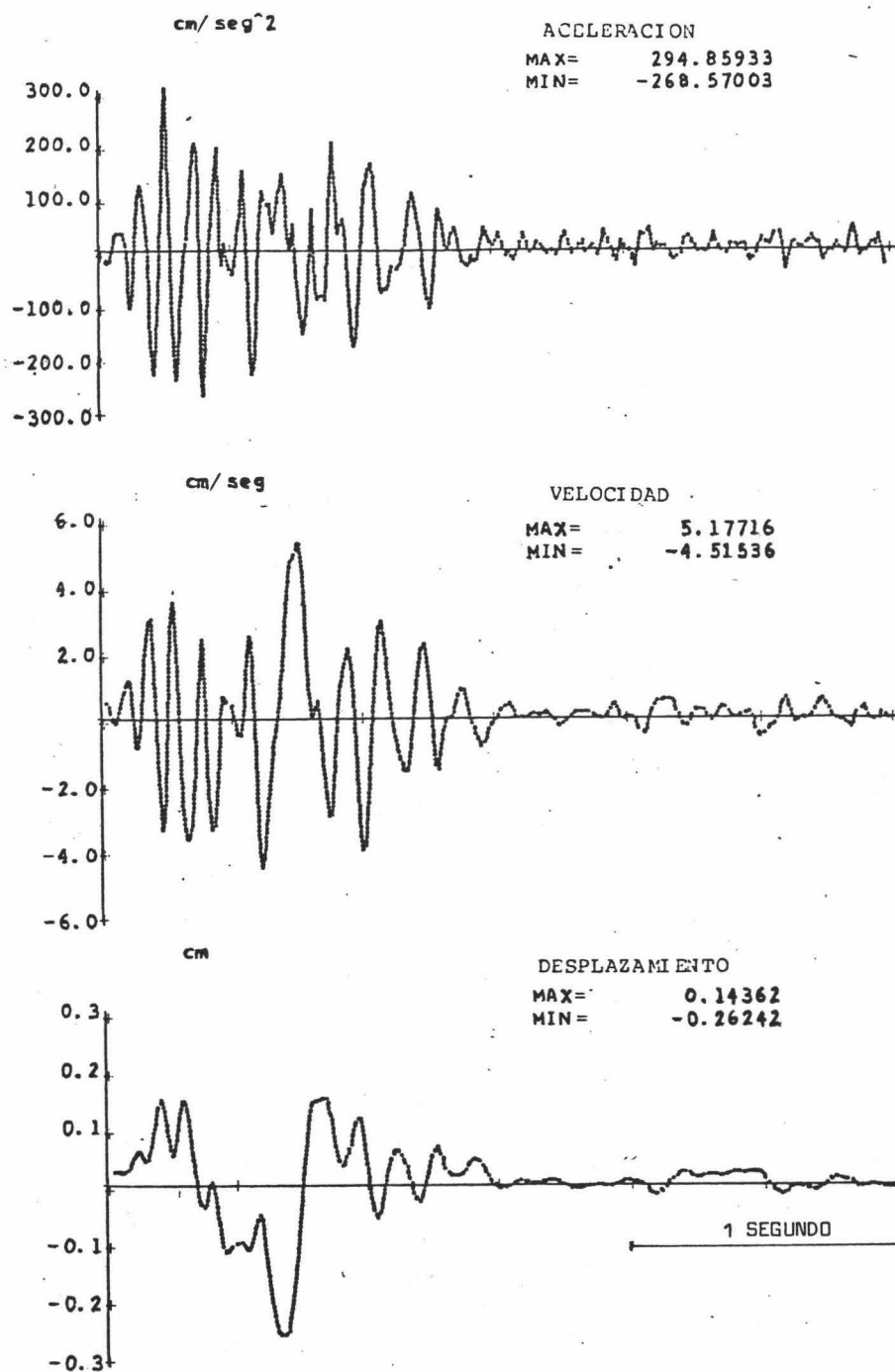


FIGURA 5.9

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331C)

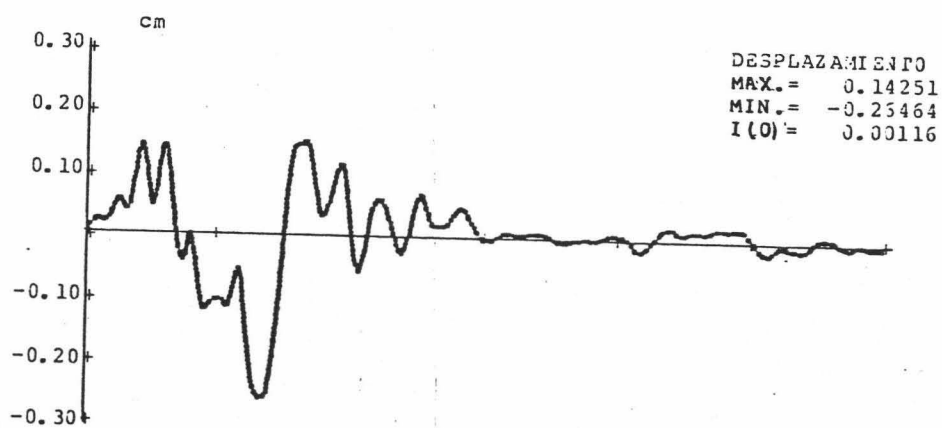
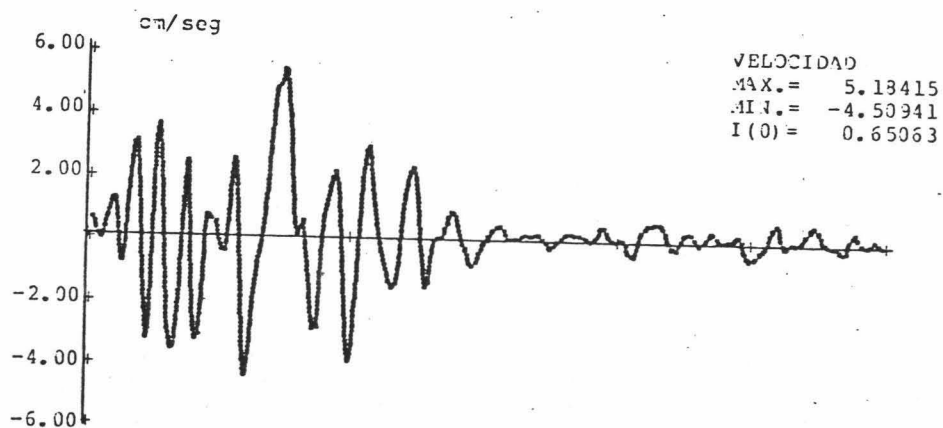
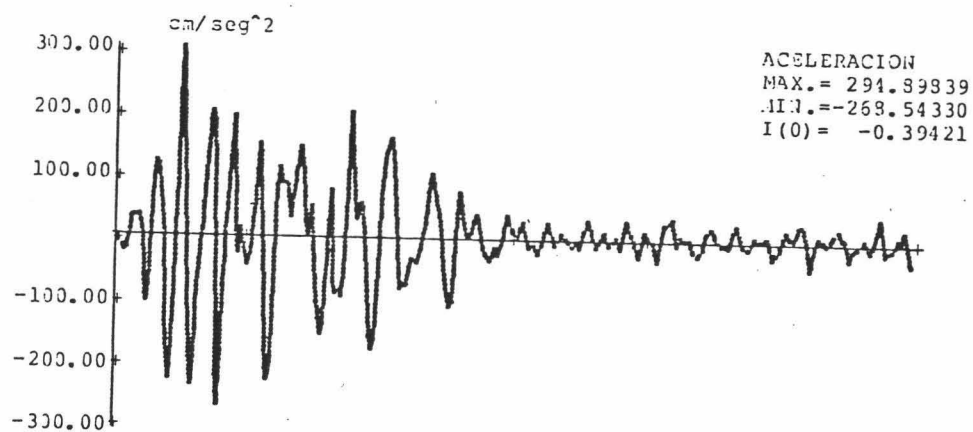


FIGURA 5.10

VAAL REEPS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (3P331C)

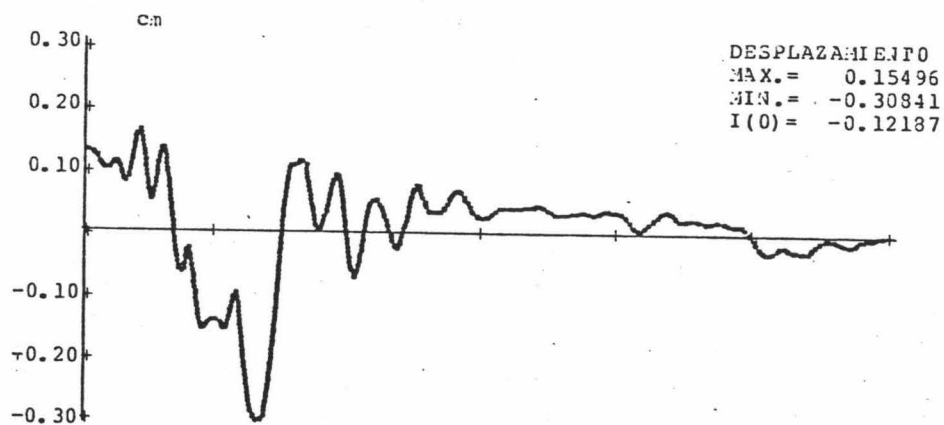
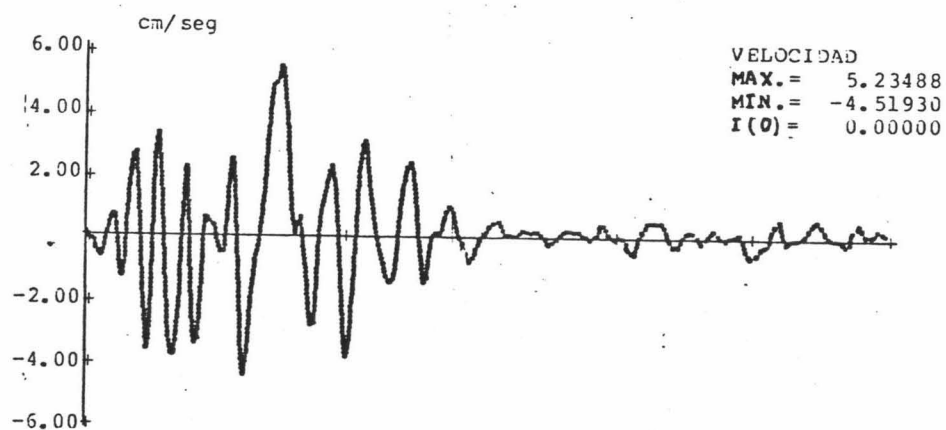
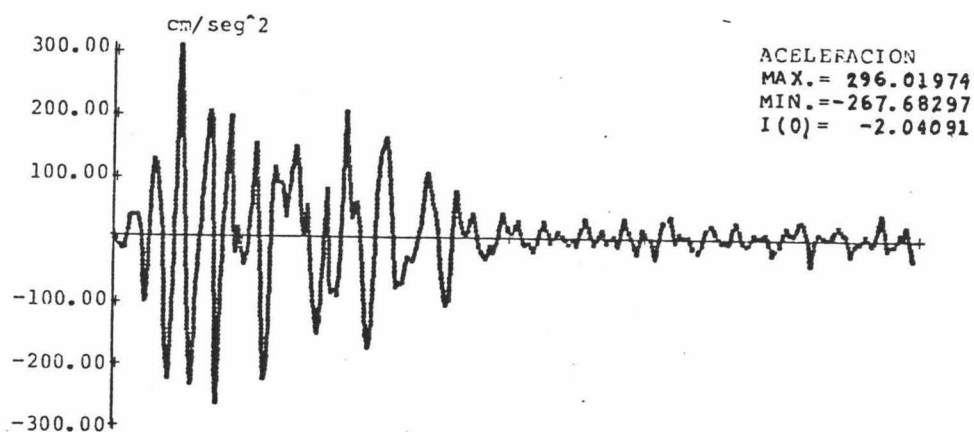


FIGURA 5.11

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P3551)

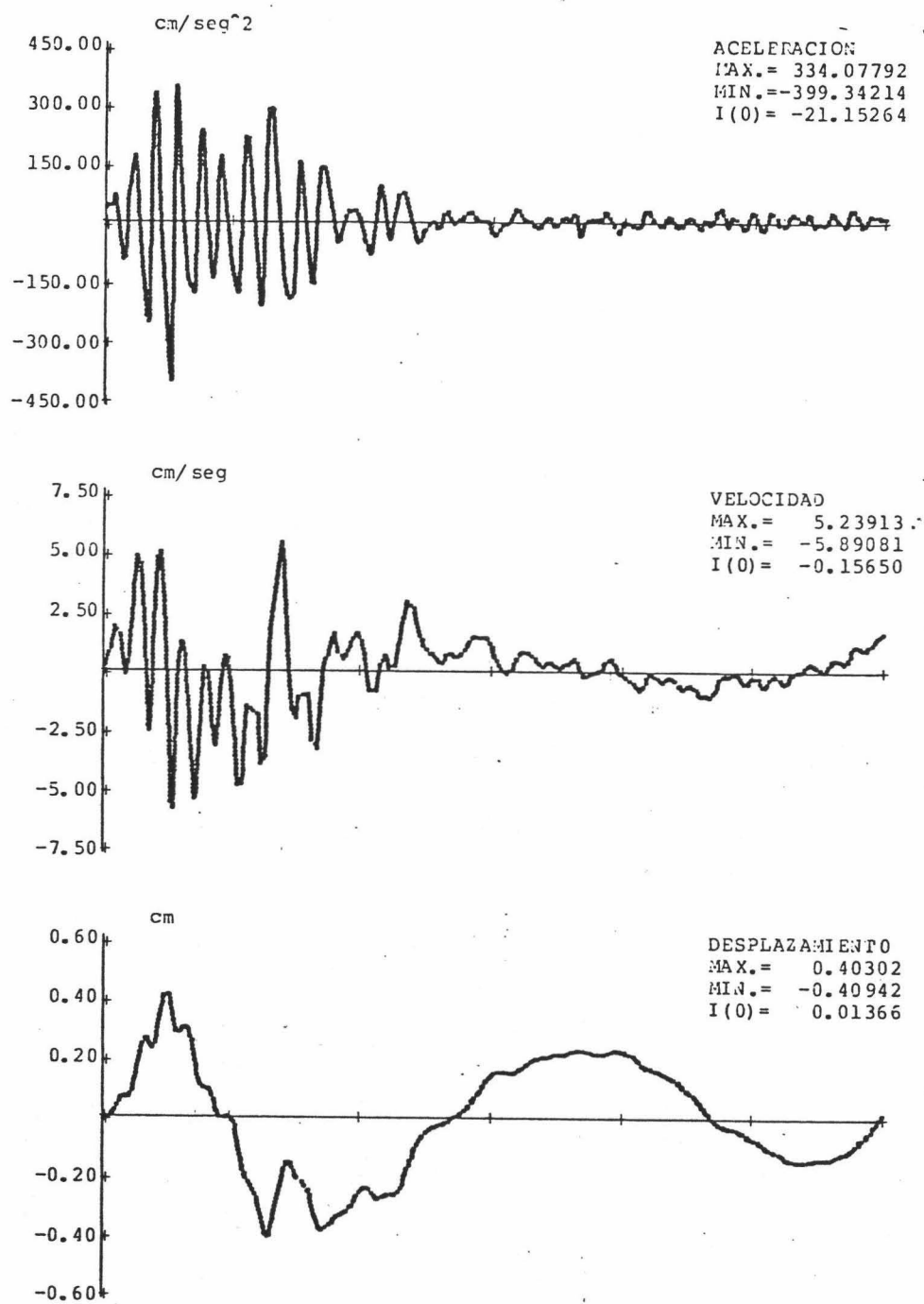


FIGURA 5.12

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (P4285)

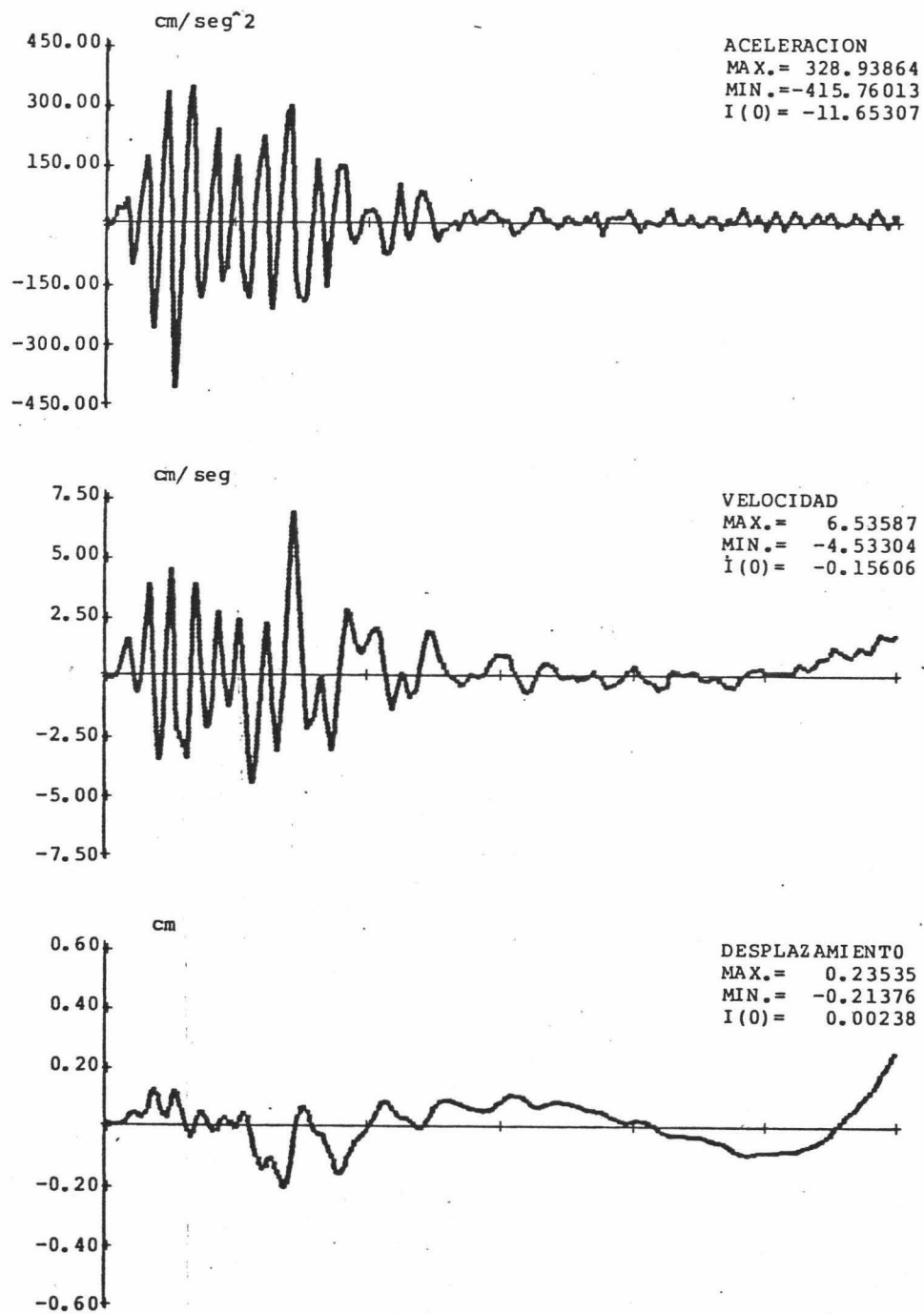


FIGURA 5.13

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P200F)

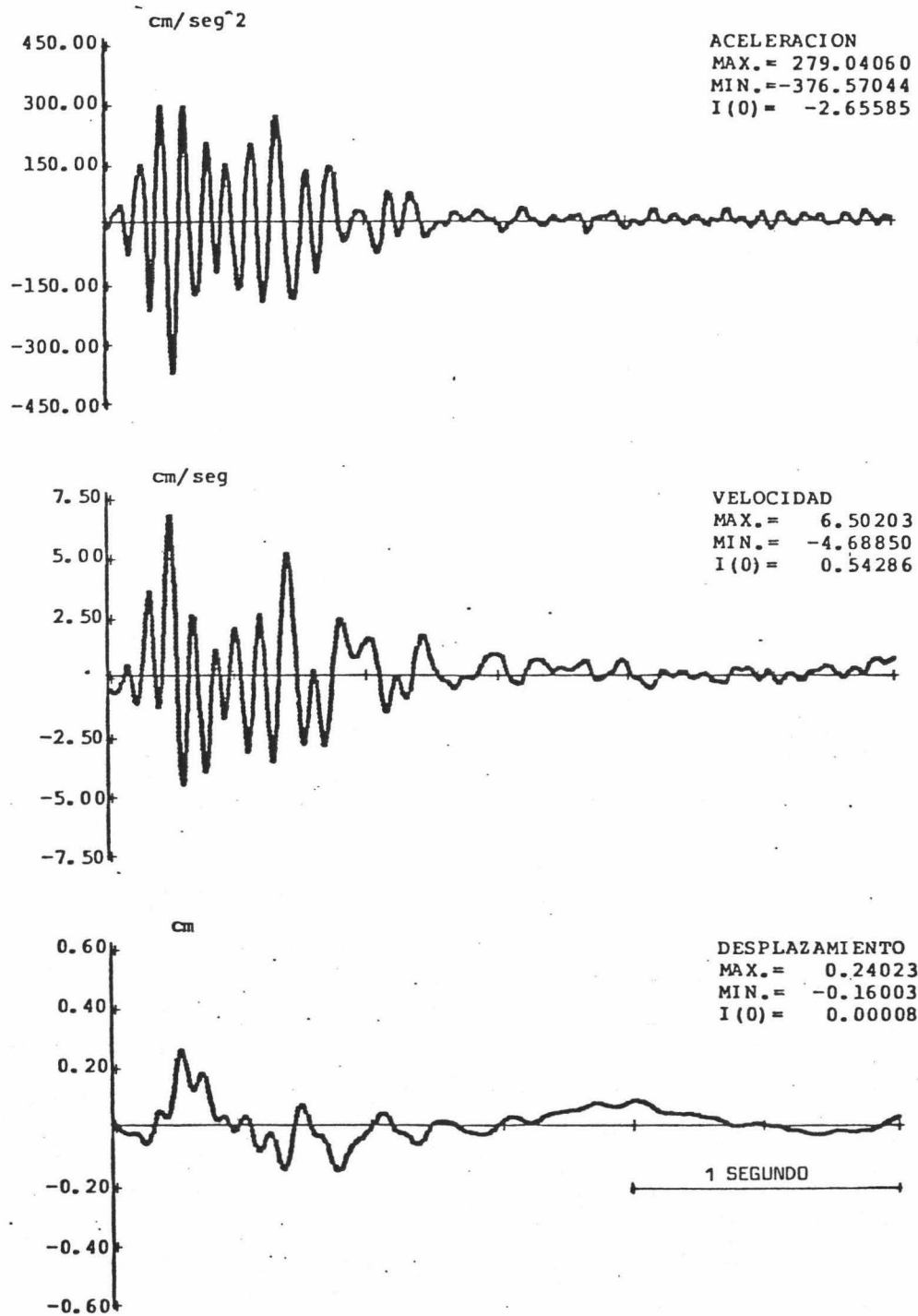


FIGURA 5.14

VAAL REERS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P600C)

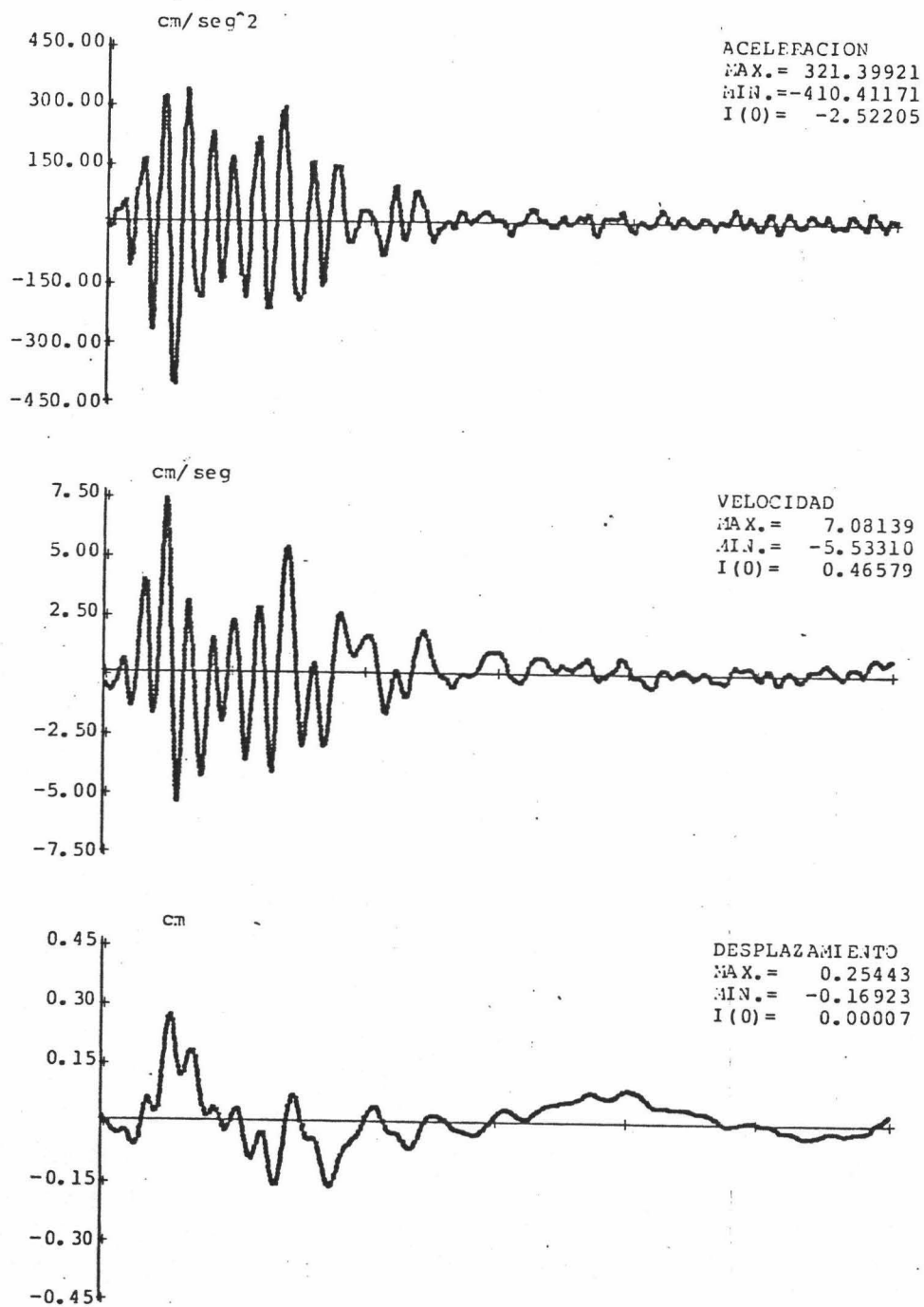


FIGURA 5.15

VNAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P501C)

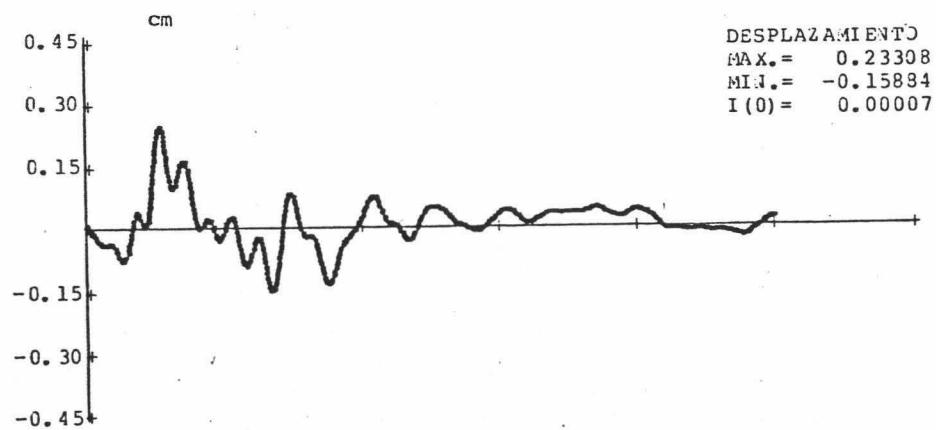
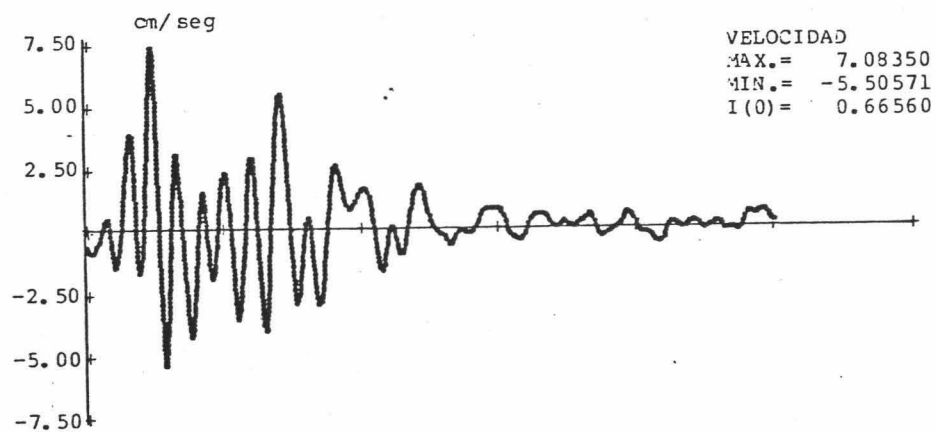
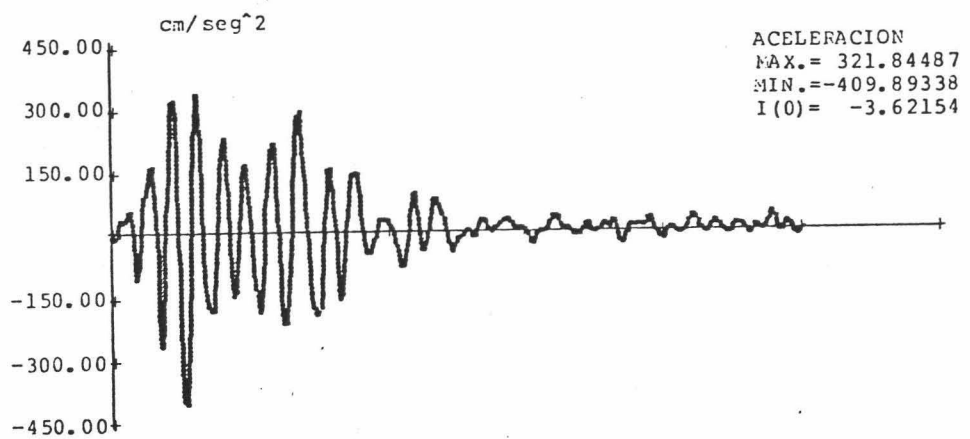


FIGURA 5.16

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P300C)

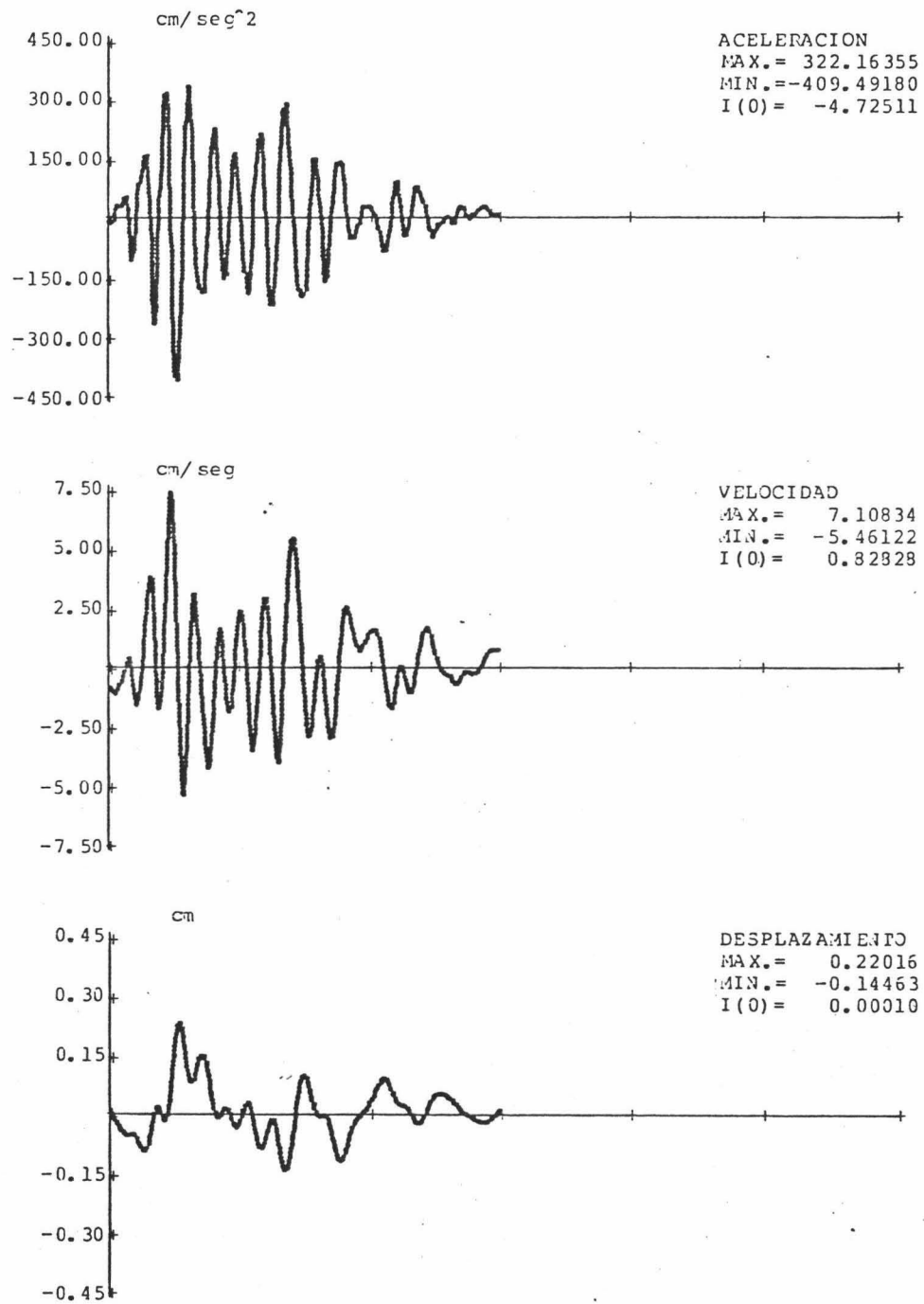


FIGURA 5.17

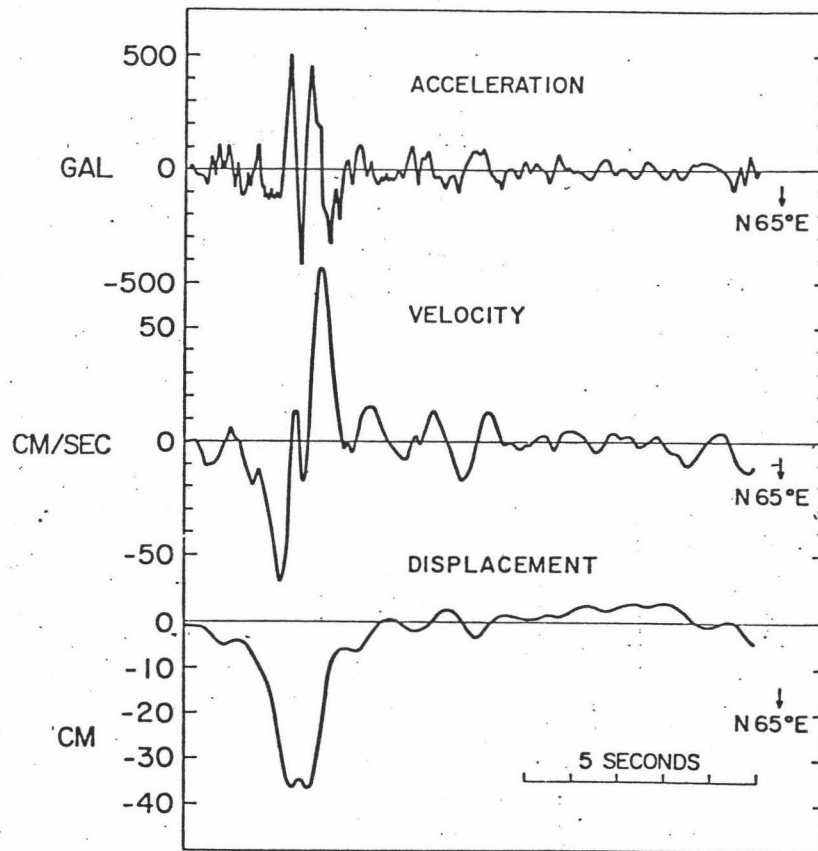


Fig. 5 Ground velocity and displacement obtained by integrating the perpendicular component accelerogram (reproduced from Aki [1968]).

PARKFIELD (CALIFORNIA) 27/06/66 (4P2302)

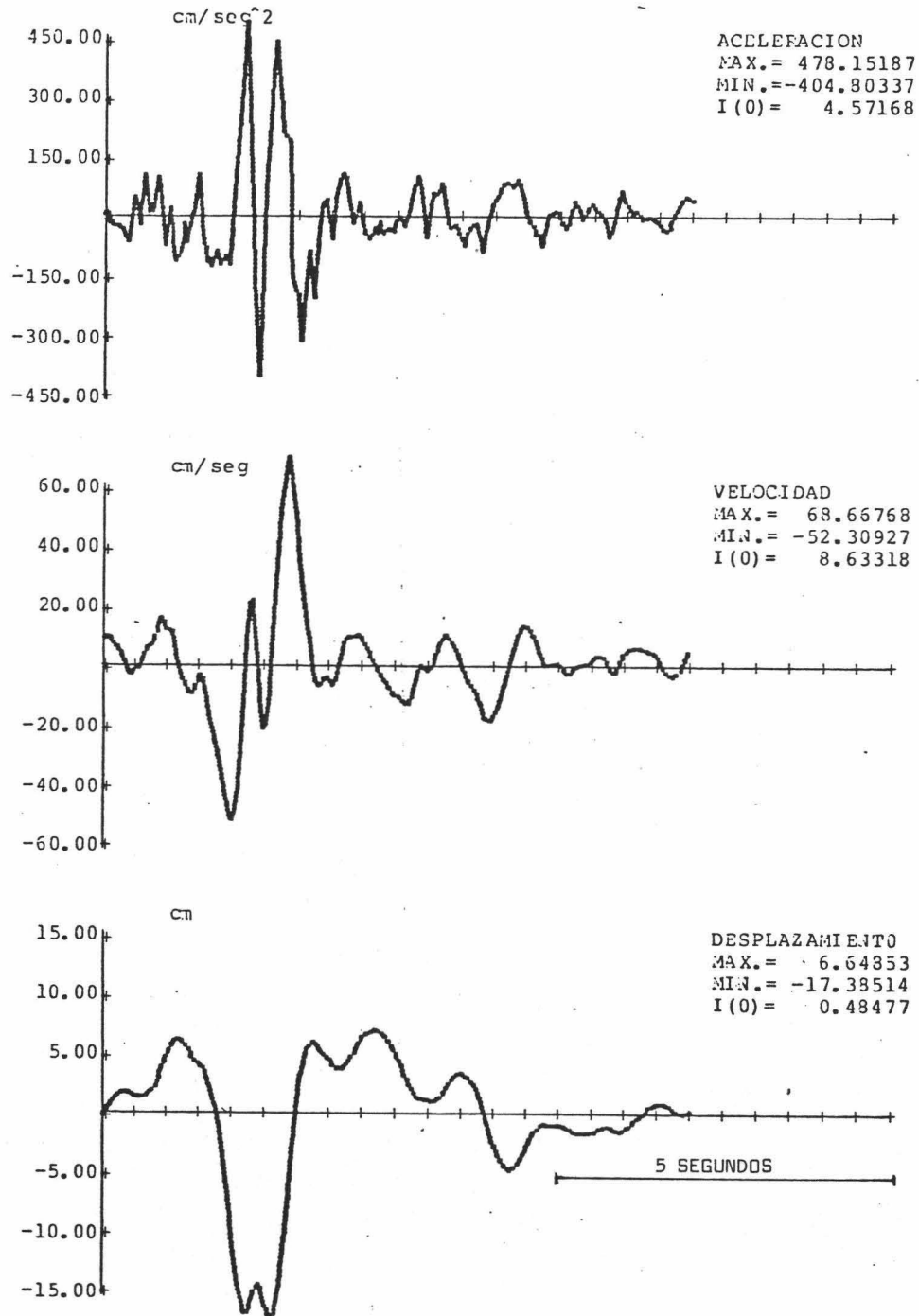


FIGURA 5.19.

PARKFIELD (CALIFORNIA) 27/06/66 (4P.09)

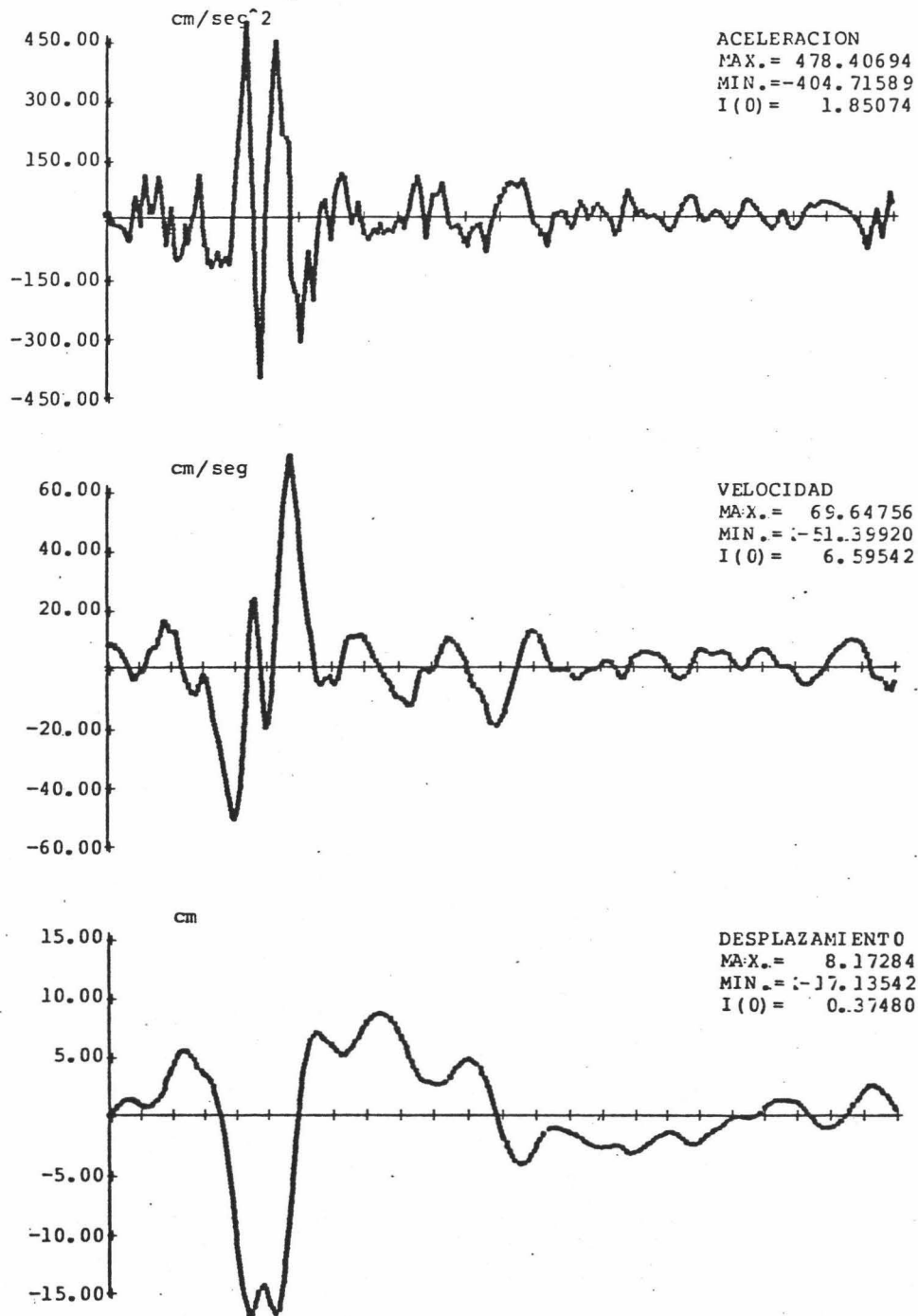


FIGURA 5.20

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P298C)

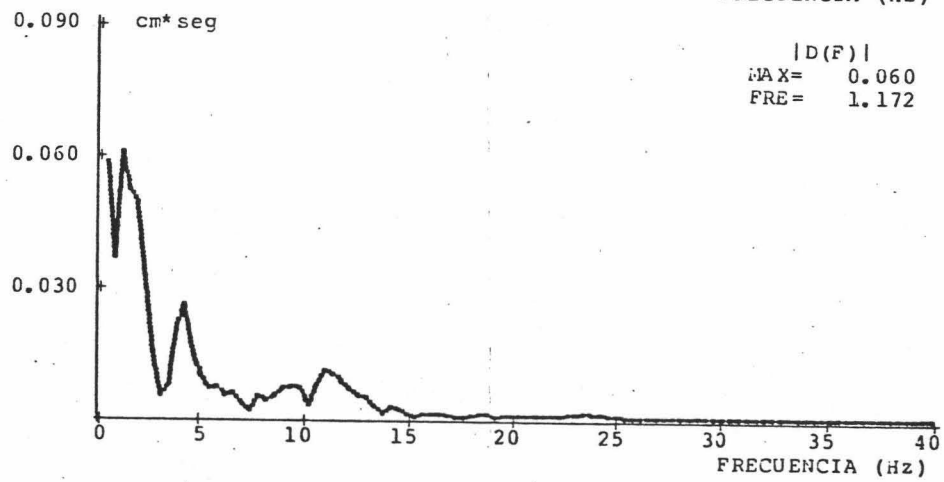
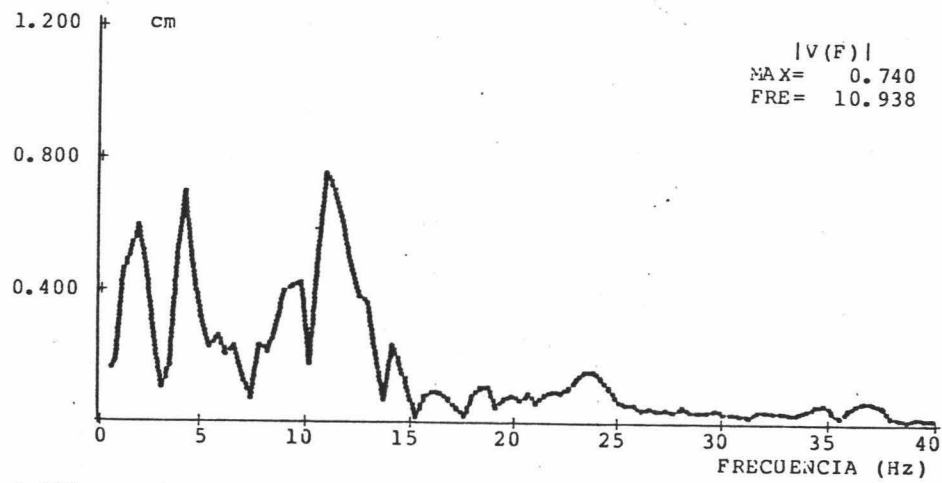
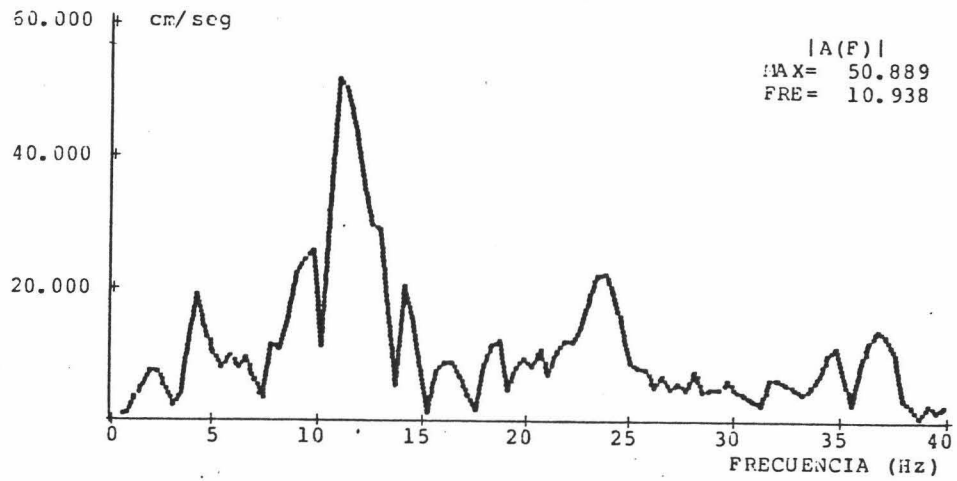


FIGURA 5.21

PARKFIELD (CALIFORNIA) 27/06/66 (4P.309C)

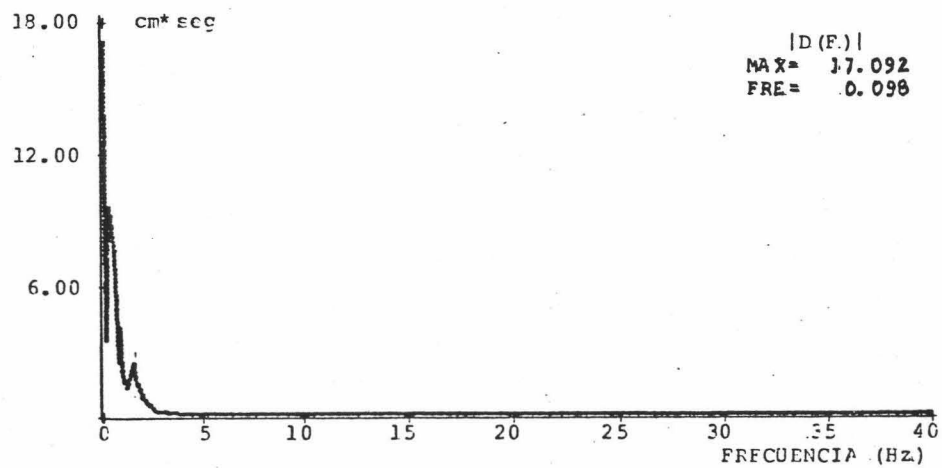
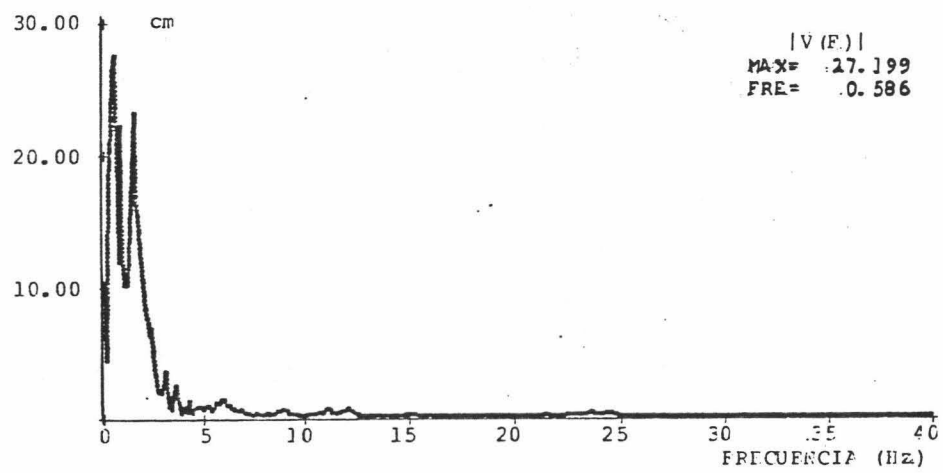
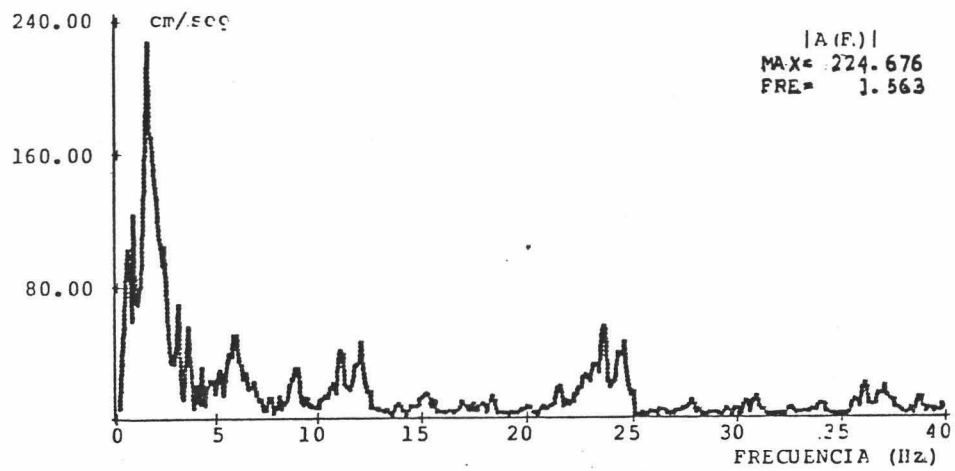


FIGURA 5.22

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=128.410)

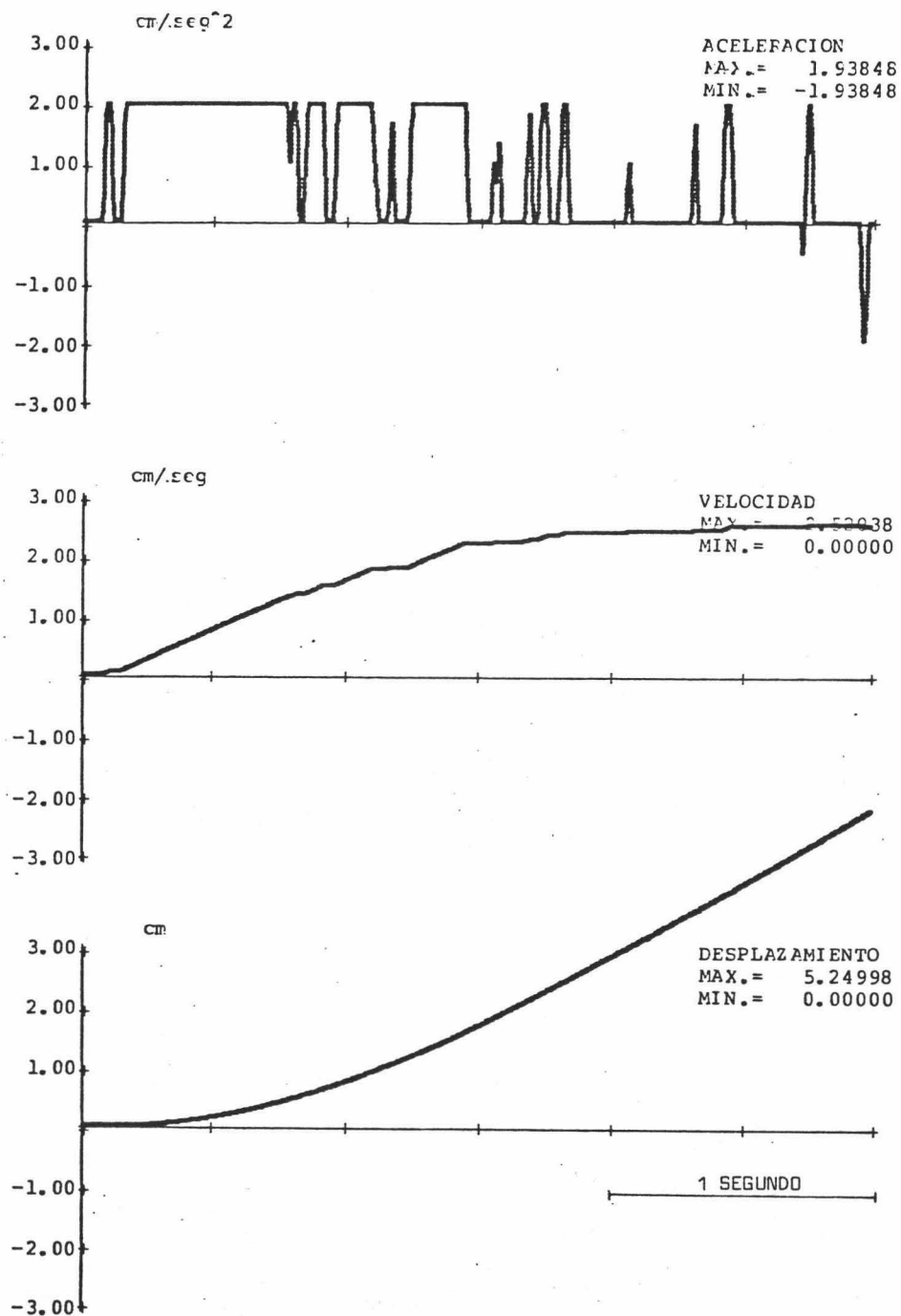


FIGURA 5.23

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=333.505)

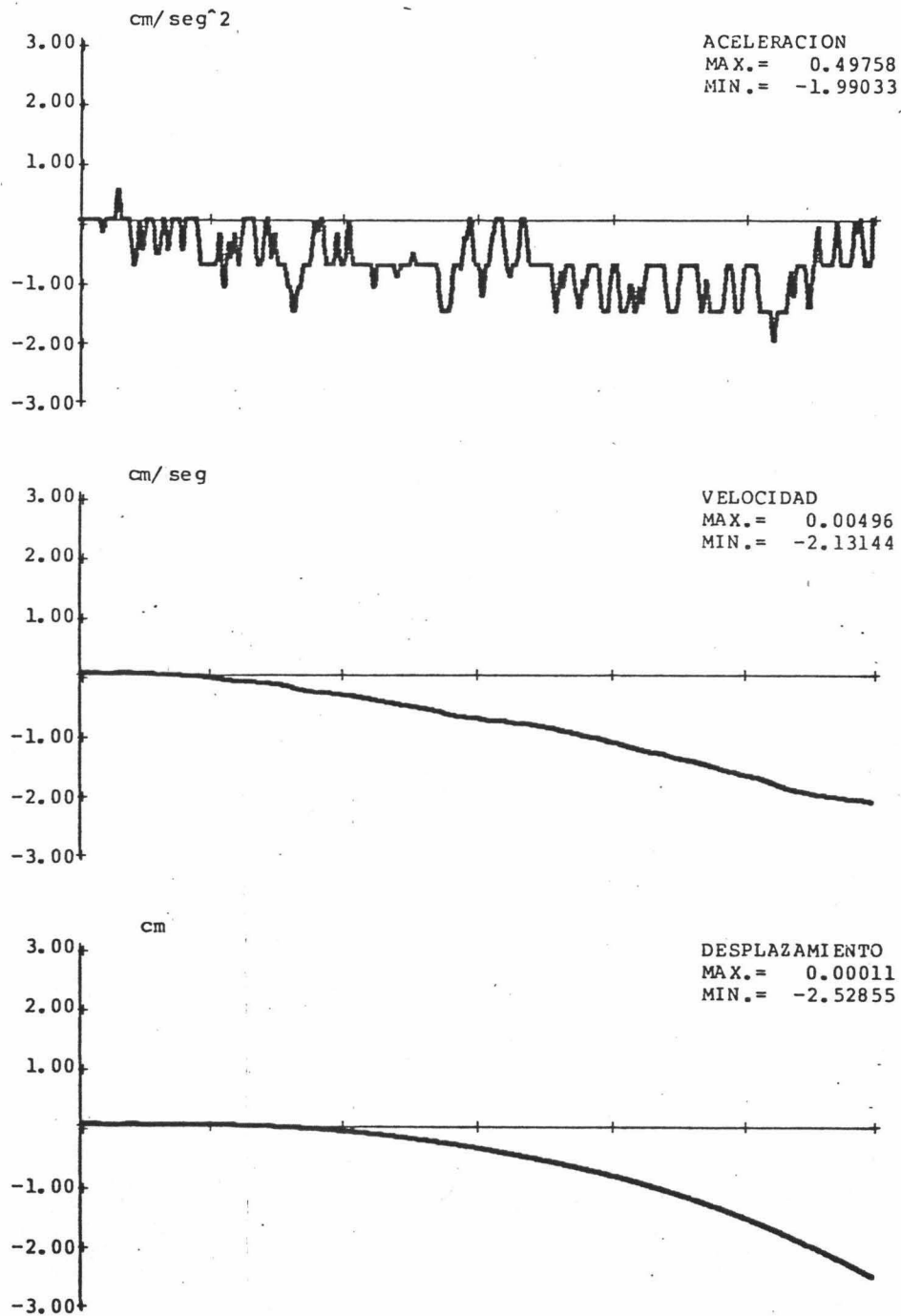


FIGURA 5.24

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (SIN FILTRO-333.505)

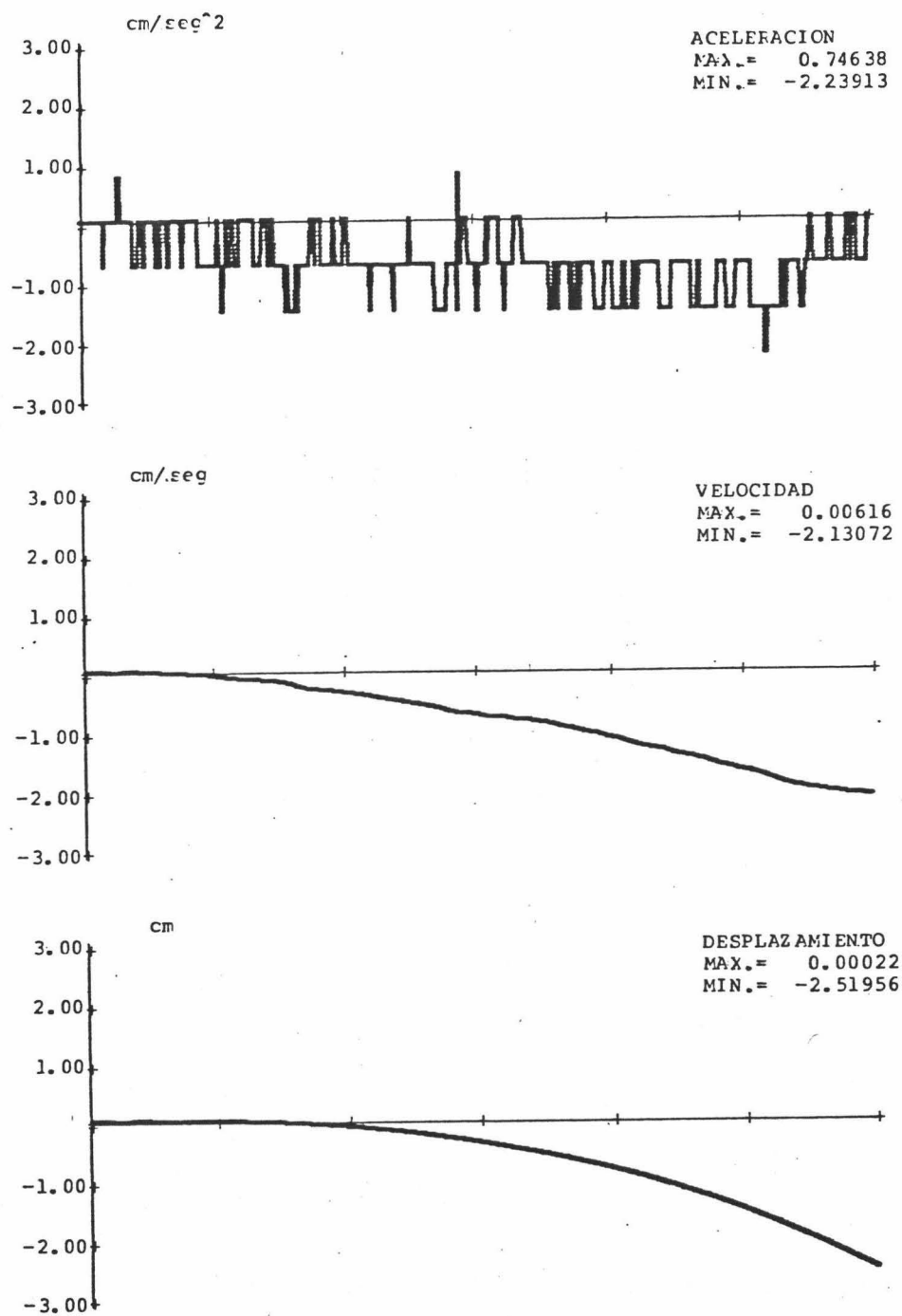


FIGURA 5.25

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=557.740)

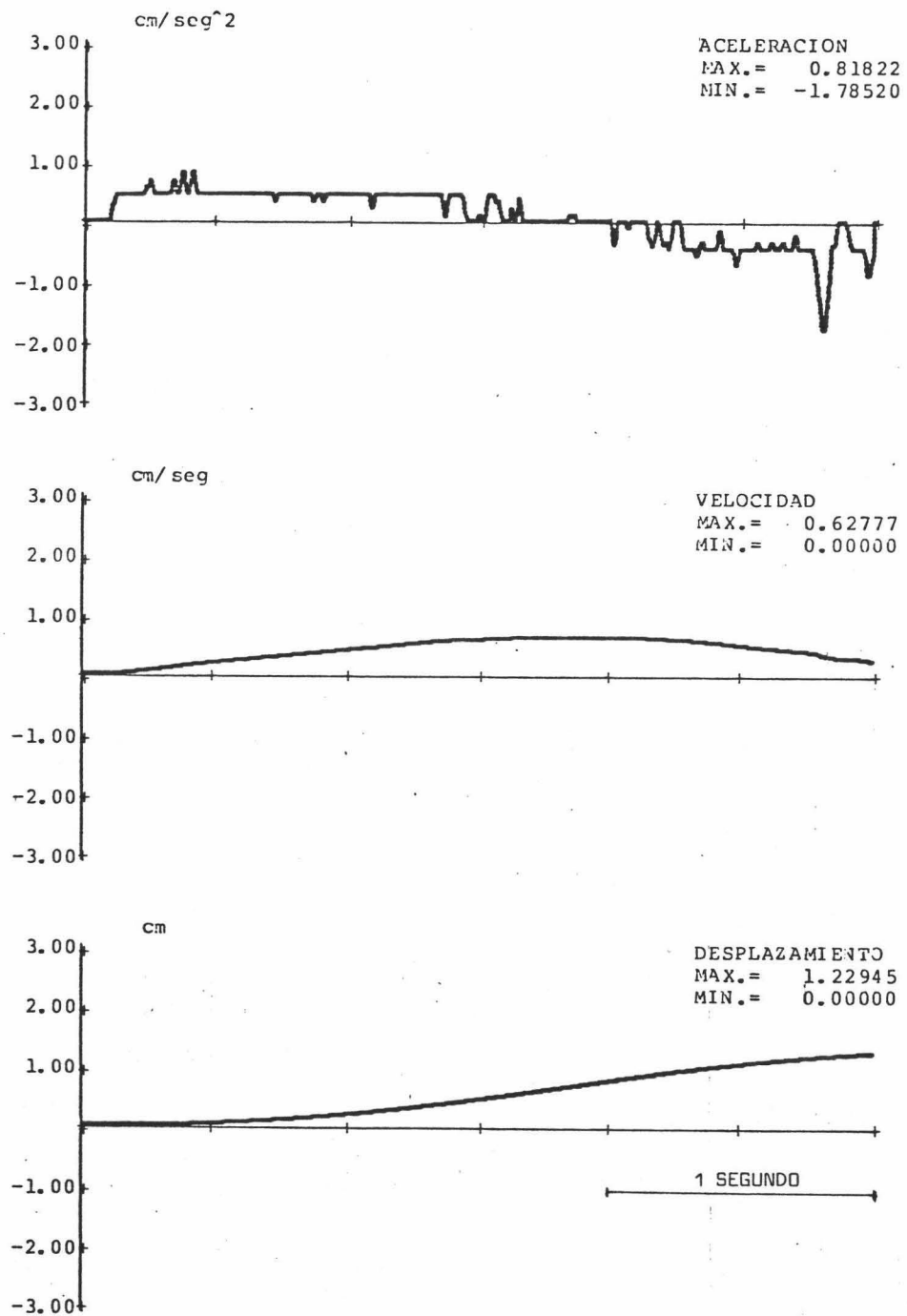


FIGURA 5.26

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=557.740)

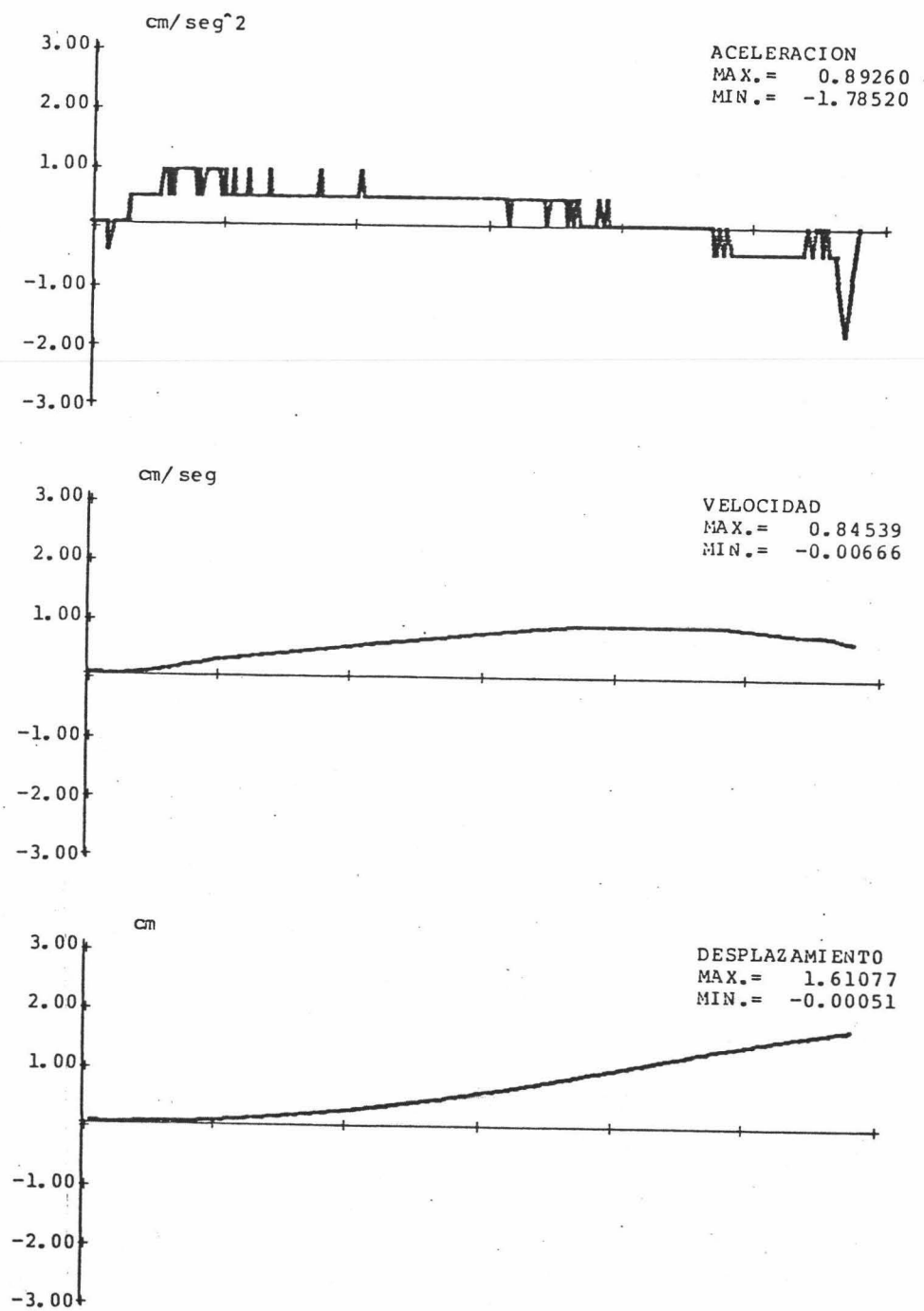


FIGURA 5.27

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=128.410)

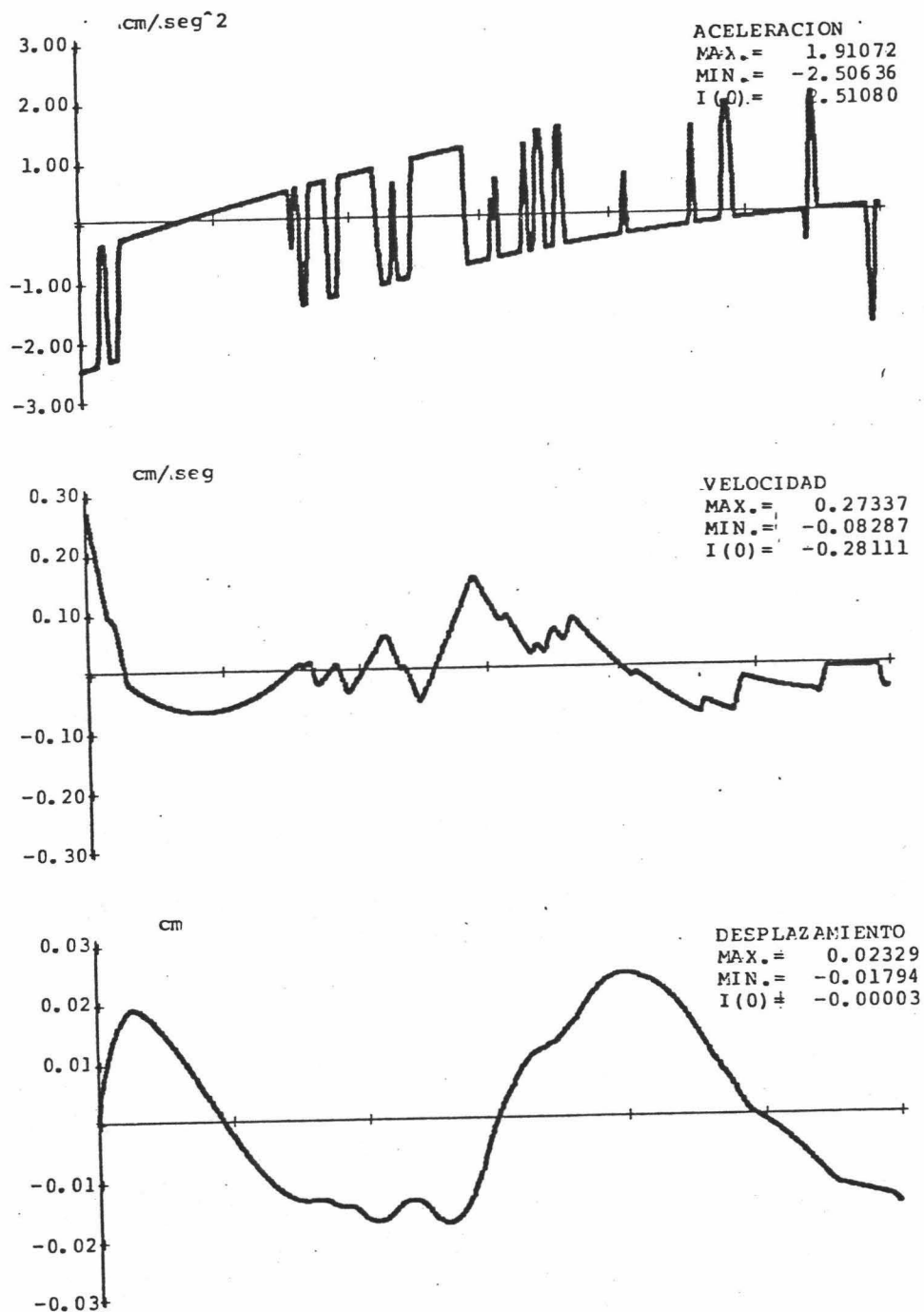


FIGURA 5.28

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (SIN FILTRO-333.505)

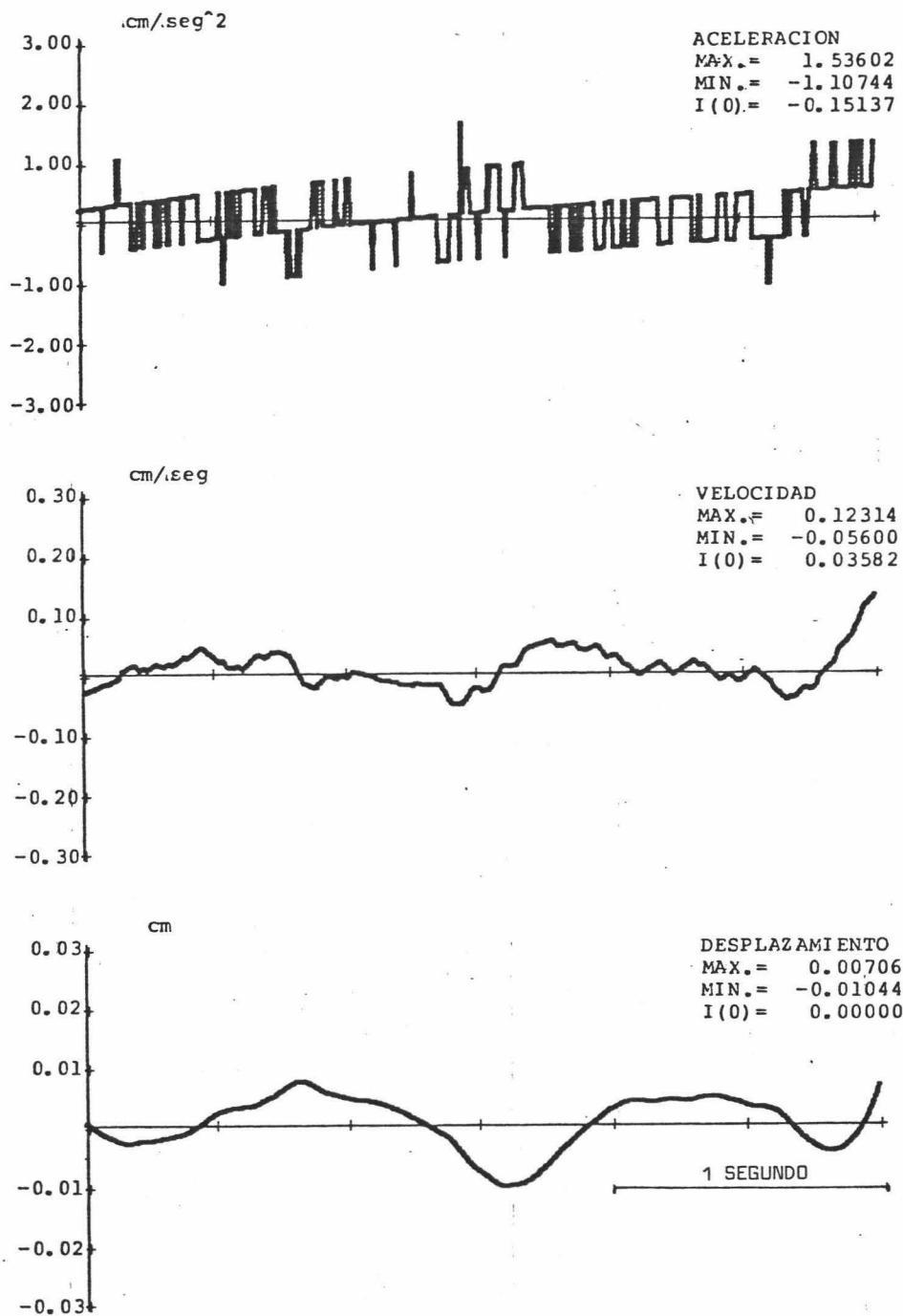


FIGURA 5.29

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=333.505)

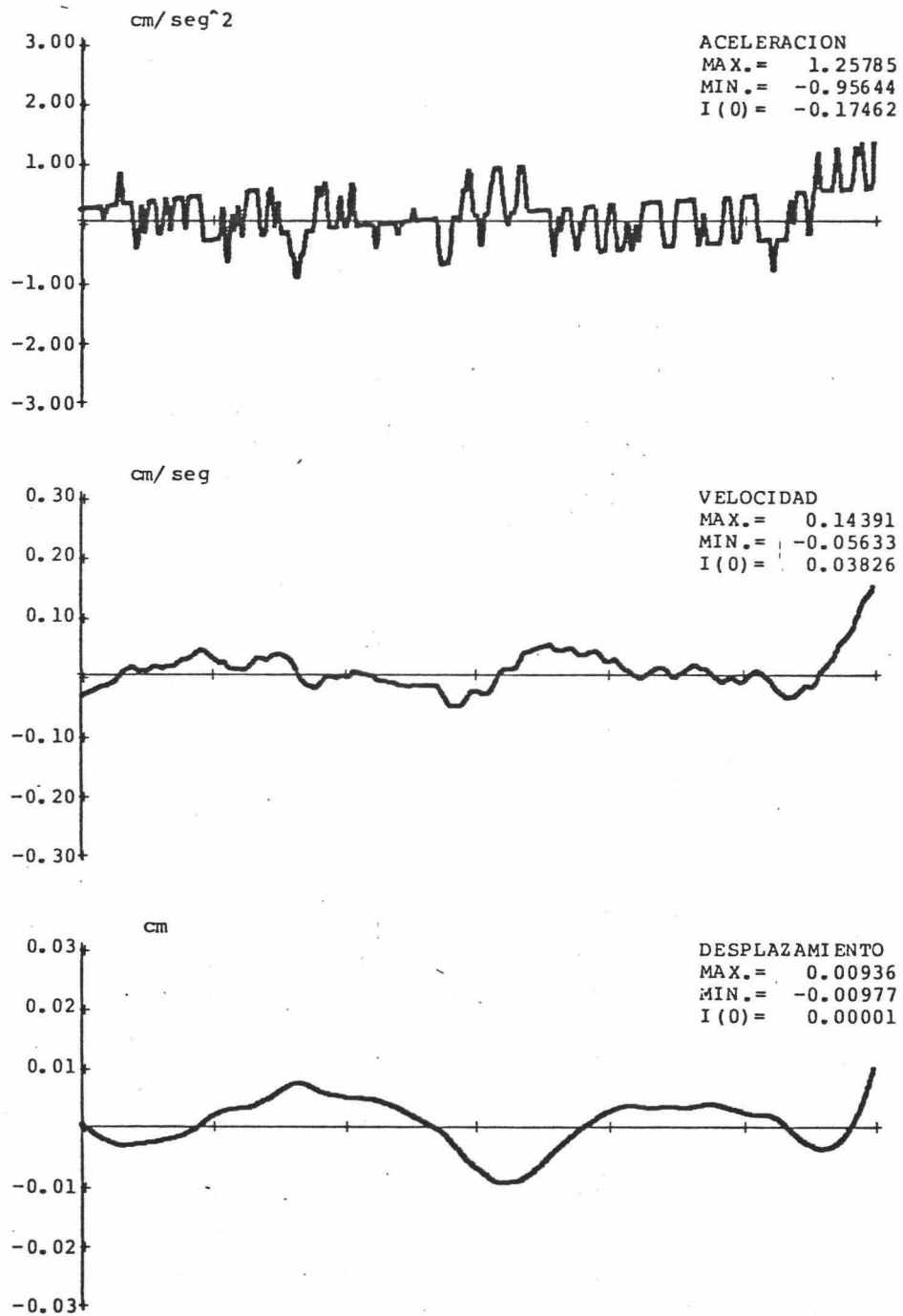


FIGURA 5.30



LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=557.740)

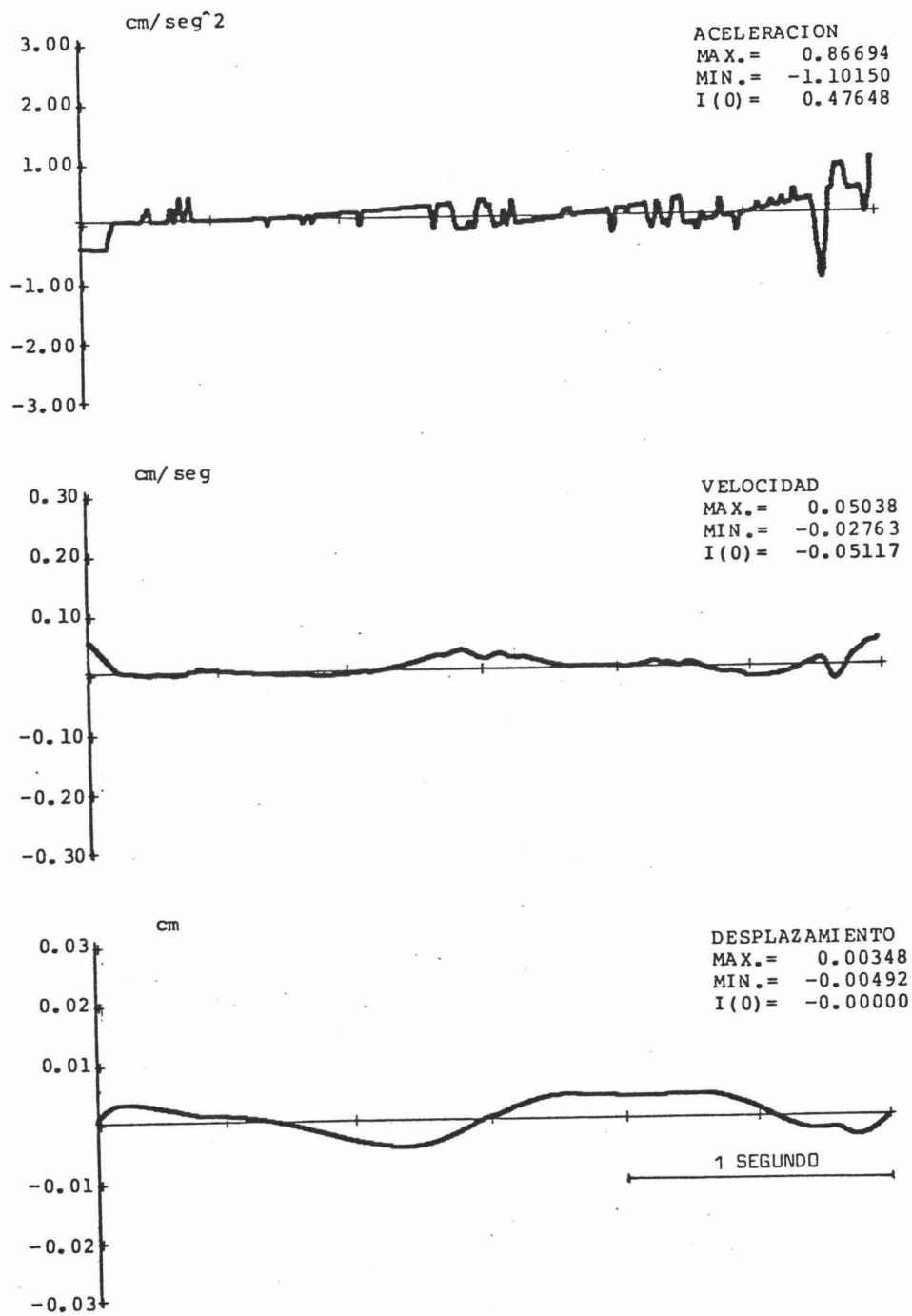


FIGURA 5.31

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=557.740)

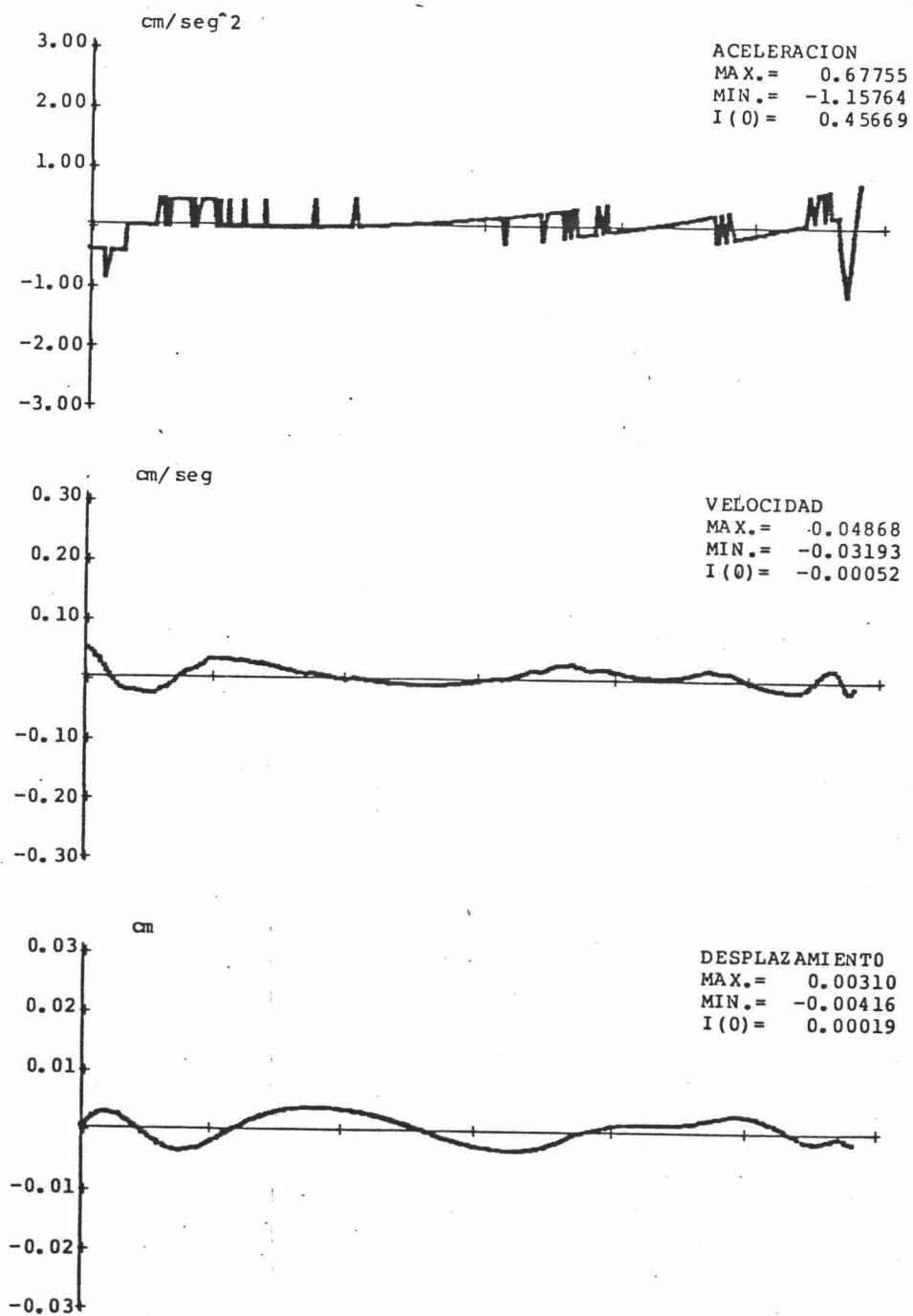


FIGURA 5.32

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (M4/G=128.410)

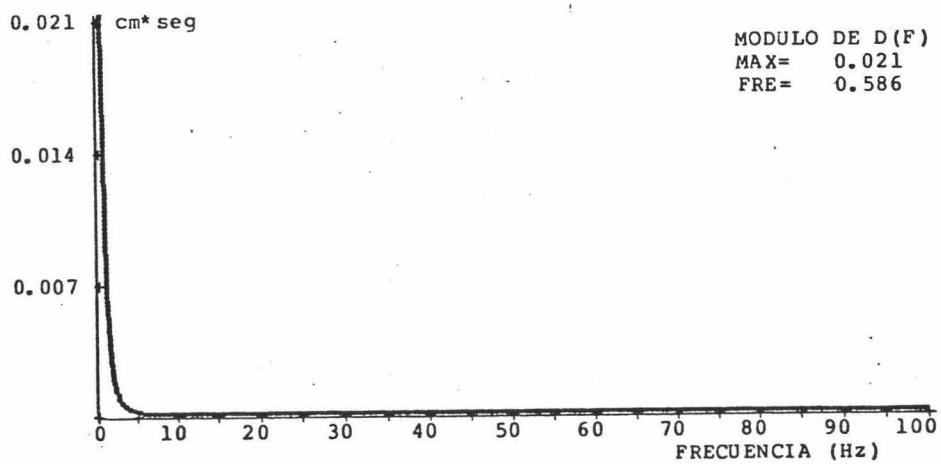
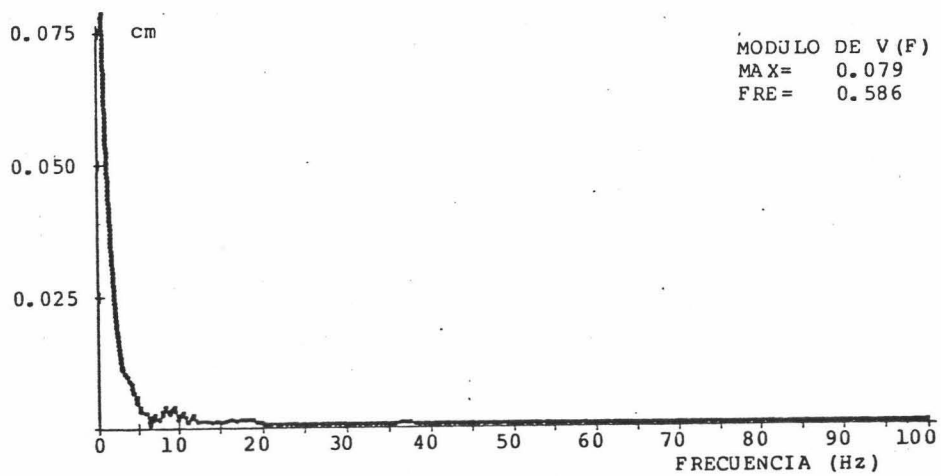
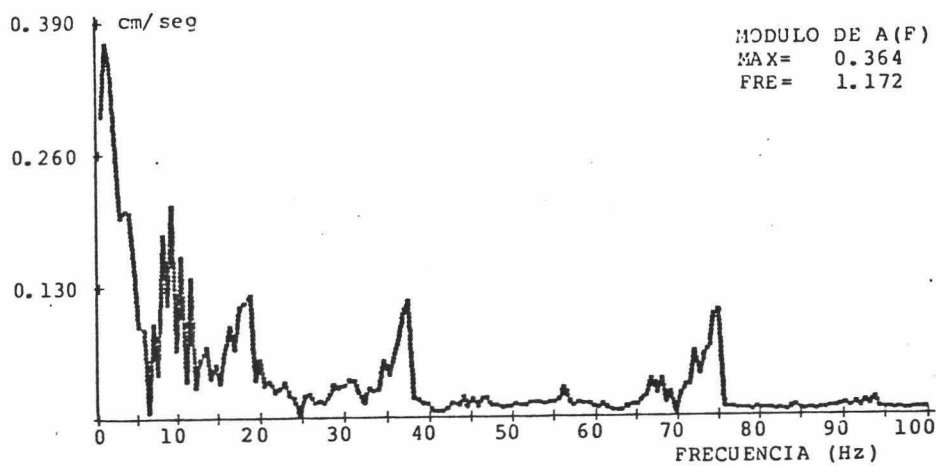


FIGURA 5.33

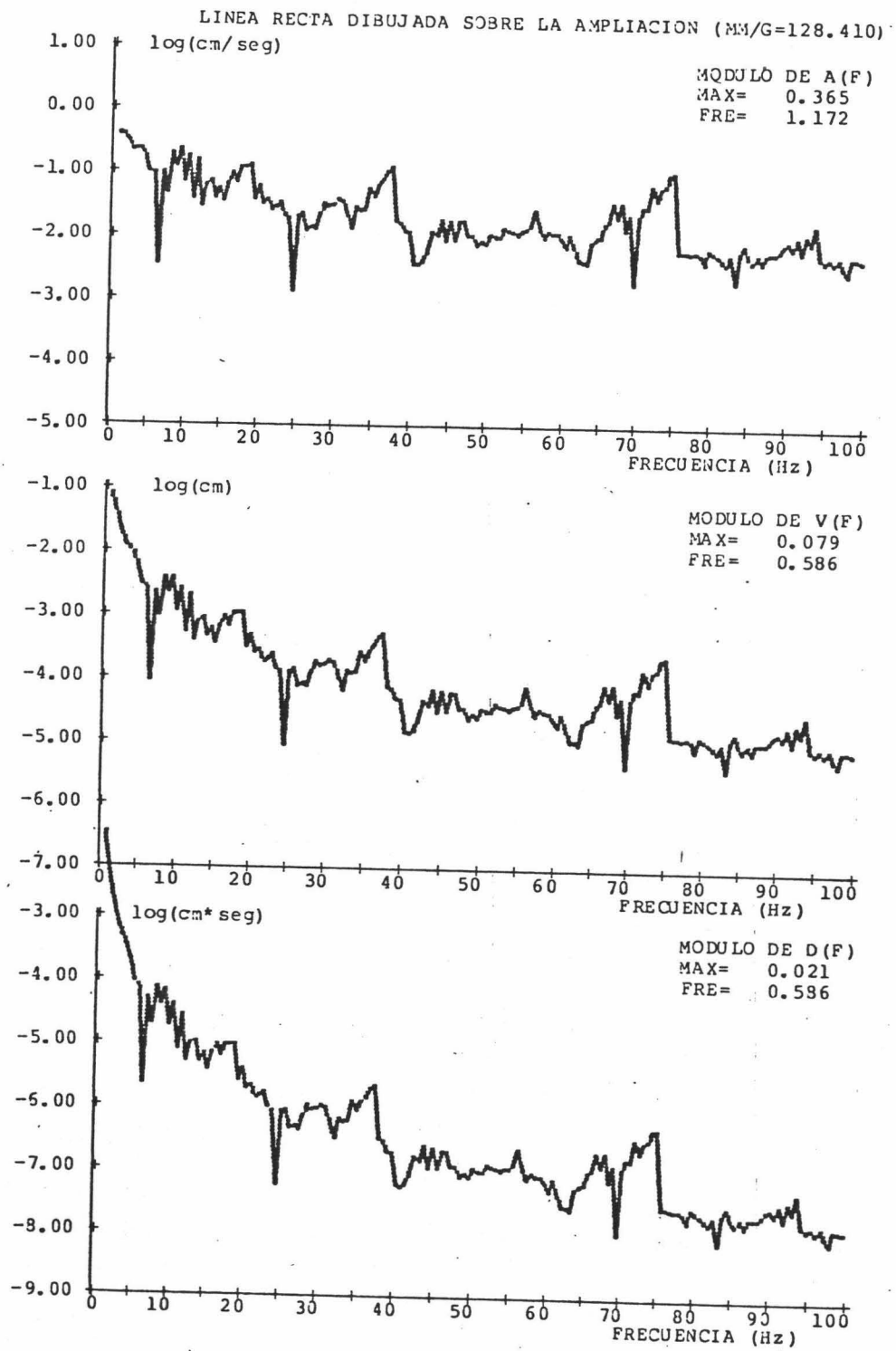


FIGURA 5.34

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=333.505)

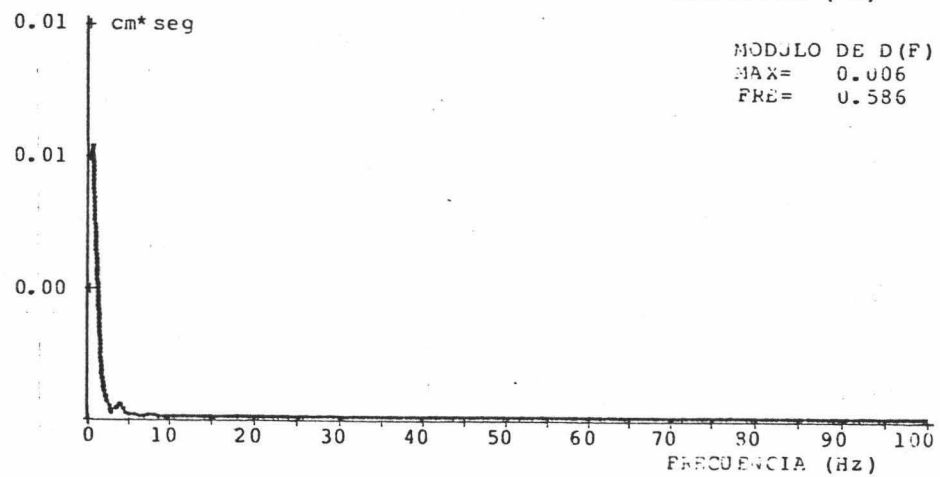
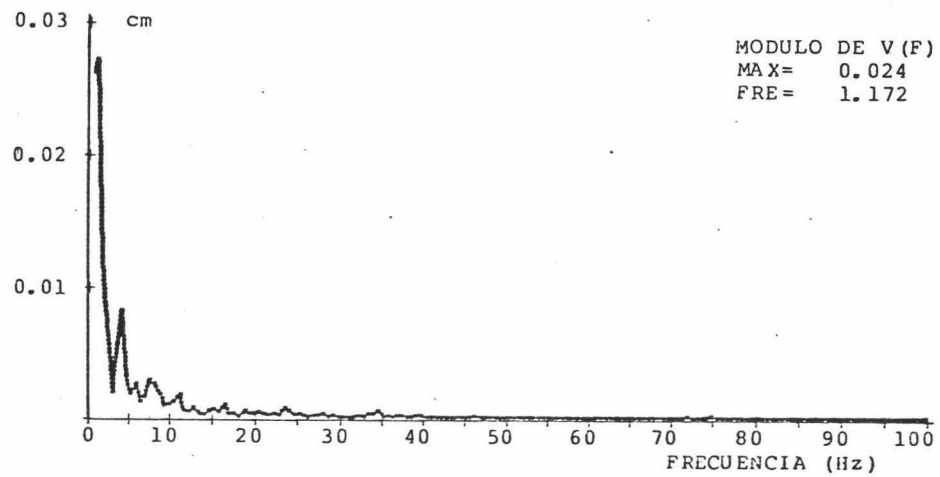
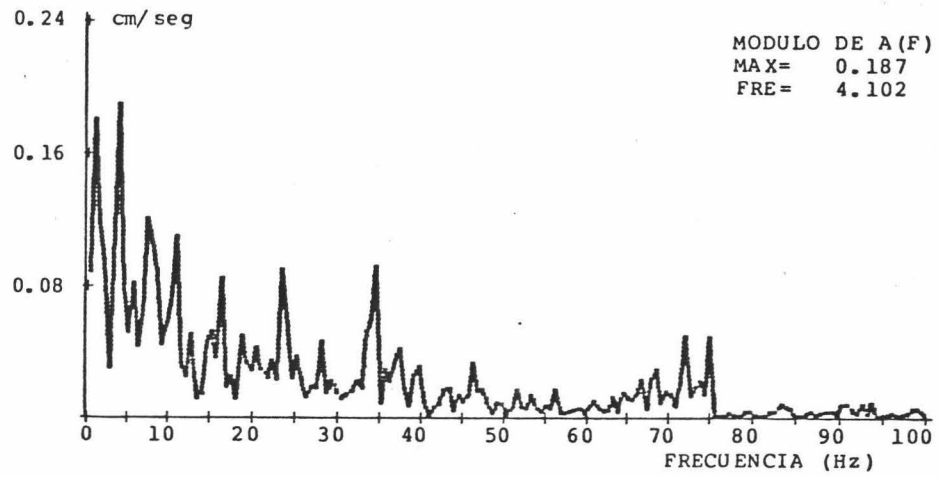


FIGURA 5.35

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (SIN FILTRO 333.505)

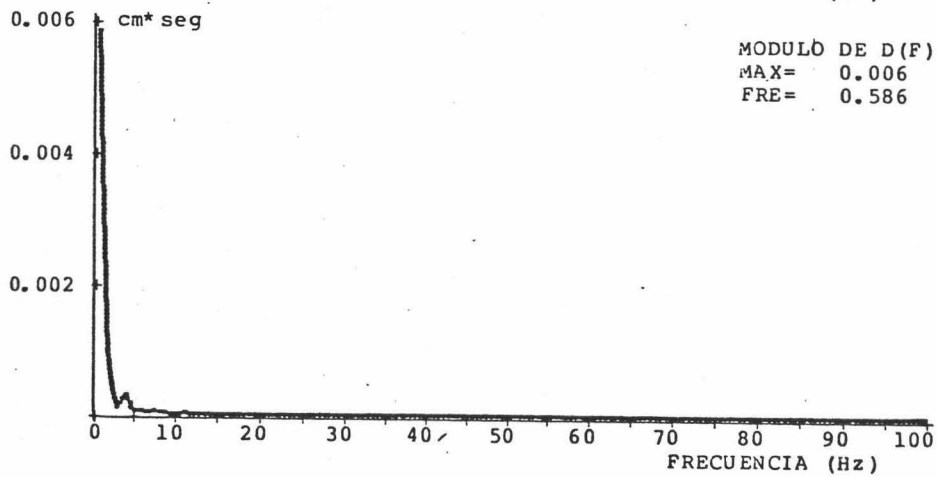
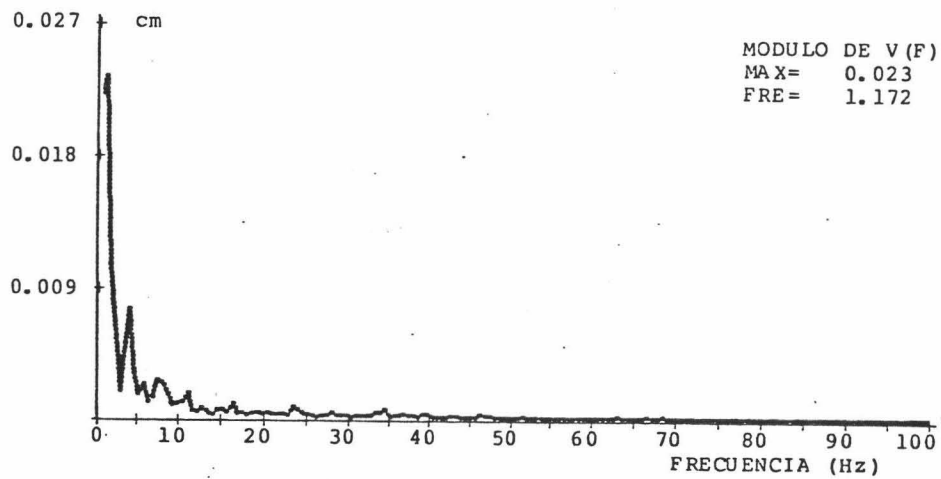
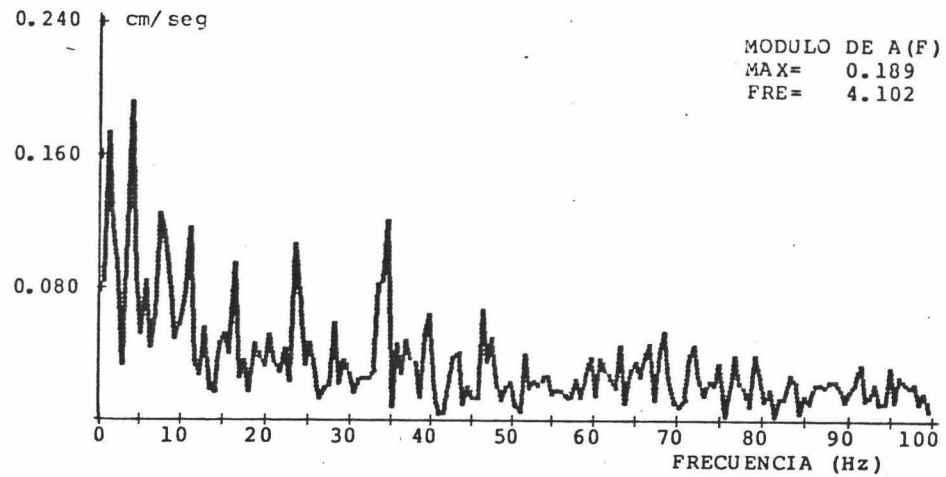


FIGURA 5.36

LINEA RECTA DIBUJADA SOBRE LA AMPLIACION (MM/G=557.740)

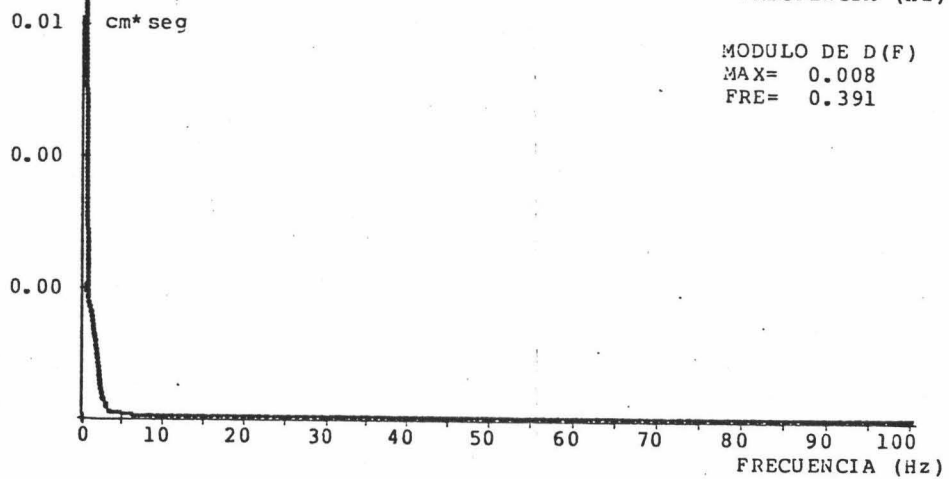
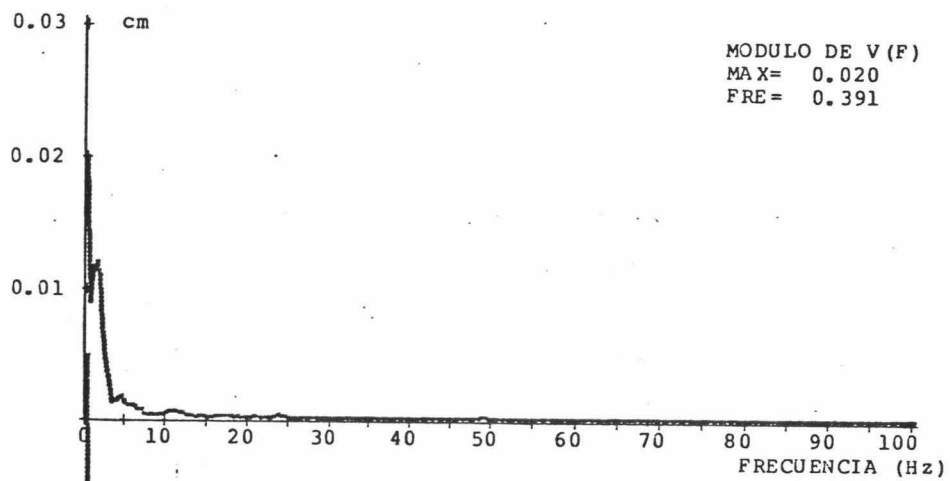
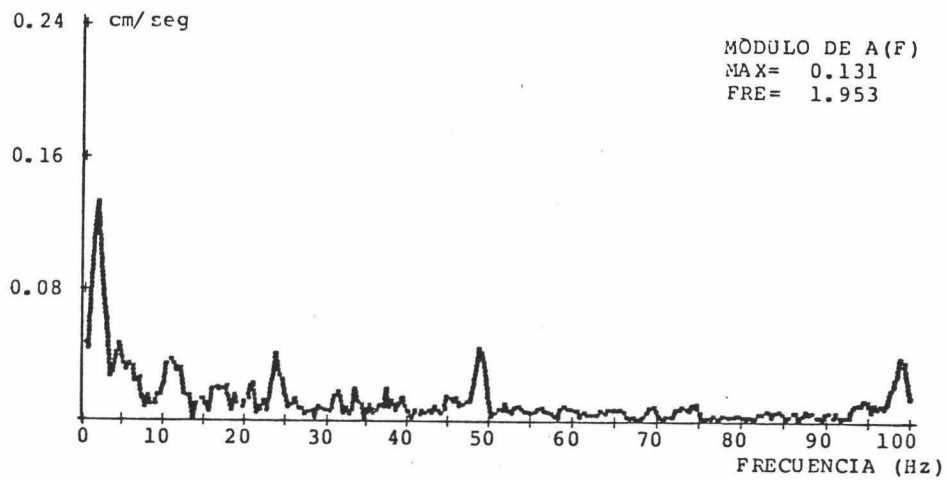


FIGURA 5.37

$Y=220 \cdot \text{SEN}(2 \cdot \pi \cdot 10 \cdot T)$ CON 200 MUESTRAS POR SEGUNDO

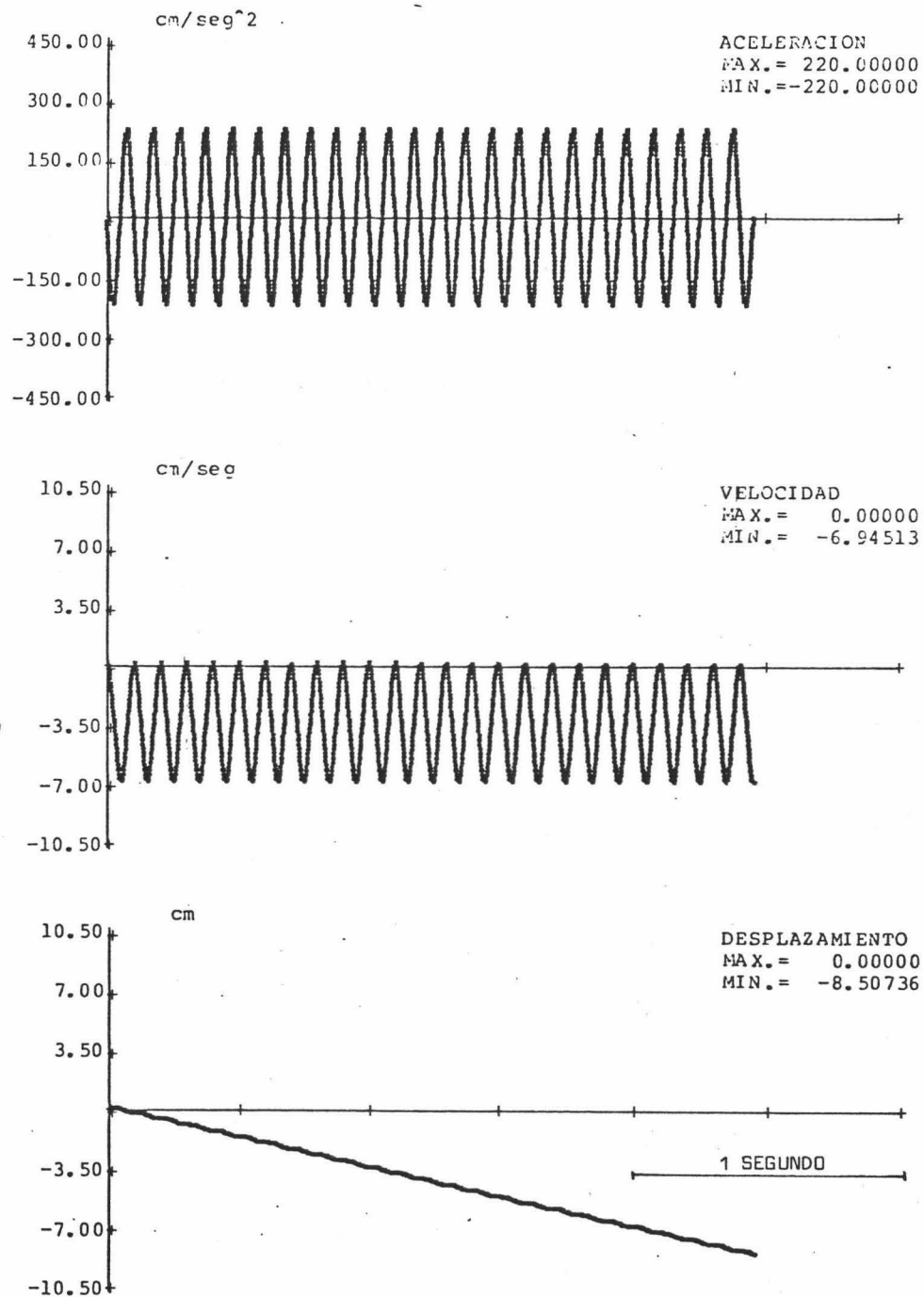


FIGURA 5.38

$Y=220*\text{SEN}(2*\pi*10*T)$ CON 200 MUESTRAS POR SEGUNDO

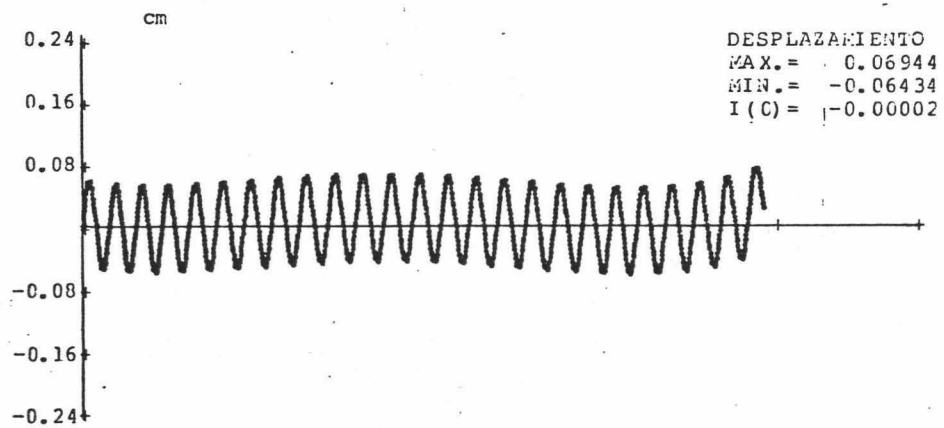
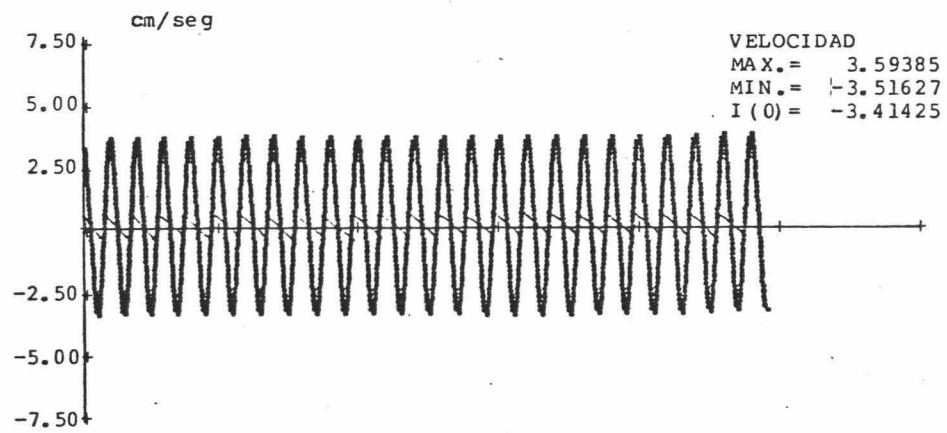
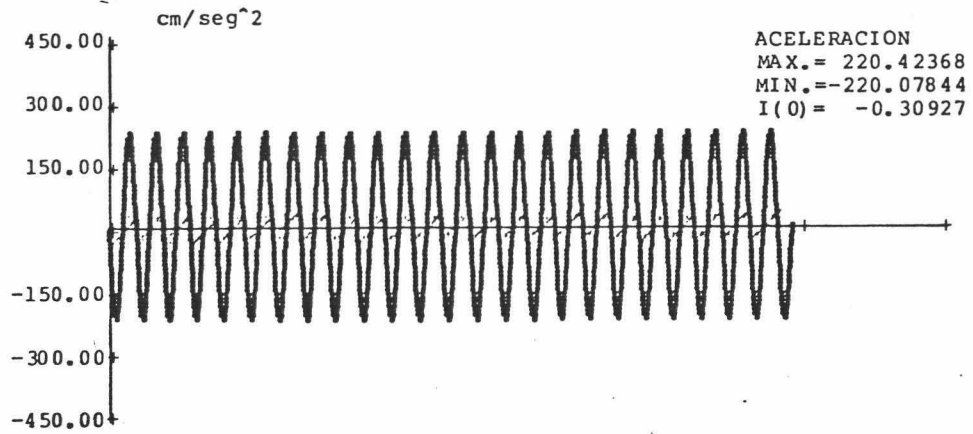


FIGURA 5.39

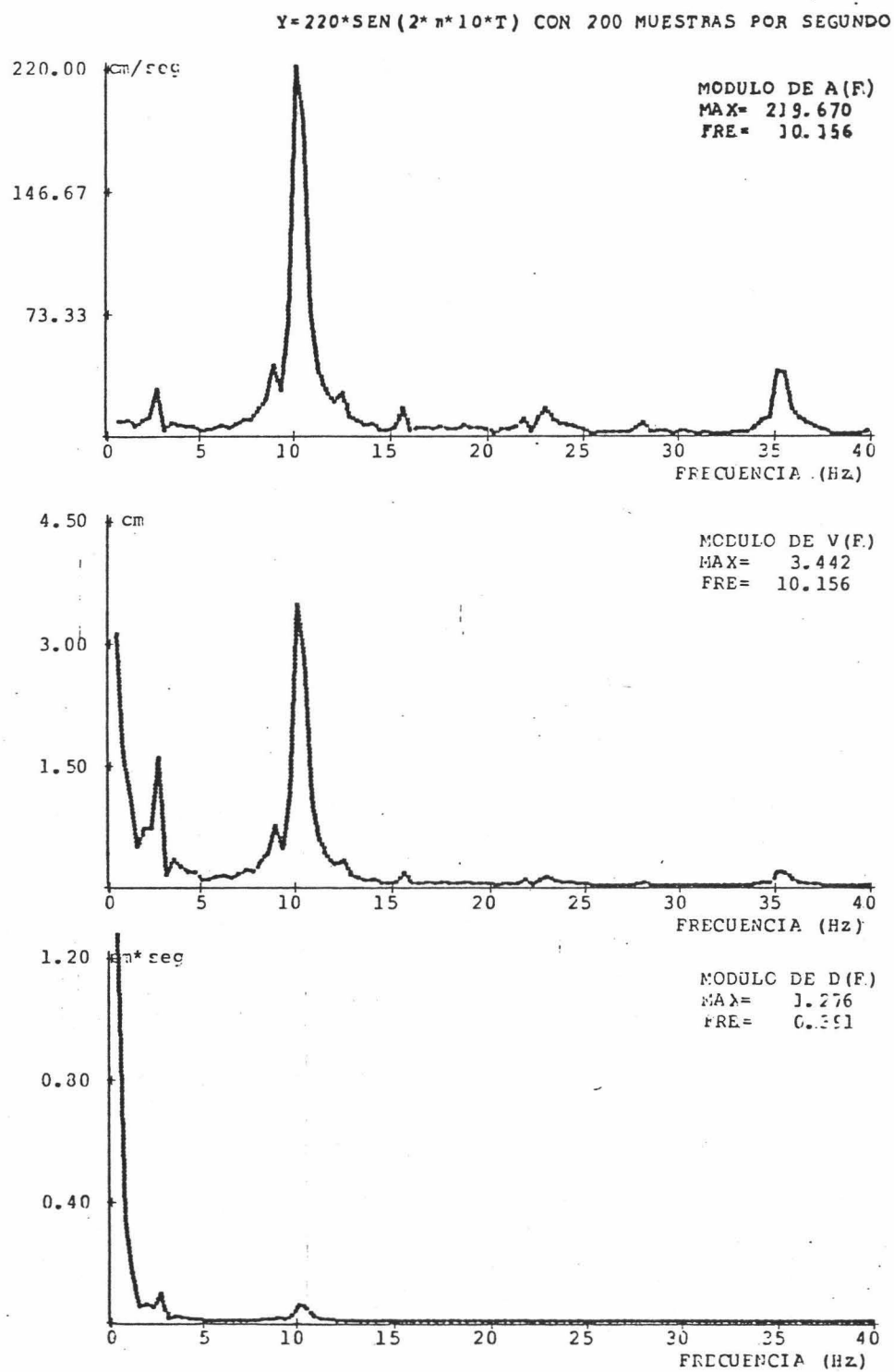


FIGURA 5.40

CALIBRACION DE LA COMPONENTE VERTICAL DEL ACELEROGRAFO SMA-1 (2120)

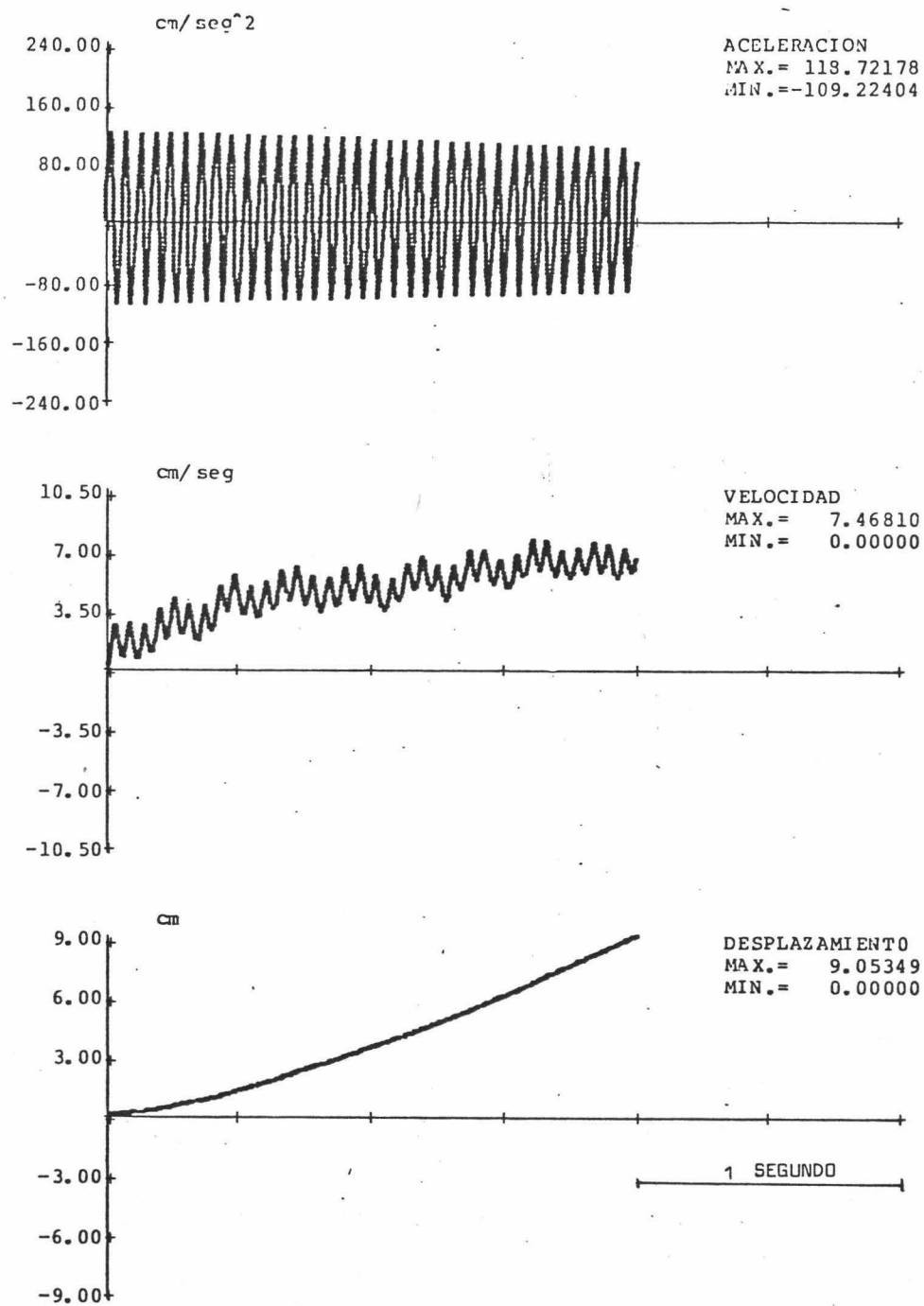


FIGURA 5.41

CALIBRACION DE LA COMPONENTE VERTICAL DEL ACELEROGRAFO SMA-1 (2120)

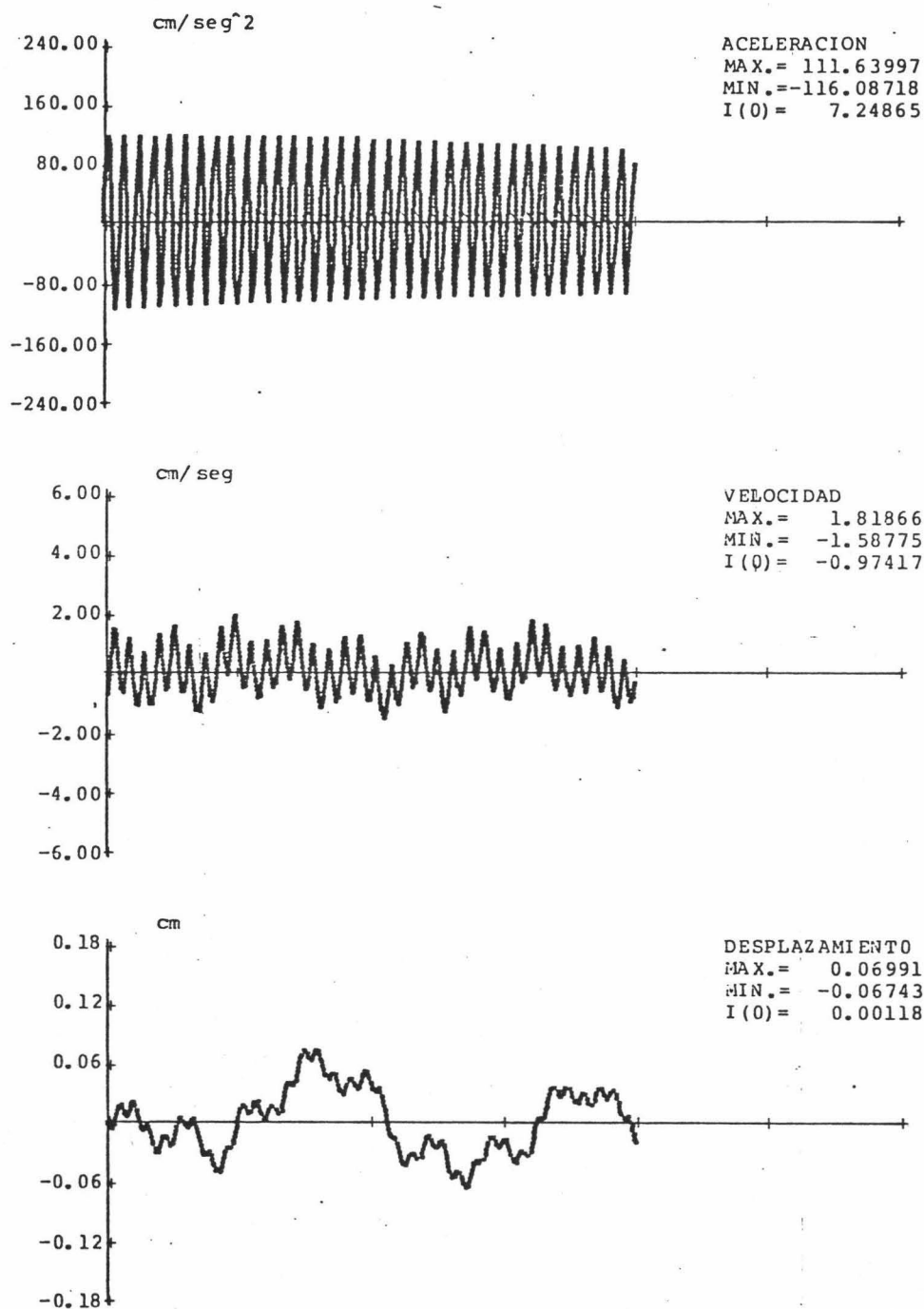


FIGURA 5.42

CALIBRACION DE LA COMPONENTE VERTICAL DEL ACELEROGRAFO SMA-1 (2120)

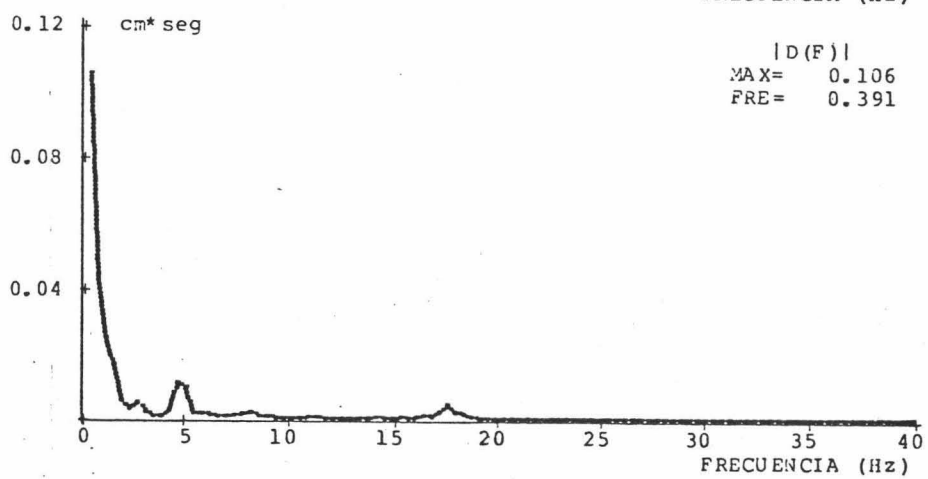
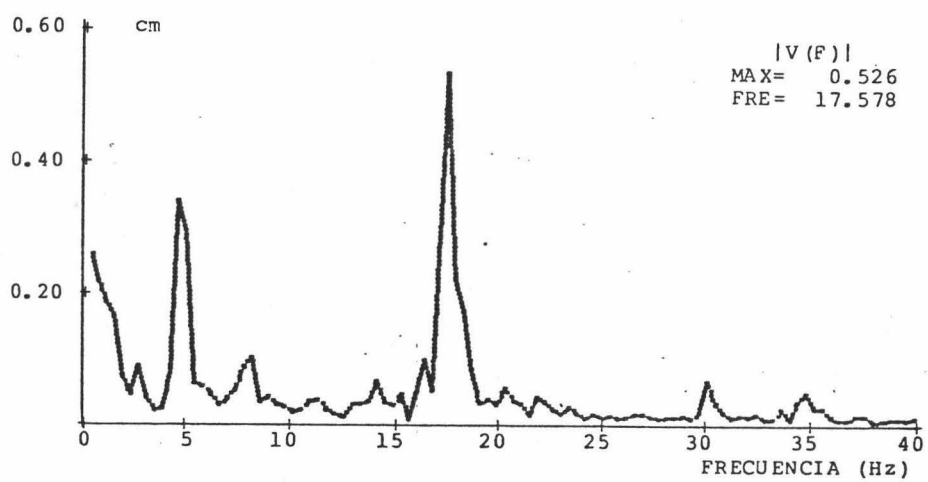
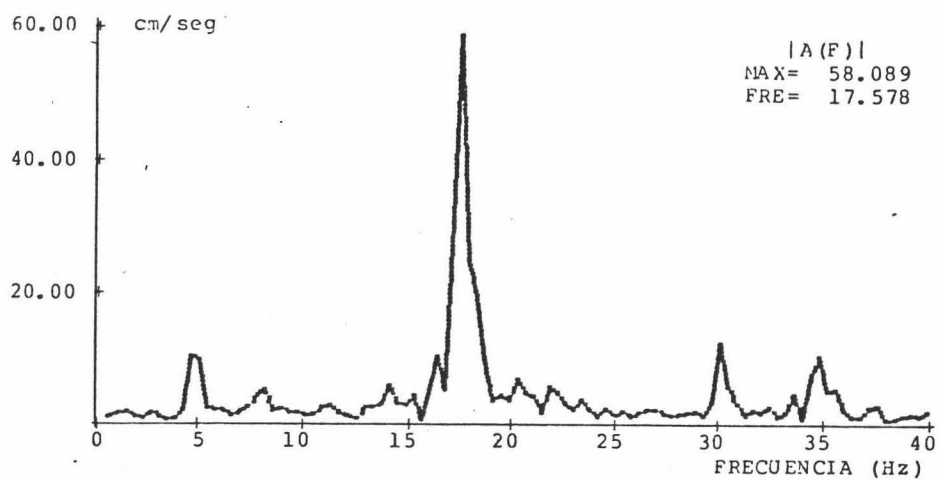


FIGURA 5.43

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331C)

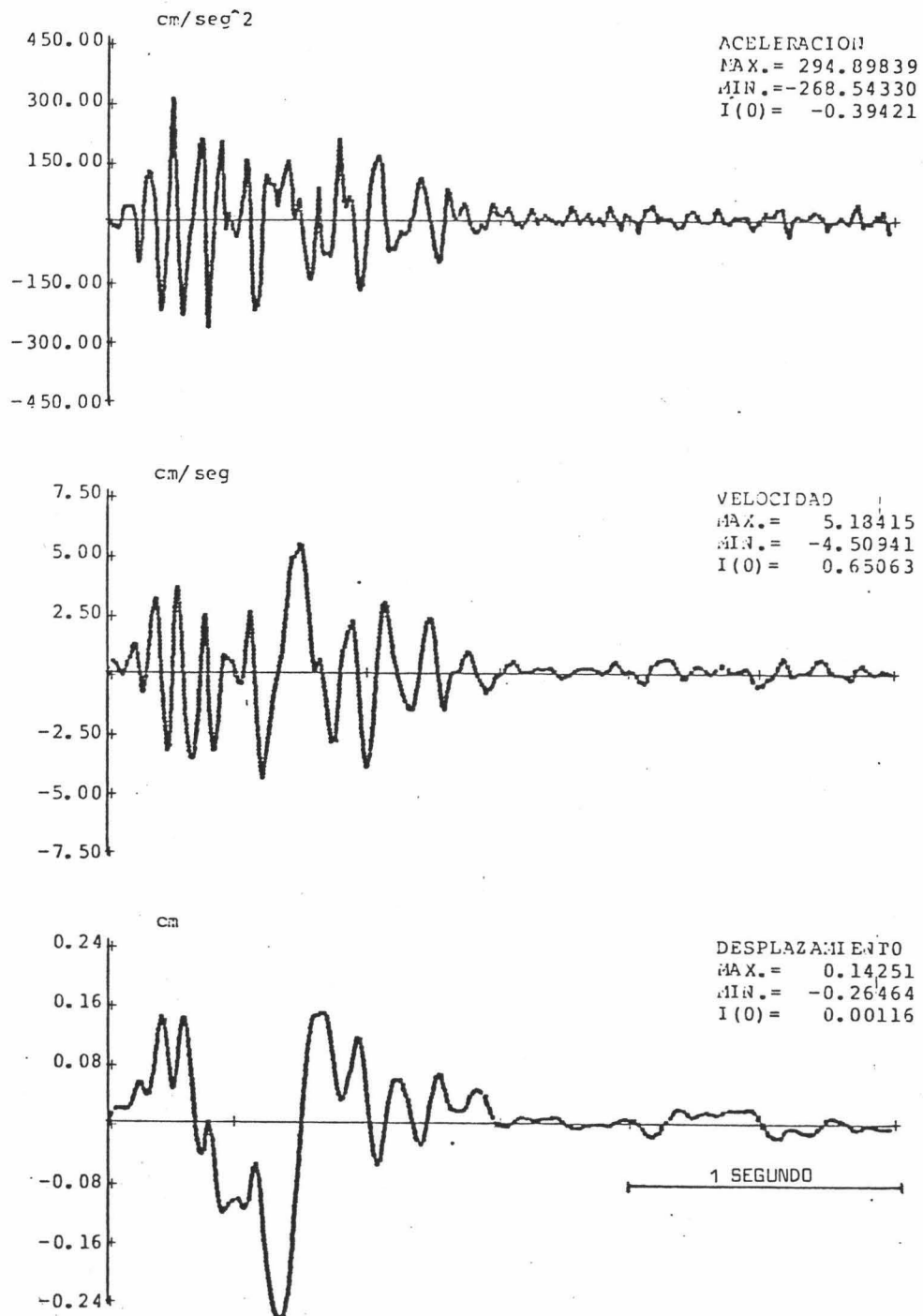


FIGURA 5.44

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P3311)

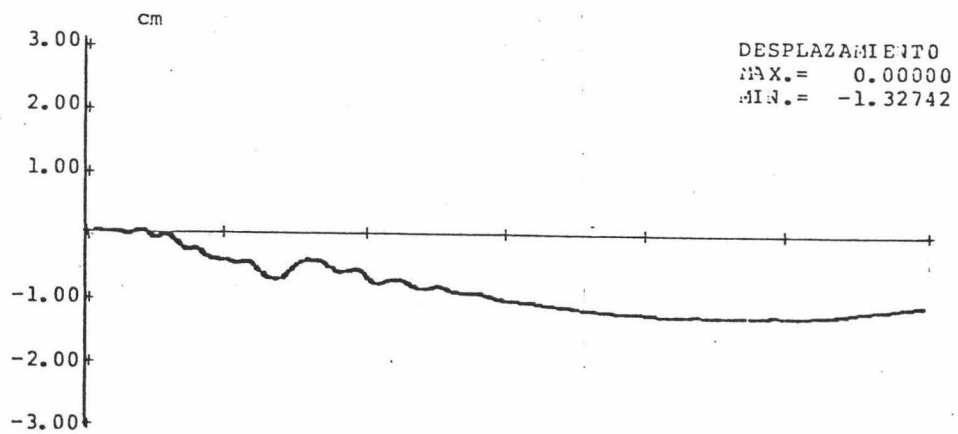
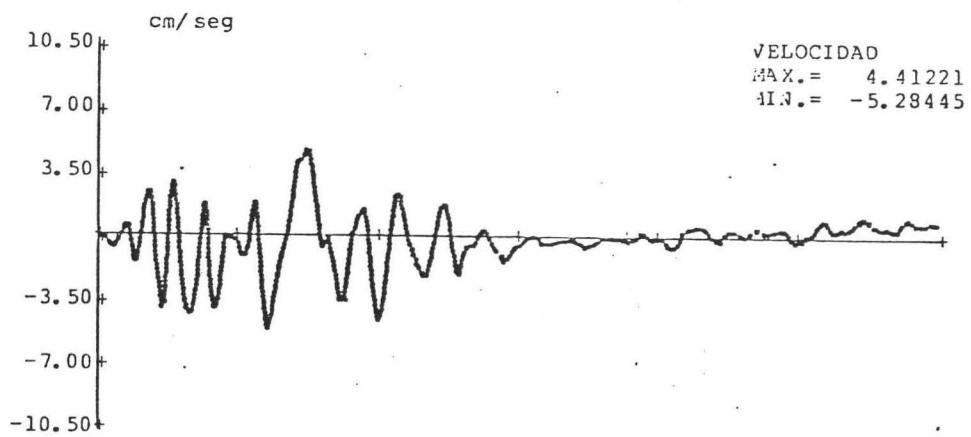
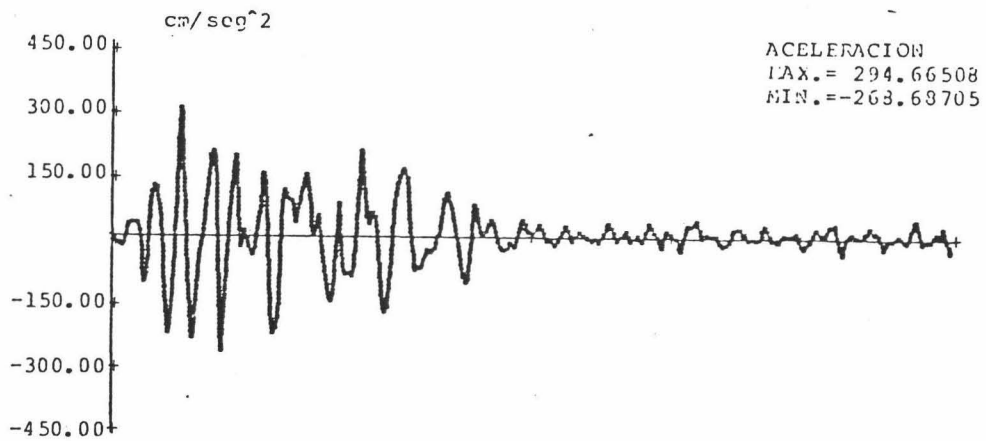


FIGURA 5.45

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331I-6)

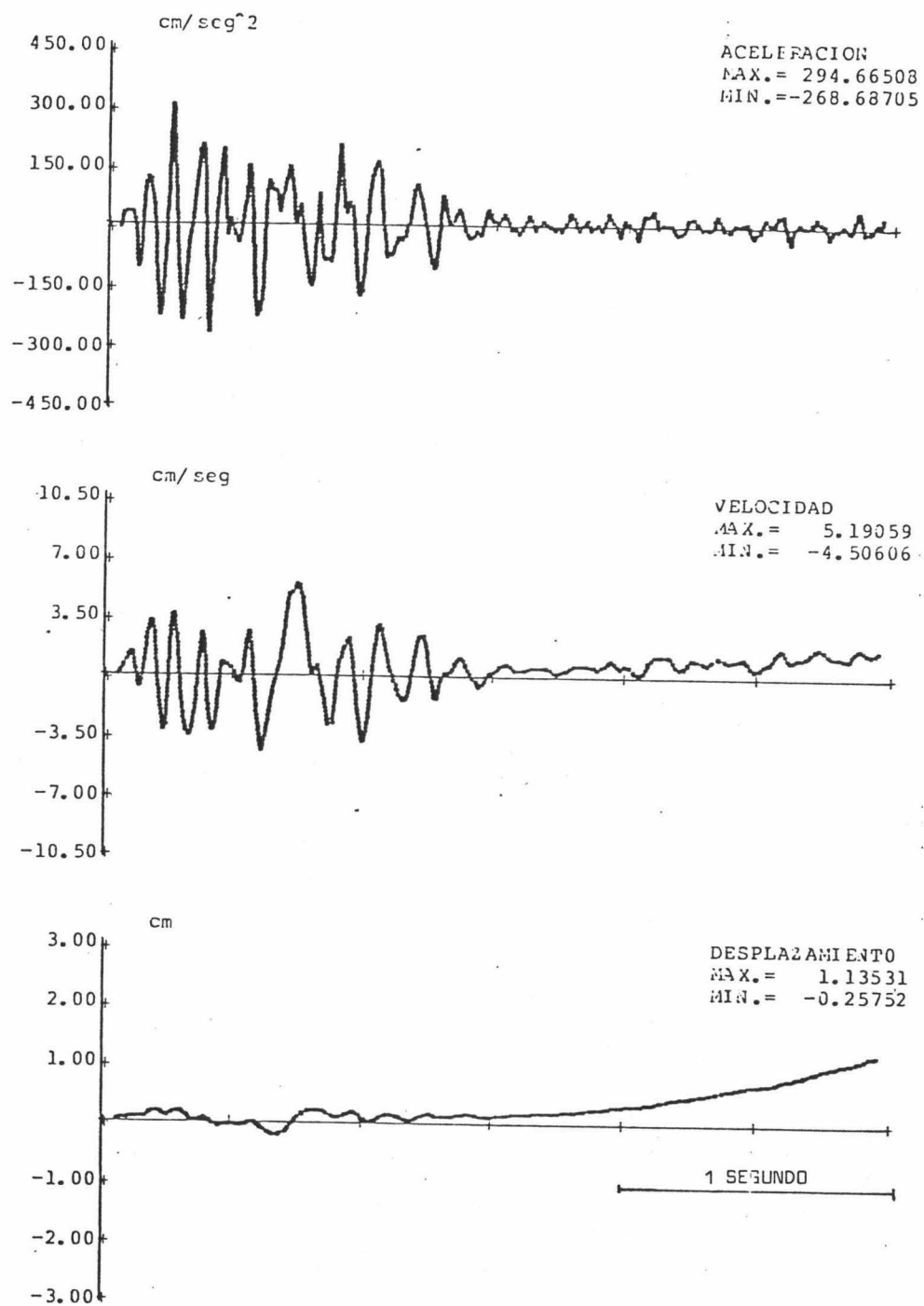


FIGURA 5.46

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331C-6)

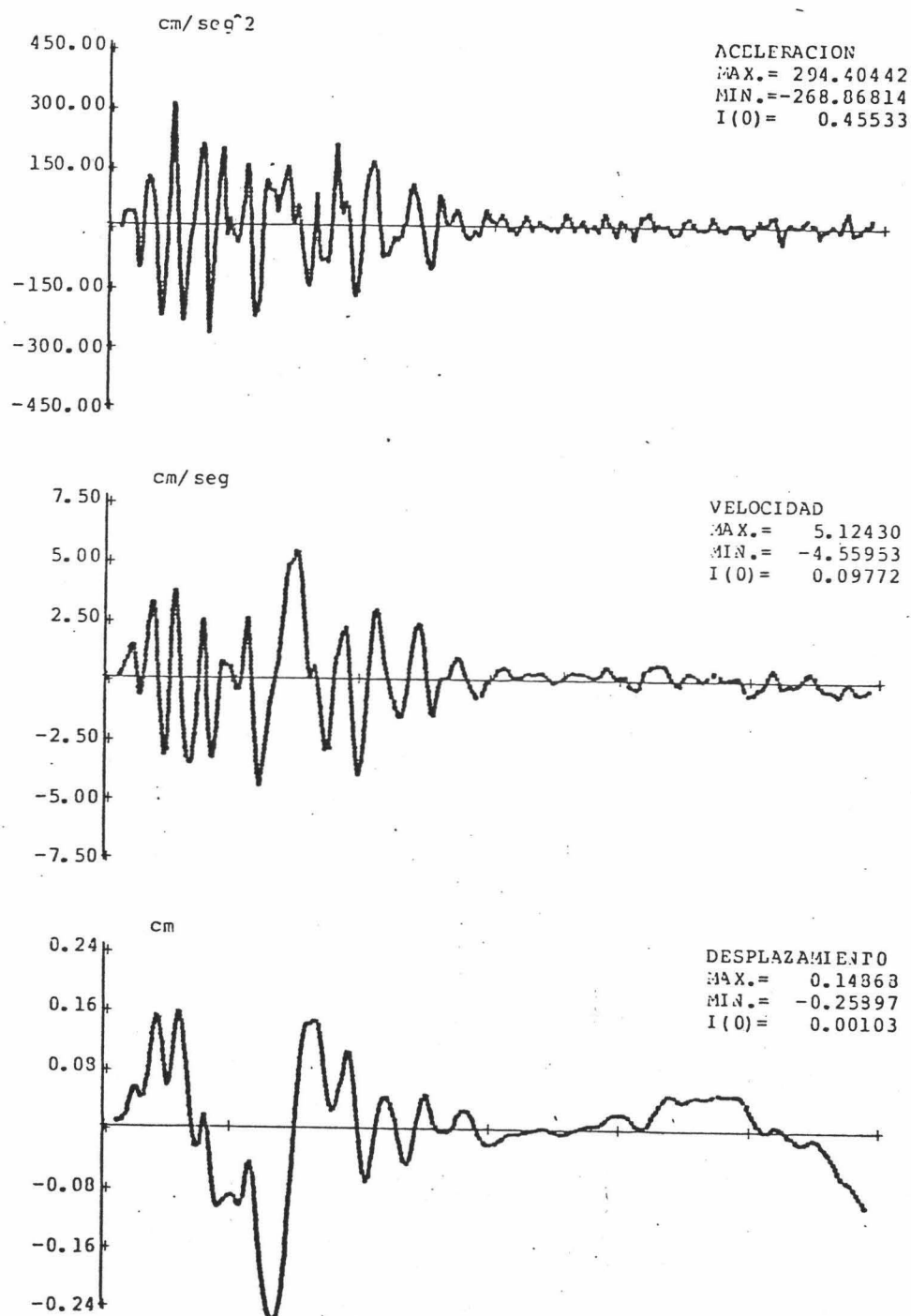


FIGURA 5.47

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331I-18)

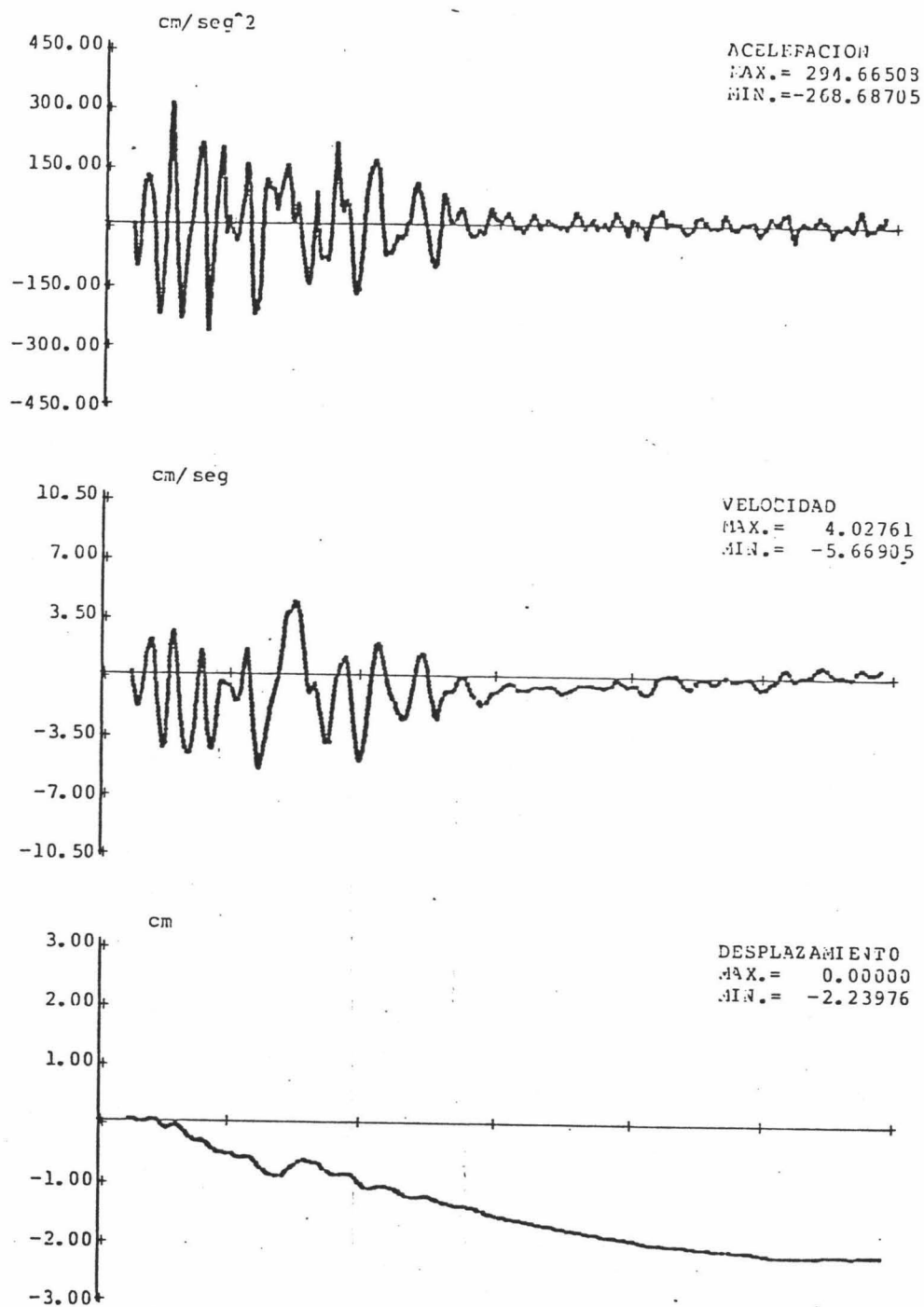


FIGURA 5.48

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P331C-18)

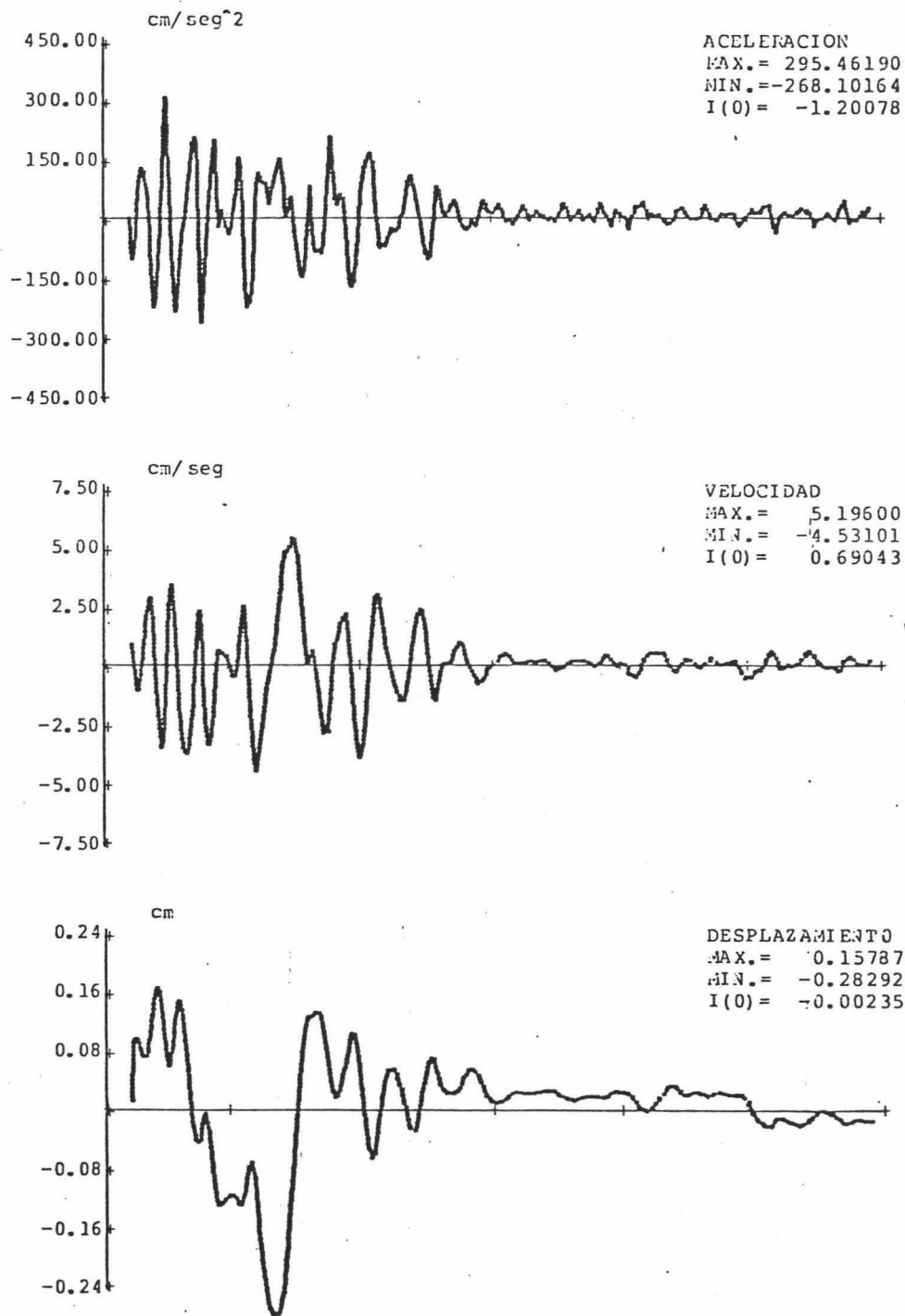


FIGURA 5.49

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P346I)

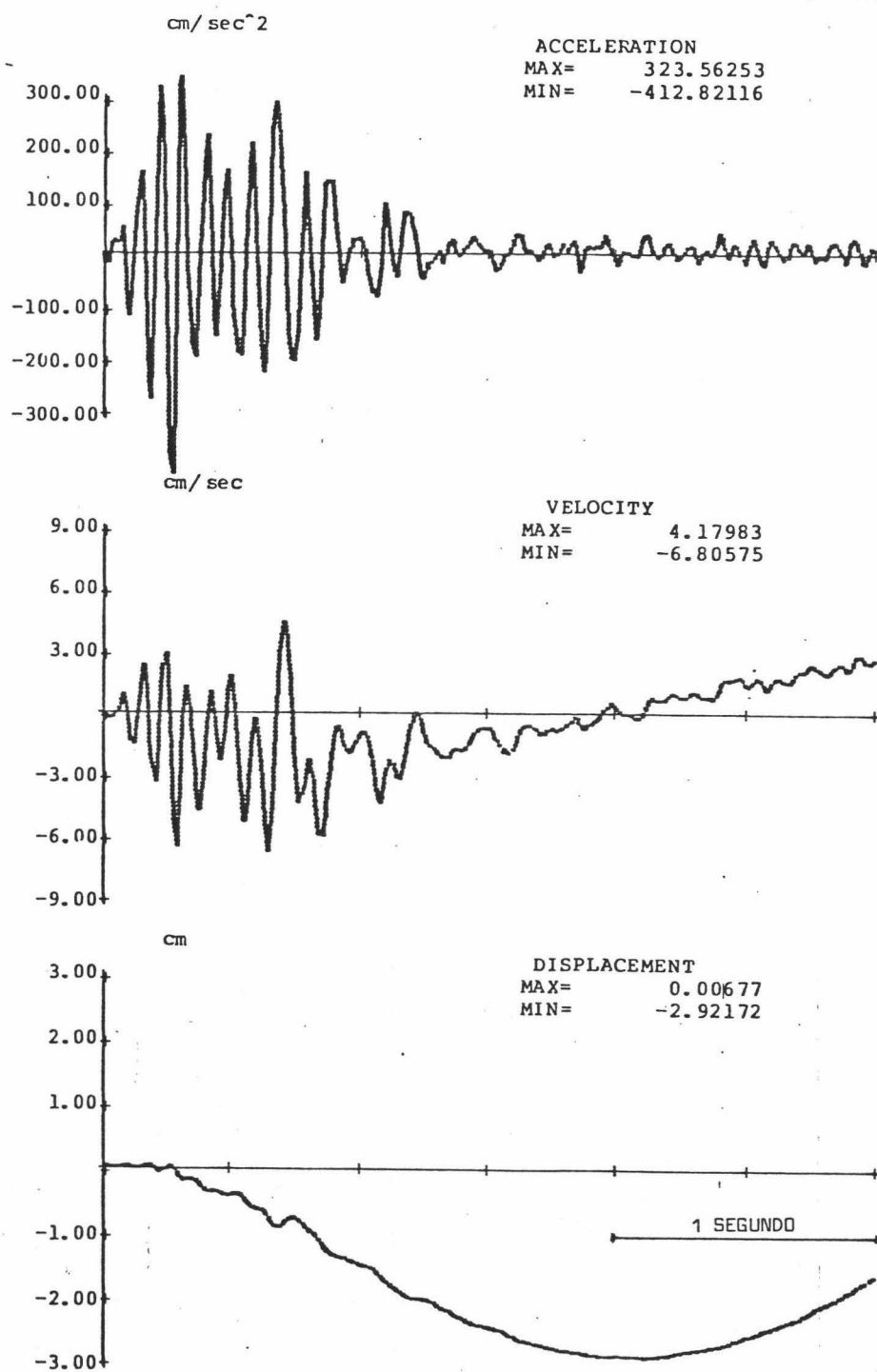


FIGURA 5.50

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P346C)

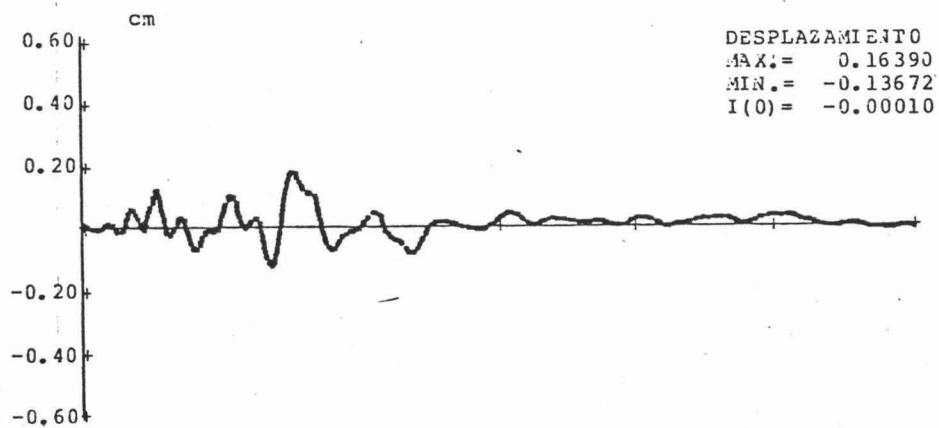
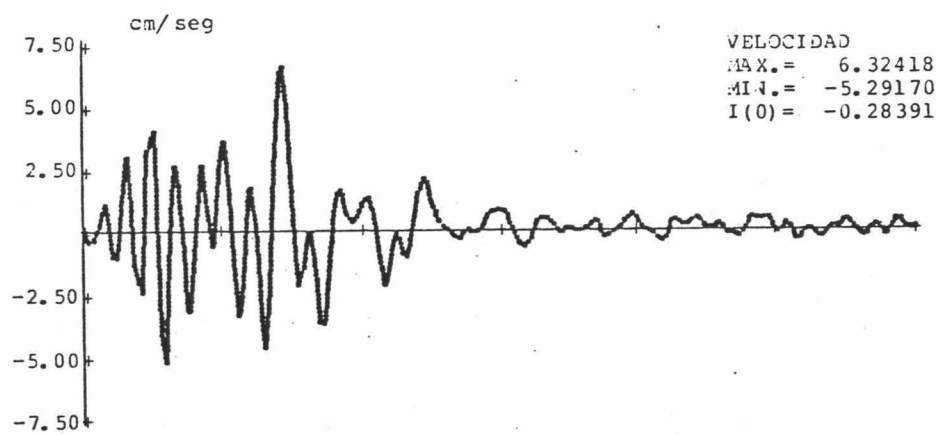
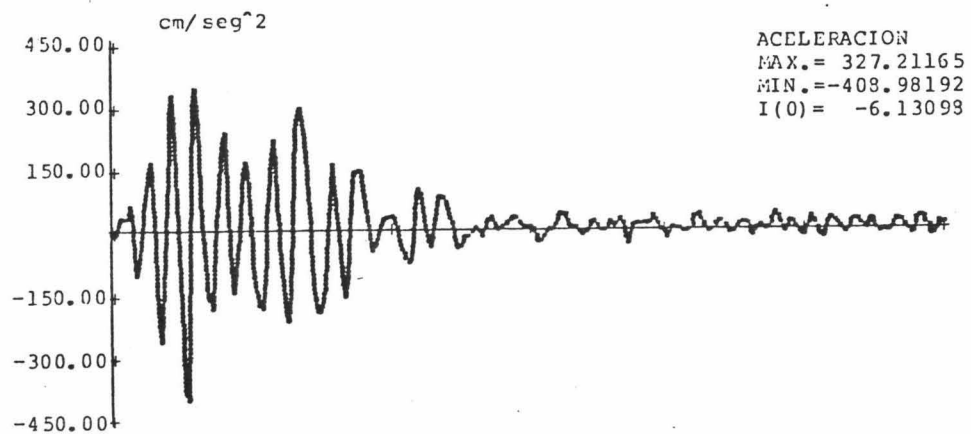


FIGURA 5.51

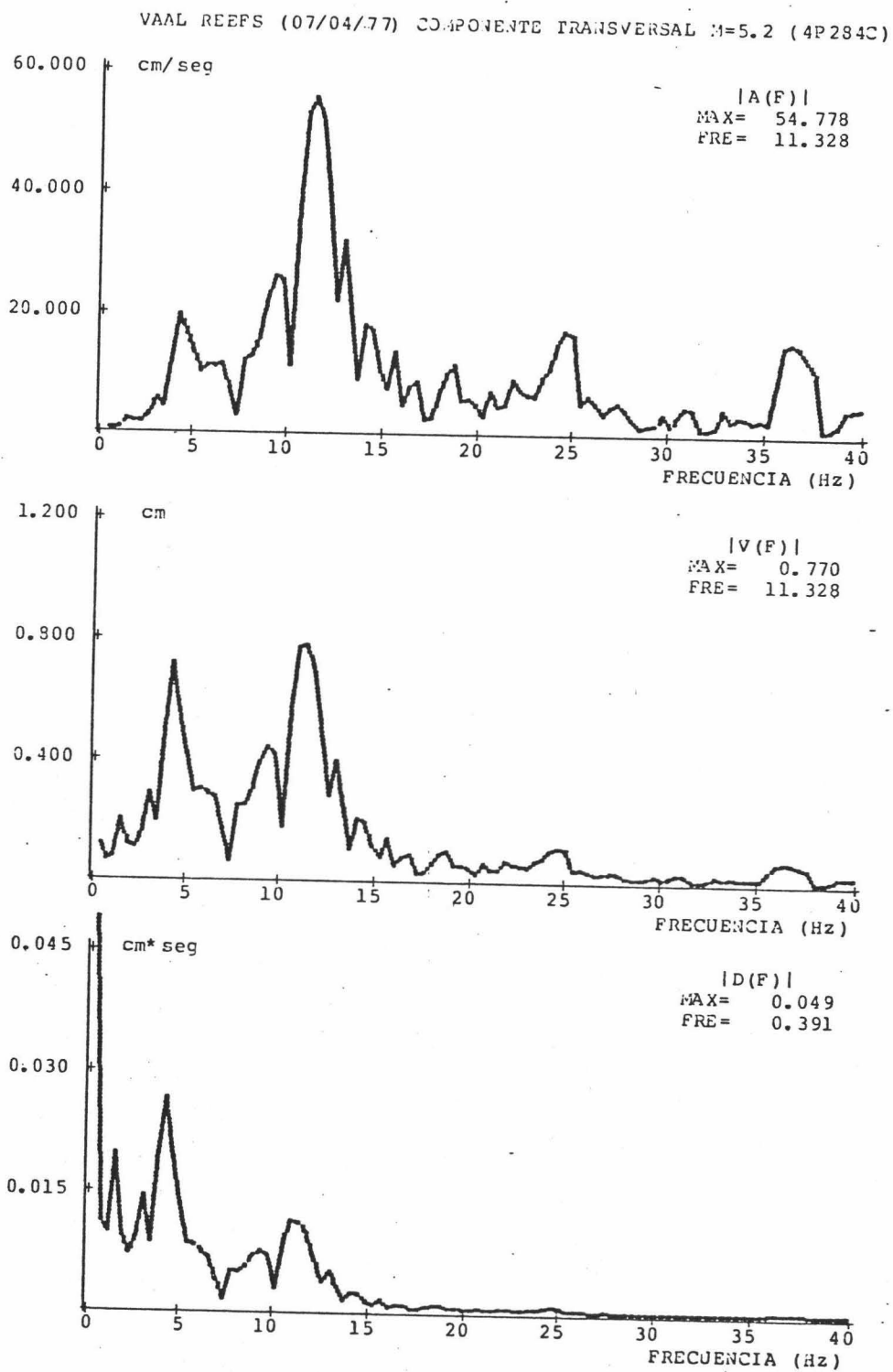


FIGURA 5.52



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P190C)

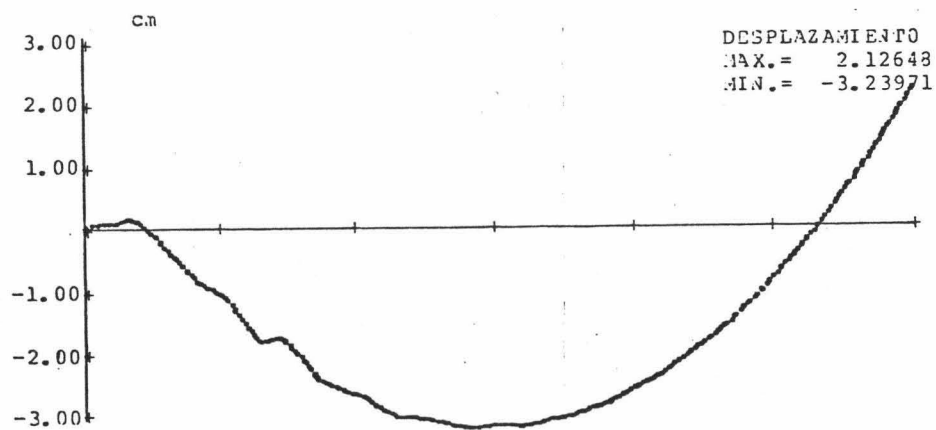
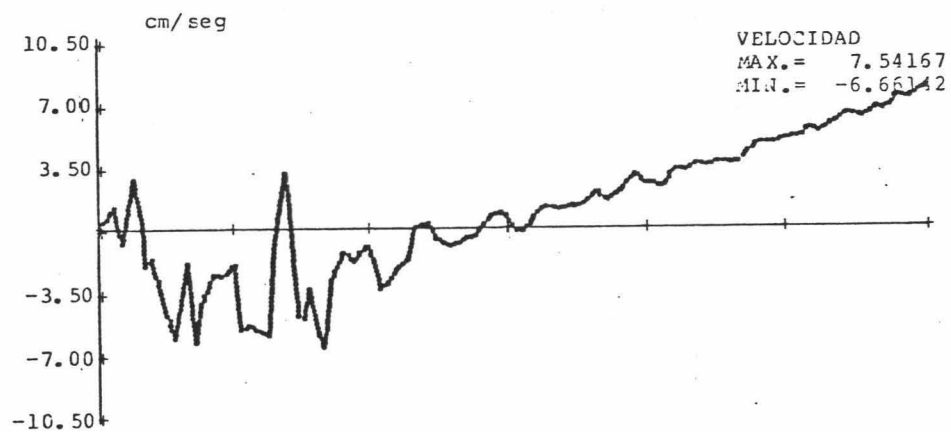
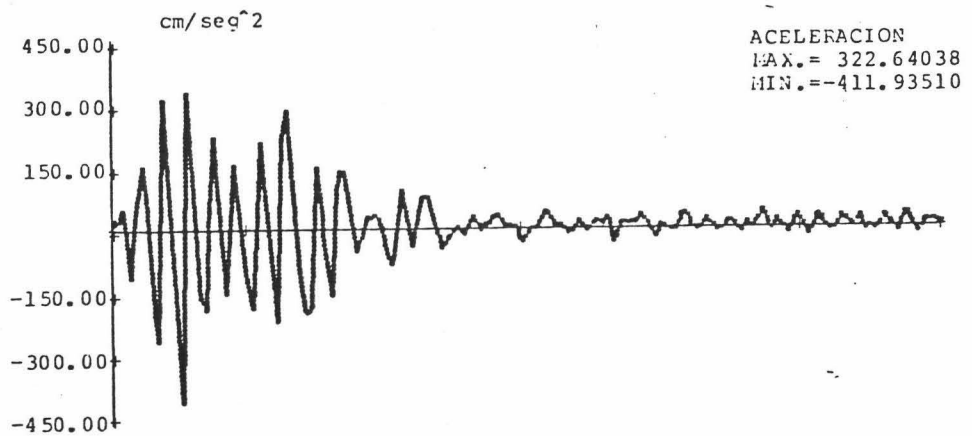


FIGURA 5.53

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P1902)

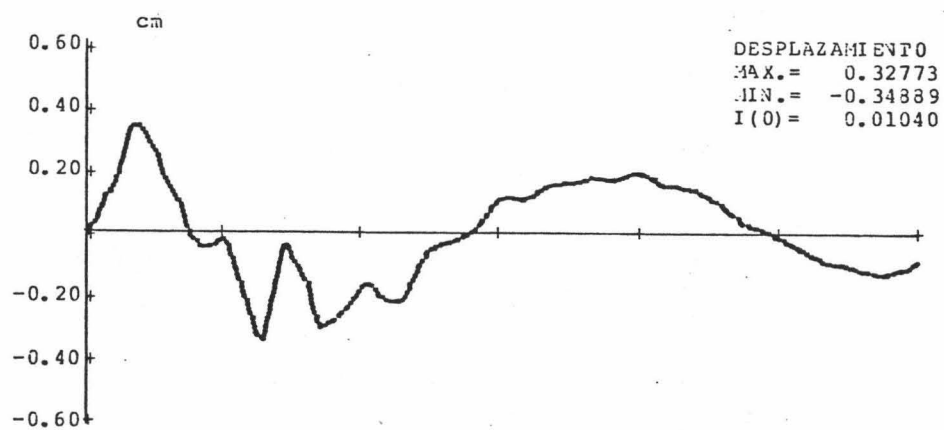
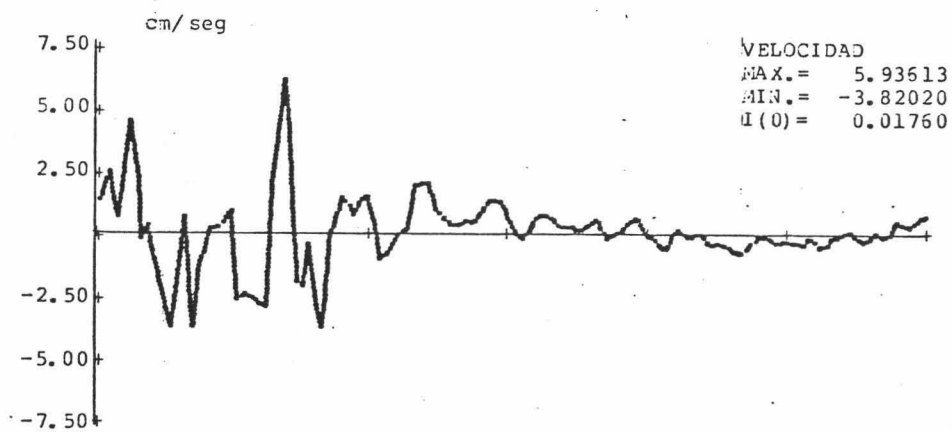
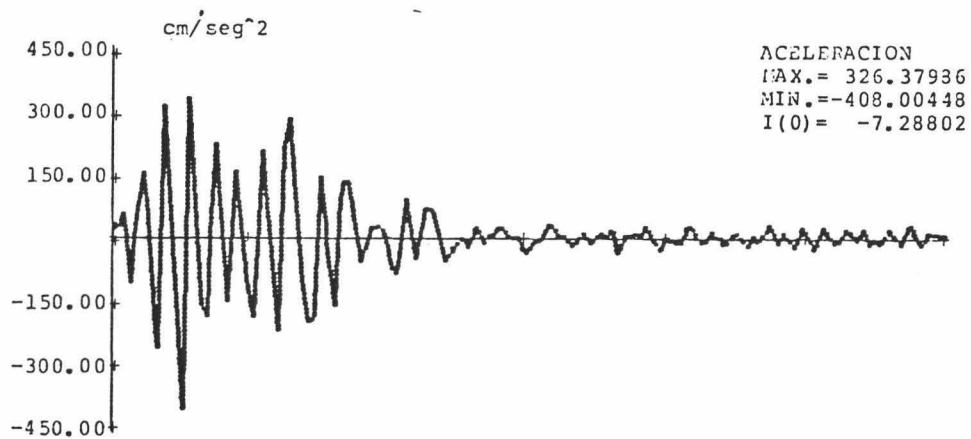


FIGURA 5.54

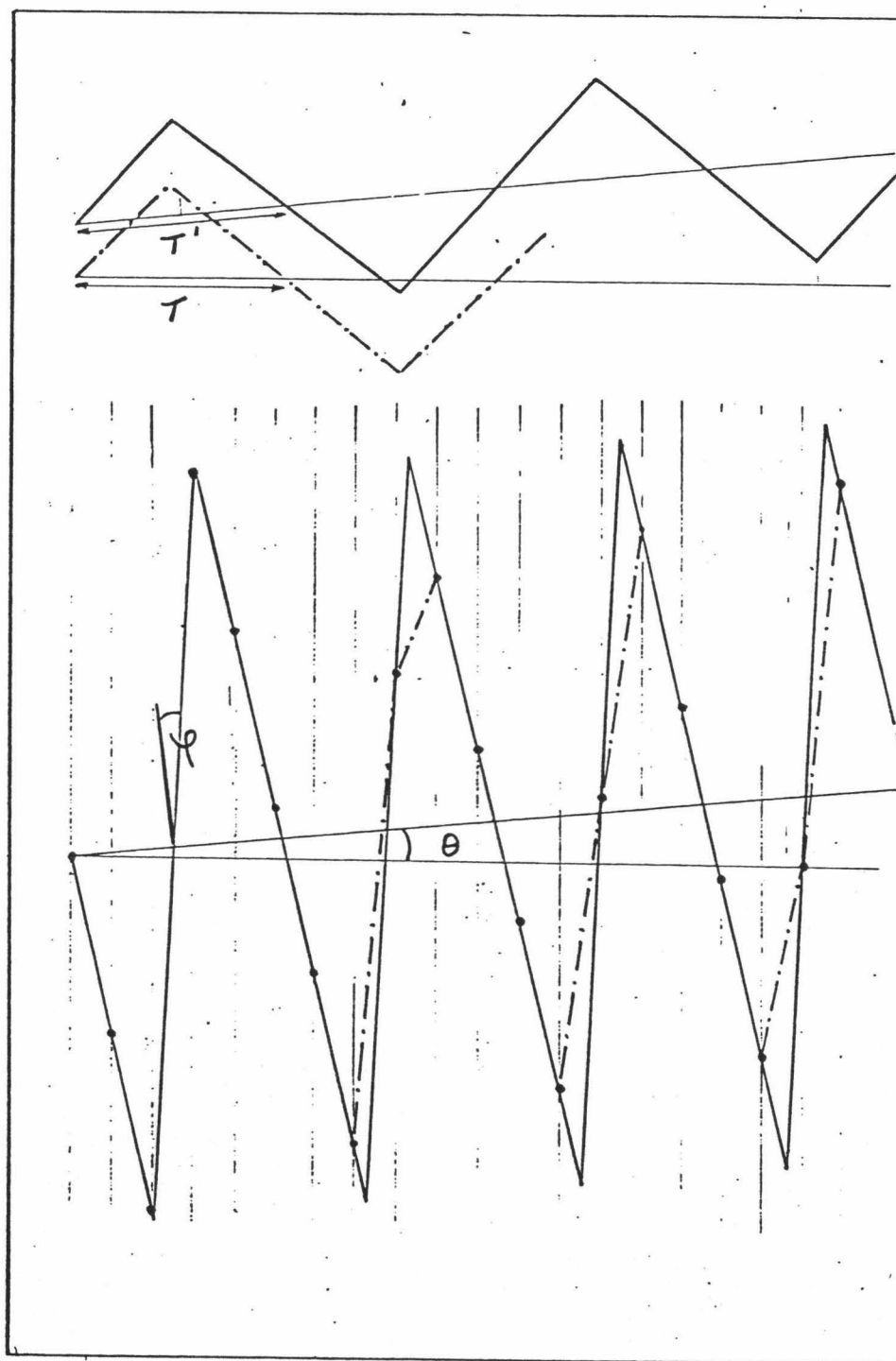


FIGURA 5.55

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207I.)

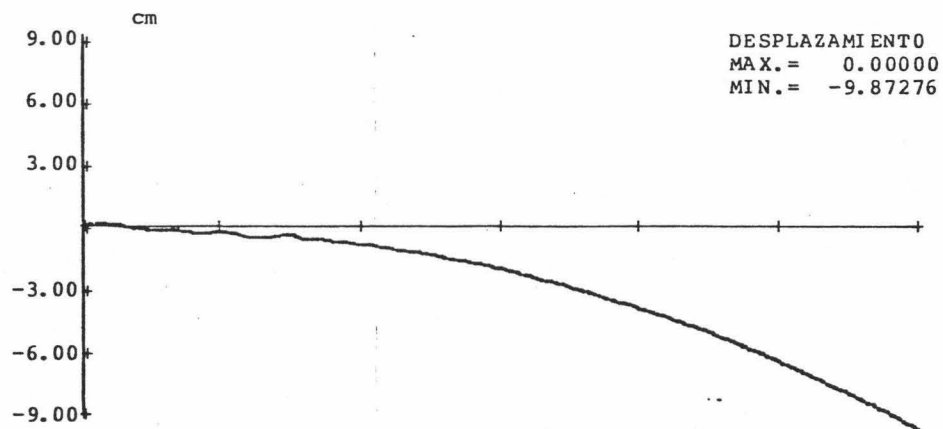
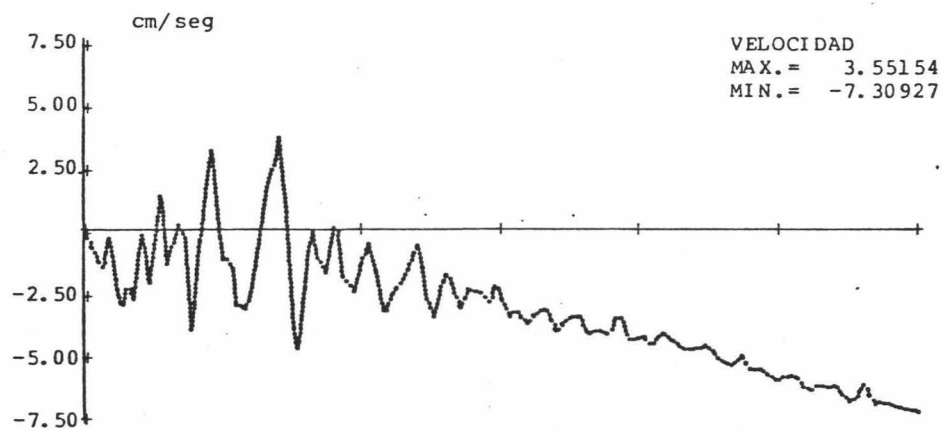
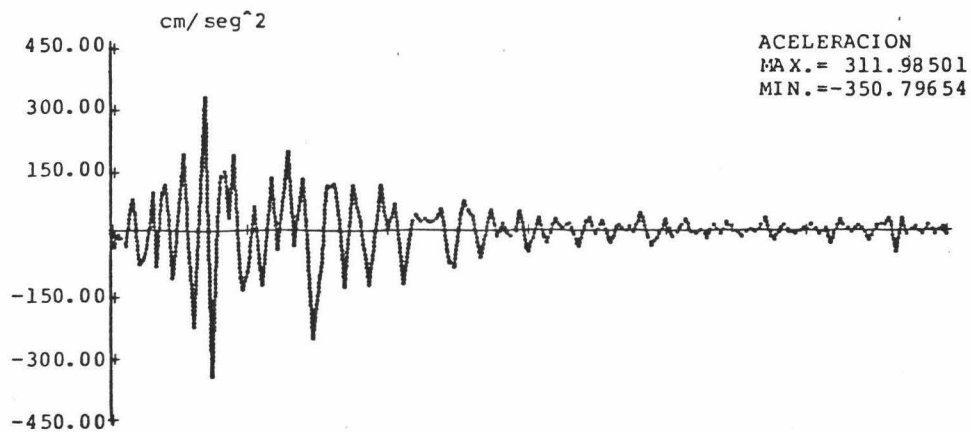


FIGURA 5.56

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207I)

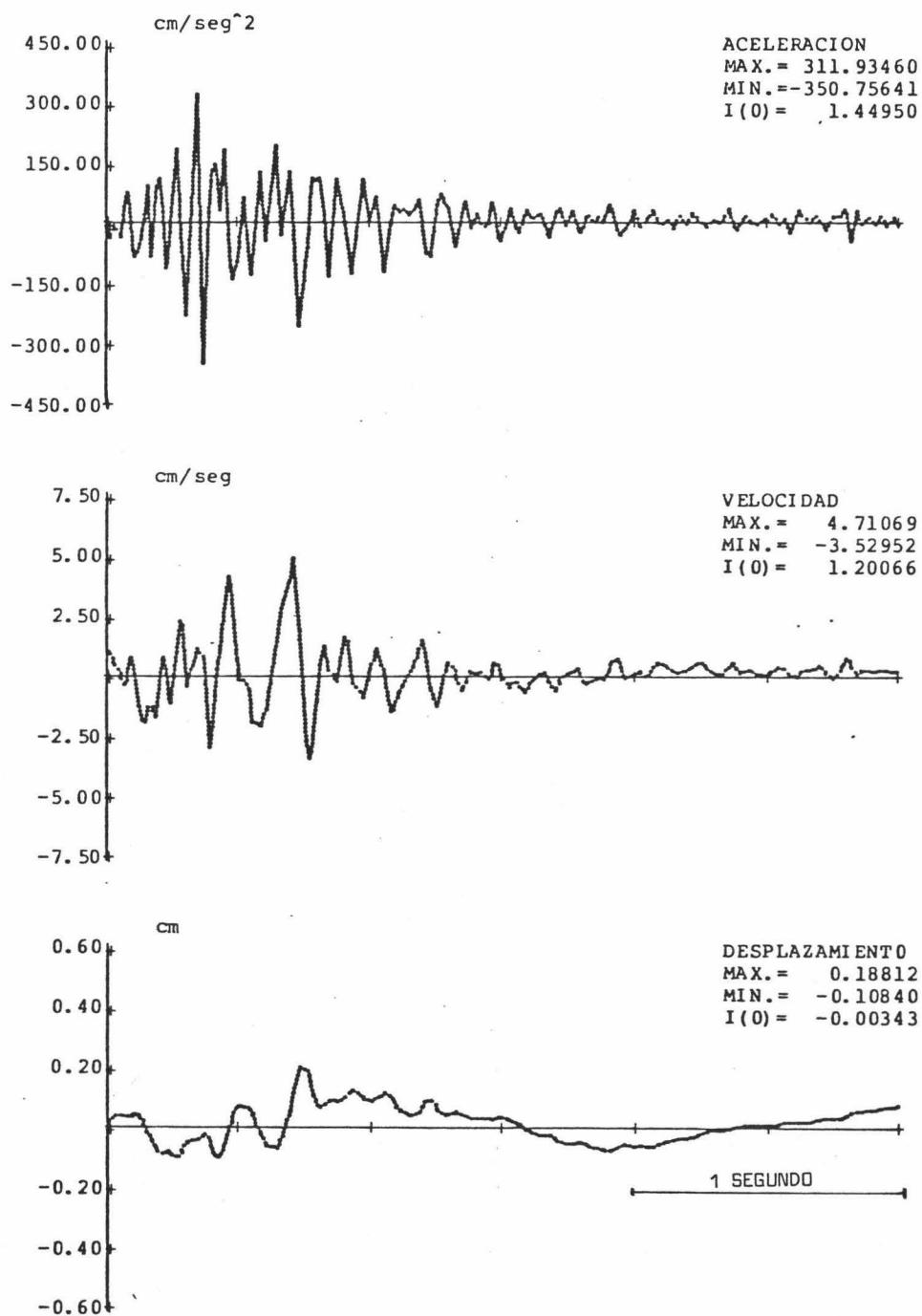


FIGURA 5.57

VAAL BIEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P.180C)

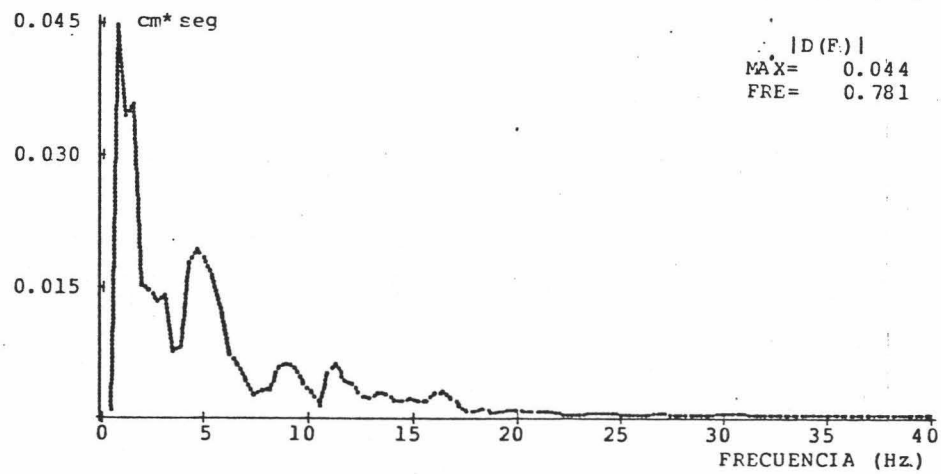
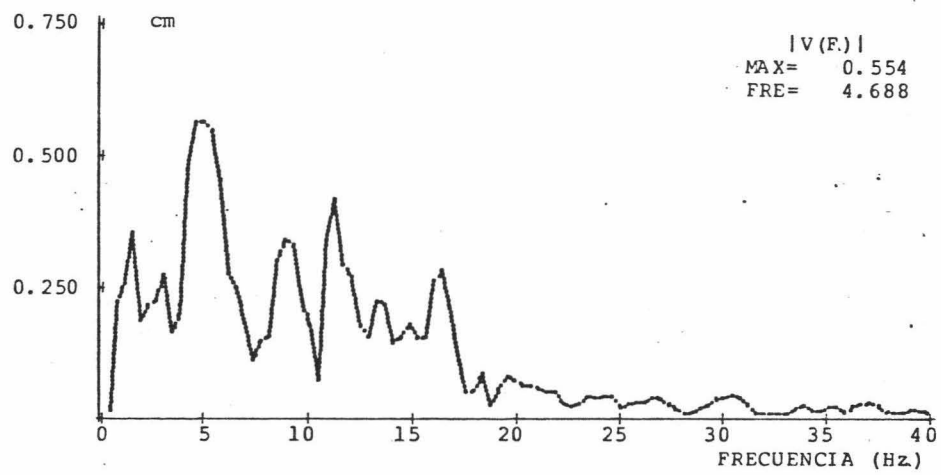
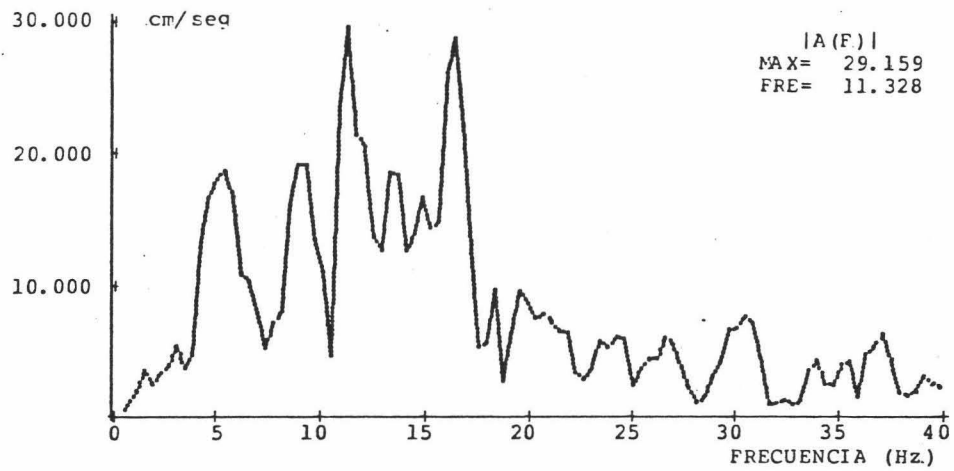


FIGURA 5.58

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207COT)

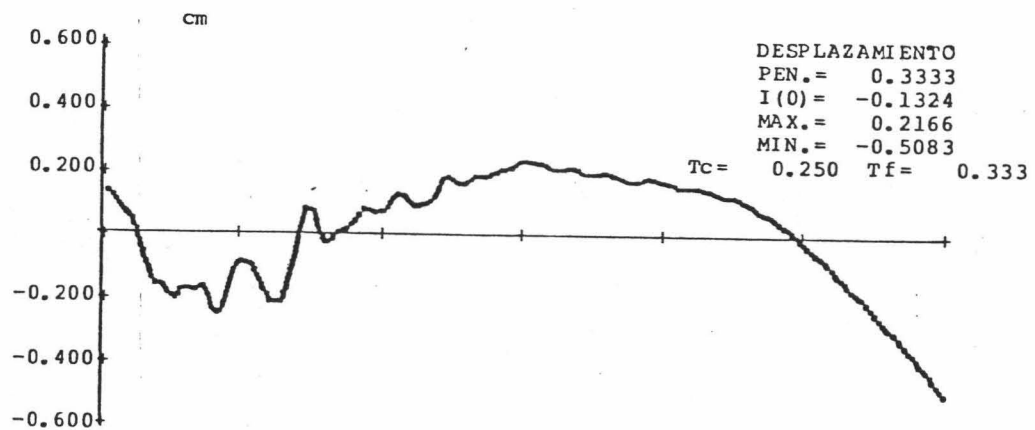
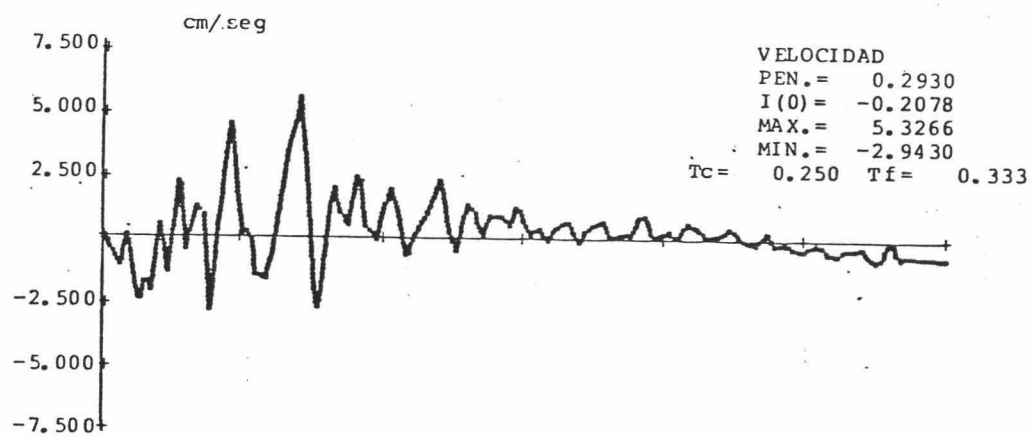
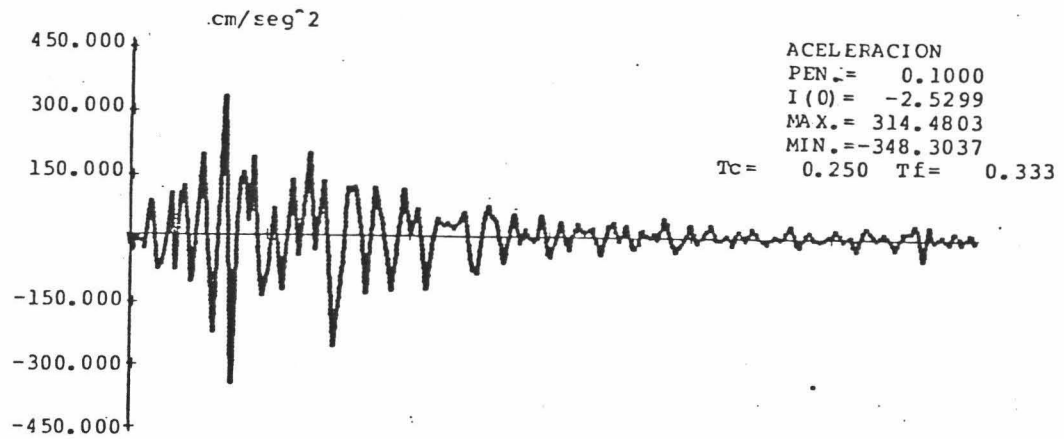


FIGURA 5.59

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207C1T)

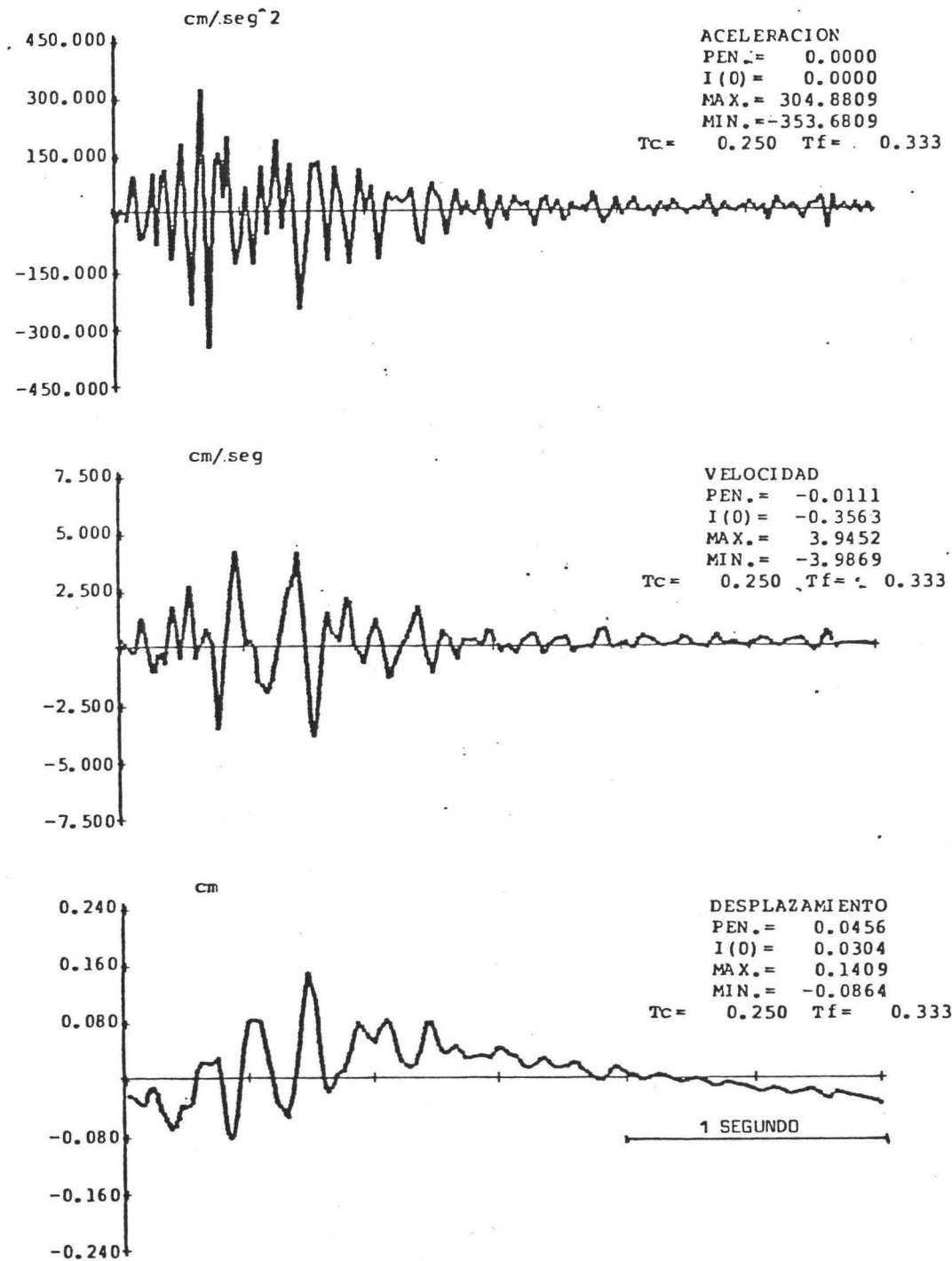


FIGURA 5.60

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207C2T)

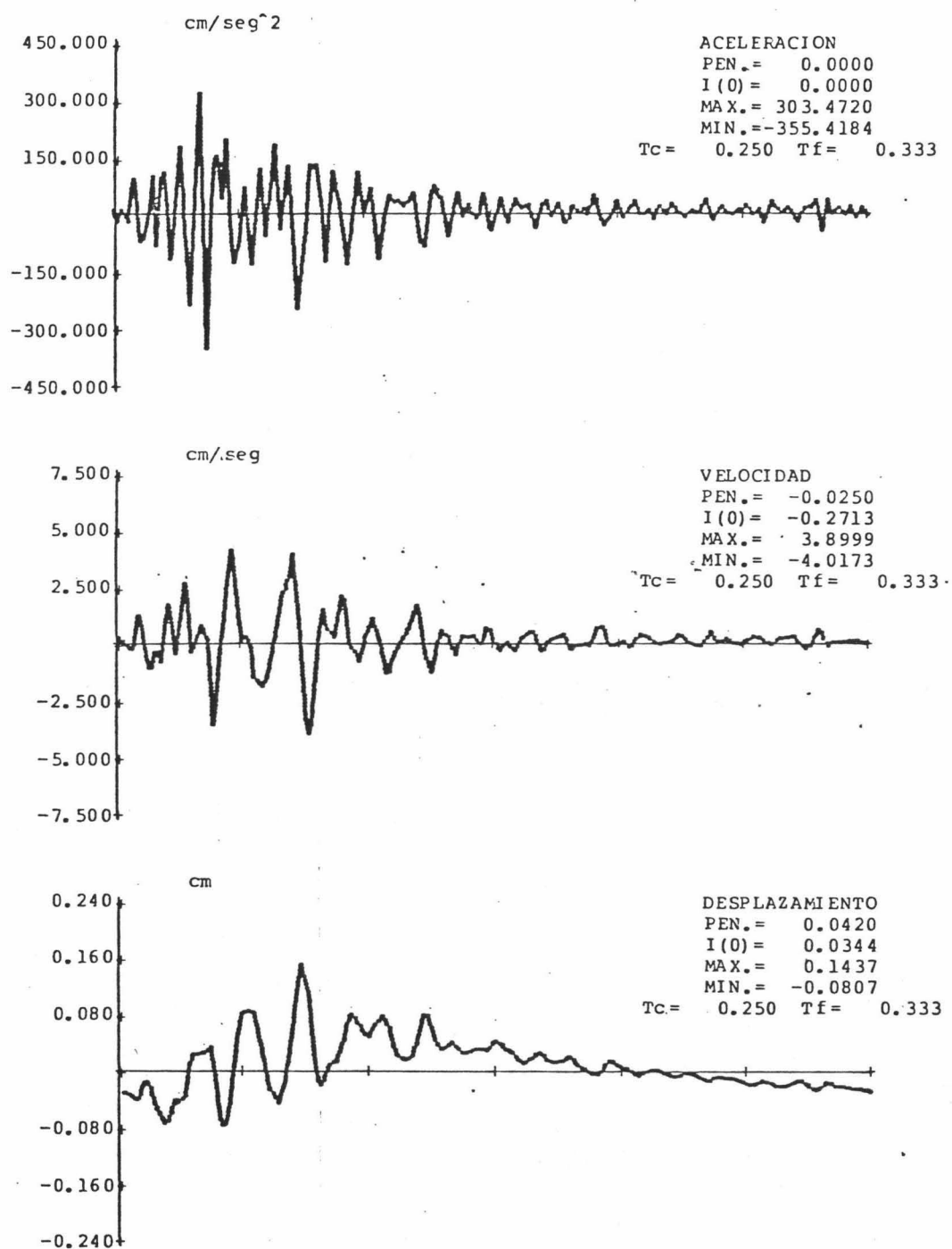


FIGURA 5.61



VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207C.3T)

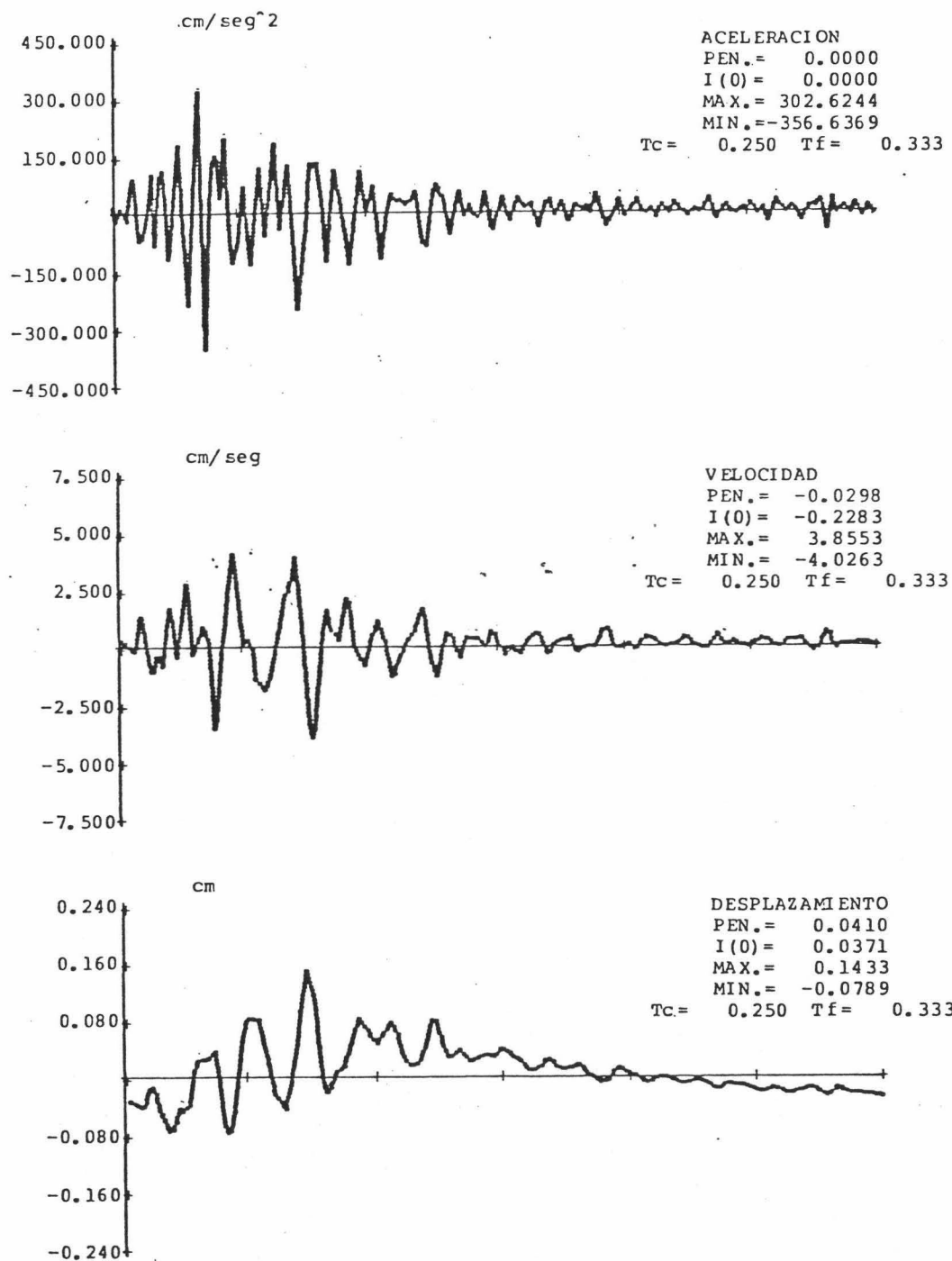


FIGURA 5.62

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P 207C 2T.)

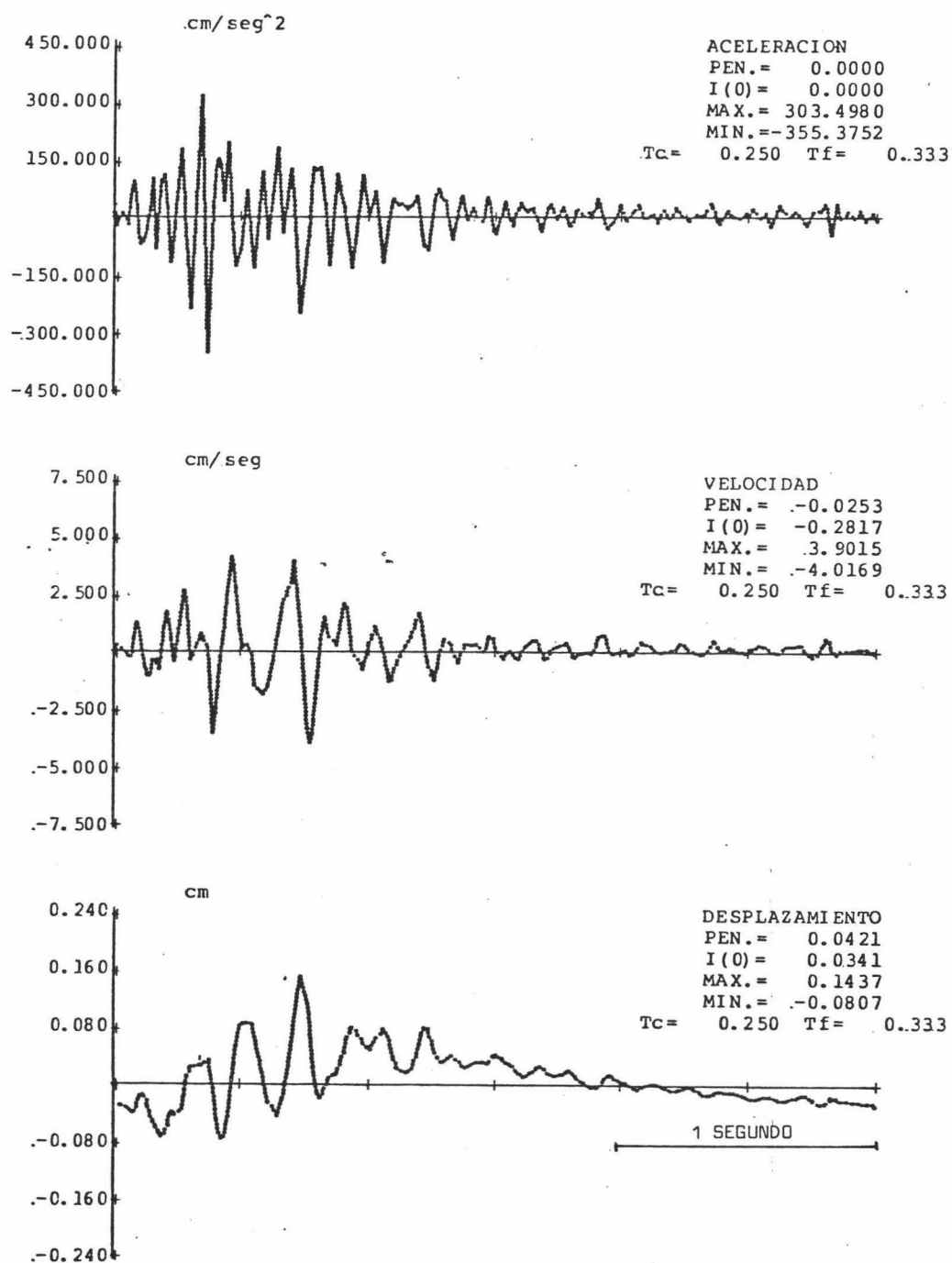


FIGURA 5.63

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P20X1T)

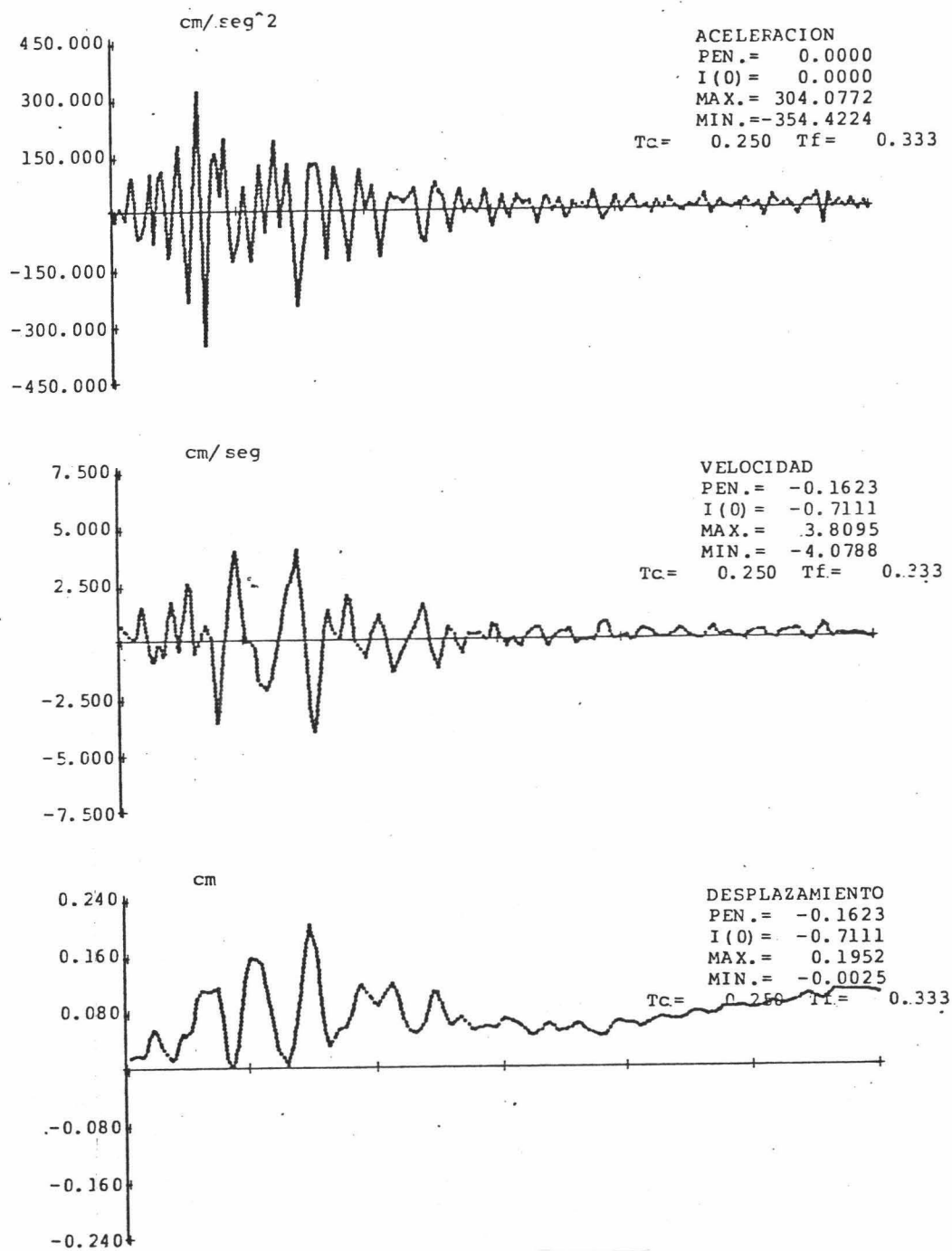


FIGURA 5.64

VAAL REEFS (07/04/77) COMPONENTE VERTICAL N=5.2 (4P20CJT)

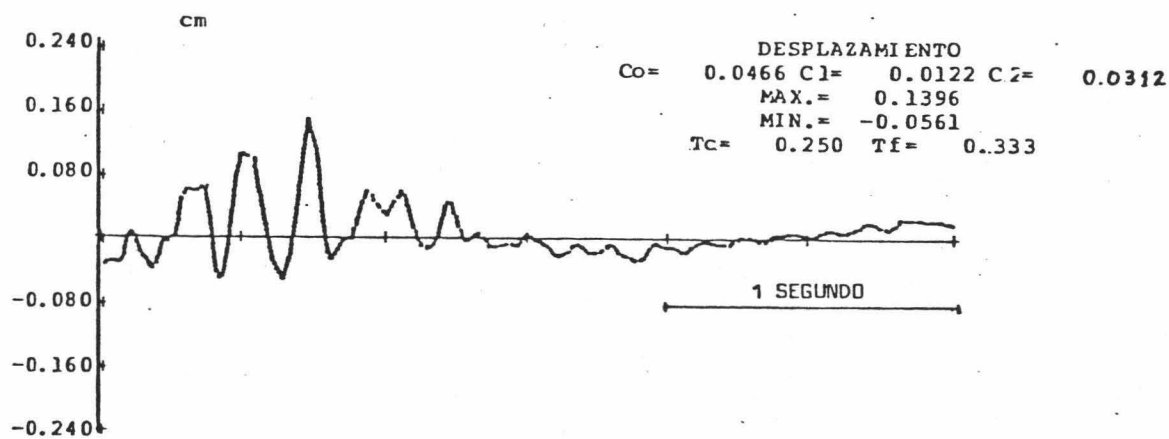
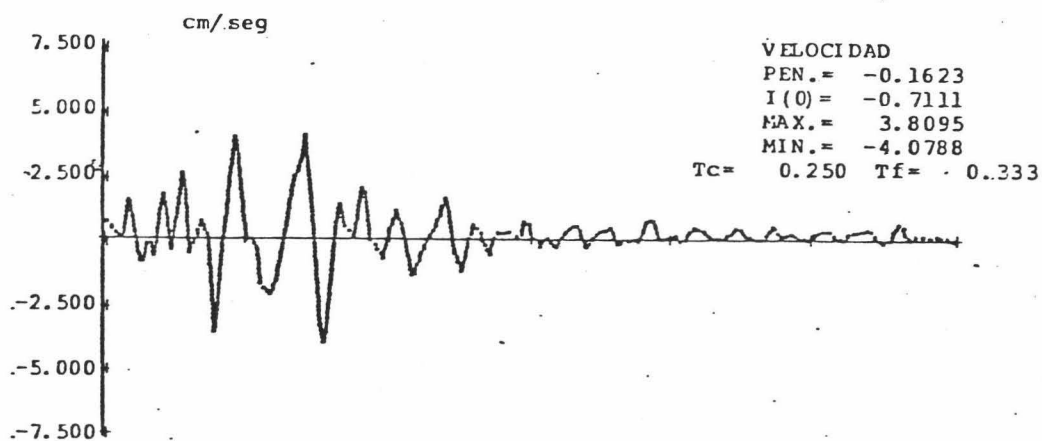
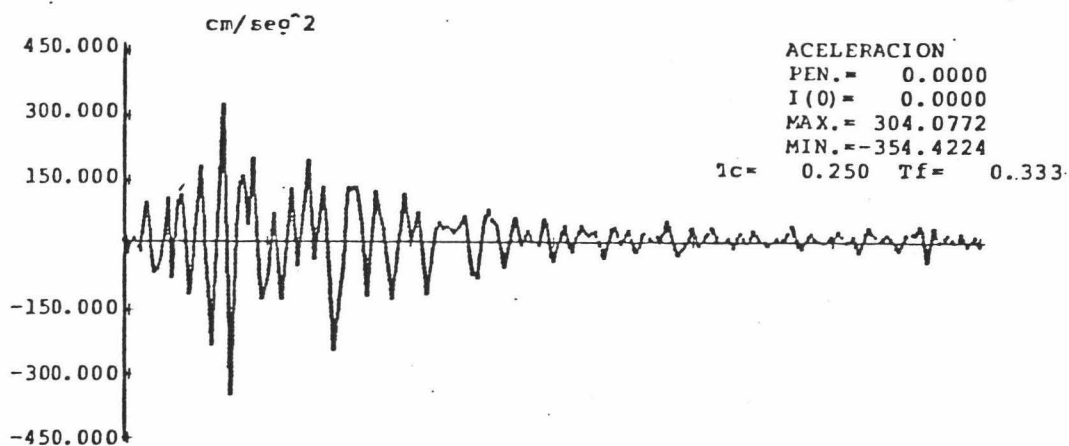


FIGURA 5.65

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P20X2T)

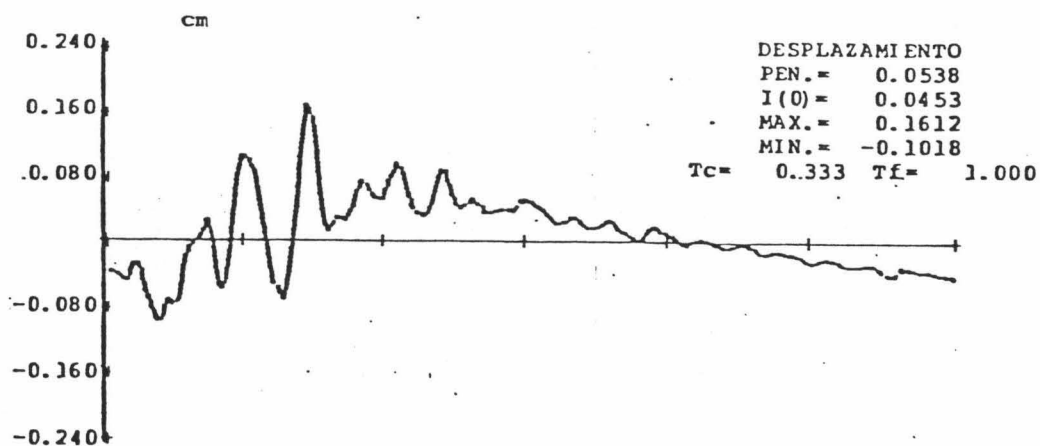
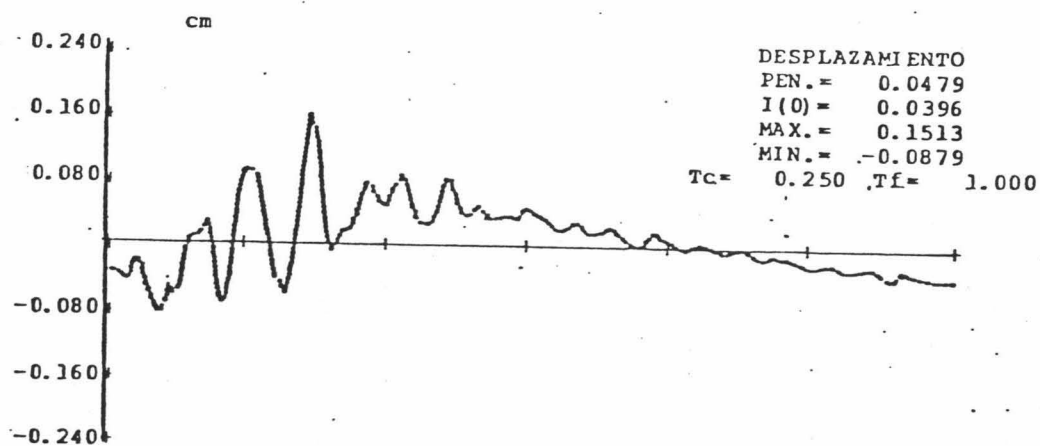
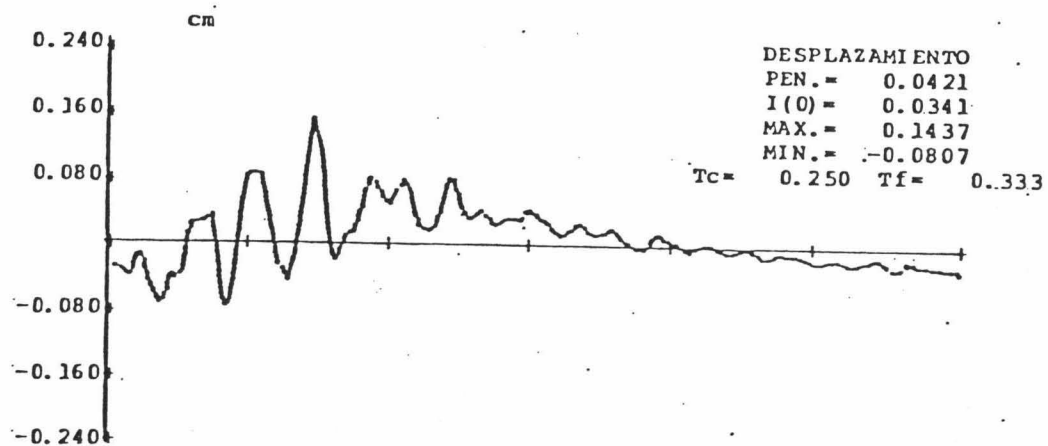


FIGURA 5.66

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P20C2T)

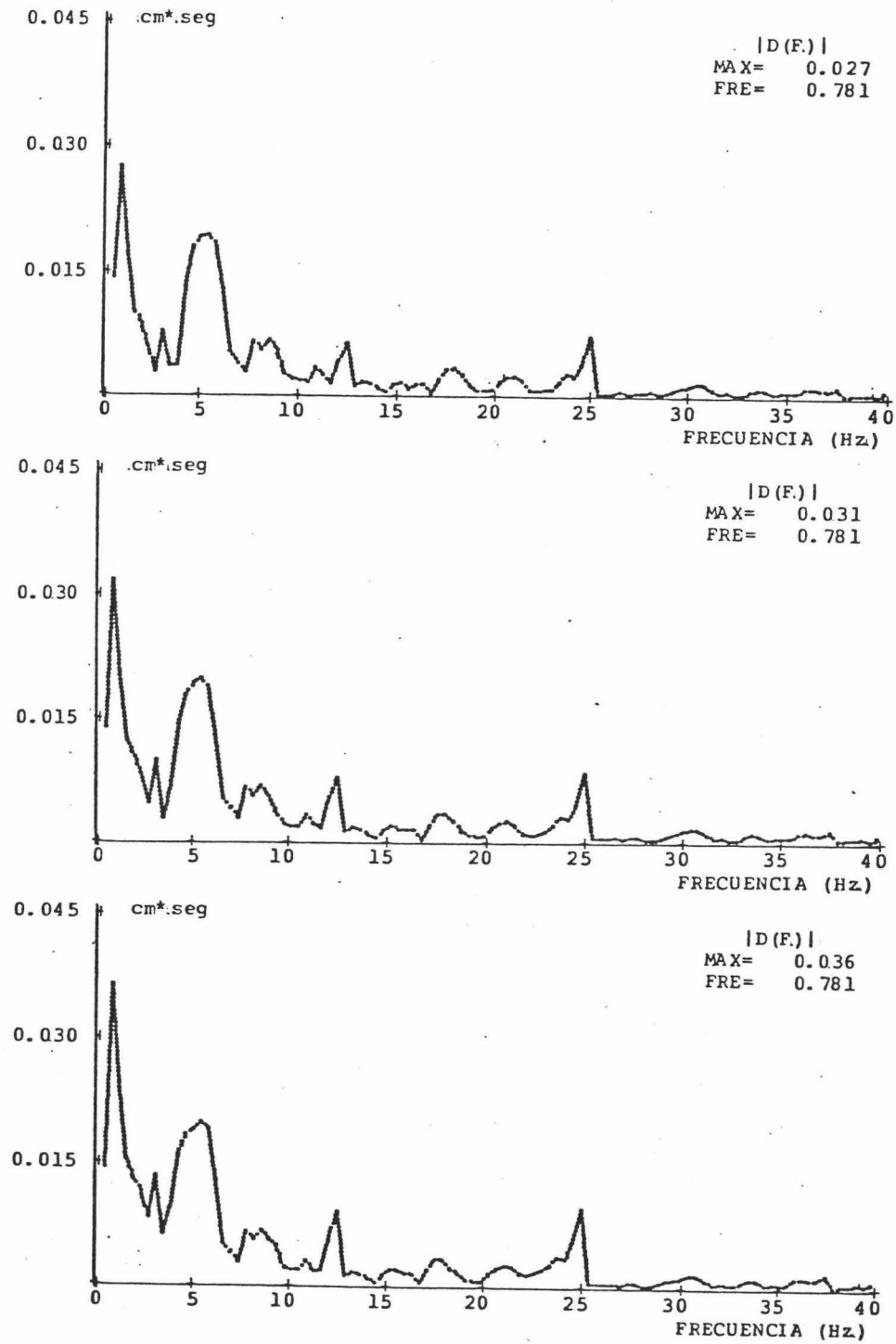


FIGURA 5.67

VPAI REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P20C10R)

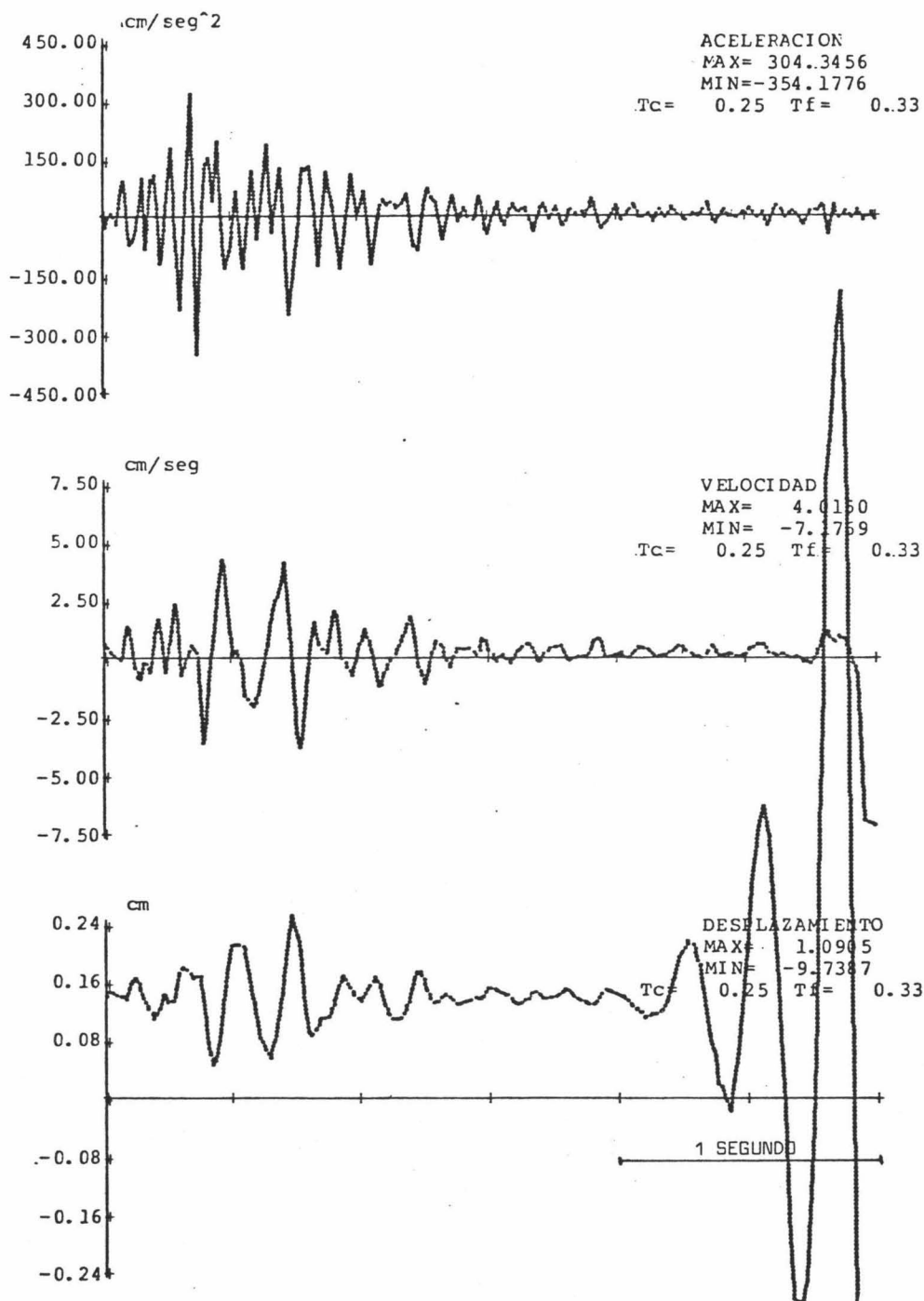


FIGURA 5.68

VPALEEFPS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P2G7OJOR)

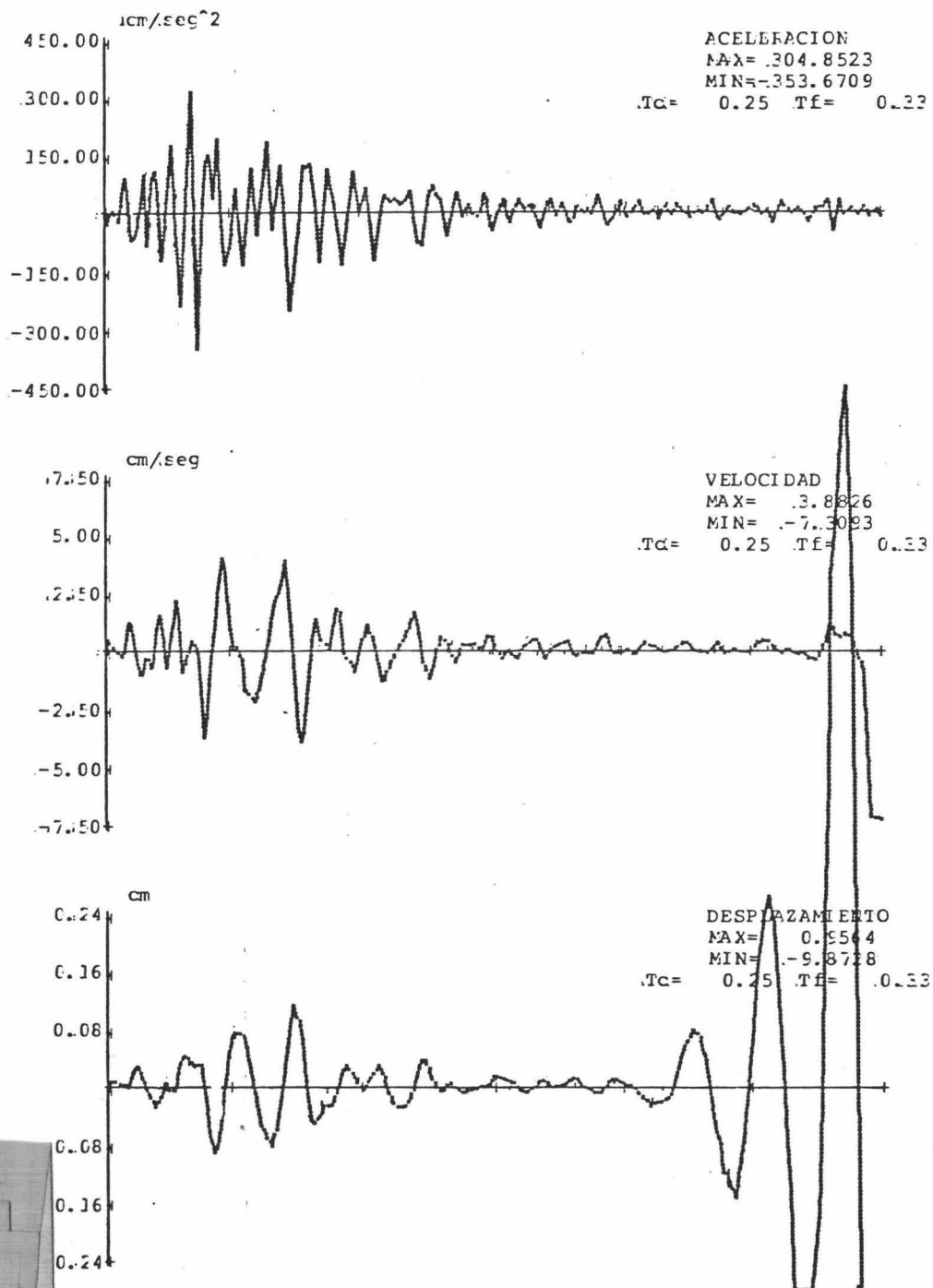


FIGURA 5.69

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P 20°C 10R)

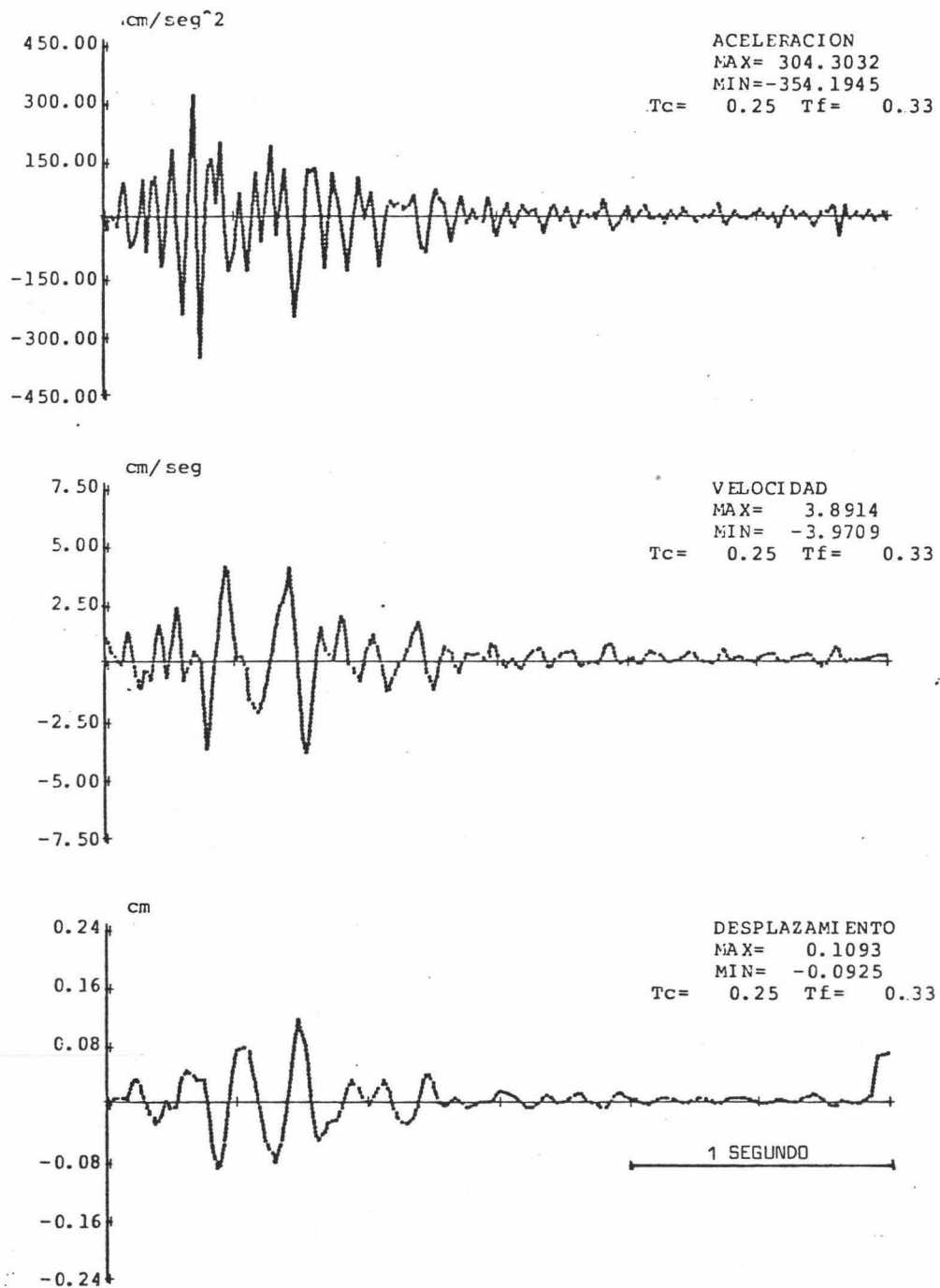
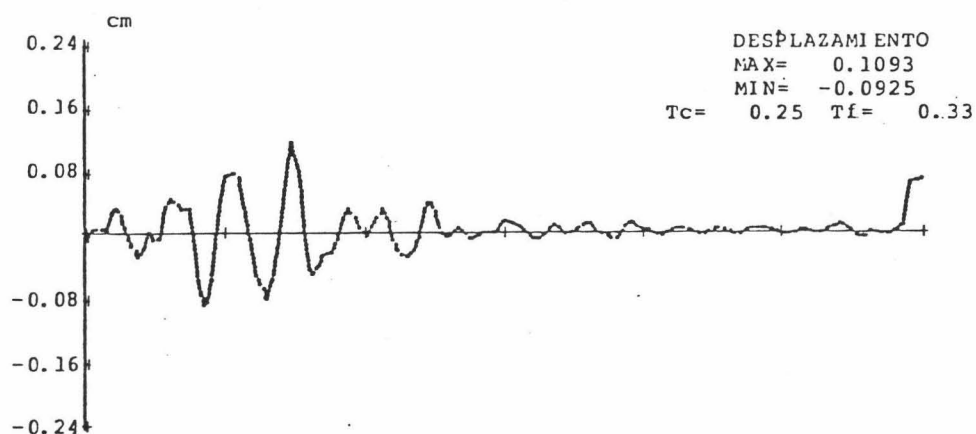
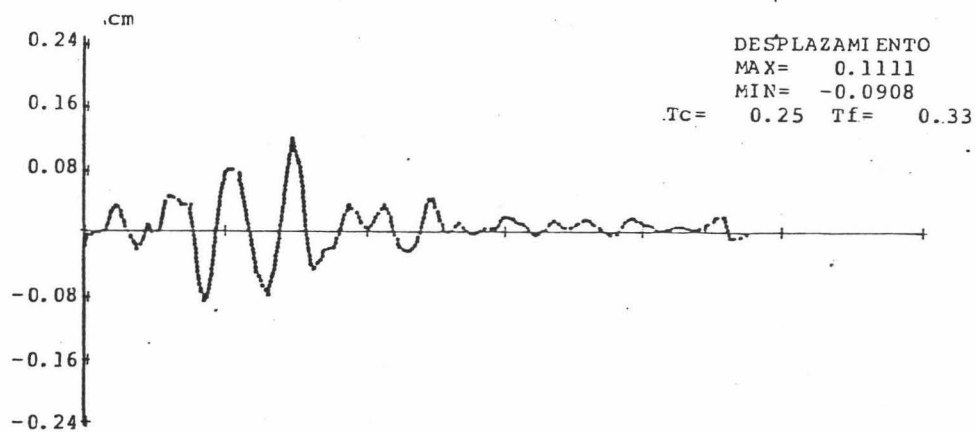


FIGURA 5.70

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P20C JOF)



VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P170C JOR)



VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2* (4P170C JOR)

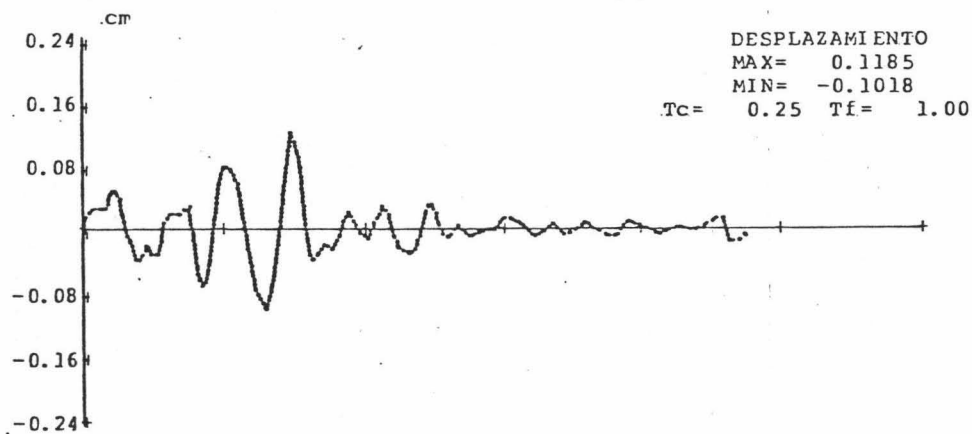


FIGURA 5.71

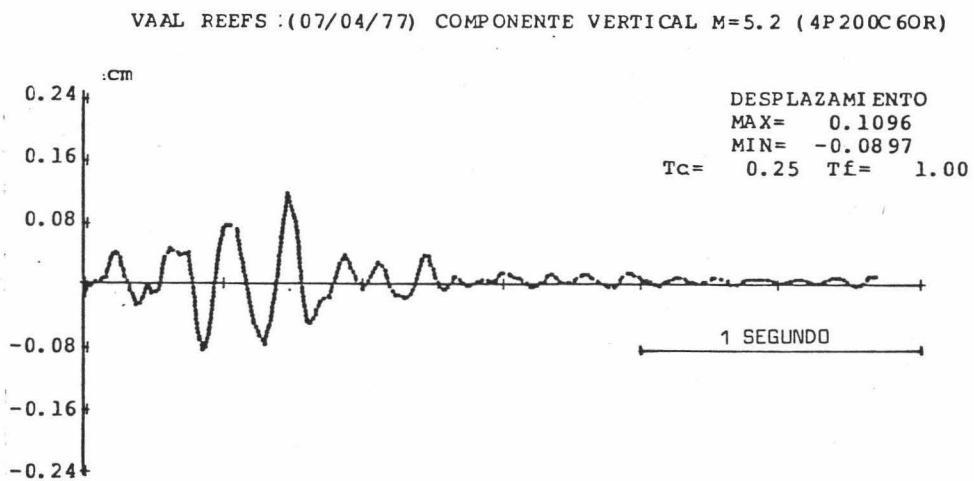
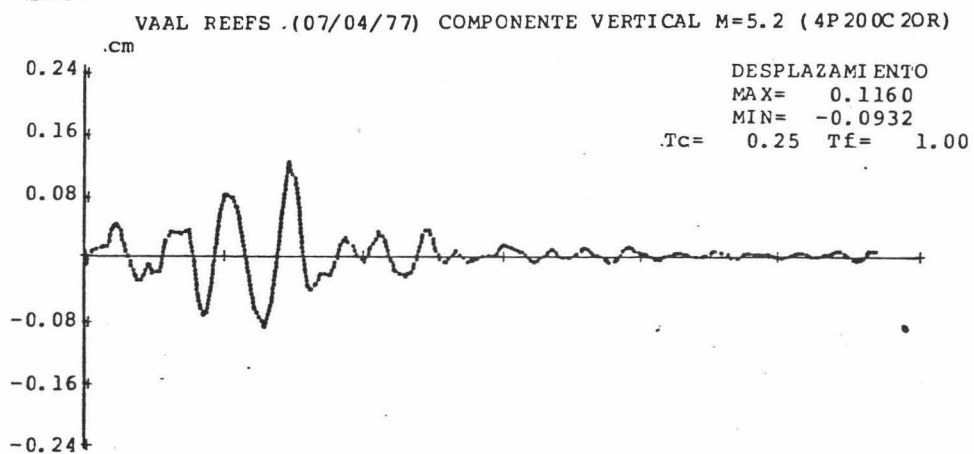
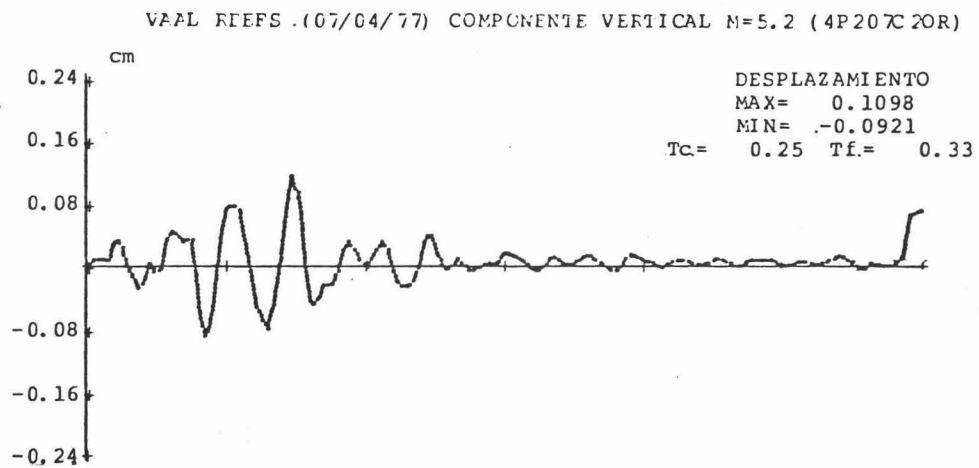


FIGURA 5.73

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P207C10R)

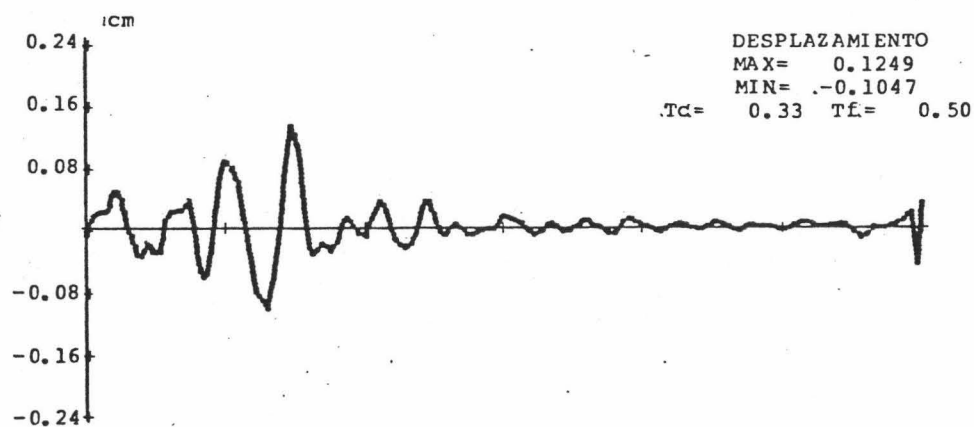
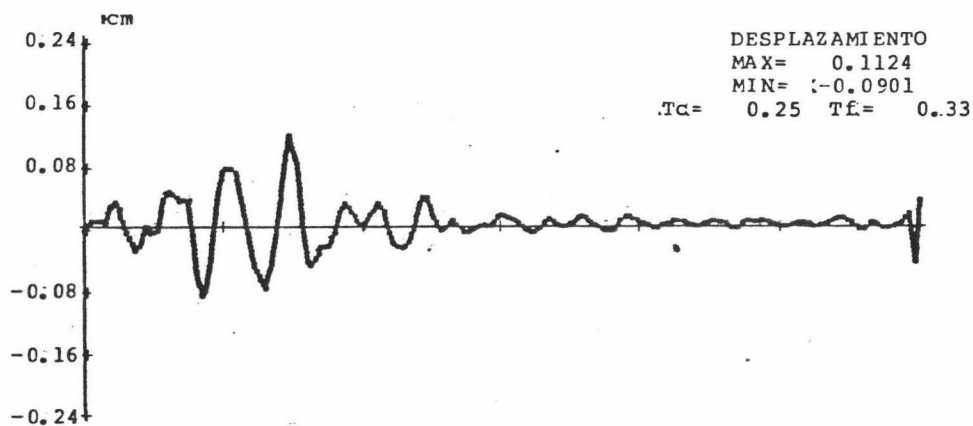
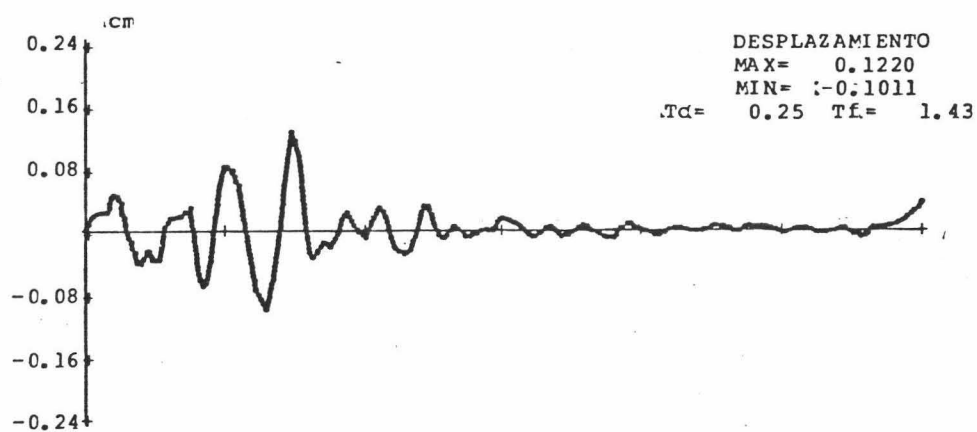


FIGURA 5.74

VAAL REEFS (07/04/77) COMPONENTE VERTICAL M=5.2 (4P203C20R)

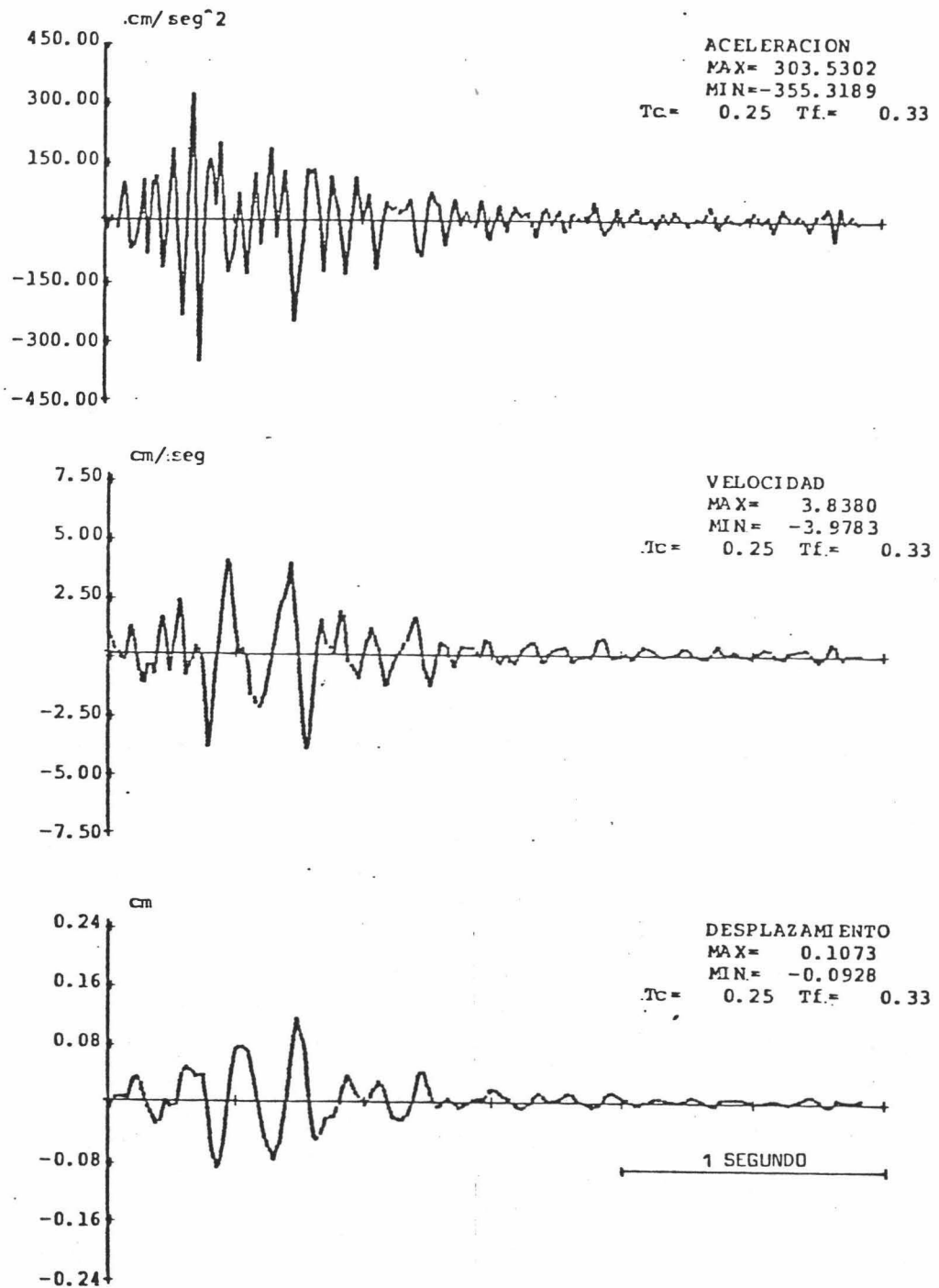
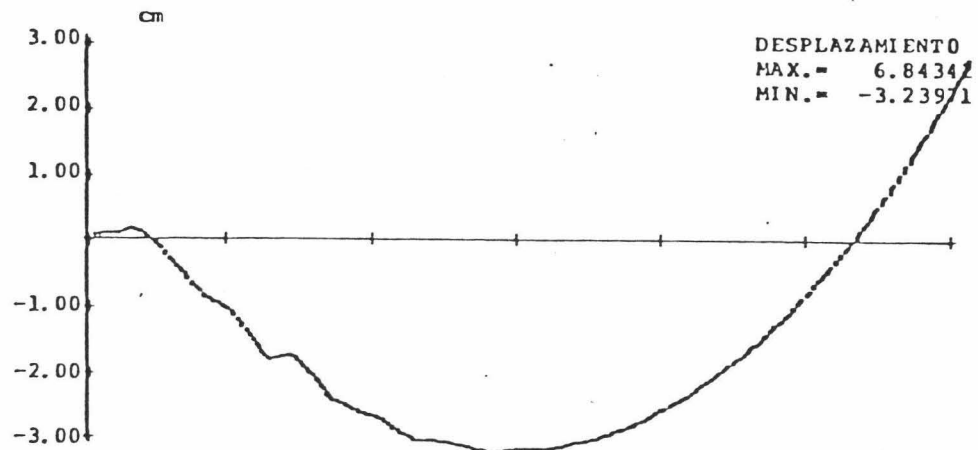
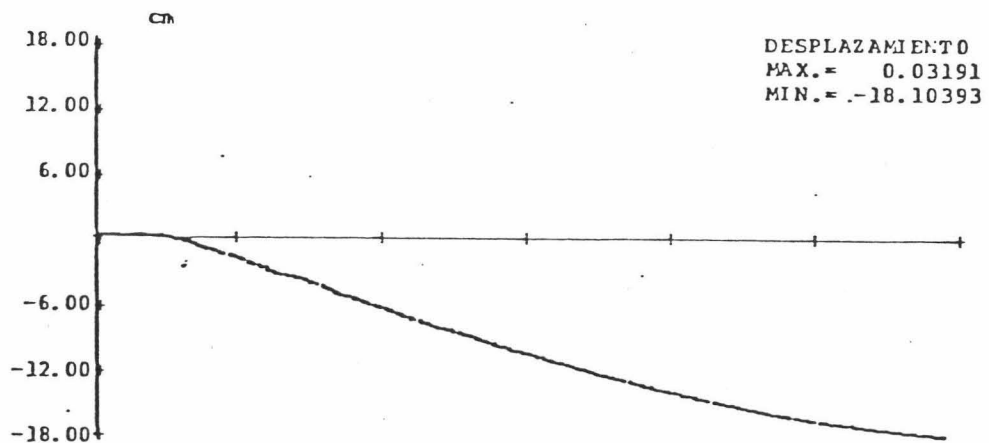


FIGURA 5.75

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P226)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P345I)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P346)

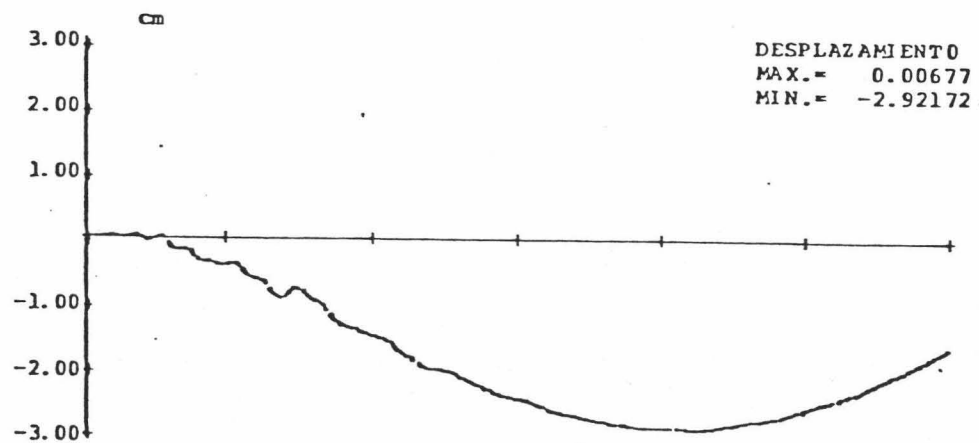
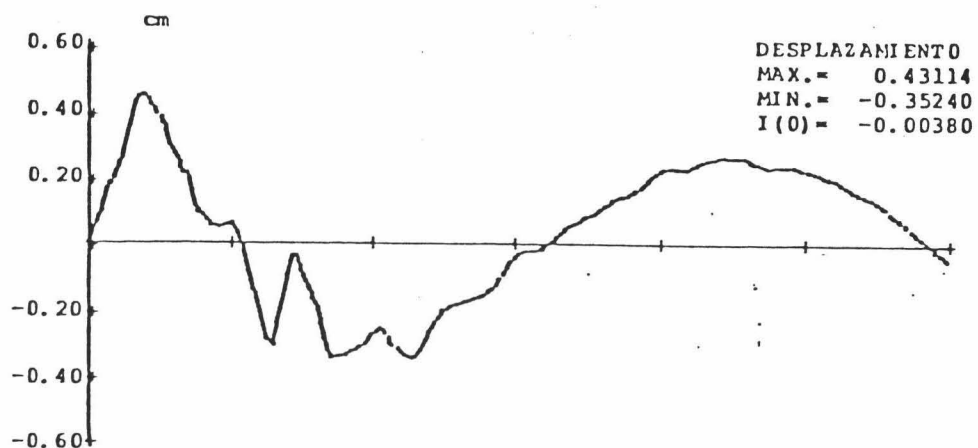
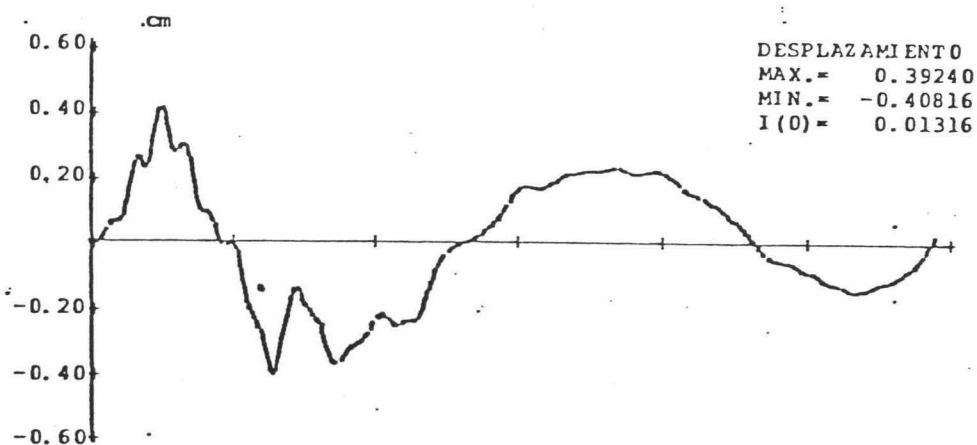


FIGURA 5.76

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P226)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P345c)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P346)

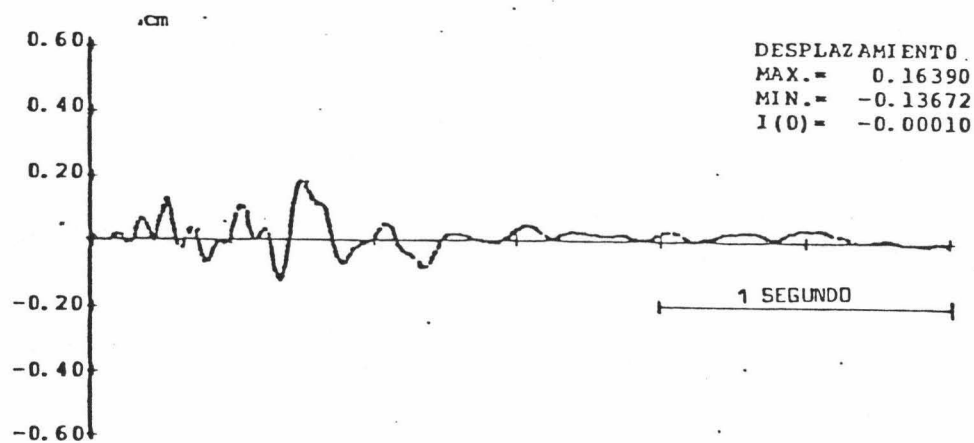


FIGURA 5.77



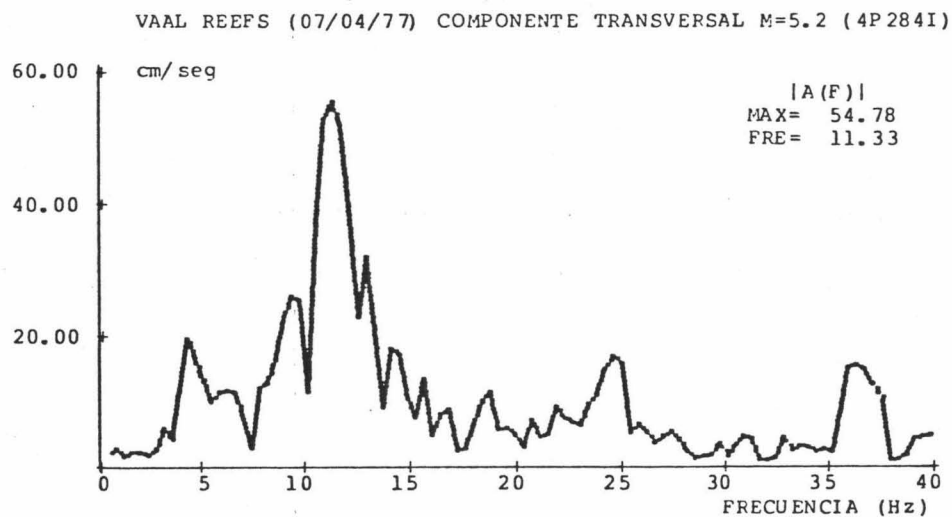
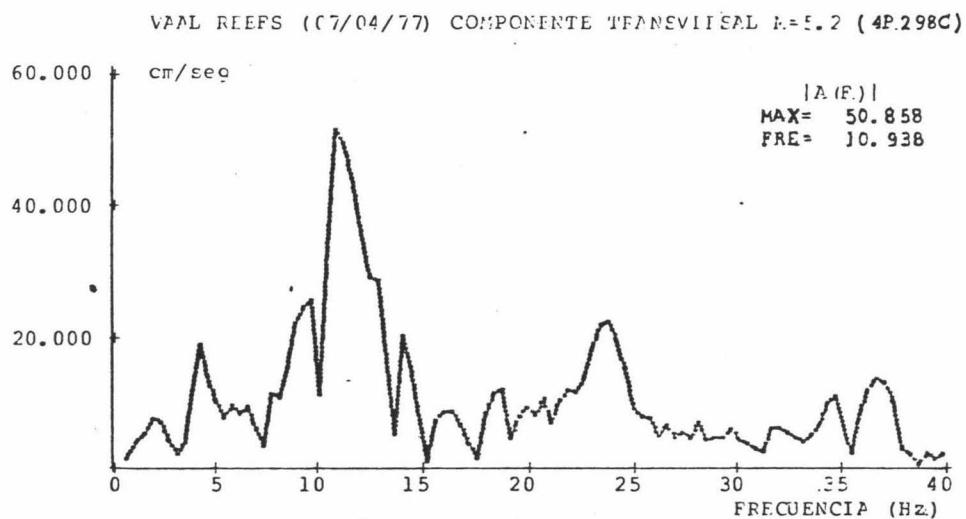
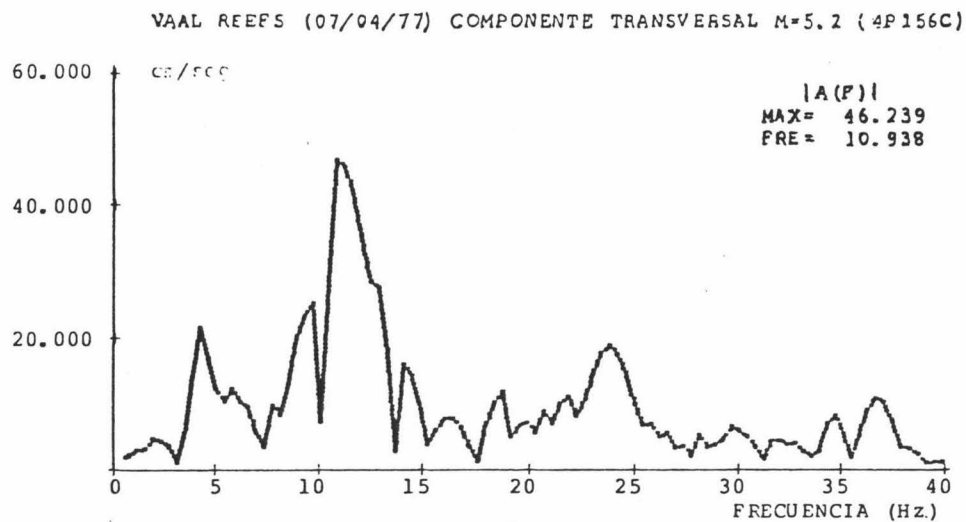
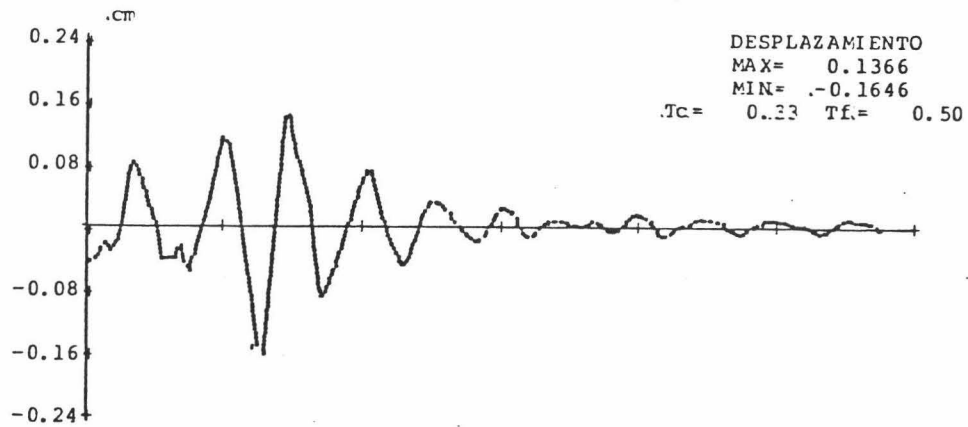
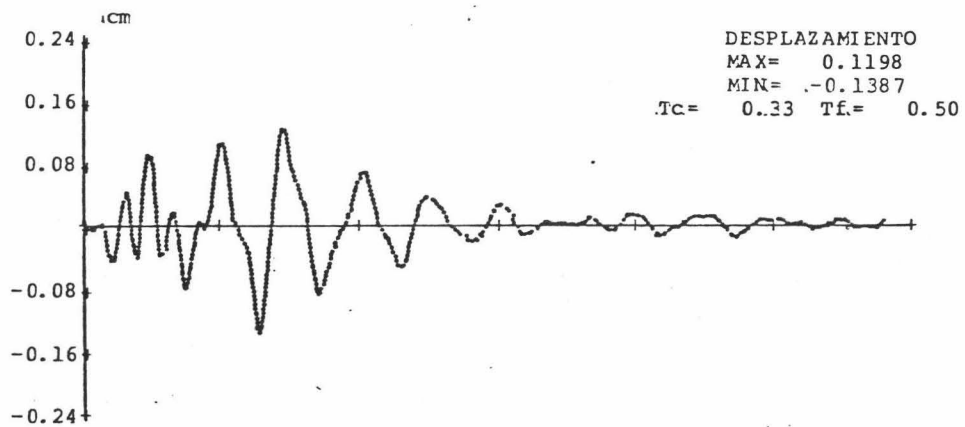


FIGURA 5.78

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P179C 20R)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P345C 20R)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P.346C 20R)

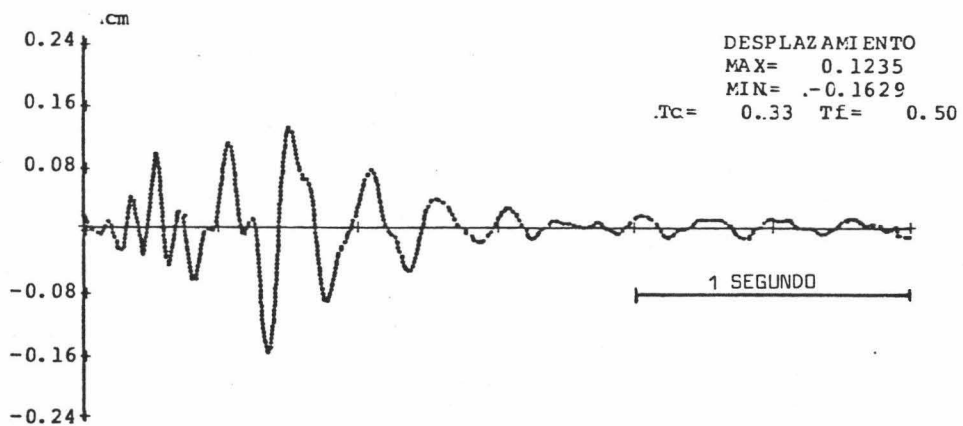
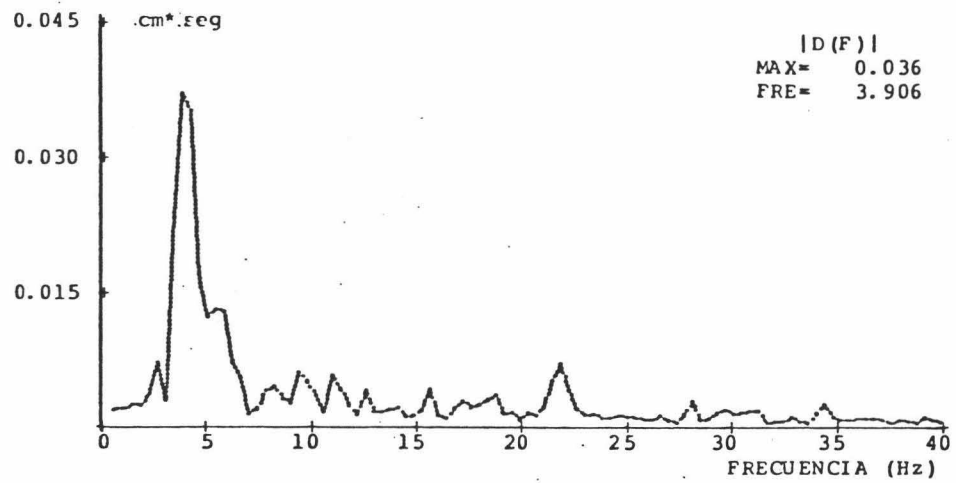
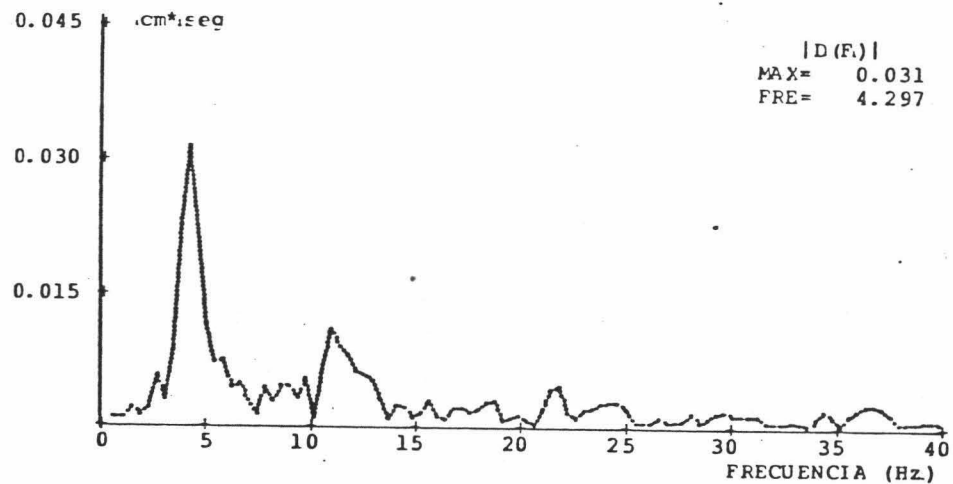


FIGURA 5.79

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P172C20R)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P297C20R)



VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL M=5.2 (4P284C20R)

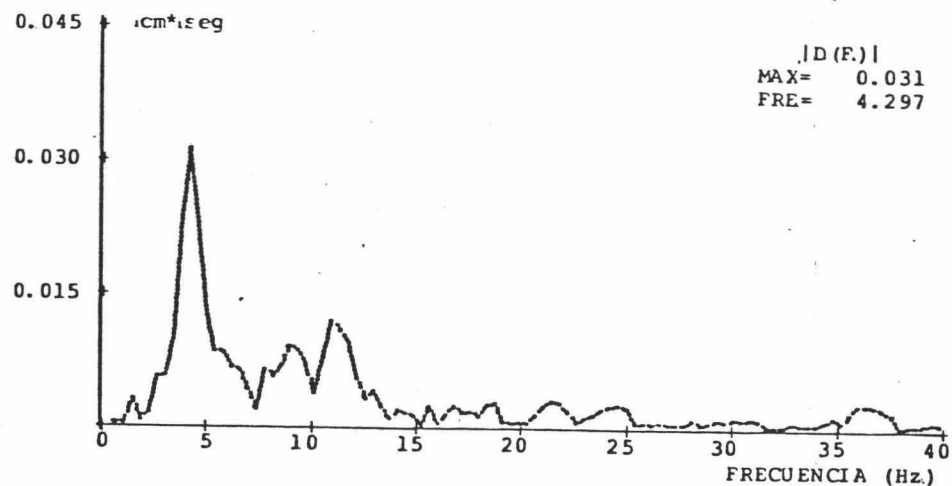


FIGURA 5.80

VAAL REEFS (07/04/77) COMPONENTE TRANSVERSAL N=5.2

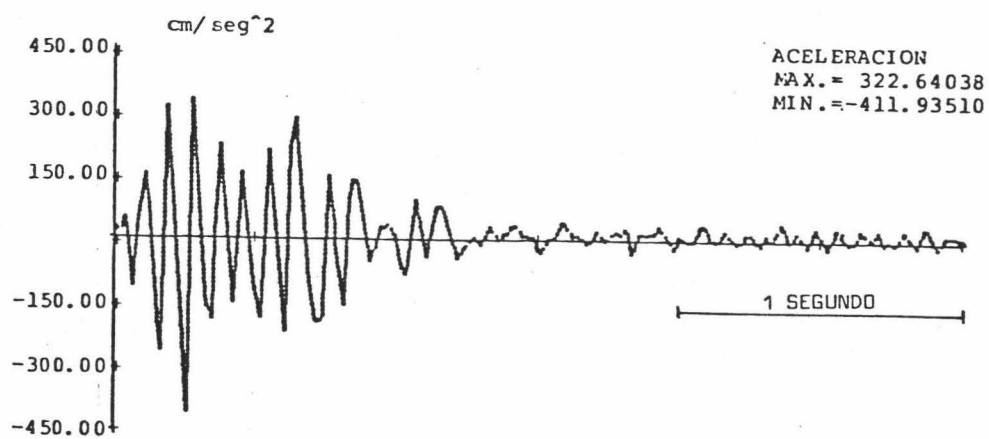
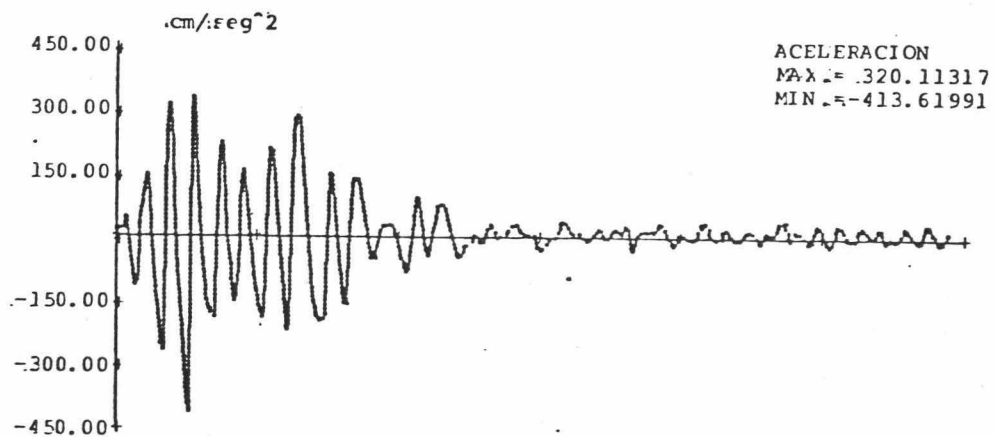
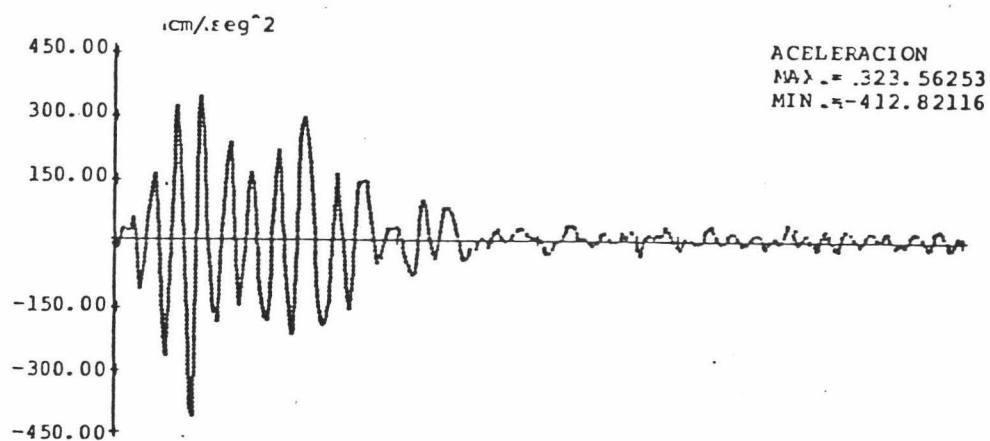


FIGURA 5.81

VAAL REEFS (C7/04/77) COMPONENTE TRANSVERSAL M=5.2 (4F278C20R)

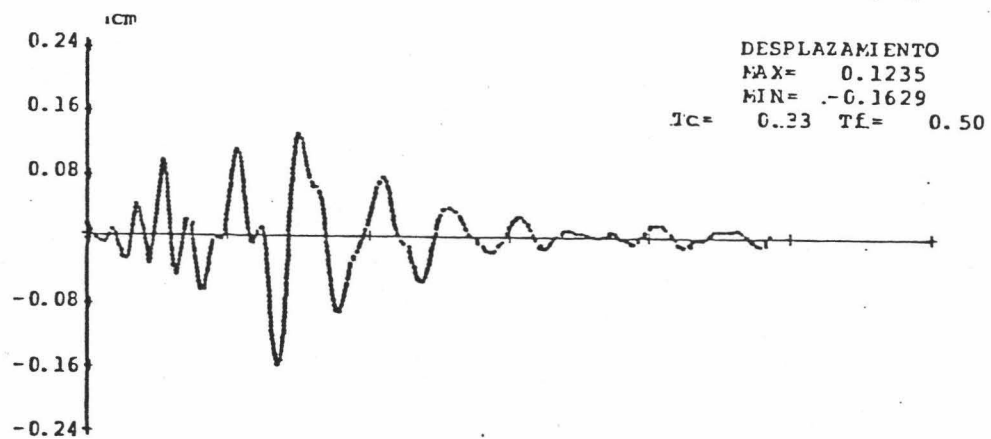
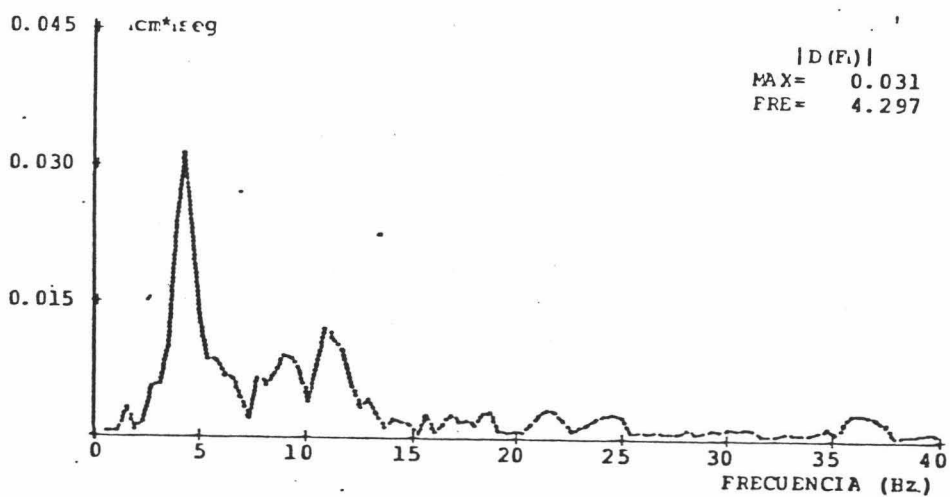
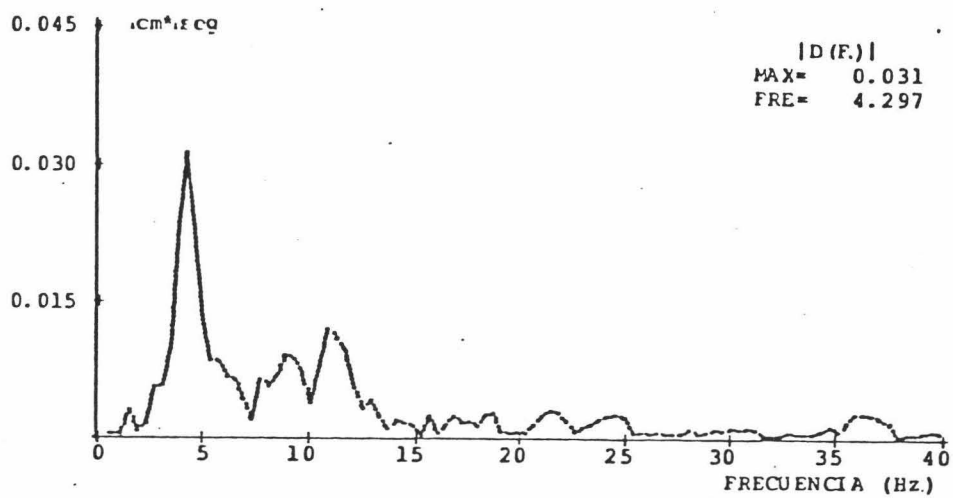


FIGURA 5.82

VAAL REEFS (07/04/77) COMPONENTE LONGITUDINAL M=5.2 (4P3100R)

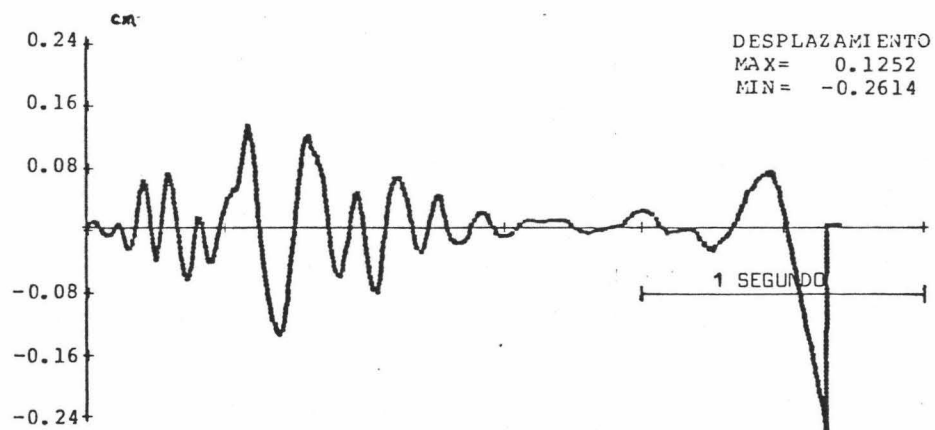
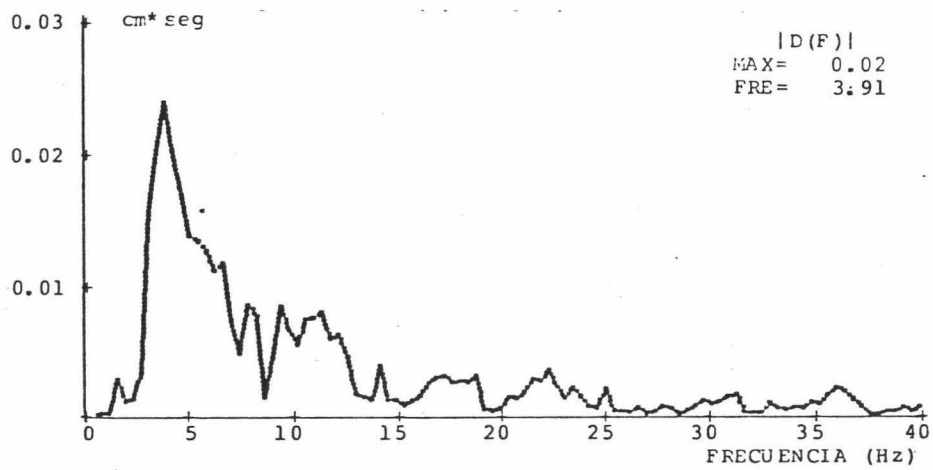
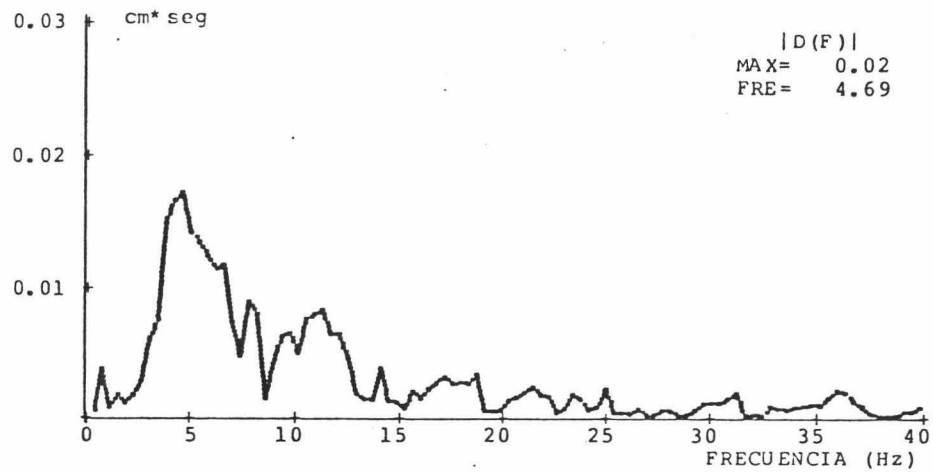


FIGURA 5.83