DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

STRONG MOTION DATA FROM THE

HOLLISTER EARTHQUAKE OF FEBRUARY 20, 1988

By

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Introduction

A moderate earthquake occurred on February 20, 1988 10 km southeast of Hollister, California, triggering three strong-motion stations operated by the U.S. Geological Survey (USGS) as part of the National Strong-Motion Instrumentation Network (fig. 1). A strong-motion station is defined as all of the instrumentation operated at one location. Details of the event provided by the National Earthquake Information Service (NEIS) are as follows:

Epicenter: 36.803°N and 121.302°W

Magnitude: M_L = 5.3

Depth: 9 km

The purpose of this report is to provide strong-motion information about the the earthquake, including a table of peak accelerations and copies of the analog records.

The Strong-Motion Network

The strong-motion network operated by the USGS in the vicinity of Hollister consists of three ground stations and the Differential Digital Array (fig. 2), which consists of six Kinemetrics DSA-1 digital accelerographs, one Kinemetrics SMA-1 analog accelerograph, and one Terra Technology DCA-333 digital accelerograph (Bycroft, 1983; Brady and others, 1986). Originally, the differential array was to consist of six DSA-1's; later plans included an SMA-1 and a DCA-333 installed adjacent to each other in the recorder house so as to provide comparative data from analog and digital instruments.

The three ground stations are Hollister City Hall Annex, Damler Residence, and Sago Vault (fig. 1). These three stations each have an SMA-1 installed at ground level.

Strong-Motion Data and Records

Table 1 presents scaled peak accelerations for recording channels at all stations and is arranged in order of increasing epicentral distance. Column 1 provides a map index number correlated with station numbers shown in figure 1.

The maximum horizontal accelerations were 0.21 g at the Differential Array and 0.06 g at Sago Vault, both 14 km from the epicenter, and 0.06 g at the Damler Residence at a distance of 9 km. The accelerograph at Hollister City Hall Annex was operational but did not trigger during the earthquake.

One DSA-1 at the Differential Array failed due to corrosion on the circuit board and one channel of another DSA-1 failed due to an intermittent open circuit. Both recorders have since been replaced.

Two other significant earthquakes, a magnitude 4.1 on April 30, 1987 and a magnitude 5.5 on January 26, 1986 (NEIS), have occurred within 4.5 km of this earthquake within the past 25 months, both of which triggered the Hollister Differential Digital Array.

Acknowledgements

The USGS would like to express their gratitude to the City of Hollister for allowing instrumentation to be installed at the City Hall Annex and at the Airport, and to Fred Damler for allowing us to install an accelerograph in his garage.

References

Bycroft, G. N., 1983, Differential ground motion array at Hollister Municipal Airport, California: U.S. Geological Survey Open-File Report 83-327, 44 p.

Brady, A. G., E. C. Etheredge, R. P. Maley, P. N. Mork, B. L. Silverstein, D. A. Johnson, A. V. Acosta, R. D. Forshee and M. J. Salsman, 1986, Preliminary report on records from the USGS-maintained strong-motion network in the Hollister area, California, January 26, 1986: U.S. Geological Survey Open-File Report 86-156, 43 p.

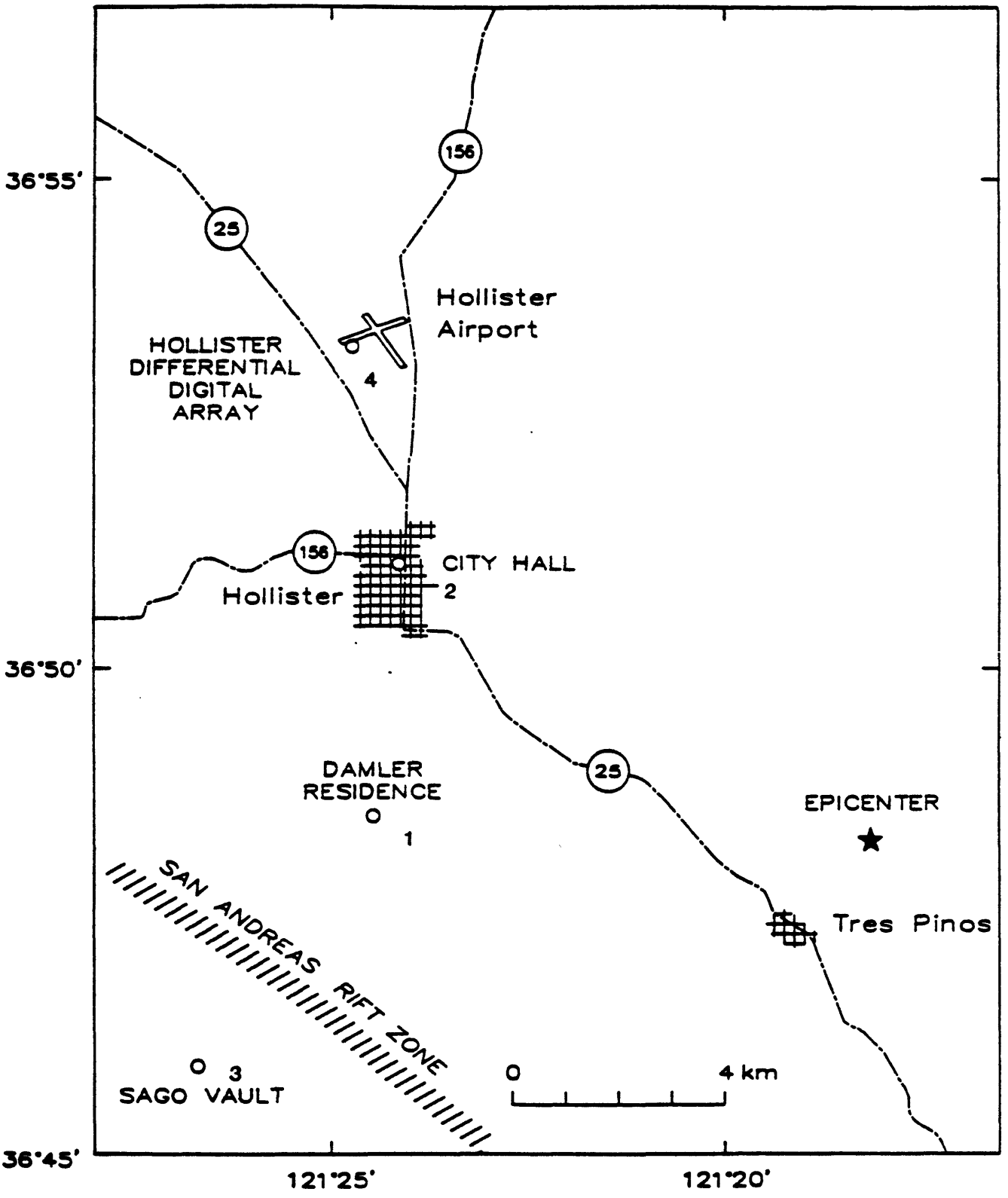


Figure 1. Strong-motion stations operated by the USGS during the February 20, 1988 earthquake in the vicinity of Hollister, Calif.

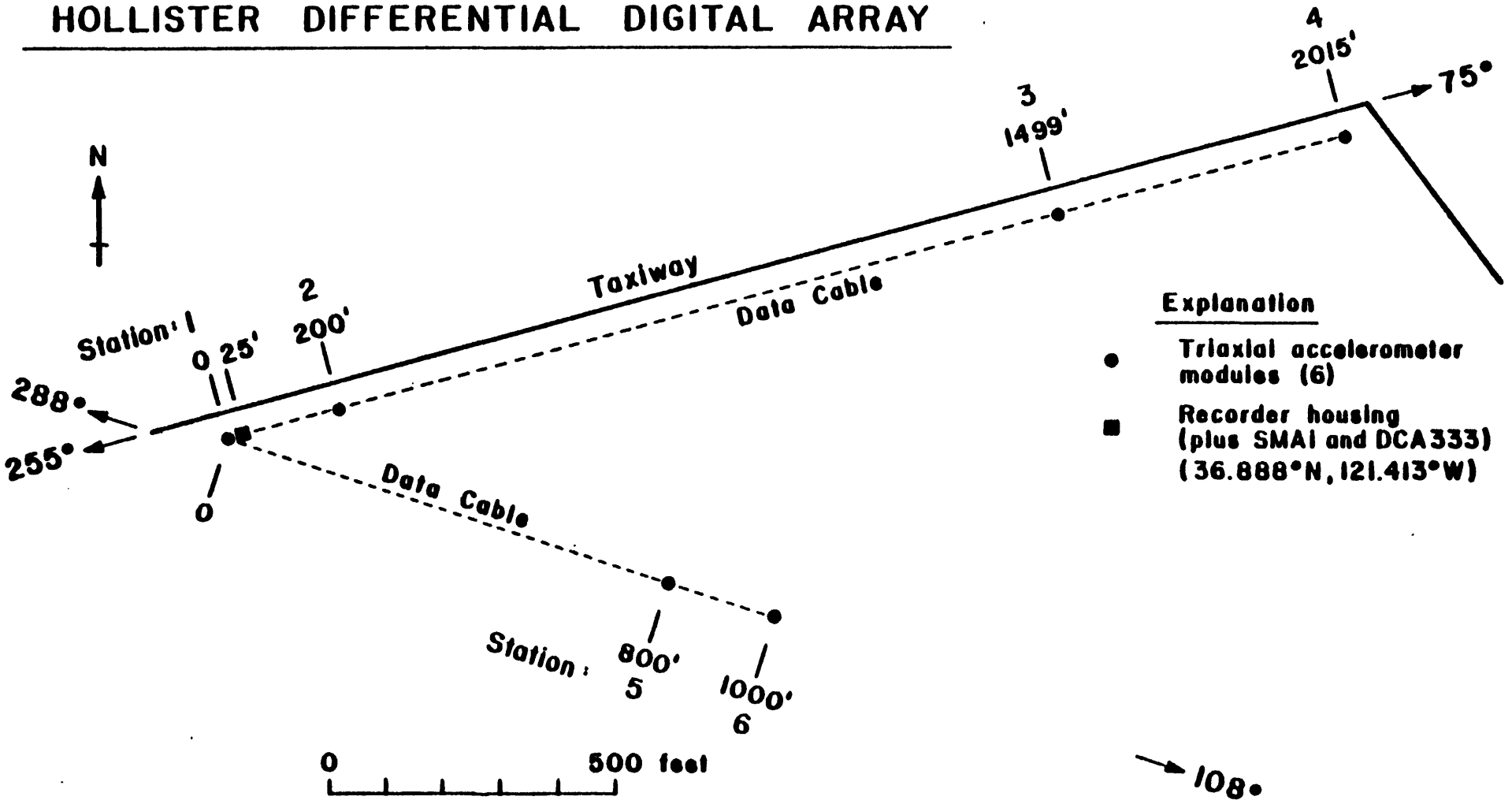


Figure 2. Locations of sensor stations in the Hollister Differential Digital Array.

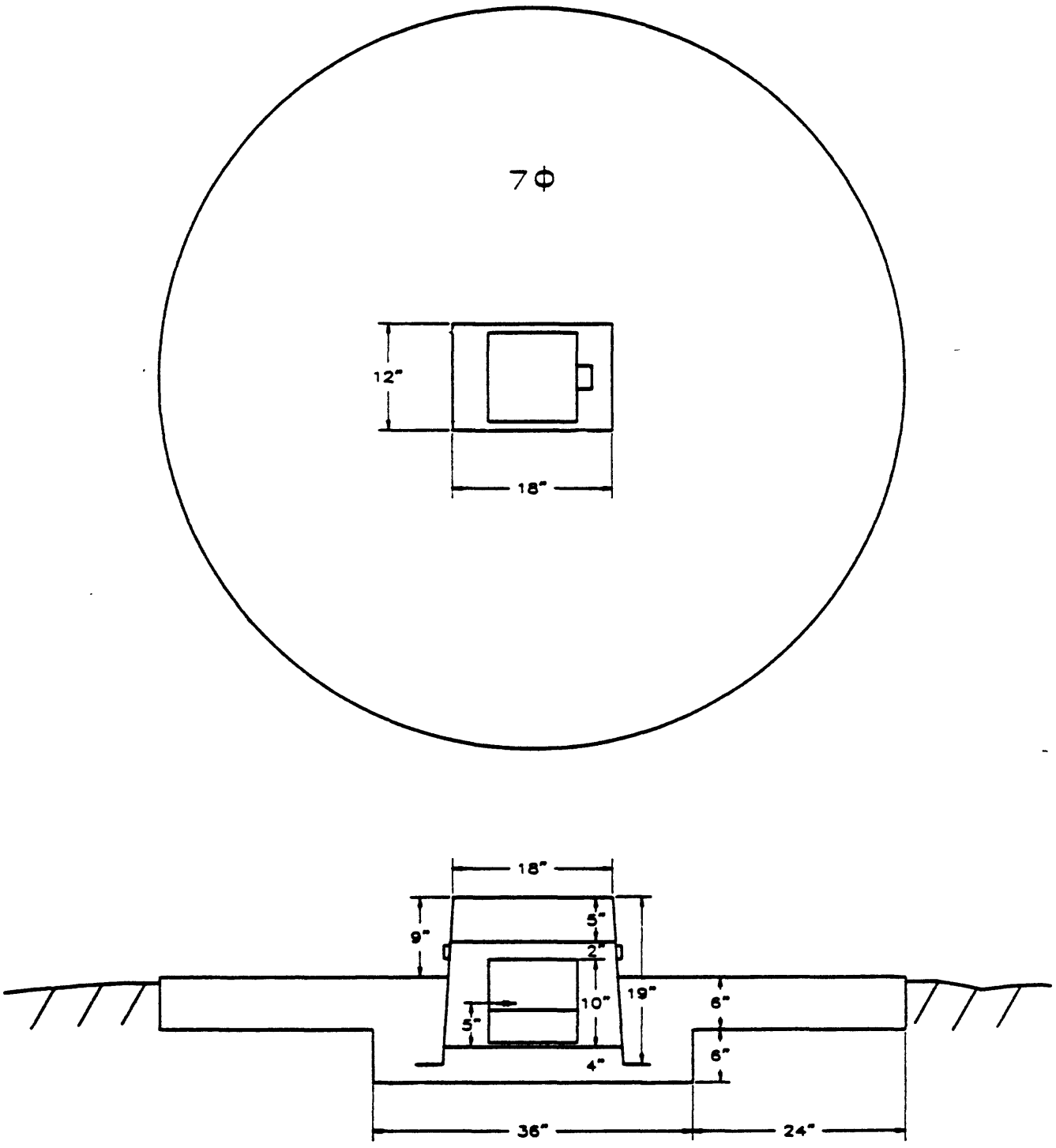


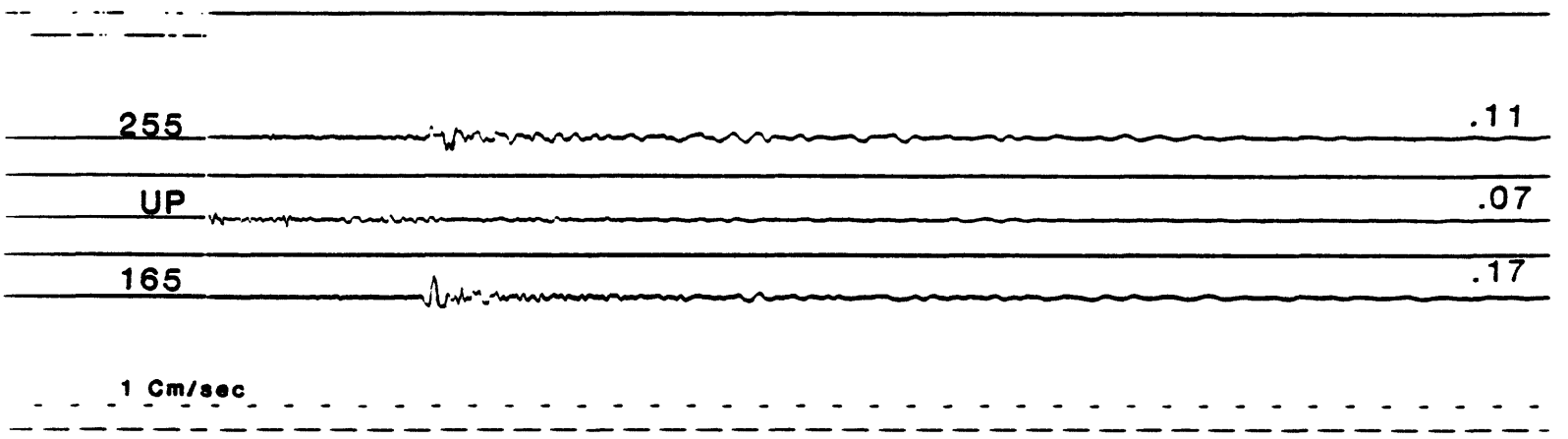
Figure 3. Detail of triaxial accelerometer sites at the Hollister Differential Digital Array.

Table 1. STRONG-MOTION STATION INFORMATION AND PEAK ACCELERATIONS FROM THE HOLLISTER EARTHQUAKE OF FEBRUARY 20, 1988

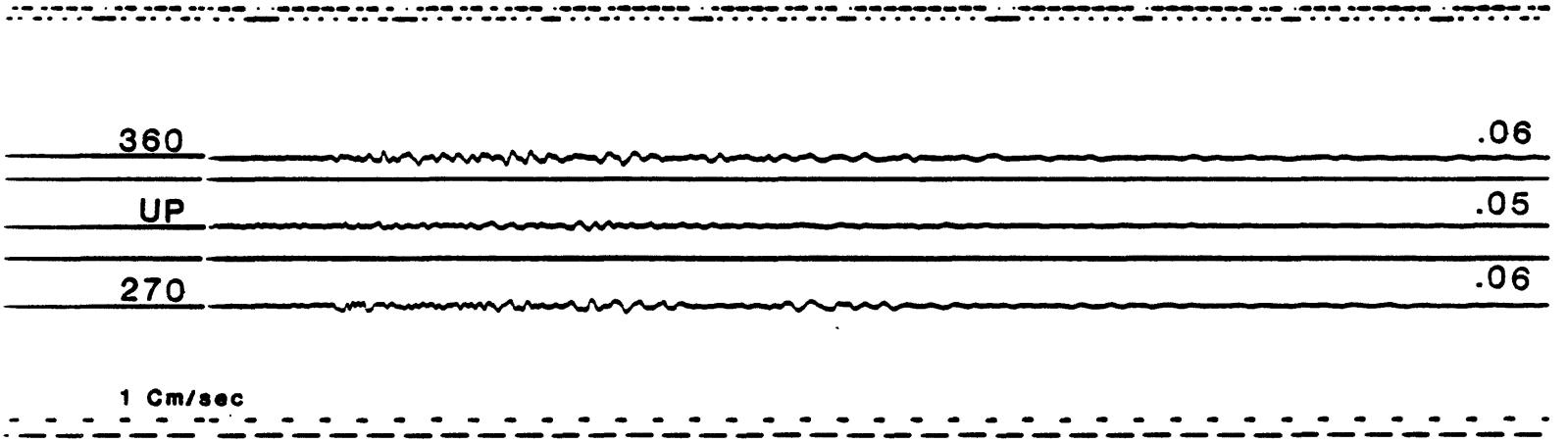
[The stations in this report are operated by the US Geological Survey. Epicentral distance is measured from station to epicenter at lat. 36.803° N., long. 121.302° W. Direction of acceleration is for upward trace deflection on accelerogram; vertical-component directions are listed as 'up' or 'down'.]

Station Identification					Acceleration	
Map Index	USGS Number	Name (Owner)	Coordinates (Lat.° N, Long.° W)	Epicentral Distance (Km)	Direction (degrees)	Maximum (g)
1	1657	Damler Residence (USGS)	36.807 121.408	9.4	360 Up 270	0.06 .05 .06
2	1575	Hollister City Hall Annex (USGS)	36.85 121.40	10.3	180 Up 090	Did not trigger
3	1032	Sago Vault (UCB)	36.76 121.45	13.4	360 Up 270	.06 .02 .05
4	1656	Hollister Differential Digital Array (USGS)	36.888 121.413	13.6		
		Station 1 (Zero point, DSA-1)			255 Up 345	.08 .05 .16
		Station 2 (200 feet, DSA-1)			255 Up 345	.09 .05 .17
		Station 3 (1499 feet, DSA-1)			255 Up 345	Instru-ment failed
		Station 4 2015 feet, DSA-1)			255 Up 345	.09 .04 No data
		Station 5 (800 feet, DSA-1)			255 Up 345	.09 .07 .19
		Station 6 (1000 feet DSA-1)			255 Up 345	.09 .06 .21
		Recorder House (25 feet, SMA-1)			255 Up 165	.11 .07 .17
		Recorder House (25 feet, DCA-333)			075 Down 345	.11 .07 .17

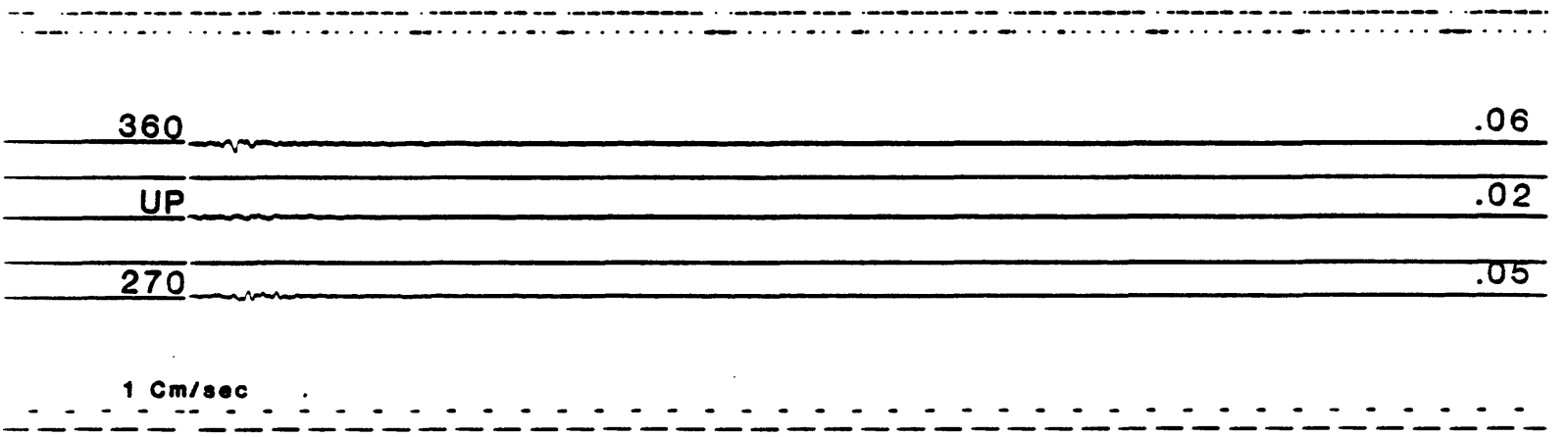
HOLLISTER DIFFERENTIAL ARRAY SMA-1

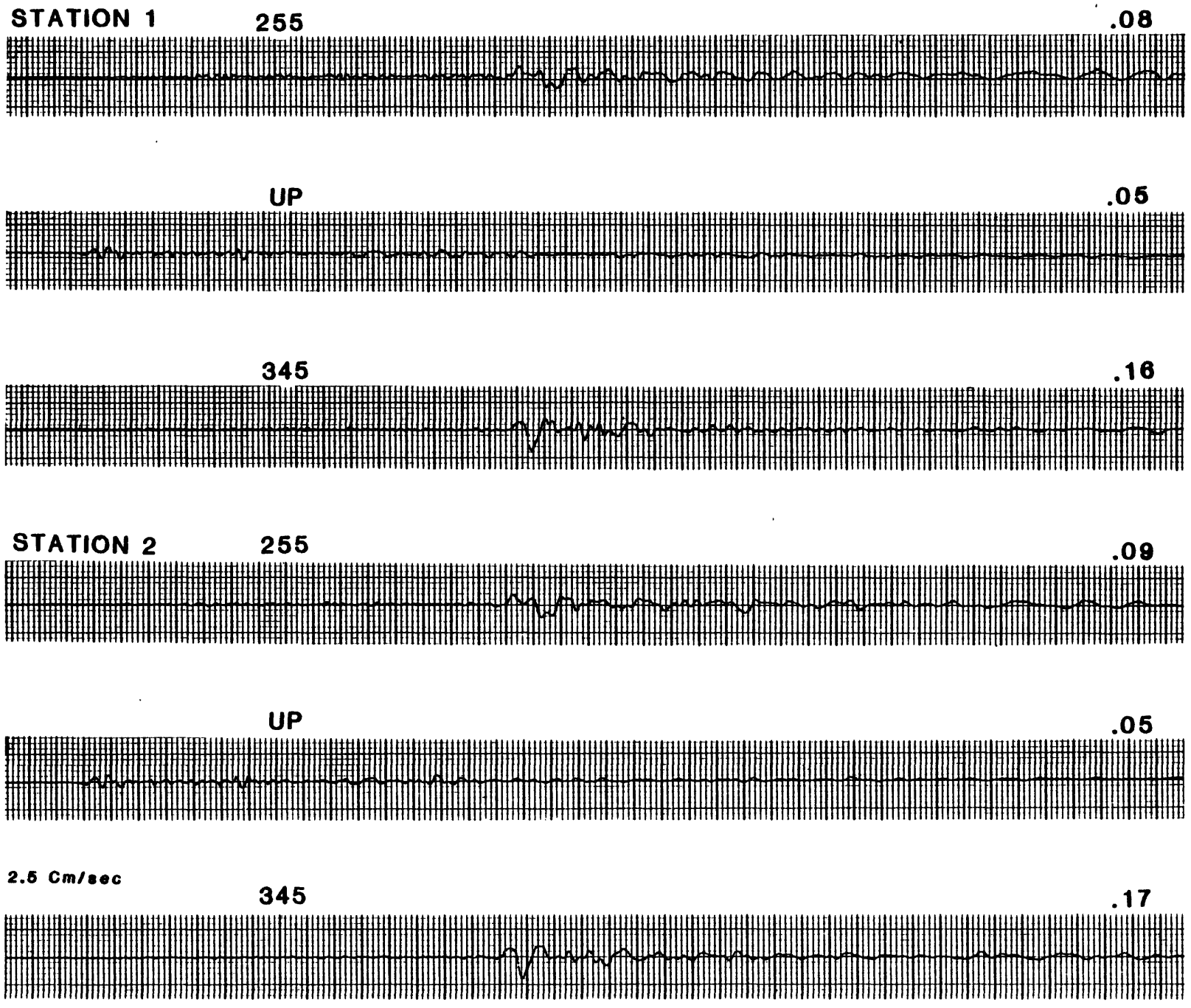


DAMLER RESIDENCE

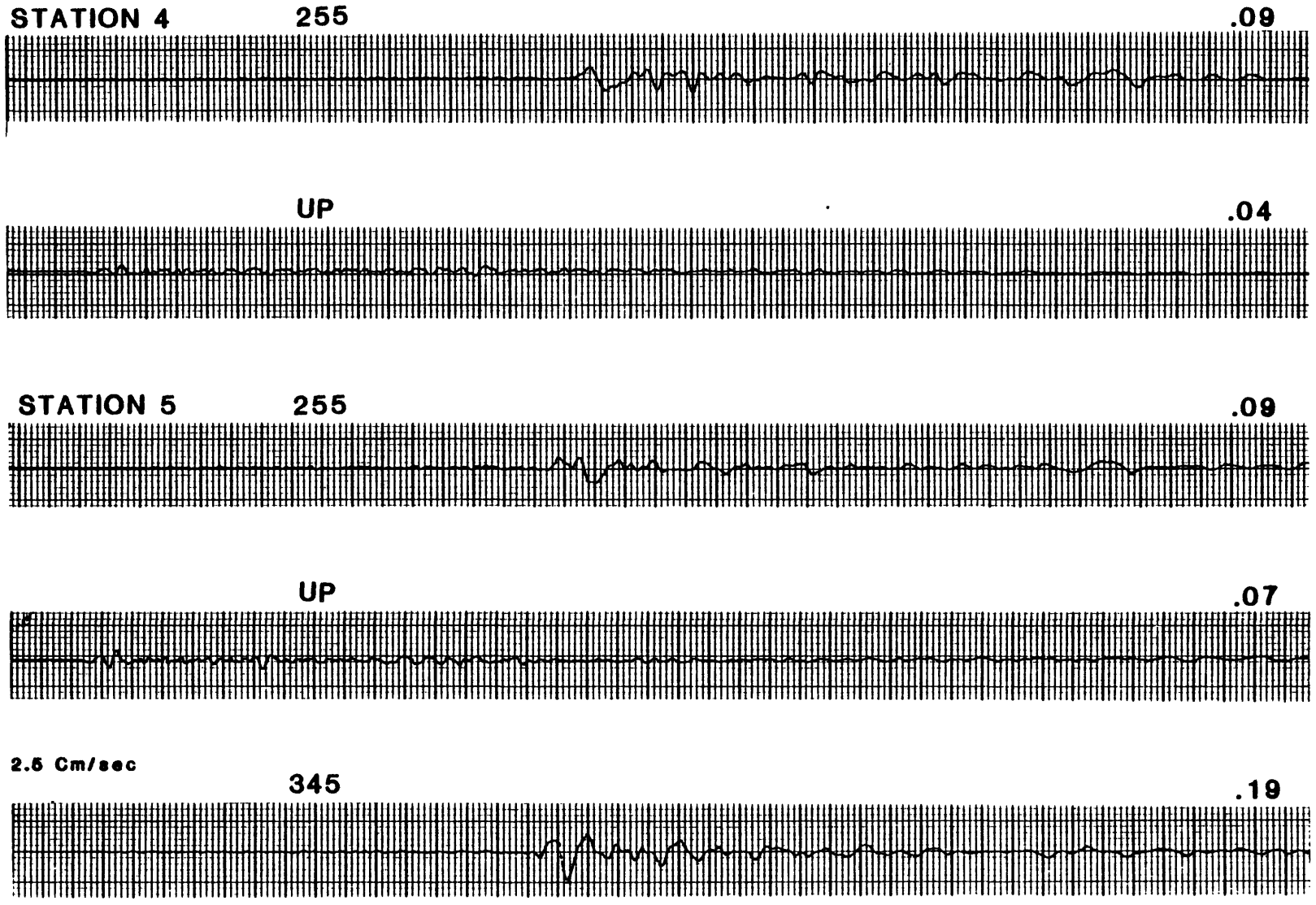


SAGO VAULT

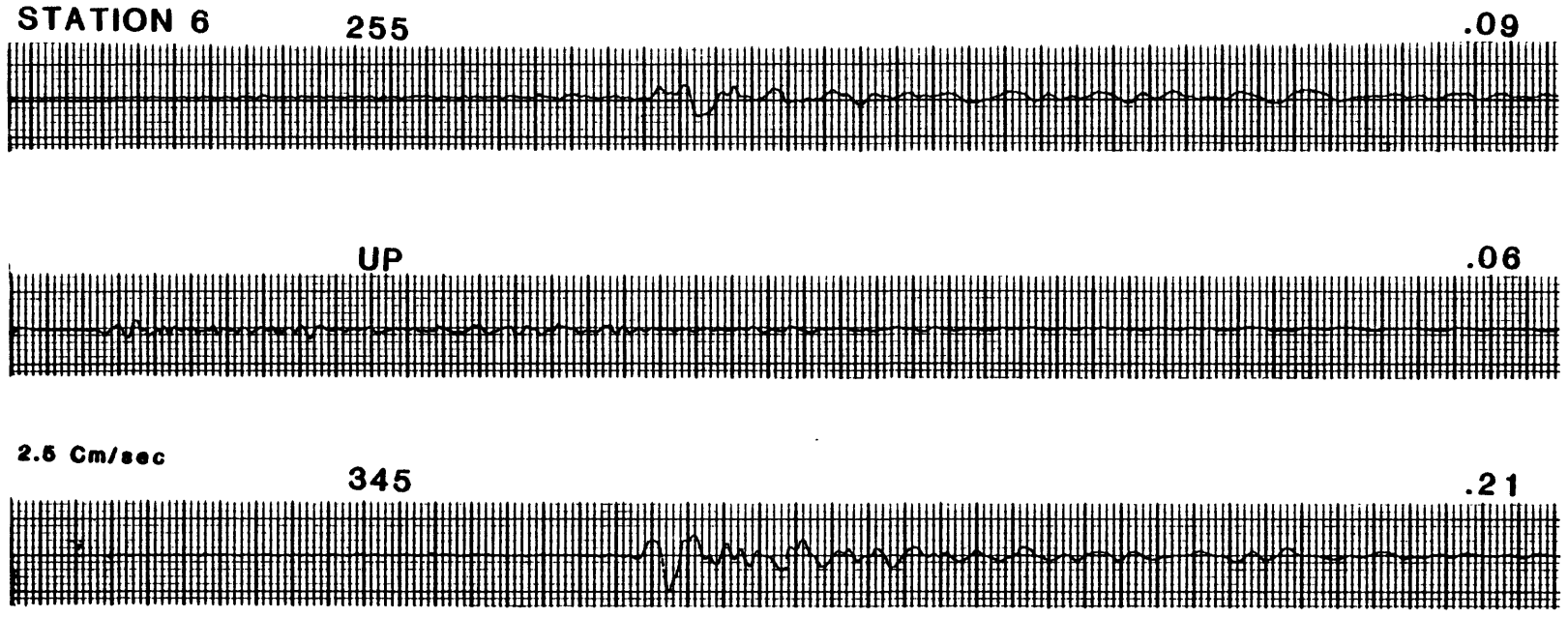


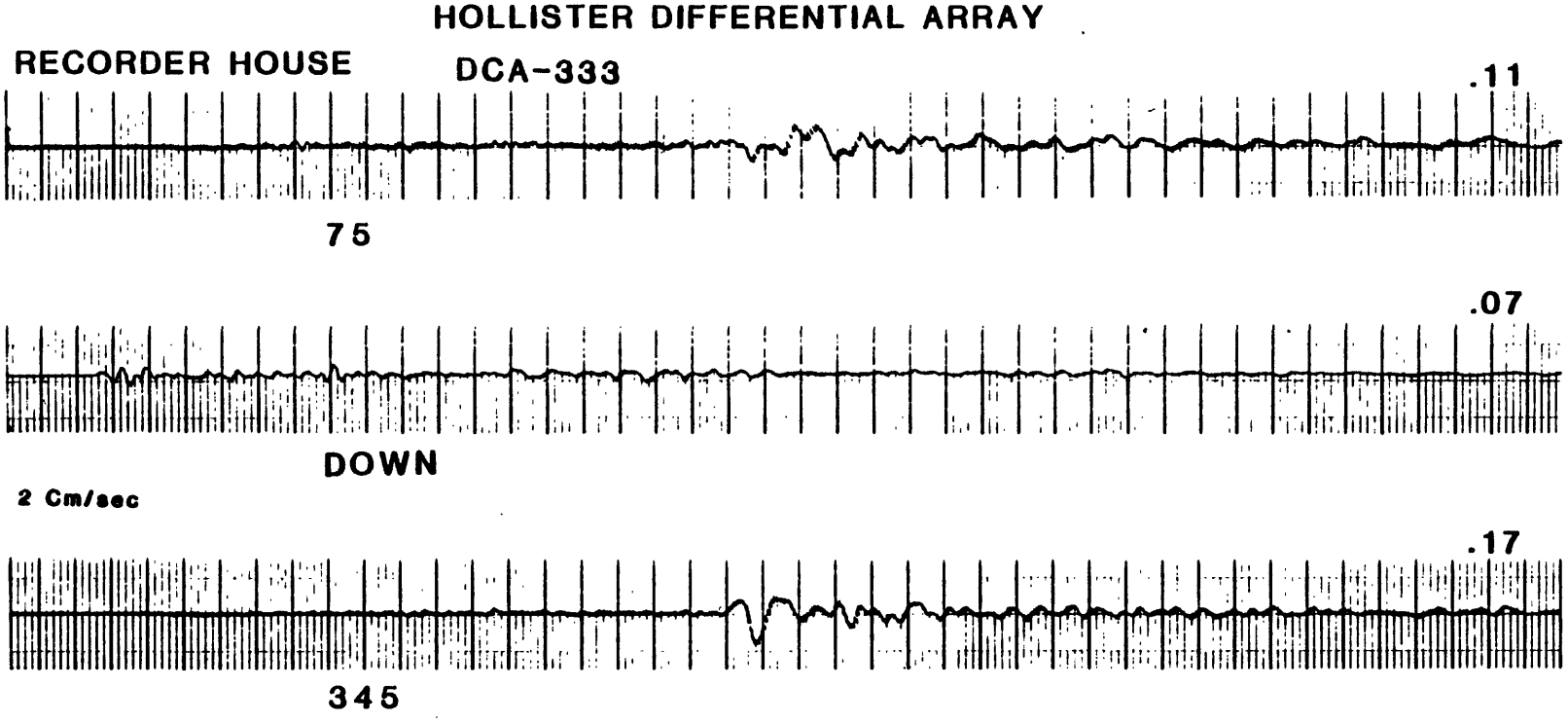

HOLLISTER DIFFERENTIAL ARRAY
STATION 1
255
.08
UP
.05
345
.16
STATION 2
255
.09
UP
.05
2.5 Cm/sec
345
.17

HOLLISTER DIFFERENTIAL ARRAY



HOLLISTER DIFFERENTIAL ARRAY




HOLLISTER DIFFERENTIAL ARRAY
RECORDER HOUSE
DCA-333
.11
75
.07
DOWN
2 Cm/sec
.17
345