# *CHAPTER IV*

## A PC-Based Seismic System for Armenia

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## INTRODUCTION

Personal-computer-based seismic systems are playing an increasing role in seismic data acquisition and processing. In the past the computer used was usually a mini-computer with specialized hardware and software (costing hundreds of thousands of dollars, and taking several weeks to install). Because personal computers (PCs) are now inexpensive, a PC-based seismic system can be implemented for as little as $5,000 and requires less than one hour to install.

A PC-based seismic system expects multiple channels of analog signals (either hard-wired or telemetered) as inputs. The analog signals are usually a few volts in amplitude (peak-to-peak), and will be digitized at a prescribed sampling rate. The system records the digital data either continuously or by event trigger.

## THE PC-QUAKE SYSTEM

The PC-Quake system (Lee, 1989) is a general-purpose seismic system, with the following characteristics:

(1) Uses IBM-compatible 286, 386sx, 386, or 486 PCs with an 8-MHz AT bus.

(2) Uses analog-to-digital (A/D) boards (DT 282x series) made by Data Translation, Inc.

(3) Digitizes 16 analog channels (upgradable to 128 channels) at user selectable rate.

(4) Digitizes up to a few thousand samples per second per channel.

(5) Displays digitized data continuously and in real time.

(6) Saves digitized data continuously or by event triggering.

(7) Automatically picks P-arrivals and locates events.

(8) Offline analysis includes manual picking, filtering, FFT, and coda Q.

(9) Channel to digitize, or display, or trigger is user selectable.

Readers are referred to Lee and Dodge (1992) for more detail.

## A PC-BASED SEISMIC SYSTEM FOR ARMENIA

In 1990, a PC-Quake system was implemented in Armenia. This system consists of two identical IBM-compatible 286 PCs with 12-bit, 16-channel A/D boards made by Data Translation. One PC is used for on-line data acquisition and the other PC is used for off-line data processing and analysis. The two PCs are linked by a high-speed local area network (LANtastic kit by Artisoft), and an optical WORM drive (IBM 3363) is used to archive the digitized data on 200-megabyte removable cartridges. The off-line PC also serves as a backup to the on-line unit. A multiplexer could be used to increase the number of channels to a maximum of 256 channels for the 12-bit A/D board (or 64 channels for a 16-bit A/D board).

Table 4-1 lists the events recorded on the PC system from 21 September 1990 through 1 January 1991. For those events simultaneously recorded on the GEOS systems the GEOS event

name is indicated. Magnitudes as found in the USGS's National Earthquake Information Center's (NEIC's) monthly Preliminary Determination of Epicenters, Arefiev *et al*. (1991), or as determined in Chapter V of this report are also provided. Note that PC trigger times are based on the relatively inaccurate PC internal clock that drift by several seconds per day.

Plots of the PC-XDETECT records follow this chapter. Start-of-record times are indicated on the upper left corner of each plot page (*e.g.* 09/21/90 07:15 30.359). The plots show the IRIG time signal, ten vertical components (G1AZ to G5BZ), the horizontal components from G1A and G4A (G1AN, G1AE, G4AN, and G4AE), and the sine-wave trigger signal that is activated by a multi-component algorithm. "N" and "E" components are nominally north and east; refer to Table 2-1 for their true orientations. Peak digital counts and relative component scaling factors are indicated at the left of each trace. The time scale shown at the bottom of the page is in seconds. Long events can appear as multiple records across several pages.