

U.S. Offers Aid to Seismographic Stations Participating in Global Net Using Standardized Equipment

The United States recently announced plans to provide modern, standardized seismic equipment to 125 seismographic stations throughout the world as part of a general program to encourage the conduct of fundamental research in seismology. These plans evolved from the recommendations of the Berkner panel on seismology and constitute one element of the U.S. program of research and development to develop an effective nuclear test detection system. The overall U.S. effort, known as Project Vela, is under the direction of the Advanced Research Projects Agency of the Department of Defense. The world-wide standardized seismographic instrument portion of the program is administered by the U.S. Coast and Geodetic Survey.

The new instruments will be capable of recording seismic waves over a wide range of periods (about 0.1 to 100 seconds). They will be accurately calibrated, and the response characteristics will be identical at each station. The intent is to establish a co-operative world-wide seismographic net employing standardized equipment in addition to, or in place of, the existing seismographs. It is expected that such a network will provide new and more quantitative data for studies of seismic activity throughout the world, and for studies of the mechanisms of earthquakes and the propagation of seismic waves.

A panel of American seismologists was appointed by the National Academy of Sciences-National Research Council to advise on the choice of instruments and the basis for selection of the recipients. The panel consisted of the following members:

Perry Byerly, University of California, Berkeley;

Carl Kisslinger, St. Louis University;
Jack Oliver, Columbia University;

Frank Press, California Institute of Technology;

James T. Wilson, University of Michigan, *chairman*.

Recommended Instruments

In considering the most useful types of instruments to recommend, the panel was guided by the following considerations: (i) the instruments should be of types that can be procured without extensive development; (ii) three components should be recorded in every case; (iii) the over-all period response should

be such as to cover the most useful part of the spectrum that can be recorded without resorting to equipment of a very special type. These requirements indicate that two sets of three-component instruments are desirable, one short-period set with high magnification, and a relatively long-period set with moderate magnification.

The recommended short-period seismographs consist of variable reluctance seismometers of 1-second period connected by means of step attenuators to galvanometers with periods in the 0.2-to-1.0-second range. The seismograph should have a peak available gain of more than 100,000, although local noise conditions will of necessity control the actual operating gain. The recommended long-period seismographs consist of moving-coil seismometers with periods in the 10-to-30-second range connected to galvanometers with periods of about 100 seconds. The peak available gain will be about 4500; while the operating gain and period response are not yet firm, it is believed that this equipment can be operated with identical characteristics at all stations. Polarized connectors will be used, and both long- and short-period seismographs will have built-in calibrators for daily automatic gain and polarity checks.

Conventional triple-drum photographic paper records will be used. The recording speed will be 60 millimeters per minute for the short-period instruments and 15 or 30 millimeters per minute for the long-period instruments. The timing unit will be controlled by an electronic clock with a rate not to exceed 0.1 second in 4 days to insure adequate time in areas where radio time signals cannot be received every day. The timing unit will provide minute and hour marks, with additional specially coded marks every 6 hours. Synchronous power for driving the recorders will be derived from the electronic clock. A high-quality crystal-controlled radio will be used to detect radio time signals which will be directly recorded on the seismograms.

Selection of Recipients

The first instruments will be made available to those stations not now equipped with instruments of the type recommended by the committee, which indicate an interest in receiving them and have been active and reliable participants in seismic work in the past. Institutions not now actively engaged in seismology which indicate a strong interest in seismological research, and

which can demonstrate capability to operate a station on a continuing basis, will also be considered.

It is anticipated that the stations receiving the equipment will, in most cases, provide the vault, pier, building, supplies, and power required to operate the equipment. However, technical assistance, when required, can be provided to aid in the installation, initial calibration, and occasional specialized maintenance of the equipment. The sponsors of the seismological observatory are expected to provide operating personnel, perform ordinary maintenance and, as is the custom among seismologists of the world, make their records available to scientists who request them. The latter is, of course, crucial to the success of the program.

Use of Data

Since one of the purposes of the program is to improve the level of seismic research throughout the world, the stations receiving the equipment will be encouraged to use the data from their equipment to issue improved bulletins and to undertake research programs that were previously not possible.

In addition to the customary individual loan of station records, each station will be expected to make all the records available to researchers throughout the world; for this purpose, the U.S. Coast and Geodetic Survey will act as a central seismogram collection center. Participating stations will be provided with photographic copying facilities and will be requested to send the originals or copies of each seismogram to the Coast and Geodetic Survey. Upon request, these records will be made available by the survey to any interested scientist throughout the world.

The seismographic instrument program is being administered by the Division of Seismology, U.S. Coast and Geodetic Survey, Washington 25, D.C. Requests for copies of the first report of the NAS-NRC Committee on Seismological Stations, as well as all other inquiries pertaining to this program, should be sent to the Coast and Geodetic Survey.

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