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Report of VESIAC

A BIBLIOGRAPHY OF SEISMOLOGY FOR PROJECT VELA

Final Edition

VESIAC STAFF

VOLUME II

June 1971

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13 ABSTRACT

The final edition of A Bibliography of Seismology for Project VELA lists authors and titles and gives abstracts for articles and reports on seismology and the detection of underground explosions. The list of authors and titles is arranged by areas of the VELA Uniform program of the Advanced Research Projects Agency.

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Report of VESIAC

A BIBLIOGRAPHY OF SEISMOLOGY FOR PROJECT VELA

Final Edition

Edited by

VESIAC Staff

June 1971

Geophysics Laboratory

Willow Run Laboratories

THE INSTITUTE OF SCIENCE AND TECHNOLOGY

THE UNIVERSITY OF MICHIGAN

Ann Arbor, Michigan

VESIAC 9787 VU
AD 456 955

During the period of time covered by the grant, a number of significant improvements were made in techniques for the determination of epicenters and the estimation of errors involved in these determinations. Computer programs were revised and improved, and a large amount of data was collected on the regional variations in Pn velocity in the United States, the Soviet Union, and Europe. The sections of this report describe briefly some of the findings under this grant along with the titles of papers and reports and abstracts of papers presented orally which resulted from these studies.

HERRIN, E. and C. F. BROWN, Description of a Digital Computer Program for the Determination of Earthquake Hypocenters, Contr. No. AF-AFOSR-414-63, Southern Methodist Univ., Dallas, Texas, 1960.

VESIAC 7736 VU

Described is a complete program called HYPO, for the Remington Rand UNIVAC 1103 digital computer designed to improve statistically an approximate hypocenter, including epicentral location, focal depth and origin time, given arrival times from 5 to 200 seismic stations. Solutions for epicenters are accurate for any locations including the geographic poles. Accurate depth estimates are not possible for depths below 400 km. The computer proceeds by successive approximations, each of which permits the operator to use its data to exercise options and to decide whether another iteration is needed. About seven iterations, each about 60 seconds, are needed to correct large errors in the trial date.

HERRINCK, P., Utilization of Nuclear Explosions in Civil Engineering Work. Communate Europeene De L'energie Atomique, France, (Translated from French), 1962, Contract SD-78.

VESIAC 10,367 VU

After presenting some information on the cost of nuclear devices and the American and Russian experiences concerning excavations by means of chemical and nuclear explosives, the present technological status of the subject is briefly examined. The problem of radioactive fallout is then considered, for this problem constitutes a major obstacle to the general application of this technique. The report finishes with the description of a method of application of nuclear explosions which might perhaps permit excavations without the disadvantage of radioactive fallout.

HILL, D. P., R. Y. KOYANAGI, The Short-Period Seismic Network on Hawaii and Its Sensitivity to Small Northern and Northwestern Circum-Pacific Earthquakes, Rept. No. NCER-4, Contract ARPA Order No. 193, U. S. Geological Survey, Menlo Park, Calif., 1967.

VESIAC 16,640 VU
AD 828 278

This report describes the existing HVO short-period seismic network and its capability of detecting small seismic events with north and northwestern circum-Pacific sources. Data used in this study are taken from selected earthquakes and earthquake swarms occurring in the Kuril-Kamchatkan and Alaskan-Aleutian seismic belts during 1963-1965 as reported in the Hawaiian Volcano Observatory Summaries. The HVO recording of the LONGSHOT event is included for comparison with Aleutian earthquakes of similar magnitude and epicenter.

HIRASAWA, T. and W. STAUDER, Spectral Analysis of Body Waves from the Earthquake of February 18, 1956, Contr. No. AF-AFOSR-386-63, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 8187 VU

The earthquake south of Honshu, Japan, on February 18, 1956, is studied by means of Fourier analysis. The focal depth is about 450 km, and the magnitude is 7 1/4 to 7 1/2. Three theoretical models of the source mechanism, Type Ia, Type Ib, and Type II, are examined by the observed amplitude spectra of S and ScS waves. It is found that the observed amplitude ratios of the Fourier components between two horizontal components of the S wave and of the ScS wave, respectively, agree well with the theoretical ratios for a Type II source. The scattering from the mean amplitude is calculated, and the result shows that the Type II model is preferable to either of the Type I models. Described is how the radius of the source region is estimated.

HOERNES, V. R., "The Earthquake of Messina on December 28, 1908," Sonder. Aus. Geol. Runds., Vol. 1, pp. 177-183, 1910, (Translated from German), Contract SD-78.

VESIAC 9530 VU

It was to be anticipated that the violent earthquake of 1908 would be the cause of many publications, in a manner similar to the earthquake of Lisbon. The present report considers only the most important of these publications, and does so only in brief. It was impossible to consider a complete investigation, since the mere listing of all the reports that have appeared in many journals throughout the world on the subject of this earthquake would far exceed the space available. This report, then, is a bibliographical essay on the most important studies which have as their subject the Messina earthquake of 1908.

HOFMANN, R. B., Limitation of Correction Factor Application to Magnitude Formulas, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 E VU
AD 441 592

This is a study of the limitation of correction factor application to magnitude formulas.

HOFMANN, R. B., Magnitude Determination Problems for the Worldwide Collection and Analysis Program, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 D VU
AD 441 592

Very high positive station magnitude corrections for short-period seismograph systems are obtained by comparing published magnitudes with calculated magnitudes. This correction does not apply at less than shadow zone distances. Two types of evidence are given for this. The average such correction for six of eight specific instrument types, distributed world wide, shows increasing positive values with decreasing average bandpass period and bandpass width. Possible explanations for these phenomena are higher than normal attenuation of the short-period components of P waves by the shadow zone mechanism, and variation in the position of the available broad P-energy spectrum passed by any specific instrument.

HOFMANN, R. B. and F. E. ROMBERG, Comparison of Earthquake Magnitude Determination Methods, Special Rept. No. 8, Contract No. AF 19 (604)-8517, Texas Inst., Dallas, Texas, 1963.

VESIAC 6109 VU

Magnitudes determined from P waves are influenced by instrument type. Short-period instruments generally yield magnitudes about one unit less than long-period instruments for teleseisms. For near events this difference is reduced.

The apparently anomalous relationship between the m_b scale recently adopted by the USC&GS and AFTAC and the widely used Richter scale, M, can be explained by the different rules for measuring P amplitudes by instrumental band-pass characteristics, and by possible shadow-zone effects.

HOFMANN, R. B. and R. W. WYLIE, Magnitude Calculation for the World-wide Collection and Analysis Program, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 G VU
AD 441 592

Several methods of magnitude determination are in common use; each has advantages and limitations. The methods and conditions under which each may be used are shown in this report. Magnification vs. period curves for seismograph systems frequently have steep slopes. Thus, the phase of largest trace amplitude may not represent that with largest ground motion. Two amplitude and period measurements, except with 20-second surface waves, should be made when possible, to minimize the potential error.

HOGAN, J. G., J. J. BLANEY, T. E. FOLEY, and W. E. HAYNES, et. al, Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Final Sci. Rept., 1 June 1966 to 31 August 1968, Rept. No. AFCRL 68-0589, Contract AF 19(628)-6067, Boston College, Chestnut Hill, Mass., 1968

VESIAC 19,159 VU
AD 679 558

Seismometer test procedures are presented. Results of the tests performed on Electro-Tech's model EV17 seismometers used in the portable seismic detection system are detailed.

The results of frequency response tests performed on the portable seismic detection system are presented. Changes and modifications of the portable seismic detection system are described.

HOLDER, A. P., M. H. P. BOTT, Crustal Structure of Great Britain, Final Sci. Rept., 1 August 1963 to 31 May 1968, Contract AF 61(052)-733, Durham Univ., Durham, England, 1968

VESIAC 19,282 VU
AD 684 550

The final form of the hardware built for crustal refraction studies is summarized and some preliminary results from a major crustal refraction experiment are given.

HOLYER, R. J., Simulation of Adaptive On-Line Maximum-Likelihood Processing, Seismic Array Processing Techniques, Tech. Rept. No. 11, Contract VT/0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,396 VU

On-line adaptive maximum-likelihood processing has been simulated on the IBM S/360 computer to investigate some of the problems associated with on-line processing. The problems considered were the presence of signals in the data, dead or noisy channels, and signal model errors in adaptive beamsteers. Experimental results indicate that relatively simple techniques are effective in reducing the detrimental effects of these on-line problems to an insignificant level.

HOLYER, R. J., and R. L. FISHER, Worldwide Collection and Interpretation of Earthquake Data - Special Report No. 5: Method for Treating Cumulative Errors in Epicenter Determinations, Contract C-104-65, Texas Instr., Inc., Dallas, Texas, 1966.

VESIAC 14,946 VU

A new technique is presented which removes both regional errors and near-source crustal and upper mantle anomalies from epicenter location calculations. This technique treats each event individually rather than statistically. Many sources of error are possible in each epicenter location. These errors can be classified into two groups: (1) random, and (2) cumulative. The effects of random errors in epicenter location are reduced by the present least-squares method used by the USC&GS and Texas Instruments. The method introduced here treats cumulative errors, the presence of which results in an irregular azimuthal distribution of time residuals. Time-residual patterns are studied to determine a theoretical epicenter shift toward the true location, and the data are applied to a number of events.

HOOK, J. F. and T. KARLSSON, A Theoretical Study on Propagation of Seismic Waves in an Inhomogeneous Earth, Final Rept., Contract No. AF 49(638)-1082, Natl. Engr. Sci. Co., Pasadena, Calif., 1963.

VESIAC 6046 VU

This final report summarizes the work performed, which had already been published in seven papers. The work involved extending and perfecting a generalization of the Helmholtz method of potentials that yields separation of the P and SV components for certain types of transversely inhomogeneous media. The method is applied to representative P and SV problems; for this initial study, inhomogeneous media for which analysis was simplest were chosen. A nearly complete catalog of the separable cases of the P and SV components of the vector wave equation was prepared for a system of nonlinear equations the properties of the medium had to satisfy. Lamb's problem for an inhomogeneous medium with constant velocities of propagation is considered.

HOOVER, D. B., D. PLOUFF, and J. H. HEALY, Calibration of a Seismic-Refraction System, Tech. Rept. No. 39, Contract ARPA Order No. 193-64, U. S. Geological Survey, Denver, Colorado, 1965.

VESIAC 12,405 VU
AD 470 872

A high fidelity piezoelectric shake table has been used to calibrate the U. S. Geological Survey's long-range seismic-refraction equipment. The frequency response is obtained by Fourier analysis of the system output from a step function in displacement, and by direct measurement of the response to sinusoidal displacements. An auxiliary *in situ* test (current release) which does not require a shake table is used to calibrate the system each time a field recording is made. The combination of these three techniques provide an accurate calibration that can be continuously monitored during the course of a field program.

HOWARD, J. H., The Mechanical Analysis of Quaternary Tectonism, Final Rept., 1 October 1966 Through 30 September 1967, Rept. No. AFCRL-67-0630, Contract F 19628-67-C-0036, Shell Development Co., Houston, Texas, 1967.

VESIAC 17,129 VU
AD 662 635

This research has been concerned principally with the analysis of strains which have developed at the earth's surface during the last 35 years. Deformation of the earth's surface has occurred within the last 35 years and presumably is continuing today. The deformation is documented by repeated surveys of geodetic movements. Sufficient data exist at a number of areas to determine strains. These determinations, however, involve interpolations of data.

HOWARD, J. H., Recent Deformation at Buena Vista Hills - (Appendix B) of The Mechanical Analysis of Quaternary Tectonism, Rept. No. AFCRL-67-0630, Contract F 19628-67C-0036, Shell Development Co., Houston, Texas, 1967.

VESIAC 17,129 B VU

This article presents a method for describing the displacements and strains associated with these areas where data are available on the movements of a limited number of points. This article also describes deformations which have occurred at Buena Vista Hills, California, during the period 1932-1959.

HOWARD, J. H., Recent Deformation of the Cholame and Taft-Maricopa Areas, California - (Appendix C) of The Mechanical Analysis of Quaternary Tectonism, Rept. No. AFCRL-67-0630, Contract F 19628-67C-0036, Shell Development Co., Houston, Texas, 1967.

VESIAC 17,129 C VU

This article presents the analyses of deformation which have occurred at the earth's surface within the last 35 years to two areas which cross the San Andreas fault. These areas are: (1) the Cholame area and (2) the Taft-Maricopa area (Figure C-1). This article is also concerned with reviewing selected methods of analyzing geodetic data in order to describe strains which are developing in the earth.

HOWARD, J. H., The Two-Dimensional Analysis of Movements of Points to Determine Finite Strains - (Appendix A) of The Mechanical Analysis of Quaternary Tectonism, Rept. No. AFCRL-67-0630, Contract F 19628-67C-0036, Shell Development Co., Houston, Texas, 1967.

VESIAC 17,129 A VU

This article presents a method for analyzing the deformation of a body when the positions through time of a limited number of points are known. The method now applies to two-dimensional problems only, but could be extended to three dimensions. The method applies to the analysis of geodetic data on recent crustal displacements and to the two-dimensional analysis of deformed fossils and of existing large-scale geologic structures.

HOWARD, J. H., The Use of Transformation Constants in Finite Homogeneous Strain Analysis - (Appendix D) of The Mechanical Analysis of Quaternary Tectonism, Rept. No. AFCRL-67-0630, Contract F 19628-67-C-0036, Shell Development Co., Ventura, Calif., 1967.

VESIAC 17,129 D VU

The size, shape and orientation of the strain ellipse, which graphically portrays the state of strain, are functions of the transformation constants and can be computed when the transformation constants have been determined.

This article presents a method for determining these constants. This article also illustrates their use by a hypothetical example (a sheared crystal) and by two real examples (a deformed spirifer and a stretched belemnite).

HOWARD, R. F., Bathymetry Program Kurile Islands Experiment, 3. Ocean-Bottom Seismographic Experiments, Project VT/6708 Contract F33657-67C-1050, Texas Inst. Inc., Dallas, Texas, 1967.

VESIAC 16,629 VU

A bathymetric survey was conducted as a part of the Kurile Islands Experiment. Since the primary efforts of the experiment were directed toward the Ocean-Bottom Seismograph and Explosive Program, the method used during the bathymetric survey was appropriate but not optimum. Bathymetric data were very good and were as reliable as navigation would permit. However, the profile coverage was generally too sparse. The conclusion is that observations of depth values, OBS-environmental relations and overall bathymetry are valid within navigational limits.

HOWELL, B. F. and P. M. LAVIN, Model Studies of Seismic Energy Distribution Around Different Types of Sources, Final Rept., Contract No. AF 19(604)-7383, Pennsylvania State Univ., University Park, Pa., 1963.

VESIAC 7373 VU
AD 427 869

This report discusses model studies of first motions produced by an actual fault. Eight models were used, five of Plexiglas and three of Plexiglas and steel. Results indicated a double-couple source mechanism. Studies were also conducted on the effect of near-source velocity discontinuities on first motion patterns. Conventional two-dimensional ultrasonic techniques were employed. It was shown that it is possible to distinguish between various simple force systems, simulating earthquake and explosion source mechanisms on the basis of first motion studies. However, interpretational problems can exist if the focal area is not homogeneous.

HOWELL, B. F., and P. M. LAVIN, Studies of the Effect of Depth of Focus on Seismic Pulses, Contract AF 19(628)-238, Pennsylvania State Univ., University Park, Pennsylvania, 1966.

VESIAC 13,550 VU
AD 627 373

The principal objective of this research is to improve the accuracy of focal-depth determination as a means of distinguishing between natural earthquakes and explosions. The research has consisted mainly of evaluating a method of focal-depth determination which depends on recognition of the sequence of events which arise from the reflection of the initial P pulse at the surface and evaluating the factors controlling the accuracy of this measurement.

A second objective is to study the effect of the nature of a boundary on seismic pulses refracted along it both in scale models and in the real earth.

HOWELL, B. F., and P. M. LAVIN, Studies of the Effect of Depth of Focus on Seismic Pulses, Final Rept., 1 January 1962 Through 31 October 1965, Rept. No. AFCRL-66-764, Contract AF 19(628)-238, Penn. State Univ., University Park, Pa., 1966.

VESIAC 15,324 VU
AD 646 035

This report summarizes conclusions of 30 reports issued in connection with this contract, and lists the reports, which discuss how each of the objectives of the contract was reached.

The principal method used to measure depth-of-focus of shallow events is the Watson-Merdler inverse-filtering technique. A simplified version which neglects noise also finds ghosts in a seismogram, as does cross-correlation. The three methods frequently find the same ghosts.

Two factors make it difficult for all three methods to find ghosts: (1) S-P seismometers do not record the main part of the energy in most pulses; (2) the ghosts commonly differ greatly from their primaries in waveform and frequency spectrum.

HOWELL, B. F., P. M. LAVIN, A. DURAZZO and Y. NAKAMURA, Model Studies of the Effect of Depth of Focus on Seismic Pulses, First Semiannual Tech. Rept., Contract No. AF 19(628)-238, Pennsylvania State Univ., University Park, Pa., 1962.

VESIAC 6498 VU

The object of this research is to develop a technique for determining the depth of focus of a seismic disturbance to within plus or minus 5 km accuracy or better. The use of accurate focal depth measurements to distinguish between earthquakes and underground nuclear explosions is discussed. The phase and frequency-spectra differences in a seismic pulse should depend on the depth of focus. In this project, results from two-dimensional model studies will be compared with actual seismograms to see whether the same effects are present. This report discusses certain difficulties in choosing material for the model. Several means of attaching transducers to the model are described. Preliminary results and other matters are included.

HOWELL, B. F., P. M. LAVIN, S. C. MERDLER, and Y. NAKAMURA, et al., Model Studies of the Effect of Depth of Focus on Seismic Pulses, Semiannual Tech. Rept. to June 1963, Contract AF 19(628)-238, Pennsylvania State Univ., University Park, Pa., 1963.

VESIAC 14,321 VU

This report discusses progress on attempts to improve methods of determining the depth from the earth's surface of seismic wave sources. It is desired that all disturbances originating at depths greater than those accessible to man be distinguished from those originating at lesser depths. The latter might then be due to nuclear explosions, unless there is evidence of a natural cause. Included is a discussion of near-source and distant stations. A section on seismogram analysis and a discussion of a report on the effect of a transition zone at the M Discontinuity on the frequency spectrum of seismic waves refracted at the boundary are included.

HOWELL, B. F., P. M. LAVIN, and J. B. PFLUKE, Model Studies of Seismic Energy Distribution Around Different Types of Source, Contract AF [illegible], Pennsylvania State Univ., University Park, Pa., 1962.

VESIAC 10,657 VU
AD 283 116

This progress report will be concerned with progress toward the third objective of the project: to study in models possible generation mechanisms which may act in natural earthquakes and to discover how they may be recognized by their first-motion patterns.

HOWELL, B. F., P. M. LAVIN and R. J. WATSON, Studies of the Effect of Depth of Focus on Seismic Pulses, Semiannual Rept., Cont. No. AF [illegible], Penn. State Univ., University Park, Pa., 1964.

VESIAC 6216 VU

This semi-annual report summarizes the progress made up to June 30, 1964 on the problem of improving focal-depth determinations. It describes the technical status and results of model work, of frequency analysis of seismograms, and of new methods of analysis. Lastly, it identifies briefly the problems encountered, the research personnel, and the schedule of work and future plans.

HOWELL, B. F., P. M. LAVIN, and R. J. WATSON, Studies of the Effect of Depth of Focus on Seismic Pulses - Sixth Semiannual Report, Contract AF [illegible], Pennsylvania State Univ., University Park, Pa., 1965.

VESIAC 9444 VU

A technique for calculating the depth of focus of seismic events has been developed and is described in this report. Preliminary tests indicate that the method works. It remains to determine how accurate the method is and how to find the range of conditions over which it applies. Forty-one digitized seismograms are available on which it will be tested, including nine nuclear-test seismograms. The variability of the frequency spectrum of a Peruvian earthquake has been measured. The high-frequency cutoff of the energy in this shock is below the cutoff of the VELA worldwide seismic recording system. Budgetary and contractual needs are discussed in terms of tests underway and studies proposed.

HOWES, E. T., Design Report Phases I and II, Advanced Control Post and Systems Development Laboratory, Contract No. VT 70, AF 33(600)-42155, United ElectroDynamics, Inc., Pasadena, Calif., 1961.

VESIAC 6604 VU
AD 406 609

This is the concluding report for Phases I and II of the contract of UED, for the design, establishment, and operation, of a Seismological Systems Laboratory composed of an experimental seismograph station and a systems development laboratory. The work phases covered here are: 1) Phase I - Design of an Experimental Seismological Station and Systems Development Laboratory, including the three steps of site selection, instrumentation, and station facilities; 2) Phase II - Investigation of Data Processing and Communications, including the steps of, a) Data Processing Study and Recommendations of Equipment for Developmental Installation, and b) Communications Study and Recommendations of Equipment for Developmental Installation.

HOWER, E. T., and F. B. COKER, Seismological Systems Laboratory, Monthly Progress Rept. No. 1, Volume II - 21 August 1965 - 30 November 1965, Contract VT/970, AF 33(600)-42159, United Electro-Dynamics, Inc., Pasadena, Calif., 1965.

VESIAC 16,977 VU

Observatory operations and additional data on the "coefficient loss problem" which previously existed in the MCF processor are summarized.

Research activities, including ambient noise studies, visual data display improvement and MCF processor evaluation, are reviewed. Data are presented which demonstrate the continued time-stationarity of the ambient noise field over a 2-yr period, thus indicating the MCF operators developed under previous efforts are appropriate for present application in the MCF processor.

Design, construction and installation of the auxiliary detection and identification processor were completed on 30 December. A description of the system and a discussion of the on-line implementation and operating parameters are presented.

HUANG, Y. T., Digital Evaluation of a Calibration Technique for Multiple-Element Array Systems, Technical Rept. No. 65-127, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Geotech Division, Garland, Texas, 1965.

VESIAC 14,473 VU
AD 463 938

A quantitative analysis was made using techniques of digital spectral analysis. Two different approaches were compared — statistical and deterministic. For the statistical approach, the computer program "BLACKY," which computes power density spectra, was adopted. A program which uses the Numerical Transform Theorem was written for the CDC 160A digital computer. This program, "NUTRAN," relies on a deterministic consideration of a time series. The agreement between the field calibration and the estimation of the magnification curve is quite good up to 1.5 cps, considering the simplicity of the mathematical model used in the study. The scatter above this frequency is discussed.

HUANG, Y. T., Preliminary Evaluation of A Calibration Technique For Multiple-Element Array Systems, Tech. Rept. No. 65-111, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1965.

VESIAC 12,910 VU
AD 626 404

A concept is investigated for the calibration of seismographs which uses spectra of strong teleseismic P waves. This technique has a special application in Large Aperture Seismic Arrays (LASA), where calibration of each instrument individually becomes difficult because of the number of seismometers involved.

Signals recorded by standard Benioff short-period seismographs were analyzed by means of an analog spectrum analyzer. The study shows a remarkable agreement between the estimated values of the relative magnification curves and the actually calibrated values for periods greater than 1 sec. For shorter periods, however, the agreement is not good enough for actual application.

HUANG, Y. T., On a Source of Seismic Amplitude Anomalies Due to Dilatational Waves, Technical Rept. No. 67-8, Project VT/6703, Contract AF 33(657)-16270, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,065 VU
AD 813 148

An idea of an elastically restrained boundary is introduced for partial explanation of the amplitude anomalies customarily observed near the low-velocity, weathered layer of the earth's surface. Nondimensional parameters are used as measures of restraint for particle motion within this weathered layer overlying an isotropic, homogeneous, semi-infinite solid earth. It is found that the degree of surface restraint has considerable effect on the amplitude anomaly when the nondimensional parameter for the restraint of particle motion which ranges from zero to infinity becomes greater than unity.

HUANG, Y. T., Spectrum Filtering by Means of Numerical Transform Theorem, Tech. Rept. No. 66-19, Contract VT/4051, AF 33(657)-12145, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,319 VU

A new type of digital filtering is explained without using the convolution theorem used in electrical engineering. The scheme makes use of the Numerical Transform Theorem which transforms a pair of finite spectra (i.e., amplitude and phase spectra) in the frequency domain into a finite time series. This time series, which may be filtered during transformation, has precisely the same record length as the "original" time series without introducing meaningless transients. The spectrum filtering technique, in contrast to the convolution filtering technique, does not require a separate digital filter.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Contr. No. NONR 266(82), Lamont Geol. Observ., Palisades, N. Y., 1963

VESIAC 8299 VU

This report outlines the studies undertaken in marine geophysics and underwater sound from drifting ice stations. The report covers five items: 1) marine geophysics at T-3; an expanded program of research was inaugrated at T-3 in June 1963. This involved the addition of a continuously operating precision depth recorder; 2) seismic refraction experiments in the Arctic Ocean; a long seismic refraction profile was obtained in the Chukchi Sea through a cooperative project with the Universities of Wisconsin and Minnesota; 3) physical oceanographic program at T-3; new studies were begun in June 1963; 4) marine geology; bottom photographs were taken and samples obtained for analysis for radiocarbon to determine the sedimentation and climatic history of the arctic; and 5) wave motion and earthquakes in the Arctic Ocean.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semiannual Tech. Summ. Rept., Contract No. Nonr 266(82), Lamont Geol. Observ., Palisades, N.Y., 1963.

VESIAC 7330 VU
AD 411 193

This summary report provides a capsule comment on both past and proposed work in the following areas: 1) magnetics experiment on Flether's Ice Island (T-3), 2) summer program on T-3, 3) reduction of T-3 data, 4) seismic refraction studies proposed for the fall, 5) ocean-bottom and ice surface seismic noise measurements made on ARLIS II, 6) shallow-water sound propagation in the Arctic Ocean, and 7) additional ARLIS II results.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semiannual Tech. Summ. Rept., 1 July Through 31 December 1964, Contr. NOnr 266(82), Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 10,550 VU
AD 457 064

This report is concerned with the following things:

(1) It is a semi-annual report that covers the field operations at T-3, a drifting ice station which is operated in the Arctic area by the Lamont Geological Observatory of Columbia University;

(2) Airborne Magnetic Survey Project: the work done on this project in the time period under consideration is discussed;

(3) Work at Lamont Geological Observatory, in Marine Geophysics and Submarine acoustics and seismology is discussed. Work done in Physical Oceanography is discussed.

Also included in the report are abstracts of two papers which were presented at the American Geophysical Union Meeting, Washington, D. C., April 1965.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semiannual Tech. Summ. Rept., Contract NOnr 266(82), Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1964.

VESIAC 14,324 VU

This Semi-annual Technical Summary Report covers the research program during the winter and spring, 1964-1965. Studies continued with depth gravity, and magnetic measurements. Navigation and weather data were also taken as necessary background for the geophysical observations. The field operations are described. In addition, the data analysis at Lamont Geological Observatory during the period is discussed. Three areas are reported on: (a) marine geophysics; (b) underwater acoustics; and (c) physical oceanography.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semi-Annual Tech. Summ. Rept, Contract NOnr 266(82), Columbia Univ., New York, N. Y., 1967.

VESIAC 16,643 VU
AD 650 409

This report describes work accomplished at Fletcher's Ice Island (T-3) during the reporting period. The topics discussed include navigation, bathymetry, and seismic profiling.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semi-Annual Tech. Summ. Rept, 1 July Through 31 December 1967, Contract Nonr 266 (82), Columbia Univ., New York, N. Y., 1967.

VESIAC 18,001 VU

This report contains brief statements of work done in the following fields; Navigation, Bathymetry, Gravity, Magnetics, Seismic Profiler, Bottom Sampling, Marine Geochemistry, Nephelometer, Current Measurements, Underwater Sound, and Arctic Sound Scattering Layers.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semiannual Tech. Summ. Rept., 1 January to 30 June 1968, Contract Nonr 266(82), Columbia Univ., New York, N. Y., 1968

VESIAC 18,786 VU

This report is a semiannual technical report which discussed work done on the following subjects: Navigation, Bathymetry, Gravity, Magnetics, Seismic Profiles, Marine Geochemistry, Underwater Sound, and Data Analysis.

HUNKINS, K., Studies in Marine Geophysics and Underwater Sound from Drifting Ice Stations, Semiannual Tech. Summ. Rept., 1 July to 31 Dec. 1968, Contract Nonr 266(82), Lamont-Doherty Geol. Observ., Columbia Univ., Palisades, N. Y., 1968

VESIAC 19,540 VU
AD 682 987

This semi-annual Technical Summary report includes descriptions of the operations at Fletchers Ice Island (T-3) and work at Lamont. It also describes the computer programs written for the marine geophysical data analysis.

HUNT, D. P., A Selected Events Recorder for Seismic Applications, Sci. Interim Rept., Rept. No. AFOSR-70-0330, Contract AFOSR-646-66, Univ. of Nevada, Reno, Nev., 1969

VESIAC 20,255 VU
AD 701 761

This document describes a developmental, suitcase-size portable seismic recording station specifically tailored to micro-earthquake investigation. The total instrument package, including recorder, 24-hour battery pack, radio antenna, seismometer, and field wire weighs less than 100 pounds and can be hand-carried by two people into remote areas not accessible by other means.

The recorder portion of the station is a two-channel, low speed, instrumentation-type magnetic tape recorder which was developed for this particular application. This recorder has the unique capability to edit incoming data and record only those signals that exceed a preset amplitude threshold while retaining the low-level preamble to the recorded event. A time signal derived from a National Bureau of Standards (WWVB) broadcast is recorded with the data to provide accurate event-time correlation.

Reproduce capability is provided within the station to permit signal monitoring during set-up and to allow transfer of data from the magnetic tape to chart type records for visual analysis.

HUSTED, J. E., Studies of the Seismicity of the State of Georgia, Phases I and II, Semiannual Tech. Rept. No. 2, CGS-1237, Georgia Inst. of Tech., Atlanta, Ga., 1965.

VESIAC 9965 VU

In this report, work has been confined to analysis of seismograms for both local and teleseismic events, with emphasis on teleseismic events. This seismogram analysis has two main objectives: "the examination of residuals from the Jeffreys-Bullen travel time tables to determine whether or not there are any correlations which could be applied to make the tables more accurately reflect travel time observed at this station; and the computation of regional magnitude corrections for this station." A discussion of how these objectives are being achieved ends the report.

HUSTED, J. E., Studies of the Seismicity of the State of Georgia, Phases I and II, Semi-Annual Tech. Rept. No. 3, Contract CGS-1237, Georgia Inst. of Tech., Atlanta, Ga., 1964.

VESIAC 12,609 VU

Preliminary results are given from earthquake body wave magnitude studies and from local explosion studies.

IBM CORP. (STAFF), LASA Experimental Signal Processing System, First Quarterly Tech. Rept., Rept. No. TR-67-458, Contract F19628-67C-0198, IBM Corp., Gaithersburg, Md., 1967.

VESIAC 16,943 VU
AD 661 358

This document discusses the effort expended during the first quarter to provide the hardware and software necessary to support research and development directed toward the study of seismic signal processing and delineates tasks planned for execution during the next quarter.

In addition to work accomplished and future plans, this document presents detailed information related to System Data Flow and Hardware Configuration, Array Interface Monitor and Control, Programming, Microcoding, and Washington Laboratory in Appendices A through E, respectively.

IBM CORP. (STAFF), LASA Experimental Signal Processing System, Third Quarterly Tech. Rept. No. TR 68-149, Contract F19628-67C-0198, IBM Corp., Gaithersburg, Md., 1967.

VESIAC 18,319 VU
AD 670 866

The Third Quarterly Technical Report for the LASA Experimental Signal Processing System identifies the effort expended to provide the hardware and software in support of research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document presents detailed information related to machine configurations, time delay correlation, event location accuracy, optimum processing, fast Fourier transform, array design, steering delay library, magnitude estimation, and travel time characterization.

IBM CORP. (STAFF), LASA Signal Processing, Simulation, and Communications Study, February 1966 - January 1967, Final Rept. No. ESD-TR-66-635, Contract AF 19(628)-5948, IBM Corp., Gaithersburg, Md., 1967.

VESIAC 16,372 VU
AD 655 802

In this final report, the study results are described in detail. A summary of the findings correlates the results with factual detail reported earlier. Signal processing is discussed; further system and simulation studies are reported; suggested system implementation is extended; and the set of simulation programs used in this study is presented.

IBM FEDERAL SYSTEMS DIV. (STAFF), LASA Signal Processing, Simulation, and Communications Study, V. 1, Rept. No. ESD-TR-66-463, AF 19(628)-5948, IBM Federal Systems Div., Gaithersburg, Md., 1966.

VESIAC 15,550 VU
AD 636 979

This report sets forth a functional description of a LASA Signal Processing System. The system parameters have been chosen by

taking advantage of important system tradeoffs to reduce the hardware necessary to implement the known operating requirements. The system is configured to allow considerable experimentation. Generalized processing techniques and system partitioning have been employed to permit growth and change on the basis of experimental results. On the other hand, certain desired operational system functions and performance objectives can at this time be identified. These have been taken into account so that immediate advantage can be taken of existing array equipments and signal processing technology.

ICHIKAWA, M., P. W. BASHAM, A Study of P-Wave Amplitude and Spectral Characteristics at Canadian Seismic Stations, Contract AF-AFOSR-62-453, Arctic Inst. of North America, Montreal, Quebec, Canada, 1966.

VESIAC 13,999 c VU

A study of the relative recording ability of Canadian seismological stations is in progress at the Observatories Branch, Dept. of Mines and Technical Surveys. Consideration of P-wave amplitude anomalies indicates that the causes of these anomalies are likely to be in the lower crust or upper mantle. Consideration of variations in the spectral structure of P waves indicates that a very great influence is exerted by the geologic structure near the station. Consideration of S/N indicates that Mould Bay's excellent sensitivity is mainly the result of its generally low noise level.

IL'IN, A. V., "Floor Relief of the Gulf of Kamchatka," Akad. Nauk SSSR, Trudy Inst. Okeanologii, Vol. 50, pp. 21-28, 1961, (Translated from Russian), Contract SD-78.

VESIAC 10,869 VU

From 1950 to 1955, the expeditionary vessel of the Inst. of Oceanology, the Vityaz, entered the Gulf of Kamchatka many times in conducting oceanographic investigations in the seas of the Far East and of the northwestern part of the Pacific Ocean. A series of sounding tasks were obtained and the data was obtained for a detailed characterization of the sea floor in the Gulf of Kamchatka. The investigation of the relief of the sea floor was accomplished with automatically recording echo sounders. A new bathymetric map of the Gulf was compiled on the basis of the Vityaz data. Data of the Korfo-Karaginski expedition of the Inst. of Oceanology on the vessel Academician Shuleikin in 1956 was used as supplementary material.

ING, Dr., and J. M. MUNUERA, Recent Seismological Contributions in Spain, Contract AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1965.

VESIAC 10,763 VU

The author describes results from research in the area bounded by the meridians 10 deg. W, 5 deg. E, 35 deg. N, and 44 deg. N. Included are: (a) a description of the seismological network, instrumentation, and instrumentation accuracy in this area; (b) a discussion of a table computed by Morencos, and his homogenized calibration of the stations at Malga, Logrono, Alicante, and Almiria. Discussed is his simplifications of Eaton's method to deduce critical damping corresponding to high period cases; and (c) studies by Payo and Arroyo, concerning instrumentation, the Euroasiatic path, frequency, regression logs, earthquake energy and epicenter studies.

ING, Dr., and G. PAYO, A Model of Crustal-Mantle Structure for the Iberian Peninsula Area, Contract AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1965.

VESIAC 10,764 VU

Making use of the earthquakes recorded at the Spanish seismological observatories during the last 15 years and at a distance from the stations less than 1,000 km, the author has selected 40 of them which show the clearest records in all the stations. Epicenter location was revised and recalculated. Travel time curves for the six fundamental crustal phases, generally considered in near quakes, have been determined at Toledo with these earthquake records. The least square method was used. Algerian quakes provided information on the crust through the Mediterranean Sea arm.

INGRAM, L. F., Project DANNY BOY, Earth-Motion Measurements, Rept. No. POR-1811, Contract DASA 1.2, U. S. Army Engineer Waterways Exper. Station, 1964.

VESIAC 8971 VU
AD 609 097

The objective of Danny Boy Project 1.2 was to measure ground motion resulting from an underground nuclear detonation in basalt. This report presents and analyzes the measurements obtained from 31 vertically and horizontally oriented accelerometers and 3 vertically oriented velocity meters.

Peak acceleration values were considerably less than anticipated. Peak acceleration attenuated approximately as slant range to the minus 5.6 power between 34 and 95 meters slant range, and as slant range to the minus 2.1 power between 95 and 300 meters slant range.

INTERNATL. BUSINESS MACH. (STAFF), Evaluation of LASA Beam Precision, Sci. Experiment Test Results, Rept. No. ESD-TR-69-187, Contract F19628-67C-0198, Internatl. Business Mach., Inc., Gaithersburg, Md., 1968

VESIAC 19,827 VU
AD 858 688

This document of test results reviews an experiment designed to evaluate the LASA beam precision as portrayed by the observed scatter in epicenter surface image estimates. Delineation of the experiment motivation, the test event data and the procedural methodology establishes the scope of the investigation. Detailed information describing the tests performed, the results obtained and the conclusions reached provides a comprehensive outline of the accomplished experiment.

INTERNATIONAL BUSINESS MACH. (STAFF), Experimental Signal Processing System, Fourth Quarterly Tech. Rept., Rept. No. ESD-TR-68-309, Contract F19628-67C-0198, International Business Mach., Gaithersburg, Md., 1967

VESIAC 18,781 VU
AD 839 715

The Fourth Quarterly Technical Report for the LASA Experimental Signal Processing System identifies the effort expended during the fourth quarter to provide the hardware and software to support research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document presents detailed information related to machine configurations, an operational signal processing system of interest with interim implementation capability, Subarray Electronics Module II, the Long Period Electronics Module, and beam phase delays.

INTERNATL. BUSINESS MACH. (STAFF), Experimental Signal Processing System, Fifth Quarterly Tech. Rept., 1 November 1967 to 31 January 1968, Rept. No. ESD-TR-68-450, Contract F19628-67C-0198, Internatl. Business Mach., Gaithersburg, Md., 1968

VESIAC 19,664 VU
AD 853 716

The Fifth Quarterly Technical Report for the LASA Experimental Signal Processing System identifies the effort expended during the fifth quarter to provide the hardware and software to support research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document presents detailed information related to machine configurations, design of IISPS signal processing and communication equipment and of SEM/LEM hardware, technical requirements for an operations console, and Detection Processor operating specifications.

INTERNATL. BUSINESS MACH. (STAFF), Experimental Signal Processing System, Final Tech. Rept., Vol. I., Rept. No. ESD-TR-69-60, Contract F19628-67C-0198, Internatl. Bus. Mach., Gaithersburg, Md., 1969

VESIAC 20,257 VU
AD 870 205

This report summarizes the effort expended during the program period to provide the hardware and software to support research and development directed toward the study of seismic signal processing. It also reviews the results and summarizes the accomplishments for the seventh quarter. The document presents detailed information related to machine configurations, data communication requirements, long period control techniques, evaluation of the ESPS system, implementation of an event processing capability, array and subarray beam deployments, and application of fidelity optimum processing.

INTERNATL. BUSINESS MACH. (STAFF), Integrated Seismic Research Signal Processing System, Second Quarterly Tech. Rept., Rept. No. ESD-TR-69-357, Contract F19628-69C-0400, Internatl. Business Mach., Gaithersburg, Md., 1969

VESIAC 20,121 VU
AD 867 825

The Second Quarterly Technical Report for the Integrated Seismic Research Signal Processing System (ISRSPS) identifies the effort expended to provide the hardware and software in support of research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document presents detailed information related to the Interim System for both LASA and NORSAR, Øyer subarray short period data analysis, NORSAR detection processing, LASA microbarograph data analysis, and retrofit for the subarray electronics module.

INTERNATL. BUSINESS MACH. (STAFF), Integrated Seismic Research Signal Processing System, Third Quarterly Tech. Rept., Rept. No. ESD-TR-70-25, Contract FI9628-68C-0400, Internatl. Bus. Mach., Gaithersburg, Md., 1969.

VESIAC 20,339 VU

This report identifies the effort expended to provide the hardware and software in support of research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document provides detailed technical information related to seismic event processing, seismic data analysis, estimating the depth of seismic events, modification study of LASA , parameters used in Phase 0 event processing and the procedures for processing seismic data from multiple arrays.

INTERNATL. BUSINESS MACH. (STAFF), Kinetic Energy Estimates of Seismic Magnitude, Sci. Experiment Test Results, Rept. No. ESD-TR-68-424, Contract F19628-67C-0198, Internatl. Business Mach., Gaithersburg, Md., 1968

VESIAC 19,313 VU

This document of test results reviews an experiment to evaluate the consistency of automatic magnitude estimates based on the calculation of kinetic energy in the seismic "P" wave as derived from LASA short period data. Delineation of the experiment motivation, the test event data, and the procedural methodology establishes the scope of the investigation. Detailed information describing the test performed, the results obtained, and the conclusions reached provides a comprehensive outline of the accomplished experiment.

INTERNATIONAL BUSINESS MACH., (STAFF), LASA Signal Processing, Stimulation, and Communications Study - Vol. II, Quarterly Tech. Report, 14 February 1966 Through 14 May 1966, Rept. No. ESD-TR-66-463, Contract AF 19(628)-5948, International Business Mach., Rockville, Maryland, 1966.

VESIAC 15,895 VU
AD 636 980

Brief statements on the purpose, status, and future plans of the following tasks are given: (1) System Performance Study; (2) Signal and Noise Simulation; (3) Beam Coverage Analysis; (4) Steering Delay Study; (5) Post-Detection and Localization; (6) Display Simulation; (7) Digital Filtering; and (8) Analysis of Shear-Wave Reception.

INTERNATIONAL BUSINESS MACH., (STAFF), LASA Signal Processing, Simulation, and Communications Study, Second Quarterly Tech. Rept., May - August 1966, Rept. No. ESD-TR-66-514, Contract AF 19(628)-5948, International Business Mach., Gaithersburg, Maryland, 1966.

VESIAC 15,898 VU
AD 642 439

This report discusses important parameters in great detail to provide technical support to the system concept, and describes some of the supporting efforts.

Sections 1 and 2 describe the work accomplished and plans, respectively. Appendices A to C contain factual detail in the areas of beam analysis, signal processing and processing systems. Appendix D describes effort relating to communications instrumentation. A summary description of the programs currently under development is given in Appendix E. Overall program comments and recommendations on relevant topics of seismological interest are presented in Appendix F.

INTERNATL. BUSINESS MACH. (STAFF), Parametric Study of Seismic Array Gain, Sci. Experiment Test Results, Rept. No. ESD-TR-68-425, Contract AF 19628-67C-0198, Internatl. Business Mach., Gaithersburg, Md., 1968

VESIAC 19,314 VU

This document of Test Results reviews an experiment designed to estimate the improvement in the seismic signal-to-noise power ratio achieved by LASA , as compared with that observed in the case of a single instrument. Delineation of the experiment motivation, the test event data and the procedural methodology establishes the scope of the investigation. Detailed information describing the test performed, the results obtained and conclusions reached provides a comprehensive outline of the accomplished experiment.

INTERNATL. BUSINESS MACH. (STAFF), Signal Processing Studies for Large Array Research, Sci. Rept., Contract F19628-67C-0198, Internatl. Business Mach., Gaithersburg, Md., 1970

VESIAC 20,178 VU

This report presents the status of certain signal processing studies and experiments pertinent to the LASA Experimental Signal Processing System. The unique surveillance requirements for the Montana array and the anticipated array in Norway are compared. System configurations, expected system functions and communication between array field and processing center are discussed. Results of experiments to validate the processing recommendations are presented. An interim system is recommended, and certain elements of the proposed online system operation are discussed.

INTERNATL. BUSINESS MACH. CORP (STAFF), Evaluation of LASA Beam Precision, Sci. Experiment Test Plan, Rept. No. ESD-TR 68-218, Contract F19628-67C-0198, Internatl. Business Mach. Corp., Gaithersburg, Md., 1968

VESIAC 19,265 VU

This Test Plan formulates an experiment to evaluate the LASA beam precision as portrayed by the observed scatter in epicenter surface image estimates. Delineation of the experiment purpose, assumptions, and hypotheses to be tested establishes the scope of investigation. Detailed information describing the envisioned nature, conduct, and implementation method provides a comprehensive outline of the anticipated experiment.

INTERNATL. BUSINESS MACH. CORP. (STAFF), Evaluation Plan Experimental Signal Processing System, Sci. Rept., Rept. No. ESD-TR 68-247, Contract AF 19628-67C-0198, Internatl. Business Mach., Corp., Gaithersburg, Md., 1968

VESIAC 19,262 VU

The Evaluation plan for the LASA Experimental Signal Processing System specifies a set of tests to measure the effectiveness of the system. Detailed information on the input data, time delays, and Detection Processor parameters to be used in the evaluation of signal processing quality and capacity is presented. Additional evaluation experiments are also identified.

INTERNATL. BUSINESS MACH. CORP. (STAFF), Integrated Seismic Research Signal Processing System, First Quarterly Tech. Rept., Rept. No. ESD-TR-69-299, Contract F19628-68C-0400, Internatl. Business Mach. Corp., Gaithersburg, Md., 1968

VESIAC 20,080 VU
AD 865 331

The First Quarterly Technical Report for the Integrated Seismic Research Signal Processing System (ISRSPS) identifies the effort expended to provide the hardware and software in support of research and development directed toward the study of seismic signal processing. It also delineates work tasks planned for the next quarter. This document presents detailed information related to long-period signal processing, extraction of post-P arrivals, high-resolution noise analysis, data analysis procedures, and the ISRSPS equipment configuration.

INTERNATL. BUSINESS MACH. CORP. (STAFF), Kinetic Energy Estimates of Seismic Magnitude, Sci. Experiment Test Plan, Rept. No. ESD-TR 68-220, Contract F19628-67C-0198, Internatl. Business Mach., Corp., Gaithersburg, Md., 1968

VESIAC 19,263 VU

This Test Plan formulates an experiment to evaluate the consistency of automatic magnitude estimates based on the calculation of kinetic energy in the seismic P-wave as derived from LASA short period data. Delineation of the experiment purposes, assumptions, and hypotheses to be tested establishes the scope of investigation. Detailed information describing the envisioned nature, conduct, and implemetation method provides a comprehensive outline of the anticipated experiment.

INTERNATL. BUSINESS MACH. CORP. (STAFF), LASA Experimental Signal Processing System Programming Manual - Vol. 1, Program Descriptions, Contract F19628-67C-0198, Internatl. Business Mach. Corp., Gaithersburg, Md., 1968

VESIAC 19,260 VU

This volume of the ESPS Programming Manual for the LASA Experimental Signal Processing System provides detailed technical descriptions of the computer programs used in the ESPS and other information useful to the programmer.

INTERNATL. BUSINESS MACH. CORP. (STAFF), Parametric Study of Seismic Array Gain, Sci. Experiment Test Plan, Rept. No. ESD-TR-68-219, Contract F19628-67C-0198, Internatl. Business Mach. Corp., Gaithersburg, Md., 1968

VESIAC 19,264 VU

This Test Plan formulates an experiment to estimate the improvement in the seismic signal-to-noise power ratio achieved by LASA, as compared with that observed in the case of a single instrument. Delineation of the experiment purpose, assumptions, and hypotheses to be tested establishes the scope of investigation. Detailed information describing the envisioned nature, conduct, and implementation method provides a comprehensive outline of the anticipated experiment.

INST. OF SCI. AND TECH. (STAFF), A Bibliography of Seismology for the VELA UNIFORM Program, Second Edition, Rept. No. 4410-81-B, Contract SD-78, Inst. of Sci. and Tech., U of M, 1965.

VESIAC 12,223 VU
AD 469 253

The second edition of A Bibliography of Seismology for the VELA UNIFORM Program lists authors and titles and gives abstracts for approximately 2000 articles and reports on seismology and the detection of underground explosions. The list of authors and titles is arranged by areas of the VELA UNIFORM program of the Advanced Research Projects Agency. This bibliography is cross-referenced, and a list of standard abbreviations for journal titles is included.

INST. of SCI. AND TECH. (STAFF), Yellowknife Seismograms for Small Magnitude Events, Contract SD-78, Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1965.

VESIAC 9483 VU
AD 456 959

This Yellowknife Seismogram Atlas for small magnitude events prepared by VESIAC includes seismograms for 17 events that took place in 1963. Among the locations are South Panama; Andreanof Island; South Iran; North Atlantic, Luzon Island; Ventura City, Calif.; Kurile Islands; Yellowstone N. P.; Van Mayen; Hakkaido; Vancouver Island; Guerrero, Mexico; Southwest Montana; and Guatemala.

ISHERWOOD, W. F., Investigation of PKP Seismic Waves, Annual Rept., 1 Feb. 1967 to 15 March 1969, Contract F44620-67C-0080, Stanford Res. Inst., Menlo Park, Calif., 1969

VESIAC 19,536 VU
AD 693 340

A four-element seismic array was established at Byrd Station, Antarctica, for investigation of PKP seismic waves. This seismic station (BYA) has been operating continuously since January 18, 1968. Seismic data are recorded on magnetic tape at a level permitting playback at a system magnification of as high as 500,000. Background ground motion amplitudes at Byrd Station were found to be in the order of 10 millimicrons at the outlying seismometers and frequently of the order of 100 millimicrons at the center seismometer when heavy equipment was operating, nearby. About 2,700 compressional and shear arrivals were reported in the first 8 months of recording, with epicenters ranging over the entire earth. About 400 of these events have been confirmed as PKP arrivals. The epicentral distance for these arrivals ranged from 110° to 173°, with the majority being from the Japanese and Kurile areas. Data from the first full year of operation are now being processed at SRI. The station was turned over to the USC&GS and is currently being operated by that agency.

ISHIMARU, A., Fluctuations of a Beam Wave Propagating Through A Locally Homogeneous Medium, Sci. Interim Rept. No. 1, Rept. No. AFCRL 68-0433, Contract F19628-68C-0126, Univ. of Washington, Seattle, Wash., 1968

VESIAC 19,589 VU
AD 677 003

General formulations for the fluctuations of a beam wave propagating through homogeneous or locally homogeneous medium are given in terms of the spectral density of the index of refraction. The amplitude and phase correlation functions and the mean square fluctuations are derived for homogeneous medium showing the dependence on the radial distance in the transverse plane of the beam. The amplitude and phase structure functions are derived for locally nhomogeneous medium.

The correlation functions and the structure functions do not depend only on the difference coordinate, but they are functions of the radial coordinates in the beam cross section. This particular inhomogeneity, however, is shown to be an analytic continuation of the homogeneous or locally homogeneous case.

The mean square amplitude fluctuation for the Kolmogorov's locally homogeneous medium is shown to behave as a plane wave for short distance and then becomes less than that of a spherical wave, and its spectrum is shown to behave as K^{-1} for large K in contrast with the plane and spherical waves.

The spread of the beam radius is shown to be approximately the 8/3 powers of the distance L for small distance and its increase depends on the magnitude of the index of refraction fluctuation.

IVANOV, L. T., "Seismic Logging with Refracted Waves," Akad. Nauk, Prik Geophysika, Ser., Vol. 17, pp. 130-137, 1957, (Translated from Russian), Contract SD-78.

VESIAC 10,202 VU

The most significant factors which reduce the accuracy of seismic logging are: change of location of the blast point in the process of observations, inaccurate data on the moment of explosion, and inaccurate determinations of the arrival time in the presence of those or other disturbances. In connection with these factors, the author attempts to describe the possibility, by the method of choice of a plan of observations, of excluding completely the errors mentioned above, in those cases when seismic logging is carried out with the aim of determining the mean velocity up to a refracting border, lying at a relatively shallow depth.

IVANOV, S. I., "The Radioseismic Station," All-Union Scientific Res. Inst. of Geophys. Methods of Surveying, Address Unknown, Undated, Received 1966, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 14,464 VU

In relation to the All-Union Scientific Research of Surveying Methods and Equipment, the author discusses: a) the best way of using the equipment of the radioseismic station for teams conducting regional seismic investigations and work by deep seismic sounding; b) essential problems connected with the development of the radioseismic station; c) the development of the RSS-60 channel radioseismic station and instruments related to it; d) the central recording point and the 21 ground points in the RSS-60 complex, as well as other parts of the RSS-60 system; e) the solution of the problem of multiplexing the radio channel; f) the problem of assuring noiseproofing; g) the problem of obtaining the required technical characteristics of the radioseismic signal.

IVANOVA, T. G., "Experimental Data on the Influence of a Layer in the Upper Part of a Profile on the Angles of Emergence of Waves of Different Frequencies," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 6, pp. 195-212, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,760 VU

Experimental data are presented on the variation of the apparent angles of emergence of waves when the apparatus is tuned to record different frequencies. The experimental data were obtained in a seismic survey on a section with a heterogeneous structure of the upper part of the profile. An attempt was made to use the variation of the apparent angles of emergence of waves as a function of the recorded frequency to determine the dependence of the mean velocity $\bar{V}$ on the depth H.

IYER, H. M., The History and Science of Microseisms, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., Rept. No. 4410-64-X, 1964.

VESIAC 7604 VU
AD 436 446

The history of and current developments in the study of microseisms, the seismic background noise of the earth, are surveyed. The three general kinds of microseisms, storm microseisms, long-period microseisms, and short-period microseisms, are separately discussed, from both a theoretical and an empirical point of view.

Theories of the origin, structure, and transmission of microseisms are discussed. Discussed most thoroughly are storm microseisms, which can be detected by even crude seismographs and which involve basic, complex, and important problems of generation and propagation. A summary of the findings of each kind of microseism ends the report, together with recommendations for their further study.

JACKSON, P. L., Array of Large Thermocouple Junctions, Contract No. AF 49(638)-1078, Univ. of Mich., Inst. of Sci. & Tech., Willow Run Labs., Ann Arbor, Mich., 1962.

VESIAC 6255 VU

Temperature disturbances may be located by using voltage residues in a large thermocouple junction. By electrically connecting such large junctions in series, voltage residues across individual junctions can be added analogously by adding the voltages produced by individual thermocouples in a conventional thermopile. With proper positioning of the added junctions, the location of temperature disturbances can be achieved with many times the sensitivity of a single junction. This experiment confirmed the voltage addition, suggesting that the adding of junction voltages could increase the total voltage output sufficiently to augment the number of applications for the large thermocouple junction.

JACKSON, P. L., Correlation-Function Spatial Filtering with Incoherent Light, Contract AF 49(638)-1759, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,733 VU

Spatial filtering can be performed by imaging one of the transparencies used in lensless correlography. A diffuse, broadband light source is used to illuminate two transparencies that represent functions of differing scale factors. The transparencies are placed so that the light passing through both forms a pattern in a third position; this pattern represents the correlation of the functions.

JACKSON, P. L., Diffractive Processing of Geophysical Data, Contracts AF 49(638)-1078 and AF 49(638)-1170, Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1965.

VESIAC 8984 VU

Processing of geophysical data can be accomplished by optical diffraction. The data are in the form of transmissive recordings, environmental photographs, or drawings. Five analyses can be performed at or near the Fraunhofer diffraction plane with single diffraction, three analyses through spatial filtering with double diffraction, and one (correlation) with triple diffraction. Primarily variable-density seismograms, for which a special recorder was constructed, have been processed.

JACKSON, P. L., Digital Simulation of Seismic Rays, Suppl. Final Rept., 1 June 1966 to 30 May 1970, Rept. No. 8071-33-F, Contract AF 49 (638)-1759, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1970

VESIAC 20,346 VU

Simulation of seismic rays for a spherical earth and a flat earth has been achieved in highly complex models. Travel times and approximate amplitudes of seismic waves can be found for both two- and three-dimensional models of portions of the earth.

Recently, the earth has been found to be more complex and nonuniform than formerly assumed. A need has thus arisen in seismology to test highly heterogeneous models of seismic velocity distribution.

The problem of complicated seismic velocity distributions was therefore investigated in terms of the most appropriate use of the digital computer. For this investigation a velocity field was set up, and the propagation computations made for short segments of rays within this field. Total travel times are found by adding the travel times of connected ray segments. Essentially, the nature of propagation was duplicated on the computer, in that, at the location of each segment along the path of propagation, the initial condition and effect of the surroundings determine the succeeding direction of the following segment.

Both visual and numerical results have shown that this simulation method can be usefully applied to investigation of seismic velocity distributions of portions of the earth of any size or complexity.

JACKSON, P. L., A Note on the Use of the Fourier Transform as a Spectrum, Contract AF 49(638)-1078, Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8983 VU

Because the Fourier transform is increasingly used for defining spectra and for the basis of spectral filtering and of optical data processing, a limitation in its use to define spectra needs to be emphasized. This limitation concerns destructive interference within an expected main, central lobe of the transform. Such interference is caused by segments of identical frequency (or wavelength) which are not in phase with one another. The purpose of this note is to re-emphasize this limitation, to clarify it by a simple mathematical extension, and to demonstrate it with an easily reproducible experiment. For simplicity, the one-dimensional case is treated, but multi-dimensional transforms are also subject to this effect.

JACKSON, P. L., Optical Analysis Techniques Applied to Seismic Data, Rept. No. 4596-25-L, Contr. No. AF 49(638)-1078, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Michigan, 1964.

VESIAC 8301 VU
AD 427 380

Work accomplished during the report period is discussed. It has to do with: 1) acquiring and using a scanning microphotometer for measurement and control of recordings and calibrations on variable-density film; 2) improvement in the conversion, calibration, and measurement of seismograms from magnetic tape to variable-density film; 3) introduction of a laser as a light source into the optical system; 4) making of arrangements to obtain a commercial variable-density recorder for evaluation; 5) development of four new analysis presentations; and 6) the writing and publication of papers and journal articles. Emphasis at present and through the next period will be on demonstrating and evaluating the optical diffraction technique for application to the VELA UNIFORM Program.

JACKSON, P. L., Seismic Data Analysis Research, Final Report, Contr. No. AF 49(638)-1078, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8486 VU
AD 444 488

This final report discusses work accomplished on the contract: 1) a 70 mm optical diffraction system designed for seismic data analysis; 2) a photographic recorder to convert seismograms from analogue voltages forms such as seismometer output or playback from magnetic tape to variable-density and wiggly-line forms; 3) the application of nine techniques of analysis to seismic data, including array data. Six of these techniques were independently developed on the contract; 4) investigation into methods of seismic analysis and a new optical technique with possible application to seismics; and 5) investigation and construction of an optical scanning device to obtain probability levels of seismic waves across an array. Other work is reported and a list of publications is included.

JACKSON, P. L., Wideband Velocity Filtering with a White-Light Source, 5178-40-I, Contract AF 49(638)-1170, Inst. of Sci. and Tech., Univ. of Mich., Ann Arbor, Mich., 1965.

VESIAC 9582 VU

The purpose of this note is to describe and illustrate wideband velocity filtering by a simplified optical method. A white light source can be used with a one- or two-lens optical system to filter for apparent propagation velocities of seismic energy when an array of seismograms is used. The technique is discussed in detail. It has been applied for seismogram arrays, contour maps, and cloud-cover photographs. The general technique may be termed directional filtering; wideband filtering is a special case.

JACKSON, P. L., R. H. MC LAUGHLIN and G. ROGERS, A Versatile Photographic Seismic Recorder, (Abstract), Contr. No. AF 49(638)-1078, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8587 VU

Variable-density, amplitude ("wiggly line"), and area seismograms can be produced when the spot on a cathode-ray tube is used as a modulated light source. Channels can be selected and their widths varied at will. The channels can be recorded simultaneously or successively with programmed time bases. A commercial oscilloscope has been modified for this purpose without invalidating it for normal uses. The spot on the cathode ray tube face is swept along a slit in a mask which is imaged with a lens on to transported film. Discussed is how the intensity of the spot is modulated, as well as how a seismogram channel is made to correspond to a segment of the slit. Described is how simultaneous recording of several data channels is accomplished.

JACKSON, W. H. and J. H. HEALY, Preliminary Report on Some Factors Affecting Shotpoint Efficiency, Contract ARPA Order No. 193-63, U. S. Geological Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 7618 VU O
AD 434 860

JACOBS ASSOC. (STAFF), Feasibility of Constructing Large Underground Cavities, Report on Cost and Constructability, Vol. III, Contract No. ARPA Order No. 260-62, Jacobs Assoc., San Francisco, Calif., 1964.

VESIAC 8344 VU

This third volume of the June 1964 technical report to the U. S. Army Engineering Waterways Experiment Station gives an account of cost and constructability studies made for excavating site 3, a large self-supporting spheroid cavity, approximately 15 miles northwest of Teona, California. Initial studies were based on a 600 ft. diameter cavity, but subsequent studies were extended to include cavities of 200 ft. and intermediate diameters. The opening section of the report outlines the method of procedure. Subsequent sections deal with excavation methods, practical considerations, and ventilation.

JANSSON, B., An Algorithm for Least-Squares Rational Approximation of Complex Functions on the Unit Circle, Sci. Rept., Contract AF 61 (052)-702, Univ. of Uppsala, Uppsala, Sweden, 1970

VESIAC 20,415 VU

An algorithm for rational approximation on the unit circle will be given. An immediate application is computation of recursive filters for use on a digital computer.

JANSSON, B., On Least Squares Approximation by Rational Functions, Appendix II to Fifth Semi-Annual Technical Summary Report, Contract AF 61(052)-702, Seis. Inst., Univ. of Uppsala, Uppsala, Sweden, 1966.

VESIAC 14,002-B VU

The problem of rational least-squares approximation of real valued functions is defined and several possible computational methods are discussed, including a Monte-Carlo method, the weighted regression method, and the two-step method.

JANSSON, B., Some New Results in Spectral Estimation, Contract AF 61 (052) 702, Seismological Inst., Univ. of Uppsala, Uppsala, Sweden, 1964.

VESIAC 8643 c VU
AD 669 511

Spectral estimation theory provides methods to interpret a phenomenon as the superposition of harmonics $\sin \Omega t$ and $\cos \Omega t$. Some methods in spectral estimation are examined and compared. The problem of estimating the spectrum is a special case of the problem of how to best approximate a function given its first N Fourier coefficients. Results from approximation theory are used to refine and generalize estimation techniques.

JAROSCH, H. S., Body Wave Magnitude and Source Mechanism, Sci. Rept., Rept. No. 225, Contract VT/6702, F33657-68C-0945, Teledyne, Inc., Alexandria, Va., 1968

VESIAC 19,106 VU
AD 842 559

A new method is proposed for improving the body-wave magnitude determination by using the observed values of the body-wave magnitude (m_b) together with the first motion directions, to obtain by least squares analysis the best double couple source parameters; the resulting radiation pattern is then integrated spatially to provide a corrected estimate of the magnitude. Results for a number of events previously studied by other investigators are presented.

JEBE, E. H., and D. E. WILLIS, An Application of the Discriminant Function Technique to Seismic Records, Contr. No. AF 49(638)-1170, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8183 VU
AD 617 053

A preliminary investigation has been made of the possible application of the discriminant function approach for distinguishing between seismic events. The background and history of the use of this technique are sketched in. Unavailability of sufficient data has been a limitation in this preliminary study. Specifically, the maximum shear-compressional wave (S/P) ratio at only six frequency bands has been used to estimate a linear discriminant. Three problems were set up for analysis using only two groups for comparison in each problem. Even with this limitation, the results are interesting. The technique should be more fully studied as suitable additional variables or measurements from the basic records become available for inputs to the analysis.

JENSEN, O. G., An Analysis of LONGSHOT Data for the Canadian Seismic Stations, Sci. Rept. No. 13, Research Paper No. 37 (THESIS), Contract AF-AFOSR-1022-66, Arctic Inst. of North America, Montreal, Quebec, Canada, 1966.

VESIAC 14,631 VU
AD 638 752

A pilot analysis of the Long Shot nuclear explosion data received by the Canadian seismic stations indicates a consistent compressional first arrival as expected from an impulsive explosion source. Significant travel time discrepancies are observed in the commencement of the P arrival.

The P arrival amplitudes appear to be anomalously low in the central B.C. area and high in eastern Canada. The effect is also evident in the unified magnitude determinations which are based on these amplitudes.

Spectral investigations demonstrate that there are both common and individual characteristics among the ground amplitude spectra of the different stations.

JOHNS, F. H., Preliminary Report on Long-Range Seismic Measurements Participation in Project MIRACLE PLAY - HUMID WATER, Tech. Data Rept., Rept. No. TR 70-16, Contract VT/0703, F33657-70C-0646, Teledyne-Geotech., Garland, Texas, 1970

VESIAC 20,297 VU
AD 872 188

The HUMID WATER explosion, the second of a series of experiments called Project MIRACLE PLAY, was monitored by eight LRSM portable systems teams. The teams occupied the same sites that were occupied for the DIODE TUBE explosion. Visual analysis of the seismograms shows that the STERLING, DIODE TUBE, and HUMID WATER signals were recorded at Lucedale, Mississippi (LD-MS).

JOHNSON, L. R., Crustal Structure Between Lake Mead, Nevada, and Mono Lake, California, Technical Letter No. 22, Contract ARPA Order No. 193-64, U. S. Geological Survey, Washington, D. C., 1964. (OFFICIAL USE ONLY)

VESIAC 8401 VU O

JOHNSON, L. R., Measurements of Mantle Velocities of P Waves with a Large Array, Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 14,812 VU

A large array has been used to investigate the P-wave velocity structure of the lower mantle. Linear array processing methods are reviewed, and a method of nonlinear processing is presented. Phase velocities, travel times, and relative amplitudes of P waves have been measured with the large array at the Tonto Forest Seismological Observatory in Arizona for 125 earthquakes in the distance range of 30 to 100 degrees. Various models are assumed for the upper 771 km of the mantle and the Herglotz-Wiechert method applied to the phase velocity data to obtain a velocity depth structure for the lower mantle. The indication of various discontinuities by the phase velocity data are discussed, as well as phase velocities beyond 85 degrees.

JOHNSON, R. H., Earthquakes Located by T Phases During the VELA UNIFORM Aleutian Islands Experiment, 1964, Tech. Summ. Rept. 7, Contract NONR-3748 (01), Hawaii Inst. of Geophysics, Univ. of Hawaii, Honolulu, Hawaii, 1964.

VESIAC 10,798 VU
AD 610 747

This report tabulates sources and strengths of earthquake T phases recorded by hydrophone net during the VELA UNIFORM Aleutian Islands Experiment (August-September, 1964). In a thirty-seven day period, 654 earthquake locations were found for the entire Pacific, of which 184 were in the Aleutians. Comparison of T-phase strengths with earthquake magnitudes suggests a threshold about magnitude three for location by hydrophone net.

JOHNSON, R. H., Investigation of the Sources of Naturally-Occurring Low-Frequency Underwater-Sound Events, Tech. Rept., Contract NONR 3748(01), Univ. of Hawaii, Honolulu, Hawaii, 1970

VESIAC 20,401 VU
AD 708 841

A distinctive noise source located by distant sofar hydrophones coincided with a ship's report of explosions and discolored water in the northern Mariana Islands. Sound spectrograms and sound-power level records of this event are similar to one which occurred two years earlier at the same location. They also resemble sounds which originated at four other sites previously located. The sounds were earlier attributed to submarine volcanism and this sighting lends weight to that hypothesis.

JOHNSON, R. H., A Program for Routine Location of T-Phase Sources in the Pacific, Rept. No. HIG-65-5, Contract NONR-3748(01), Hawaii Institute of Geophysics, Univ. of Hawaii, Honolulu, Hawaii, 1965.

VESIAC 10,380 VU
AD 614 273

A program for routine location of T-phase sources in the Pacific has been initiated. Data is supplied principally by the Pacific Missle Range hydrophone network. Hydrophone records are forwarded weekly for reading at Honolulu. In correlating arrivals records from all stations are viewed together. Correlation is established by similarity in shape and level and by locations determined roughly from arrival time differences. Arrival times and power levels are read for processing by an IBM 7040 computer. Given are: the method by which the solution for location and origin time is obtained; how velocity is derived; how a T-phase strength is computed from readings of peak power level.

JOHNSON, R. H., SOFAR Velocities in the North Pacific, Tech. Summ. Rept. No. 5, Contr. No. NONR 3748(01), Hawaii Inst. of Geophys., Honolulu, Hawaii, 1963.

VESIAC 8601 VU

Average velocities of propagation in the deep-ocean sound (SOFAR) channel have been measured from hydrophone recordings of the Pacific Missile Range for explosive sources near the Aleutian Islands. Hydrophone sites were near Oahu, Midway, Wake, and Eniwetok Islands. Means of at least five velocity computations were obtained from sound-channel paths to each site and from sources in deep water south of Adak. Shots located north of the Aleutian Islands showed lower average transmission velocities (1.431 to 1.473 km/sec) than the other shots. A chart of the central North Pacific is presented showing sound-channel velocity contours.

JOHNSON, R. H., Spectrum and Dispersion of Pacific T Phases, Tech. Summ. Rept. No. 4, Contract No. Nonr 3748(01), Univ. of Hawaii, Honolulu, Hawaii, 1963.

VESIAC 6608 VU

This report deals with observations of the variation of power level with frequency and time in T-phase signals recorded on a Pacific Missile Range hydrophone at Kaneohe, Hawaii. The results are quite preliminary, serving to indicate a course for future research.

JOHNSON, R. H. and R. A. NORRIS, SOFAR Velocity Chart of the Pacific Ocean, Tech. Summ. Rept. No. 6, Contr. No. NONR 3748(01), Hawaii Inst. of Geophys., Honolulu, Hawaii, 1964.

VESIAC 8602 VU

A SOFAR velocity chart of the Pacific Ocean is presented. The chart displays velocity contours at 2-meter-per-second intervals. A steep velocity gradient is shown at the convergence of the Kuroshio and the Oyashio off the Kurile Islands. Seasonal variations of SOFAR velocity were not detected.

JOHNSON, R. H., R. A. NORRIS, T-Phase Radiators in the Western Aleutians, Tech. Summ. Rept., Rept. No. HIG-66-4, Contract Nonr-3748(01), Univ. of Hawaii, Honolulu, Hawaii, 1966.

VESIAC 14,455 VU
AD 632 156

The aftershocks of the Rat Islands earthquake of 4 February 1965 provided a large volume of data for processing with a T-phase source location program. The computed T-phase sources were grouped in six clusters along the Aleutian arc. The clusters are considered to represent radiation from distinct sites along the Aleutian ridge. These sites are evidently submarine promontaries which, due to their exposure, radiate energy over broader arcs of the Pacific than do intervening regions. The relationship of T-phase strength to earthquake magnitude among these radiators, and T-phases from sources south of the Aleutian trench is discussed.

JOHNSON, R. H., and R. A. NORRIS, T-Wave Generation Mechanisms, Sci. Rept., Rept. No. HIG-70-7, Contract NONR-3748(01), Univ. of Hawaii, Honolulu, Hawaii, 1970

VESIAC 20,298 VU
AD 708 695

The transformation of earthquake body waves to T waves is as efficient at deep slopes as at slopes which transect the sofar axis. Moreover, spectral studies of T phase signatures have shown no basis for distinguishing between the two cases. As simple downslope propagation is inadequate to explain the production of T waves at deep slopes, that process is relegated a minor role in favor of scattering from the sea floor as the dominant mechanism. A slope in the direction of propagation insures that once energy is scattered in that direction the probability of its being unfavorably rescattered upon successive approaches to the sea floor will be less. Scattering near the sea surface is detectable in the abscence of bottom-scattered T waves. Such abyssally generated T waves display a distinctly higher frequency spectrum when originating in subarctic regions than when originating in lower latitudes. This difference is ascribed to downward ducting of higher frequency energy from the subarctic surface channel.

JOHNSON, R. H., R. A. NORRIS, and F. K. DUENNEBIER, Abyssally Generated T Phases, Technical Summary Report, Rept. No. HIG-67-1, Contract NOnr-3748(01), Univ. of Hawaii, Honolulu, Hawaii, 1967.

VESIAC 15,740 VU
AD 649 315

Two distinct types of signals have been identified from studies of T-phase spectra and source locations. One, with its source at a shoaling slope of the ocean bottom and with dominant frequencies near 4 cps, is the previously recognized and described classic T-phase. The other, with its source in deep water and with dominant frequencies near 30 cps, is newly identified and is termed the abyssal T-phase. Sea surface roughness is hypothesized as shaping the spectrum of the abyssal T-phase. A synthesis of the power-level record is derived which relates the degree of sharpness of the abyssal T-phase peak with focal depth.

JOHNSON, W. A., J. A. BONNER, An Evaluation of the Use of High-Resolution Wavenumber Spectra for Ambient-Noise Analysis, Advanced Array Research, Special Rept. No. 8, Contract VT/7701, F33657-67C-0708, Texas Inst., Inc., Dallas, Texas, 1968.

VESIAC 17,984 VU
AD 829 858

A principal objective of the network studies is to characterize the worldwide ambient-noise field. An excellent tool for such studies is the frequency-wavenumber spectrum of the ambient noise recorded by an array station. To establish the procedure to use for computing the spectra, the experiment described in this report was performed prior to the computation of ambient-noise wavenumber spectra for the network studies.

JOHNSON, W. A., J. A. BONNER, Network Studies - Noise Analysis, Advanced Array Research, Special Rept. No. 6, Contract VT/7701, F33657-67C-0708, Texas Inst., Inc., Dallas, Texas, 1968.

VESIAC 17,983 VU
AD 831 568

This report presents an analysis of ambient seismic noise seen at the network level and is directed toward characterization of the network noise field. Simultaneously recorded noise samples from two VELA stations and eight LRSM stations are investigated through analysis of power-density spectra, coherence, high-resolution frequency-wavenumber spectra, and K-line spectra.

JOHNSON, W. A., J. BONNER, and G. BURRELL, P-Wave Signal Extraction Using 3-Component Subsystems at TFO, Array Research Special Rept. No. 21, Project VT/4053, Contract AF 33(657)-12747, Texas Instruments, Inc., Dallas, Texas, 1967.

VESIAC 16,061 VU
AD 813 365

Results of an initial analysis of long-period and short-period data collected at TFO are presented in this report. The objective of this work is experimental evaluation of the 3-component systems' capability to reject noise by exploiting the relationship between horizontal and vertical components of the seismic noise field.

JOHNSON, W. A., P. L. STRANGE, J. A. BONNER, and S. A. BENNO, Network Studies - Signal Characteristics, Advanced Array Research, Special Rept. No. 7, Contract VT/7701, F33657-67C-0708, Texas Inst., Inc., Dallas, Texas, 1968.

VESIAC 17,982 VU
AD 830 463

This report presents an initial study of signal characteristics and coherent signal processing at the network level. Topics investigated include signal similarity, depth-phase detection and recognition, separation and location of events overlapping in time and space, and methods for real-time network processing and data presentation.

JORDAN, J. N., El Salvador Seismic Field Program Seismological Bulletin, January 1964, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 7748 VU O

JORDAN, J. N., Seismological Bulletin Special Field Program Nueva Concepcion El Salvador (NCS), May 1964, ARPA Order No. 173, USCGS, Washington, D. C., 1965.

VESIAC 11,994 VU

A field seismograph station has been established by the USCGS at Nueva Concepcion, El Salvador, a mobile seismic unit consisting of a north-south linear array of six vertical seismometers and a three-component small Benioff variable reluctance. The objectives are to locate the quietest possible site, to operate the instruments at the highest practical sensitivities and to establish the effective perceptibility of the station. This bulletin includes data from the Benioff film records, and the response characteristics of the instruments.

JORDAN, J. N. and R. N. HUNTER, A Brief Study of Seismic Signal Reception by San Juan, Puerto Rico Station, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1964.

VESIAC 7541 VU

This study specifies the recording capabilities of the Coast and Geodetic Survey seismograph station at San Juan, Puerto Rico (SJP), using data that are internally consistent as far as the computation of magnitudes and seismogram interpretation are concerned. The general approach is to treat the data in a passive way, and to discuss a few of the limitations (such as change in S/N with time) in detail. The study is divided into three major sections: 1) materials and methods, 2) data and plots, and 3) noise.

JORDAN, J. N. and R. N. HUNTER, 1963 Operations Summary of El Salvador Seismic Project, Contr. No. VT/2034, U. S. Coast & Geodetic Survey, Wash., D. C., 1964.

VESIAC 8750 VU
AD 450 349

In July 1963, a mobile multi-seismograph station was established at Nueva Concepcion, El Salvador. The object was to eliminate the deficiencies in azimuthal coverage for calibration and hypocenter location studies. Location, instrumentation, noise background and operations are given. Field operations were carried out under less than ideal conditions. The more difficult aspects concerned the security of equipment. The station is in the 100,000 magnification range by a single element of the array. This is a geological area of great heterogeneity in respect to wave lengths being recorded and the seismic capability varies with the azimuth. This tends to complicate the seism: data. Some improvement may be realized by repositioning or adding units.

JORDAN, T. H., and J. N. FRANKLIN, Optimal Solutions to a Linear Inverse Problem in Geophysics, Contract F44620-69C-0067, Calif. Inst. of Tech., Pasadena, Calif., 1970

VESIAC 20,452 VU

This paper is concerned with the solution of the linear system obtained in the Backus-Gilbert formulation of the inverse problem for gross earth data. The theory of well-posed stochastic extensions to ill-posed linear problems, proposed by Franklin, is developed for this application. For given estimates of the statistical variance of the noise in the data, an optimal solution is obtained under the constraint that it be the output of a prescribed linear filter. Proper specification of this filter permits the introduction of information not contained in the data about the smoothness of an acceptable solution. As an example of the application of this theory, we present a preliminary model for the density and shear velocity as a function of radius in the earth's interior.

JOUR. SEISMOLOGY (STAFF), "On the Earthquake Swarm Near Niijima Island in November 1957," Jour. Seismology, Vol. 23, No. 1, pp. 15-34, 1958, (Translated from Japanese), Contract SD-78.

VESIAC 9828 VU

This report discusses an earthquake swarm originating as a result of an earthquake at 4 hr. 20 min. on November 11, 1957 in the vicinity of Niijimi Island. Discussed are the epicenter location and the magnitude of the main earthquake. Earthquake swarms were observed once on November 15, 1901, and once on December 27, 1936. The 1957 swarms caused about the same amount of damage as the swarms of 1901.

Discussed are the foreshocks, aftershocks, and the main results from the records. Some of the subjects under consideration are: (1) Distribution of the earthquake magnitude; 2) Propagation of the main earthquakes; 3) The epicenters of some of the main fore- and aftershocks; 4) The magnitude of the main earthquake; and 5) The distribution of the foreshocks.

JOUR. SEISMOLOGY (STAFF), "On the Ground Conditions of Seismograph Room of Weather Stations Attached to JMA," Jour. Seismology, Vol. 23, No. 1, pp. 47-56, 1958, (Translated from Japanese), Contract SD-78.

VESIAC 9830 VU

Previously, the authors summarized the investigation of the ground conditions of the seismograph room of the weather stations. That information is essential in selecting locations suitable for the installation of high-magnification seismographs. However, it merely helps to exclude locations with bad ground conditions. Therefore, starting in 1957, the ground conditions of the seismograph rooms were investigated individually by the use of a high-magnification seismograph at the weather stations of each district. The results were reported to the main bureau. Given here are: (1) stations inspected in the first year; (2) a discussion of the method of investigation and instrumentations; (3) a summary of the weather stations' investigations; (4) conclusions.

JOYNER, G. L., T. W. CASS, J. R. HOFFMANN, and A. F. LINVILLE, Aleutian Islands Experiment (1969), Project MILROW, Final Rept., Contract VT/0705, F33657-70C-0326, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,183 VU
AD 869 003

The VELA Seismological Center participated in Project MILROW, on Amchitka Island in the Aleutian Chain. Texas Instruments was selected to install, operate, and analyze data from a network of Ocean-Bottom Seismograph units deployed in waters surrounding Amchitka Island for a 3-week period. The objectives of this program were to observe aftershock activity and to improve epicenter locations of such seismic activity within a 50-km radius of the MILROW site. The major tasks involved in completing the experiment included equipment preparation, field operations, and data analysis. This report describes the experiments, analytical goals, and the results obtained. Evaluation of the OBS equipment and recommendations for improving equipment reliability are also included. A crustal model was developed to permit hypocenter calculations for events in the vicinity of Amchitka Island; 250 associated events which correlated with USC&GS data were found. Hypocenter-location refinement was attempted on 140 of these events; 81 events yielded satisfactory hypocenter location, and 27 of the events occurred in the vicinity of ground zero.

JOYNER, W. B., Sites in the Soviet Union for Clandestine Underground Nuclear Testing and Their Geographical Analogues in the U. S., Contract AF 49(638)-1270, Dunlap and Assoc., Inc., Washington, D. C., 1964.

VESIAC 9443 VU

The three main seismic regions of the USSR — Baikalia, Kamchatka, and Central Asia — were studied as possible sites for clandestine nuclear tests, and for each of these regions, geographical analogues were intended as places where excercises could be held to evaluate the ability of an on-site inspection team to verify suspected clandestine tests. Characteristics of each region are given. It was concluded that, in the present state of knowledge, the three regions should be considered roughly equal in probability of use.

KAHALAS, S. L., B. L. MURPHY and J. C. WOO, Theoretical Study of Magnetohydrodynamic Wave Propagation and Experimental Study of Collisional Effects on Wave Propagation, Final Rept., 24 August 1966 to 23 November 1967, Contract F19628-67C-0070, Mt. Auburn Res. Assoc., Inc., Cambridge, Mass., 1967

VESIAC 19,765 VU
AD 832 669

Two problems relevant to the magnetotelluric detection of high altitude nuclear detonations are treated in this final report: (1) Theoretical and numerical computations of the propagation of magnetohydrodynamic waves generated by a current source in a realistic ionosphere including dipole magnetic field and spherical earth. The relationship of the theory to magnetic signals observed from the Star Fish nuclear detonation is discussed. (2) The effect of collisions on the propagation of ion-acoustic waves in the ionosphere is considered. The qualitative behavior is deduced after a review of current knowledge of the subject. A laboratory experiment to check these conclusions and obtain quantitative data is described.

KALININA, R. V., "Variation of the Physical Properties of Devonian Rocks in the Central Region of the Russian Platform," Prikladnaya Geofizika, No. 23, pp. 46-89, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,009 VU

These conclusions can be drawn from this study: (1) there is a sufficiently clear regularity in the variation of the interrelated parameters. It is expressed through the fixed correspondence between these parameters and the thicknesses of the deposits, as well as by the distribution of coastal and deep-water features (environments and by the depth of occurrence of the deposits); (2) In the variation of specific gravity there is a definite relationship with the characteristic features of the mineralogical composition of the rocks, due to all the factors enumerated above and to the physical-chemical features of the basin of accumulation; (3) It is necessary to intensify the study of the regularities pointed out here taking into account diagenesis and epigenesis on rocks.

KANAEV, V. F., and N. P. LARINA, "The Underwater Relief of the Northern Kurile Region," Akad. Nauk SSSR, Trudy Inst. Okeanologiyi, Vol. 36, pp. 158-168, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 10,414 VU

After investigation of the floor relief around Paramushir Island, conducted in 1954, more data were obtained, which allowed the author to compile a new map of the area.

KANAMORI, H., Spectrum of Short-Period Core Phases in Relation to the Attenuation in the Mantle, Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 15,321 VU

Spectral analysis is made of the records of the short period reflected core phases from array stations at Tonto Forest, Arizona. Three earthquakes having distances of 32.5°, 49.0° and 62.8° are studied. Spectral ratios of ScS to ScP and PcS to PcP are calculated in order to estimate the differential effect of attenuation on P and S waves. The possible maximum value of average Q for shear in the mantle is about 324 for the period range 1.5 sec to 5 sec. Using the value of the average Q for P waves, which was previously estimated at 435 through the spectral analysis of PcP phase, the average Q for shear in the mantle and the ratio of the average Q for P waves to average Q for shear, can be estimated at 230 and 1.90 respectively.

KANAYEV, V. F., "New Geomorphological Observations in the Kurile Islands," Akad. Nauk, Trudy Inst. Okenologii, Vol. 32, pp. 215-231, 1960, (Translated from Russian), Contract SD-78.

VESIAC 10,457 VU

Discussed are the results of an expedition, made in the summer of 1955, to investigate cataceans in the region of the Kurile Islands. The author of this article was able to make incidental geomorphological observations on the Islands which allowed him to investigate the general features in the structure of the relief of the land and the ocean floor, and to make some comparisons between them.

As a result of the author's findings, it is possible to characterize the coasts of the Kurile Islands, and to describe the most interesting forms of the relief on the coasts of the volcanic islands.

KANE, J., Fiber Optics and Strain Interferometry, Scientific Report No. 4, AFCRL-65-39, Contract AF 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1965.

VESIAC 9661 VU

By use of glass fibers as dielectric waveguides, interferometric measurements of light along the propagation path can be used as a new type of strain gauge. Two novel strain interferometers are proposed, and described in the report. The theory of the instruments is described, and explicit estimates for the strain sensitivity calculated. The numerical data shows that with digital readout, strains of the order of 10^{-8} can be resolved with a basic instrument 10 m long, and strains of the order of 10^{-9} can be resolved by a 100 m device. With various refinements, sensitivity can be enhanced by another order of magnitude.

KANE, J., Rayleigh Waves at the Continental Margin, Sci. Rept. No. 6, Rept. No. AFCRL 65-454, Contract AF 19(628)-319, Univ. of Rhode Island, Kingston, Rhode Island 1965.

VESIAC 12,189 VU
AD 618 920

In this report, on the analytic continuation of wave functions past discontinuities. The author introduces an elementary procedure for the solution of problems involving the diffraction of vector fields. The report discusses the propagation of Rayleigh waves incident obliquely upon the continental margin. The crustal layering on either side of the coastline is mathematically modeled as a two-part boundary layer in such a fashion that the relevant reflection and transmission coefficients emerge as elementary algebraic expressions.

KANE, J., Seismic Diffraction by Crustal Discontinuities, Final Rept., January 1962 Through September 1966, Contract 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1967.

VESIAC 16,373 VU
AD 653 582

This report describes the research contributions of a group studying theoretical problems of seismology at the University of Rhode Island. These are described in simplified formulations which are mathematically tractable and yet still relevent to realistic crustal structures. Reprints of papers describing the methods are included as appendices in the report.

KANE, J., Seismic Refraction at Crustal Discontinuities, Annual Report, Contract AF 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1966.

VESIAC 14,294 VU
AD 632 172

If any harmonic wave propagates over a path with a nonuniform velocity, then, owing to second-order effects, phase shift data will not be proportional to travel time. The travel time will always seem to be larger than it actually is owing to increased phase shift resulting from diffraction effects. This dilation can be described in a rather elementary manner in terms of a nonlinear first-order differential equation. An integration of this equation gives an explicit formula for the discrepancy between actual travel time and the travel time computed from phase shift data.

KANE, J., Seismic Waves at Crustal Discontinuities. Semiannual Tech. Rept. No. 2, Contract No. AF 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1963.

VESIAC 5480 VU

The theory of transform techniques has been extended to more adequately describe the diffraction of elastic waves by wedge-shaped obstacles. The key result has been the discovery of a "polar representation" of solutions of a wave equation. Experiments in the diffraction of Rayleigh waves by simple crustal discontinuities are now being performed.

A pulse generator has been designed and constructed capable of delivering a 650 volt pulse to transducers composed of barium titanate dishes 0.1 inches thick and 0.25 inches in diameter backed with a brass rod 15 inches long and 0.25 inches in diameter.

KANE, J., Techniques for the Determination of Reflection and Transmission Coefficients of Seismic Waves at Crustal Discontinuities, Semiannual Tech. Rept., 1 July 1963 to 31 December 1963, Contract AF 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1964.

VESIAC 9789 VU

This paper is a summary of a scientific report in preparation. The purpose of the report is to describe a representation of the two-dimensional wave equation which offers major advantages in considering scattered fields in angular sectors.

KANE, J., A Travel-Time Anomaly in Non-Uniform Wave Propagation, Scientific Rept. No. 3, AFCRL-64-921, Contract 19(628)-319, Univ. of Rhode Island, Kingston, R. I., 1964.

VESIAC 9367 VU

If any harmonic wave propagates over a path with a non-uniform velocity, then owing to second-order effects, phase shift data will not be proportional to travel time. The travel time will always seem to be larger than it actually is owing to increased phase shift resulting from diffraction effects. The dilation can be described in a rather elementary manner in terms of a non-linear first order differential equation. An integration of this equation gives an explicit formula for the discrepancy between actual travel time, and the travel time computed from phase shift data.

KANESTROM, R., The Dip of Moho under the NORSAR, Sci. Interim Rept., Rept. No. 3, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1969

VESIAC 19,829 VU

Elastic waves from explosions are recorded at NORSAR and used to determine the dip of Moho under the array. From the azimuthal change of apparent Pn velocities the Moho discontinuity can be represented by a plane dipping 12.6° in a direction N66°E.

KARUS, E. V., I. P. PASECHNIK, "Investigation of the Elastic and Absorption Properties of Rocks in their Natural Layering by the Methods of Seismoacoustics," Izv. Akad. Nauk SSSR Serv. Geofiz., Vol. 6, pp. 515-526, 1954, (Translated from Russian), Contract SD-78.

VESIAC 6740 VU

A description is given of the physical bases of a method, apparatus and technique of field observations developed for the determination of the elastic and absor 'on properties of rocks in their natural beds. The method is based . . a study of the character of the propagation in rocks of elastic stationary sinusoidal vibrations with frequencies of 50-100 to 3000 cps, excited by electromagnetic or piezoelectric vibrators with small power requirements. With the method, it is possible to determine the phase velocities of elastic stationary sinusoidal vibrations and the amplitude factors of absorption of these vibrations in rocks during observations on the surface and in underground rock.

KARZHEVA, L., and N. N. PUZYREV, "An Experimental Study of Transverse Head Waves," Akad. Nauk SSSR, Sib. Otdel. Trudy Inst. Geol. i Geofiz., No. 16, pp. 64-94, 1962, (Translated from Russian), Contract SD-78.

VESIAC 12,552 VU

The main task of the work with the refracted transverse wave method was to make clear the possibilities of a considerable improvement in the depth of investigation in comparison with the previously conducted work, and an investigation of the character of the traceability of transverse waves under various conditions. The field observations were made in Saratovskaya and Tyumenskaya Oblasts. Some of the conclusions were: (1) a considerable increase in the power of directed impact effects as compared with those previously used and the use of explosive effects for the first time permitted a systematic registering and tracing of steady transverse head SH waves. (2) main characteristics of the propagation and reception of these waves were determined.

KATS, A. Z., "The Propagation of Short Period Vibrations in the Ground in the Presence of a Barrier," Trudy Seismol. Inst., No. 127, pp. 112-135, 1948, (Translated from Russian), Contract SD-78.

VESIAC 12,434 VU

Inquiry into the propagation of vibrations in the ground in the presence of barriers in the form of a mass made up of a medium the physical properties of which differ from those of the ground, is discussed. Taking into account only the reflection and refraction of plane waves and starting from the assumption that the type of movement of particles beyond a barrier is determined by the wave having the highest energy, expressions for displacements and energy as functions of the properties of the barrier are obtained which are sufficiently accurate for practical purposes.

KATS, A. Z., "Some Questions of Seismic Microzoning Methods," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 5, pp. 20-59, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,758 VU

The article examines the conditions which permit differentiating surface regions seismically. It is shown that such regions are characterized more fully and unequivocally by dynamic deformations arising in them during the propagation of seismic waves. A method is presented to estimate the deformation of the ground on the basis of its physical characteristics and of seismometric observations at the surface.

KATZ, S., Shallow and Deep Wells in Earthquake and Explosion Detection, Semiannual Tech. Rept. No. 5, Contr. No. AF 19(604)-8376, Rensselaer Polytechnic Inst., Troy, N. Y., 1963.

VESIAC 7724 VU

This report briefly discusses progress in research to develop methods for detecting seismic signals by recording water-level fluctuations in open wells and pressure fluctuations in capped wells.

KEELE, J. E., Development of Low-Power Low-Noise Phototube Amplifier, Contr. No. VT/072, AF 33(600)-41824, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7710 VU

This report describes the development of a low-power phototube amplifier having either analog or frequency modulated carrier output. Test results indicate the amplifier with either type output has the capability of detecting 1.25×10^{-18} w in the passband from 0.01 to 5 cps. The amplifier with analog output has a voltage gain of 350K, a total power requirement of 1.56 w, and a dynamic range of 60 db. The amplifier with frequency modulated carrier output has a power requirement of 1.8 w and when combined with F. M. Discriminator, Model 15216, has a gain of approximately 700 K and a dynamic range of 70 db.

KEELE, J. E., Low-Level, Low-Frequency Photocell Amplifier, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8479 VU
AD 446 573

This report describes the development of a low-level, low-frequency photocell amplifier (PCA) having either analog, broad-band FM carrier, or IRIG FM carrier output.

KEELE, J. E., Low-Level, Low-Frequency Solid State Amplifier, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8484 VU
AD 446 574

This report describes the development of a low-level, low-frequency, all-solid-state amplifier having either analog, broad-band FM, or IRIG FM output. The amplifier was developed primarily for amplification of seismic signals in geographic areas where the low-noise detection capability of a phototube amplifier is not required. The equivalent-input noise level for a passband of 0.1 to 5 cps is given. Signal common-mode rejection is 86 db and the effects of power supply variation are negligible. Power requirements are less than 1 w. Operating temperature is given, as well as other important details of this instrument.

KEFELI, A. S., "A Method of Solution of the Inverse Problem of Seismic Surveying in the Case of a Tilted Layered Medium," Geol. i Geofiz., No. 5, pp. 100-103, 1965. (Translated from Russian). Contract DA-49-083 OSA-3137.

VESIAC 13,311 VU

The solution of the inverse problems for continuous media was limited usually to the case when velocities changed with depth and the horizontal gradient was absent. The author offers a simple way of solving an inverse problem for the case of a sloping plane-parallel medium (a monocline) which involves the construction of a time-field in the lower half-plane, which is recalculated subsequently into the velocity field. This method is based on ray symmetry with respect to the axis normal to the iso-planes of velocities. A system of the overtaking travel-time curves directs the up-dip of the velocity iso-lines (layers), supplemented by the counter travel-time curves at certain intervals.

KELLEHER, J. A., Research Directed to Use of Long and Intermediate Period Seismic Waves for Identification of Seismic Sources, Sci. Interim, 1 Aug. 1969 to 1 July 1970, Rept. No. 2, Contract F19628-68C-0341, Lamont-Doherty Geol. Observ., Columbia Univ., Palisades, N. Y., 1970

VESIAC 20,285 VU
AD 709 410

Extensive analysis was done on the excitation of long-period (15-70 second) Rayleigh and Love waves by earthquakes, underground explosions and presumed explosions. The use of 40 second rather than 20 second surface wave amplitudes for m_b-M_s graphs was shown to have some distinct advantages for purposes of detection and discrimination. A complementary study of the nature and sources of long period earth noise (15-150 second) was completed. Computational procedures for tracing seismic rays in a heterogeneous spherical earth were improved considerably. These improved methods led to important information on seismic velocity anomalies. Microearthquakes studies of Central and Southern Nevada gave insight concerning the tectonic strain release effected by a nuclear test shot. A region-by-region analysis of reliable focal mechanism solutions for deep and intermediate depth earthquakes provided additional support for the idea that portions of the lithosphere that descend into the mantle act as slab-like stress guides. A study of the space-time distribution of major earthquakes in the Alaska-Aleutian region suggests that these events do not occur randomly either in time or in space. Progress in each of these areas, particularly the analysis of long-period surface waves has contributed materially to the capability to detect and identify seismic events.

KELLER, G. V., A Program of Research on the Electrical Properties of the Earth's Crust, with Emphasis on the Detection of Underground Nuclear Explosions, Semiannual Tech. Summ. Rept., Contract No. ARPA Order No. 193-62, U. S. Geol. Survey, Wash., D. C., 1963 (OFFICIAL USE ONLY).

VESIAC 6794 VU O
AD 422 446

KELLER, G. V., and L. A. ANDERSON, Preliminary Report on Deep Resistivity Soundings near Pawnee City, Nebraska, Technical Letter E & M 6, Contract VT/042, U. S. Geological Survey, Denver, Colorado, 1962. (OFFICIAL USE ONLY)

VESIAC 8604 VU O

KELLEY, D. S., Analysis of TFSO Long-Period Noise Survey Data, Spec. Tech. Rept., Rept. No. TR 67-54, Project VT/7702, Contract AF 33(657)-67C-0091, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,014 VU
AD 822 367

The installation and checkout of a medium aperture long-period array at TFSO is described. Methods of data selection and preparation for processing are given. Power spectra and phase velocities of the noise are computed; comparison with previously reported results show basic agreement. Coherence functions show peaks at the same frequencies in which the noise power is concentrated. In the frequency band 0.04 to 0.082 cps, the peak coherence is greater than 0.8 for station separations less than 10 kilometers. The coherence tends to decrease with increasing distance between stations.

KELLEY, D. S., Preliminary Evaluation of the UBSO Vertical Array, Sci. Rept., Rept. No. TR 68-51, Contract VT 6705, AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 19,163 VU
AD 845 302

The vertical array at the Uinta Basin Seismological Observatory consists of six short-period seismographs distributed along the 9000-foot depth of the Carter U. S. No. 1 well. A study of four data samples containing teleseismic earthquake signals indicated a maximum improvement of about 9 dB in signal-to-noise ratio of a single vertical array instrument to a surface instrument. Analyses of two noise samples indicate that the noise field consists of fundamental mode Rayleigh waves for periods greater than 2.5 seconds, at shorter periods the noise field is primarily dominated by P-wave noise.

KELLY, E. J., Beam Patterns and Geometry Studies, Contract AF 19(604)-7400, Lincoln Lab., Mass. Inst. Tech., Lexington, Mass., 1965.

VESIAC 13,858-K VU
AD 648 415

The author discusses array geometry in general, and then the aperture of LASA, roughly 200 km across, which was chosen to provide about twenty-times the wavenumber (or angular) resolution of existing arrays. The adopted subarray geometry is discussed. In the second section of the report, beamforming and array processing are considered. Processing with linear processors is discussed. Non-adaptive and adaptive forms are considered. The third section of the report, the author discusses subarray beams.

KELLY, E. J., A Comparison of Seismic Array Processing Schemes, Contract AF 19(628)-500, Lincoln Laboratory, Massachusetts Inst. of Tech., Lexington, Mass., 1965.

VESIAC 11,762 VU
AD 618 017

The author discusses three approaches to seismic array processing from the theoretical point of view. The three are: 1) maximum-likelihood processing; 2) the minimum-variance, unbiased estimator (MVU) approach used by Levin; and 3) multichannel Wiener filtering. A feature common to these techniques is the formation of a single output waveform which serves as an estimator of the unknown signal coming from a fixed direction. Such an output is referred to as a "beam".

KELLY, E. J., LASA On-Line Detection, Location and Signal-to-Noise Enhancement, Tech. Note 1966-36, Rept. No. ESD-TR-66-245, Contract AF 19(628)-5167, Mass. Inst. of Tech., Lincoln Lab., Lexington, Mass., 1966.

VESIAC 14,836 VU
AD 636 144

This report describes the results of carrying out a number of seismic signal handling operations in on-line digital equipment at the LASA Data Center in Montana. An appraisal is made of the threshold detection capability of a single LASA sensor by comparison with two well-calibrated stations nearby, UBSO and BMSO. It was found that signals average slightly higher at LASA than at these other stations. When the detection threshold of one LASA sensor is corrected for the predetection processing gain being achieved by current LASA beamformer programs, a LASA detection threshold for event detection by surveillance is established.

KELLY, E. J., Limited Network Processing of Seismic Signals, Group Report, Contr. No. AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 8487 VU
AD 447 220

In processing the data from a large seismic array there is a need for rapid determination of source epicenter using only data from the array itself. In this report it is shown how this may be accomplished using the peripheral elements of the array to form a seismic network of limited extent. The method of processing is derived as a limiting case of the classical method of epicenter determination using a world-wide network, and the expected accuracy of performance evaluated by error analysis. The method has been used on data obtained on the New England Seismic Network of Boston College, and results are presented here. These results are in satisfactory agreement with theoretical expectations.

KELLY, E. J., Random Scatter Channels Group Report 1964-61, Contract AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 8877 VU

In many radar and communications problems communication is established between transmitter and receiver by means of electromagnetic scattering from a region of space illuminated by the two antenna beams. In this report we study such scatter-channels in which the perturbation of free-space propagation conditions responsible for the scattering is complicated, and amenable to a statistical treatment. This rules out simple line-of-sight communications problems and radar problems involving a small number of targets. It includes, however, communications via tropospheric scatter or orbiting dipole (West Ford) scatter, and the theory of radar return from a turbulent, ionized gas or from a collection of many metallic scatterers.

KELLY, E. J., The Representation of Seismic Waves in Frequency-Wave Number Space, Contr. No. AF 19(628)-500, Mass. Inst. of Tech., Lexington, Mass., 1964.

VESIAC 7573 VU
AD 433 611

In seismic discrimination problems, one is interesied in filtering out information carried in certain waves from noise carried in other waves. With the use of arrays of sensors, this filtering can be performed in space and time. It is quite useful to visualize the filtering the Fourier-conjugate space of wave number and frequency, and this point of view is developed here. Most of the report is devoted to an expression of the pertinent facts about the propagation of elastic waves in the earth in terms of the frequency-wave number diagram. The remainder concerns signal and noise models and the interpretation of filtering techniques in frequency-wave number space.

KELLY, E. J., Response of Seismic Arrays to Wide-Band Signals, Tech. Note, Contract AF 19(628)-5167, Lincoln Labs, Mass. Inst. of Tech., Lexington, Mass., 1967.

VESIAC 16,630 VU
AD 656 344

Response patterns are computed for the LASA and other arrays and for a class of wide-band signals. Results are displayed as contour plots in wavenumber space and in real space, with and without P-wave attenuation.

KELLY, E. J., Results of Preliminary Seismic Studies, Contract AF 19(604)-7400, Lincoln Lab., Mass. Inst. Tech., Lexington, Mass., 1965.

VESIAC 13,858-G VU
AD 648 415

The author has investigated the detectability of small events by manual and automatic means, the coherence of signals across the array, and the relative station corrections to arrival times between subarrays. Analytical work is in progress for studying the frequency-wavenumber properties of the noise.

KELLY, E. J., A Study of Two Short-Period Discriminants, Tech. Note, Rept. No. ESD-TR-68-16, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1968.

VESIAC 17,998 VU
AD 666 701

This paper is the result of a large-population study of discrimination between earthquakes and explosions, using only short-period data from a single station. The data was obtained from the Large Aperture Seismic Array and the two discriminants studied were waveform complexity and spectral ratio. Procedures for multivariate discrimination are developed and results are given in terms of earthquake identification percentages using these discriminants singly, and in combination with each other and with magnitude.

KELLY, E. J. and R. T. LACOSS, Estimation of Seismicity and Network Detection Capability, Tech. Note, Rept. No. TN 69-41, ESD-TN-69-250, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1969

VESIAC 19,886 VU
AD 695 044

The problem of estimating seismicity and the performance of a system which detects earthquakes is formulated in such a way that maximum likelihood estimation can be applied. The mean number of earthquakes which occur in a fixed time interval is assumed to be of the form exp [a-bm] where m is magnitude and a and b are constants. The probability of detection as a function of m is taken to be an error function with mean and variance μ and σ. Procedures to obtain maximum likelihood estimates of a, b, μ and σ are derived, discussed and applied to experimental data to check the relevance of the theoretical development.

KELLY, E. J. and M. J. LEVIN, Signal Parameter Estimation for Seismometer Arrays, Contr. No. AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 7682 VU
AD 435 489

Statistical methods are applied to the estimation of the velocity, direction of arrival, and waveform of a signal appearing in an array of sensors, with particular attention to seismological problems. The signal is assumed to be a plane wave propagating through linear homogeneous nondispersive medium so that it is the same in each sensor except for a time delay due to its finite velocity. A novel formulation is introduced which requires no assumptions concerning the signal waveform but permits its estimation along with the vector of time delays per unit distance. Described is a least-squares procedure which does not depend on any assumptions regarding the noise.

KERR, J. T., Interim Report on the Experimental Investigation of Thermal Noise, Tech. Rept. No. 64-127, Project VT/072, AF 33(657)-9967, Geotech. Corp., Garland, Texas, 1964.

VESIAC 9435 VU
AD 454 557

An experiment has been designed for the experimental investigation of thermal noise in seismograph systems. The ultimate goal of this experiment is to obtain experimental data to confirm the theoretical limitation of the maximum magnification of a seismograph. Torsion pendulums, similar to galvanometers, will be used to simulate the seismometer and/or galvanometer of a seismograph. Work on this experiment is incomplete. The instruments have been designed and partially constructed. This report describes the planned experiments and their present status, and gives recommendations for the completion of the investigation.

KEOUGH, D. D., Design of Pressure Transducers, Project COACH, Final Report, GPU-4643, Contract DA-49-146-XZ-273, Stanford Res. Inst., Menlo Park, Calif., 1965.

VESIAC 10,479 VU

This project has been directed toward participation in a proposed field test event, Project COACH. Cancellation of this event has necessitated termination of this contract. Specific goals of the contract are given: the status of the piezoresistance gage at the time the present work was initiated permitted recording of pressure profiles of 10 to 150 kbar peak gage pressure with a gage insulator reasonably matched to the shock impedance of the proposed shot environment (salt), work was started on other insulators. Three phases of the effort are sketched in. Termination status of these phases is described, and a discussion concerned with matching of sh k parameters is presented.

KEOUGH, D. D., Pressure Transducer for Measuring Shock Wave Profiles - Final Rept., Contract No. VT/1126, DA-49-146-XZ-096, Stanford Research Inst., Menlo Park, Calif., 1963.

VESIAC 7201 VU

The object of the program reported here is given: the development of a piezoresistive gage capable of recording multikilobar shock pressure profiles in soils and shocks. Initial effort consisted of two concurrent phases, and investigation of piezoresistive and insulating materials and a gage development program. As these phases progressed, it became of primary importance to obtain suitable insulating media. Thus, the main effort has been the selection of insulators, determination of their electrical and Hugoniot characteristics, and subsequent utilization in the design and construction gages. Piezoresistive effect in conductors, shock wave considerations, and full results are given.

KHAIKOVICH, I. M., "The Propagation of Vibrations in a Relaxing Medium," Trans. Inst. Phys. Earth, Acad. of Sci., USSR (Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR), No. 2, pp. 145-178, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,920 VU

In this study, quantitative corrections are found for formulas of seismic wave propagation in a half-space which is under the influence of a pulsed, axially semetric load.

KHAIKOVICH, I. M., "A Radial Method of Calculating Wave Magnitude in a Relaxing Medium with a Long Relaxation Time," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 2, pp. 179-186, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,759 VU

This report extends the method of calculating the magnitude of reflected and head waves, known as the radial method, to the calculation of wave intensities close to wave fronts in a medium with a long relaxation time.

KHARIKOV, B. A., and B. I. SAL'NIKOV, "First Results of the Use of Seismic Surveying by the Controlled Directional Reception Method in the Cheleken Peninsula," Neftgaz. Geol. i. Geofiz., No. 4, pp. 51-53, 1965, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 13,441 VU

The main productive complex of beds of all the deposits of southwestern Turkmenia is a red series. For purposes of deep drilling, the surveyors of west Turkmenia need to study the structural chart of the underlying red deposits. Experimental investigations have been conducted since 1960 by the Western Geophysical Expedition No. 1 using the reflected wave method and the correlation method of refracted waves. This article gives a description of the profile most successfully plotted by the ADR method (Adjustable Directional Reception) in the eastern part of the structure on the Dagadzhik section of the Cheleken Peninsula. As a result of these investigations, the deep structure of the underlying red bed over a given object is represented fairly completely.

KHOVANOVA, R. I., "Spectra of the Effect of Certain Earthquakes in the Naryn Zone of the Tien Shan," Trans. Inst. Phys. Earth, Acad. of Sci., USSR, (Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR), No. 5, pp. 113-125, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,921 VU

Recordings of certain earthquakes of the Naryn team of the Tadzhik Complex Seismological Expedition (TCSE) were used to determine the spectra of earthquake effects by the method proposed by S. V. Medvedev.

KIELIS-BOROK, V. I., "Determination of the Dynamic Parameters of a Focus," Trudy Geofiz. Inst., A. N., SSSR, No. 9, pp. 3-19, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,161 VU

In this paper, a method for determining the source approximately equivalent to the focus of an earthquake is discussed.

KIM, W. H., Model Study of Seismic Effects of Explosions in Prestressed Media, THESIS, Contracts: AF 19(628)-1689, AF 19(628)-5100, St. Louis Univ., St. Louis, Mo., 1966.

VESIAC 17,299 VU

The primary purpose of this investigation was to study some of the seismic effects of explosions in two-dimensional models which are prestressed in uniaxial tension. The seismic effects produced by explosions in prestressed media were examined from the point of view of radiation patterns of elastic waves and size of cavity diameter after the explosion.

KIMLER, B. F., Field Operations and Ocean-Bottom Seismograph Performance and Observations - Kurile Islands Experiment - Spec. Rept. No. 1, Ocean-Bottom Seismograph Experiments, Project VT/6708, Contract F33657-67C-0105, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,027 VU
AD 822 531

A shallow-water test program and a deep-water operational program were conducted. The shallow-water tests environmentally checked the performance of 14 units which were not tested under the previous contract. Special tests of antenna design and temperature measurements were included.

Deep-water tests were conducted adjacent to the Kurile Islands Arc to evaluate the seismicity of the area and the operational worthiness of the ocean-bottom seismograph and auxiliary equipment.

VESIAC 12,440 VU

KIRILLOV, F. A., "Influence of the Depths of the Blast on the Seismic Effect," Akad. Nauk SSSR Trudy Seismol. Inst., No. 106, pp. 74-77, 1941, (Translated from Russian), Contract SD-78.

The magnitude of the seismic effect of a blast is greatly influenced by the depth at which the charge is placed. The study of this problem was carried out in connection with experimental data obtained from observations of blasts on Atach mountain in the town of Magnitogorsk.

VESIAC 12,433 VU

KIRILLOV, F. A., "The Period of Ground Vibrations as a Function of the Distance from the Shotpoint," Trudy Seism. Inst., No. 117, pp. 65-73, 1945, (Translated from Russian), Contract SD-78.

The results of measurements of the periods of ground vibrations produced by blasts located at different distances from the observation point are reported. The results of these observations indicate that the periods of groups of waves making up the main phase of the vibration increase noticeably as one moves away from the point of blast. The empirical formula of Sadovskii giving the period T of the ground vibrations as a function of distance in the form $T = k \log R$, using the results of measurements, confirmed the acceptability of this formula for calculating the period in a range of distances up to 6-7 km. On the basis of these results the coefficient of this formula was refined for alluvial soils.

VESIAC 12,914 VU

KIRILLOV, F. A., "Seismic Explosion Effects," Akad. Nauk SSSR. Trudy Seismolog. Instituta, No. 121, pp. 1-95, 1947, (Translated from Russian), Contract SD-78.

Empirical relationships are established between the intensity of vibrations and the weight of explosive charge, distance from blast, and the cratering index. A formula is given for determining the displacements or rate of vibration of the ground for arbitrary values of the explosive charge, distance from the blast, and the cratering index. The influence of the level of the observation point (depth of shaft), depth of the charge, dispersal of charges, and the type of explosive on the intensity of vibrations is examined. An expression of the relationship between the period of vibration (main phase) and distance is given. The energy expended in the formation of seismic waves is determined as the damping factor of the vibrations of the ground is calculated.

VESIAC 18,014 VU
AD 832 225

KIRKLIN, R. H., B. W. GIRARD, Strain Seismograph Operating Procedures and Applications, Tech. Rept., Contract VT/5081, AF 33(657)-15288, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

Procedures necessary to operate the multicomponent strain seismograph facility located at the Wichita Mountains Seismological Observatory WMSO and the applications of these seismographs to the enhancement and identification of seismic waves are discussed. The theory of strain seismometers and their response to seismic waves are examined to assist in the interpretation of strain seismograms. A description of the WMSO strain seismograph system is also included.

KIRKPATRICK, B. M., Long-Period Seismograph Development, Quarterly Rept. No. 5, 1 July Through 30 September 1967, Rept. No. TR-67-60, Contract VT/6706, AF 33(657)-16406, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,123 VU

Development of the long-period triaxial seismometer is complete. A specially prepared seismometer module was transported to WMSO for preliminary field testing. These tests are now complete and satisfactory operation at seismograph magnifications up to 50K was obtained. The 200-foot deep test hole at UBSO is now complete.

KIRKPATRICK, B. M., Long-Period Triaxial Seismograph Development, Quarterly Rept. No. 6, 1 October to 31 December 1967, Rept. No. TR-68-5, Contract VT/6706, AF 33(657)-16406, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,012 VU
AD 832 548L

Assembly of the long-period triaxial seismometer is complete. Laboratory tests have been conducted and field evaluation of the complete seismograph is now in progress at the Uinta Basin Seismological Observatory (UBSO).

KIRKPATRICK, B. M., Long-Period Triaxial Seismograph Development, Quarterly Rept. No. 7, Rept. No. TR 68-20, Contract VT/6706, AF 33(657)-16406, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 18,509 VU
AD 835 823

Field testing of the long-period triaxial seismometer has continued at the Uinta Basin Seismological Observatory (UBSO). The results of tests involving artificially induced tilt and the response of the system to wind and barometric pressure change are presented.

KIRKPATRICK, B. M., J. MASSE, Galvanometers, Rept. No. TR-64-133, Project VT/072, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 10,643 VU
AD 626 528

Air damping in L-P galvanometers has been reduced by a moving-magnet fixed-coil design, wherein the moving magnet is operated in an evacuated glass housing. A computing or dynamometer-type galvanometer has been constructed and tested for use in seismic data analysis where a power-level indication is of interest and in signal multiplication and correlation. An analysis was made of various optical factors governing the sensitivity of galvanometers with emphasis being placed on improving the sensitivity.

KIRKPATRICK, B. M. and A. W. SIMMONS, Long-Period Triaxial Seismograph Development, 1 July to 30 Sept. 1968, Rept. No. TR 68-41, Contract VT/6706, AF 33(657)-16406, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 19,109 VU
AD 843 477 L

The spectra and coherence of the noise as recorded by the triaxial and long-period seismographs at UBSO were computed. Plots of the amplitude ratio (or spectra ratio) and coherency of the noise are presented. Comparison of the amplitude ratio plots, from the recordings for wind free and windy days, indicates that the wind induced noise is attenuated, but not completely eliminated with the burial of a seismometer.

KIRKPATRICK, B. M., and A. W. SIMMONS, Long-Period Triaxial Seismograph Development, Quarterly Rept. No. 10, 1 October to 31 December 1968, Rept. No. TR 69-5, Contract VT/6706, AF 33(657)-16406, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969

VESIAC 19,270 VU

The redesigned triax seismometer module has been completed and transported to Fairbanks, Alaska, for operational tests. A triax borehole facility has been prepared at the Murphy Dome ALPA site 3-4 approximately 40 miles northwest of Fairbanks. The improved module and two of the engineering prototype modules operated at UBSO have been installed at site 3-4 and field evaluation is now in process.

KIRNOS, D. P., "The Possibility of the Generation of Natural Vibrations in the Alluvial Layer," Trudy Seism. Inst., No. 117, pp. 74-80, 1945, (Translated from Russian), Contract SD-78.

VESIAC 12,432 VU

Certain experimental results are described indicating that natural vibrations may arise in the alluvial layer at the time of blasts and local earthquakes.

KISSINGER, F., Array Processor and Lissajous Display, Contract No. VT/072, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8477 VU

The array processor and Lissajous display is a seismic signal display device designed to perform time compensation on seismic signals. Time delay or advance is performed by physically displaying recording dots on the front of a cathode-ray tube parallel to the time axis. The face of this CRT is continuously photographed and recorded on 16-mm film. After processing the image is projected on a viewscreen at X20 magnification. The system may be operated in one of the following five modes: 1) Analog signal display Y-axis deflection; 2) Analog signal display X-axis deflection; 3) Analog signal display Z-axis deflection; 4) Analog signal display optical summation; and 5) Lissajous display of earth particle motion.

KISSINGER, F., Improved Seismograms, Semiannual Prog. Rept. No. 8, 1 July through 31 December 1964, Rept. No. TR-64-136, Project VT/072, Contract AF 33(657)-9967, Geotech. Corp., Garland, Texas, 1964.

VESIAC 10,293 VU
AD 480 518

Work on these tasks is discussed in detail in this progress report: (a) Inclined Seismometer; (b) Galvanometers; (c) Filtering; (d) Amplifiers; (e) Digitizer; (f) New Methods of Signal Presentation; (g) Improved Seismograph Testing Facilities; (h) Stable Table; (i) Strain Seismograph; (j) Investigation of Thermal Noise.

KISSLINGER, C., Model Studies of Explosion-Generated Seismic Waves, Semiannual Tech. Rept. No. 2, Contract No. AF 19(628)-1689, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6584 VU
AD 423 412

This semiannual technical report discusses the completion of a series of experiments for the study of the generation of Rayleigh waves in a semi-infinite medium. Some experiments were conducted in a two layer system. An attempt was made to study the direct S wave produced by explosions in a Plexiglas sheet. The frequency response curves for the capacitance pickups were also obtained.

KISSLINGER, C., Model Studies of Explosion-Generated Seismic Waves, Semiannual Tech. Rept. No. 3, Contr. No. AF 19(628)-1689, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 7697 VU
AD 439 079

The report covers the period of 1 October 1963 to 31 March 1964 in which time the principal effort was directed to the study of P and S wave radiation patterns from explosions in rectangular cavaties. Both aluminum and plexiglass were used for the purpose.

KISSLINGER, C., Model Studies of Explosions-Generated Seismic Waves, Semiannual Tech. Rept. No. 4, Contr. No. AF 19(628)-1689, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 8746 VU
AD 462 014

Research on three aspects of explosion-generated seismic waves was in progress during the period covered by this report: 1) the pattern of radiation of body waves into the interior of a half-space from a near-surface source; 2) decoupling of seismic energy by shooting in a cavity; and 3) the effect on the characteristics of waves at a distance when the shot is surrounded by a small zone of material with different physical properties than the substance forming the main transmitting medium.

KISSLINGER, C., Model Studies of Explosion-Generated Seismic Waves, Semi-Annual Tech. Rept. No. 5, 292-62, Contract AF 19(628)-1689, St. Louis Univ., St. Louis, Mo. 1965.

VESIAC 10,473 VU

The author applies his model technique to the study of the effect on radiation when a shot is fired in a circular inhomogeneity in an otherwise homogeneous infinite medium. The purpose of this work is to relate the spectrum of the compressional wave to the size of the cavity and the contrast in properties between the inhomogeneity and the surrounding medium. Described is the same experimental technique used throughout the project. The theory behind the experiments is discussed. Conclusions are given regarding styrofoam in plexiglas, and plexiglas in aluminum. Part II of the report concerns Anistropy Produced by Static Stress.

KISSLINGER, C., Model Study of Explosion-Generated Seismic Waves, Final Rept., Contract AF 19(628)-1689, St. Louis Univ., St. Louis, Mo., 1965.

VESIAC 13,549 VU
AD 627 038

The generation of waves by an explosive source in homogeneous media was investigated by two-dimensional models. The size of the effective source for compressional waves agrees well with the outer limits of the zone of circumferential cracking in a brittle medium. Discussed are occasions on which prominent shear waves appear. The radiation of both types of body waves is strongly modified by surrounding the shot with a different material. How the P-wave spectrum can be modified is discussed; cavity effects are examined. Rayleigh-wave evidence about explosion effects, the presence of various kinds of stress and strain are examined.

KISSLINGER, C., Progress in Understanding the Generation of Seismic Waves by Contained Explosions, Rept. No. 4410-104-X, Contract SD-78, Inst. of Science and Technology, Univ. of Michigan, Ann Arbor, Michigan, 1965.

VESIAC 13,023 VU
AD 804 865

This report, based on a survey of pertinent literature published since 1962, is an evaluation of the techniques developed to monitor contained explosions. Included is a description of the types of close-in measurements, a review of the computer codes used to predict the waveform and energy level at the input to the elastic region, and a discussion of the important work in P-wave and surface-wave analysis and prediction.

KISSLINGER, C., Research in Seismology, Annual Tech. Rept., Contract AF 19(628)-5100, St. Louis Univ., St. Louis, Mo., 1966.

VESIAC 15,021 VU
AD 640 637

During the year, the main technical accomplishments have included efforts in these areas: (a) the focal mechanism of earthquakes; (b) model studies of explosion-generated waves; (c) azimuthal departure of P-wave motion from the great circle path; (d) determination of depth of focus; (e) the phase velocity of surface waves. Each of these studies is reported here. In connection with focal mechanism studies, the great Alaska earthquake of 1964 was studied, and an abstract of the work done on this study is given. For model studies of explosion-generated waves, two topics have been under consideration, and are reported on: the effect of prestressed media on seismic waves generated and a study of seismic decoupling in an explosion.

KISSLINGER, C., Research in Seismology - Annual Tech. Rept., Contract AF 19(628)-5100, St. Louis Univ., St. Louis, Mo., 63100, 1967.

VESIAC 17,020 VU
AD 660 861

During the course of the year the following studies were conducted: body wave studies of special effects related to path of propagation and station site, the focal mechanism of earthquakes, model studies of the relation between cavity size and decoupling of explosive sources, the determination of depth of focus, and the phase velocity of surface waves. This summary is divided into two sections corresponding to the completion status of the work.

KISSLINGER, C., Research in Seismology, Annual Tech. Rept., Contract AF 19(628)-5100, St. Louis Univ., St. Louis, Mo., 1968

VESIAC 19,035 VU

In this report, research in seismology on fundamental problems related to the detection, location, and identification of underground nuclear explosions is described. The period covered by the report is September, 1967 through August, 1968.

KISSLINGER, C., Small-Scale Studies of Explosive Seismic Sources, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-II VU

An experimental study of the explosive source mechanism using small-scale experiments is reviewed. The study is based on two-dimensional laboratory models and small-scale field tests. Results for body and Rayleigh waves are given. It was found that such tests cannot take the place of full-scale trials, but are useful to test the validity of theoretical treatments and to guide the design of experiments.

KISSLINGER, C., E. MATEKER and T. V. MC EVILLY, Seismic Waves Generated by Chemical Explosions, Final Rept., Contract No. AF 19 (604)-7402, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6873 VU
AD 423 980

This report describes the results of research on some fundamental properties of seismic waves generated by chemical explosions. The work was carried out between August 1, 1960 and July 31, 1963. Seismograms from some 160 small charges, one 500 lb. surface burst, one 100 ton surface charge, and a buried charge of 10 tons, were recorded at close range. The experiments involving the small charges were designed to elucidate a variety of aspects of the generation of seismic waves by explosive sources. Given in the report are: a) the principal subjects investigated; b) some areas for further study suggested by some of the results; c) principal conclusions of the work; and d) recommendations.

KITZINGER, P. R., VELA UNIFORM, Project SHOAL, SHOAL Surface Motion Measurement Near Source, Final Report, VUF 2002, Project 1.2, Sandia Lab., Albuquerque, N. M., 1965.

VESIAC 10,487 VU

Successful measurements of surface motion were made on Project Shoal at horizontal ranges between 300 and 4775 feet. These measurements consisted of accelerations, velocities, and at larger distances, some relative displacements. A definite spalling effect was indicated; this effect was less at very close-in stations than it was farther out. When scaled by cube root scaling and compared with scaled results from Hard Hat, the signals from Shoal proved somewhat lower than those from Hard Hat. This effect may have been caused by extensive faulting at the Shoal site.

KLAPPENBERGER, F. A., Correlation of Amplitude Anomalies at LASA, Sci. Rept., Project VT/6702, Contract F 33657-67C-1313, Teledyne Inc., Alexandria, Va., 1967.

VESIAC 16,366 VU
AD 815 581

Peak-to-peak amplitudes recorded by subarray center instruments for independent events have been tested for correlation. Significant positive correlations were detected for events whose focuses originated close to each other. It is also shown that measurement errors tend to reduce the estimate of their coefficient of correlation; the distribution of the coefficient of correlation for small sample sizes are graphically presented.

KLAPPENBERGER, F. A., Distribution of Short Period P-Phase Amplitudes over LASA, Rept. No. 187, Project VT/6702, Contract F 33657-67-C-1313, ARPA Order No. 624, Teledyne, Inc., Alexandria, Va., 1967.

VESIAC 16,384 VU
AD 815 580

The behavior of short period P-Phase amplitudes over LASA has been investigated for several earthquakes. It has been found that the distribution of the peak-to-peak amplitudes across a sub-array approaches a log-normal distribution of those events studied.

KLAPPENBERGER, F. A., Spatial Correlation of Amplitude Anomalies, Contract VT/6702, F33657-67C-1313, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 16,749 VU

Spatial correlations of amplitude anomalies have been conducted over LASA and LASA subarrays to test the hypothesis that these anomalies exhibit spatial stationarity. The evidence indicates that the anomaly process cannot be considered to be covariance stationary.

KLASKY, P. S., G. F. FRANCIS, O. R. RUSSELL, and H. W. RUSSELL, Final Rept., 17 November 1961 to 30 April 1965, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1965.

VESIAC 11,765 VU
AD 625 464

The TFSO is discussed as an effective test bed for seismological research; and as an operating seismological station. The Arizona site was chosen for its low ambient noise characteristics. Ambient noise during quiet periods and during storms is discussed. The various probabilities involved in detecting earthquakes of various magnitudes is discussed. Events west of the observatory can be better detected than those occurring to the east. The difference, given in magnitude, is slight. Array configuration and instrumentation are discussed.

KLASKY, P. S., and A. M. RUGG, TFSO FM Seismic System Test, Phase I, Special Report No. 11, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,283 VU
AD 454 384

The FM-250 seismic system, developed under Call No. 3 of Contract AF 33(657)-7747, has been operated with the remote portion of the system at the Experimental Vault of the TFSO for ten weeks. This vault has local power available for operation of auxilliary test equipment. During this time, the following parameters of the system were compared against laboratory results: (1) dynamic range; (2) system noise; (3) cross-talk; (4) line interference; (5) system drift; and (6) frequency response. Each of these is discussed in the report. The test procedure followed was essentially that described in the FM Seismic System Field Test Program, Phase I, dated 27 December, 1963.

KNOPOFF, L., The Nature of Surface Wave Propagation in Crustal Structures of Varying Thickness, Final Report, Contr. No. AF-AFOSR 26-63, Calif. Inst. of Tech., Pasadena, Calif., 1964.

VESIAC 8529 VU
AD 448 223

This report summarizes research results which were performed in the following areas: 1) The beat mechanism in frequency modulated waves; 2) Scattering of seismic waves by inhomogeneities in the earth interior; 3) Scattering of surface waves by irregularities in geometry corresponding to non-plane surfaces; and 4) Studies associated with nature and structure of the upper mantle of the earth. Abstracts of technical papers in these four categories of research are also included.

KNOPOFF, L., Radiation from Seismic Surface and Interior Sources, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-G VU

The first-motion radiation patterns from suddenly occurring dislocations are formally identical to those from suddenly applied forces or torques. A tangential displacement dislocation has radiation identical to that for a double couple of force. The radiation pattern for seismic sources near surfaces of discontinuity of the first-order are significantly altered from those for interior sources. This is especially so for surface sources in the case of SV waves near the critical angle; this feature may provide a rapid method for discriminating between buried and surface sources.

KNOPOFF, L., Studies of Seismic Waves in Heterogeneous Regions of the Earth, Annual Sci. Rept., Rept. No. AFOSR 66-2389, Contract AF-AFOSR 710-66, University of Calif., Los Angeles, Calif., 1967.

VESIAC 17,016 VU
AD 659 243

The annual report contains a brief summary of work done in 1966-67. A bibliography of reports generated under the contract is included.

KNOPOFF, L., Studies of Seismic Waves in Heterogeneous Regions of the Earth, Final Rept., AFOSR-66-2389, Contract AF-AFOSR-710-65, Univ. of Calif., Los Angeles, Calif., 1966.

VESIAC 15,044 VU
AD 802 190L

The final report contains a summary of all work done in 1965-66 and includes abstracts of papers submitted for publication under this grant.

KNOPOFF, L., Theoretical and Experimental Studies of Seismic Waves in Geometrically and Physically Heterogeneous Regions of the Earth, Final Rept., Contract AF-AFOSR-710-64, Univ. of California, Los Angeles, California, 1965.

VESIAC 12,193 VU
AD 619 739

The abstracts here describe papers which constitute the research report proper. The authors have completed work on the crustal structure under the Alps. They have found the equivalent body forces which yield the same seismic radiation pattern as a dislocation source. A one-dimensional laboratory model has been constructed which simulates many of the statistical features of seismic activity. Minimizing errors in transducer placement in model seismology is discussed, and a semi-automatic line fitting process on a computer. Representation of surface waves on a sphere using Legendre functions is described. Green's function methods are developed for mathematical and geometric conditions.

KNOPOFF, L., M. J. BERRY, and F. SCHWAB, Tripartite Phase Velocity Observations in Laterally Heterogeneous Regions, Publ. No. 548, Contract AF-AFOSR-710-66, Univ. of Calif., Los Angeles, Calif., 1966.

VESIAC 15,043 VU

The hypothesis that one can assign the phase velocity calculated from a tripartite net to one of the legs of the net exclusively, when that leg approximately coincides with the surface wave propagation vector, has been substantiated by experimental data. If more than one leg of an array of stations is parallel to the propagation vector, it is possible to make a quantitative estimate of the lateral heterogeneity of structure across the net. However, if the propagation vector coincides with only one of the legs, then one can only draw qualitative conclusions concerning lateral heterogeneity.

KNOPOFF, L., W. L. PILANT, A Proposal for a Seismological Study of the Gulf of California, Publication No. 473, Contract AF-AFOSR-710-65, Univ. of Calif., Los Angeles, Calif., 1965.

VESIAC 13,542 VU
AD 649 933

In this proposal the authors indicate that a significant geophysical problem remains to be solved with regard to the southern part of the Gulf of California. By means of a program of both short and L-P seismic observations, it should be possible to resolve many of the structural problems associated with the origins of the Gulf of the peninsula of Lower California.

KOCH, C. F., Intrinsic Redundancy of Seismic Data, Pt. 1, Preliminary, Sci. Rept., Rept. No. 237, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1969

VESIAC 19,918 VU
AD 861 506

When data are digitized, the sampling rate is selected to provide for the highest frequency phenomena predicted. Much of the time the data is of lower frequency, and redundant data is obtained. A technique has been developed to reduce the quantity of redundant data. It has been applied to both short and long period seismic data. Seismograms from before and after processing have been compared to evaluate the effect of the data. A 5 to 1 reduction in data quantity, while maintaining adequate data quality, seems feasible.

KOGAN, L. I., "Multiple Reflections in a Water Layer and Their Effect on the Reliability of Data Interpretation in Seismic Marine Surveying," Razved. Geofiz., No. 2, pp. 16-35, 1964, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 13,324 VU

Intensive multiple reflections in a water layer were explained by the existence of a rigid acoustical water-air barrier at the surface and an acoustical water-sea bottom boundary at the bottom. The reflection produced by this seismic energy trap cause "water resonance" which was studied theoretically and experimentally. Regularities were found concerning: (1) strength of the "resonance"; (2) the determination of the resonance and oscillation frequencies; (3) conditions under which the maximum resonance effect was produced; (4) possible serious errors in a standard interpretation of "resonance seismograms"; and (5) the use of special filters to suppress the resonance effect.

KOGAN, S. D., "On the Application of the Principle of Phase Correlation for Remote Earthquakes," Doklady, Akad. Nauk, SSSR, Vol. 101, No. 4, pp. 653-655, 1965, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,311 VU

In this work the author has presented an experiment on the phase correlation for distant earthquakes. Multichannel seismograms were used for comparing the recording traces to be correlated. The results of the work do not completely solve the problems, however, they show that the correlation of remote earthquakes is possible.

KOLOSENKO, M. N., "Determination of the Azimuth to the Epicenter of a Distant Earthquake by Using the Arrival Time of the Seismic Waves at Two Stations," Trudy Geofiz. Inst., A. N. SSSR, No. 30, pp. 89-103, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,165 VU

This paper presents the problems of the determination of the location of the epicenter of a distant earthquake by using azimuths obtained by the differential (kinematic) method. Sections 1, 2, and 3 present the details of the problem and its solutions for the plane and spherical case; in section 4 the errors in determining the azimuth are calculated and the conditions under which it is possible to achieve an accuracy of $\pm 1^{\circ}$ are discussed; Section 5 recommends formulas and nomograms for decreasing the required amount of calculations; in section 6 we have presented examples of obtaining the locations of the epicenters of several earthquakes.

KONDORSKAYA, N. V., "Detection of the sP Wave in Shallow Earthquakes and its Use for Determining the Depth of the Focus," Trudy Geofiz. Inst., A. N. SSSR, No. 36, pp. 35-47, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,163 VU

It is shown that waves reflected in the vicinity of the epicenter (sP and sS) can be detected on the records of earthquakes, the foci of which are located in the earth's crust, for epicentral distances varying from 2° to 80°. The existence of a sufficiently strong sP wave in shallow earthquakes was established as a result of examining the dynamic characteristics of the sP wave related with the mechanism of the seismic focus.

KORSCHUNOW, A., "Deep-Focus Earthquakes from Goettingen Seismograms," Ztschr. f. Geophys., Vol. 21, pp. 113-134, 1955, (Translated from German), Contract SD-78.

VESIAC 9533 VU

The subject of this paper is a statistical review of deep-focus earthquakes registered at the seismological station of Gottingen from 1930 to 1937. With reference to the catalogue of ISS (International Seismological Summary) and to the seismological tables by Jeffreys-Bullen (1948), 103 deep-focus earthquakes have been dealt with. Specially defined "quality-classification"—as derived from the entire volume of seismograms, and a critical test of sensitivity of seismograph components to first waves give an indication of the quality and useability of seismograms which may be regarded as representative of the output of central European stations.

KOSMINSKAYA, I. P., "Analysis of the Interference Zones of Seismic Waves," Trudy Geofiz. Inst., A. N. SSSR, No. 35, pp. 116-145, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,164 VU

Consideration is given to the question concerning the applicability of the method for analyzing complex harmonic vibrations to the analysis of the interference zones of seismic waves occurring as a result of the superposition of quasi-sinusoidal pulse vibrations.

A comparison of the calculated data with theoretical examples of the interference zones of two refracted waves (the shape of the vibration is derived from observed data) shows the practicality of utilizing the proposed method.

KOSMINSKAYA, I. P., "Methods of Analysis of Amplitude Curves and Travel-Time Curves of Phases of Complex Harmonic Waves," Trudy Geofiz. Inst., N. A., SSSR, No. 30, pp. 302-313, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,162 VU

Methods for determining amplitude curves and phase travel-time curves for simple seismic waves are described by the use of the corresponding graphs of complex harmonic vibrations. Travel-time curves of simple waves can be determined by three methods: from the grid map of t-x curves, from the intersection of the amplitude curves of the complex and dominant waves, and from the magnitude of the interval between similar extrema of the amplitude curves of the complex waves.

KOSTENKO, N. P., "Changes in the Slopes of the Earth's Surface and Seismicity (with the Example of Mountainous Countries in Southern Central Asia)," Byulleten' Soveta po Seysmologii A. N. SSSR, No. 8, pp. 150-156, 1960, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,312 VU

This report discusses the relationship of the earths crust to seismic activity. There is a brief discussion of the formation of mountains and slope structure. The effects of these formations on earthquakes and fault line are also discussed. It is shown that clusters of deep epicenters often correspond to the boundaries of transverse uplifts and troughs, the boundary zones between mountain structures, and a sharp change of course of the structural elements.

KOVACH, R. L., Seismic Surface Waves: Some Observations and Recent Developments, Contract No. AFOSR-25-63, Calif. Inst. of Tech., Pasadena, Calif., 1963.

VESIAC 6478 VU

This report summarizes much of the observed seismic surface wave data that has accumulated in the past thirty years. The data are discussed by seismic wave type and by major geographic areas.

KOVACH, R. L., Seismological Analysis of VELA Array Data, Annual Rept. I, Feb. 1966 - Jan. 1967, Contract AF 49(638)-1687, Stanford University, Stanford, Calif., 1967.

VESIAC 15,543 VU
AD 647 920

This report contains discussions of work on these subjects: (1) study of PKP arrival times in the 115°-140° epicentral distance range;

(2) the energy of the free oscillations of the earth; (3) attenuation of seismic body waves in the mantle and core. In this last category, the technique being employed is spectral amplitude comparison of particular seismic phases that have the same vertical take-off angle in the mantle and have travelled the same great circle path. Data from the VELA Arrays and LRSM stations have been examined for suitable recordings of the seismic phases SKS and SKP. Spectral amplitude comparison allows the ratio of SKS to SKP to be formulated according to an equation given in the report.

KOZLOV, P. T., "Basic Financial Funding of the Geophysical Service of the Oil Industry of the USSR," Prikl. Geofiz., No. 24, pp. 234-243, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,441 VU

The features of the basic investment in geophysical work in connection with the oil and gas industry is characterized by the fact that the leading role belongs to outfitting and precision instruments. Building and structures do not occupy an important position. This lays the groundwork of the basic investment in the geophysical enterprise, for example in the oil industry where oil wells play the large role in the results. The author gives a breakdown of major production investments of the geophysical service in the oil industry of the USSR at the beginning of 1956 (in percents of the total), and then explains the breakdown. He discusses the changes that the individual elements of the basic production investments have undergone, and the effectiveness of the investments.

KOZSUCH, P. J., NUTRAN Program for Digital Spectral Analysis, Tech. Rept. No. 66-40, Contract: VT/4051, AF 33(657)-12145, Teledyne Indust., Geotech Div., Garland, Texas, 1966.

VESIAC 14,304 VU

A 3100 CDC computer program called NUTRAN was written to perform unified digital spectral analysis. The program will yield numerical Fourier series, numerical Fourier transform, and "stacked" spectra.

KOZSUCH, P. J., and Y. T. HUANG, A Seismograph Calibration Technique and Prediction of Seismometer Parameters, Tech. Rept. No. 66-63, Contract VT/6703, AF 33(657)-16270, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,154 VU
AD 803 339

A seismograph calibration and seismometer parameter prediction technique using a calibration function constructed from a given set of amplitude and phase spectra is discussed in this report. The amplitude response of the seismograph is determined by comparing the spectral content of the input calibration function with the spectral content of its transformed output. For field personnel, where data processing hardware is not available, a method for predicting the amplitude response of the seismograph from the output calibration function is discussed. The possibility of predicting the seismometer free period and damping parameters is also suggested.

KUBOTA, S., E. BERG, Evidence for Magma in the Katmai Volcanic Range, Contract AF-AFOSR-701-64, AF-AFOSR-701-66, Univ. of Alaska, College, Alaska, 1967.

VESIAC 15,734 VU
AD 649 249

The location of magma reservoirs has been attempted, using the calculated wave path and the screening of the mainly vertically polarized shear wave.

Of the possible ten chambers thus located, the ones of shallow depth (to 20 km) correspond to the location of active volcanoes. The ones between the 20 km level to the upper mantle seem to spread over a rather wide area and are not clearly related to the geographical position of a particular volcano.

Theoretical considerations on the propagation of elastic waves substantiate the observed absence of vertically polarized shear waves.

KUPALOV-YARAPOLK, I. K., "Geophysical Methods of the Prospecting for Oil (A Review of the Foreign Literature)," Prikladnaya Geofizika, No. 14, pp. 214-232, 1956, (Translated from Russian), Contract SD-78.

VESIAC 12,012 VU

The author, a Russian, writes that in many "capitalist" countries, oil bearing structures are explored by using geophysical prospecting methods. He says that in the foreign periodicals dealing with oil and geology are papers published about the improvements introduced into any of the geophysical methods and expanding the possibilities of the methods to solving increasingly complex geological problems. There are reviews which describe the work being carried out. This paper familiarizes the reader with the level of development of geophysical methods in the capitalist countries as it was in 1954. The materials were drawn from more than 100 articles that appeared from 1951-1954. Some of them, describing new ways of observation or new instruments, appear in the reference list.

KUO, J. T., Support of Visiting Seismologists, Final Rept., Contract AF-AFOSR-62-303, Lamont Geol. Obs., Columbia Univ., Palisades, New York, 1965.

VESIAC 13,344 VU
AD 624 453

Discussed is the work of nine seismologists from Japan, England, and Denmark, who have participated in a program of research at Lamont Geological Laboratories during the last three years. As a result of their work we now have more knowledge of : 1) earthquake prediction studies; 2) travel times of body waves through North America for nuclear explosions and earthquakes; 3) the theory of wave propagation through complicated structures, such as corrugated interface and a medium with a hyperbolic type of interface; 4) the dissipation factor 1/Q in the upper and lower mantle and in the core. Through these studies, light has been shed on seismic event location and identification.

KUO, J. T., M. MAJOR, and J. OLIVER, Observations of Earth Tides with Strain Meters, Contr. No. AF 19(604)-7376, Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 7837 VU

Earth tides are well recorded on two horizontal strain meters which are installed in a deep mine located at Ogdenburg, New Jersey. The strain meters are of the Benioff fused-quartz type and are oriented at N29° 30'E and S48°E. A 29-day series for each of these instruments from April 7 to May 5, 1962 was analyzed. The effects of instrumental drift and barometric pressure were corrected. Five principal tidal constituents, M_2, O_1, S_2, K_1 and N_2 were obtained. The means by which they were obtained is described. Given are the best values of Shida's number 1 with correction for the ocean tidal load by means of the Boussinesq solution with the modified cotidal and corange charts. Other values are given.

LABLANC, G., (S. J.), Studies of the Effect of Depth of Focus on Seismic Waves, Special Tech. Rept. No. 4 on Spectral Analysis of Short-Period First Arrivals of the April 13, 1963 Peruvian Earthquake, Rept. No. AFCRL-66-569, Contract AF 19(628)-238, Pennsylvania State Univ., University Park, Pa., 1966.

VESIAC 14,969 VU
AD 639 743

The S-P vertical seismograms of 37 stations for the Peruvian earthquake of April 13, 1963 were Fourier-analyzed for a time duration of 10 sec. The spectra were similar in overall shape, but different in finer structure. The similarity of the envelope appears to be associated with the source, while the crustal effect could account for the differences in the finer spectral structure. The crustal effect appears to be so considerable that the other effects are impossible to measure accurately. The necessity of truncating the crustal transfer function before attempting to associate the finer spectral variations to a given crustal structure is mathematically established. The use of averaging to obtain a cancellation of the crustal effects at many stations is discussed.

LACOSS, R. T., Geometry and Patterns of Large Aperture Seismic Arrays, Tech. Note 1965-64, Contract AF 19(628)-5167, Lincoln Lab., Mass. Inst. Tech., Lexington, Mass., 1965.

VESIAC 13,916 VU
AD 628 148

A study of possible configurations for LASA has been completed. Described is the most satisfactory pattern in wave number space. Patterns for some alternative placements of subarrays, including that of the experimental LASA in Montana, have been included. Results indicate that a LASA having a diameter of 200 km should be composed of subarrays from 10 to 15 km in diameter. Such an increase in size would require the use of less regular subarray geometries than those which have been used in Montana. Also discussed is a sensitivity function for patterns which has been developed. Uses of the sensitivity function are discussed.

LACOSS, R. T., A Large-Population LASA Discrimination Experiment, Tech. Note, Rept. No. ESD-TR-69-69, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1969

VESIAC 19,624 VU
AD 687 478

A computer program has been written and has been applied to LASA time series data from nearly 200 events in order to obtain data for discrimination studies. In general, the previously estimated performance of M_s - m, spectral ratio, and complexity have been corroborated. Some of the specific results are the following. Except for one anomalous earthquake, all shallow earthquakes with $m_b > 4.8$ and explosions with $m_b > 5.1$ have been correctly identified, using M_s-m_b. No events with $m_b < 5.1$ could be unequivocally identified as explosions. However, the probability that an earthquake would be identified as such decreased to zero only gradually as m_b was reduced to about 4.0. A modification of spectral ratio has been made which introduced the option to make no decision concerning the nature of an event when the signal-to-noise ratio is not sufficiently large. The probability that no decision will be made is zero for $m_b > 4.8$ and unity for $m_b < 4.0$. The probability of correct identification is high for events which pass the signal-to-noise ratio tests. The period of short period P-waves may be a valuable discriminant at low magnitudes. Many earthquakes with magnitudes below 4.5 can be identified as such using the period data. Depth phase picks have been made for about 60 percent of the earthquakes in our population. About 70 to 95 percent of these picks correspond to valid depth phases. Unfortunately, depth phases were also picked for three presumed explosions.

LACOSS, R. T., LASA Decision Probabilities for M_S-m_b and Modified Spectral Ratio, Tech. Note, Rept. No. TR 1969-40, ESD-TR-69-207, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1969

VESIAC 19,805 VU
AD 692 451

LASA data has been analyzed to determine the probabilities that M_S-m_b and Modified Spectral Ratio (MSR) can be effectively applied to seismic events. The probabilities have been estimated as a function of magnitude and whether the event is an explosion or an earthquake. In the case of the earthquakes, the probabilities go from about 1.0 to 0.0 as m_b goes from 5.0 to 4.0. The drop is slightly faster for M_S-m_b. MSR behaves similarly for explosions. However, the probability for M_S-m_b in the case of explosions drops to zero roughly over the range of m_b from 5.2 to 4.5. In addition, a limited study of joint properties of M_S-m_b and MSR has indicated that they operate quite independently in the sense that if one of the discriminants yields no decision concerning a particular event, the probability that the other can make a decision is not significantly affected.

LACOSS, R. T., Seismic Discrimination, Semiannual Tech. Summ. Rept., 1 July to 31 December 1969, Rept. No. ESD-TR-69-412, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington Mass., 1969

VESIAC 20,076 VU
AD 700 322

During the reporting period short-period data from several sites have been used to study the nature of the spectra from presumed explosions, to test a potential new discriminant, and to study depth phases. Surface- and body-wave magnitude data have been obtained and used to study regionalization phenomena. Preliminary studies of ultra-long-period data have been undertaken. Modifications of continental array processing methods have been completed and signal equalization studies initiated. Upgrading of software and hardware facilities has continued.

LACOSS, R. T., J. CAPON, and R. J. GREENFIELD, Preliminary Design of a Long-Period Seismic Array for Norway, Tech. Note, Contract AF 19(628)-5167, Lincoln Labs., Mass. Inst. of Tech., Lexington, Mass., 1968

VESIAC 17,436 VU

A preliminary design study for a long-period seismic array in Norway has been completed. It has been shown that if the array contains more or less uniformly distributed seismometers over a disc then the spacings between adjacent elements should be between 20 and 25 km. Larger spacings would result in spacial aliasing of organized noise and signals. Smaller spacings would decrease the array resolving power. Properties of specific array configurations are given.

LACOSS, R. T., and G. T. KUSTER, Processing of a Partially Coherent Large Seismic Array for Discrimination, Tech. Note, Rept. No. ESD-TR-70-353, Contract F19628-70C-0230, Lincoln Labs., M. I. T., Lexington, Mass., 1970

VESIAC 20,460 VU

This report outlines the technical work in progress for processing a partially coherent large seismic array for discrimination.

LAKE, H., Development of Wide Band Beam Patterns Using the Montana LASA, Contract: VT/5053, AF 33(657)-13899, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 13,858-H VU
AD 648 415

A large aperture seismic array is assumed to consist of 21 outputs, each output representing the center of one of the 21 subarrays. Considered here is the manner in which these outputs are combined to yield a desired beam response. Response curves are presented which result from optimum beam shaping. These beams are developed by Wiener optimum criteria, in that desired regions of k space were passed, and selected regions in k space were specified for rejection. The technique is further discussed.

LAKE, H., Noise and Signal Characteristics in the Vicinity of Montana LASA, Contract: VT/5053, AF 33(657)-13899, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 13,858-F VU
AD 648 415

This paper presents results of a study to determine those noise and signal characteristics in the vicinity of the Montana LASA which are pertinent to the operation of a large diameter seismic array. The author discusses the problem of phase and amplitude variations between instruments within the same array. A number of studies were conducted to determine the effect of burial on the ambient measured noise spectra.

LAKE, H., LASA Large Aperture Seismic Array Preliminary Specification Report, 1 October 1964 - 15 January 1965, Project VT/5053, Contract AF 33(657)-13899, Texas Instruments, Inc., Dallas, Texas, 1965.

VESIAC 10,292 VU
AD 822 219

Given in the report is the purpose of LASA. Following this, is a statement concerning the purpose of the report. This report constitutes preliminary specifications in the form of recommended criteria for design and operating techniques for a Large Aperture Seismic Array. The two subarrays (BI, Angela and F3, Hysham) have been installed and checked out, and systems engineering activities are in progress. An approach to the solution of the objectives is given.

LAKE, H., G. HAIR, D. CROUCH, and B. JOHNSON, LASA Data Analysis and MCF Support, Final Report, Rept. No. ESD-TR-66-553, Contract AF 19(628)-5167, Texas Instruments, Inc., Dallas, Texas, 1966.

VESIAC 15,891 VU
AD 642 403

Based on the measured characteristics of noise fields and instrument responses, 14 multichannel filters were developed and compared as to degree of improvement in SNR. These filters were designed so that only one design criterion differed for each pair compared, allowing evaluation of that criterion's effect on performance.

LAKE, H., G. HAIR, R. GUIDROS and D. GLOVER, Study of Statistical Discrimination Between Earthquakes and Explosions, Semiannual Tech. Rept. No. 1, Contr. No. AF 19(628)-4173, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 8754 VU

The work discussed in this semiannual report was undertaken as a feasibility study of discrimination between the seismic energy released by earthquakes and underground nuclear explosions. In this study, event recognition is based on parameters that can be detected at third-zone distances (greater than 1500 miles). Effort is being made to exploit the advances in seismic signal extraction offered by optimum processing of multichannel array data.

LAKE, H., G. HAIR, and L. STRICKLAND, Detection of Relative Signal Polarity Between Stations by Equalization and Cross-Correlation, Rept. No. 7885-1-X, Contract AF 19(628)-4173, DA 49-083 OSA-3137, SD-78, Texas Instr., Inc., Dallas, Texas, 1967.

VESIAC 15,915-P VU

This paper discusses a data-processing technique that may be useful in obtaining a better interpretation of the source function. Cross-correlation determination of relative polarity between stations is enhanced when the stations are separated by as much as 26°. These results show hope of decreasing the required signal-to-noise ratio for radiation-pattern detection.

The cross-correlation and equalization technique might show improvements in determining both epicenter location and pP radiation patterns.

LAKE, H. L., Broadband Digital Seismometer Evaluation, Final Rept., Contr. No. AF 19(628)-2986, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 7616 VU
AD 433 679

Ambient seismic noise and several large earthquakes were recorded at the same location using both velocity- and displacement-sensing seismograph systems. These data were evaluated for information content by application of convolution filters designed to map outputs from the broadband instruments into the outputs of conventional narrowband systems into each other. The broadband displacement seismometer was tested for static and dynamic linearity and the response determined from shake table measurements. The velocity instrument was constructed, with minor modifications, from off-the-shelf components. The necessary dynamic range for the two types of broadband seismometer systems was examined; studies were made to determine effectiveness of both types.

LAKE, H. R., Dynamic Range of Broadband Seismographs, VESIAC Rept. No. 4410-77-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8865B VU
AD 452 161

Development of broadband seismograph systems is directed toward increasing the total information content of seismic data. Reasons are given for the immediate need for broader-band seismograph systems. The use of seismic data in broadband seismogram studies makes it necessary eventually to convert the data to digital form for use in high-speed computers. Two charges of direct digitization of broadband data, with their advantages and disadvantages, are discussed. Also considered are displacement and velocity sensing, both of which have been considered for broadband recording.

LAKE, H. R., J. P. EDWARDS, and D. P. GLOVER, Cumberland Plateau Seismological Observatory, Quarterly Rept. No. 2, VT/5054, AF 33(657)-14648, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 13,047 VU

This second quarterly progress report reviews the analysis, engineering and research tasks which have been performed or initiated during August, September and October 1965 at the Cumberland Plateau Seismological Observatory (CPSO). The research tasks include ambient noise and signal studies involving the use of spectral analysis techniques, and an evaluation of directional detection capability with the use of special filtering techniques.

LAMBERT, D. G., R. O. AHNER, and D. H. VON SEGGERN, Preliminary Summary Report on MILROW, Sci. Rept., Rept. No. 246, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1970

VESIAC 20,115 VU
AD 867 095

This report presents a preliminary evaluation of the seismic data for the nuclear explosion MILROW which was available at the Seismic Data Laboratory on 10 December 1969.

This analysis includes location determinations, amplitude, and magnitude estimates for MILROW and compares them to the results for LONG SHOT.

With regard to epicenter determination, we compare the initial location determination for MILROW, to the initial location determination for LONG SHOT using Herrin 68 travel time curves without travel time anomalies. Further, we employ a station network common to MILROW and LONG SHOT to locate the epicenter of each event with and without travel-time anomalies.

The report compares amplitude measurements, magnitude estimates, and phases received for MILROW with those from LONG SHOT when possible. The preliminary measurements provide an opportunity to determine what gross differences, if any, are readily apparent between a large explosion (MILROW) and a smaller one (LONG SHOT), from the same epicentral region.

LAMONT GEOL. OBSERV. (STAFF), Research Directed Toward the Use of Long- and Intermediate-Period Seismic Waves for the Identification of Seismic Sources, TR No. 2, Contract AF 19(628)-4082, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1966.

VESIAC 15,528 VU

A study of the relative excitation of surface and body waves by nuclear explosions and earthquakes has been done for the LONGSHOT nuclear test and 29 earthquakes in the same area as LONGSHOT. The analysis showed that the nuclear explosions had surface wave magnitudes which were much smaller than those of earthquakes with body wave magnitudes comparable to the explosions. A frequency analysis was performed on P waves recorded at Palisades, New York, from LONGSHOT and some Aleutian earthquakes. Spectral amplitudes of LONGSHOT are compared with earthquakes from the same area.

LAMONT GEOL. OBSERV. (STAFF), Semiannual Technical Report, 1 July 1961 to 30 December 1961, Contract No. AF 19(604)-7376, Lamont Geological Observatory, Palisades, N. Y., 1962.

VESIAC 5569 VU

A program for the IBM 1620 has been developed which synthesizes seismograms as a function of phase versus period at the origin of a given seismogram. Phase and group velocities of Rayleigh waves in the period range 20 to 140 seconds have been determined for the Pacific Ocean, Eurasia, and Africa. A program for the IBM 7090 has been developed which makes possible the inversion of surface wave dispersion data to obtain the layered structure which should produce the observed dispersion. Two types of seismograms have been placed in operation to study possible methods of extending the sensitivity of seismographs into the long-period range. Other items are reported.

LANEY, T. D., T. W. HARLEY, Large-Array Signal and Noise Analysis - Spec. Sci. Rept. No. 8 - Short Period Signal Waveform Similarity at LASA, Project VT/6707, Contract AF 33(657)-16678, ARPA Order No. 599, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,127 VU
AD 819 629

Similarity of signal waveform across the LASA was studied. The analysis technique depended on differences in waveform shape but not on amplitude differences. The waveform was found to be very similar both within subarrays and, except for a few cases, between subarrays. Thus, 1-pt (amplitude) equalizations usually is sufficient when processing LASA data both on the subarray and large-array levels.

LANEY, T. D., T. W. HARLEY, Short-Period Signal Waveform Similarity at LASA, Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 16,751 VU

Similarity of signal waveform across LASA was studied. The analysis technique depended on differences in waveform shape but not on amplitude differences. The waveform was found to be very similar both within subarrays and, except for a few cases, between subarrays. Thus, 1-pt (amplitude) equalizations usually is sufficient when processing LASA data both on the subarray and large-array levels.

LANZ, A., A Linear Distance-Correction Factor for Computing Earthquake Magnitudes, Tech. Rept. No. 63-108, Contract No. AF 49(638)-1150, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7222 VU
AD 431 019

First-order station-correction factors have been found for 10 Long Range Seismic Measurements stations for use in computing earthquake magnitude from body waves. A linear dependence of amplitude on distance is postulated; variations due to depth of focus are not considered. The variations among values for the magnitude computed by this easily applied linear factor compare favorably with variations among magnitudes corrected using Gutenberg and Richter's table of "Q". The linear distance-correction is defined only from 20° to 90°; it is meant to be applied to a group of stations with a 30° maximum distance spread. Determination of the station correction is the first step in an evaluation and possible revision of the distance-correction factors now in use.

LARROWE, V. L., Collection and Analysis of Seismic Wave Propagation Data - Supplement 1: Analog Computer Measurement of Time - Varying Power Spectra, Rept. No. 5178-64-F_1, Contract AF 49(638)-1170, Univ. of Mich., Inst. of Sci. and Tech., Ann Arbor, Mich., 1966.

VESIAC 14,826 VU
AD 487 426

This report describes an extension and continuation of a theory of defining and measuring time-varying power spectra. Results and suggestions for future work are included.

LASTER, S. J., Basic Research in Crustal Studies, Semiannual Tech. Rept. No. 1, Contr. No. AF 49(638)-1244, Texas Inst. Inc., Dallas, Texas, 1964.

VESIAC 7708 VU
AD 437 331

This report describes work performed during the period September 1, 1963 to March 1, 1964. This contract is directed toward the understanding of the complex seismic energy following the first arrival in near-zone recordings (where P_n is important) and toward the understanding of the effect of the crust on seismograms. Theoretical and analog model studies of a layer over a half-space are presented in Section I, and Section II discusses preliminary experimental work with near-zone events recorded on the short-period array at the TFSO.

LASTER, S. J., Seismic Discrimination Techniques, Quarterly Rept. No. 1, 25 August 1969 to 30 November 1969, Contract VT/0702, F33657-70C-0311, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,004 VU

This first quarterly report summarizes the work progress for the four tasks of the Seismic Discrimination Techniques Contract. Work has begun to incorporate long-period discriminants into the Seismic Event Classification Software Package (SECSP). The literature search comparing nuclear explosions and chemical explosions has begun. Studies were begun to examine possible use of higher-order surface-wave energy for discrimination. Some encouraging results were obtained using a surface wave from an event in eastern Khazakh as a "master event" matched filter in the studies of effectiveness of noise power removal by subtraction and ways of improving matched filter results.

LASTER, S. J., Statistical Discrimination, Quarterly Rept. No. 2, 1 Dec. 1969 to 31 March 1970, Contract VT/0702, F33657-70C-0311, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,256 VU
AD 871 116

A new and larger learning ensemble was assembled to better represent the area under study and to better represent the two classes of events statistically. The effectiveness of various short-period statistics for discrimination was studied. Higher-order surface modes were sought in two long-period events by obtaining estimates of group velocity from maximum-entropy spectral peaks measured over short time gates of the seismogram. Definition of the fundamental Rayleigh mode was good, and possible higher-mode energy was indicated. Matched filtering was performed on a suite of long-period explosion recordings. Chirp filters worked almost as well as master events.

LASTER, S. J., Statistical Discrimination, Quarterly Rept. No. 3, 1 March 1970 to 31 May 1970, Contract VT/0702, F33657-70C-0311, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,295 VU
AD 872 070

A description is given of the long-period statistics being studied. Chirp filtering of long-period events is done iteratively. A set of theoretical data, which has been constructed for use in the higher mode studies, is described.

LASTER, S. J., M. M. BACKUS, Basic Research in Crustal Studies, Final Rept., Contract AF 49(638)-1244, Texas Inst., Inc., Dallas, Texas, 1965.

VESIAC 13,926 VU
AD 628 385

The work reported here is concerned with: 1) single-layer models; 2) multilayer models; 3) models with laye thickness variation; 4) experimental studies using field data. These four work areas are reported on in some detail.

LASTER, S. J., R. B. HOFMANN, F. LINVILLE, and J. FOREMAN, Basic Research in Crustal Studies, Semiannual Tech. Rept., No. 2, Contr. No. AF 49(638)-1244, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 8548 VU

This semiannual report describes work performed during the period March 1, 1964 to September 1, 1964. Section I deals with additional theoretical studies of propagation in a layer over a half-space. Section II is a detailed theoretical discussion of modal propagation in very general inhomogeneous models.

LASTER, S., A. F. LINVILLE, and J. G. FOREMAN, Basic Research in Crustal Studies, Semiannual Tech. Rept. No. 3, Rept. No. 292-63, AF 49(638)-1244, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 10,379 VU

This semiannual report deals with work performed during the period September 1, 1964 to March 1, 1965. Section I describes the completion of the mode separation studies begun in the previous quarter. Section II deals with additional results in estimating the frequency-wavenumber spectrum of an array of seismograms. Finally, Section III describes initial theoretical and analog model studies for a crustal model consisting of two layers over a half-space.

LAUN, P., Nepenthe Study, Seismic Array Processing Techniques, Tech. Rept. No. 7, Contract VT/0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,394 VU
AD 875 069

The Nepenthe process and some simple modifications are investigated to determine their potential value as offline surface-mode signal-extraction techniques. The techniques have been applied to long-period noise, with a known signal added at various strengths. The processor output is compared with the known signal input to judge performance. The results are compared with the results of a bandpass filter.

LEHMANN, I., Core-Mantle Boundary, Contract No. AF-AFOSR 303-62, Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 8427 VU

This article is a summary of the history of the study of the core-mantle boundary, and a description of that part of the earth.

LEHMANN, I., Seismological Tables, Contract No. AF-AFOSR 303-62, Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 8426 VU

This is a survey of the history of the development of and the uses of seismological tables. Reasons are given why the construction of final seismological tables can be done only by successive approximation. Also discussed are these subjects: a) how tables are finished off by a smoothing of travel times; b) the lack of precision in the early seismological tables of Milne, Oldham, Benndorff, and others; c) the first important set of tables, by Zoppritz; d) the Jeffreys-Bullen Tables of 1935; e) the important contributions of Mohorovicic; f) the work of Gutenberg; g) the tables constructed in the twenties by Angenheister, Visser, and Hecker which improved on the Zoeppritz tables; and h) the improvements of the thirties.

LEHMANN, I., On the Travel Times of P as Obtained from the Nuclear Explosions BILBY and SHOAL, Contract AF-AFOSR 887-65, Lamont Geol. Observ., Columbia Univ., Palisades, New York, 1967

VESIAC 16,627 VU

The travel times of the explosions Bilby and Shoal were studied. Bilby which was fired on the Nevada Test Site was by far the stronger of the two and its observations could be combined with those of other shots fired on the NTS. It was found that there were differences in the travel times to the ESE, E and NE of the NTS. There appeared to be a region of high velocity to the northeast. Some confirmation was obtained of the validity of the type of velocity distribution for the upper mantle considered by the author on previous occasions.

LEICHLITER, B. B., Atlas of Signals and Noise, Tech. Rept. No. 66-42, Contract VT/5054, AF 33(657)-12373, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 14,471 VU
AD 483 754

This Atlas contains a selection of seismograms of signals and noise recorded at UBSO, and includes typical examples as well as many which should be considered atypical. It is intended to illustrate some of the many different characteristics of the signals and noise which appear on UBSO seismograms.

LEICHLITER, B. B., Estimates of the Detection Capability of Four VELA UNIFORM Seismological Observatories, Technical Report 66-1, Contract VT/4054, AF 33(657)-13562, Teledyne Ind., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,061 VU
AD 480 346

To estimate empirically the detection capabilities of BMO, CPO, UBO, and WMO, seismograms were synthesized by superposing teleseismic P-wave signals on representative microseismic noise samples from each observatory. Signals were randomly summed into the noise several times at each of several levels. Each of the resulting synthesized seismograms was analyzed independently by seven experienced analysts. Characterization of the background noise, based on visual measurements of every half cycle of the noise within a restricted period band determined by the dominant period of the signal, proved to be more effective in defining S/N than other methods of noise characterization tested. An evaluation of the detection capability of each observatory is given.

LEICHLITER, B. B., Final Report of the Operation of the Wichita Mtns. Seismological Observatory - 1 July 1964 Through 31 October 1965 and Semi-Annual Report No. 3 - 1 June Through 31 October 1965 - Technical Report, TR 65-133, Contract: VT/4054, AF 33(657)-13562, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 13,805 VU

The operation of the Wichita Mountains Seismological Observatory between 1 July 1964 and 31 October 1965 is discussed in this report. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatory are reported. Also discussed is the progress of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Installation of a 10-Element Shallow-Buried Array at the Uinta Basin Seismological Observatory, Vernal, Utah, Rept. No. TR 65-28, Project VT/1124, Contract AF 33(657)-12373, Geotech. Corp., Garland, Texas, 1965.

VESIAC 10,749 VU
AD 626 406

This report outlines the installation of a buried array at the Uinta Basin Seis. Observ. Major considerations in such an undertaking included the selection of the most effective array pattern and the most suitable instrumentation to be used. In addition, the drilling, logging, and casing of the holes is outlined, and a brief section on the local geology is included. This report merely documents the procedures and considerations utilized in the installation of a shallow-buried array.

LEICHLITER, B. B., Operation of Seismological Observatories, Semiannual Rept. No. 4, Contract VT/036, AF 33(600)-41318, Geotechnical Corp., Garland, Texas, 1962.

VESIAC 5568 VU

This is a report of work done at the Wichita Mountains Seismological Observatory from January 1 through June 30, 1962. A List of major tasks is reported on.

LEICHLITER, B. B., Operation of Three Observatories, Semiannual Rept. No. 1, Contract VT/1124, AF 33(657)-12373, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 7477 VU
AD 430 314

The operation of the Blue Mountains Seismological Observ., Cumberland Plateau Seismological Observ., and Uinta Basin Seismological Observ. between 1 July and 31 December 1963 is discussed in this report. Modifications and additions to the observatory instrumentation are described and tests of the long-period vault installation, presently in progress, are reported. The report also describes special investigations that are planned, and summarizes pertinent reports published during the reporting period.

LEICHLITER, B. B., Operation of Three Observatories, Semiannual Rept. No. 2, Contract No. VT/1124, AF 33(657)-12373, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8481 VU
AD 446 575

The operation of the Blue Mts. Seism. Observ., Cumberland Plateau Seism. Observ., and Uinta Basin Seism. Observ. between 1 January and 30 June 1964 is discussed in this report. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatories are reported. Also discussed in the report is the progress of special investigations designed to evaluate and improve the detection capability of the observatories.

LEICHLITER, B. B., Operation of Three Observatories, Final Rept, Semiannual Rept. No. 3, Tech. Rept. No. 65-58, Project VT/1124, Contract AF 33(657)-12373, The Geotech. Corp., Garland, Texas, 1965.

VESIAC 12,195 VU

Discussed is the operation of the Blue Mountains Seismological Observatory, Cumberland Plateau Seismological Observatory, and Uinta Basin Seismological Observatory between 1 July 1963 and 30 April 1965. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatories are reported. Also discussed in the report is the progress of special investigations designed to evaluate and impr ve the detection capability of the observatories.

LEICHLITER, B. B., Operation of the Tonto Forest Seismological Observ., Quarterly Rept. No. 1, Tech. Rept. No. 65-96, Contract VT/5055, AF 33(657)-14444, Geotechnical Corporation, Garland, Texas, 1965.

VESIAC 12,352 VU
AD 625 467

This is a report of the work accomplished on Project VT/5055 from 1 May through 31 July 1965. Project VT/5055 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special seismological investigations using data derived from eight Long Range Seismic Measurements Project (LRSM) seismological stations.

LEICHLITER, B. B., Operation of TFSO, Quarterly Report No. 3, Tech. Report No. 66-14, Contract VT/5055, AF 33(657)-14444, Teledyne Indus., Geotech Div., Garland, Texas, 1966.

VESIAC 14,066 VU
AD 480 348

This is a report of the operation, evaluation, and improvement of TFSO. It also includes special research and test functions carried out at TFSO. Research and development tasks performed by the Garland, Texas staff using TFSO data are included.

LEICHLITER, B. B., Operation of the TFSO, Quarterly Rept. No. 3, Rept. No. TR No. 67-63, Project VT/7702, Contract AF 33(657)-67-C-0091, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,125 VU
AD 824 300

This is a report of the work accomplished. It includes the operation, evaluation, improvement and expansion of the TFSO. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

LEICHLITER, B. B., Operation of TFSO, Quarterly Report No. 4, 1 Feb. 1966 through 30 April 1966, Tech. Rept. No. 66-53, Contract VT/5055, AF 33(657)-14444, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 14,472 VU
AD 483 755

This is a report of the work accomplished on Project VT/5055 from 1 February through 30 April 1966. Project VT/5055 includes the operation, evaluation, and improvement of TFSO located near Payson, Arizona. It also includes special research and test functions carried out at TFSO. Research and development tasks performed by the Garland, Texas, staff using TFSO data are included.

LEICHLITER, B. B., Operation of TFSO, Quarterly Rept. No. 5, 1 May 1966 Through 31 July 1966, Tech. Rept. No. 66-85, Contract VT/5055, AF 33(657)-14444, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,160 VU
AD 803 338

This is a report of the work accomplished on Project VT/5055 from 1 May through 31 July 1966. Project VT/5055 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO. Research and development tasks performed by the Garland, Texas staff using TFSO data are included.

LEICHLITER, B. B., Operation of TFSO, Quarterly Rept. No. 6, 1 August 1966 Through 31 October 1966, Tech. Rept. No. 66-109, Contract VT/5055, AF 33(657)-14444, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,165 VU
AD 803 872

This is a report of the work accomplished on Project VT/5055 from 1 August through 31 October 1966. Project VT/5055 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO. Research and development tasks performed by the Garland, Texas staff using TFSO data are included.

LEICHLITER, B. B., Operation of the Tonto Forest Seismological Observatory, Final Tech. Rept. No. 67-13, Project VT/5055, Contract AF 33(657)-14444, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1967.

VESIAC 16,363 VU

This is a report of the work accomplished on Project VT/5055 from 1 May 1965 through 31 December 1966. Project VT/5055 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO. Research and development tasks performed by the Garland, Texas, staff using TFSO data are included.

LEICHLITER, B. B., Operation of Two Observatories, Quarterly Rept. 1, Tech. Rept. No. 65-99, Contract VT/5054, AF 33(657)-12373, Teledyne Industries, Geotech Div., Garland, Texas, 1965.

VESIAC 12,349 VU
AD 625 460

Described is the operation of the Blue Mountains Seismological Observatory and Unita Basin Seismological Observatory between the period of 1 May through 31 July 1965. Modifications and additions to the observatory instrumentation are described, tests to improve the operation of the observatories are reported.

Also discussed in this report is the progress of special investigations designed to evaluate and improve the detection capacity of the observatories.

LEICHLITER, B. B., Operation of Two Observatories, Quarterly Rept. No. 2, 1 August Through 31 October 1965, Contract VT/5054, AF 33(657)-14648, Geotech. Corp., Garland, Texas, 1967.

VESIAC 16,666 VU
AD 625 461

This report describes the operation of the Blue Mountains Seismological Observatory and Uinta Basin Seismological Observatory during the period of 1 August through 31 October 1965. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatories are reported.

Also discussed is the progress of special investigations designed to evaluate and improve the detection capacity of the observatories.

LEICHLITER, B. B., Operation of Two Observatories, Quarterly Report No. 3, Technical Report No. 66-18, Contract VT/5054, AF 33(657)-12373, Teledyne Indus., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,067 VU
AD 480 344

This report describes the operation of BMSO from 1 November through 31 December 1965 and the Uinta Basin Seismological Observatory during the period of 1 November 1965 through 31 January 1966. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatories are reported. Also discussed is the progress of special investigations designed to evaluate and improve the detection capacity of the observatories.

LEICHLITER, B. B., Operation of Two Observatories, Final Report, 1 May 1965 Through 30 April 1966, Tech. Report No. 66-54, Contract VT/1124, AF 33(657)-12373, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 14,624 VU
AD 485 507

The operation of the Blue Mts. Seis. Observ. between May 1, 1965 and December 31, 1965 and the Uinta Basin Seis. Observ. between May 1, 1965 and April 30, 1966 is discussed in this report. Modifications and additions to the observatory instrumentation are described, and tests to improve the operation of observatories are reported. Also discussed is the progress of special investigations designed to improve the usefulness of the data recorded at the observatories.

LEICHLITER, B. B., Operation of UBSO, Quarterly Rept. No. 1, 1 May Through 31 July 1966, Tech. Rept. No. 66-54, Contract VT/6705, AF 33(657)-16563, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,159 VU
AD 803 341

This report describes the operation of the Uinta Basin Seismological Observatory from 1 May through 31 July 1966. Modifications and additions to the observatory instrumentation are described, and tests to improve the operation of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Operation of UBSO, Quarterly Rept. No. 2, 1 August Through 31 October 1966, Tech. Rept. No. 66-102, Contract VT/6705, AF 33(657)-16563, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,164 VU
AD 803 871

This report describes the operation of the Uinta Basin Seismological Observatory (UBSO) from 1 August through 31 October 1966. Modifications and additions to the observatory instrumentation are described, and tests to improve the operation of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Operation of UBSO, Quarterly Report No. 3, 1 November 1966 Through 31 January 1967, Rept. No. TR 67-10, Project VT/6705, Contract AF 33(657)-16563, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 15,738 VU
AD 809 709

This report described the operation of UBO from 1 November 1966 through 31 January 1967. Modifications and additions to the observatory instrumentation are described, and tests to improve the operation of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Operation of UBSO, Quarterly Rept. No. 4, 1 February Through 30 April, 1967, Rept. No. TR 67-31, Project VT/6705, Contract 33(657)-16563, Teledyne Corp., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,369 VU
AD 815 690

This report describes the operation of UBSO. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Operation of UBSO, Quarterly Rept. No. 5, Rept. No. TR 67-46, Project VT/6705, Contract AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,725 VU

This report describes the operation of UBSO from 1 May 1967 through 31 July 1967. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Operation of UBSO, Quarterly Rept. No. 6, Rept. No. 67-73, Project VT/6705, Contract AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,304 VU
AD 825 764

This report describes the operation of the UBSO from 1 August through 31 October 1967. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

LEICHLITER, B. B., Wichita Mountains Seismological Observatory and Selection of Sites for Geneva-Type Stations, Semiannual Rept. No. 3, Contract No. VT/036, AF 33(600)-41318, Geotechnical Corp., Garland, Texas, 1962.

VESIAC 5567 VU

This report covers the period of July 1 through December 31, 1961. Minor operational changes are listed and evaluation of instruments is reviewed. The stability of an unmanned Johnson-Matheson seismometer and power supply was tested, but considerable difficulty was caused by lightning. Magnification, frequency response, and dynamic range were satisfactory. The response of a Willmore vertical seismometer was matched as nearly as possible to that of a small Benioff vertical seismometer; a list of all local and regional signals recorded at WMSO was compiled for a two-month interval. Using epicenter data supplied by USC&GS, excessive residuals were noted when the actual P-arrival times at WMSO were compared with the Jeffreys-Bullen arrival times.

LEICHLITER, B. B., Operation of Wichita Mountains Seismological Observatory, Semiannual Rept. No. 6, Contract No. VT/036, AF 33(600)-41318, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 6290 VU

This is a report on the work involved in the extended operation, evaluation, and improvement of the Wichita Mountains Seismological Observatory, located at Fort Sill, Oklahoma.

LEICHLITER, B. B., Operation of the Wichita Mountains Seismological Observatory, Semiannual Rept. No. 1, 1 July through 30 November 1964, Tech. Rept. No. 64-130, Contract VT/4054, AF 33(657)-13562, The Geotechnical Corp., Garland, Texas, 1964

VESIAC 9301 VU
AD 454 558

This is a report of the work done on Project VT/4054 from 1 July through 30 November 1964. This project includes the operation, evaluation, and improvement of the Wichita Mountains Seis. Observ. (WMSO), located on the Fort Sill Military Reservation in southern Oklahoma. It also includes special seismological investigations using data from WMSO and other seismological observatories. Authority for the operation of WMSO is contained in Contract AF 33(657)-13562, dated 1 July 1964. The statement of work for Project VT/4054 is included as appendix 1 to this report.

LEICHLITER, B. B., Operation of Wichita Mountains Seismological Observatory, Semiannual Rept. No. 7, Contr. No. VT/036, AF 33(657)-12007, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 7564 VU

The operation of the Wichita Mountains Seismological Observatory between 1 July and 31 December 1963 is discussed. Modifications and additions to the observatory instrumentation are described, and field tests of new instrumentation presently in progress are reported. The report also describes the status of special investigations being conducted at the present time, and summarizes pertinent reports published during the reporting period.

LEICHLITER, B. B., Operation of the Wichita Mountains Seismological Observatory, Final Rept., March 1963 Through June 1964, and Semiannual Rept. No. 8, 1 January Through 30 June 1964, TR 64-118, Project VT/036, Contract AF 33(657)-12007, The Geotech. Corp., Garland, Texas, 1964.

VESIAC 8966 VU
AD 452 844

All phases of the operation are reported. The logging procedures are evaluated, the instruments and instrumentation systems are evaluated, and modifications in the standard instrumentation are described. Three studies not described in separate reports are presented: a quarry blast study, a comparison of triangular and 13-element arrays, and the earthquake detection capability of the station.

LEICHLITER, B. B., Operation of the Wichita Mountains Seismological Observatory, Semiannual Rept. No. 2, Rept. No. TR-65-52, Project VT/4054, Contract AF 33(657)-13562, Geotechnical Corp., Garland, Texas. 1965

VESIAC 11,763 VU
AD 625 462

This is a report of the work done from 1 December 1964 through 31 May 1965. This project includes the operation, evaluation, and improvement of the Wichita Mts. Seis. Observatory (WMSO) in southern Oklahoma. Given is this purpose, history, and operation of WMSO. Under operation are discussed standard seismograph operating procedures, outages caused by electrical storms, data channel assignments and standard operating magnifications of seismographs, component failure reports, calibration of test equipment, shipment of data to seismic data laboratory, securityinspection, and revision of calibration procedures. Data evaluation message tranmission, and publication of the monthly bulletin is discussed.

LEITH, E. and J. UPATNIEKS, Wavefront Reconstruction Using Continuous-Tone Objects, Contract No. AF 49(638)-1078, Univ. of Mich., Inst. of Sci. & Tech., Willow Run Labs., Ann Arbor, Mich., 1963.

VESIAC 6257 VU

This paper describes the success of the Leith and Upatnieks technique for eliminating the twin image, using a gas laser for a light source and a Mach-Zehnder interferometer. The light produced by the laser is highly monochromatic; holograms and successful reconstructions have been carried out using continuous-tone transparencies.

LENTON, R. A., Greenland Ice Cap Noise Studies - Project BLUE ICE, Final Rept., 30 June 1966 to 31 August 1967, Rept. No. 47, Contract AF 49(638)-1722, Arctic Inst. of North America, Washington, D. C., 1968

VESIAC 18,505 VU

The station on the Ice Cap showed low-noise levels and low coherences between seismographs indicating that a larger array would be an effective tool in detection. Emplacement of the seismometers in shallow holes eliminated the noise associated with high wind velocities. At the 50-percent probability of detection level, a single seismometer at the station has a detection capability of at least magnitude 4.3. The long-period noise levels were comparable with average sites on the continents.

LETTAU, H., "On the Direct Influence of Atmospheric Forces on the Earth's Crust," Meteorologische Zeitschrift, pp. 453-57, 1937, (Translated from Russian), Contract SD-78.

VESIAC 12,554 VU

A consideration of the direct influence of atmospheric pressure on the earth's crust is undertaken for at least two reasons: (1) the field has been somewhat neglected; (2) to more fully understand geology and meteorology. Neglecting certain aspects of the subject, the author considers the static-mechanical influence of extensive atmospheric pressure fluctuations on latitudes.

LETTAU, H., "Plumb Line Variations under the Influence of Tidal Forces and Atmospheric Forces," Geriand's Beitrage fur Geophysik, Vol. 51, pp. 250-269, 1937, (Translated from German), Contract SD-78.

VESIAC 12,844 VU

A horizontal double pendulum, the principle of which is explained, recorded plumb line variations over a 2-month interval at the Geophysical Observatory of the University of Leipzig with a sensitivity of 0.0009 arc seconds per mm. The mean solar and lunar daily variations were analyzed by means of the harmonic analysis. The amplitude of the variations observed is considered to be a complex expression, which is composed of the effect of gravitation forces and atmospheric forces. Atmospheric pressure on the crust is also calculated, by means of the Darwin theory. In the conclusion, reference is made to the Steinhauser calculation of the earth's crust deformation due to the snow load of the Alps in winter and a comparison is made with the influence of weather-conditioned air pressure variations on the earth's crust.

LEVIN, M. J., Bounds on the Inverse of a Positive Definite Symmetric Matrix, ESD-TDR 64-579, Contract AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 8953 VU

Bounds are established for the elements of the inverse of a positive definite symmetric matrix in terms of the maximum absolute value of its off-diagonal elements.

LEVIN, M. J., A Method for Power Spectrum Parameter Estimation, Group Rept. 1965-8, Contract AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1965.

VESIAC 10,023 VU

An asymptotic analysis is carried out for an approximate method of estimating the parameters of the power spectrum of a zero-mean stationary Gaussian random process from an observed realization of limited duration. Maximum likelihood estimates are obtained with the approximation that the coefficients of the Fourier series expansion of the realization are uncorrelated. The dispersion of the estimates is evaluated in terms of a quantity called the differential variance. An approximate expression for the differential variance in terms of the power spectrum is given.

LEVIN, M. J., P. E. GREEN and E. J. KELLY, Some Considerations in the Use of Large Seismometer Arrays, Contract No. ARPA Agency Document, Mass. Inst. of Tech., Cambridge, Mass., 1963, (OFFICIAL USE ONLY).

VESIAC 7351 E VU O
AD 666 169

LEWIS, B. R. T., On the Comparison of Theoretical and Observed Truncated Ratio Spectra, Tech. Note, Annual Rept. No. 2, Contract F44620-68C-0087, Univ. of Wisc., Madison, Wisc., 1970

VESIAC 20,417 VU

It is well known that if the outer regions of the earth are viewed as a system of horizontal layers upon which is incident a P or S wave at an angle of incidence i, then the vertical and horizontal motions at the surface are given respectively by a convolution of the source function with the vertical and horizontal transfer function and the respective detector responses. Taking the ratio of the Fourier transforms of the truncated vertical and horizontal motions, one obtains a ratio spectrum which is independent of the source function if this function is of relatively small time duration (see Lablance, 1967) and depends only on the model if the assumptions in the theoretical case are adequate. Attempts to determine crustal structure using this method have been applied by Phinney, 1964; Lablance, 1967; McCamy, 1967 and others. However, since these studies, it has become evident that rapid changes in velocity occur at several depths in the mantle, notably near 600 km, 400 km and around 100 km. These discontinuities serve as generators of secondary P and S waves which are incident at the base of the crust shortly after the primary P or S wave and therefore violate the assumption of one incident wave.

LEWIS, B. T. R., and L. M. DORMAN, Experimental Isostasy, Part II: An Isostatic Model for the U. S. A. derived from Gravity and Topographic Data, Sci. Rept. Contribution No. 233, Contract: F44620-68C-0087, Univ. of Wisconsin, Madison, Wisc., 1969

VESIAC 19,409 VU

Using a fast Fourier transform algorithm the two dimensional transform of the Bouguer anomaly (with terrain correction) BA (k_x, k_y), Free Air anomaly, FA (k_x, k_y) and topography H (k_x, k_y) on a 32 km grid has been obtained, being based on some 80,000 actual gravity observations and the Bouguer anomaly map of the U. S. A. The radially constant, real function $R(k) = \left\langle \mathrm{REAL}\left(\frac{BA(k_x,k_y)}{H(k_x,k_y)}\right)\right\rangle$ averaged over azimuth so as to minimize the geological "noise", gives the transfer function of the earth to a unit load. Under fairly nonrestrictive assumptions regarding the strength of the earth, the experimentally obtained R(k) has been inverted to give the change in density with depth (to about 400 km, a rough limit imposed by the long wavelength resolution of the data) causing the isostatic compensation. The compensation appears to be in the mantle and not related to parameters less than 30-40 km deep, some features of this isostatic model comparing favorably with recent seismic results. R(k) has also been used to obtain the gravity field from the compensation and hence to construct an isostatic anomaly map which is independent of an assumed isostatic mechanism by multiplying $H(k_x,k_y)$ by R(k), subtracting this from $BA(k_x,k_y)$ and taking the inverse transform. Another function $R'(k) = \left\langle \mathrm{REAL}\left(\frac{FA(k_x,k_y)}{H(k_x,k_y)}\right)\right\rangle$ is used to predict the gravity field due to both the topography and compensation.

LEWIS, E. A., Geometry and First-Order Error Statistics for Three- and Four-Station Hyperbolic Fixes on a Spherical Earth, Rept. No. AFCRL-64-461, Contract: Agency Document, AF Cambridge Res. Lab., Wash., D. C., 1964

VESIAC 9452 VU
AD 605 816

Certain fundamental geometric properties of hyperbolas and ellipses on the surface of a sphere are developed. A first-order theory is then presented for the random errors in the location of a point on a spherical earth, but the intersection of spherical hyperbolas physically determined by a time difference technique in which the individual errors are "normally" distributed and uncorrelated. Two cases are treated: (a) Four time-measuring stations working as two independent pairs, and (b) Three time-measuring stations working on a common time-base. In both cases, the contours of equal error probability density are shown to be ellipses and their properties are discussed. In both cases the distribution of radial error without regard to direction is given by a generalized distribution function which contains the Rayleigh distribution as a special case. Using the general form, the most probable mean, root mean square, and median radial errors are obtained. The results are adaptable to include errors in ordinary direction finders as well as those of the hyperbolic type. Numerical examples are included.

LICHTENSTEIN, M. G., Extraction of Spectral Lines from Seismic Data, Seismic Array Processing Techniques, Tech. Rept. No. 1, Contract VT/0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970.

VESIAC 20,089 VU
AD 865 533

Two methods for the removal in real time of stable spectral lines from seismic data were investigated. The first method involved the generation of a cosine wave, by means of a digital feedback system, to approximate the spectral lines. In this method, the cosine generator is adjusted in accordance with a mean-square-error criterion.

This system of adjustment was simulated and proved to be unstable. In the second method, a Widrow adaptive prediction filter is used to remove the deterministic component. A simulation of this prediction method was carried out using one seismic data channel from a short-period array. Results show that this method significantly attenuated some of the spectral lines. However, if a signal were present, some amplitude and phase distortion would be caused in the signal. In addition, this system would be cumbersome to implement.

LICHTENSTEIN, M. G., A. H. BOOKER and J. P. BURG, Problems in Automating Multichannel Adaptive Processing, Advanced Array Research Special Rept. No. 5, Contract VT/7701, F33657-68C-0867, Texas Inst., Inc., Dallas, Texas, 1969

VESIAC 19,755 VU
AD 855 343

Methods of coping with problems anticipated in on-line adaptive multichannel processing are investigated. Effects on filter response of adding or deleting a channel and methods of redistributing filter coefficients so as to maintain filter constraints are considered. Attenuation of small signals not exactly corresponding to the signal model, and the effects of such signals on the filter responses, are estimated using synthetic signals of various velocities and signal-to-noise ratios.

LIDIAK, E. G., Basement Rock Distribution in Nebraska, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8721 I VU

This paper presents preliminary information on basement configuration, relation of gravity to geology, isotropic age, and lithology of this buried crust in Nebraska.

LIN, J. L, Special Technical Report on an Evaluation of a Method for Focal-Depth Determination of Seismic Disturbances from Underground Nuclear Explosions - Tech. Interim Rept., AFCRL-66-570, Contract AF 19(628)-238, Penn. State Univ., Univ. Park, Pa., 1966.

VESIAC 15,028 VU
AD 640 842

The Watson-Merdler method for determination of focal depths was applied to fourteen seismograms from underground nuclear explosions. Because the depths for blasts are less than 1 km, the true time for the actual surface reflection was not tested. Two hundred cases where the concentration ratio was greater than in the original seismogram and where the area under the seismogram was reduced were investigated. The doublet-function hypothesis for a seismogram is too simple and is therefore unrealistic. The simplicity criterion may identify many pulses in addition to the pP pulse on the seismogram. The Watson-Merdler method does not show promise to distinguish blasts from earthquakes.

LINCOLN LABS., MIT (STAFF), Large Aperture Seismic Array (LASA) - Digital-to-Analog Converter Unit - Lincoln Manual 64, Vol. 5, Contract AF 19(628)-5167, Lincoln Labs., MIT, Lexington, Mass., 1966.

VESIAC 17,627 VU
AD 823 042

This manual is written for the use of technically trained personnel to maintain the 2?-Channel Digital-to-Analog Converter Unit of the Large Aperture Seismic Array (LASA).

LINCOLN LABS., MIT (STAFF), Large Aperture Seismic Array (LASA) - Maintenance Display Console - Vol. 4, Lincoln Manual 64, Contract AF 19(628)-5167, Lincoln Labs., MIT, Lexington, Mass., 1966.

VESIAC 17,632 VU
AD 823 041

This manual is written for the use of technically trained personnel to maintain the Maintenance Display Console of the Large Aperture Seismic Array (LASA).

LINCOLN LABS., MIT (STAFF), Large Aperture Seismic Array (LASA) - Phoneline Input System (PLINS) - Vol. 3, Lincoln Manual 64, Contract AF 19(628)-5167, Lincoln Labs., MIT, Lexington, Mass., 1966.

VESIAC 17,633 VU
AD 823 040

This manual is written for the technically trained personnel who maintain the Phone-Line Input System (PLINS) of the Large Aperture Seismic Array (LASA).

LINCOLN LABS., MIT (STAFF), Large Aperture Seismic Array (LASA) - Subarray Electronic Module (SEM) - Sci. Report, Lincoln Manual 64, Contract AF 19(628)-5167, Lincoln Labs., MIT, Lexington, Mass., 1966.

VESIAC 17,623 VU
AD 823 038

This manual is written for the use of technically trained personnel to maintain Subarray Electronic Modules (SEMS) of the Large Aperture Seismic Array (LASA).

LINCOLN LABS., MIT (STAFF), Large Aperture Seismic Array (LASA) - Timing System, Vol. 2, Lincoln Manual 64, Contract AF 19(628)-5167, Lincoln Labs., MIT, Lexington, Mass., 1966.

VESIAC 17,622 VU
AD 823 039

This manual is written for the use of technically trained personnel to maintain the Timing System of the Large Aperture Seismic Array (LASA).

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Quarterly Rept., Contract No. AF 19(628)-212, Boston College, Chestnut Hill, Mass., Undated.

VESIAC 5578 VU

This report points out that a proper shelter for the instruments has been erected, but that the instruments to be tested have not yet been delivered. The report defines the problem to be attacked as visco-elastic wave propagation from a point source in a plate. Thus far, theoretical work has been focused on dispersive P wave propagation in a bar and on internal friction in solids. Selection of a laboratory approach has been made — repetitively striking the model material while synchronously flashing a stroboscopic, polarized light source through the model. Plans include the design and construction of an impacter unit and the purchase of a large field, high quality, photo-elastic polariscope.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Quarterly Rept. No. 8, Contract No. AF 19(628)-212, Weston Observ., Weston, Mass., 1964.

VESIAC 7131 VU

During this report period, the EV100 Vertical Seismometer continued to operate satisfactorily. The procedure of remote recording proved useful on occasions of teleseismic events, as it provided a visual recording of long period activity from instruments of another program. Some difficulties were noted with time marking of records, but this does not relate to the instrument. Linearity comparison studies continued as seismic event occurred. There were no major accomplishments. As for future plans, the Fourier Analysis with an IBM program is still contemplated when sufficient data has been gathered.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Quarterly Rept. No. 9, Contract No. AF 19(628)-212, Weston Observ., Weston, Mass., 1964.

VESIAC 7132 VU

During this report period, the EV100 Vertical Seismometer was loaned on two occasions for field experiments. Towards the end of the period, trouble developed in the recording system. This was evident by the poor wave form produced. The instrument was sent to the manufacturer for repairs in the power supply. Seismic events from Weston records used in the linearity comparison study were enlarged by pantograph for comparison of amplitudes, phase and period with EV100 records. The use of the pantograph for this purpose proved unsatisfactory; it was decided to use an autoplotter instead. There were no major accomplishments.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Quarterly Rept. No. 11, AF 19(628)-212, Weston Observ., Weston, N. J., 1964.

VESIAC 10,645 VU
AD 441 289

The EV100 vertical seismograph has been operated on battery power while its power supply was at the manufacturer for repairs. Results of continuous operation on this type of power source seems to indicate a critical voltage for optimum operation. This critical voltage problem, and accompanying problems, are discussed. Also discussed are noise tests performed on the instrument and an enforced shutdown of the temperature controlling system of the vault housing the EV100, which presented an opportunity to observe temperature effects on the operation of the instrument. Linearity tests performed on the EV100 system are discussed, as well as the Sprengnether Autocorder and the Bay State Statistical Analyzer.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Quarterly Rept. No. 13, September 1, 1964 - November 30, 1964, Contract AF 19(628)-212, Weston Obser., Weston, N. J., 1964.

VESIAC 9433 VU

This is the 13th quarterly report of the Weston Observatory. Approximately 500 analyses of "on-line" seismic activity were made on the Bay State 601 Statistical Analyzer and permanent records made on the EAI 1110 Variplotter.

Other entries include: (1) operation of Sprengnether Autorecorder; (2) completed evaluation of the Aerosmith Tiltmeter; (3) arrival for evaluation of the EV300, a three component seismometer; (4) receipt of Ocean Bottom seismometers; and (5) receipt of equipment necessary for photoelastic stress analyses of brittle fracture.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Semiannual Rept., Contr. No. AF 19(628)-212, Weston Observatory, Weston, N. J., 1964.

VESIAC 8260 VU

This report offers a general evaluation of the EV100 Vertical Seismograph. Although the instrument produces a highly readable paper record, one drawback in its use as a general purpose seismograph is that in 24 hours it will produce a record 21.6 meters long. Test results indicate that system interference will affect the magnitude and waveform if a study is to be made of the properties of the seismic background noise. Also, at higher magnifications there is considerable distortion of a low-amplitude signal. Apparently, a critical range of voltage exists for optimum battery operation; outside this range, system noise rapidly increases and inundates any seismic signal. A detailed analysis of the EV100 signal will be made soon.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Semiannual Tech. Rept., Contract No. AF 19 (628)-212, Boston College, Chestnut Hill, Mass., Undated.

VESIAC 5579 VU

This semiannual technical report begins by noting that the instruments to be evaluated have not yet been delivered. It goes on to declare that the particular theoretical problem to be approached is visco-elastic wave propagation from a point source in a plate. To complement this effort, a model study in visco-elasticity is being undertaken.

Respecting theoretical work completed, a solution was obtained to the problem of plane P wave propagation in a plate of Voigt solid thick enough to show geometric dispersion. Theoretical work continues while laboratory equipment is being assembled.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Semiannual Tech. Rept. No. 4, Contr. No. AF 19(628)-212, Weston Observ., Weston, N. Y., 1964.

VESIAC 7569 VU
AD 402 179

This report evaluates the performance of an Electro-Tech EV100 Vertical Seismometer which was put in use under this contract. The instrument proved valuable over an extended period of continuous operation, showing good sensitivity, amplification, recording of wave formation, remote recording capabilities, and stability under varying temperatures. Difficulties arose in the recording section but were easily resolved. Good results were obtained from a Linearity comparison study between EV100 records and Weston Observatory records. Some difficulties were encountered in identifying corresponding phases on the two sets of records. Discussed is a method for getting more details of propagating waves with a shorter exposure.

LINEHAN, D., Evaluation of Seismic Instruments and Basic Research on Seismic Wave Propagation, Semiannual Tech. Rept. No. 6, March 1, 1964 - August 31, 1964, Contract AF 19(628)-212, Weston Obser., Weston, N. J., 1964.

VESIAC 9432 VU

This report deals with three seismic instruments received for inspection and use, and gives an account of the work done under contract on the seismicity of Northeastern United States and Eastern Canada.

The three instruments described are the Bay State 601 Statistical Analyzer, the EV100 Vertical Seismograph, and the Ideal-Aerosmith Tiltmeter.

Results of the regional seismicity study show that earthquakes should be. ome more intense as time proceeds.

LINEHAN, D., Radiation Patterns and Surface Waves Generated from New England Seismic Events, Rept. No. 7885-1-X, Contract DA 49-083, OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-C VU

A description of P and S waves from explosions and earthquakes recorded by the New England Network of Seismic Stations is presented. Velocity studies were conducted for six explosions in the New England area. It was found that amplitudes of P groups of explosions are larger than S groups for earthquakes in the same distance range; the frequency range of P phases is lower for blasts than for earthquakes; some blasts exhibit well-formed surface waves; and the complexity of the P group seems to be a function of blast location.

LINEHAN, D. and D. M. CLARKE, New England Seismic Network, Semi-annual Tech. Rept. No. 3, Contract No. AF 19(628)-358, Weston Observatory, Weston, Mass., 1963.

VESIAC 6801 VU

Instrumentation and data interpretation problems encountered in the course of research are discussed. The report also describes a new electronics package for data transmission and outlines a helpful filtering technique. Techniques for automated data processing are presented as a partial answer to data access problems. Some interesting seismic events are discussed individually, including a curious T phase and the detection of a "false S".

LINEHAN, D. and D. M. CLARKE, New England Seismic Network, Quarterly Rept. No. 4, Contract No. AF 19(628)-358, Weston Observatory, Weston, Mass., Undated.

VESIAC 5547 VU

During the previous three quarters of the contract, the first two seismic substations were completed near Caribou, Milo, and Mile, Maine. A receiving station at Weston Observatory was prepared and data processing was begun. In the fourth quarter, two new sites were chosen, near Berlin, New Hampshire, and Machias, Maine, completing the four substation sites planned. Equipment was obtained for the substations, the Berlin station began recording seismic events and background noise. All preparations for the completion of the Machias installation in better weather have been made. Programs for digital analysis of the seismic records are to be developed, and there are plans for computations of crustal velocities, interface locations, and phase anomalies.

LINEHAN, D. and D. M. CLARKE, New England Seismic Network, Eleventh Quarterly Rept., Contr. No. AF 19(628)-358, Weston Observ., Weston, N. J., 1964.

VESIAC 8837 VU

The New England Seismic Network continues to operate with four transmitting substations. Seismic data are being recorded on magnetic tape and sixteen millimeter film. Studies of magnitude are progressing with the IBM 1620 programming of magnitude determinations. Detonation times for explosions have been acquired for several sites throughout the New England area, thereby making accurate velocity determination possible. A study of the large Love and Rayleigh phases of blasts occurring within 100 km of the Maine detection sites has been made. Being evaluated are the data from three local earthquakes which occurred in October 1964.

LINEHAN, D. and D. M. CLARK, New England Seismic Network, Semiannual Tech. Rept. No. 4, Contr. No. AF 19(628)-358, Weston Observatory, Weston, N. J., 1964.

VESIAC 7991 VU
AD 441 462

Described are the operations of the New England Seismic Network, which has been operating on a continuous basis during this report period of August 1963 to February 1964. The areas covered are described. Earthquakes, teleseisms, quarry blasts, underwater explosions, and artificial noise have been studied. Studies in source location and data analysis, by hand computation and the IBM computer program, have been made. Substation instrumentation and operation are described. Included is a discussion of methods used to determine source location for local seismic events. Also included is a discussion of fourier series analysis of various local disturbances.

LINEHAN, D., and D. M. CLARKE, New England Seismic Network, Semiannual Tech. Rept. No. 5, Contract AF 19(628)-358, Weston Observ., Weston, N. J., 1965.

VESIAC 8989 VU

The New England Seismic Net operated on a continuous basis during the report period and continues to reproduce seismic motion from Berlin, New Hampshire; Milo, Maine; Caribou, Maine; and Machias, Maine. Local earthquakes, teleseisms, quarry blasts, and underwater explosions have been studied. All four substations operated continuously during the 6 months with no electronic failures. Each seismometer together with its data transmission system has been adjusted to provide equal response to weight life. Calibration procedures are described. A description of events recorded is included. The report includes a summary of blast studies recorded across the network.

LINEHAN, D., and T. TURCOTTE, New England Seismic Network, Semiannual Tech. Rept. No. 4, Rept. No. 292-62, Contract AF 19(628)-358, Weston Observ., Weston, N. J., 1965.

VESIAC 10,377 VU

The first section presents a general summary of the status of the research program as of February 15, 1965. Subsequent sections of the report are technical summaries of specific phases of the program. Included are: (a) Comparison of Local Earthquake and Blast Recordings—(included here are sections on Detectability, Phase Identification, Local Earthquakes); and (b) Evaluation of Weston Telemeter System.

LINEHAN, D., and T. TURCOTTE, New England Seismic Network, Semi-annual Tech. Rept. No. 6, Contract AF 19(628)-358, Weston Observ., Weston, N. J., 1965.

VESIAC 10,282 VU

The first section is a general summary of the status of the research as of February 15, 1965. Subsequent sections of the report are technical summaries of specific phases of the program, each prepared by the individual responsible for the conduct of that phase. Included are: (a) Comparison of Local Earthquake and Blast Recordings; (b) Detectability; (c) Phase Identification; (d) Local Earthquakes; and (e) Evaluation of Weston Telemeter System.

LIN'KOV, E. M., "The Use of Magnetron Transducers in Seismic Receivers and Tiltmeters," Uchenya Zapiski IGU, Vol. 324, pp. 147-154, 1964. (Translated from Russian), Contract SD-78.

VESIAC 13,051 VU

In recent years some modifications of magnetron converters of mechanical oscillations into electrical ones have been developed at the Dept. of Physics of the Earth's Crust at Leningrad State University. Investigations of magnetron transducers showed the advisability of using them as converting elements in seismic receivers and tiltmeters. In this article, the author first examines the principal characteristics of magnetrons. This is necessary for understanding the working principle of magnetron transducers. Second, the author reproduces and describes diagrams of magnetron transducers.

LINSTROM, L. R., Analysis of a Multisensor Seismic Array Technique, Final Rept., Contract No. AF 19(628)-388, Melpar, Inc., Falls Church, Va., 1963.

VESIAC 6479 VU
AD 419 179

A study of the application of digital multibeam steering (DIMUS) to the outputs of seismometer arrays is described. Several other processing techniques were investigated with varying degrees of success. It is concluded the DIMUS offers a relatively inexpensive method for determining the arrival direction of seismic energy, but that it is not a good method for obtaining seismograms for visual analysis with currently available seismometer arrays.

LINTZ, P. R., An Analysis of a Technique for the Generation of High Resolution Wavenumber Spectra, Sci. Rept., Rept. No. 218, Contract VT/6702, F33657-68C-0945, Teledyne Indust., Inc., Alexandria, Va., 1968

VESIAC 18,524 VU
AD 834 725

In this report, we discuss a method of obtaining a high-resolution wavenumber spectrum of time series data obtained from a seismic array. We derive the theoretical high-resolution wavenumber spectrum of both a single plane-wave event and an event made up of the sum of two plane waves of different amplitudes. We then process the two theoretical events and analyze the results. The plane waves for both events are simulated by impulses, with time delays between sensors chosen to simulate move out across the array. We also process the LONG SHOT event.

LINTZ, P. R., Principles of Wiener Auto-Adaptive Filtering, Sci. Rept., Rept. No. 224, Contract VT/6702, F33657-68C-0945, Teledyne, Inc., Alexandria, Va., 1968

VESIAC 19,107 VU
AD 842 560

This report discusses various techniques of designing auto-adaptive filters, and the application of one particular technique to two teleseisms. This report also discusses the calculation of running correlation functions using a moving time window, and iterative solutions to the multi-channel normal equations. A program listing is included which will calculate an auto-adaptive multichannel filter by the use of running correlation functions and the method of steepest descent.

LINTZ, P. R., Rayleigh Mode Synthesis and Analysis at a Typical Vertical Array Site, Sci. Rept., Rept. No. 235, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1969

VESIAC 19,919 VU
AD 861 773

To aid in the identification of Rayleigh modes recorded in vertical arrays, a catalog is presented of power spectra, spectral ratios, frequency-wavenumber spectra, impulse seismogram patterns, and 3-dimensional plots of depth-frequency amplitude. Results for the Rayleigh fundamental and sixteen higher modes are based on a Canadian Shield model consisting of plane-parallel homogeneous layers.

LINTZ, P. R., and G. C. BURRELL, Design of Signal-Extraction Filters Using Local Signal and Noise, Array Research Special Rept. No. 20, Contract: VT/4053, AF 33(657)-12747, Texas Instr., Inc., Dallas, Texas 1967.

VESIAC 16,059 VU

This report discusses the use of multichannel filters designed from local signal and local noise in order to overcome the problem of gain inequalization. Included in this study is an analysis of the filtered outputs of several teleseisms and quarry blasts in order to determine whether the signal rejection noted in a previously developed filter was due to gain inequalities. Also included is an investigation of the use of various array geometries in the design of multichannel filters.

LINTZ, P. R., D. W. McCOWAN, High-Resolution Frequency-Wavenumber Spectra, Sci. Rept. No. 206, Contract VT/6702, F33657-67C-1313, Teledyne, Inc., Alexandria, Va., 1968.

VESIAC 17,991 VU
AD 827 959

In this report the method of high-resolution spectral analysis has been applied to one- and two-dimensional wavenumber spectra. In this method a prediction operator is used to extend the length of the spatial correlation functions in order to obtain higher resolution of the resulting spectra in wavenumber space. A theoretical description of the method, its procedures, and its relation to ordinary wavenumber spectra is given.

LINVILLE, A. F., Matched Filtering Studies, Special Rept. No. 4, Statistical Discrimination, Contract VT/0702, F33657-70C-0311, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,462 VU

Two types of matched filters are investigated. Master-event matched filtering is applied to a group of 12 events occuring in the same source region and recorded at LASA. An iterative chirp filtering technique is used to determine optimum chirp length and detection time window placement for Rayleigh waves from different source regions. Iterative chirp filtering is applied to 95 events recorded at LASA and 12 events recorded at ALPA and different source regions are compared in terms of group velocity and the complexity of the chirp filtered outputs. The peak of the chirp filtered output is used to compute a statistic which is a measure of the surface wave excitation.

LINVILLE, A. F., Results of Literature Search Comparing the Seismic Effects of Chemical and Nuclear Explosions, Special Rept. No. 2, Contract VT/0702, F33657-70C-0311, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,458 VU

The purpose of this literature survey was to compare seismic characteristics of underground chemical and nuclear explosions as observed at teleseismic distances. No significant quantitative data to effect a comparison was found in the literature, primarily because most underground chemical explosions have been small (compared to nuclear explosions) and are not well recorded at teleseismic distances.

LINVILLE, A. F., T. W. HARLEY, R. D. BAUER, and J. G. MCDERMOTT, et al., Preliminary Analysis Report, Aleutian Islands Experiment, Ocean-Bottom Seismographic Experiments, Contract VT/7704, F33657-67C-1341, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 18,515 VU
AD 672 284

A preliminary model of the crustal structure across the Aleutian Ridge in the vicinity of Amchitka is presented. Data from two inline-reversed refraction profiles utilizing shot and Ocean-Bottom Seismograph arrays along a northeast-southwest line through Amchitka were used to determine the structure. The analysis was limited to first-arrival data, most of which was Moho-refracted; however, some upper-crust refractors were identified immediately beneath Amchitka.

LINVILLE, A. F., R. F. HOWARD, G. D. MCNEELY, and T. W. HARLEY, Signal and Noise Analysis Report, Aleutian Islands Experiment, Ocean-Bottom Seismographic Experiments, Special Rept., Contract VT/7704, F33657-67C-1341, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 19,826 VU
AD 859 704

Aleutian Islands signal and noise data were analyzed to determine the teleseismic recording capability of the Ocean-Bottom Seismograph (OBS). From this analysis it was concluded that both noise and signal levels vary with OBS location, and the lowest noise sites are in deep water far from land. The noise spectrum is sharply peaked at 1 Hz; as the frequency increases to 2 Hz, the levels are down 10 to 20 db. Thus, ocean-bottom seismographs can perceive higher-frequency events up to a full magnitude better than they can perceive 1-Hz events (important in detecting explosive events at teleseismic distances). OBS perceptibility is quite variable at 1 Hz because of the variability of signal level with location and noise level with location and time.

It appears that events of magnitude 5.0 or greater can be detected by at least some of the OBS stations, provided that the events are 40° or less from the array. Events of magnitude 6.0 or greater usually can be detected at all epicentral distances. The noise field determines the type of processing which can be used.

LONG, L. T., Transmission and Attenuation of the Primary Seismic Wave, Δ = 100 to 600 Km, (Thesis), Contract AF 49(638)-1403, Oregon State Univ., Corvallis, Oregon, 1968.

VESIAC 17,430 VU

The first arrivals from the GNOME and SHOAL nuclear explosions were anlayzed to show the important effects of such factors as the nature of the source, exponential attenuation, crustal structure, type of wave propagation, recording site geology and instrument response.

LYON, R. H., VISTA Semi-Annual Report No. 2, Technical Summary Report Covering 1 July 1965 to 31 December 1965, Contract NOnr-4714(00), Bolt, Beranek, & Newman, Inc., Cambridge, Mass., 1966.

VESIAC 14,062 VU

This report reviews progress toward the development of a teleseismic method of detecting underground nuclear explosions. This progress is shown as (1) the development of decision procedures which make possible the classification of unknown events based on measures describing a number of known events of two classes, and (2) the development of a number of measures potentially useful for the detection and classification of teleseismic signals.

MACK, H., Signal Variations Due to Multiple Arrivals at LASA, Contract AF-AFOSR-414-67, Southern Methodist Univ., Dallas, Texas, 1968.

VESIAC 17,427 VU

This report shows that amplitude distributions, expressed as a function of frequency, are highly repeatable for a given source location. A mechanism is introduced which appears to explain all the amplitude variations both within a particular subarray and between subarrays.

MACK, H., Studies in a Deep Hole with a Controlled Wave Seismograph, TR 64-88, Contract VT/1139, AF 33(600)-43369, Geotech. Corp., Garland, Texas, 1964.

VESIAC 10,774 VU

The possibility of a frequency-dependent coupling, in the range 2.5-20 cps, between a deep-hole casing and the surrounding medium was studied experimentally. The source used was a Continental Oil Company "VIBROSEIS" vibrator and the receiver was a Geotechnical Corporation deep-hole seismometer which is used in the VELA-UNIFORM Deep-Hole Program. Smooth amplitude variation with depth and constant pulse width indicate that the coupling does not vary and that all of the measured attenuation can be explained by normal propagation phenomena. On this assumption, a value for $1/Q$ of 20×10^{-3} is derived over 1852 m (6077 ft) of fairly uniform sandy shales.

MAC KENZIE, G. S., Stationary and Non-stationary Ground Movements at Frequencies from 1 to 200 Millicycles per Second (THESIS), Contract AF 49(638)-1388, Univ. of Calif., La Jolla, Calif., 1965.

VESIAC 11,828 VU

To study the phenomena grouped under stationary and non-stationary ground movements, the author has recorded and analyzed, with a digital computer, such phenomena as ground velocity, atmospheric pressure and ocean wave height. The stationary and non-stationary portions of the record have been analyzed by different techniques. Characteristic of microseisms measured near San Diego, California, are discussed. In addition, measurements of earth noise have been extended to frequencies as low as a few mcps. Discussed is the ground motion below 40 mcps. "Spectral maps" representing non-stationary signals are described; a computational technique for detection and elimination of transients occurring in otherwise "stationary" seismic records is given.

MANAKHOV, F. I., "The Angles of Emergence of Longitudinal Seismic Waves in the Region of South Sakhalin," Trudy Geofiz. Inst., A. N., SSSR, No. 36, pp. 15-24, Undated, (Translated from Russian), Contract DA-49-083 OSA -3137.

VESIAC 18,159 VU

In this paper are contained the results of experimental observations on the emergence angles of seismic longitudinal waves in the region of South-Sakhalin at the South-Sakhalin seismic station.

MANGHNANI, M. H., E. SCHREIBER, and N. SOGA, Use of Ultrasonic Interferometry Technique for Studying Elastic Properties of Rocks, Contract AF 49(638)-1355, Lamont Geological Observ., Columbia Univ., Palisades, New York, 1967.

VESIAC 16,505 VU

This report presents data concerning the elastic properties of a specimen of obsidian taken by the pulse superposition method, and is the first example of its successful application to a natural rock material.

MANNING, J. E., M. C. GRIGNETTI, and P. R. MILES, An Application of Statistical Classification Procedures to Teleseismic Event Classification, Final Report, 1 January 1965 to 30 April 1966, Contract NOnr 4714(00), Bolt, Beranek & Newman, Inc., Cambridge, Mass., 1966.

VESIAC 14,963 VU

Two statistical classification procedures are applied to the problem of classifying teleseismic events. The first is the well known maximum likelihood procedure that has often been used in pattern recognition problems. The second was developed during the course of this project. This procedure differs from the first in that it uses the abilities of a human operator to analyze data visually. The performance of each of these two procedures is promising for the teleseismic classification problem. For a particular choice of measures, the complete set of 19 shallow earthquakes and 19 underground nuclear explosions are classified correctly. Too few events are used in evaluating the procedures to allow a further conclusion. Criteria used to describe the signals are discussed.

MANNING, J. E., and R. H. LYON, VISTA Semiannual Report No. 1, Tech. Summ. Rept., Report No. 1313, Contract NOnr 4714(00), Bolt, Beranek & Newman, Inc., Cambridge, Mass., 1965.

VESIAC 12,188 VU

A summary of research at Bolt, Beranek and Newman on the detection of underground nuclear explosions is presented. The report covers the first six months of the project effort. The main goals are to:

(1) Obtain relevant data on seismic signals from nuclear events;
(2) Select a subset of representative events to reduce the mass of data;
(3) Determine preliminary criteria for classification;
(4) Derive criteria from the signals recorded and develop computer techniques for evaluation of the criteria derived;
(5) Establish a decision procedure in which the data are categorized into relevant events; and
(6) Perform tests of the discrimination process using new sets of data to determine how well the system permits classification of detected events.

MANSFIELD, R. H., J. F. EVERNDEN, Long Range Seismic Data from the Lake Superior Seismic Experiment, Tech. Report VU-66-1, Contract: Agency Document, AFTAC, VELA Seis. Center, Washington, D. C., 1966.

VESIAC 14,303 VU
AD 633 475

As part of a planned subcrustal experiment, three series of chemical explosions, ranging in size from 1/8 to 10 tons, were detonated on the bottom of Lake Superior during July 1963 and July and October 1964. Many of these explosions were detected at distances of approximately 500 to 2500 kilometers during routine daily recording operations at a number of mobile LRSM van stations, at five experimental seismic observatories, and at several scattered deep-well installations, all operated as a part of VELA-UNIFORM research program under the technical direction of the Air Force Technical Applications Center. This report summarizes the types of data recorded, presents typical measurements, and discusses some of the resulting conclusions.

MARTIN, J. J., Time and Frequency Characteristics of an Acoustic Signal Reflected from a Rough Boundary, Res. Paper, Rept. No. P243, Contract SD-50, Inst. for Defense Analysis, Washington, D. C., 1966

VESIAC 19,592 VU
AD 630 695

This paper contains an analysis for determining the time of arrival and doppler frequency characteristics of a pulse transmitted to a target by reflection from a not-too-rough surface such as the sea bottom, and gives numerical values for a typical sonar application. The analysis may be important in sonar signal processing associated with one-way or round-trip transmission and in the interpretation of data from marine geophysical surveys; it may in addition have application to propagation of electro-mechanical waves by ionospheric refraction.

MARTIN, W. B., JR., Subarray E3 Expansion, Final Report, Rept. No. ESD-TR-68-26, Contract AF 19(628)-5167, Philco-Ford Corp., Billings, Montana, 1968

VESIAC 19,026 VU
AD 667 517

An expansion and reconfiguration of a Montana LASA subarray was performed during the period October - December 1966. A description of the construction and installation of that subarray is presented. The evaluation of the array is reserved for a subsequent report.

MARTINEK, J., and H. P. THIELMAN, A Circle Theorem Related to Pure Bending of a Circular Elastically Supported Thin Plate, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 7374 VU

A circle theorem is established giving the displacement field of an elastically supported thin, circular plate in pure bending due to an arbitrary distribution of forces. The displacements in the plate are derived in terms of the displacement due to the same distribution of forces in the infinite thin plate.

MARTINEK, J., and H. P. THIELMAN, Effects of an Elastic Spherical Layer and a Liquid Core on the Propagation of SH Waves, SDL Rept. No. 115, Contract 33(657)-12447, VT/2037 (AFTAC), United ElectroDynamics, Inc., Alexandria, Va., 1965.

VESIAC 9608 VU

For a model consisting of a single spherical elastic layer which surrounds a liquid core, we consider two SH sources located inside the elastic layer, such that the field created by the potential due to the sources is axial symmetric and steady state. Thus, the sources are assumed in a form which assures equilibrium of the elastic-fluid configuration at all times. The effect of gravity is neglected. The object of this study is to find ultimately, the effect of diffraction on the waves appearing on the free surface of the layer.

MARTINEK, J. and H. P. THIELMAN, Laurent Type of Expansion and General Radiation Conditions Related to Solutions of the Reduced Wave Equation, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8347 VU

In this paper, we derive a series expansion of the Laurent type which is the three-dimensional counterpart of a result obtained by Reichardt (1960) for two dimensions. With the aid of this expansion we find the radiation conditions valid for arbitrary complex frequencies k. For these conditions, it is then possible to give a proof that the eigenfrequencies for the first and second boundary value problems are always damped. The solution to the first boundary value problem and its uniqueness proof in case Green's function exists are given.

MARTINEK, J., and H. P. THIELMAN, New Solutions of the Laplace Equation in Spherical Coordinates, Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8138 VU

To predict some of the expected waveforms of earthquakes, there have been several recent attempts to solve the scalar wave equation in a spherical earth. In general, it is difficult to solve boundary value problems of this type. Gilbert gave a method for constructing new solutions to the wave equation by means of harmonic functions in three dimensions. To facilitate the use of this method for solving the above type of boundary value problem, a new method is derived in this paper to increase the set of available harmonic functions required in Gilbert's procedure, thereby increasing the set of available solutions to the wave equation. This development shows a purely mathematical link between several basic equations of physical origin.

MASS. INST. OF TECH. (STAFF), Large Aperture Seismic Array (LASA) for Seismic Discrimination, Sci. Rept., Contract: Agency Document, Mass. Inst. of Tech., Lincoln Labs., Lexington, Mass., 1965.

VESIAC 17,630 VU
AD 823 043

The design and general characteristics of the Montana LASA are described in the light of its potential for seismic discrimination.

MASS. INST. OF TECH. (STAFF), Seismic Discrimination, Semiannual Tech. Summ., ESD-TDR-64-593, Contract AF 19(628)-500, Mass. Inst. of Tech., Lincoln Labs., Lexington, Mass., 1964.

VESIAC 9557 VU
AD 455 743

This report covers Lincoln Laboratory's work for Advanced Research Projects Agency on the seismic discrimination problem (VELA UNIFORM) for the period 1 July to 31 December 1964. The major effort during this period has been planning and initial implementation of telemetry and signal processing for the Large Aperture Seismic Array, a 200 km 525 sensor array for nuclear test surveillance being installed in Montana. The configuration, analog-to-digital conversion, telemetry, and data recording for this system are described in this report. Also described is the work that has continued with data from the Tonto Forest Seismological Observatory (TFSO), the reformulating of the maximum-likelihood array processing theory, and a summary of the dissertation of J. L. Holsinger.

MASS. INST. OF TECH. (STAFF), Seismic Discrimination, Rept. No. ESD-TDR-65-263, Contract AF 19(628) 5167, Lincoln Labs., Lexington, Mass., 1965.

VESIAC 11,993

This report covers Lincoln Laboratory's work for the Advanced Research Projects Agency on the seismic discrimination problem (Vela Uniform) for the period 1 January to 30 June 1965.

The engineering of the Large Aperture Seismic Array is virtually complete and is discussed in some detail in this report. Supporting investigations of automatic detection and location of seismic events are described, as well as digital processing array outputs.

MASSE, R. P., Analysis of Seismic Events as Recorded on Both Wide Band Long Period and Standard Vela Long Period Seismograph Systems, Sci. Rept., Rept. No. 260, Contract VT/0706, F33657-70C-0041, Teledyne-Geotech., Alexandria, Va., 1970

VESIAC 20,291 VU
AD 872 658

Analysis of seismic signals recorded on both the standard long period and the wide band long period seismograph systems at TFO revealed that these systems yield equivalent information concerning long period energy in the signals. The Rayleigh wave energy at periods greater than sixty seconds, was determined to originate almost entirely from events with epicenters near oceanic trenches or oceanic ridges.

MASSE, R. P., D. M. CLARK, and H. J. MECKLENBURG, Analysis of Long Period Seismic Signals and Noise Recorded at LASA, TFO and UBO, Sci. Rept., Rept. No. 254, Contract VT/0706, F33657-70C-0941, Teledyne-Geotech, Alexandria, Va., 1970

VESIAC 20,398 VU
AD 874 843

Long period signals recorded at the seismic arrays UBO, TFO and LASA were analyzed to determine the fundamental mode Rayleigh wave dispersion curves for paths from different source areas to each of the arrays. These paths are mixed continental and oceanic, and the dispersion curves calculated fall within the range between the average dispersion for a pure continental path and that for a pure oceanic path. Analysis of the long period noise (15 to 50 seconds) recorded at each array shows the rms value to be in the 8 to 20 mu range. Simple beamforming gives approximately $N^{1/2}$db reduction in noise at all arrays. Using a group velocity of 3.5 km/sec results in signal loss for some events in the LASA beams.

MASSE, R. P., R. SIMONS, H. S. TRAVIS, and R. A. WEISBRICH, Effects of Upper Crust in the Llano Uplift Region on Teleseismic P waves, Tech. Data Rept., Rept. No. TR 68-26, Contract VT/8703, F33657-68C-0734, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 19,031 VU
AD 842 357

A seismic investigation was performed in the Llano Uplift area in central Texas to study the effects of the sedimentary layers on teleseismic P waves. Five LRSM short-period portable systems were operated along a geological profile in which the sedimentary section decreases gradually in thickness from about 12,000 feet to zero feet at the granite outcrop. The spectral response of the sedimentary layers beneath each of the seismic station sites was computed from known values of velocity and density.

MATTABONI, P., and E. SCHREIBER, A Variable Air Transformer for Impedance Matching, Contract AF 49(638)-1355, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1966.

VESIAC 14,627 VU

In the extremely precise ultrasonic interferometry technique for measuring sound velocity, proper impedance matching is crucial to obtain satisfactory results. The wide range of transducer frequencies (10 to 60 (mc/s)) for both compressional and shear vibrational modes makes it necessary to match impedances over very wide limits. The authors have designed a device which permits impedance matching over a wide range of operating conditions simply and quickly. It is an air transformer in which the primary and secondary are both continuously variable and operated similarly to tuning stubs, and it should prove useful in those applications where flexibility in impedance matching is required.

MATUMOTO, T., and R. A. PAGE, Jr., Micro Aftershocks Following the Alaska Earthquake of 28 March 1964: Determination of Hypocenters and Crustal Velocities in the Kenai Peninsula-Prince William Sound Area, Contracts AF 19(628)-4082 and AF 19(604)-8485, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1965.

VESIAC 12,557 VU

Following the great Alaska earthquake of 28 March 1964 (GMT), seismologists from the Lamont Geological Observatory initiated a field program to study the microseismicity associated with a major aftershock sequence. As one phase of the program, a few hundred microshocks were recorded within a four-day interval in July 1964 by two tripartite arrays of high-gain, high-frequency seismographs situated on the Kenai Peninsula. Most of the 249 microshocks for which hypocenters were determined are interpreted as micro aftershocks that occurred in the uplifted tectonic block — that is, in the Prince William Sound Region, and eastern Kenai Peninsula. Several subcrustal microshocks, located beneath the Cook Inlet lowlands and western Kenai Peninsula, are discussed.

MC CAMY, K., Research Directed Toward the Use of Long and Intermediate Period Seismic Waves for the Identification of Seismic Sources, Final Sci., 1 August 1964 to 31 July 1968, Rept. No. AFCRL-68-0553, Contract AF 19(628)-4082, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1968

VESIAC 19,100 VU
AD 678 557

In the period covered by this report, Lamont Geological Observatory has made significant advances towards the use of long and intermediate period seismic waves for the identification of seismic sources. Our increased understanding of many features of the seismogram has enhanced its utility in detecting and identifying small seismic events. The recently stated principles of global tectonics have shed new light on the problems of world seismicity, source mechanisms and the location of seismic events.

MC CONNELL, R. K. and G. H. MC TAGGART-COWAN, Crustal Seismic Refraction Profiles, Contract No. AF 19(628)-222, Univ. of Toronto, Toronto, Canada, 1963.

VESIAC 6197 VU

This compilation of seismic refraction profiles includes, for each point on the earth where a determination was available, location, summary of seismic results, topographic and physiographic characteristics, a reference for the full interpretation, and, where available, information on gravity anomalies. The combination of thicknesses and velocities used in Steinhart's 1961 compilation was chosen. Provision is made for up to eight distinct crustal layers at each point (excluding the water where the solid surface lies below the sea level) and a velocity for the upper mantle material (which is assumed to extend to an infinite depth with constant velocity). Only publications which promised deep seismic profiles were investigated.

MC COWAN, D. W., Design and Evaluation of Certain Multichannel Filters, Sci. Rept. No. 209, Contract VT/6702, F33657-67C-1313, Teledyne, Inc., Alexandria, Va., 1968.

VESIAC 17,993 VU

The theory of optimum least-squares multichannel filters is developed from the definitions of correlation functions and power spectra. Four types of these optimum processors were applied to an Aleutian earthquake recorded by part of the Montana LASA and the results evaluated. Several other topics are discussed from a theoretical point of view; these include estimation of power spectral density functions, frequency-wavenumber spectra, and certain coherence functions.

MC COWAN, D. W., Digital Computer Programs for the Design and Evaluation of Multichannel Filters, Sci. Rept. No. 210, Contract VT/6702, F33657-67C-1313, Teledyne, Inc., Alexandria, Va., 1968.

VESIAC 17,994 VU

This report lists program write-ups for the multichannel filter program set written under the multichannel filter project here at the SDL. All of these programs were verified using these write-ups which are now as free from errors as possible.

MC COWAN, D. W., Finite Fourier Transform Theory and Its Application to the Computation of Convolutions, Correlations, and Spectra, Sci. Rept. No. 168, Contract VT/6702, AF 33(657)-15919, Teledyne Indus., Inc., Earth Sciences Div., Alexandria, Va., 1966.

VESIAC 14,981 VU
AD 800 371

The theory of finite Fourier transforms is developed from the definitions of infinite transforms and applied to the computation of convolutions, correlations, and power spectra. Detailed procedures for these computations are given, including listings and writeups of FORTRAN subroutines.

MC COWAN, D. W., and E. A. FLINN, Hyperfine Beamsteering Using a Signal Crosscorrelation Technique, Sci. Rept. No. 213, Contract VT/6702, F33657-67C-1313, Teledyne, Inc., Alexandria, Va., 1968.

VESIAC 17,996 VU
AD 829 164

A method is developed to eliminate automatically the loss in signal amplitude of LASA phased sums with travel-time anomaly corrections due to small mis-alignments in the signal arrivals. This method is a hyper-fine or vernier adjustment of the trace alignments. A mathematical description of the procedure and its errors is given. Three events with different signal-to-noise ratios recorded by 11 LASA subarrays were chosen as examples of the method.

MC COY, D. S., An Analysis of Factors Limiting Seismic Detector Sensitivity, Contr. No. AF 49(638)-1080, Radio Corp. of America, Princeton, N. J., 1964.

VESIAC 7840 VU
AD 441 080

To analyze factors limiting seismic detector sensitivity, RCA Laboratories have measured amplifier excess noise spectra and have made thermal calculations. A closer study of the detectability criterion is needed to perfect this research, and such a study has begun. Wolf's criterion, which was used at first, seems overly conservative. Also, experiments were conducted to measure the decrease in total noise of a GPTA when its input resistance temperature is lowered to that of liquid nitrogen. A theoretically predicted reduction in noise was discovered. Also, the noise level of a Texas Instrument RA-2 amplifier was 4 db lower than that shown by another previously detected RA-2. Noise amplitude distribution measurements show essentially Gaussian noise.

MC COY, D. S., An Analysis of Factors Limiting Seismic Detector Sensitivity, Semiannual Tech. Summ. No. 1, Contract AF 49(638)-1456, RCA Laboratories, Princeton, N. J., 1965.

VESIAC 10,317 VU

The first section describes an approach for determining sensitivity limitations of clusters of seismometers such as might be used in a large multi-element array. Methods previously developed for analysis of thermal noise and the measurement of amplifier noise have been incorporated into a computer program for determining signal-to-noise ratios of seismometer clusters as a function of the parameters of the system. In the second section, an analysis of the use of current feedback in high impedance amplifiers to produce a better impedance match with a given seismometer is presented. In section three, noise spectrum measurements of the Texas Instruments RA - 3A Parameter Amplifier are presented.

MC COY, D. S., An Analysis of Factors Limiting Seismic Detector Sensitivity, Semiannual Tech. Summ. Rept. No. 4, Contract No. AF 49(638)-1080, RCA Labs., Princeton, N.J., 1964.

VESIAC 7245 VU
AD 431 028

With the proposed method of measuring thermal noise of a seismometer of small inertial mass, errors will arise from: 1) the inability to cancel out completely the signal from ground motion because of differences in amplitude or phase of the frequency response of the small seismometer and the reference seismometer. This problem is more difficult if the overall level of microseismic noise is high; and 2) the inaccuracies in subtracting out the excess noise of the amplifier. Because of the difficulty of performing the experiment with accuracy, the desirability of continuing it should be re-evaluated. Alternatives seem to be: a) finding other ways to cancel ground motion; and b) extension of the program of accurate measurement of amplifier noise characteristics.

MC COY, D. S., An Analysis of Factors Limiting Seismic Detector Sensitivity, Final Rept., Contract AF 49(638)-1080, Radio Corporation of Am., Princeton, N. J., 1964.

VESIAC 8948 VU
AD 608 820

This report summarizes and supplements previously published reports of this study. New sections in this report are: (a) Amplifier Noise Measurements; (b) Coupling Seismometers and Amplifiers for Maximum SNR; (c) Visual Detection of Signal.

MC COY, D. S., J. T. FISCHER, and H. BLATTER, An Analysis of Factors Limiting Seismic Detector Sensitivity, Semi-Annual Tech. Summ. No. 2, (April 1, 1965 to August 1, 1965), Contract AF 49(638)-1456, RCA Labs., Princeton, N. J., 1965.

VESIAC 12,623 VU

The first section of this report considers the use of feedback to improve the signal-to-noise ratio of certain seismometer amplifier combinations. Amplifiers with extremely high input resistances are considered first. Also considered are amplifiers having input impedances too low for proper damping with the seismometer coil available. It is shown to be undesirable to use voltage feedback to increase the amplifier input impedance. In the second section of the report, the problem of optimizing SNR of seismometer systems using galvanometer amplifiers is discussed.

MC COY, D. S., J. T. FISCHER, and H. BLATTER, An Analysis of Factors Limiting Seismic Detector Sensitivity, Final Report, Contract AF 49 (638)-1456, RCA Labs., Princeton, New Jersey, 1966.

VESIAC 14,012 VU
AD 628 933

A detailed analysis is presented to show the effect of certain design parameters on the S/N of systems in which seismometers are coupled to galvanometer amplifiers. General guidelines are presented for optimizing the S/N of such systems. In addition, the effect of feedback on the S/N of seismic detector systems is analyzed and results are given. The potential advantage of displacement transducers over velocity transducers at lower frequencies is discussed. The sensitivity of clusters of seismometers connected to a single amplifier is summarized briefly, and noise measurements on the Texas Instruments RA-3 Parametric Amplifier are presented.

MC DERMOTT, J. G., E. G. BEABOUT, and R. R. GUIDROZ, Operations Report, Aleutian Islands Experiments, Ocean-Bottom Seismographic Experiments, Special Report, Contract VT/7704, F33657-67C-1341, Texas Inst., Inc., Dallas, Texas, 1968.

VESIAC 18,064 VU
AD 670 215

An Ocean-Bottom Seismograph Aleutian Experiment was conducted during the summer of 1967. The objective of the experiment was to obtain data for the determination of thickness and seismic velocities of the crust and uppermantle structure by deployment of three linear arrays of instruments in the vicinity of Amchitka Island and by detonation of a series of chemical explosions. Several tasks involved in the completion of the experiment were equipment preparation, ship-rigging, shakedown cruises, and field operations. In general, the OBS units and auxiliary equipment performed reliably so that the experiment was completed with a minimum number of problems within the specified schedule.

MC DERMOTT, J. G., and J. C. CASTANO, Worldwide Collection and Interpretation of Earthquake Data, Special Report No. 3, Depth Phases, Contract C-104-65, Texas Instr., Inc., Dallas, Texas, 1966.

VESIAC 14,177 VU

The object of this study is twofold: to appraise the likelihood of identifying depth phases from paper seismograms, and to evaluate the differences in the reliability of various depth-indicator phases. The several seismic phases that may be used to determine depths of events are discussed, and are classified into two groups for comparison of reliability: (a) initially upward-traveling phases; (b) initially downward-traveling phases. It is shown how these classifications allow comparison of the effects of the crust and mantle on the reflected phases. Depth phases were identified from nine events. A comparison of the depth calculations of the present study with USC & GS calculations is presented.

MC DERMOTT, J. G., R. L. FISHER, and R. R. GUIDROZ, Worldwide Collection and Interpretation of Earthquake Data, Semiannual Technical Report No. 1. Seismicity Studies - Planning and Initial Results, ARPA Order No. 620, Texas Instr. Inc., Dallas, Texas, 1965.

VESIAC 10,508 VU

This contract is a study of the errors that exist in determining epicenters and focal depths of seismic events and the means to evaluate and reduce them. Programs and techniques will be developed and applied for improvement in determining epicenters, focal depths, magnitudes, and annual numbers of seismic events. This report gives introductory material to be used in discussions to be presented in future reports. Emphasis in this report is on Task I: Hypocenter Determination. However, sections on Task II: Magnitude Determination, and Task III: Seismicity Evaluation, are included. Included is a section on data and a section on computer programs.

MC DERMOTT, J. G., R. L. FISHER, S. C. MERDLER, and R. R. GUIDROZ, Worldwide Collection and Interpretation of Earthquake Data, Semiannual Tech. Rept. No. 2, Contract No. C-104-65, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 13,010 VU

Determination of several parameters of seismic events such as sizes, numbers of occurrence, and accurate locations is a necessary ingredient in determining seismicity. This progress report studies these parameters. Task I - Hypocenter Determination, was emphasized during the reporting period. Work on travel-time corrections, crustal studies, data reduction, depth phases, seismicity studies, and the digitizing of several event recordings to determine whether WWSSN recordings may be used as a world array to enhance signal identification (depth phases in particular), are discussed. Task II was concerned with magnitude evaluation. Task III was concerned with seismicity evaluation. An appendix is concerned with computer programs.

MC DERMOTT, J. G., R. L. FISHER, and P. POLLOCK, Worldwide Collection and Interpretation of Earthquake Data, Semiannual Tech. Rept. No. III - Seismicity Studies Progress Report, Contract C-104-65, Texas Instr., Inc., Dallas, Texas, 1966.

VESIAC 14,467 VU

This work was initiated to accomplish these objectives: (a) to effect improvement in hypocenter determination accuracy, particularly of depth; (b) to investigate magnitude calculations and variations in earthquake magnitudes; (c) to evaluate worldwide seismicity in 1964. Section I is an Introduction and Summary. Section II describes the data used and the status of the data receipt, data reduction, and data handling. Section III is concerned with the hypocenter determination program and associated studies. Section IV discusses 1963 magnitude data investigation results and their implications. Section V discusses future plans and schedules for completion of the current study.

MC DERMOTT, J. G., B. F. KIMLER, and E. G. BEABOUT, Aleutian Islands Experiment (1968), Ocean-Bottom Seismographic Experiments, Final Rept., Contract VT/8705, F33657-68C-0875, Texas Inst., Inc., Dallas, Texas, 1968.

VESIAC 19 104 VU

The 1968 Aleutian Islands Experiment's objective was to obtain and analyze data for the determination of thicknesses and seismic velocities of crustal structures in the Amchitka Island vicinity. Deployment of three linear arrays of Ocean-Bottom Seismographs and detonation of a series of chemical explosions were proposed to accomplish the data acquisition portion of the program. Planning, instrument preparation, field operations, and analysis were defined for the successful completion of the 1968 effort.

MC DERMOTT, J. G., R. J. LABHART, and V. O. MARSHALL, Kurile Islands Experiment, Ocean-Bottom Seismographic Experiments, Preliminary Bull, Project VT/6708, Contract F33657-67C-0105, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,019 VU
AD 822 396

An ocean-bottom seismograph field experiment was conducted in the Kurile Islands region between 21 October 1966 and 16 December 1966. Preliminary data recorded during the experiment is presented. Data includes USC & GS reported events, preliminary OBS epicenter determinations and unassociated phases.

MC DERMOTT, J. G., A. F. LINVILLE, and T. W. HARLEY, Kurile Islands Experiment, Final Rept., Ocean-Bottom Seismographic Experiments, Contract VT/6708, F33657-67C-0105, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,423 VU

An Ocean-Bottom Seismograph Kurile Islands Experiment, conducted from 21 October to 16 December 1966 had as objectives the determining of the operational worthiness of the OBS and the increasing of knowledge of seismic velocities, epicenter determinations, microseisms, and seismicity in the area of interest. All field objectives were accomplished as planned or modified to satisfy field conditions. Most events recorded by the OBS network were local or near-regional. Weather movements correlated with noise-amplitude fluctuations. Noise levels were of the same order of magnitude as found in previous work. Analysis of first-arrival data indicated an average crustal velocity of 5.4 km/sec and a mantle velocity of 8.1 km/sec in the Kurile region.

MC DERMOTT, J. G., and R. SHERMAN, Worldwide Collection and Interpretation of Earthquake Data, Special Report No. 4, Results of Worldwide Array Feasibility Investigation, Contract C-104-65, Texas Instr., Inc., Dallas, Texas, 1966.

VESIAC 14,178 VU

The authors attempted to enhance the identification of depth phases by combining single-trace recordings of short-period vertical seismograms of the World Wide Standard Stations in ensemble displays and applying some multichannel computer processing techniques to the ensembles. As a result, it was anticipated that subtle trends or changes in the character of the recordings would become more apparent. For example, phases could be more easily identified in the ensemble than on a single seismogram. Other parts of the study included: (a) digitizing of single-trace analog records of two events, and (b) bandpass frequency filtering, deconvolution and ensemble averaging. Applications of these and other processes were considered.

MC EVILLY, T. V., Crustal and Upper Mantle Structure of the Central United States from Surface Wave and Body Wave Studies (THESIS), Contract AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 12,164 VU

This paper treats the numerical inversion of observed surface wave phase velocities in the Central United States by a technique based on Anderson's idea. In addition to the dispersion data, all available body wave data was incorporated as constraints on the model during the inversion procedure. The resulting understanding of the velocity-depth function for the crustal-upper mantle structure in the Central United States will improve epicenter and focal depth determinations in the area.

MC EVILLY, T. V., Detailed Study of the November 1964 Earthquake Sequence Near Corralitos, California, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-K VU

The aftershock sequence following a magnitude 5.0 earthquake on the San Andreas fault zone in central California was monitored with mobile stations situated 5 to 14 km from the main shock for a period commencing 3 hr after it and lasting 26 days. Three University of California permanent telemetered stations are located within 40 km of the epicenter. Detection is considered complete for magnitude 1.0 shocks for the full 26 days, and for magnitude 0.1 events for the first 6 days. Of about 100 aftershocks observed, 36 were recorded widely enough to be accurately located. These proved to be surprisingly localized in position and very consistent in first-motion radiation patterns. The source appears to be a zone approximately 3 km in diameter, which repeatedly fails in the characteristic right lateral strike-slip motion of the San Andreas fault zone.

MC EVILLY, T. V., Phase Velocity Determinations in the Central United States, Semiannual Tech. Rept. No. 6, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6855 D VU

Rayleigh and Love wave phase velocities in the 5 to 70 second period range have been measured using data from the St. Louis University long-period seismograph network. Some results have been obtained in the problem of inversion to structural parameters. Figure 3 shows the result of the inversion. It seems difficult to fit both the Love and the Rayleigh wave observations to the same model. The discrepancies noted are due possibly to insufficient detail for the upper mantle-lower crust portion of the model, to anisotropy in the upper mantle, and to errors in the Love wave observations. Work on the inversion method is continuing and the likely sources of trouble are being examined.

MC IVOR, I. K., Collection and Analysis of Seismic Wave Propagation Data-Supplement 3: Scattering of Elastic Plane Waves by an Elliptical Inclusion or Cavity, Rept. No. 5178-64-F_3, Contract AF 49(638)-1170, Univ. of Mich., Inst. of Sci. and Tech., Ann Arbor, Mich., 1966.

VESIAC 14,989 VU
AD 489 526

The present study is an investigation of the scattering of a plane compressional wave incident from an arbitrary direction on an elliptical obstacle (either cavity or rigid inclusion). By varying the ellipticity, shapes ranging from the finite-length slit to the cylinder may be considered. Analytical solutions are obtained for the scattered displacements in the form of product series expansions valid throughout the entire media. Reasons are given why the boundary conditions are not separable and, consequently, the coefficients of the series solution are determined from a coupled, infinite system of algebraic equations. Also, simplified asymptotic solutions are given for far-field displacements.

MC IVOR, I. K., Scattering of Plane Elastic Waves by Surface Imperfections, Sci. Rept., Contract AF 49(638)-1759, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1969

VESIAC 19,283 VU

A perturbation method for treating the scattering of plane waves by small surface imperfections on an elastic half space is presented. The solution to the first order approximation is given as convolution integrals of the surface imperfection with kernel functions defined by Fourier inversion integrals. The evaluation of these integrals is discussed and their asymptotic representations determined. In particular the error in the apparent angle of emergence due to the scattered waves is obtained. A strong dependence of the magnitude of the error on the angle of incidence is demonstrated.

MC KENZIE, D. P., Forced and Free Convection Within the Earth's Mantle, Contract AF 49(638)-1337, California Inst. Tech., Pasadena, Calif., 1967.

VESIAC 16,358 VU

An analysis of zonal circulation in a rotating homogeneous compressible sphere shows it to be more important than was previously believed. The basic equations of the problem are nonlinear, but may be linearized if the viscosity is sufficiently high. The conditions which must be satisfied before this approximation is valid are examined in detail because of their importance in the problem of convection in the mantle. This discussion shows many of the terms in the full equations may be neglected, and the simplified, but highly nonlinear, equations governing convection in the upper mantle are obtained.

MC KENZIE, D. P., The Viscosity of the Earth, Part 2 of Study of Earth Noise on Land and Sea Bottom, Contract AF 49(638)-1388, Univ. of Calif., San Diego, Calif., 1966.

VESIAC 13,965-A VU

The viscosity of the mantle is important to theories of convection and continental drift, and also to the understanding of the earth's external gravity field. Until recently, however, the processes causing creep in solids under the low stresses present within the earth were obscure, and there were no estimates of the viscosity of the lower mantle. The purpose of this paper is to justify the use of a stress independent viscosity and hence the application of the Navier-Stokes equation to creep within the mantle, to investigate how this viscosity may vary with depth within the earth, and to estimate the viscosity of the lower mantle from the non-hydrostatic equatorial bulge.

MC MILLAN, R. E., Melton Long-Period Bore-Hole Triaxial Seismometer, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8480 VU
AD 446 576

The Melton long-period bore-hole triaxial seismometer has been constructed so that it may be operated on the bottom of wells or bore holes up to 45 m deep. The instrument is 0.3 m in diameter, 0.6 m high, and weighs 115 kg. Three mass-spring suspensions within the instrument have three orthogonal axes of sensitivity to earth motion. The natural frequencies are adjustable from .05 to 0.1 cps. Electromagnetic damping is produced by the moving-coil transducers. Each transducer has a 1000-ohm coil and a generator constant of 135 v/m/sec. Capability for remote calibration and for remote control of the mass lock, mass position, and natural frequency is provided.

MC MURRY, R. F., Methods of Digitizing Earth Motion, Vesiac Rept. No. 4410-77-X, TR No. 63-113, Contract SD-78, Univ. of Mich., Inst. of Tech., Ann Arbor, Mich., 1964

VESIAC 8865 E VU
AD 452 161

When observed with seismographs available today, the particle motion resulting from events at large epicentral distances can be described by continuous mathematical functions. Even though modern narrowband seismographs are capable of resolving earth motion on the order of 10^{-10} meter, no natural quantized motion appears to be involved. While the term "digital seismograph" has been used, examination of any instrument so named has shown a mechanical device and some type of converter to change the mechanical motion of the instrument into a digital output. Desirable as they may be, truly digital seismographs have not yet been devised.

MC NEELY, G. D., TFO and UBO Long-Period Array Data Analysis, Seismic Array Processing Techniques, Tech. Rept. No. 8, Contract VT/0701, F33657-70C-0100, Texas Instr., Inc., Dallas, Texas, 1970.

VESIAC 20,393 VU
AD 875 070

Results of the analysis of two long-period noise samples from Tonto Forest Seismological Observatory (TFO) and three from Uinta Basin Seismological Observatory (UBO) are presented. Analysis methods include single channel power density spectra, determination of multichannel coherences, and computation of two-dimensional frequency-wavenumber spectra. Results are compared to results obtained earlier from the Montana Large Aperture Seismic Array: the noise fields at the three sites are found to be generally similar. Comparison of array processing methods for the UBO and TFO data indicate that little more than 2 db noise suppression improvement above the 6-7 db obtainable by beamsteer processing can be expected from multichannel filter processing. There is some evidence of acoustically coupled low-frequency propagating noise in the TFO data.

MEDVEDEV, S. V., "Experimental Investigations of the Vibrations of Rigid Structures Under Seismic Influences," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 1, pp. 65-129, 1958, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,133 VU

This report deals with the methods of obtaining data characterizing the vibrations of massive structures located on elastic bases for the purpose of determining the periods, forms and damping of natural vibrations. Also discussed is the improvement in methods of measuring vibration of structures in nature.

MEDVEDEV, S. V., "The 1957 Seismic Zoning Map of the Territory of the USSR," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 1, pp. 3-27, 1958, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 15,717 VU

A new seismic zoning map of the territory of the USSR is described. It was compiled in connection with the formulation of new standards and regulations for construction in seismic regions.

MEDVEDEV, S. V., "Qualitative Data on Ground Displacements During Strong Earthquakes," Akad. Nauk SSSR Sovet po Seysmologii Byull, No. 14, pp. 14-27, 1963, (Translated from Russian), Contract SD-78.

VESIAC 7356 VU

The earthquake intensity scale of the Inst. of Geophys. of the USSR Acad. of Sci. consists of twelve points. The points of that scale most important for earthquake-proof construction (from six to nine) have been approved as a state standard—GOST 6249-52. Further material on the seismic scale of the Institute is presented.

Other information about seismic vibrations, corresponding to various intensities on the scale, is necessary for the design of buildings and other structures in seismic regions. Quantitative data are given on the accelerations, velocities and displacements of vibrations of the ground, the strains and stresses in the ground, energy of ground vibrations. Also, the spectra of the displacements, velocities, and accelerations of vibrations of systems with one degree of freedom are shown.

MEDVEDEV, S. V., "Relationships Between the Focal Depth of an Earthquake and Isoseismic Lines," Trudy Inst., Fiziki Zemli, A. N. SSSR, No. 5, pp. 94-99, 1959, (Translated from Russian), Contract SD-78.

VESIAC 13,398 VU

A method of determining the focal depth of an earthquake by the distances from the epicenter to the corresponding isoseismic lines is reported in the article.

MEDVEDEV, S. V., "All Union Conference on Earthquake-Proof Construction," Akad. Nauk. SSSR, Izv., Vol. 12, No. 6, pp. 569-571, 1948, (Translated from Russian), Contract SD-78.

VESIAC 12,052 VU

The All-Union Conference on Earthquake Construction, organized by the Central Earthquake-Proof Construction Bureau of the Acad. of Sci. of the USSR and by the All-Union Sci. Engineering and Tech. Soc. of Architects, was held in Erevan on September 10-15, 1948. This report describes the make-up of the Conference, and the developments in the area of the instrumental study of the characteristics of ground displacements. It also discusses the results of constructing epicenter charts on the basis of instrumental findings, presents information on the determination of the depths of the epicenters, and contains new results concerning certain laws of the propagation of seismic waves.

MEECHAM, W. C., Short-Period Propagation of Infrasonic Waves from Nuclear Explosions, Memorandum No. RM-5103, Contract SD-79, Rand Corp., Santa Monica, Calif., 1966.

VESIAC 15,899 VU
AD 643 536

A possible explanation is given for the great time duration of intermediate-period (about one minute) and short-period (less than one minute) acoustic-gravity waves received from nuclear explosions. It is suggested that the signal delay for intermediate periods may be due to refraction from large-scale weather fronts, and that the signal delay for short periods may be caused by commonly occurring wind ducts.

MEECHAM, W. C. and J. M. DE NOYER, Elastic and Acoustic Waves Radiated from Cylindrical Media about a Point Source, Contract Nos. AF 49(638)-1170, AF 19(604)-6642, Univ. of Mich., Inst. of Sci. & Tech., Willow Run Labs., Ann Arbor, Mich., 1963.

VESIAC 6796 VU
AD 423 016

The theory for three related but different problems is considered. These problems involve finding the radiation pattern from simple harmonic sources in various types of media geometries which can be represented by cylindrical surfaces. The first problem is a consideration of a point source on the axis of an elastic circular cylinder which is completely surrounded by an infinite elastic medium of different properties. The second and third problems are acoustic or two-fluid problems. The last problem involves a truncated fluid cylinder with the axis normal to the free surface. No numerical values have been obtained for the formal solutions presented here.

MEEK, R. A., AFTAC Deep Well Program, Rept. No. 4410-83-X, Contract SD-78 (ARPA), Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884-B VU
AD 452 596

A summary is made of AFTAC's deep well seismic research program. Beginning in early 1961, inertial deep well seismometers were designed and tested. Field measurements are currently being recorded in a number of representative abandoned oil exploration wells. This field work is supported by theoretical model studies using Rayleigh noise computations, signal analysis and other data processing techniques for each deep well site under study.

MEISSNER, R., "Errors and Corrections in Seismic Measurements in Areas with Rough Topography," Ztschr. f. Geophys., Vol. 23, pp. 287-305, 1957. (Translated from German), Contract SD-78.

VESIAC 9816 VU

The errors involved in the orthodox plotting methods usually employed for seismic reflection surveys in areas with rough topography are analyzed by means of some derived equations. The main errors are (a) near-surface variations of the velocity in the weathered layer and below; (b) influence of the rough topography itself in some usual but incorrect plotting methods. Different procedures for the elimination of these and other errors are discussed and illustrated be means of two figures. In general, the most reliable results are found to be obtained in general by the construction of a horizontal reference profile, corrected, if possible, by a time and space compensation on the basis of an upper horizon recognized as plane.

MELAMUD, A. Y., and N. S. SHIPILIN, "High-Frequency Seismic Apparatus," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 6, pp. 336-354, 1959. (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,036 VU

The requirements to be met by seismic apparatus intended for work on high-frequency seismics are stated. Two types of hf seismic stations are described which have been used in work by the method of hf seismics in the Institute of Physics of the Earth of the USSR Academy of Sciences. Field data on a comparison of the work of hf stations with medium-frequency stations are presented.

MENIS, S., and C. MORELLI, "Contribution to the Study of the So-Called Principal Phase of a Seismogram," Annali di Geofisica, Vol. 2, No. 4, pp. 545-575, October 1949, (Translated from Italian), Contract DA 49-083 OSA-3137.

VESIAC 14,379 VU

Love waves, but not the waves predicted by the Rayleigh theory, were found in the "principal phase" of a seismogram, the physical nature of which is studied. To determine whether these waves at least represent component waves, the principal phase of two distant earthquakes (Japan, November 18, 1941; Peru, August 24, 1942) were decomposed by the period analysis of Prof. Vercelli. However, the component waves were still found to be either Love waves or surface waves normal to the principal plane with a vertical component. Somigliana's theory assumes that these waves may exist. To account for their elliptical oscillations and rotation of their axes, the hypothesis of a phase difference in the wave components and phase shift variations was advanced. Finally, the physical reality of the results was discussed.

MERDLER, S. C., Special Technical Report on an Estimation Procedure for Focal-Depth Determination of Seismic Disturbances, Contract AF 19(628)-238, Penn. State Univ., Philadelphia, Pa., 1964.

VESIAC 8755 VU
AD 607 491

A new data processing technique, described in this report, is suggested to estimate the delay time between initially uptravelling energy which is reflected once at the earth's surface and initially downtravelling energy on earthquake seismograms. The technique was applied to band-limited synthetic signals that contained several primary-secondary pairs in the presence of random noise. Of 27 synthetic signals which were analyzed, the procedure successfully selected the correct delay time in 22 cases. Four actual earthquake seismograms were then analyzed, and results are given. Conclusion: the technique provides a reasonable estimate of the delay time between primary and surface reflected energy.

MICHIGAN, UNIVERSITY OF (STAFF), Lakewood Conference Proceedings: High Frequency Seismic Energy, VESIAC Special Rept. No. 4410-52-X, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 7742 VU
AD 438 709

This report consists of four papers given in connection with the conference on high-frequency seismic energy held at Lakewood, Colorado, on October 15 and 16, 1962, and a series of summary and evaluative comments on this meeting offered by several of the attendees. Each of the papers treats somewhat different aspects of the problem. The effects of different types of sources on high frequency signals, the attenuation of short-period P waves in the mantle, and the amplitudes of P waves over an 1100-km profile are examined; and the last paper, by Dr. T. F. Gaskell, is an extensive summary of work on high-frequency energy from earthquakes.

MICHIGAN, UNIVERSITY OF (STAFF), Proceedings of the VESIAC Conference on Seismic Event Magnitude Determination, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 VU
AD 441 592

This report is a collection of papers presented at a VESIAC Special Study Conference held at the University of California, April 11 and 12, 1963. The conference was called to review the seismic magnitude problem for the VELA UNIFORM Program. The availability of seismic energy from high yield chemical and nuclear explosions has provided seismologists with considerable data for studying this problem. At present, magnitudes determined by Richter's method, which makes use of surface waves, are inconsistent with magnitudes determined from body waves.

MICHIGAN.UNIVERSITY OF (STAFF), Proceedings of the VESIAC Conference on Variations of the Earth's Crust and Upper Mantle, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8217 VU

This report is a collection of papers presented at a VESIAC Special Study Conference held at Escanaba, Michigan, September 16-18, 1963. The conference was called to review current thought on problems in measuring parameters of the earth's crust and upper mantle. Thickness measurements in specific areas, the correlation between the earth's gravity and velocity distribution, and surface-wave propagation are discussed.

MICHIGAN.UNIVERSITY OF (STAFF), VELA UNIFORM - Program Reports Published, Jan. - Dec. 1961, Contract No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Willow Run Labs., VESIAC Library, Ann Arbor, Mich., 1964.

VESIAC 7249 VU

This bibliography contains the following material: 1) VELA UNIFORM Program Reports published January to December 1961; 2) VELA UNIFORM Program Reports published January 1962 to February 1963, 3) VELA UNIFORM Program Reports published in Journals to date (February 28, 1963). The reports are listed in the bibliography according to Project and contract number, and in charts provided in the bibliography, the activity names are given along side the contract numbers.

MICHIGAN, UNIVERSITY OF (STAFF), Washington Conference Proceedings: A Review of Broadband Seismographs to Include Digital Seismographs, VESIAC Rept. No. 4410-77-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8865 VU
AD 452 161

This report publishes a collection of papers presented at a VESIAC Special Study Conference, held 18-19 November 1963, on recent developments in wideband seismic recording. Emphasis is placed on advances in digital recording and problems related to digital recording systems. A related report is included on a pressure-sensitive transducer, known as the "Sollon Transducer," applicable to hydroacoustic sensing.

MICKEY, W. V., Equivalent Earthquake Magnitudes for Selected Nuclear Detonations at the Nevada Test Site, Contract No. VT/4052, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 7076 VU

Seismic magnitude data were obtained from 23 shot reports prepared for the AFTAC covering nuclear detonations at the Nevada Test Site. The data consisted of 419 individual equivalent earthquake magnitude determinations from 81 stations. Given is the method by which magnitudes were calculated for each station from the Pn or P waves. The averages of all the station magnitudes for a given event were used for the event magnitudes as reported by AFTAC. The standard deviation for an average magnitude for an event increased generally with the number of observations. A trend for plus values was indicated (magnitudes larger than average) for stations less than 1600 km.

MICKEY, W. V., Microearthquake Monitoring at the Shoal Site, Contract No. VT/4052, U. S. Coast and Geodetic Survey, Wash., D. C., 1964.

VESIAC 8348 VU
AD 443 555

A microearthquake monitoring period from August 20 to November 1, 1963, located 187 shocks of which 77 per cent were in an area of about 550 sq. km. Calculated seismic energies varied from 1.2 $\times 10^9$ to 1.6×10^{14} ergs. Average depth of focus was 9 km with an ordered trend in the most seismic active area possibly related to the Fairview Peak Fault. Microearthquake sequences followed the major earthquake patterns in the area with concentrated activity in separated areas, but related in time. Data on strain release characteristics in relation to earthquake magnitude, during the period 1954 to 1962, are given. Microearthquake strain release studies are also included. Depth was the least reliable parameter defining hypocenter location.

MICKEY, W. V., Seismic Effects of 1000 lb. H-E Detonations in Salt and Sedimentary Deposits - Operation PRE-DRIBBLE, Contr. No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 7967 VU

The Coast and Geodetic Survey and the Geological Survey participated in a high-explosive detonation program in the DRIBBLE area during April, May and June, 1963. Charge sizes ranges from 500 to 4000 lb; shots were fired near the towns of Rayleigh, Collins, NcNeil and Ansley, Mississippi. Several shots were detonated on or near the Tatum Salt Dome. This brief report is concerned with the 1000 lb. shots in the sedimentary deposits and shots in the salt. The COWBOY 1000 lb. shots in salt are included for reference.

MICKEY, W. V., and T. R. SHUGART, Seismic Data Summary Nuclear Detonation Program 1961 through 1963, Contr. No. VT/053, U. S. Coast and Geodetic Survey, Wash., D. C., 1964.

VESIAC 7814 VU

The Coast and Geodetic Survey has participated in the NOUGAT, STORAX and NIBLICK nuclear detonation series starting with the first event ANTLER. This report summarizes the participation of the Seismology Division in the detonation series from September 15, 1961, event ANTLER to September 13, 1963, event BILBY.

MICKEY, W. V. and J. C. STEPP, Seismic Effects from Controlled Underwater Detonations, Operation HYDRA IIA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1962 (OFFICIAL USE ONLY).

VESIAC 6010 VU O
AD 423 756

MIKUMO, T. and K. AKI, A Combined Use of Strain and Pendulum Seismographs for a Measurement of Local Phase Velocity, Contract No. AF-AFOSR 25-63, Calif. Inst. of Tech., Pasadena, Calif., 1963.

VESIAC 7110 VU

An attempt was made to determine the local phase velocity of seismic waves by a combined use of records written by the strain and pendulum seismographs set up a single station. A strain seismograph record may be reducible to the space derivative of the ground displacement with respect to the direction of a strain rod, while the time derivative of the same displacement may be obtained from a pendulum record. The ratio of the two derivatives should then be the apparent local phase velocity of the waves along the direction of the instruments. An amplitude and phase compensation technique was applied to the two kinds of seismograms over an appropriate frequency range to get the phase velocities of waves for five quakes recorded at Pasadena.

MILLER, H. J., Calibration of Long-Period Seismographs at Thirteen Stations Throughout the World. Contr. No. AF 19(604)-7376, Lamont Geol. Observ., Palisades, N. Y., 1963.

VESIAC 7722 VU
AD 435 981

During mid-1962 accurate calibrations were made of 42 special seismograms located at 13 stations throughout the world. Given are the locations of the stations. Two methods were used, one based on a steady-state input signal, the other on a transient pulse-like input signal. The signals were applied through a Willmore-type bridge. Analysis of the steady-state output was conventional. Described is how analysis of the pulse was made. Both methods provide displacement sensitivity and phase response curves. The instruments were calibrated according to existing conditions. They were then adjusted for standardization and recalibrated. Discussed is the installation of the bridge and pulse generating circuit. Calibration results are given in graphical form.

MILLER, M. K., A. F. LINVILLE, and H. K. HARRIS, Continuation of Basic Research in Crustal Studies, Annual Report, Rept. No. AFOSR 67-0519, Contract AF 49(638)-1588, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 15,722 VU
AD 648 149

Crustal models have been constructed for TFO and LASA.

A long period event recorded at TFO with epicenter in Southern California was time partitioned and Rayleigh wave dispersion in the frequency range of 0.025 to 0.175 was derived. By use of these data, the adequacy of the TFO model crust has been substantiated at low frequencies by a direct comparison of theoretical and experimental dispersion curves.

An analog model having a crustal layer with an abrupt thickness change (3cm to 5cm) was used for scattering studies. The dominant leaking mode of propagation in the thin end of the model is PL_{22}. Theory predicts that this energy is primarily scattered into the leaking mode PL_{23} in the 5-cm end. There is also some evidence of wave propagation which is not readily explained in terms of modes.

MILLER, M. K., H. K. HARRIS, and F. A. LINVILLE, Continuation of Basic Research in Crustal Studies, Final Rept., Contract AF 49(638)-1588, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 16,661 VU

This report is divided into two main areas: (1) theoretical dispersion calculations and experimental measurements of the fundamental Rayleigh wave at LASA in Montana, and (2) a study of teleseismic signals using analog model data.

MILLER, M. K., A. F. LINVILLE, and H. K. HARRIS, Experimental Scattering Studies, Sci. Rept., Contract AF 49(638)-1588, Texas Inst., Inc., Dallas, Texas, 1969

VESIAC 19,937 VU

A laboratory model having small surface irregularities was used to perform scattering experiments. The experimental model consisted of a 30-mm brass layer over a steel half-space. Bonded to the brass layer were small brass objects acting as scatterers. Backscattered Rayleigh-wave energy was the predominant scattered energy observed. Filtering techniques were used to derive the scattering function which transforms the incident energy into scattered energy.

MINAMIGUMO, S., Y. MORI, and M. HAYAKAWA, Experimental Studies on Miscellaneous Shocks and Reflected Waves Caused by the Detonation of Explosions, Contract No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Willow Run Labs., Ann Arbor, Mich., 1964.

VESIAC 7218 VU

Described are the relationships obtained in experiments between amplitude variations of the earth's vibrations and the distance from the shot point and the time elapse from the shot time. Section I describes the problem and the field program; Section II describes the preliminary experiments and investigations made prior to the main phase of the experiment; Section III describes an experimental study on the amplitude; Section IV describes the second experimental study of amplitudes; Section V is a conclusion. Regarding future studies, instruments that are available make it impossible to perform harmonic analysis. Also, there is need to construct a wave-producing apparatus and an harmonic analyzer.

MINEAR, J. W., Research Directed Toward the Study of Seismicity in the Southeastern United States, Annual Tech. Rept. No. 2, AF 19(628)-3892, Research Triangle Institute, Durham, North Carolina, 1966.

VESIAC 13,406 VU

This annual report covers research activities in the study of seismicity in the Southeastern United States. Principle research activities during the period of December 15, 1964 to December 15, 1965 were concerned with: (1) local epicenter location, (2) long-range refraction, (3) computation of crustal models from gravity data and surface wave dispersion, and (4) computation of P residuals. Several epicenters were located in the Southern Appalachians using data from VELA standard and mobile stations. Magnitude, focal depth, and energy release for several earthquakes previously reported have been calculated.

Several computer programs were developed during the course of study. These include epicenter location, P-residual computation, mass anomaly computation from gravity anomalies, autoregression of time-series data, and the computation of phase velocities by band-pass filtering.

MINEAR, J. W., Research Directed Toward the Study of Seismicity in the Southeastern United States, Final Report, 2 January 1964 Through 15 December 1966, Rept. No. AFCRL-67-0069, Contract AF 19(628)-3892, Research Triangle Inst., Research Triangle Park, N. C., 1967.

VESIAC 15,727 VU
AD 648 458

Travel times determined from local earthquake and refraction data are used to determine the crustal structure and upper mantle velocity for the Southern Appalachain region. A slight velocity reversal in the upper crust at a depth of about 15 km, a general increase of crustal velocities and densities with depth below this zone, and an upper mantle low-velocity zone at a depth of 70 km are indicated beneath the Southern Appalachians.

MINEAR, J. W., Seismicity of the Southeastern United States, Semiannual Tech. Rept. No. 2, Contract ARPA Order No. 292, Research Triangle Inst., Research Triangle Park, N. C., 1965

VESIAC 9446 VU

This report deals with the current projects at the Univ. of North Carolina concerning seismic studies of the southeastern U. S. The electronic rack and recorder for the short-period seismograph has been in operation at the University since August, 1964. However, the University is seeking to establish a strong capability in geophysics and is therefore considering the construction of a vault in a remote rural area. Field refraction equipment, discussed here, was purchased by the Research Triangle Institute. The equipment consists of an Electro-Tech eight-channel refraction systemmounted in a Scott vehicle; photographs of these are included. Discussion of the short-period displacement seismograph involves accounts of: detection and amplification, boom centering, and other matters.

MITCHAM, W. S., Preliminary Evaluation of $V_D \times M$ Vector-Correlation Process (Appendix 4 to TR 65-112), TR 65-57, Contract AF 33(657)-13668, VT/5051, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 12,789-D VU

A $V_D \times M$ vector-correlation process for a three-component set of orthogonal seismographs was examined. Preliminary theoretical considerations applicable to data interpretation under limiting assumptions were developed. One simple analog computer implementation of the process was developed and a limited amount of data was processed. Alternative approaches, for equipment and technique, were considered. The processor provided a trained analyst with information in a form suitable for discrimination between natural and man-made events on the basis of preliminary source location and depth from a 3-component set of seismographs.

MIZOUE, M., "Deformation of the Earth's Crust in the Tempoku-Urakawa Zone," J. of the Soc. of Geological Survey, Tokyo Univ./Japan, No. 1, pp. 29-37, 1962 (Translated from Japanese), Contract SD-78.

VESIAC 7741 VU

In this paper, it is shown that the pattern of the strong negative anomalies of the Tempoku-Urakawa zone can be explained by Vening Meinesz's theory of viscoelastic deformation of the crust by compressive stress. The time required for the deformation of the crust and the density of the sedimentary layer were also calculated and these results are in good harmony with the geohistorical evidence in this region.

MOHAMMADIOUS, B., "Structure of the Earth's Mantle and Core According to the Energy Spectra of Longitudinal Waves," Annales de Geophysique, Vol. 23, No. 1, pp. 61-107, 1967, (Translated from French), Contract DA 49-083 OSA-3137.

VESIAC 17,314 VU

The object of the present study was to substitute a precise definition of the signal by its energy spectrum for the conventional measurements of periods and amplitudes so as to obtain data on the phenomenon at the source as well as the elastic properties of the transversed media.

MOLOTOVA, L. V., "Recording Deep Reflections in Seismic Surveying," Trans. Inst. Phys. Earth, Akad. Nauk, USSR, (Trudy Inst. Fiziki Zemli, A. N., SSSR), No. 6, pp. 237-252, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,918 VU

The article describes experimental data on the recording of distinct strong waves with arrival times of 11-17 sec obtained with low-frequency apparatus. The recording site was 17-70 km from the shot point. It is shown that the recorded waves are longitudinal singly-reflected waves corresponding to the Mohorovicic discontinuity. By an approximate analysis it was found that the reflecting boundary was at a depth of about 33 km and the mean wave velocity in the earth's crust was about 6.0 km/sec.

MONTGOMERY, C. S., Coordinate Transformer, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8404 VU
AD 444 202

The coordinate transformer is an electronic analog computational device designed for operation in triaxial seismograph systems. It is designed for incorporation between the phototube amplifier outputs and the recording instrumentation inputs of such system. Operational controls permit electrical modification of output signals that simulate geographical leveling and orientation of a triaxial seismometer.

Output stgnals equivalent to a conventional three orthogonal component setsmograph syst are also provided.

MONTGOMERY, C. S., and C. GARRETT, Digital Film Recorder and Reader-Converter, Tech. Rept. No. 64-128, Project VT/072, AF 33(657)-9967, Geotech. Corp., Garland, Texas, 1964.

VESIAC 9436 VU

Thts recorder will be able to record 124 tracks of digital information tn parallel form on 16-mm film. The tnstrument wtll be able to record the outputs of 10 short-period digitizers simultaneously at a 50-Hz rate. Light-tight preloaded film magaztnes will faciltate fteld handling, will contain enough film to permit the tnstrument to operate unattended for a period of 28 h. Film processtng wtll be performed at a central location under controlled conditions to obtain uniform characteristtcs. The reader converter will be mounted in a separate console suitable for laboratory operatton. The reader will photoelectrtcally convert the recorded information into an electrical output. Conversion of these signals for computer processing is discussed.

MONTGOMERY, W. D., A Wave Front Reconstructton Process for a Display of the Multiple Beams of Seismic and Other Arrays, Research Paper P-249, Contract SD-50, Insl. for Def. Analy., Washington, D. C., 1966.

VESIAC 14,693 VU
AD 636 142

The passive planar arrays used in receiving sonic waves through the earth or water, or those used in radio astronomy, use mechanical or electronic scanning to observe a large solid angle such as 2 pi steradians. In this paper, a method is developed for obtaining a real-time visual display of such wave fields. The method is analogous to the use of a wide-angle lens for viewing large soltd angles in the visible spectrum. It uses a recently developed technique of incoherent holography as an analog, wtth the important difference that the sampling aspect of an array enables one to obviate any film processtng stage. An appendix treats a few problems for seismic arrays.

MOONEY, H. M., Characteristics of Rayleigh Wave Dispersion on a Two-Layered Soltd Half Space for Fundamental, First Shear, and Second Shear Modes, Summ. Rept., 1 May 1962 Through 30 Aprtl 1964, 62-411, AF-AFOSR 62-411, Univ. of Minnesota, Minneapolis, Minn., 1965.

VESIAC 10,441 VU

This report presents a summary of work accomplished to date under AFOSR Grant 62-411. Since all funds provided by the grant have been expended, it constitutes a final report also.

Work continues on the project. We anticipate that two papers will be submitted for publication in the near future.

The investigation is being carrted out in cooperation with Dr. B. A. Bolt, University of Caltfornia.

MOONEY, M. H., B. A. BOLT, Dispersion Tables for Rayleigh Waves on a Stngle Surface Layer, Rept. No. 4410-102-X, Contract SD-78, AF-AFOSR-62-411, Institute of Science and Technology, The Univ. of Mich., Ann Arbor, Michigan, 1965.

VESIAC 12,860 VU
AD 473 363

Tables are presented to show the dispersive characteristics for Rayleigh waves on a single elastic layer overlying a uniform elastic half-space. Two standard models are considered, each specified in terms of four parameters: Poisson's ratio in the layer and in the half-space, and the shear velocity and density ratios. Each parameter is varied through eight values, holding the other three parameters constant. For each such structure, results are given for the fundamental Rayleigh mode and the first and second shear modes. The tables consist of 32 cases, for each of three modes, for each of the two standard models, or a total of 192 tables.

A special computation procedure for group velocities is used which eliminates the errors associated with the usual finite-difference approximation.

Auxiliary information includes a tabulation of long-period cutoff values as a function of structure parameters.

To illustrate the results for specific geologic and laboratory models, 36 additional tables are given. These include results for a continental ice cap, a continental crust, a sedimentary basin, an alluvial overburden, various two- and three-dimensional seismic models, and a case selected from the literature.

MOORE, E. W., Evaluation of the Multiple Array Processor in Detecting P-Wave Motion at the TFSO, Spec. Rep. No. 14, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,564 VU
AD 609 533

This is an interim report covering all records presently available at the TFSO for periods when the Measured Isotropic Processor (MIP) trace of the Multiple Array Processor (MAP) was operating properly and for which USC & GS epicenter reports have been received. It includes fifty-five days during January and February 1964. All detected teleseismic P arrivals during this time were examined on MIP, Sum B_2 and Z_1. The results are shown in Table 1.

MOORE, E. W., and D. D. NELSON, Long Range Seismic Measurements - SCROLL, Rept. No. 220, Contract VT/6702, F33657-68C-0945, Teledyne Indust., Inc., Alexandria, Va., 1968

VESIAC 18,503 VU
AD 836 661

An analysis of seismological data from an underground nuclear explosions as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel-times and amplitudes of P, Pg, Lg, and surface waves are included along with other unidentified phases.

MOORE, J. C., Special Purpose Seismograph System, Tech. Rept. No. 64-129, Project VT/072, AF 33(657)-9967, Geotech. Corp., Garland, Texas, 1964.

VESIAC 9437 VU
AD 454 584

Described is a portable short-period seismograph system which has been developed, and is suitable for noise-survey work, observatory site locations, and similar applications.

MORENCOS, J., Contribution to the Theory of the Electromagnetic Seismograph, Sci. Rept. No. 19, Contract AF 61(052)-657, Inst. Geografico Y Catastral, Madrid, Spain, 1967.

VESIAC 16,495 VU

This work exposes an operational method for deducing the response of an arbitrary seismograph with already known constants to any earth motion. The treatment yields infinite power series, which are originated by successive integrations of the time-function defining the earth motion. Such series become well known expansions in all the cases of practical interest.

The approach avoids any consideration of discontinuity when considering excitements of sudden commencement, in spite of which it provides both the steady-state and the transient responses, simultaneously. Neither the Laplace-transform method nor the Heaviside's unit function are used.

MORENCOS, J., A Method for Computing Ground Motion Tables for any Galitzin Type Seismographs, Contract AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1964.

VESIAC 15,548 VU
AD 638 519

This report is intended to provide the seismologist with a practical tool for his daily laboratory determinations. The tables included here have been planned for values adequate to the special type of seismographs used in the Spanish Seismological Survey. Nevertheless, the procedure used is valid for computing similar tables adapted to any Galitzin seismograph, the dynamic magnification of which is given by a formula in this work.

MORENCOS, J., A Study of Seismicity on the Peninsula Iberica Area - Scientific Report No. 16: Calibration of an Electro-Magnetic Seismograph in the General Case, Contract AF 61(052)-657, Inst. Geograf. y Catastral, Madrid, Spain, 1966.

VESIAC 14,806 VU

The responses of an electromagnetic seismograph to an undamped harmonic motion and a sudden pendulum displacement are considered from the theoretical point of view. No assumptions were made concerning the instrument constants, in order that practical formulas for calibration in the general case might be deduced. The damping constants are found by using a very fast portable recorder. Finally, a detailed exposition of the practical procedures and results is given.

MORENCOS, J., On the Use of Implicit Unknowns in the Least Square Method, Sci. Rept. No. 23, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1968.

VESIAC 18,327 VU
AD 671 515

On the basis of Schreiber's formulation, the report describes a computer program with capacity for solving up to 9999 equations, 24 unknowns and 274 group-terms or implicit unknowns, which can have the character of systematic errors from circumstances of observation. Two application samples are included as illustration, for questions in the field of Seismology and Geodesy, respectively.

MORGAN, T. A. and L. A. PANEK, A Method for Determining Siress in Rock, Contr. No. DA-2939, U. S. Bureau of Mines, Wash., D. C., 1963.

VESIAC 7617 VU

This report describes a method for determining the stress in rock based on a requirement for static equilibrium; namely, that the total load on a sufficiently large area must remain constant even after a drift or stope is mined in the area. The method is based on mathematical relationships that are independent of the elastic properties of the rock and the stress distribution near ihe underground opening. In addition to determining the preexisting stress (before mining), the method can be used to determine ihe change in stress due to mining.

MORRILL, B. J., Maximum Acceleraiions and Displacemenis at Hoover Dam during Underwater Detonations of High Explosives in Lake Mead, with Record Supplement, Coniract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1962.

VESIAC 6506 VU

This is the record of tests made by ihe USC & GS in 1961-1962 to measure accelerations and displacements at ihe Hoover Dam during three underground detonations of high explosives. The program was pari of a Crustal Studies Projeci, with detonations several miles above ihe dam in Lake Mead, for which 6000 lb. charges were required. Acceleraiions from the 1961 deionaiions were negligible ai Hoover Dam. However, in June 1962, a more efficieni explosive was made available for coniinued crusial study deionaiions. Included is a description of procedure, deionaiions, iype of explosives, and instrumentation. Results include: maximum accelerations and displacemenis; comparisons of explosives and wave form study.

MOZZHENKO, A. N., "Low-Frequency Seismic Apparatus," All-Union Scieniific Res. Inst. of Geophys. Methods of Surveying, Address Unknown, Undated, (Translated from Russian), Contraci DA 49-083 OSA-3137.

VESIAC 14,461 VU

For the equipping of teams conducting seismic surveys in a low-frequency modification, apparaius which permits conducting observations in the infrasonic part of the seismic spectrum (3-30 cps) is necessary. Discussed are designs of amplifiers which are suiiable for carrying out work by the correlaiion method of refracied waves and by deep seismic sounding. Also discussed are: a) a small portable seismological station, the "Zemlya" ("Earth"); b) ihe production of a low-frequency seismograph, the SPEN-1; c) the industrial produciion of NS-3 seismographs; d) ihe NCh (low-frequency) SS-30/60 Seismic Station. Also discussed is the influence of radio inierference in low-frequency seismic surveying.

MUEHLBERGER, W. R., An Invesiigation of the Buried Crust of North America, Semiannual Tech. Rept., Coniract No. AF 49(638)-1115, Univ. of Texas, Ausiin, Texas, 1962.

VESIAC 6254 VU
AD 437 241

This report describes the progress made in the procurement of rock samples from various wells in the wesiern and southwesiern Uniied States.

MUEHLBERGER, W. R., An Investigation of the Buried Crust of North America, Semiannual Tech. Rept., Contract AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1963

VESIAC 18,511 VU

Steady progress has been made on the areas discussed in the last semiannual technical report. In addition, an intensive search was made for materials, sample identifications, thin sections, etc., for the southeastern United States. This region is very sparsely drilled, many of the wells are for water, with the final result that no systematic collections of samples have been kept for much of the area.

MUEHLBERGER, W. R., Investigation of the Buried Crust of the North American Continent, Semiannual Tech. Rept., 1 October 1964 - 31 March 1965, Order No. 180-62, Contract AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1965.

VESIAC 10,322 VU

This is the first reporting period for a one year extension on the contract to study the Buried Basement of the North American Continent. The Final Report, distributed in September 1964, gives the basic data and interpretations concerning this project. The extension was requested so that a few critical areas could be documented in more detail. Significant results of the project are given. As a result of the project, more is now known on a regional basis about the Precambrian evolution of the mid-continent region that for the western United States, where at least some portious of it are exposed.

MUEHLBERGER, W. R., An Investigation of the Buried Crust of the North American Continent, Contract AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1966.

VESIAC 15,314 VU

Petrographic study of samples from more than 3000 basement wells, together with more than 200 new isotropic age determinations and geophysical information, permit an analysis of the Precambrian evolution of the region. Some of the results of this study are: (1) rocks 2500 m.y. or older underlie eastern North and South Dakota. Bands of greenstone alternating with gneiss and granite give west-southwest-trending gravity anomalies, similar to those in northern Minnesota and Manitoba; (2) almost continuous igneous activity is recorded during Late Precambrian time. Events older than 1400 m.y. are found from southwestern Nebraska to central Wisconsin; (3) central and Trans-Pecos Texas contain rocks deformed during the Llano orogony, about 1000 m.y. age.

MUEHLBERGER, W. R., Late Paleozoic Movement Along the Texas Lineament, Contract AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1965.

VESIAC 10,015 VU

Discussed and described is the Texas lineament. About 200-250 miles of right-lateral slip took place along this lineament during the late Paleozoic. This interpretation is supported by two lines of reasoning, which are given in the report. Similar analyses of the Amarillo-Wichita-Arbuckle trend from the same kind of data indicates that Texas' original position was just west of Florida. Further implications of this are given.

MUEHLBERGER, W. R. and R. E. DENISON, Precambrtan Geology of South Central New Mextco, Contr. No. AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1964.

VESIAC 8134 VU
AD 455 523

This publication reports on the project that made a petrographtc study of sample materials from each basement well tn the district, and isotropic age determtnations of selected samples in order to work out the geologtcal history of Precambrian. A history of work done in the area, a background discussion of the geology of the area, and a regional statement dividing the Precambrian rocks into four geological untts, together with a description of those units, are given. Conclustons regarding the depositing of a thtck Precambrian sedimentary and rhyolittc, and the depositing of ltmestone, sandstone, and siltstone, are included. Hopefully, a study of Larmtde intrusions will give informatton on the general composttion of the underlytng crustal layers.

MUEHLBERGER, W. R., R. E. DENISON, and E. G. LIDIAK, Basement Rocks in the Continental Interior of the United States, Contract AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1967.

VESIAC 15,726 VU

This paper describes a sequence of areas from north to south that outline tn as near a chronologtc order as possible, the major Precambrtan events of the conttnental tntertor of the U. S., show the variety of basement rock types present, and show the varying detail posstble in mapping depending on the kinds of data available.

MUEHLBERGER, W. R., R. E. DENISON and E. G. LIDIAK, Buried Basement Rocks of the United States of America and Canada, Vol. I., Final Report, Contr. No. AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1964.

VESIAC 8544 VU
AD 449 390

This is the first of a two volume final report on the construction of a map of the geology of the buried basement of the United States and western Canada. The report is intended mainly as an amplification and explanation of the map itself and includes brief descriptions of the rock units recognized and, insofar as possible, their inferred sequence of formation. It also includes: 1) the locattons and rock type of each sample studied petrographically; 2) the specific gravity of cores available; and 3) the isotropic ages of rocks analyzed.

MUEHLBERGER, W. R., R. E. DENISON and E. G. LIDIAK, Buried Basement Rocks of the United States of America and Canada, Vol. II, Appendix, Final Report, Contr. No. AF 49(638)-1115, Univ. of Texas, Austin, Texas, 1964.

VESIAC 8545 VU
AD 449 413

This appendix (Vol. 2 of 2) includes an explanation of symbols used on the map of the buried basement of the U. S. A., petrographic data tables for all wells studied by project members, and tables of density of the basement rock cores which were accumulated during the course of this study.

MUELLER, S., K. FUCHS, Investigations on the Nonelasiic Behavior of the Upper Mantle, Quarterly Progress Rept. No. 1, Contract AF 61(052)-861, Geophysical Institute, Technical University, Karlsruhe, Germany, 1965.

VESIAC 12,920 VU
AD 628 068

The distorting effect of the earth's crust on the spectrum of seismic signals which are transmitted from the source through the mantle to the receiving station, is discussed. In an attempt to correct for the influence of the "receiver-crust" a crustal model for the region of the Grafenberg Observatory (GGGR) near Nürnberg, Germany, has been derived. Its main features are a positive velocity gradient at the top of the crystalline basement, a low-velocity channel at a depth of about 10 km, and the possible existence of a high-velocity layer just above the Mohorovicic discontinuity.

MUELLER, S., and K. FUCHS, Investigations on the Nonelastic behavior of the Upper Mantle, Quarterly Progress Rept. No. 2, AF 61(052)-861, Geophysical Institute, Tech. Univ., Karlsruhe, Germany, 1965.

VESIAC 13,545 VU

A possible procedure for the isolation of the effects of anelasticity ascribed to the upper mantle and its implications on the spectra of body waves is outlined. Reliable information about the source spectrum and the spectral "transparency" of the crust below the source and the receiving station has to be obtained prior to analysis. Work continued to collect previously obtained data on crustal and upper mantle structure in Europe and to reinterpret seismic refraction observations. A reinterpretation of a north-south profile in Western Germany brought forth new evidence for the existence of a low-velocity channel in the upper crust. The influence of this high-velocity layer on the spectra of body waves is discussed for two models of crustal structure along the Haslach profile.

MUELLER, S., and K. FUCHS, Investigations on the Nonelastic Behavior of the Upper Mantle, Quarterly Narrative Progress Rept. No. 4, Contract AF 61(052)-861, Geophys. Inst., Tech. Univ., Karlsruhe, Germany, 1966.

VESIAC 14,975 VU

A special Fortran II program for the spectral analysis of seismic body phases is briefly described. The P- and S-waves of a Crete shock (10 September 1960) have been analyzed with different filters, different sampling intervals and with different time windows. Further evidence for the existence of a low-velocity channel in the upper part of the continental crust has been derived by comparison of experimental and theoretical group velocities of Rayleigh waves in central Germany. A crust and upper mantle model STUTTGART 2 representative for central Europe is presented. Numerical experiments with slight variations of the model parameters and their effects on Rayleigh wave dispersion and S-wave travel times are discussed.

MUELLER, S., K. FUCHS, Investigation on the Nonelastic Behavior of the Upper Mantle, Quarterly Progress Rept. No. 5, Contract AF 61(052)-861, Geophysical Inst., Tech. Univ., Karlsruhe, Germany, 1966.

VESIAC 16,368 VU

P-phases from three shocks recorded by the long-period instruments of the LRSM Graefenberg Observatory have been harmonically analyzed. The spectra of the three components show similarity even in details for the same shock. Slight discrepancies must be ascribed to different instrument response and to different transfer functions for the vertical and horizontal components.

MUELLER, S., K. FUCHS, Investigations on the Nonelastic Behavior of the Upper Mantle, Quarterly Prog. Rept., Contract AF 61(052)-861, Geophys. Inst., Tech. Univ., Karlsruhe, Germany, 1967.

VESIAC 16,519 VU

A brief summary of the work done in evaluating the effect of the crust and upper mantle on the spectrum of body waves is given.

MUELLER, S., K. FUCHS, Investigation on the Nonelastic Behavior of the Upper Mantle, Sci. Interim Rept., Sci. Rept. No. 6, Contract AF 61(052)-861, Geophys. Inst., Tech. Univ., Karlsruhe, Germany, 1967.

VESIAC 17,624 VU
AD 658 047

The spectrum of seismic body phases radiated from sources within the earth's crust is distorted by multiple reflections in the crustal layers. To estimate the crustal distortion crustal transfer functions for P-waves have been computed for sources having a simple radiation pattern in the infinite medium. Radiation patterns have been computed for P-waves in the frequency range from 0 to 0.5 cps. An attempt has been made to separate the effect of the free surface from that of the layered crust in case of an explosive source.

MUELLER, S., and K. FUCHS, Investigation on the Nonelastic Behavior of the Upper Mantle, Progress Rept. No. 8, Contract AF 61(052)-861, Geophysical Inst., Technical University, Karlsruhe, Germany, 1967

VESIAC 18,521 VU

New calculations of the radiation pattern for the two basic source types (atmospheric and buried explosions) have been carried out. Any quantitative conclusions based on the radiation pattern crucially depend on a precise knowledge of the structure of the "source crust". Attempts have therefore been made to evaluate the influence of various crustal parameters.

MUELLER, S., K. FUCHS, Investigations on the Nonelastic Behavior of the Upper Mantle, Progress Rept. No. 9, 1 August - 31 October 1967, Contract AF 61(052)-861, Geophysical Inst., Tech. Univ., Karlsruhe, Germany, 1967.

VESIAC 18,324 VU

This report discusses the present status of the work being done on the investigation on behavior of the upper mantle.

MUELLER, S., K. FUCHS, Investigations on the Nonelastic Behavior of the Upper Mantle, Annual Summ. Rept. No. 1, Contract AF 61(052)-861, Geophysical Inst., Technical Univ., Karlsruhe, Germany, 1966.

VESIAC 14,977 VU
AD 641 312

In this annual summary report, the following work is reported: 1) a procedure for the spectral analysis of seismic body waves is described; 2) digital spectral analysis has been performed for the P and S phase of a Crete shock (10 September 1960). The cause of the variance of the amplitude spectra is investigated; 3) a crustal model has been derived from seismic refraction results close to the Graefenberg Observatory in northeastern Bavaria; new transfer functions have been computed for three crustal models in central Europe; 4) crustal data have been compiled for a trans-European profile from the Iberian Peninsula to northern Fennoscandia; 5) the structure of the upper mantle in Europe was derived from surface wave dispersion data and body-wave travel times.

MULLER, S., "Influence of Semi-Elastic Sediments on the Propagation of Oceanic Rayleigh Waves," Inst. of Ground Displacement and Seismology, Jena, No. 77, pp. 171-175, Undated, (Translated from German), Contract SD-78.

VESIAC 12,721 VU

The analysis of nonstationary seismic processes by means of an electronic sound spectrograph, as given by Ewing, Muller, Landisman, and Sato, permitted for the first time an accurate investigation of the spectrum of oceanic Rayleigh waves and their higher modes. In this report, the spectrum analysis of an earthquake was given which had been recorded on August 21, 1951, in Pasadena, California by a vertical Benioff seismometer and recorded on magnetic tape. This report is concerned with the structure analysis of this recording.

MULLER, S., "Investigations of Continental Rayleigh Waves in Eurasia," Inst. of Ground Dynamics and Seismology, Publ. Jena, No. 77, pp. 165-170, Undated, (Translated from German), Contract SD-78.

VESIAC 12,722 VU

Two earthquakes in Sinkiang, China, in April, 1961, were accurately recorded in Stuttgart with a L-P Press-Ewing seismograph. In both cases, the epicenter was located at the same place at a distance of 5340 km from Stuttgart. The wave path was continental and crossed an extensive mountain massif in the vicinity of the focus. Both seismograms are identical in detail.

This paper shows that a standardized model of the crust for Eurasia can be derived from the phase and group velocity dispersion of continental Rayleigh waves (H = 45 km). For the structure of the upper mantle, the velocity distribution given by Gutenberg must be assumed.

MUNUERA, J. M., Approximate Rough Slip Vector Direction Determination for Iberian Non Shallow Shocks, Using the Polarization Angle from Two Local Stations, Sci. Rept. No. 24, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1968.

VESIAC 18,328 VU
AD 671 516

Simplified method based on working assumptions to deduce an approximate rough slip vector direction for non shallow shocks, using S wave polarization angle from two SP seismological stations and including a program to compute angles, which give this spacial direction, where the two last angles are the dip and drift angles of the probable fault plane, supposing that mechanical focal distribution agrees with Model II.

MUNUERA, J. M., Far Shocks Magnitude Determination from LP Malaga and Toledo Seismograms, Sci. Rept. No. 20, Contract AF 61(052)-657, Inst. Geografico Y Catastral, Madrid, Spain, 1966.

VESIAC 16,497 VU

The paper presents preliminary results obtained as an extension of the magnitude scale which was deduced for near shocks, and is now applied to distant earthquakes using LP records and P waves. The measuring method uses the first three pulse groups on the records, (three components). The results seem acceptable when compared with several values published by different US seismological laboratories.

MUNUERA, J. M., The Intergovernmental Union of Seismology and Seismic Engineering (In Spanish), Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1965.

VESIAC 16,645 VU
AD 647 952

The UNESCO organized four missions of inquiry into seismology and seismic engineering for the regions of Southwest Asia, South America, the Mediterranean and Near Orient, and Africa. At the XII meeting of the general conference of UNESCO a resolution was approved authorizing the General Director to call together an intergovernmental meeting on seismology to determine a concerted action for the improvement of seismic networks, and of the tsunamis warning systems, and also to gain more effective protection against earthquakes. Thus in 1962, the Intergovernmental Union of Seismology and Seismic Engineering was formed. This test pertains to the organization and observations of the missions pertaining to seismology and seismic engineering.

MUNUERA, J. M., Seismic Magnitude and Specific Absorption Coefficient in the Iberian Region, Sci. Rept. No. 14, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1965.

VESIAC 15,897 VU
AD 637 674

This report presents a description of the magnitude scale used by the Spanish Seismological Survey (SSS) for earthquakes inside the area 5^{o} E - 10^{o} W, 35^{o} - 44^{o} N, which has been derived from shear-wave data. A term for the specific absorption coefficient is included in this magnitude scale. The coefficient is computed using theoretical and emperical formulas. Examples of the use of this scale are given.

MUNUERA, J. M., Spanish Map of Probable Seismic Frequency (Abstract), Contr. No. AF 61(052)-657, Inst. Geografico y Catastral, Madrid, Spain, 1964.

VESIAC 7696 VU

This is an abstract of an unpublished article. The authors used as material the previous selection of earthquakes grouped by epochs. Discussed are: 1) use of the Gutenberg and Richter formula; 2) the establishment of the probable frequency period; 3) the fact that all available seismic data are plotted when the intensity was VI or more, 4) the designing of the equal-frequency curves, following a simple topographical criterion. This map can be used to establish different zones in order to obtain application for the building codes or earthquake engineering rules.

MUNUERA, J. M., "Spanish Seismic Map for Probable Intensity," Memorias del Instituto Geografico y Catastral, Vol. 34, No. 2, pp. 1-15, 1965, (Translated from Spanish), Contract SD-78.

VESIAC 10,765 VU

An earthquake catalog published by the Seismology Service of the Inst. Geografico y Catastral is discussed. The following can be derived from the map: a) curve of equal probability for the occurrence of a strong earthquake of given intensity; b) zones of seismic activity applicable to seismic engineering. The findings can be summarized by transformation from the percent curves to the isoseismals of equal probability. The map has been prepared for this purpose, limited to the Spanish territory in the region. Weighted regression, probable frequency, isoprobability, and other subjects are discussed.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Annual Summ. Rept. No. 1, Contract No. AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, Dec. 1963.

VESIAC 7472 VU

This report contains: 1) Introduction, describing, a) Program of the research; b) Work planning to develop the research; 2) Progress during 1963, a) Disturbances and background noise, b) Calibration of SSS net, c) Microseismic storms, Toledo and Malaga, d) Seismicity of the area, e) Crustal structure; 3) Technical Notes Formulated: (TN-1) "Seismic Data", Sept. 1963, J. M. Munuera; (TN-2) "Calibration of the Galitzin type, SP seismographs of the SSS", Oct. 1963, J. Morencos; (TN-3) "Observed noise in the Standard Seismographs of Toledo Observatory", Oct. 1963, G. Payo; (TN-4) "Background noise on the SSS Standard Instruments" (not finished yet), A. Lopez Arroyo.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Annual Summ. Rept. No. 2, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1965.

VESIAC 10,278 VU
AD 615 728

Work accomplished in 1964 includes studies in: a) background noise; b) optimum working conditions of the seismograph net; c) study of microseismic storms, and the study of differences in these storms in Toledo and Malaga; d) regional structure by seismicity studies and comparison with geotechnic Spanish maps; e) crustal structure deduced from near and distant earthquakes, and comparison with the average structure of Europe. Also included is a summary of the scientific reports for 1964, and a list of other additional papers.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Annual Summ. Rept. No. 3, Contract AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1966.

VESIAC 13,911 VU

Topics reported here are concerned with seismicity, crust-mantle structure, and seismic analysis of the Toledo and Malaga regions. Sprengnether seismometer calibration, computer programs, seismicity, crust-mantle structure, and research on the upper mantle structure in the Toledo and Malaga areas are discussed. Technical papers completed during 1965 are included.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Annual Summ. Rept., 1 January - 31 December 1967, Contract AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1968

VESIAC 18,662 VU
AD 671 514

A progress report for 1967, summarizing computer programs prepared, results obtained on Iberian travel times and methods followed in the studies, mainly on focal mechanism is contained in this report. The report includes abstracts of 4 papers presented to the XIVth General Assembly, Zurich, of the IUGG, a list with other 9 publications and 8 additional papers in different stages of preparation.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Final Sci. Rept., 1 Jan. 1963 to 31 March 1968, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1968.

VESIAC 18,331 VU
AD 671 518

The Final Scientific Report contains a note on station factors by Lopez Arroyo; samples deducing m from S spectra and two scanning programs to compute F(C,T) for LQ and LR waves, by Munuera, and comments by Payo on the use of both simplified computer programs to deduce phase velocity dispersion curves. It includes also the abstracts of the 26 Scientific Reports produced and the 11 additional papers published in the total research time, from 1 Jan. 1963 to 31 March 1968.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area, Epicenters and Frequency, Scientific Report No. 6, Contract AF 61(052)-657, Instituto Geografico Y Catastral, Madrid, Spain, 1965.

VESIAC 10,285 VU

The authors have studied the density of shocks at the different active quadricles on the area 10 deg. W - 5 deg. E and 35 deg - 44 deg. N, establishing 22 seismic regions of approximately homogeneous density. A map is prepared; plotted are the acceptable epicenters with coordinates computed or deduced from macroseismic determinations. Results are given concerning the observation of apparently cyclic tendency for the migration of the maximal density corresponding to different epochs, the frequency and magnitude relation, and an approximate expression for the regression of LogN and m.

MUNUERA, J. M., A Study of Seismicity on the Peninsula Iberica Area - Scientific Report No. 17: Iberian Seismicity, 1961-1965, Contract AF 61(052)-657, Inst. Geograf. y Catastral, Madrid, Spain, 1966.

VESIAC 14,807 VU

From recordings of 237 earthquakes, maximal density migration, parabolic regression (log) N, m, cyclic frequency variation, strain accumulation shape, intralpine character and intermediate foci in relation to faults have been deduced in agreement with those of a fifty-year period.

MUNUERA, J. M., J. MORENCOS, A. L. ARROYO, and G. PAYO, A Study of Seismicity on the Peninsula Iberica Area, Scientific Report No. 13, AF 61(052)-657, Instituto Geografico y Catastral, Madrid, Spain, 1965.

VESIAC 13,491 VU

Four main areas are considered in the report: (1) In an attempt to improve the recordings, the authors have investigated the origin and characteristics of the background noise on the SSS net, mainly at Malaga and Toledo; (2) They have considered it a fundamental task to standardize the SSS net, mainly the SP Hiller seismographs, built as an homogeneous series and installed at seven out of nine Spanish stations (five outside the studied area); (3) They have studied the crust-mantle structure between Toledo and Malaga; (4) With regard to seismicity, they analyzed all the material quoted in the Spanish official seismic catalog up to 1960 and made a statistical study of absolute seismicity and relative frequency.

MUNUERA, J. M. and A. LOPEZ-ARROYO, A Study of Seismicity on the Peninsula Iberica Area, Sci. Rept. No. 21, Recording Capabilities of some Spanish Seismological Stations, Contract AF 61(052)-657, Inst. Geografico Y Catastral, Madrid, Spain, 1967

VESIAC 19,021 VU
AD 662 641

Sensitivity curves for TOL and MAL stations are deduced. It is shown that TOL is more sensitive than MAL owing mainly to its longer period microseismic noise, different of the P-wave period.

MURAYAMA, N., "Pressure Waves Produced by the Large Nuclear Explosions in 1961-1962," Kishocho Kenkyu Jiho, No. 15, pp. 5-6, March 14, 1963, (Translated from Japanese), Contract SD-78.

VESIAC 12,446 VU

Direct waves, first trains A, antipodal waves, second trains A, and return of the direct waves after a complete global passage as well as third trains A were found in the microbarograph records of the large explosions at Novaya Zemlya in 1961-1962. Observed features of these pressure waves including some new findings are referred to in some detail in this article. Some of the dispersion curves of group velocity against period exhibit the effects of thermal structure and wind in the atmosphere on the propagation of pressure waves. Tracing of an inversely dispersed wave train superimposed by a normally dispersed wave train in A waves. Other inversely dispersed waves having a period shorter than 0.5 minutes are found.

MURDOCK, J. N., Configuration of the Crust-Mantle System in the Central Aleutians, an Hypothesis, Contract ARPA Order No. 533, Earthquake Mechanism Lab., San Francisco, Calif., 1967.

VESIAC 16,631 VU

This report describes the construction of a hypotheoretical geologic model of the region between the Aleutian Islands and the Aleutian Trench, using data from the 1964 Central Aleutians seismic experiment as well as data from other investigations.

MURDOCK, J. N., Preliminary Report On Earthquake Studies, Contr. No. AF 19(604)-8517, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 7574 VU

This report attempts to determine the feasibility of obtaining polarity data from secondary phases and to arrive at a better notion of the control that the focal mechanism exerts on the seismic record. These studies are now possible with known instrument magnification and uniform instrumentation of the "world array". The study is aimed at determining: 1) whether polarity of secondary phases may now be obtained from uniform recordings; 2) the actual effect of the focal mechanism on the attenuation patterns of P and S; and 3) the significance of observed radiation patterns of secondary phases. The report's seven sections, some of which are included here, describe phase identification, seismic signatures from the Sprengnether system, and other subjects.

MURDOCK, J. N., A Study of Earthquake Activity in the Central Aleutians Recorded at Local Distances, Technical Letter EML-2, Contract ARPA Order No. 533, Earthquake Mechanism Lab., San Francisco, Calif., 1966.

VESIAC 14,469 VU

Small-magnitude earthquakes occurring in the Central Aleutians during the time of the 1964 Aleutian experiment have been located from seismic data gathered at local distances. Shallow earthquakes occurred mainly south of the island arc and seem to delineate a shallow earthquake belt. Deeper earthquakes have been located north of the shallow earthquake belt and these deep earthquakes seem to delineate a trend indicative of a fault (or other tectonic feature) which dips toward the island arc from the oceanic side of the arc.

MURDOCK, J. N. and J. G. MC DERMOTT, Worldwide Collection and Evaluation of Earthquake Data, Semiannual Tech. Rept. No. 4, Contr. No. AF 19(604)-8517, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 8150 VU
AD 441 861

By using the P-polarity method, fault-plane solutions were attempted for nine earthquakes. Although these nine shocks show few P polarities which are inconsistent with the solution, little confidence can be placed in any tentative solution because all solutions contain some nodal figures which were arbitrarily drawn. The P data will allow other configurations. Use of S data has permitted the exclusion of some possibilities in fault-plane orientation as well as exclusion of certain mechanism types. Also discussed are: location of recording station to evaluate attenuation patterns and the attenuation pattern in the nodal vicinity; two distinctly different polarity and attenuation patterns found in studying the suite of Kurile Islands shocks.

MURDOCK, J. N., J. H. PFLUKE, R. G. KRAYNICK, and M. E. BLACKFORD, et al., Microseisms and Teleseisms Recorded in Australia, Tech. Rept., Contract ARPA Order No. 533, Earthquake Mech. Lab., San Francisco, Calif., 1968

VESIAC 18,519 VU

The Earthquake Mechanism Laboratory participated in Project ARPA/SAR-SURA during 1967 and 1968. The field operations were conducted in the Northern Territory of Australia during late July, August, and early September 1967. Objectives of the field project were to acquire seismic data for the following endeavors: (1) description of parameters of recorded microseisms and (2) description of seismic signal reception.

VESIAC 9295 VU

MURPHY, B. F., and L. DONOVAN, Project SHOAL, Final Timing and Firing Report, Final Photo Report, VUF-1006, DASA 1.3, Edgerton, Germeshausen & Grier, Boston, Mass., 1964.

A description of the equipment and operational procedures for Project Shoal Photo support is given. The event took place on 26 October 1963. All cameras functioned properly and good photographic records were obtained.

VESIAC 6477 VU

MURPHY, L. M., Comparison of Yellowknife and College Data, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

Included are data for a comparison of recording capabilities of Yellowknife Station (YKC), described as a relatively sophisticated array station of the Canadian National Network, and the College, Alaska Station (COL) of the Coast and Geodetic Survey. The YKC readings are not results of the array process, but are interpretations made by a helirecorder of a single seismometer. The number of P readings reported is less than the anticipated magnification of the YKC instruments suggests. The Chief of the C&GS Seismology Divisions thinks noise may have been high, or the forwarded P data may represent field analysis, or preliminary interpretation by inexperienced personnel.

VESIAC 6799 VU O

MURPHY, L. M., Seismological Bulletin Special Field Program, Nueva Concepcion, El Salvador (NCS), Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963 (OFFICIAL USE ONLY).

VESIAC 7578 VU O

MURPHY, L. M., Seismological Bulletin Special Field Program, Nueva Concepcion, El Salvador (NCS) November 1963, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 8128 J VU
AD 441 592

MURPHY, L. M. and J. N. JORDAN, Aspects of Magnitude Determinations in the United States Coast and Geodetic Survey, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

In connection with the USC&GS computer program for determining magnitudes of seismic events, the authors discuss the part of the program which will try to relate the magnitude equations in all ranges of depths and distances. Research indicated need for a long-range study of magnitudes in order to improve the state-of-the art. The main consideration of the problem are: 1) the nature of the propagation path; 2) the nature and mechanism of the forces at the focus; 3) the depth of focus; 4) energy range at the focus; and 5) response characteristics of the detectors. The second section of this report discusses "General Considerations" concerning magnitude equations; the third part discusses the USC&GS program to study body-wave magnitudes.

NAIMARK, M. A., "Estimating From Below the Absolute Value of the Real Roots of the Frequency Equation of an Elastic Layer Lying on an Elastic Half Space," Trudy Seismol. Inst., No. 127, pp. 16-25, 1948, (Translated from Russian), Contract SD-78.

VESIAC 12,435 VU

It is shown that the frequency equation of a system consisting of an elastic layer overlaying an elastic half space does not have roots in the interval, where P is the frequency, and a_2 is the velocity of the longitudinal waves in the medium of the half space.

NAIMARK, M. A., "Vibrations of a Thin Elastic Layer Lying on an Elastic Half-Space, Under the Influence of a Concentrated Harmonic Force Applied to the Free Surface of the Layer," Trudy Seism. Inst., No. 127, pp. 1-15, 1948, (Translated from Russian), Contract SD-78.

VESIAC 12,556 VU

In this paper we determine from below the upper limit of the height of a layer at which the frequency equation of this system still has exactly one positive root; the existence of such an upper limit was established in Part I of this work.

NAKAGAWA, I., A Program for Lecolazet's Method in Harmonic Analysis Written for IBM 7094, Contr. No. AF-AFOSR-303-62, Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 8140 VU

Lecolazet's method has been widely used for analyzing earth tidal data obtained with a gravimeter. A program for the Lecolazet's method has been written for an electronic computer, the IBM 7094. The program consists of two parts; one is a calculation of observed tides and the other that of homologous tides. Data correction, data filtering and error calculation are included in the former and calculation of geodetic coefficients in the latter.

NAKAMURA, Y., Frequency Spectra of Refraction Arrivals and the Nature of the Mohorovicic Discontinuity, Contr. No. AF 19(628)-238, Pennsylvania State Univ., University Park, Pa., 1963.

VESIAC 7098 VU

One of the recent developments in the study of the nature and origin of the discontinuity is the phase transition theory, in which a broad transition zone at the discontinuity is expected. To seek seismological evidence of the transition zone, a structure with a linear transition zone has been postulated as a model of the discontinuity and frequency dependence of refraction arrivals has been investigated, first by theoretical considerations, secondly by ultrasonic model experiments and finally by analyses of field data obtained in Maine, 1961. Combining the results of these investigations has enabled an estimate of the minimum possible velocity gradient at the Mohorovicic discontinuity in the Gulf of Maine to be made. The estimated value is 6 (km/sec)/km for the minimum possible velocity gradient.

NAPALKOV, UU. V., "The Structure of Directional Characteristics of Complex Arrays in Seismic Surveys," Akad. Nauk., Prikladnaya Geofizika, Vol. 22, pp. 25-52, 1959, (Translated from Russian). Contract SD-78.

VESIAC 9953 VU

This report develops the methods of calculation and structural directional characteristics for the majority of types of complex arrays now in use. Main areas of investigation developed are: (1) directional characteristics of areal arrays; (2) reduction of some directional characteristics to one-point observation; (3) comparison of linear arrays with different distances between seismographs; (4) directional characteristics of linear heterogeneous arrays; and (5) examples of the structure of directional characteristics of complex arrays.

NATIONAL OBSERV. OF ATHENS (STAFF), Aftershock Sequence and Crustal Structure in the Region of Greece (Outline of the Proposed Project), Contract: Agency Document, National Observ. of Athens, Seism. Inst., Athens, Greece, 1964

VESIAC 18,512 VU

This report is the outline of the proposed project "Aftershock Sequence and Crustal Structure in the Region of Greece". This project concerns the following two main problems. (1) The aftershock sequence and seismicity in the area of Greece; (2) Crustal and upper mantle structure and space coordinates of the hypocenters in the area of Greece.

NAYMARK, M. A., "On the Roots of the Frequency Equation for an Elastic Layer Lying on an Elastic Half-Space," Trudy Geofiz. Inst., Akad. Nauk, SSSR, No. 1, pp. 3-10, Sept. 1951, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,449 VU

This paper shows that the frequency equation of a system which consists of an elastic layer, lying on an elastic half-space, can have roots in the interval (-p/b, -p/a) to (p/a, p/b), where a and b are velocities of the longitudinal and transverse waves in the medium fitting the half-space and p is the observed frequency.

NAYMARK, B. M., "Some Functional Methods in the Ideal Linear Theory of Elasticity," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 11, pp. 90-120, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,131 VU

In this article three problems of the theory of elasticity are solved in a functional formulation for a fairly broad class of regions, and differential properties of the solutions are given. By making use of the structure of the obtained solutions, it is possible to apply approximate methods which have been described in detail in the literature.

NEEDHAM, R. E. and A. K. STEELE, Montana LASA - Data Analysis Techniques, Sci. Rept., Rept. No. S-110-33, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Montana, 1969

VESIAC 19,907 VU
AD 855 745

A description of the seismic signal analysis techniques applied to the Montana Large Aperture Seismic Array (LASA) data in order to produce the daily Seismo Bulletin is presented. These techniques were in use until 14 April 1968, at which time bulletin preparation was discontinued at the Montana location. The procedures and programs used to analyze data as it was input to the Montana LASA Data Center until its output as the daily Seismo Bulletin are discussed.

NICHOLIS, H. R. and V. E. HOOKER, Comparative Studies of Explosives in Salt, Contract No. DASA-EO-301-61, U.S. Bureau of Mines, Wash., D.C., 1962.

VESIAC 7347 VU

The objectives of this investigation were to determine the strain propagation laws for a strain pulse in salt and to compare the seismic effects from the detonation of different explosives in salt.

NICHOLLS, H. R., Shear and Longitudinal Waves from HE Detonations in Tuff—Comparison of Tuff and Granite Data, Final Rept., Contract No. ARPA Order No. 172-61, U. S. Bureau of Mines, Wash., D. C., 1963.

VESIAC 6480 VU
AD 419 454

The program discussed in this report was to investigate the generation of shear and longitudinal waves in two media under varying geologic conditions, using high explosives as a source. The investigation also considered the effect of characteristic impedance matching in two media. The results from field tests in a granite-gneiss medium were reported earlier; here, those data are compared to the data from field tests conducted in tuff near Camp Verde, Arizona, using strain gages of resistanc -wire elements mounted on short lengths of 2 1/8 in. diameter tuff core and commerically available piezo-electric accelerometers.

NICHOLLS, H. R., In Situ Determination of the Dynamic Elastic Constants of Rock, RI 5888, Contract DA 2939, U. S. Bureau of Mines, Washington, D. C., 1961.

VESIAC 12,396 VU

A simple economical method has been developed for determining the in situ longitudinal and shear velocities in rock from which its elastic constants can be calculated. By detonating small charges of high explosives in shallow drill holes near a free surface, both longitudinal and shear waves were generated simultaneously. Measurements were made in two rock types. From the arrival time measurements, the longitudinal and shear wave velocities were calculated. From these velocities and the density of the rock, the elastic constants were calculated.

The dynamic elastic constants of drill core samples of the two rock types were determined in the laboratory by the resonant-frequency method. The laboratory and in situ elastic constants are compared and significant differences noted.

NIKITIN, L. V., "Propagation of Elastic-Plastic Waves in Continuous Media, (All-Union Symposium at Baku)," Vestn. Akad. Nauk. SSSR, No. 2, pp. 111-112, 1965, (Translated from Russian), Contract SD-78.

VESIAC 13,309 VU

This article contains short resumes of the 42 reports that were heard at the All-Union Symposium at Baku on October 7-14, 1964 on the propagation of elastic-plastic waves in continuous media. The symposium was held by the scientific council of the USSR Academy of Sciences and was on the general subject of "Scientific Principles of Strength and Plasticity". In the resolution adopted by the symposium, it was noted that important work has been done in the study of the dynamics of a plastic body, but much remains to be done in a number of areas. The equipment of laboratories for the dynamic material testing with the latest measuring apparatus is weak at present.

NIKOLAVESKII, A. A., "Density Characteristics of the Geologic Section of the Eastern Part of the Siberian Platform," Prikladnaya Geofizika, No. 23, pp. 112-126, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,011 VU

These conclusions were reached in this report: (1) the average density values obtained for the Precambrian, Cambrian, and Meso-cenozoic deposits are closely related to the lithological composition of the rocks, to the density of similar rocks in other regions, and were obtained by analyzing more than 10,000 measurements; (2) the average density of the various groups of rocks of the crystalline sub-structure varies from 2.6 to 2.95 g/cm^3; the average density of the rocks of the crystalline base as a whole over the eastern part of the platform is given; (3) the established density difference between the various groups of rocks of the crystalline structure reveals the possibility of the use of gravimetric surveys for zoning the Pre-cambrian substructure.

NORTHROP, J., Relationship Between Source Characteristics and Earthquake T Phases in the North Pacific Area, Res. & Dev. Rept., Sept. 1964 - May 1968, Rept. No. NUWC TP 88, Contract NONR 3748(01), Naval Undersea Warfare Center, San Diego, Calif., 1968

VESIAC 19,766 VU
AD 848 080

This report covers an investigation of earthquake-generated underwater-sound signals (T phases) from the Aleutian Islands area. The mode of generation of T-phase signals, variation in signal strength, signal duration, frequency spectrum, source characteristics, detection threshold, and source location accuracy are discussed.

NORWEGIAN DEFENSE RES. EST. (STAFF), NORSAR Phase I, Operation and Maintenance, Tech. Interim Rept., 1 February to 30 November 1968, Rept. No. ESD-TR-69-00, Contract F61052-68C-0009, Norwegian Defense Res. Est., Kjeller, Norway, 1969

VESIAC 20,173 VU

The report has four chapters: (1) A short introduction states the purpose of the operation of the Phase 1 system and defines the O & M tasks; (2) Then follows a rather detailed description of the system, covering geographical configurations, constructional and other technical layouts; (3) The third chapter describes the O & M organization and its facilities, and lists the working routines and records; and (4) Finally the operational experiences are summed up, partly as a narrative of the operations, partly in the form of graphical statistics.

NORWEGIAN DEFENSE RES. EST. (STAFF), NORSAR PHASE 2, The 1968 Installation Program, Tech. Rept., 1 Jan. 1968 to Spring 1969, Rept. Nos. ESD-TR-69-00, NDRE IR-S-45, Contract F61052-68C-0060, Norwegian Def. Res. Est., Kjeller, Norway, 1969.

VESIAC 20,340 VU
AD 711 069

Project NORSAR concerns installation and operation of a large seismic array in S-E Norway.

This report covers that part of the NORSAR Phase 2 installation which has customarily been entitled the 1968 Installation Program. It covers the field installations of the so-called A and B-ring subarrays, i.e. the innermost 8 subarrays of the array, and to some extent also the establishing of the Data Processing Center at Kjeller and the telecommunication channels linking the latter to the individual subarrays.

Various circumstances made it necessary that the 1968 Installation Program was extended in time well beyond the calendar year 1968. The period covered by this contract expires late spring 1969.

NORWEGIAN DEFENSE RES. EST. (STAFF), Norwegian Seismic Array - Phase 1 (Installation), Final Tech. Rept., Rept. No. IR-S-37, Contract F61052-68C-0009, Norwegian Defense Res. Establ., Kjeller, Norway, 1968.

VESIAC 19,306 VU
AD 691 010

This report concerns installation of Phase 1 of a large aperture seismic array (NORSAR) being built in south-eastern Norway. Phase 1 comprises a 12 short period (SP) seismometers subarray at Øyer near the town of Lillehammer, a 5-7 SP sensors experimental noise study array at Falldalen, E of Lake Mjosa, and a rudimentary long period (LP) array consisting of 3 three-component LP sensors located at Øyer, Falldalen and Borgseter, the latter point situated about 20 km from the Swedish border.

The data handling system consists of 5 recording units, one each for the two SP arrays and the three LP installations. The units have a multiplexer for sampling of sensor analog signals, an analog/digital converter and a magnetic tape station for recording of digital codes for identification, time-of-day and sensor signals. Drilling and casing of some 20 boreholes in bedrock, trenching and laying of about 60 km of cables and building of four underground vaults were the main constructional tasks of the Phase 1 project.

Subsequent to a brief pre-history of NORSAR, Phase 1, the report describes the planning and implementation stages and presents the technical data of the project.

NUNN, H. D., The Design, Fabrication and Laboratory Testing of a Deep Well Inertial Seismometer, Semiannual Rept., Contract AF 33(600)-42890, VT/1129, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 9570 VU

Described is a seismometer, about to be designed, which will sense earth motions to approximately one Angstrom unit at depth of 10,000 feet. It shall not exceed 5 in. O.D. and shall operate for derivations of up to 10 degrees from vertical. As of January 1962, the project had completed about 85% of the design as follows: (a) seismic spring attached to the mass through a levered flexure system; (b) lower flexures to be of the straight Willmore type; (c) mass to be composed of the transducer magnets which move relative to the coils mounted to the instrument case; (d) an electromechanical device employed to calibrate the seismometer; and (e) an extra moving coil transducer to provide more signal energy without adding mass. The project will be completed by February 1962.

NUNN, H. D., The Design, Fabrication, Laboratory Testing and Field Evaluation of a Deep Well Inertial Seismometer, Progress Report, Rept. No. T/1129-18, Contract VT/1129, AF 33(600)-42890, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 15,326 VU

This report describes the operation, the results of laboratory testing and the field operation of the inertial seismometer. The contract's objectives were to design, fabricate, and test in the laboratory and field a modular deep well, moving coil, inertial seismometer with a large enough seismic mass to eliminate the need for an integral preamplifier. Capabilities, design, and testing of the seismometer are described, including work at the Pasadena facility, the Prater Field Site, and the Trigg Field Site. The data from the tests indicates that the instrument response curves duplicate those of conventional instrumentation.

NUTTLI, O., The Determination of S Wave Polarization Angles for an Earth Model including Crustal Layering, Semiannual Tech. Rept., No. 6, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6855 A VU

The technique is described for obtaining the polarization angle at the smaller epicentral distances for which the horizontal phase velocity is less than the P velocity in the mantle.

NUTTLI, O., Some Effects of the Crust and Free Surface on the Amplitudes of P and S Waves, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8217 B VU

The author deals with the reduction of surface motion, taking into account the structure of the crust and upper mantle. He attempts to take the observed surface or ground motion and determine from it the amplitude of the P- and S-wave particle motion in the upper mantle near the recording station. The author mentions some problems which involve the use of bodywave amplitudes to which his investigation may apply, and also gives some background information on the problem. At the end of the report are a number of conclusions, the central idea of them being that the crustal and upper-mantle structure has an important effect on the amplitude and wave shape of recorded body-wave motion.

OBENCHAIN, R., LASA Phase Shift Measurements, Special Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,613 VU
AD 822 630

As part of the engineering evaluation of Montana LASA; an extensive measurement program was conducted to determine the magnitude and bounds of phase shift in the sensing system of LASA. A total of 75 systems and their major components contained in subarrays A0, B4 and C2 were measured. The purpose of this report is to present a statistical sampling of the data thus obtained, together with curves which summarize some of the more important features of the data.

OBENCHAIN, R., Plastic Casing Study - Special Report, Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,612 VU
AD 822 631

This study was undertaken to establish the feasibility of using plastic casing in future LASA installations and compare it technically, operationally, and economically to steel casing. It was found that it is operationally feasible to utilize plastic pipe to house seismometers in a LASA installation. Taking life expectancy into consideration, the plastic pipe competes favorably with the cost of steel pipe. Preliminary checks indicate that the seismometers operate satisfactorily within the plastic pipe.

OBENCHAIN, R., RA-5 Amplifier Temperature Effects, Special Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,610 VU
AD 822 628

During the reporting period, measurements were made on two amplifiers and wellhead vault panels which were obtained from the LASA maintenance center in Miles City. These measurements were made over the temperature range of -20°F. to +140°F. Both thermal transient and stable temperature measurements were made.

OBENCHAIN, R., RA-5 Amplifier Temperature Effects, Supplement No. 1, Special Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,609 VU
AD 822 632

This report covers additional work on RA-5 amplifiers temperature effects. An investigation of the dynamic range of the amplifier over the temperature range was made. During the course of this investigation, the linearity and common mode response of the amplifier were measured. The results of these measurements are reported.

OBENCHAIN, R., Remote Amplifier Gain Calibration and Power for Subarrays B1 and F3, Sci. Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,608 VU
AD 822 633

The description of a system for remote amplifier calibration is presented.

OBENCHAIN, R., Seismograph Noise - Special Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,614 VU
AD 822 629

The purpose of the study was to determine the relationship of spurious signals appearing at the well-head amplifier input terminals to the connection pattern of the seismometer cable and the seismometer. It was found that the removal of cable conductors from the seismometer main coil center tap terminal did not reduce the spurious signal magnitudes at the amplifier input.

OBENCHAIN, R., Thermoelectric Power Supply for LASA CTH, Special Rept., Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,611 VU
AD 822 634

The power requirement for the LASA signal acquisition and conditioning components is centered in the 21 subarrays. The consideration of future installations includes the probability that dependable, well-regulated primary power systems will not be available. Therefore, the employment of an independent power source for each of the subarrays is a practical solution to the power problem if suitable equipment is available.

The search for such an independent subarray power source is the subject of this report. A commercially available power source of the thermoelectric type has been located and is described.

OCAL, N., "The Seismicity of Turkey," Pure and Applied Geophysics, Vol. 57, pp. 103-116, 1964/I, (Translated from Russian), Contract SD-78.

VESIAC 8135 VU

Using the formulas given by Gutenberg and Richter, the author has calculated the magnitude and energy of 1804 earthquakes which occurred in Turkey during the period of 1850-1960. In drawing the "isenerget," the formula $\sigma = \log_{10} S$ was used according to the definitions given by Toperczer and Trapp, where $S = \Sigma e_i / F \cdot p$ represents the energy in erg/m^2h corresponding to the surface element of 0.5^o lat. $\times$ 0.5^o long. Furthermore, the relationship between the seismicity and the tectonics of Turkey was studied by drawing maps of the epicenters, the focal depths and the frequencies of the earthquakes of various intensities.

ODEGARD, M. E., N. MARK, N. J. LETOURNEAU, and T. H. KWON, Ocean-Bottom Seismographic Station (OBS) Catalogue to Events for the Period 1 February 1967 to 31 January 1968, Sci. Interim Rept., Sci. Rept. No. 1, Contract F19628-68C-0083, Hawaii Inst. of Geophs., Honolulu, Hawa 1969

VESIAC 20,078 VU
AD 700 812

This is a catalogue of events recorded by the Columbia Ocean-Bottom Seismographic Station during the period 1 February 1967 to 31 January 1968. The text includes a description and location of the station. The list of events gives the date, time of arrival, phase identification, recording component, and, where possible, a description of the cause of the disturbance.

OLCZAK, T., "On the Earthquake of February 27, 1786 in the Western Carpathians," Acta Geophysica Polonica, Vol. 12, No. 4, pp. 251-255, 1964, (Translated from French), Contract DA 49-083 OSA-3137.

VESIAC 14,183 VU

Discussed are the different opinions regarding the location of the epicenter of the earthquake, of February 27, 1786 in Moravia, N. Slovakia, and SW Poland. It is pointed out that it is relatively simple to demonstrate that the epicenter was located in the region of Cieszyn-Frydek in the immediate proximity of the foot of the western Carpathians. The depth of the focus, the magnitude of the earthquake, and foreshocks and aftershocks are discussed. The belief that "two earthquakes are probably involved" in the seismic events of February 27, 1786 is confirmed in this article.

OLIVER, J., Some Observations of Unusual Seismic Waves, Contract SD-78, Univ. of Mich. I. S. T., Ann Arbor, Michigan, 1966.

VESIAC 13,999A VU

Anomalous features observed on seismograms obtained by long-period instruments at various sites throughout the world are discussed.

ONG, C. Y., Frequency-Domain Maximum-Likelihood Adaptive Filtering, Seismic Array Processing Techniques, Tech. Rept. No. 9, Contract VT/0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,421 VU

Recent intensive study of adaptive (gradient-search) filtering in the time domain has not solved the problems with rate-of-convergence problem, which is a major difficulty with this technique. A recent study based on a set of time stationary synthetic data shows that the time-domain maximum-likelihood adaptive filter converges very slowly to the optimum filter. After 3300 iterations of adaption with an adaptive rate of 10 percent of maximum value, the adaptive filter is still about 4 db away from the optimum filter in the sense of mean-square outputs.

Time-domain adaptive filtering necessitates using only one convergence parameter for all filter coefficients, which may cause slow convergence for some data. Frequency-domain adaptive filtering may solve this problem, since different convergence parameters can be used for different frequency components. This report describes a frequency-domain maximum-likelihood adaptive-filtering algorithm analogous to the time-domain adaptive algorithm. This algorithm was used with a set of synthetic stationary data previously used for a time-domain adaptive-filtering study. Different filter lengths and convergence parameters were used. Results are compared with beamsteer and time-domain adaptive filter.

ONG, C. Y., Long-Period Signal Separation Experiments, Seismic Array Processing Techniques, Tech. Rept. No. 6, Contract VT 0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,395 VU

The problem of separating Rayleigh waves from two distinct epicenters received simultaneously was studied. The relations between the target-to-interferring-event (TTIE) ratio and interfering event suppression as well as target event extraction in MCF design were examined. Using the vertical components of the array, the results show that interfering event suppression increases as TTIE ratio increases. For the data recorded at LASA using a 5-channel 21-point MCF designed with a TTIE ratio equal to -10 db and -40 db, the interfering event was suppressed by 15.5 db and 22.0 db, respectively. There was no significant signal distortion.

The coherence between the vertical and horizontal traces of an individual site was examined, using two FBO samples. Utilizing a 2-channel, 43-point prediction filter, prediction errors of -9.1 db and -16.4 db, respectively, are shown in the results.

OREGON STATE UNIV. (STAFF), Compilation of Reprints, Contr. No. AF-AFOSR 376-62, Oregon State Univ., Corvallis, Oregon, 1964.

VESIAC 8569 VU

This document is a compilation of the following reprints: 1) Technical Report 35 - "A port Gravity Base Station Network in Oregon," The Ore Bin (March 1964); 2) Technical Report 36 - "Earthquake Energy Release and Isostasy," Bull. Seism. Soc. Am. (April 1964); 3) Technical Report 38 - "The Oceans: A Neglected Mining Frontier," The Ore Bin (April 1964); and 4) Data Report 15 - "Sedimentary Rocks from the Continental Shelf and Slope Off the Central Coast of Oregon," The Ore Bin (May 1964).

OROWAN, E., Physics of the Seismic Source, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-T VU

Since high undercooling or superheating needed for a rapid phase transformation is unlikely under geological conditions, tectonic earthquakes should be caused by the collapse of the resistance of the material to stress, i.e., a "mechanical instability" such as a frictional shear fracture in the Coulomb layer or ductile (creep) shear fracture at greater depths. Instability of this kind involves the concentration of shear strain in a thin layer (shear band or surface of fracture); the seismic source is then necessarily a fault or several faults releasing one another, not a quasi-continuous volume source. Coulomb friction alone cannot produce seismic shocks: the presence of a cohesive strength is necessary. If the cohesive strength is restored after an earthquake at an initially rapid but decreasing rate while the tectonic stress rises steadily, earthquakes occur more or less periodically.

PAKISER, L. C., Continental Crust, Contract ARPA Order No. 193-64, U. S. Geological Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 8146 VU O
AD 441 301

PAKISER, L. C., D. P. HILL, Traveltimes, Amplitudes, and Crustal Structure Between Nevada Test Site and Boise, Idaho, Tech. Letter No. 36, Contract ARPA 193-65, U. S. Geological Survey, Denver, Colo., 1965.

VESIAC 13,782 VU
AD 470 849

Travel times of seismic waves from nuclear explosions recorded north of the Nevada Test Site (NTS), when corrected for delays in the upper 20 km of the crust based on interpretation of reversed profiles form chemical explosions, indicate that the depth to the M Discontinuity ranges from 29 km at a distance of 100 km north of NTS in the Basin and Range Province to 48 km at a distance of 680 km north of NTS in the Snake River Plain. Abrupt changes in the M Discontinuity occur in three places. Given is the velocity in the upper layer of the crust. Amplitudes of PN fall off with the inverse third power of distance; implications of this regarding the upper mantle structure are given.

PAPAGEORGE, G. E., Design of an Electrical Analog for Spherical Wave Propagation in Solid Elastic Media, Thesis, Contract No. AF-AFOSR 376-62, Oregon State Univ., Corvallis, Oregon, 1964.

VESIAC 8420 VU

This thesis investigates the design of electrical analogs to represent the propagation of seismic waves. The analogs developed allow for the study of the effects of variations in the characteristic constants of the medium through which the wave propagates and further allow for the characteristics of the source to be imposed on the compressional displacement propagation. It is assumed that the source may be represented by a spherical radiator and by solving the wave equation in spherical coordinates, the transfer function of the wave is obtained. Design of the analog is described. To include the effects of multiple layering a second analog, described here, was designed.

PAPAZACHOS, B., N. DELIBASIS, N. LIAPIS, G. MOUMOULIDIS, and G. PURCARU, Foreshock and Aftershock Sequences of Some Large Earthquakes in the Region of Greece, Scientific Rept. No. 5, Contract AF 61(052)-803, Natl. Observ. of Athens, Athens, Greece, 1966.

VESIAC 15,024 VU
AD 641 160

Deformation characteristics, magnitude and time distribution of the aftershock of the large earthquakes occurring in the region of Greece from 1926 till 1964 are investigated. An approximate relation between the number of aftershocks and the magnitude and focal depth of the main shock has been found. Also, an approximate relation has been derived between the magnitude of the largest aftershock and the magnitude and focal depth of the main shock. It is shown that some properties of the earth's material in the aftershock region can be derived by studying the magnitude distribution and deformation characteristics of the aftershocks.

PAPAZACHOS, B., N. MANDALOS, and M. POLATOU, Dispersion of Surface Waves Recorded in Athens - Scientific Rept. No. 6, Contract AF 61(052)-803 (AFOSR), Natl. Observ. of Athens, Athens, Greece, 1966.

VESIAC 15,170 VU
AD 642 546

Records at Athens, Greece, of 85 earthquakes with epicenters in several regions of the earth were used to determine the group velocities along thirty-five paths. The mean crustal thickness along each path has been estimated by comparing the observation with Press's standard curves. A linear relation has been found between the mean crustal thickness and mean elevation along each path. This relation is in agreement with Airy's isostatic hypothesis. Determination of Love-wave dispersion along five paths and Rayleigh-wave dispersion along two paths in southeastern Europe and northern Asia Minor gave values from 35 to 45 km for the crustal thickness in this region.

PAPIRNO, R., H. BECKER, Photoelastic Simulation of a Seismic Radiation Source, Final Rept. No. AFCRL-64-1009, Contract AF 19(628)-4012, Allied Res. Assoc. Inc., Concord, Mass., 1964.

VESIAC 9442 VU
AD 610 515

A two phase photoelastic investigation of the radiation field surrounding a simulated seismic source was performed. First, a method was developed for producing a shear fracture in a simulated shear fault in a urethane photoelastic plate model. The limited selfhealing ability of fractures in urethane rubber was exploited in this phase of the investigation. High-speed motion pictures of the shear fracture process indicated that a slip-stick mode of fracture occurred prior to the opening of a finite width crack. Second, strobelasticity was employed to study the radiation pattern after shear impact. The isoclinic analysis and the derived stress trajectories indicated that dilational and distortional waves were present.

PARARAS - CARAYANNIA, G., J. SASSER, Earthquake Epicenter Determination Using Delta t Data, Rept. No. HIG 65-16, Contract NONR-3748(01), Hawaii Inst. of Geophysics, Univ. of Hawaii, Honolulu, Hawaii, 1965.

VESIAC 15,902 VU
AD 631 847

Theoretical time differences in the arrival of P-waves at five different seismic stations around the Pacific have been compiled and plotted by digital computer and by hand. Time-difference curves have been plotted for each pair of seismic stations; such curves will allow the quick determination of earthquake epicenters.

Included in this report is a modified version of the spherical hyperbola program that was used in the compilation. Travel-time difference charts are included as appendices for all combinations of the seismic stations.

PARIISKAYA, G. N., "Study of the Surface of a Vertically Layered Medium with a Complex Relief on the Basis of a System of Longitudinal Seismic Profiles," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 6, pp. 283-319, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,037 VU

The possibility is shown of investigating the surface of a vertically layered medium characterized by a complex relief on the basis of dynamic and kinematic features of seismic refracted waves recorded on a system of longitudinal profiles.

UNIV. OF PARIS (STAFF), Activity Report of the Physics Laboratory of the Ecole Normale Superieure - Seismology, Univ. of France, Paris, France, 1966, (Translated from French), Contract DA-49-083 OSA-3137.

VESIAC 16,757 A VU

In this report, the results of work in seismology conducted by the Physics Laboratory of the Ecole Normale Superieure for the year 1966 are summarized.

PAVAGEAU, J., "Dispersion of a Plane Wave on an Irregular Surface By Reflection," Acad. Sci. Paris Comptes Rendus, Vol. 256, No. 2, pp. 390-392, 1963, (Translated from French), Contract SD-78.

VESIAC 9413 VU

Utilizing the Fourier transform for the representation of the reflecting surface, a dispersion law was established in which phase and amplitude fluctuations introduced by the irregularities of this surface are taken into account simultaneously.

PAYO, G., Crustal Structure of the Mediterranean Sea, Part II, Phase Velocity and Travel Times, Sci. Interim Rept., Rept. No. AFOSR 67-2415, Contract AF 61(052)-657, Inst. Geografico Y Catastral, Madrid, Spain, 1967

VESIAC 19,027 VU
AD 662 628

Crust-mantle structure of the Mediterranean sea is studied by phase velocity of Love and Rayleigh waves and by body waves travel-time. Two distinct regions are found; a Western Zone between Italy and Spain of oceanic type (crustal thickness about 13km) not showing low velocity channel in the Upper Mantle, and an Eastern Zone to the South of Greece (crustal thickness about 23 km) with a very thick sedimentary layer.

PAYO, G., A Study of Seismicity on the Peninsula Iberica Area - Observed Noise in the Standard Seismographs of Toledo Observatory, Contr. No. AF 61(052)-657, Inst. Geografico Y Catastral, Madrid, Spain, 1963.

VESIAC 8185 VU

The correlation between the velocity of the wind in the area of Toledo Observatory and the noise observed on the long-period records of Standard seismographs has been studied. This correlation shows a clear dependence between the observed noise amplitudes on the horizontal components and the wind direction and velocity. The maximum amplitudes are produced for the wind coming from the east. The authors though that this was because the E-wall of the vault is the side of the building most exposed to the wind's free action. The authors suggest a modification of the vault, or, the construction of a new one. Studies of noise produced by traffic on the highway nearest the Observatory have been made.

PEEBLES, J. R., and F. M. BINDER, Large-Array Signal and Noise Analysis. Special Sci. Rept. No. 21, Epicentral Estimation for Five LASA Events Using Frequency-Wavenumber Spectra, Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 19,043 VU
AD 841 672

Five short-period events were processed using a 15-sec gate for the LASA A0, D-ring subarray, a 10-sec gate for the extended E3 subarray, and a 5-sec gate for the F1 subarray. Gate positions were based on time-trace playbacks and were chosen to include the primary P-wave arrivals.

PEKERIS, C. L., Final Report on Theoretical Seismology Covering the Period of January 1, 1961 Through December 31, 1964, Contract AF 61(052)-509, Weizmann Inst. of Sci., Rehovot, Israel, 1965.

VESIAC 13,995 VU

The main objective of this research is to produce exact theoretical seismograms due to explosions of prescribed character in well-defined elastic media. The main subjects studied have been: (1) The nature of seismograms produced by explosions in a sphere; (2) The free oscillation of the earth; and (3) Propagation of seismic pulses in a flat layered elastic half-space.

PEKERIS, C. L., Theoretical Seismology, Annual Rept., 1 Jan. 1961 to 31 Dec. 1961, Including Quarterly Tech. Status Rept. No. 4, Contract No. AF 61(052)-509, Weizmann Inst. of Sci., Rehovot, Israel, 1962 (OFFICIAL USE ONLY).

VESIAC 5576 VU O

PEKERIS, C. L., Theoretical Seismology, Final Report, Contract AF 61(052)-841, Weizmann Inst. of Science, Rehovot, Israel, 1966.

VESIAC 14,176 VU

The main topics of this research were: Theoretical Seismograms, The Internal Constitution of the Earth, Analysis of the P-Arrival Times from the Eniwetok and Bikini Nuclear Explosions and Seismic Travel Times. This report lists four Technical Notes and nine journal publications relating to these topics.

PENA, C., Seismic Noise Survey, Volume 3, Long-Range Seismic Measurements Program, Tech. Data Rept., Contract VT/6703, F33657-67-C-1457, Teledyne Industr., Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,903 VU
AD 820 869

This report is the third in a series of studies which evaluate seismic noise levels at LRSM sites. Data from the short- and long-period vertical seismographs from 33 sites are reviewed, and standardized data compilation methods are discussed. Cumulative probability distribution of amplitude curves and noise spectrum curves are developed for each site studied.

PERELMAN, I. I., "Determination of Apparent Velocity According to the Time-Distance Curves of Reflected Waves," Razved. I Promsl. Geofiz., No. 51, pp. 39-42, 1964, (Translated from Russian), Contract SD-78.

VESIAC 12,550 VU

A method for determining apparent velocity at any point of the time-distance curve of a reflected wave is presented, assuming that a section of the travel time can be approximated with sufficient accuracy with a second order curve. All of the assumptions concerning the structure of the medium and the method for average velocities are of course retained.

PERONACI, F., "The Seiches of Iseo Lake," Annali di Geofisica, Vol. 2, No. 3, pp. 406-416, July 1949, (Translated from Italian), Contract DA 49-083 OSA-3137.

VESIAC 14,375 VU

The experimental data relative to uni-, bi-, and tri-nodel seiches obtained with a model of the lake of Iseo, were compared with the analytical results presented in a previous report. Some seiches were found which involve only certain basins of the lake, with the result that the analytical study and the observations are in full agreement.

PETKEVICH, G. I., and T. Z. VERBITSKII, "Investigation of Longitudinal Elastic Wave Velocities in Rocks Saturated by Liquids," Inst. Geofiz. An SSSR, Geofiz. Svornik, Vol. 5, No. 7, pp. 93-97, 1963, (Translated from Russian), Contract SD-78.

VESIAC 12,551 VU

To clarify the physical nature of the saturation and in so doing to determine the character, magnitude and sign of the change in velocity of elastic waves in real rocks, the authors have made direct measurements on core samples of various lithological types of rocks. By the method of ultrasonic sounding (at a frequency of 140 cps), determinations were made of the velocity of longitudinal waves in 67 rock specimens saturated with distilled water, 12 specimens saturated with aqueous 20% NaCl solution, and 18 specimens saturated with kerosene. The velocities were measured in the natural, maximally saturated, and absolutely dry states of the specimens.

PETRUSHEVSKII, B. A., "The Relation Between Earthquakes of Maximum Intensity and the Geological Conditions," Byullet. Soveta po Seysmologii, A. N. SSSR, No. 8, pp. 28-38, 1960, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,310 VU

This paper deals with the possible conclusion that although seismic-geological investigations do not give direct answers to questions about the frequency and intensity of earthquakes, still, by using geological data, one can obtain approximate indications of the relative frequency of underground shocks in some cases.

PETRUSHEVSKIY, B. A., "The Geological Fundamentals of Seismic Zoning - The Relation of Seismicity to Geological Features," Akad. Nauk, SSSR, Geofiz. Inst. Trudy, Vol. 155, No. 28, pp. 1-59, 1955, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 15,092 VU

The author finds the seismo-tectonic method proposed by Gubin to be based on erroneous assumptions and supports Gorshkov's seismo-geologic method. Tectonic features of the near-surface strata of a region cannot determine the genesis of seismic phenomena which have their source at much greater depths. Only the study of deep geology of an area can make possible the localization of the focus of an earthquake to determine its mechanical cause and to relate seismologic evidence with the most important geologic features. Therefore, the first step in seismic zoning ought to be the study of the geology of the region. Tectonic features can be of secondary importance and must be explored for their local value, of interest primarily in engineering problems.

PFLUKE, J. H., Model Studies of Seismic Energy Distribution Around Different Types of Source II First Motions Produced by an Actual Fault (THESIS), Contract No. AF 19(604)-7383, Pennsylvania State Univ., University Park, Pa., 1963.

VESIAC 6195 VU

To facilitate the analysis of seismic data in earthquake focal-plane problems it has been attempted to find a mathematical equivalent of an earthquake source comprising a system of suddenly applied forces acting at the focus which would deliver the same pattern of seismic waves as the earthquake itself. This hypothetical system of forces is referred to as the earthquake source mechanism. In an effort to discover the expectable source mechanism of earthquakes due to faulting in the earth, two-dimensional seismic models were investigated. These models are discussed in detail in the report. The amplitudes of the first motions of P and S waves were recorded and plotted for all models, and are discussed. Presented is a hypothetical description of the physical processes at the source.

PFLUKE, J. H., Seismic Model Studies of First Motions Produced by an Actual Fault, (Dissertation), Contract AF 19(604)-7383, Pennsylvania State University, University Park, Pennsylvania, 1963.

VESIAC 9579 VU

In order to facilitate the analysis of seismic data in earthquake focal-plane problems it has been attempted to find a mathematical equivalent of an earthquake source comprising a system of suddenly applied forces acting as the focus which would deliver the same pattern of seismic waves as the earthquake itself. This hypothetical system of forces is referred to as the earthquake source mechanism. In an effort to discover the expectable source mechanism of earthquakes due to faulting in the earth, two-dimensional seismic models were investigated. A hypothetical description of the physical processes at the source is presented which is based on the model observations and theory.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array (LASA), First Quarterly Tech. Rept., 1 May to 1 August 1968, Rept. No. ESD-TR-68-316, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Montana, 1968

VESIAC 18,785 VU
AD 840 080

This report concerns technical activity at the Montana LASA. It describes engineering work to interface the IBM System/360 Model 44 computer to the LASA and the programming to develop the operating system for the Montana segment of the Interim Integrated Signal Processing System.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, First Quarterly Tech. Rept., Rept. No. ESD-TR-69-369, Contract F19628-70C-0010, Philco-Ford Corp., Billings, Montana, 1969

VESIAC 19,934 VU
AD 863 532

This report concerns the technical activity associated with the operation and maintenance of the Montana Large Aperture Seismic Array (LASA). The data center computer operation statistics are presented. A description of the array control along with such array operation statistics as subarray data outages and incidence of defective array equipment is provided. The maintenance effort at the LDC and LMC is discussed and the work order system is described. The activities, such as land restoration, of maintaining the array facility are listed. Also provided are discussions of the RA-5 amplifier bias battery increasing failure rate and the actions taken to rectify the defective sensors at subarray E3.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, First Quarterly Tech. Rept., Rept. No. ESD-TR-70-364, Contract F19628-70C-0254, Philco-Ford Corp., Billings, Mo., 1970

VESIAC 20,463 VU

This report concerns the technical activity associated with the operation and maintenance of the Montana Large Aperture Seismic Array (LASA) for the period May - July, 1970. Changes in the operating modes of both the IBM/360 and PDP-7 computers are described. The microbarograph data recording is described. Array equipment failures are summarized. Progress on the long-period system modification and the RA-5 amplifier rehabilitation program is presented. Statistics relating to the operation of the data center, maintenance of equipment and land facilities support are provided.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Second Quarterly Rept., 1 August to 31 October 1968, Rept. No. ESD-TR 68-426, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Montana, 1968

VESIAC 19,261 VU
AD 846 155

This report concerns technical activity at the Montana Large Aperture Seismic Array (LASA). IBM System 360 Model 44 computer programming to complete the Montana segment of the Interim Integrated Signal Processing System (IISPS) and system testing are discussed. Array work described includes installation of attenuated short-period and long-period seismic signal channels and completion of the Large Aperture Microbarograph Array (LAMA). A report on oil well drilling noise confirms preliminary conclusions which state that no effect on LASA data analysis from analog sum signals is evident unless drilling occurs within about two miles of the center hole sensor. Measured short-period seismic channel phase shift statistics are reported.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Second Quarterly Tech. Rept., Rept. No. ESD-TR-70-31, Contract F19628-70C-0010, Philco-Ford Corp., Billings, Mo., 1970

VESIAC 20,119 VU
AD 866 562

This report concerns the technical activity associated with the operation and maintenance of the Montana LASA for the period October - December, 1969. The LASA Data Center computer operation statistics are presented. Array operation statistics such as subarray data outages and incidence of defective array equipment are provided. The LASA maintenance effort for the period is discussed. Locations of oil well drilling activity in the array vicinity are presented. Discussions of equipment built for the improvement and safety in testing the LASA weather station equipment and standby power system are given.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Second Quarterly Tech. Rept., Rept. No. ESD-TR-70-381, Contract F19628-70C-0254, Philco-Ford Corp., Billings, Mo., 1970

VESIAC 20,464 VU

This report concerns the technical activity associated with the operation and maintenance of the Montana Large Aperture Seismic Array (LASA) for the period August - October 1970. Improvements to the array operation using the PDP-7 computer for on-line monitoring and calibration control are described. Progress on the long-period system modification, the RA-5 amplifier rehabilitation, the LTV-6 microbarograph remote calibration, and the power system battery voltage measurement modification is presented. Array equipment performance and failures are summarized. Statistics relating to the operation of the data center, maintenance of equipment and land facilities support are provided.

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Third Quarterly Technical Rept., Rept. No. ESD-TR 69-57, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Montana, 1969

VESIAC 19,397 VU
AD 850 373

This report concerns technical activity of the Montana Large Aperture Seismic Array (LASA). Computer program and equipment configuration changes to the Montana segment of the Interim Integrated Signal Processing System (IISPS) are discussed. Array work described included installation of a number of weather stations which permit the measurement of wind speed and direction, temperature, and barometric pressure. A report on the evaluation of a thermoelectric generator as a subarray power source concludes that it is entirely satisfactory with respect to reliability, output stability, operating economy, simplicity of operation, insensitivity to ambient conditions, and overload protection. Also provided are statistics on the seismic events reported in the Seismo Bulletin, maintenance of the equipment, and general operation of the Data Center.

VESIAC 20,251 VU
AD 871 747

PHILCO-FORD (STAFF), Montana Large Aperture Seismic Array, Third Quarterly Tech. Rept., Rept. No. ESD-TR-70-137, Contract F19628-70C-0010, Philco-Ford Corp., Billings, Mo., 1970

A planned study of the short-period seismic channel tolerances is presented. A new procedure for characterizing array equipment failures is described along with changes to the EDP maintenance documentation system. Recent calibration data for the ESSA micro-barograph array are given. Release of a weather bulletin via phone line interface between the LASA Data Center and the Billings Weather Bureau is described. Description of a long-period seismometer cabling and free-period adjustment improvement modification is included. A short-period sensor field test and RA-5 amplifier rehabilitation program in progress is detailed. The LDC computer and array operation statistics are provided.

VESIAC 19,750 VU
AD 855 745

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Fourth Quarterly Tech. Rept., Rept. No. ESD-TR-69-181, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Mo., 1969

This report concerns technical activity at the Montana Large Aperture Seismic Array (LASA). The computer program changes to the Montana segment of the Interim Integrated Signal Processing System (IISPS) are discussed. These were required in order to delete the tape recording function and to eliminate other peripheral equipment. Brief descriptions of the various Montana LASA manuals being prepared or revised are presented. Also provided are statistics on the seismic events reported in the Seismo Bulletin, maintenance of the equipment, and general operation of the Data Center.

VESIAC 19,885 VU
AD 860 480

PHILCO-FORD CORP. (STAFF), Montana LASA, Final Rept., 1 May 1968 through 30 June 1969, Rept. No. ESD-TR-69-283, Contract F19628-68C-0401, Philco-Ford Corp., Billings, Montana, 1969

This report represents fourteen (14) months of activities by the Communications and Technical Services Division of the Philco-Ford Corporation in behalf of the Montana Large Aperture Seismic Array (LASA). The presentation covers a precise and factual discussion of research and engineering work and technical effort during a fifth quarterly period from 1 May 1969 through 30 June 1969 (Section II) and a summary of accomplishments for the entire contract period of 1 May 1968 through 30 June 1969 (Section III). Particular attention is focused on the development, improvement and reconfiguration of LASA during the contract period.

VESIAC 20,402 VU

PHILCO-FORD CORP. (STAFF), Montana Large Aperture Seismic Array, Final Rept., 1 July 1969 to 30 April 1970, Rept. No. ESD-TR-70-269, Contract F19628-70C-0010, Philco-Ford Corp., Billings, Montana, 1970

The method employed for remotely calibrating the amplitude responses of the array's short-period seismic channels is described. The operation for the period of remotely controlling the long-period seismometers is presented. Array equipment failures are summarized.

Progress on efforts directed towards allowable channel tolerances. is indicated. The maintenance programs together with a summary of activities are discussed. Improvements to short-period and long-period seismic systems and the installation of near-surface seismometers at subarray D1 are described. Statistics relating to the operation of the data center, maintenance of equipment and land facilities support are provided.

PHILLIPS, D. R., and D. S. KELLEY, Preliminary Evaluation of Beam-Steering Capabilities of the TFSO 37-Element Array, Tech. Rept., Rept. No. TR 68-47, Contract VT/8702, F33657068C-0766, Teledyne Indust., Inc., Geotech Division, Garland, Texas, 1968

VESIAC 19,157 VU

The evaluation of the beam-steering capabilities of the 37-element short-period seismograph array at TFSO indicates that the array provides a signal-to-noise ratio improvement over a signal detector of approximately 12 dB at frequencies near 1.0 cps. The phased summed output of the array suppresses the noise by a factor of $\sqrt{N}$ (15.6 dB) for frequencies greater than about 1.5 cps. At 1.0 cps, the average noise reduction relative to an individual output is 13.7 dB. The signal amplitude loss in a 30-second P-wave coda is between 1.0 and 2.0 dB in the frequency range of greatest signal power (0.5-1.0 cps).

PHILLIPS, D. R., and J. M. WARD, Evaluation of the Detection Capabilities of the UBSO Long-Period Array, Rept. No. TR 69-53, Contract VT/9703, F33657-69C-0759, Teledyne-Geotech, Garland, Texas, 1970

VESIAC 20,126 VU
AD 866 821

Three events from different directions were selected from which both a P and a Rayleigh waves energy was recorded by the seven vertical long-period seismographs of the UBSO array. Using the power density spectra of the signals and noise segments preceding the signals, signal-to-noise ratios were formed for the simple and phased summations. The simple summation indicated an improvement in signal-to-noise over a single detector of approximately 17 dB at the peak noise frequency of 0.0625 cps for the P-wave signal, but showed little or no improvement for the Rayleigh energy because of the large degree of Rayleigh signal loss. In all three cases the phased summations show improvement for both P and Rayleigh signals; however, the degree of improvement varied from event to event because of the directional properties of the noise sources.

PHILLIPS, G. C., L. M. MOTT-SMITH, C. WU, and J. C. WOODALL, Study of Seismic Signals and Noise Detected by a Buried Array, Rept. No. 4410-83-X, Contract SD-78 (ARPA), Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884-II VU
AD 452 596

Simultaneous recordings of seismic signals and noises with instruments consisting of a short period vertical-movement Benioff seismograph and an array of seven shallowly buried low frequency geophones have been compared. In general, the same earthquake signals were recorded in both systems, but the amplitudes of undesired background noise have been reduced in the buried-array system. It is concluded that the buried-array system produces a clearer, more outstanding, P-wave arrival event, within its detection capability.

PHILLIPS, G. C., and C. WU, Enhancement of Seismic Signals by Means of a Buried Array, Semiannual Rept. No. 2, MI P 3614, Contract AF 19(628)-3888, Mandrel Industr., Inc., Houston, Texas, 1965.

VESIAC 11,795 VU

Simultaneous recordings of seismic signals and noises with instruments consisting of a short-period vertical-movement Benioff seismograph and an array of seven shallowly buried 2-cps seismometers has been compared. Conclusions are given. Results are given of estimates of spectral density of noise and signal plus noise for record samples obtained at three field sites (Houston Site, Llano Site in Texas, and Poplarville Site in Mississippi) which were computed and compared. Given is how the improvement factor was determined. Values for various sites are presented, and two factors that contributed to the improvement are given.

PHILLIPS, G. C., and C. WU, On Recordings of Salmon Event of Project DRIBBLE, Memorandum, Contr. No. AF 19(628)-3888, Mandrel Indust., Inc., Houston, Texas, 1964.

VESIAC 8741 VU

Discussed is the relevant information about the two types of records giving data on the SALMON event of Project DRIBBLE, Miles City Station in Montana, October 22, 1964. Section I describes the field arrangement of the instruments, given Benioff trace magnification, and reports that the traces 1-7 move downward if the first motion is compressional, and upward for rarefractional motion. Traces 8 and 9 are reversed. Also noted is the large amplitude of trace 9 of the "Heliocorder Record". Section 2 describes the field set-up, the magnification factor, and an analysis of the "Playback Record for Detail Studies". Included is the recording of a probable teleseismic event around 10:00 a. m., (5.5 minutes after the arrival of the SALMON Event).

PHILLIPS, G. C., and C. WU, Research Directed Towards the Enhancement of Seismic Signals by Means of a Buried Array, Semiannual Rept., Contract AF 19(628)-3888, Mandrel Industr., Inc., Houston, Texas, 1965.

VESIAC 9960 VU

This project proposes to investigate the geophysical reasons why the shallow buried array improves signal-to-noise ratio so that optimum use of the techniques may be directed towards further improvement of the ratio. The three phases of the contract described are: (1) to modify the detecting system to permit recording the output of seven individual seismometers; (2) to investigate other areas where different geological and geophysical environments exist; and (3) to analyze data obtained in order to compare signal-to-noise ratios obtained by the seven-seismometer array and a surface Benioff seismometer.

PHILLIPS, G. C., C. WU, Study of Seismic Signals and Noise by Means of a Buried Array, Final Report, 1 February 1964 to 1 February 1966, Rept. No. AFCRL-66-578, Contract AF 19(628)-3888, Mandrel Industries, Inc., Houston, Texas, 1966.

VESIAC 14,952 VU
AD 637 687

Spectral treatments on S-P (0.5 - 5.0 cps) seismic noise obtained from four sites with a small buried seismometer array at shallow depths were performed. The results obtained from the Houston site indicate (1) high coherence; (2) similarity of wave packets; (3) attenuations of particle velocity with near surface layers acting as a low-pass filter; (4) almost constant propagation velocity of about 1150-1250 ft/sec. As a result of these findings, conclusions are reached regarding the seismic noise near 2 cps in this area, and the S-wave velocity in the weathering layer. Similar results were obtained at Montana sites and the Tennessee site except the seismic noise propagates at higher velocities.

PHINNEY, R. A., Geophysical Data Recording and Processing Using a Small Digital Facility, Sci. Rept., Contract AF 49(638)-1243, Princeton Univ., Princeton, N. J., 1967

VESIAC 18,531 VU

The equipment and operating configuration described in this report arose from the recording needs of the field magneto-telluric program started under NSF sponsorship in 1966. Briefly, the requirements for data recording in the magneto-telluric experiment are stated.

PHINNEY, R. A., Research in Geophysics (Seismology), Semi-Annual Tech. Summ., Contract AF 49(638)-1243, Princeton Univ., Princeton, N. J., 1964

VESIAC 18,510 VU

The method of spectral ratios has been applied to the analysis of long-period body waves at the USC&GS stations at Albuquerque and Bermuda-Columbia. An exposition of the method and analysis of the results will be distributed in a separate paper which will be available soon.

PHINNEY, R. A., Research in Geophysics (Seismology), Semi-annual Tech. Summ. and Quarterly Progress Rept., Contract AF 49(638)-1243, Princeton Univ., Princeton, N. J., 1967.

VESIAC 16,506 VU

The results of a study of diffraction by the core are presented along with a brief outline of the computer programs used in the analysis of LASA and LRSM data.

PHINNEY, R. A., Structure of the Earth's Crust from Spectral Behavior of the Long Period Body Waves, Contr. No. AF 49(638)-1243, Princeton Univ., Princeton, N. J., 1964.

VESIAC 7565 VU
AD 432 362

Long-period P waves from distant earthquakes have been analyzed at Albuquerque and Bermuda in light of Haskell's theory for the spectral response of a layered crust. By using the ratio of the vertical spectrum to the horizontal component spectrum, one obtains a function which depends on structure beneath the station. Because of the poorly understood nature of the signal which follows the first P motion, the motions of power spectral analysis were applied and a lag window selected to discriminate against long time correlations with the signal. It is explained how corrections for the differing responses of the three components are made. Also described is a range of crustal models, agreeing with the data, which have been found.

PHINNEY, R. A., Theoretical Calculation of the Spectrum of First Arrivals in Layered Elastic Media, Contract AF 49(638)-1234, Princeton Univ., Princeton, New Jersey, 1965.

VESIAC 10,584 VU
AD 617 746

A difficulty arises in the calculation of the spectral parameters of first-arriving signals in seismology because the first arrival usually behaves as an imperfectly trapped mode. Mathematically, it arises from the contributions of branch line integrals and complex poles. Attempts to transform the solution into a generalization of the normal modes have been a mathematical success only. The difficulties of this solution necessitate a different, less elegant approach: by a change of variable, by twice transforming the solution to form a product. The technique is completely described in this article.

PHINNEY, R. A., and D. V. HELMBERGER, Research in Geophysics (Seismology), Final Rept., 1 July 1963 through 31 December 1969, Contract AF 49(638)-1243, Princeton Univ., Princeton, N. Y., 1969

VESIAC 20,456 VU

The primary objectives of the project were: (1) The development of theoretical methods for treating the amplitude and phase characteristics of body waves in the earth. (2) The development of parallel numerical methods for computing the amplitudes and phases of body waves in a radially heterogeneous earth. (3) The application of these results to a more complete understanding of observed long- and short-period signals from explosions and earthquakes.

PIERCE, A. D., and J. W. POSEY, Theoretical Prediction of Acoustic-Gravity Pressure Waveforms Generated by Large Explosions in the Atmosphere, Final Rept., 1 Feb. 1967 to 31 Jan. 1970, Contract F19628-67C-0217, Mass. Inst. of Tech., Cambridge, Mass., 1970

VESIAC 20,252 VU
AD 707 122

A computer program is described which enables one to compute the pressure waveform at a distant point following the detonation of a nuclear explosion in the atmosphere. The theoretical basis of the program and the numerical methods used in its formulation are explained; a deck listing and instructions for the program's operation are included. The primary limitation on the program's applicability to realistic situations is that the atmosphere is assumed to be perfectly stratified. However, the temperature and wind profiles may be arbitrarily specified. Numerical studies carried out by the program show some discrepancies with previous computations by Harkrider for the case of an atmosphere without winds. These discrepancies are analyzed and shown to be due to different formulations of the source model for a nuclear explosion. Other numerical studies explore the effects of various atmospheric parameters on the waveforms. In the remainder of the report, two alternate theoretical formulations of the problem are described. The first of these is based on the neglect of the vertical acceleration term in the equations of hydrodynamics and allows a solution by Cagniard's integral transform technique. The second is based on the hypothesis of propagation in a single guided mode and permits a study of the effects of departures from stratification on the waveforms.

PILANT, W. L., Automated Techniques in Model Seismology, Contract AF 49(638)-1534, Univ. of Pittsburgh, Pittsburgh, Pa., 1966.

VESIAC 14,948 VU

The introduction of advanced electronic instrumentation has made possible a large improvement in the techniques of model seismology. Instead of using the time-consuming process of hand reduction of photographic records, one can now record travel times and wave amplitudes directly from the oscilloscope presentation and can digitize entire waveforms for later processing on a digital computer. As an example of waveform analysts, transmission coefficients are obtained for Rayleigh waves propagating around a corner in a two-dimensional situation.

PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Semi-annual Tech. Rept., Contract AF 49(638)-1534, University of Pittsburgh, Pittsburgh, Pa., 1966.

VESIAC 14,454 VU
AD 482 820

The first part of this report is a study dealing with Rayleigh surface wave velocities across North America. The second is concerned with the transmission of Rayleigh waves around the corner of a wedge. Results for this part of the study are in final form and are compared with theoretically predicted values.

PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Semi-Annual Tech. Rept., Contract AF 49(638)-1534, Univ. of Pittsburgh, Pittsburgh, Pa., 1966.

VESIAC 15,183 VU
AD 804 294

A discussion is given of the quality of the data obtainable from carefully selected Rayleigh surface waves traversing the North American continent. Using data from five events, a phase velocity map is constructed for the United States, the Canadian Shield, and Greenland. Average values are computed for various regions of this area and are given in a table and compared from region to region as well as with previous results.

PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Final Tech. Rept., Contract AF 49(638)-1534, Univ. of Pittsburgh, Pittsburgh, Pa., 1967.

VESIAC 16,647 VU

The principle purpose of this research was to investigate the effects of major tectonic features of the earth upon the transmission of surface waves. To do this, a study was made of Rayleigh waves crossing the North American continent from many azimuths. The following properties were looked at: phase velocity variation, group velocity variation, refraction and reflection, and attenuation.

PILOTTE, F. F., and E. A. FLINN, A Preliminary Evaluation of a Method for Linear Array Data Processing, Contract VT/2037, AF 33(657)-12247, United ElectroDynamics, Inc., Pasadena, Calif., 1964 (OFFICIAL USE ONLY).

VESIAC 7613 VU O
AD 439 059

PLUTCHOK, R., Analysis of Seismic Noise at the Yellowknife Array, Can[illegible], Scientific Rept. No. 157, Contract VT/6702, AF 33(657)-15919, Teled[illegible]ne Indust., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 14,948 VU

The introduction of advanced electronic instrumentation has made possible a large improvement in the techniques of model seismology. Instead of using the time-consuming process of hand reduction of photographic records, one can now record travel times and wave amplitudes directly from the oscilloscope presentation and can digitize entire waveforms for later processing on a digital computer. As an example of waveform analysis, transmission coefficients are obtained for Rayleigh waves propagating around a corner in a two-dimensional situation.

PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Semi-annual Tech. Rept., Contract AF 49(638)-1534, University of Pittsburgh, Pittsburgh, Pa., 1966.

VESIAC 14,454 VU
AD 482 820

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PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Semi-Annual Tech. Rept., Contract AF 49(638)-1534, Univ. of Pittsburgh, Pittsburgh, Pa., 1966.

VESIAC 15,183 VU
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PILANT, W. L., Tectonic Features of the Earth's Crust and Upper Mantle, Final Tech. Rept., Contract AF 49(638)-1534, Univ. of Pittsburgh, Pittsburgh, Pa., 1967.

VESIAC 16,647 VU

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PILOTTE, F. F., and E. A. FLINN, A Preliminary Evaluation of a Method for Linear Array Data Processing, Contract VT/2037, AF 33(657)-12247 United ElectroDynamics, Inc., Pasadena, Calif., 1964 (OFFICIAL USE ONLY).

VESIAC 7613 VU O
AD 439 059

PLUTCHOK, R., Analysis of Seismic Noise at the Yellowknife Ar y, Canada, Scientific Rept. No. 157, Contract VT/6702, AF 33(657)-15919, Teledyne Indust., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 15,020 VU

From data supplied by the United Kingdom Atomic Energy Authority the structure of the vertical component of a seismic noise field at the Yellow-Knife array in Canada (YKC) was examined. Because of the large relative spacing at YKC, meaningful wave-number spectra could not be obtained. Thus the noise field was examined by computing auto- and cross-correlations, power-spectra, and coherencies of various noise samples at chosen seismometers. System noise was found to adversely effect the results obtained, particularly above 1.5 cps.

POCKELS, F., "Results of More Recent Seismic Research Relative to the Physical Constitution of the Interior of the Earth," Sonder. Auz. Geol. Runds., Vol. 1, pp. 249-268, 1910, (Translated from German), Contract SD-78.

VESIAC 9531 VU

The recent seismic research referred to in the title was apparently completed not later than 1910, the latest date in the bibliography or footnotes. Pokels has reviewed the basic operations of a seismograph, paying close attention to the interpretation of seismic waves as they suggest the composition of the core and the existence of a sudden change in the interior at a depth of about 1500 km. He reviews the work of Wiechert, Laska, Benndforf and Zoppritz, and announces confirmation of Wiechert's theory of a metal core and a rock mantle 1300 to 1600 km thick. Most of the paper is devoted to the mathematics and geometry of travel time curves as they are used to determine the path of the rays of the first or second foreshocks.

POHLMAN, N. E., and V. G. GREGSON, Experimental Investigation of Decoupling Techniques, IITRI No. T6087, Contract DA 49-146-XZ-317, Illinois Inst. of Tech., Chicago, Ill., 1965.

VESIAC 10,191 VU

The primary objective of this program is to reduce the seismic disturbances from underground explosions by manipulating the close-in material surrounding the explosive charge. A series of closely controlled experiments have been conducted by IITRI. The standard test, the resulting seismic records, the computation of the decoupling factor, the measurement of peak to peak amplitude for the third peak of the Rayleigh wave and values for the tamped charge in relation to the value of the air cavity are discussed.

POLAK, L. S., "Attenuation and Absorption of Reflected Waves in Sedimentary Rocks," Akad. Nauk, Prikladnaya, Geof., Vol. 17, pp. 16-32, 1957, (Translated from Russian), Contract SD-78.

VESIAC 10,136 VU

The author investigates the principle and mechanism of attenuation of elastic longitudinal waves reflected by rocks from a theoretical and practical point of view. He concludes that the attenuation of intensity by artificially exciting and elastic longitudinal wave as the result of travel through a layer of sedimentary rocks, its reflection and return to the surface, is determined by a series of factors: by the propagation of a wave front, substantially by absorption, by the relation of the depth of a reflecting layer to the wave length, by the smoothness of the reflecting boundary, by the Rayleigh coefficient of reflection, and by an oblique incidence also with the emergence of converted waves. The nature of absorption and the coefficient of absorption are fully discussed.

VESIAC 15,915-I VU

POLLACK, H. N., Two-Dimensional Waves on an Infinite Medium Bounded Internally by a Harmonically Pressurized Ellipse, Rept. No. 7885-1-X, Contract AF 49(638)-1170 - DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

This paper studies the role of the cavity shape in determining the two-dimensional far-field radiation from a pressurized source. The radiation patterns are obtained for both the longitudinal and transverse waves radiating from an elliptical region that varies from a line source to a circular source.

VESIAC 13,124 VU

POLLOCK, P., and J. G. MC DERMOTT, Worldwide Collection and Interpretation of Earthquake Data, Special Rept. No. 2, Correlation of Time Residuals with Magnitude, Contract No. C — 104-65, Texas Instr., Inc., Dallas, Texas, 1965.

This report presents the results of an investigation to determine whether; (1) an empirical correlation may be observed between time residuals and magnitude on a station-source region basis; (2) average time residuals as observed on seismic recordings tend to become more negative as magnitude increases; (3) station-source region time corrections expressed as a function of magnitude will increase the accuracy of hypocenter determinations. Also discussed is the source of the time residual data used in this study. Results are given of the evaluation of the computer output. Limitations of the techniques used in this study are given, and suggestions for future studies.

VESIAC 10,247 VU

POLSHKOV, M. K., "Questions of the Theory and Calculation of an Electro-Dynamic Seismograph with the Calculation of the Input Circuit of a Seismic Amplifier," Akad. Nauk, Prik. Geofizika, Vol. 22, pp. 37-58, 1959, (Translated from Russian), Contract SD-78.

This paper is about the correspondence of parameters of an electrodynamic seismograph and the input circuit of a seismic amplifier, and the theory of established processes in the system "an electrodynamic seismograph"—the input of a seismic amplifier. Attempted, is to give a clear idea of the form of the frequency and phase characteristics of a seismograph, with a calculation of the influence of an electrical input circuit of an amplifier on these characteristics, and even more on the form of established processes, originating in the seismograph with its connection to the input of a seismometer channel. The author tries to solve problems concerning the form of the characteristics of the system of "seismograph-amplifier input" and of special processes of this system.

VESIAC 15,915-D VU

POMEROY, P. W., The Distance Ranges and Minimum Magnitudes Required for Detection of Surface Waves, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

The distance ranges and minimum magnitudes required for recording surface waves using long-period seismographs are studied. Results indicate that there is effective surface-wave generation at least in the magnitude range about 3.6 and that probably there is no minimum limit on the magnitudes at which surface waves are generated.

VESIAC 12,851 VU
AD 622 794

POMEROY, P. W., Establishment of a Long-Period Seismograph Network Utilizing Magnetic Tape Recording, Rept. No. AFCRL-65-527, Contract AF 19(604)-8485, Lamont Geological Observatory, Columbia University, Palisades, New York, 1965.

Discussed are the establishment and operations of a world-wide network of long-period seismograms recording on magnetic tape. Station locations are given, and instrumentation described. Given are eight analysis techniques developed and/or utilized for data analysis in this program. Also discussed are four studies of particular interest to the VELA UNIFORM PROGRAM.

VESIAC 14,325 VU

POMEROY, P. W., Establishment of a Long Period Seismograph Network Utilizing Magnetic Tape Recording, Semiannual Tech. Summ. Rept. No. 4, Contract AF 19(604)-8485, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1963.

Four stations of a network of long-period seismograph stations using magnetic tape as a recording medium have been established and the seismic data is currently being received at the Lamont Observatory for analysis and storage. Analysis of tape recorded data is currently being emphasized. Discussed in this report are: (a) the network stations; (b) instrumentation; and (c) analysis techniques.

VESIAC 14,326 VU

POMEROY, P. W., Establishment of a Long Period Seismograph Network Utilizing Magnetic Tape Recording, Semiannual Tech. Summ. Rept. No. 6, Contract AF 19(604)-8485, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1964.

A network of long-period seismograph stations using magnetic tape recording and magnetic tape data analysis was established. All stations of the network are now operational and the seismic data is being received and analyzed in the Analog Analysis Laboratory of Lamont Observatory. Current emphasis is on the analysis of the tape recorded data. Discussed in this report are: (a) network stations; (b) instrumentation; and (c) analyses and results.

VESIAC 9170 VU

POMEROY, P. W., Establishment of a Long Period Seismograph Network Utilizing Magnetic Tape Recording, Semiannual Tech. Summ. Rept. No. 7, 1 June 1964 - 30 November 1964, Contract AF 19(604)-8485, Lamont Geol. Observ., Palisades, N. Y., 1965.

The first part of this report lists the completely operational stations of the network, and describes the design, testing and procurement of real time playback facilities for remote stations and the installation of the TR-48 analogue computer. Part two discusses studies of the aftershock sequence of the Alaska earthquake, ocean bottom data, Gnome and Hardhat data, recording of the larger Lake Superior shots on the short-period magnetic tape system at Palisades, and a study to determine the lower limit in time between P and S at which the multiplication of the longitudinal and vertical components can separate P and S.

POMEROY, P. W., Operation of a Long Period Seismograph Network Utilizing Magnetic Tape Recording and Analyses of Data Recorded on Magnetic Tape, Annual Rept. I, June 1965-May 1966, Contract AF 19(628)-5058, Columbia University, Lamont Geol. Observatory, Palisades, N. Y., 1966.

VESIAC 15,542 VU

Given are the stations of this network which have been fully operational during the report period. During the year, automatic time encoding units have been built and shipped to these stations. Also given are scientific accomplishments during the period: (1) Analysis of short-period energy from GNOME, HARDHAT, Hebgen Lake, and New Madrid events was completed. An abstract of a paper on this subject is included; (2) Analysis of relative excitation of surface waves by the underground nuclear explosion LONGSHOT was completed partially under support of the contract. An abstract is included for a paper on the subject; and (3) Analysis of amplitude and phase information on PcP arrivals for nuclear explosions and earthquakes has been carried out.

POMEROY, P. W., Operation of a Long Period Seismograph Network Utilizing Magnetic Tape Recording and Analysis of Data Recorded on Magnetic Tape, Final Sci. Rept., Contract AF 19(628)-5058, Lamont Geol. Observ., Columbia Univ., Palisades, New York, 1967.

VESIAC 16,724 VU

Many studies utilizing data from the worldwide network of long-period seismographs have been carried out and several of these are of particular significance to the VELA-UNIFORM program. These include: (1) the relative excitation of surface and body waves by the underground nuclear explosion LONGSHOT; (2) the magnitude and AR measurements from nuclear explosions and earthquakes in the western U. S.; (3) the determination of energy radiation patterns for GNOME, HARDHAT, and the New Madrid and Hebgen Lake earthquakes; and (4) the amplitude frequency content and travel times of PcP from nuclear explosions and earthquakes.

POMEROY, P. W., Two Seismograph Stations on the African Continent, Final Report, Contract AF-AFOSR 678-64, Lamont Geol. Observ., Columbia Univ., Palisades, New York, 1966.

VESIAC 16,074 VU
AD 651 478

Two seismographs stations have been established in Africa, one at Lamto, Ivory Coast, and one at Abeche, Chad. This report contains a detailed description of the instrumentation and preliminary results at the Abeche station. At Abeche, a 3 element 3-component short-period array, 15 km. on a side, is operated. The seismograph signals at the end points of the array are telemetered to a central station where they are recorded photographically and on magnetic tape. Short period gains of approximately 300 k are utilized. Preliminary results on the detection capability of this station as a function of magnitude and distance are presented.

POMEROY, P. W., Seismological Studies, Semiannual Tech. Rept., Contract AF 19(604)-8375, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1961.

VESIAC 9791 VU

This report contains a survey of four items: (1) filtering techniques and subsequent study of earthquakes occurring in the vicinity of the Easter Island Rise; (2) short period seismic recordings in the Sterling Mine at Ogdensberg; (3) a summary of the establishment of a long period seismographic station to form a tripartite array with Palisades and Waynesburg stations; and (4) report on the June 6, 1961 worldwide storms of microseisms with periods of about 26 to 27 seconds.

POPOV, V. V., "Geological Engineering Criteria of Detailed Seismic Zoning," Trudy Inst., Fiziki Zemli, A. N. SSSR, (Trans. Inst., Phys. Earth, Akad. Nauk, USSSR), No. 5, pp. 81-93, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,917 VU

Characteristics of ground conditions are presented for estimating point rating changes for purposes of seismic microzoning.

POSZEL, F. B., Comparison of Rainier Results with Rand Theory for Cratering by a Surface Blast, Contr. No. SD-50, Inst. Defense Analyses, Wash., D. C., 1962.

VESIAC 8780 VU
AD 428 216

This paper makes an appraisal of the results presented in Rand Research Memorandum RM 2600 by a significant comparison with test results from RAINIER, a deep underground nuclear explosion of 1.7 KT detonated at Nevada Test Site in September 1957. This paper arose over a need for an objective comparison of theory with experimental evidence. The author concludes that the methods of RM 2600 would not be reliable even for the relatively simple case of a spherical explosion in soil and should not be a basis for claiming the discovery of a new method for producing large craters by impact of bomb parts.

POTTER, T. F., Array Research-Special Rept. No. 19- Generalized Horizontal-Vertical Interpolation Arrays, Contract AF 33(657)-12747, Texas Inst., Inc., Dallas, Texas, 1966.

VESIAC 15,535 VU
AD 807 648

The author considers use of concentric rings of horizontal seismometers to estimate average output of a ring of verticals (concentric with horizontal rings) in an isotropic noise field which may contain more than one mode. Formulas for numerical calculation of ring crosspower spectra and optimum interpolation filters are included. A means for graphically representing response of a given horizontal-vertical interpolation array to surface wave noise having arbitrary dispersion and horizontal-vertical coupling is presented. Also discussed is the calculation of array response for several array geometries and noise fields.

POTTER, T. F., R. B. RODEN, Array Research Theoretical Capability of Systems of Horizontal Seismometers for Predicting A Vertical Component in Ambient Trapped-Mode Noise, Special Report No. 7, Contract AF 33(657)-12747, VT/4053, Texas Instruments Inc., Dallas, Texas, 1965.

VESIAC 13,048 VU
AD 626 407

The theoretical capabilities of systems consisting of a single vertical seismometer and one or more horizontal seismometers are investigated. Results indicate that arrays of horizontal-component seismometers should prove to be useful tools for the removal of trapped-mode noise from the outputs of vertical-component instruments. Condttions necessary for the effective functioning of these arrays are discussed. Reasons are given why it ts unlikely that difficulties presented by system noise, uncorrelated seismic notse and Love waves should be any more serious than they are in the case of vertical-component arrays. For these reasons, and others, it is concluded that multicomponent seismometer arrays offer a great deal of promise for signal enhancement applications.

POWELL, T. and D. FRIES, Handbook: World-Wide Standard Seismograph Network, Contr. No. SD-78, Untv. of Mtchigan, Inst. of Sci. & Tech., Ann Arbor, Mtch., 1964.

VESIAC 7812 VU
AD 439 691

This report is a compilation of informatton about each of the seventy-ftve stations in the World-Wide Cooperative Standard Seismograph Network as of June 1963. This tnformatton includes material on each station's location and factlittes, envtronment, vault and pter constructton, and instrumentation. Maps, dtagrams, and photographs supplement the text.

PRENTISS, D. D., Seismic Signals on the Deep Ocean Floor, Final Rept., Contract AF 19(604)-8357, Lamont Geol. Observ., Palisades, N. Y., 1963.

VESIAC 7533 VU
AD 431 180

Thts is a final report on the "Seismic Motion of the Deep Ocean Floor". The Lunar Telemetering Bottom Seismograph (LTBS) was developed. A dtscussion of its use, the battery pack used in connection with it, and the mechanical design of the three long-period 15 second seismometers, the same as the lunar prototype except that the sprtngs are designed for earth gravity, is included. The project installed low-frequency amplifters (0.025-10.0 cps) to make recordings at intervals from March 10, 1963 to September 24, 1963. Approximately 50 earthquakes can be recognized. These records are discussed. Described are multiple phases produced by the reflection of incident seismic energy from the ocean surface and back to the bottom detector.

PRESKITT, S. V., Improved Seismographs, Semiannual Rept. No. 1, Contract No. VT/072, Geotechnical Corp., Garland, Texas, 1961.

VESIAC 5562 VU

Summarized is work on Geotech Project VT/072 in the six months ending December 31, 1960. The development and testing of an engineering mockup of the long-period seismometer model 7505 continued. The instrument suffered from hysteresis, particularly at long periods; new pivots of beryllium copper improved the hysteresis, but the trouble remained. The vertical seismometers were modified for operation at an angle of 35° 16' from the horizontal. Work on the design of a 100-second galvanometer continued; a prototype coil reached a maximum period of 65 seconds. In the spectrum analysis equipment, signals will be applied to a bank of filters covering the frequency range of 0.01 to 10 cps.

PRESKITT, S. V., Improved Seismographs, Semiannual Rept. No. 2, Contract VT/072, AF 33(600)-41824, Geotechnical Corp., Garland, Texas, 1961.

VESIAC 5563 VU

During the six months ending June 30, 1961, the Geotechnical Corporation completed or continued work on eight parts of the Project. The eight parts, progress on which is discussed at some length in the report are: 1) Improved vertical and horizontal long-period seismometers were constructed and testing began; 2) a short-period triaxial seismometer was assembled and put into operation at WMSO. Preliminary designs for a long-period model were not yet complete; 3) a rugged long-period galvanometer designed by Harris was constructed. Attempts to reduce damping are being made; 4) Electronic and galvanometer-type notch filters were evaluated; and 5) commercial amplifiers were evaluated. Other work is reported.

PRESS, F., Dimensions of the Source Region for Small Shallow Earthquakes, Rept. No. 7885-1-X, Contract AF 49(638)-1337 - DA 49-083 OSA-3137, SD-78, Calif. Inst. Tech., Pasadena, Calif., 1967.

VESIAC 15,915-J VU

Available data are reviewed and interpreted to obtain very rough indications of the source dimension for small-magnitude earthquakes. A magnitude 4 earthquake may have a source dimension between 1/10 and 1 km.

Tocher's hypothesis on a plastic zone within the crust is modified to place the zone in the upper-mantle low-velocity, low-Q region. With this change, energy release from large earthquakes would vary with the horizontal area of the source region. Small earthquakes would release energy proportional to the volume of the source region.

PRESS, F., Free Oscillations, Aftershocks and Q, Contract AF 49(638)-1632, Mass. Inst. of Tech., Cambridge, Mass., 1966.

VESIAC 14,169 VU

Investigated in this report is whether free oscillations are prolonged by aftershocks which lead to systematic overestimates of Q. The aftershock sequences for the Chilean earthquake of 1960 and the Alaskan earthquake of 1964 were used in a program which estimates energy decay for the entire sequence of main shocks and aftershocks. If it is assumed that the relative excitation of free oscillations is determined by the relative energy in the aftershock, then systematic errors occur in a Q range and for modes which are significant in recent estimates of Q in the mantle. It is pointed out that the bottom of the low Q zone of the upper mantle is much deeper than 400 km under these assumptions, and may be as deep as 700 - 1000 km.

PRESS, F., Seismic Wave Attenuation in the Crust, Contract AF 49(638) 1337, Calif. Inst. of Tech., Pasadena, Calif., 1964.

VESIAC 8424 VU
AD 612 212

The distribution of attenuation of seismic waves versus depth (usually expressed by the dimensionless quality factor Q) is a new and important source of information regarding the composition, state, pressure and temperature in the earth's interior. As with all inversion problems, the more constraints on the solution in the way of direct measurements, the fewer are the solutions which satisfy the data. In this note the authors use seismic waves from nuclear explosions in Nevada as recorded by the long-range seismic measurements (LRSM) network of Project Vela Uniform to obtain a direct measurement of Q for the upper continental crust. A better precision is achieved than heretofore with S-P seismic waves.

PRESS, F., Study of Seismic Phenomena Connected with Earthquakes and Explosions, Final Rept., Contract AF-AFOSR-25-63, Calif. Inst. of Tech., Pasadena, Calif., 1964.

VESIAC 7542 VU
AD 431 992

This report consists of a series of abstracts of technical reports which contain the results of research performed under this contract. The technical reports are listed in seven categories which deal with different phases of the study of seismic phenomena connected with earthquakes and explosions.

PRESS, F., M. N. TOKSOZ, Post-Doctoral Program in Seismology, Sci. Annual Rept., Contract AF 49(638)-1763, Mass. Inst. of Tech., Cambridge, Mass., 1967.

VESIAC 16,649 VU

The following studies are briefly described in this report: (1) Synthesis of dilatation and rotation seismograms; (2) Particle motion-mode filters; (3) Structure of the earth's core; (4) Partial derivatives of phase velocity of surface waves with respect to anisotropy factors; (5) Application of array data processing techniques to a network of seismograph stations; and (6) Excitation of free oscillations and surface waves by a point source in a vertically heterogeneous earth.

PRESS, F., and M. N. TOKSOZ, Research in Seismology, Annual Rept., 1 November 1965 to 31 October 1966, MIT Rept. No. S-2, Contract AF 49(638)-1632, Mass. Inst. of Tech., Cambridge, Mass., 1966.

VESIAC 15,182 VU
AD 643 966

The velocity structure in the earth's mantle is determined using the travel times and travel-time slopes of P-waves recorded at LASA. The results show anomalous velocity gradients at depths of 700, 1200, and 1900 km. Both surface wave dispersion data and $dt/d\Delta$ data show the presence of lateral heterogeneities in the upper and lower mantle.

Theoretical studies of acoustic and gravity wave propagation in the atmosphere-ocean systems, affect of aftershocks on free oscillations, and response of layered spherical earth to point sources have been described.

PRESS, F., M. N. TOKSOZ, Research in Seismology, Annual Sci. Rept., 1 November 1966 Through 31 October 1967, Contract AF 49(638)-1632, Mass. Inst. of Tech., Cambridge, Mass., 1968.

VESIAC 18,002 VU
AD 666 482

The utilization of LASA data for various seismological studies is discussed. The structure and inhomogeneities of the upper mantle are studied using seismic and other geophysical data. The near source and far-field seismic data from the Parkfield earthquake of 1966 are analyzed for source mechanism and attenuation studies. The stress drop associated with this earthquake is estimated to be about twenty bars.

PRESS, F., M. N. TOKSOZ, and K. AKI, Research in Seismology, Annual Rept., 1 November 1967 to 31 October 1968, Rept. No. AF SR-68, Contract AF 49(638)-1632, Mass. Inst. of Tech., Cambridge, Mass., 1970

VESIAC 20,221 VU
AD 706 871

Seismic research efforts covering four general areas are outlined. These studies deal with (1) the structure and inhomogeneities of the earth's interior, (2) source mechanisms of earthquakes, (3) seismic arrays, frequency-wavenumber studies of microseisms and discrete formulations of wave propagation in layered media, and (4) design and construction of a stable long-period mercury tiltmeter.

PRESS, F., M. N. TOKSOZ, K. AKI, and P. GREEN, Post-Doctoral Program in Seismology, Annual Sci., 1 July 1967 to 30 June 1968, Rept. No. S-2, Contract AF 49(638)-1763, Mass. Inst. of Tech., Cambridge, Mass., 1968

VESIAC 19,099 VU

The research efforts of the research associates supported by this program are described. These studies are divided into two groups: I. Continental size arrays and their application, and II. Theoretical seismograms and earth structure.

A continental size array can be realized by considering individual seismic stations as array elements. The theoretical seismograms for P and S waves are computed for a model of point source in layered medium and matched with observed records.

PRICE, R., An Approach to Estimation in Seismic Equalization, Rept. No. ESD-TDR-65-272, Tech. Note 1965-24, Contract AF 19(628)-500, Mass. Inst. of Tech., Lexington, Massachusetts, 1965

VESIAC 12,040 VU
AD 619 020

The "seismic equalization" problem is that of correcting the response at one station to match that at another station which may have different instrument characteristics and different (and unknown) local reverberation characteristics. In this note, the problem of seismic equalization is formulated mathematically, and that portion involving measurement or estimation of a transfer-function ratio is modeled and attacked on statistical terms, first by an ad hoc procedure and then by the method of maximum likelihood.

PRICE, R., Statistical Synthesis of a pP-Wave Enhancer, Rept. No. ESD-TDR-65-235, Contract AF 19(628)-500, Lincoln Laboratory, Mass. Inst. of Tech., Lexington, Mass., 1965.

VESIAC 11,739 VU
AD 617 951

This note provides a communication-theoretic rationale for a successful nonlinear processing scheme due to Shimshoni and Smith, by showing its resemblance to minimum-rms-error estimation. The latter filtering, although "optimum" under certain assumptions, is rather more complicated in its implementation.

As in all such filtering studies, the mean-square error is made up of bias, or signal distortion, and variance (which in linear filtering is attributable only to the noise). It would be interesting to see whether the filtering developed here could be modified to allow a controlled tradeoff between these two sources of error.

PROS, Z., "Apparatus for the Precise Measurement of the Elastic Parameters of Rocks," Geofysikalni Sbornik, 153, pp. 192-228, 1961. (Translated from Russian), Contract SD-78.

VESIAC 7717 VU

The elastic parameters of rocks are important data in geophysics the knowledge of which is necessary in the study of the propagation of elastic waves and in the processing of seismic measurements. Consequently, considerable attention is being paid to methods for their measurement. In the Geophysical Institute of the Czechoslovak Academy of Sciences work has been underway since 1954 in connection with dynamic methods of measurement of the elastic constants of rocks and an appropriate apparatus has been worked out simultaneously.

PSHENNIKOV, K. V., "Some Peculiarities of the Aftershocks in the Baikal Region and Mongolia," Geol. and Geophysics, Vol. 4, pp. 119-121, 1962, (Translated from Russian), Contract SD-78.

VESIAC 9501 VU

As a rule, every earthquake is examined individually as an independent event among the phenomena similar to it. At the same time, there are series of earthquakes that are casually related to one another,—for example, foreshocks, aftershocks, and earthquake clusters. These phenomena have been the subject of little study. The most important of the studies known to the author is the paper of Tokugi Utsi, a reference to which appears in the article, describing the characteristics of aftershocks in Japan. This article is an attempt to examine and compare a series of aftershocks accompanying a number of earthquakes in the Baikal Region and Mongolia, the most powerful of which are given in Table I.

PUCHKOV, S. V., "Instrumental Seismic Microzoning of the Zone of the 1948 Ashkhabad Earthquake," Trans. Inst. Phys. Earth, Acad. of Sci., USSR, (Trudy Inst. Fiziki Zemli, Acad. Nauk, SSSR,) No. 5, pp. 60-80, 1959, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,919 VU

The change of magnitude of seismic vibrations in the transition from certain ground conditions to others is estimated on the basis of instrumental seismic observations during near weak earthquakes. On this basis, a seismic microzoning chart is constructed and compared with the degree of damage and destruction of structures during the 1948 earthquake.

PUCHKOV, S. V., "Seismic Microzoning of the Region of the 1948 Ashkhabad Earthquake on the Basis of Recorded Data," Byull. po Seismol., No. 8, pp. 142-149, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,118 VU

This report deals with the comparison of the magnitude of seismic vibrating on different structures at the earths surface and involves an examination of the energy flux along two seismic rays. Data from the various seismic stations was processed. Soil conditions and the effects of the earthquake are discussed.

PUZIREV, N. N., "Phase Distortion and Amplitude Characteristics for Grouping of Seismographs in Large Arrays," Akad. Nauk., Prikladnaya Geof., Vol. 17, pp. 3-14, 1957, (Translated from Russian), Contract SD-78.

VESIAC 9427 VU

This paper deals with the problem of phase distortion in grouping in large arrays. Problems concerning the directional characteristics and their distinction from harmonic oscillations are also briefly discussed.

Results of this qualitative and quantitative evaluation of the effects of grouping seismographs in large arrays lead to a very cautious selection of parameters and types of grouping, keeping in mind the effect of suppressing interfering waves, as well as the possibility of distortions of the shape of cophasal axes.

PYATETSKIY-SHAPIRO, ZHELANKINA, T. S. and KEILIS-BOROK, V. I., and G. L. PAVLOVA, "Determination of Earthquake Epicenters on an Electronic Computer," Dokl. Akad. Nauk SSSR, Vol. 151, No. 2, pp. 323-25, 1963, (Translated from Russian), Contract SD-78.

VESIAC 7355 VU

Described is a method of determining epicenter locations with a universal digital computer. The method is suitable for the case where the initial arrival is unknown and some observations contain large errors. P wave arrival times at epicentral distances up to 105° and PKP waves at distances above 110° are used. Where there is an erronous identification, the data are discarded during the calculation. Arrivals in the shadow zone are considered unreliable and are not used. The time distance curve adopted is identical for the entire earth. The program's limitations in consideration of nonsphericity of the earth is discussed. The data of not more than 150 stations out of 1006 stations are used for each earthquake under this program.

RABENSTINE, D. B., LASA Operation and Maintenance, Quarterly Progress Rept., 1 December 1965 Through 28 February 1966, Project VT/5071, Contract AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 17,026 VU
AD 480 411

The major areas of effort during the reporting period were: (1) routine maintenance of the signal acquisition system; (2) installation of the analog recording filter and pinboard system at the LASA Data Center; and (3) engineering work on the various study programs (plastic casing, seismograph noise, phase shift, temperature effects, and remote amplifier gain measurements).

RABENSTINE, D. B., LASA - Operations and Maintenance, Quarterly Progress Rept., 1 September 1965 Through 30 November 1965, Project VT/5071, Contract AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1965.

VESIAC 17,024 VU
AD 626 424

The major areas of effort during the reporting period were: (1) routine maintenance of the signal acquisition system; (2) initiation of analog recording and visual analysis at the LASA Data Center; and (3) engineering work on the standby power system.

RACKETS, H. M., Automated Bulletin and Seismic Data Retrieval System Status Report, Project VT/1124, Contract AF 33(600)-43486, Texas Instruments, Inc., Dallas, Texas, 1963.

VESIAC 10,668 VU
AD 609 528

The associated improvement package, described in this report, is recommended at this time. All the suggested revisions can be accomplished with about 4 man months for programming and about 15 hours of computer time. Bulletin processing could proceed while improvements were accomplished.

RACKETS, H. M., To Construct, Equip, and Operate Three Seismological Observatories, Final Rept., Contract No. VT/1124, AF 33(600)-43486, Texas Inst., Dallas, Texas, 1963.

VESIAC 6503 VU
AD 420 644

Instrumentation and operating procedures at three observatories incorporating recommendations of the 1958 Geneva Conference and constructed for VELA UNIFORM were evaluated with respect to individual and network performance. Earthquake detection capability was studied using USC & GS reports and statistics from ambient noise measurements. Both single-channel and multi-channel noise characteristics were determined. The observed ambient noise was of three types: Rayleigh waves, Mantle P waves, and converted shear wave modes.

RACKETS, H. M., LASA Large Aperture Seismic Array, Quarterly Report, Project VT/5053, Contract AF 33(657)-13899, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 10,128 VU

The Large Aperture Seismic Array (LASA) installation is expected to provide improved experimental data which will increase the VELA UNIFORM capability for seismic discrimination between nuclear explosions and earthquakes. Installation and testing of the array are described. Modification for the Calibration Line Spiking is discussed, as well as System Maintenance, System Equalization, and Future Plans. An Appendix discusses System Equalization Procedures.

RACKETS, H. M., LASA Large Aperture Seismic Array, Quarterly Rept. No. 2, 1 January Through 31 March 1965, Contract VT/5053, AF 33(657)-13899, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 10,593 VU

This report discusses the purposes of the Large Aperture Seismic Array, and the present contract, which concerns the installation and testing of two LASA subarray elements located in the general vicinity of Miles City, Montana. Reasons for the selections of the sites, and a description of each subarray is given. Operational Technical Status and Evaluation is given. Included are four parts: (a) General Installation; (b) System Maintenance; (c) System Modification; (d) System Stability Tests; and (e) Amplifier Stability. Data analysis and future plans are discussed.

RACKETS, H. M., LASA Large Aperture Seismic Array, Final Specifications Rept., Contract VT/5053, AF 33(657)-13899, Texas Inst., Inc., Dallas, Texas, 1965.

VESIAC 12,353 VU
AD 626 777

This report describes the installation of Angela and Hysham subarrays of the LASA. Each subarray is described; drilling of boreholes is described; lowering of a Hall-Sears HS-10 seismometer into each borehole is described. How data are amplified is discussed. Lightning protectors were installed. Two studies are described: 1) the systems were evaluated from an engineering standpoint to determine those elements which affect the desired performance of the array; 2) characteristics of the seismic information field were determined. Phase differences and noise level between instruments of an array are considered, and signals received at Angela and Hysham are compared.

RACKETS, H. M., LASA Large Aperture Seismic Array Installation Report Site No. 1, Angela, Montana, Contract VT/5053, AF 33(657)13889, Texas Instruments, Inc., Dallas, Texas, 1965.

VESIAC 9609 VU
AD 822 217

The Texas Instruments Inc. object was to install near Miles City, Montana two subarray elements of a LASA in the same area. These sites are to provide information about the efficiency of certain engineering techniques in both easily accessible and rugged terrain. Also the project will evaluate the efficiency of design, system and component noise and signal-to-noise improvement by subarray operation.

By 21 January, 1965 the installations had been completed. The main efforts were turned to reducing the spiking effects associated with the calibration line.

RACKETS, H. M., LASA Large Aperture Seismic Array Installation Rept. Site No. 2 Hysham, Montana, Project VT/5053, Contract AF 33(657)-13899, Texas Instruments, Inc., Dallas, Texas, 1965.

VESIAC 10,127 VU
AD 822 218

On 1 October 1964, a contract was awarded to Texas Instr. Inc. for installing and testing two subarray elements of a Large Aperture Seismic Array (LASA) in the general vicinity of Miles City, Montana. In this report, the locations of these arrays are shown and reasons are given for the site selection. Instrumentation is given for each subarray and for the center of the array. Borehole location and amplification and transmission of data are discussed. Presented also is a discussion of the characteristics and installation of the Hysham subarray, and its differences from the Angela installation.

RADER, C. M., and B. GOLD, Digital Filter Design Techniques, Tech. Note, Rept. No. ESD-TDR-65-593, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1965

VESIAC 19,590 VU
AD 627 146

Digital filtering is the process of spectrum shaping using digital components as the basic elements. Increasing speed and decreasing size and cost of digital components make it likely that digital filtering, already used extensively in the computer simulation of analog filters, will perform, in real-time devices, the functions which are now performed almost exclusively by analog components. In this paper, using the z-transform calculus, several digital filter design techniques are reviewed, and new ones are presented. One technique can be used to design a digital filter whose impulse response is like that of a given analog filter; another technique is suitable for the design of a digital filter meeting frequency response criteria. A third technique yields digital filters with linear phase, specified frequency response, and controlled impulse response duration. The effect of digital arithmetic on the behavior of digital filters is also considered.

RADU, C., "Contributions to the Determination of the Magnitude of Deep Earthquakes of the Carpathians," Rev. Roumaine Geologie, Geophysique, et Geographie, Ser. Geophysique, Vol. 8, pp. 35-52, 1964, (Tranlated from French), Contract DA 49-083 OSA-3137.

VESIAC 13,660 VU

This report contains further research on the magnitude of deep earthquakes in Vrancea. The recordings of the stations of Vrincioaia and Jassy are used. The calibration functions obtained for the P and S wave are computed. In the same manner, a detailed analysis was made of the S-P phase.

Observations of the maximum periods and amplitudes are of great importance for a study of the best operating conditions of high-sensitivity instruments as well as for an explanation of some phenomena connected with earthquake engineering in Romania.

RADU, C., "Contributions to the Study of the Seismicity of the Region of Vrancea," Rev. Roumaine Geologie, Geophysique et Geographie, Ser. Geophysique, Vol. 8, pp. 53-70, 1964, (Translated from French) Contract DA 49-083 OSA-3137.

VESIAC 13,658 VU

The author presents a series of relationships between the different parameters which characterize an earthquake, utilizing the deep earthquakes of Vrancea from 1901 to 1963 as data. The relationships are: (1) the energy-magnitude relationship; (2) the magnitude-intensity relationship; (3) the energy-intensity relationship; (4) the relationship between magnitude and the shock frequency; (5) the relationship between the intensity and the shock frequency; and (6) the relationship between the energy and the shock frequency. Also, a series of combinations between the different equations obtained is present. The results are important for the quantitative study of seismicity in Romania, and also for the study of the laws of earthquakes.

RAFFEL, J. I., Graphics, Semiannual Tech. Summ. Rept., Contract AF 19(628)-5167, Lincoln Labs., Mass. Inst. of Tech., Cambridge, Mass., 1967.

VESIAC 16,739 VU
AD 653 191

During the last reporting period, the following has been accomplished. A general-purpose front-end system has been designed based on the VITAL system. VITAL itself has been expanded to allow a compiler to control the scanning of a source program and outputting of messages. An ALGOL-like language, LABGOL, has been implemented; with the addition of means for building and manipulating a store of explicit relations between objects and their attributes, a new language, LEAP, has also been specified. The new hybrid conic generator has been operated successfully on-line.

RAGIMOV, SH. S., R. D. DZHAFAROV, and A. M. ALIEV, "Kyzyl-Burun Earthquake in March 1962," Akad. Nauk. Azerbatdzgabn, SSSR Doklady, Vol. 18, No. 10, pp. 45-46, 1962, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 13,662 VU

A large magnitude earthquake occurred in the Kyzyl-Burun region (Siazan) on 26 March 1962 at 1639 hours GMT. This report discusses the position of the epicenter according to the instrumental data of the Shemakha, Baku, and Makhachkala permanent seismic stations and the Kara-Chukhur and Nasosnaya temporary seismic stations. Depth of focus, aftereffects of the earthquake, intensity of the earthquake in various locations, and damage are discussed.

RAIKHER, L. D., "Detailed Study of Structures with Breaking Faults," Akad. Nauk., Prikladnaya Geofizika, Vol. 16, pp. 98-112, 1957, (Translated from Russian), Contract SD-78.

VESIAC 9788 VU

This paper describes seismic exploration in the western regions of the Ukraine and outer zone of the pre-Carpathian flexure. The first phase was a study of structures in the presence of a supporting reflecting layer, and the second phase was a study of the structures in the presence of a supporting refracting horizon.

Carried out were (1) survey studies by the reflection method and by the correlation method of refracted waves; (2) regional seismic prospecting by the same methods; and (3) a regional detailed survey.

RAKHIMOVA, I. SH., "The Possibility of Determining the Depth of the Mohorovicic Discontinuity for a Three-Layer Earth's Crust," Akad. Nauk, Ukrain SSR, Inst. Geofiziki, Geofiz, Sbornik, No. 8, Vol. 10, pp. 27-33, 1964, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 13,632 VU

To solve problems concerning the nature of the Mohorovicic Discontinuity, it is necessary to know the temperature in the upper layers of the earth and the phase equilibrium curve which would best correspond to phase transitions at the Mohorovicic Discontinuity. After showing that the temperature distribution can be determined and after giving the equation for the curvature of the phase transition, the author gives the necessary expressions for the phase equilibrium curve and temperature distribution in the upper parts of the earth, and also the starting parameters for obtaining calculating formulas to determine the depth of the occurrence of the Mohorovicic Discontinuity.

RASMUSSEN, D. C., Interim Rept. No. 3, July 1964 - March 1966, Tech. Interim Rept. No. 66-92, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 15,538 VU
AD 807 663

Progress of the LRSM Program during the period 1 July 1964 through 31 March 1966 is described. The data in the report are categorized along the same lines as the organization of the LRSM program, namely: operations, data processing, equipment modifications, equipment and seismogram evaluation, and special projects. During November 1964, a program was initiated whereby several mobile observatories were transferred from the LRSM Program to other organizations. As a result, the number of observatories in the group was decreased by 39 to 16. Fmphasis continues to be placed on advantages realized by operation of portable seismograph systems. The six LRSM portable systems were extensively used. Equipment modification and evaluation are discussed.

RASMUSSEN, D. C., Special Orientation Program, Final Report, Contract AF 49(638)-1150, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 16,069 VU
AD 803 510 L

This report reviews the on-site visits conducted for AFOSR at three mobile observatories. These sites were formerly operated as part of the LRSM and are located in Bolivia, Germany and Norway. During the visits, equipment repairs were made as required at each site and the station operators were briefed on new data recording techniques. At all three observatories, an assessment of the operators' capability indicates that an acceptable degree of proficiency exists at each site.

RASMUSSEN, D. C., and L. C. LANDE, Seismic Analysis of the GASBUGGY Explosion and an Earthquake of Similar Magnitude and Epicenter, Tech. Rept., Rept. No. 68-15, Contracts: VT/6703, F33657-67C-1457, VT/8703, F33657-68C-0734, Teledyne, Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 18,778 VU
AD 838 894

Seismic comparisons are made between the GASBUGGY explosion and an earthquake which had a nearly identical epicenter. Utilizing travel-time residuals derived from the GASBUGGY arrival data, the earthquake epicenter is relocated 35 km NNE of the GASBUGGY shotpoint. The corrected epicenter of the earthquake and the true GASBUGGY location are located approximately 5 km WNW of their respective uncorrected epicenters, which indicates that the travel time anomalies are consistent for the region between and including the two sources.

RASMUSSEN, D. C., R. G. REAKES, Participation in Project Early Rise Long-Range Seismic Measurements Program, Tech. Data Rept., Rept. No. TR 66-116, Contract VT/6703, AF 33(657)-16270, Geotech Division, Teledyne Industries, Garland, Texas, 1967.

VESIAC 15,537 VU

Portable Seismograph Systems, operating under the LRSM program, occupied and recorded data from 77 temporary sites during the 21-day Project EARLY RISE experiment. As was anticipated, the portable systems were operationally well suited for the quick set-up time required by the shot schedules in this program. Site selection was performed by the systems' operators rather than by an advance site selection team. Tolerance on site locations was plus or minus 5 km. Magnetic-tape data recorded during the experiment was played out on visual records and sent to the project investigators. Data recorded by the 16 LRSM mobile observatories was also made available. Findings from a preliminary plot of travel times versus distance over two profile lines in Canada are given.

RATNIKOVA, L. I., "Surface Waves Recorded in the Vicinity of the Source," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 6, pp. 255-282, 1959. (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,035 VU

The results of experiments dealing with the recording of surface waves in the vicinity of the source are presented. Impacts were used to generate vibrations which were recorded with horizontal and vertical seismographs. Various groups were distinguished among the surface waves: Rayleigh waves, Love waves, and M_2 waves. The surface waves were used to determine the velocities of transverse waves in the medium.

RATS-KHIZGIYA, M. I., "The Averaging of Recorded Data in Constructing Graphs of Variation of Seismic Wave Amplitudes with Distance," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 6, pp. 187-194, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,120 VU

A method is proposed for constructing amplitude curves ln A = f(x), based on averaging the amplitude graphs by means of segments of straight lines, within the boundaries of each seismic station, and subsequently linking the straight fitted lines along the entire line of the profile.

REAKES, R. G., Final Rept., Project VT/8703, January through December 1968, Tech. Rept., Rept. No. TR 69-7, Contract VT/8703, F33657-68C-0734, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969

VESIAC 19,305 VU

The progress of the LRSM during the period 1 January 1968 through 31 December 1968 is described.

The organizational structure of LRSM underwent few changes and continued to sustain the flexible and efficient operation required for a field-oriented program. At the start of the report period, there were fifteen mobile observatories and six portable seismograph systems in the LRSM program; five additional portable seismograph systems were activated in March 1968, providing a total of eleven operational portable systems. The portable seismograph systems demonstrated their versatility and effectiveness during all field assignments.

Equipment and seismogram evaluation programs continued to improve methods for ensuring high quality data. Results of these efforts are being used for advanced methods of data processing. A review of the studies and evaluations made is included in this report. Studies conducted were directed toward (1) the analysis of data from portable and mobile systems and (2) the investigation of long-period and short-period data.

REAKES, R. G., Long-Range Seismic Measurements Program, Final Rept., 1 April 1966 to 31 March 1968, Rept. No. TR 68-19, Contract VT/6703, F33657-67C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 18,532 VU
AD 834 696

The progress of the Long-Range Seismic Measurements Program during the period 1 April 1966 through 31 March 1968 is described.

REAKES, R. G., Long Range Seismic Measurements, Final Report, Jan. to Dec. 1969, Rept. No. TR 70-4, Contract F33657-69C-0757, VT 8703, Teledyne-Geotech, Garland, Texas, 1970

VESIAC 20,253 VU
AD 870 697

At the beginning of this report period, there were nine mobile observatories and eleven portable seismograph systems in the LRSM program. These seismograph systems participated in related programs and experiments such as MIRACLE PLAY, RULISON, JORUM, and MILROW. The portable seismograph systems continue to demonstrate their versatility and effectiveness during all field assignments. Six portable strain systems were designed, prefabricated, and deployed to the Nevada Test Site. The site selection was completed in late September and site preparation and installation was started during November 1969.

A review of the studies and evaluations made is included in this report. Studies conducted were directed toward: 1) the analysis of data from portable and mobile systems and 2) the investigation of long-period and short-period data.

REAKES, R. G., A. S. CHILD, and W. H. FRYE, Long Range Seismic Measurements - CHASE VII, Sci. Tech. Rept. No. 66-88, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Geotech Div., Garland, Texas, 1966.

VESIAC 14,982 VU
AD 800 310

An analysis of an underwater chemical shot is presented as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel times and amplitudes of identified, as well as unidentified, phases is included.

REAKES, R. G., W. H. FRYE, L. F. CRAIG, and A. S. CHILD, Long Range Seismic Measurements - STUTZ, Tech. Rept. No. 66-57, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 14,474 VU
AD 484 219

An analysis of seismological data from an underground nuclear explosion as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel-times and amplitudes of P, Pg, Lg, and surface waves are included along with other unidentified phases.

REAKES, R. G., G. J. NEWSON, W. H. FRYE, and A. S. CHILD, Long Range Seismic Measurements - CHASE V, Technical Report No. 66-71, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Geotech Div., Garland, Texas, 1966.

VESIAC 14,682 VU
AD 486 266

An analysis of an underwater chemical shot as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel times and amplitudes of identified, as well as unidentified, phases is included.

REAKES, R. G., R. S. SIMONS, W. H. FRYE, L. F. CRAIG, and A. S. CHILD, Long Range Seismic Measurements, CORDUROY, Tech. Rept. No. 66-43, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Geotech Div., Garland, Texas, 1966.

VESIAC 14,458 VU
AD 481 059

An analysis of seismological data from an underground nuclear explosion as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel-times and amplitudes of P, Pg, Lg, and surface waves are included along with other unidentified phases.

Appendix IV is a report on the characteristics of CORDUROY signals recorded by the LRSM portable systems. Five sites in the eastern United States were located on the arc of a circle centered at NTS, each of them situated in a region of distinctly different geologic character.

RECTOR, R. E., Response of Long-Period Seismometers To Pressure Variations, Tech. Rept. No. 65-95, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Division, Garland, Texas

VESIAC 12,773 VU

As magnifications of long-period seismographs are increased, the seismometer response to barometric changes becomes more significant. It has been shown that the response of the long-period vertical Sprengnether seismometer to barometric pressure variations is due to the reaction of the inertial mass to changes in buoyant forces associated with the pressure variations. The buoyant force acting on the inertial mass of the long-period vertical seismometer is a function of the density of the air surrounding it, and the density of the air surrounding the inertial mass is a function of the barometric pressure. Long-period horizontal seismometers also respond to pressure variations, but the cause of the response is not clearly understood. The motion of the inertial mass of the horizontal seismometer is designed to be constrained to the horizontal plane, whereas the buoyant forces act vertically. The objective of the tests discussed in this report was to determine the cause of long-period horizontal seismometer response to barometric pressure changes. The results of the test indicate that the response of the horizontal seismometer to barometric pressure changes is due to the associated change in the buoyant forces acting on the inertial mass of the seismometer.

RECTOR, R. E., Shallow-Hole Test of Long-Period Horizontal Seismometer, Tech. Rept. No. 65-30, Contract VT/4051, AF 33(657)-12145, Geotech. Corp., Garland, Texas, 1965.

VESIAC 15,316 VU

The report discusses an operational test of a long-period horizontal seismometer in a 15.2 m cased hole. The purpose of this test was to evaluate the effect of the shallow-hole environment on the operation of long-period seismometer in comparison with surface instruments. Tests were conducted to find a method to stratify the air within the enclosure. A satisfactory method was found and is discussed in this report. Initial data obtained from the hole seismograph system displayed high noise background. Sealing the enclosure and thermally stratifying the air within the enclosure reduced the background noise level until magnifications of 10K to 20K, limited by microseisms, were routinely used in a location subject to much cultural disturbance.

REED, J. C., Seismic Field Operations and Analysis of 1966 Lake Superior Experiment, Final Report, Contract AF-AFOSR-1140-66, Artic Inst. of North America, Montreal, Quebec, Canada, 1966.

VESIAC 15,892 VU
AD 643 245

A brief description of the Artic Institute's participation in Project EARLY RISE is given.

REEVES, G. S., A. H. BOOKER, Large-Array Signal and Noise Analysis - Wiener Nontime-Stationary Processing, Special Sci. Rept. No. 14, Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,013 VU

In applying the Wiener multichannel time-series processing theory to seismic arrays for teleseismic signal extraction, the transient nature of the signal is not used. This report presents the theoretical development of optimum nontime-stationary signal-extraction filters which take advantage of the additional information of known signal-arrival time. The matrix inversion is made computationally practical by using an extension of the Levinson technique to determine prediction filters several points into the future. A sequence of programs to accomplish the filter design and application is described and illustrated by a sample problem. Significant improvement in mean-square error was not obtained for this sample problem compared to classical Wiener filters.

REEVES, G. S., A. H. BOOKER, Wiener Nontime-Stationary Processing - Large-Array Signal and Noise Analysis, Sci. Rept. No. 14, Project VT/6707, Contract AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 17,426 VU
AD 822 372

This report presents the theoretical development of optimum nontime-stationary signal-extraction filters which take advantage of the additional information of known signal-arrival time. The matrix inversion is made computationally practical by using an extension of the Levinson technique to determine predection filters several points into the future. A sequence of programs to accomplish the filter design and application is described and illustrated by a sample problem. Significant improvement in mean-square error was not obtained for this sample problem compared to classical Wiener filters. Full evaluation of this technique requires additional data processing and examination with respect to criteria other than mean-square error.

REICH, H., G. A. SCHULZE, and O. FORTSCH, "Geophysical Results of the Haslach Explosion in the Southern Black Forest," Geologische Rundschau, Vol. 36, pp. 85-96, 1948, (Translated from German), Contract SD-78.

VESIAC 6034 VU

A few strong explosions were made in the years after World War II in Western Europe. Since the location and time of the related ground shocks were accurately known previously, these could be utilized for extensive seismic observations and concepts regarding the structure of the outer earth's crust could thus be improved. In this report, two explosions are evaluated which were made on April 28 and 29, 1948, at Haslach in the Kinzigtal (by French occupation forces) and which were thus at 6° Lat. further toward the south in the interior of the continent and in the crystal-line basement of its rock layer. Analysis resulted in a distinct tripe layering of the crust below the sedimentary blanket similar to the Heligoland explosion.

REILY, D. M., V. J. CUSHING, Characteristic Emissions from an Underground Explosion, Final Report, Contract DA 49-146-XZ-089, Engineering-Phys., Co., Rockville, Md., 1967.

VESIAC 17,305 VU
AD 824 873 L

The work is a continuation of earlier analyses which have been embellished to take into account elastic-plastic wave propagation, and to simplify the analysis in the seismic regime. The effects on the amplitude spectral density of the mechanical disturbance which result from the soil response are discussed. The numerical solutions to a non-linear and seismic propagation model are described. Two methods for introducing a change in the mesh size of the computational net are discussed and a new sequence for the calculations are introduced. Computer codes and flow charts for both the non-linear and seismic models are given.

REKIETA, T. W., CPO Ambient Noise Study, Report No. 1, Contract VT/6704, AF 33(657)-14648, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 16,734 VU

This report summarizes the results of a comprehensive analysis of the ambient seismic noise field existing at CPO. Results of this study have shown that the ambient noise field has not changed significantly over extended time periods, nor has it changed on a daily or seasonal basis. These results imply that an accurate modeling of the CPO noise field can be used to generate a multichannel filter set which can be used in a digital MCF processor to reject ambient noise throughout the year, except for periods of intense microseismic activity.

REKIETA, T. W., Noise Study for TFO Extended Short-Period Array, Seismic Array Processing Techniques, Tech. No. 5, Contract VT/6701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,399 VU
AD 875 026

Seismic data was digitally collected from the recently extended short-period array of the Tonto Forest Observatory during the summer of 1968 and the winter of 1969.

Several contributors to the ambient noise field could be defined in both of the periods analyzed and appeared to be both time- and space stationary. Other contributors, due primarily to atmospheric storm or pressure activity, were not stationary and could be related to its generating source.

Multi-channel filtering of the extended array could not provide any significant improvement over simple beamsteering at frequencies of interest (greater than .8 Hz). At lower frequencies, the amount of improvement obtained by MCF processing relative to beamsteering was directly related to the increase in noise level due to the non-stationary contributor of the noise field.

REKIETA, T. W., Signal and Noise Analysis of the Partial Norsar Array, Advanced Array Research Special Rept. No. 7, Contract VT/7701, F 33657-68C-0867, Texas Inst., Inc., Dallas, Texas, 1969

VESIAC 19,757 VU
AD 855 344

Long-period signals, long-period noise, and one sample of short-period noise recorded at the partially installed NORSAR site were analyzed. Power-density spectra, 2-channel coherences, and wave-number spectra are presented. Both long-period noise and short-period noise were dominated by directional Rayleigh-wave energy. Short-period noise in the 1.5- to 4.0-Hz range shows unusually high coherence for seismometer separations of 10 km. Love-wave signal similarity appears good, but Rayleigh waves exhibit considerable dissimilarity.

REYNOLDS ELECTRICAL & ENGINEERING CO. (STAFF), General Support Plan, Project DRIBBLE, Contract No. AT(29-2)-162, Reynolds Electrical & Engineering Co., Mercury, Nev., 1963.

VESIAC 7021 VU

This general support plan, prepared by the Reynold's Electrical and Engineering Company, describes the authority, general concept, scope, costs, various operation support services, and construction support of Project Dribble. In November 1961, the AEC, Division of Military Application, approved a program of geological exploration for a portion of the VELA UNIFORM Seismic Detection Series called "Project Dribble". This project proposes to detonate three nuclear devices in a dome of almost pure salt. The dome is located in Lamar County, Mississippi. The experimental objectives of "Project Dribble" are given here.

RHIAN, E., Details of Lamont-Philco Ocean Bottom Seismograph Telemetry Systems, Contr. No. NONR 266(92), Philco-Ford Corp., Blue Bell, Pa., 1964.

VESIAC 7965 VU
AD 601 273

The purposes of this report are: 1) to describe the OBS telemetry system, specifically noting any differences from the system as specified in reference 1 or described in reference 2, and 2) delineate the interface and installation arrangements for the equipment to be delivered.

RICHARDS, P. G., Potentials for Elastic Displacement in Spherically Symmetric Media, Contract F44620-69C-0067, Calif. Inst. of Tech., Pasadena, Calif., 1970

VESIAC 20,455 VU

The choice of P and S designations is somewhat arbitrary in heterogeneous elastic media, but becomes precise in the high frequency limit of ray theory. This fact is used in a radially heterogeneous isotropic medium to establish three potentials (P, S, T) with the following properties: (1) every displacement solution is represented by some (P, S, T); (2) T(r, t) is decoupled from P and S, is a potential for SH motion, and satisfies a second-order wave equation; and (3) the coupling of P and SV is represented by coupled equations in potentials P and S. At high frequencies these equations decouple (for an important class of sources) into separate second-order wave equations for P and S. An important role, in this decoupled case, is played by the variable density. Several possibilities suggested by the general P and SV equations are also outlined.

RICHTER, C. F., Historical Background of the Magnitude Scale, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 A VU
AD 441 592

The author points out that the primary purpose of introducing the term magnitude and its accompanying apparatus into seismology was and remains to clarify the statistics of earthquake occurrence. Although there is danger in uncritically applying statistics to earthquake events, the application of statistics in itself should not be condemned offhand, even though grave errors have sometimes resulted. The early use of intensity data is discussed. Seismicity and periodicity are considered. The circumstances under which the magnitude scale of Richter was developed is reported.

RICHTERS, J. S., The Application of Analysis of Variance to the Seismic Discrimination Problem, Group Report 1964-60, Contract AF 19(628)-500, Mass. Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 8876 VU
AD 451 871

Considered is discrimination between earthquakes and underground nuclear tests by means of measurements made on their seismograms. Such measurements will be subject to random perturbations caused by microseismic noise and fluctuations from event to event. The causes of nuisance parameters are discussed as well as their effects. The desirability of removing these effects before formulating a discrimination procedure, and the analysis of variance technique, which may be applied to this question, is discussed. Provided is an introduction to the analysis of variance for two nuisance parameters. One measurement per event is considered first, and then several measurements per event. All results are extended to the multivariate case.

RICKER, N. H., The Propagation of Ultrasonic Elastic Waves in Solid Bodies and in Granular Media, Final Rept., Contract AF 19(604)-8416, Univ. of Oklahoma, Norman, Oklahoma, 1963.

VESIAC 7475 VU
AD 430 191

This report is divided into three chapters. Chapter I outlines the immediate problem undertaken in the present research. It describes our understanding of the propagation and absorption of elastic waves in metals and sets up an analogy between the structure of a metal and the structure of a granular medium in which the pore spaces are filled with a monatomic gas. The problem becomes a matter of determining how well this analogy is supported by experiment. Chapter II describes the approach to the experimental phase of the work. The techniques of preparation of the constants of the Stokes Wave Equation are given. Chapter III describes the experimental studies.

RICKER, N. H., Ricker's Wavelet Review, Contr. No. AF 19(604)-8416, Univ. of Oklahoma, Norman, Okla., 1964.

VESIAC 7661 VU

This is an introduction to a longer report. The author summarizes his studies on the physics of elastic wave propagation in solid bodies and in granular media. He concludes that the absorption coefficient for the sinusoidal seismic waves must necessarily be proportional to the square of the frequency. The Stokes Wave Equation rather than the Classical Wave Equation should be used to describe seismic wave propagation. How the author developed his series of Wavelet Functions is described; the experimental correlation is presented. In addition, two problems pertinent to the VELA UNIFORM Program, concerning: 1) the magnitude scale, and 2) distinguishing between buried nuclear blasts and earthquakes, are discussed.

RIECKER, R. E., An Application of Induction Heating to Rock Deformation Apparatus, Contr. No. GRD TASK 865211, Air Force Cambridge Research Labs., Wash., D. C., 1964.

VESIAC 8181 VU
AD 601 167

A new shear press capable of simultaneously applying pressures of 50 kb and temperatures of 1000°C to thin sample pellets 1/4 in. to 1 in. in diameter uses a 5-kw, 450-kc induction heater, a Speedomax

H recorder, a current-adjusting-type control unit, a saturable-core reactor, a magnetic amplifier and an infrared pyrometer to accurately record, control, and monitor sample temperatures within 1 percent from 200 to 1000°C. Less than 45 sec is required for the apparatus to reach thermal equilibrium at maximum temperature.

RIECKER, R. E., Bibliography of Rock Deformation, Spec. Rept. No. 5, Contract GRD TASK 865211, A. F. Cambridge Res. Lab., Washington, D. C., 1964.

VESIAC 8583 VU
AD 606 550

A bibliography of 490 rock-deformation research articles published in scientific journals is presented with both subject and author entries. The cross-referenced subject listings fall into the following major categories: Apparatus, Brittle Behavior, Calcite, Calibration, Compressibility, Conductivity, Creep, Density, Dolomite, Elastic Behavior and Elastic Constants, Fabric, Friction, General, Marble, Metals, Olivine, Phase Studies, Plastic Behavior, Quartz, Resistance, Safety, Sedimentary Rocks, Seismic Velocities, Shear, Shock, Strain Rate, Surveys, Viscosity, X-Ray.

RIECKER, R. E., Geophysical Implications of Shear Deformation in Rocks, Rept. No. 7885-1-X, AFCRL-65-457, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-O VU

A new shear press employing spherical, opposed anvils has been used to determine shear strength, coefficients of internal friction, and viscosity data for upper mantle mineral analogs under geophysically realistic conditions of high temperature and pressure. Using high-frequency induction, the press externally heats samples to 1000°C at simultaneous pressures to 60 kb. Strain rates vary from 1/sec to 10^{-3}/sec. Results of experiments with the shear press are discussed.

RIECKER, R. E., Opposed Anvil Basic Design Considerations, Contract No. GRD TASK 865211, Air Force Cambridge Research Labs., Wash., D. C., 1963.

VESIAC 8414 VU
AD 432 044

Optimum design of opposed anvils depends on analysis of stress distribution, geometry, and material strength as well as on such exceptional considerations as limitations imposed by apparatus application. Thirty years of reviewed experience using opposing anvils suggests that 6 per cent cobalt-bonded tungsten-carbide inserts shrunk-fit into high-strength heat-treated binding rings yield best results if low cone angles (4° to 6°), slight insert tapers (1°), moderate interference (0.75 percent on the diameter), and moderate heat treatments are used. Sample pressures for various pressures are given for well designed opposed anvils. Bridgman-type opposed anvils used in a 50-kb 1000°C shear press developed at AFCRL are described; tables are included.

RIECKER, R. E., and D. L. PENDLETON, High Pressure Thrust Bearing: An Application, AFCRL-64-883, GRD Task 865211, AF Cambridge Res. Lab., Washington, D. C., 1964.

VESIAC 8954 VU

Successful operation of a 50 kb-1000°C rock deformation shear press depends on frictionless operation of two thrust bearings; requirements for an upper bearing and for a lower bearing are given. Upper bearing friction coefficients as low as 0.01 result when colloidal bonded films containing 65 percent pure MoS_2 in an alkyd resin are used with MoS_2 greases. The torque arm bearing is lubricated with 0.01 in. thick Teflon sheet to obtain friction coefficients below 0.016. Bearing pressures occasionally exceed 100,000 psi in both bearings; however, no evidence of galling, seizing or wear have developed on any thrust plate. Torque losses do not exceed 5 percent of the transmitted value in the upper bearing, and 3.5 per cent in the lower bearing.

RIECKER, R. E., and T. P. ROONEY, Shear Strength, Polymorphism, and Mechanical Behavior of Olivine, Enstatite, Diopside, Labradorite, and Pyrope Garnet: Tests to 920° and 60 kb, Scientific Interim Rept., AFCRL 66-543, Contracts: AF 19(628)-5196, and AF 19(628)-1646 (Agency Document), AFCRL, Bedford, Mass., 1966.

VESIAC 15,175 VU
AD 642 925

Four hundred and seventeen shear and compression tests have been completed on five minerals: olivine, enstatite, diopside, labradorite, and pyrope garnet. These are assumed to represent the principal constituents of an upper-mantle rock model. Tests were performed in an opposed anvil shear apparatus to maximum temperatures and pressures of 920°C and 60 kb at a constant strain rate of 10^{-1}/sec. Shear strength of these minerals varies from 14.0 to 16.2 kb at 27°C, and 50 kb normal pressure; and 6.5 to 7.8 kb at 900°C and 40 kb normal pressure. There are indications that the minerals deform cataclastically at low pressures and temperatures, with intragranular flow beginning at 30 kb normal pressure. Phenomena of geophysical importance, discovered during shear testing, are considered.

RIECKER, R. E., and K. E. SEIFERT, New Shear Apparatus for Temperature of 1000°C and Pressures of 50 kb, Contract No. GRD TASK 865211, Air Force Cambridge Res. Labs., Wash., D. C., 1963.

VESIAC 7205 VU
AD 425 629

A new shear press, capable of simultaneous pressures and temperatures of 50 kb and 1000°C, incorporates a 5-kw high frequency induction heater, 300-ton hydraulic jack, 1/2-HP motor and 3-pinion gear train for strain rates of .01 to 10 rph, and tungsten carbide ball-type anvils faced to diameters of 1/4 in. to 1 in. The press, designed to simulate earth depths of 30 to 200km, determines shear strength, viscosity, and internal friction data for rock samples of lower crust and upper mantle composition under geophysically realistic conditions of temperature and pressure.

RIECKER, R. E. and K. E. SEIFERT, Shear Deformation of Upper Mantle Mineral Analogues: Tests to 55 kb at 27° C, Contr. No. GRD TASK 865211, Air Force Cambridge Res. Labs., Wash., D. C., 1964.

VESIAC 8546 VU

Shear deformation of upper mantle mineral analogues forsterite, enstatite, diopside and labradorite at 27°C temperature, 5 to 55 kb average pressure, and at strain rates from 1 sec^{-1} to 10^{-3} sec^{-1} indicates that all minerals have high average shear strengths. Shear strength for North Carolina and Hawaiian olivine is 15.17 kb at 50 kb average pressure. Average shear strength for Madagascar diopside and Labrador labradorite are 14.90 kb to 14.03 kb and 13.15 kb, respectively, at 50 kb average pressure. Each shear stress-normal pressure curve is resolvable into two regions of constant but different slopes separated by a broad transitional knee. These represent separate and distinguishable behavior described in the article.

RITSEMA, A. R., Problematics of Small Shallow Earthquake Mechanisms, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-B VU

The author examines the reliability of earthquake mechanism solutions, with special attention given to the problem of shallow shocks. The influences of focal depth, magnitude, and free surface on P-wave amplitude are discussed. The use of P-wave amplitude gradients for the study of the earthquake mechanism is illustrated in some examples. It is suggested that a special seismograph network be established to evaluate shocks in certain limited areas.

RITSEMA, A. R., Remarks on Some Seismic Signal Anomalies, Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 e VU

The epicenter azimuths determined by the two horizontal components of the P wave at Djakarta station show a systematic southward deviation from the theoretical direction. The De Bilt Rayleigh waves from Novaya Zemlya explosions show an azimuth deflection dependent on the wave period. Differences in period for simple seismic signals are strongly masked by the filtering system of the seismometer/galvanometer, e. g., the response of a Galitzin seismograph to a single sinusoidal wavelet of one or one-half period.

RIZNICHENKO, YU. V., "Construction of Reflecting or Refracting Surfaces from Hodographs of Reflected or Refracted Converted Waves," Izv. Akad. Nauk SSSR, Ser. Geogr. i. Geofiz., No. 5, pp. 751-758, 1940. (Translated from Russian), Contract SD-78.

VESIAC 12,131 VU

A method is described for determining reflecting or refracting surfaces from seismic hodographs of reflected or transient (refracted) waves. It is assumed that there is one reflecting or refracting boundary and the velocities of the incident and incoming waves are constant and known. The solution is analyzed.

RIZNICHENKO, YU. V., "The Dispersion and Absorption of Seismic Waves," Trudy Geofiz. Inst., A. N. SSSR, No 35, pp. 9-41, Undated, Contract DA 49-083 OSA-3137.

VESIAC 17,315 VU

Various interpretations of the concepts of "dispersion" and "absorption" of waves encountered in papers on seismology and seismic prospecting are discussed. The problem of the dispersion of head waves related to the boundaries of half-spaces is reviewed. An approximate theory for refracted head waves related with a thin high-velocity layer compared to the velocity in the surrounding medium is proposed. Some of the results of the theory were verified in experiments on models.

RIZNICHENKO, YU. V., "The Propagation of Seismic Waves in Discrete and Heterogeneous Media," Izv. Akad. Nauk, Ser. Geogr. i. Geofiz., No. 2, pp. 115-128, 1949, (Translated from Russian), Contract SD-78.

VESIAC 12,335 VU

Certain problems related to the propagation of elastic waves in media consisting of a large number of elements will be discussed: in a "discrete" medium consisting of separate masses linked elastically, and in a heterogeneous medium (a continuous medium with structural nonuniformity). Conditions are determined under which a velocity of propagation of long, low-frequency waves in a heterogeneous medium is on the whole found to be very small, less than in any of the components. Some of the calculations are made using experimental seismometric data.

RIZNICHENKO, YU. V., "Seismic Characteristics of Permafrost Layers," Izv. Akad. Nauk SSSR, Ser. Geogr i. Geofiz., No. 6, pp. 263-274, 1942, (Translated from Russian), Contract SD-78.

VESIAC 12,130 VU

Previous opinions on the seismic properties of the permafrost layer are subjected to a critical review. Experience with work carried out in 1940 shows that this layer not only does not interfere with seismic prospecting, particularly using the method of reflections, but even produces certain advantages.

RIZNICHENKO, YU. V., "Seismic Velocities in Layered Media," Izv. Akad. Nauk SSSR, Ser. Geogr. i. Geofiz., Vol. 11, No. 2, pp. 153-172, 1947, (Translated from Russian), Contract SD-78.

VESIAC 12,360 VU

Relationships are discussed between seismic velocities encountered in seismic prospecting work. These velocities include: wave velocity, effective velocity, layer velocity, boundary velocity, etc. It is shown that the wave velocity obtained by phase correlation of seismograms is generally different from the phase and group velocities. A comparison of layer velocities, boundary velocities, and effective velocities leads to the conclusion that there is no noticeable anisotropy of seismic velocities in thick layers of sedimentary formations.

RIZNICHENKO, YU. V., "The Tasks of the Conference on Deep Seismic Sounding," Acad. of Sci., USSR, Geophys. Inst., pp. 7-9, Undated - Received 21 June 1966, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 14,462 VU

After sketching in the recent history of Soviet progress in the development of methods of deep seismic soundings of the earth's crust, the author sketches in the main tasks of the conference. They are: 1) The presentation of the results of work in the area of the development of the deep seismic sounding method in ten years; 2) The explanation of the main general difficulties arising in the application of that method to the study of the earth's crust; 3) The formulation of the basic primary problems of investigations to improve the deep seismic sounding method in the next few years, and discussion of the general prospects of its development and application.

RIZVI, S. A., J. P. BURG, and L. N. HEITING, Analysis of K-Line Wavenumber Spectra from Three WMO Noise Samples, Special Report No. 2, Contract VT/7701, F33657-67C-0708, Texas Inst., Inc., Dallas, Texas, 1967.

VESIAC 16,911 VU

The noise pattern at WMO was studied in detail in order to design an array of vertical and horizontal seismometers which would enhance teleseisms at WMO. This report discusses the analysis of the one-dimensional wavenumber spectra obtained from noise samples NS1, NS2, and NS3 recorded on 25 April 1962, 1 June 1962, and 27 April 1962, respectively.

The major achievement of the analysis is the identification of broadband 0.2- to 1.0-cps Rayleigh-wave energy coming from the lakes Lawtonka and Elmer Thomas in the northeast and of high-velocity P-wave energy. In addition to the northeastern Rayleigh energy and the high-velocity energy appearing at all frequencies from 0.2 to 1.0 cps, there is some indication of isotropic (nondirectional) Rayleigh-wave energy.

ROBERTSON, H., Preliminary Report on Long Range Seismic Measurements Participation in Project MIRACLE PLAY - DIODE TUBE, Tech. Data Rept., Rept. No. TR 69-10, Contract VT/8703, F33657-69C-0757, Teledyne-Geotech. Div., Garland, Texas, 1969

VESIAC 19,626 VU
AD 853 192

The MIRACLE PLAY - DIODE TUBE gas explosion in a cavity in Tatum Dome, Mississippi, was monitored by eight LRSM teams operating 3-component short-period and long-period seismographs. Four teams encircled the salt dome and occupied approximately the same sites as were occupied during the STERLING experiment. Four more teams encircled the Lucedale, Mississippi (LD-MS) site where an anomalous signal was recorded from the STERLING shot. High winds during the time of the arrival of the DIODE TUBE signal at LD-MS resulted in a record with a low signal-to-noise ratio. Spectrum analysis and coherence measurements indicate that the DIODE TUBE signal was recorded at LD-MS by the radial seismograph. The DIODE TUBE signal amplitude was about one-third the STERLING amplitude according to measurements of the largest waves in the STERLING and DIODE TUBE recordings of the radial seismographs.

ROBERTSON, H., Statistical Analysis of Short-Period Noise, Appendix II to Semiannual Tech. Summ. Rept. No. 7, TR No. 66-26, Contract AF 49(638)-1150, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 13,962-B VU
AD 628 883

This is a progress report describing statistical research on short-period seismic noise. Magnetic-tape records and 16 mm film records were obtained from deep-hole seismographs at Eureka, Nevada; Apache, Oklahoma; and Grapevine, Texas. In addition, a 16 mm film record of random noise was obtained from a shake-table controlled Benioff seismograph. Intervals of 240 seconds of noise from the magnetic-tape records were subjected to spectrum analysis and the resulting power spectral density functions were integrated in the band of 0.8 to 3.3 cps to get rms values. The method of visual analysis of the wavelets under consideration, and the discrepancies that indicate some bias in visual measurements as the frequency of the noise increases are described.

ROBERTSON, H., Study of Short-Period Seismic Noise, Appendix 2 to Tech. Rept. No. 65-2, Tech. Rept. No. 64-134, Physical and Topographic Factors and Related to Short-Period Wind Noise, Contract AF 49(638)-1150, Geotech. Corp., Garland, Texas, 1964.

VESIAC 9438-B VU

Median values of seismic noise in the period range of 0.3 to 1.3 sec were obtained from recordings at vaults of the Pole Mountain and WMSO arrays. Interquartile ranges were used to measure dispersions about the medians. Medians of the noise at Pole Mountain ranged from about 0.91 millimicrons to 2.20 millimicrons in November 1962. Described is how these two values were obtained. It was indicated that topographic shielding from wind rather than density of bedrock affected noise. As a test of this idea, wind protection numbers were assigned to vaults Z1 through Z9 of the WMSO array based on comparative topographic shielding with respect to known wind direction. Noise values increased as wind numbers decreased.

ROBINSON, E. A., Radar and Seismic Signal Detection, Contract AF 61 (052)-702, Seismological Inst., Univ. of Uppsala, Uppsala, Sweden, 1964.

VESIAC 8643 a VU
AD 669 511

The purpose of this paper is to bring together the two fields mentioned in the title so as to emphasize their similarities and differences. Because of the narrow band character of radar signals, it is possible to give a simplified treatment of radar antennas in the first three chapters. Later chapters treat the more difficult problem of seismic arrays where the signals have bandwidths of up to three octaves.

ROBINSON, E. A., Regression Analysis of Statistical Data with Digital Computer Programs - Chapters 3, 4, & 5, Annual Summ. Rept., Rept. No. 62, Contract AF 61(052)-702, Univ. of Uppsala, Seis. Inst., Uppsala, Sweden, 1968

VESIAC 18,653 VU

This report is an annual summary report of work done on contract AF 61(052)-702. Chapters 3, 4, and 5 are contained in this report and summarizes the work done previously and the present status of the contract.

ROBINSON, E. A., Regression Analysis of Statistical Data with Digital Computer Programs (Chap. 6). Sci. Interim Rept., Rept. No. 71, Contract AF 61(052)-702, Uppsala Univ., Seis. Inst., Uppsala, Sweden, 1968

VESIAC 19,271 VU

Chapter 6 of this report deals with Multiple Regression. The theory is given and also computer programs for the solution of problems.

ROBINSON, E. A., Regression Analysis of Statistical data with Digital Computer Programs, Chapter 7, Sci. Interim Rept., Rept. No. 74, Contract AF 61(052)-702, Uppsala Univ., Uppsala, Sweden, 1969

VESIAC 19,538 VU
AD 685 203

Chapter 7 of this report deals with Determinants, Matrices and Quadratic Forms.

ROBINSON, E. A., Selsmic Arrays for the Detection of Nuclear Explosions, Sci. Rept. No. 8, Contract AF 19(604)-7378, Massachusetts Inst. of Tech., Cambridge, Mass., 1964.

VESIAC 8859 VU
AD 608 275

Selsmic arrays are multichannel sensor patterns immersed in a multidimensional S/N field and the analytical problem is hence analogous to that of radar antennas. The following subjects are considered: 1) a review of antenna theory; 2) the general optimization problem for multichannel data which leads to large systems of normal equations of Toeplitz form (as presented in previous reports) requiring recursion solution techniques to be completely feasible; 3) the specific seismic array problem, considered in terms of plane-wave-front signal and noise contributions plus incoherent noise, with details of the "velocity filtering" method; 4) spectral estimation from finite array measurements.

ROBINSON, E. A., Selsmic wave Propagation in Layered Media - Part 1, Interim Scientific Report, Contract AF 61(052)-702, Seismological Inst., Uppsala Univ., Uppsala, Sweden, 1966.

VESIAC 15,896 VU
AD 634 914

This paper gives the basic equations for seismic wave propagation in layered media. The wave equation is solved by the Laplace transform method. The boundary conditions are finally expressed in matrix form for an arbitrary boundary.

ROCARD, Y., ARPA Research Grant No. SD-107-G-2, Quarterly Report No. 18, January through March 1966, (Translated from French), Contract SD-107-G-2, DA-49-083, OSA-3137, ALPENS, Paris, France, 1966.

VESIAC 14,310 VU

The author reports on the recording of a shock, the epicenter of which substantially coincided with a preceding shock reported in his earlier article, "Recording in Dordogue." Profiles were extended in some directions in order to permit a better definition of the amplitude variations with distance that were noticed in the earlier report. The results of these recordings in Tarn and Garrone are presented here, and compared with those of the first. Conclusions about the crust and mantle in the immedtate vicinity of the receiving station are reached as a result of amplitude increase. In the second section of the article, the author reports on the anomaly of seismic wave propagation in the Rhine Valley.

ROCARD, Y., "ARPA Research Grant No. SD-107-G-2-Quarterly Report No. 19 for April, May, and June 1966," ALPENS, Paris, France, 1966, (Translated from French), Contract SD-107-G-2 DA-49-083 OSA-3137.

VESIAC 14,965 VU

First, the author discusses work on the seismic background in Italy. During May and June 1966, ALPENS formed very close working relationships with the geophysics teams of the "Observatorio Geofisico Sperimentale" of Trieste, directed by Prof. Carlo Morelli. A list of accomplishments which resulted from the tests is included, as is a discussion of the geological structure of Italy. Second, the author reports on the Lake Blanc test. Discussed are the three tests which took place between June 29 and July 9, including descriptions of equipment, positions of stations, the Pg and Pn waves, the Mohorovicic Discontinuity, and reflected and refracted waves.

ROCARD, Y., Azimuthal Sensitivity Variations of Seismograph Sites in France, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8217 E VU

The author has drawn attention to azimuthal variations in seismic signal amplitude, and has suggested that these variations may be caused by focusing or defocusing of seismic waves through prism or lens effects within the earth's crust. Tilting and bending of layered strata, especially the Mohorovicic discontinuity, may explain these variations. The author tries a direct experimental study of station sensitivity as a function of azimuth and emergence angle.

ROCARD, Y., The Transverse Profile of Montagene Noire Sea Shots, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Michigan, 1964.

VESIAC 8217 F VU

On April 22, 1963, the French Navy fired two successive shots at sea in nearly the same place. Recording was carried out at seven stations located on a transverse profile of the Montagene Noire, northwest to southwest. The tabulated results from the two sea explosions at seven stations are shown. Distances from the shooting point to the stations, and Pg, Pb, and Pn arrival times are given. New knowledge has been obtained about the thicknesses of the layers and the features of the discontinuities in the neighborhood of the shot point and the stations. Also, new information about the Mohorovicic and the Conrad discontinuity is discussed.

ROCARD, Y., P. MECHLER, Importance of Small Local Variations of Travel Time-Methods of Evaluation, (Translated from French), Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 g VU

The system of tripartite stations used by ALPENS to obtain absolute data on the travel time of seismic waves through the crust is described.

ROCARD, Y. and P. MECHLER, Seismic Station Efficiency Related to Irregularities of the Moho Layer - Progress Report No. 2, 1 October Through 31 December 1966, (Translated from French), Contract AF 61(052)-962, DA 49-083 OSA-3137, Alpens, Paris, France, 1967.

VESIAC 16,922 VU

Amplitude studies have been made for arrivals from the September 1966 explosion series at Lac Negre. It was found that, for constant shot depth, the signal amplitude increased with increasing shot size up to 20 tons, but then remained relatively constant even though the size of the shots increased to 40 tons.

The velocity of surface waves from these shots has also been studied.

ROCARD, Y., P. MECHLER, Seismic Station Efficiency Related to Irregularities of the Moho Layer, Progress Rept. No. 3 (Translated from French), Contract AF 61(052)-962, DA 49-083 OSA-3137, ALPENS, Paris, France, 1967.

VESIAC 16,761 VU

The two new seismic stations on the island of Rangiron in the Pacific Ocean are described. The description includes a discussion of the problems involved in establishing a useful seismic network in Polynesia and the background noise observed at the stations.

Also included in this report is a discussion of a study of 73 recordings of the September 1966 explosion series in Lac Negre.

ROCARD, Y., P. MECHLER, Seismic Station Efficiency Related to Irregularities of the Moho Layer, Progress Report No. 4 (Translated from French), Contract AF 61(052)-962, DA 49-083 OSA-3137, ALPENS, Paris, France, 1967.

VESIAC 16,762 VU

In this report, studies on: (1) the seismic background in a granitic massif of the lower Pyrenees; and (2) the ratio of seismic signals (body waves) of an air blast to the same underground blast are described.

ROCARD, Y., P. MECHLER, Two Cases of Seismic Focalization, (Translated from French), Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 1 VU

Two examples of reinforcement of the amplitude of seismic waves recorded in France are presented. The authors believe that this phenomenon may be explained by the curvature of a crustal discontinuity.

RODEN, R. B., Array Research, Semiannual Tech. Rept. No. 2, 30 March to 15 November 1964, Contract AF 33(657)-12747, VT/4053, Texas Instr., Inc., Dallas, Texas, 1964.

VESIAC 9434 VU
AD 454 582

This Project is directed toward continued development of array processing technology for nuclear surveillance and exploitation of the data available from arrays for analysis of ambient seismic noise and of distant P-waves. This report presents results obtained during the second six months of the Project from 30 March 1964 to 15 November 1964.

RODEN, R. B., An Evaluation of Vertical Seismometer Array and Horizontal Array Performance Based Upon a Theoretical Model of Noise and Teleseismic Signal, Contract No. VT/4053, AF 33(657)-12747, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 9485 VU

A model of teleseismic signal and surface mode noise is derived from wave propagation theory. Optimum Wiener multichannel frequency domain filters are designed to operate on the outputs of six seismometer arrays so as to pass signals and reject noise. The theoretical results are very sensitive to the amount of random noise assumed in the model. The performance of an array of either type appears to be quite insensitive to changes of geometry if the number of receivers and the maximum dimension are not changed very much.

RODEN, R. S., and M. N. BACKUS, Array Research Horizontal and Vertical Arrays for Teleseismic Signal Enhancement: UBO Model Theoretical Results, Special Rept. No. 6, Contract VT/4053, AF 33(657)-12747, Texas Instruments, Inc., Dallas, Texas, 1965.

VESIAC 10,129 VU

The following configurations are discussed, and a figure accompanies each one of them: a) assumed input power spectra of signal and noise at a surface seismometer, expressed in db relative to the maximum signal power; b) three dimensional seismometer array; c) input and output signal-to-noise ratios—UBO Model 10; d) input and output signal-to-noise ratios—UBO Model 15; e) input and output signal-to-noise ratios—UBO Model 20. Figures 6 through 11 concern the Theoretical power spectra of system output - Vertical Array "A", Vertical Array "B", "CPO" Array, Buried "CPO" Array, 3-D Array, Buried 3-D Array.

RODEN, R. B., J. P. BURG, Array Research, Study of Teleseisms Recorded at Cumberland Plateau Observatory, Special Rept. No. 25, Project VT/4053, Contract AF 33(657)-12747, Texas Instruments, Inc., Dallas, Texas, 1967.

VESIAC 16,064 VU
AD 814 674

During 1963, Multiple Array Processor (MAP) systems were operated online at the 19 - element CPO array in order to enhance the teleseismic P-waves relative to surface-wave noise. Outputs of these processors and of the individual seismometers were recorded in analog format on magnetic tape and photographic film. Subsequently, three ensembles of selected recordings were digitized for computer analysis at 50-msec intervals, with later resampling of Ensembles II and III at 100 msec. The transcribed records are 4 min long, with start times chosen so that the P onset is approximately at the center of the record.

RODEN, R. B., G. BURRELL, Array Research, Analysis of Vertical Array Data from Grapevine and UBO, Special Rept. No. 24, Project VT/4053, Contract AF 33(657)-12747, Texas Instruments, Inc., Dallas, Texas, 1967.

VESIAC 16,063 VU
AD 814 673

During 1965, deep-well seismic records were obtained from the Trigg well near Grapevine, Texas, and the Carter well at the Uinta Basin Seismological Observatory near Vernal, Utah. Data of interest to the present study are discussed in this special report.

RODGERS, P. W., and C. A. DANN, Rotational Seismometer, Final Rept., 15 June 1968 to 15 June 1969, Contract F19628-68C-0370, Univ. of Calif., Berkeley, Calif., 1970

VESIAC 20,397 VU
AD 712 632

Elastic wave theory predicts that the elastic waves generated by an earthquake and other seismic events include a measurable component of horizontal elastic rotation. Several rotational seismometers have been designed to measure this rotational component.

ROLLER, J. C., Crustal Structure in the Eastern Colorado Plateaus Provicce from Seismic-Refraction Measurements, Technical Letter No. 19, Contract ARPA Order No. 193-63, U. S. Geological Survey, Washington, D. C., 1964. (OFFICIAL USE ONLY)

VESIAC 8145 VU O

ROLLER, J. C., Preliminary Report on Seismic-Refraction Studies of Crustal Structure in the Western, Central, and Southern United States, Technical Letter No. 14, Contract ARPA Order No. 193-63, U. S. Geological Survey, Denver, Colorado, 1963. (OFFICIAL USE ONLY)

VESIAC 7562 VU O

ROLLER, J. C., et al., A Preliminary Summary of a Seismic-Refraction Survey in the Vicinity of the Tonto Forest Observatory Arizona, Technical Letter No. 23, Contract ARPA Order No. 193-64, U. S. Geological Survey, Denver, Colorado, 1964. (OFFICIAL USE ONLY)

VESIAC 8557 VU O

ROLLER, J. C., and J. F. GIBBS, Chemical Explosions Detonated by the U. S. Geological Survey from July 1961 to July 1964, Technical Letter No. 24, Contract ARPA Order No. 193-64, U. S. Geological Survey, Washington, D. C., 1964. (OFFICIAL USE ONLY)

VESIAC 8603 VU O

ROLLER, J. C., W. H. JACKSON, D. H. WARREN, and J. H. HEALY, A Preliminary Summary of a Seismic-Refraction Survey in the Vicinity of Tonto Forest Observatory, Arizona, Contr. No. ARPA Order No. 193-64, U. S. Geol. Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 8557 VU O
AD 448 596

ROMNEY, C. and E. A. FLINN, An Analysis of Epicentral Errors in Sample Cases, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 6892 VU

This is a report on epicentral uncertainties introduced largely from travel time scatter. Two methods, using data from high-quality stations with good time service, were used. The first uses travel time residuals, derived from a conventional linearized Geiger least-squares epicentral determination, to compute the standard errors of the coordinates; the standard errors are symmetrical around the epicenter. The second method employs Monte-Carlo techniques for estimating uncertainties in the epicenter. A number of subsets drawn from the total ensemble of all arrival readings are used to make independent calculations of the epicenter. Three nuclear explosions and three earthquakes have been analyzed by both methods, and herein the methods are evaluated.

ROMNEY, C. and W. HELTERBRAN, Progress and Promise in the Study of the Earth Using Nuclear Explosions, Contract No. Agency Document, Air Force Technical Applications Center, Wash., D. C., 1964.

VESIAC 8403 VU

A review of measurements of seismic waves from nuclear explosions has shown results which have implications of interest for basic studies of the earth. Among these are observations which show regional differences in travel times and amplitudes which have been interpreted in terms of structural differences, and variations in travel times and amplitudes at teleseismic ranges which suggest inhomogeneities in the mantle. Comparisons between explosion- and earthquake-generated waves have given information on the nature of earthquake sources. Suggestions are made on methods for further study of fundamental problems by means of large explosions.

ROMNEY, C. F., Analysis of Film Recording at Angela and Hysham Subarrays (B1 and F3), Contract: Agency Document, Air Force Tech. Appl. Center, Washington, D. C., 1965.

VESIAC 13,858-D VU
AD 648 415

Mobile stations from the Long Range Seismic Measurements (LRSM) program were installed at the centers of Subarrays B1, Angela, Montana, and F3, Hysham, Montana. The instrumentation of the stations is described. The objectives were to obtain a comparison between the signal-to-noise ratios recorded at the surface and in the shallow holes and to obtain preliminary estimates of the effectiveness of the unphased sum of all instruments in each subarray. Preliminary conclusions from the analysis of these recordings are reported here.

ROMNEY, C. F., An Investigation of the Relationship Between Magnitude Scales for Small Shocks, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 K VU
AD 441 592

In 1956, Gutenberg and Richter revised and extended their earlier work on earthquake magnitude scales. As a result of this work, new relationships were found between magnitudes determined from body waves and magnitudes determined from recordings on torsion seismographs at small distances. Much of the data for these studies was derived from the Kern County, California, earthquakes of 1952. The available data, largely from earthquakes of magnitude 5.5 and greater, were consistent with a number of equations, given in the report. The average value of m in the formulas was called "unified magnitude," the relationship between m_b and M_s. Presented are results of a preliminary investigation of this relationship for small shocks.

ROSENBAUM, J. H., The Borehole-Noise Problem Treated on the Basis of a Layered Elastic Model, Rept. No. 4410-83-X, Contract SD-78 (ARPA), Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884-D VU
AD 452 596

A surface-wave computer program, which also has the ability to calculate high Rayleigh modes and which reads out velocity, potential, and energy information as a function of depth, has been used to calculate the characteristic vibrations for several geophysical models of the Hempstead well site. Some very interesting features of waveguide transmission have been observed. The presence of vertically radiating modes may have to be taken into account under certain conditions; the task of computing their characteristic features, applicable to the borehole-noise problem, may be fairly difficult.

ROSENTHAL, F., Beam Patterns, Contract: Agency Document, Advanced Research Projects Agency, Washington, D. C., 1965.

VESIAC 13,858-J VU
AD 648 415

The author discusses the requirements for the LASA Skeletal Array Beam Pattern. After discussing a possible goal for such a pattern, he points out that neither the present LASA skeletal array design, nor any other design that he has studied quite meets this goal. However, preliminary studies indicate that some significant side lobes of the present array can be slightly reduced by the addition of the well-placed subarrays. For any future arrays, an array design based on a regular polygon possessing an odd number of sides shows promise. Discussed also are two computer programs written in an approach to the problem.

ROTHE, J. P., International Association of Seismology and of the Physics of the Interior of the Earth, Berkeley Meeting (1963), Report of the Secretary General, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1963.

VESIAC 7698 VU

This report has to do with UNESCO's seismological research programs, and with four missions sent by UNESCO into the most highly menaced earthquake regions: Southeast Asia, South America, the Mediterranean Basin and the Middle East, and Central Africa. The main task was to gather and analyze information on: 1) present status of seismic observation networks in those regions with regard to their equipment, personnel, and facilities; 2) progress achieved in the localization of zones of seismic activity, and in the preparation of seismicity or seismotectonic maps on a national or regional scale; 3) existence of regulations for construction and their applications to regions of seismic activity; and 4) existing facilities for the training of specialists in these and related areas.

ROTHE, J. P., "The Mid-Indoatlantic Seismic Zone," Proc. Roy. Soc. London, Vol. 222, pp. 387-397, 1954, (Translated from French), Contract SD-78.

VESIAC 9329 VU

The distribution of earthquake epicenters in the Atlantic and Indian Oceans is discussed; numerous new epicenters are listed; it is shown that the line of epicenters following the mid-Atlantic Ridge is continued around the Cape of Good Hope and joins the similar line marking the central ridge of the Indian Ocean. It seems, therefore, that these two ridges are related structures.

ROTHE, J. P., E. PETERSCHMITT, Application of the Haslach Tables to the Electronic Calculation of European Epicenters, (Translated from French), Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 m VU

This paper presents a series of travel-time tables for Pg, Sg, and Pn waves called the Haslach tables (1948, revised 1964), as well as the "extrapolated Haslach tables" for Pn, as these have been programmed for epicenter location by electronic calculation.

ROTHMAN, R. L., Studies of the Effect of Depth of Focus on Seismic Pulses, Suppl. to Semiannual Rept., Contr. No. AF 19(628)-238, Penn. State Univ., University Park, Pa., 1964.

VESIAC 8247 VU

To develop techniques for extracting arrival time differences between first arrivals from a shallow disturbance and near-source surface reflections, (a technique very useful in determining the focal depth of a seismic disturbance and consequently in discriminating between natural earthquakes and man-made explosions), two-dimensional model studies were conducted. The construction of the models is described, as well as the two analytic operations performed on the records obtained. Theoretical spike seismograms were generated and the results were compared with the model data results. Results indicate that, for epicentral distances in the range equivalent to 150 to 1000 km in the earth, focal depths up to 12 km deep can be determined.

ROZEBOOM, R. W., Theoretical Estimation and Implementation of Signal-to-Noise Ratio Improvement, Special Rept. No. 2, Advanced Array Research, Contract VT/7701, F33657-68C-0867, Texas Inst., Inc., Dallas, Texas, 1969

VESIAC 19,395 VU

This study was undertaken to determine if signal-to-noise improvements resulting from the addition of sensors to existing seismic-recording arrays could be theoretically estimated. A general process for estimating improvements is determined and presented, as well as a preliminary study of the feasibility of implementing the process. The first step in the general process is to estimate the noise field at the existing array by computing measured-noise crosspower matrices at each frequency used. Next a theoretical-noise crosspower matrix which approximates the measured-noise crosspower matrix is formed from a noise model compiled for each frequency. After a satisfactory noise model is obtained, the locations of additional sensors are determined by positioning them to minimize the new array's straight-sum response to the major noise components. The new array is then evaluated by computing the improvement in the signal-to-noise ratio obtained after the new sensors are added. For the feasibility study, a 13-sensor station having a relatively simple and time-stationary noise field was selected. Obtainable signal-to-noise improvements were estimated when sets of one, two, or three sensors were added. Greatest general improvement for straight-sum and MCF processing occurred when three sensors were added and overall dimensions of the existing array were retained. The amount of signal-to-noise improvements could probably be increased by using more exact methods or improved techniques.

RUBB, A. M., Jr., Seismograph Calibrator Phases I and II, Spec. Rept. No. 20, Project VT/070, Contract AF 33(657)-7747, United Electro-Dynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,044 VU

The seismometer calibrator as conceived and developed under this project appears to be a useful device for the calibration of the J-M seismometer subject to the limitation regarding the determination of relative frequency response rather than absolute magnitude of frequency response. The step response current can be accurate to less than 1 percent with as much as 20 percent variation in cable characteristics and carrier voltage input, and can be set for each seismometer.

RUBENSTEIN, M. A., J. AEIN, and J. BEARDWOOD, High Frequency Signal Content in Seismic Events, Contract: Agency Document, Advanced Research Projects Agency, Washington, D. C., 1965.

VESIAC 13,858-R VU
AD 648 415

Reported are the efforts of the Institute for Defense Analyses to investigate the problem of high-frequency content of signals obtained at teleseismic distances. Because of the presence of high-frequency signals associated with nuclear events, the following possibilities now exist: (1) New seismic research on earthquakes and geologic events at teleseismic distances; (2) For LASA the potential for very fine beams with good side-lobe characteristics and perhaps smaller arrays; (3) Diagnostic studies comparing the spectral distribution of shots and earthquakes; (4) Seismic concealment; (5) The critical issue of cavity decoupling as a function of frequency.

RUDNEV, V. M., "Arbitrary Levels in Seismic Prospecting in the Azerbajan, SSR," Prikladnaya Geofizika, No. 20P, pp. 46-59, 1958, (Translated from Russian), Contract SD-78.

VESIAC 12,010 VU

The author presents information concerning the accuracy of seismic operations and especially the results of comparisons of data of seismic exploration with those of borings. The results allow him to apply the concept of the arbitrary level to the geological conditions of the Azerbaijan.

RUDNEV, V. N., "Estimating the Accuracy of Hodographs of Reflected Waves from the Scattering of Effective Velocities," Akad. Nauk, Prikladnaya Geofizika, Vol. 5, pp. 24-32, 1956, (Translated from Russian), Contract SD-78.

VESIAC 10,194 VU U

This paper describes a method which in the opinion of the author can be employed for calculating the error in determining the arrival time of reflected waves from the internal conversions of the observations. The value of the error is obtained by a comparison of the entire set of hodographs obtained in a given area. The result of the appropriate calculations is essentially similar to the mean square error of any physical measurement calculated from the deviation from the mean.

RUGG, A. M., Effects of Thunderstorms on TFSO Operations, Special Rept. No. 23, Contract VT/070, AF 33(657)-7747, United Electro-Dynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,581 VU

This report describes: (1) the storm damage to operations of the TFSO instrumentation during the period from 24 June to 14 September 1964, at the Tonto Forest Seismological Observatory. The damage is fully described, and it is tabulated in Figure 2; (2) Location of lightening strikes is described; (3) The correlation between Damage and Other Parameters; (4) Storm Damage to Facilities; and (5) Comparison of 1964 and 1963 Storm Seasons.

RUGG, A. M., Jr., Experimental Seismograph Station, Spec. Rept. 18, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,661 VU
AD 609 536

This is a Special Report on the Effect of Changing Multiple Array Processor (MAP) Output Filter Band Width. The MAP summation at the TFSO is particularly affected by noise in the frequencies generated by wind, thunder, and animals or personnel near a seismometer site. To decrease this effect, the MAP output filter was changed from a bandwidth of 5.0 - 0.75 cps with 12 db per octave slopes to a bandwidth of 3.0 - 0.75 cps, with 24 db per octave slope at 3 cps, with a 12 db per octave slope at 0.75 cps. Figure 1 of the report shows the frequency response curves run on the system before and after the changes in filter settings were made. How frequency response was obtained is described. Figs. 2 and 3 show "before and after" sequences for filter characteristics.

RUGG, A. M., Jr., Seismological Systems Laboratory, Semiannual Rept., VT/070, AF 33(600)-42159, United ElectroDynamics, Inc., Pasadena, Calif., 1961.

VESIAC 10,646 VU
AD 454 253

This second semi-annual report covers the period from January 1 to July 1, 1961, and replaces the monthly report due on June 20, 1961. This report briefly reviews the status of the project through June 1 and then goes into greater detail for the month of June concerning land acquisition and additional noise measurements. The objectives of the project are given; work performed during the first six months of 1961 is outlined. This includes site selection, preliminary design of the Seismological Systems Laboratory, data processing, world-wide communications study. A list of documents submitted to AFTAC concerning Project VT/070 is supplied; project programs are discussed.

RUGG, A. M., Jr., Simplex Seismograph Calibrator Field Test, Phase III, Special Rept. No. 22, Project, VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,043 VU

With the advent of large seismic arrays using millions of feet of cable, the need for a technique of remote calibration of seismometers using the signal line has become apparent. This need could be met by several techniques - this report covers a brief test of one particular technique.

RUGG, A. M., Jr., Study of Automatic Calibration of Seismograph Systems, TFSO Spec. Rept. No. 17, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,565 VU
AD 609 530

The author discusses the objectives of automatic calibration, describes an "ultimate" calibrating system, and gives recommendations. In regard to recommendations, he proposes steps which will be advantageous as automation is approached gradually. Four appendices make up the major part of this document: (a) Appendix A is a list of the companies to whom letters of inquiry were sent; (b) Appendix B concerns "Tests on Boonshaft and Fuchs Analyzers"; (c) Appendix C is called "Preliminary Instrument Cost Data;" (d) Appendix D is called "Adage, Inc., Ambilog 200 Stored Program Signal Processor."

RUGG, A. M., Jr., Tonto Forest Seismological Observatory, Semiannual Rept., Contr. No. VT 070, AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 6257 VU
AD 447 533

During the report period, several modifications to the array were made, which are described in this report. Also, development and evaluation programs included an evaluation of the Johnson-Matheson seismometer, installation and operation of the Electro-Tech EV-100 long-period seismometer and the National 21 short-period seismometer, preliminary field testing of the F. M. data transmission system, and investigation of an automatic calibration system. Routine Earthquake Bulletin analysis continued during this period. Blasts at several open pit mines in Arizona and New Mexico were timed. An evaluation was begun of various summation traces and the Multiple Array Processor Trace. Ground motion studies and comparisons of earthquake magnitudes were made.

RUSSELL, O. R., Tonto Forest Seismological Observatory, Special Rept. No. 4, Contract VT 070, AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 7496 VU

Field studies were made at the Tonto Forest Seismological Observatory area to evaluate the influence of the geology on the installation and operation of the observatory. The region is underlain by a batholithic mass of Precambrian granite with a thin veneer of Paleozoic sediments covering the northern half of the seismometer array area. The major structural feature of the area is the Diamond Rim Fault, the structure and mapping of which is discussed. Displacement along the fault exceeds 1000 ft. in project area, but the trace of the fault was not observed to exceed 30 ft. in width. Also discussed is an area of approximately two square miles east of Mayfield Canyon which is mantled by deposits of gravels and sands of Quaternary and Tertiary age.

RYALL, A., Crustal Structure and Amplitudes of P Waves from NTS to Ordway, Colorado, VESIAC Special Rept. No. 4410-52-X, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 7742 B VU
AD 434 709

P waves for five seconds after the first arrival from earthquakes, with focal depths greater than 150 km were Fourier analyzed, while 15 shallow earthquakes were spectrum analyzed. It was concluded that: 1) the P waves from deep shocks contain frequency components around 5 cps; 2) the general belief that the more distant an earthquake is, the less high frequency components it contains is not strongly verified by field data; and 3) the attenuation of P waves, shorter than 3 or 4 cps, in the crust is dependent of locality and in some places is much stronger than the attenuation in the mantle.

RYALL, A., Seismic Identification at Short Distances, Contract AF-AFOSR-1564-68, Univ. of Nevada, Reno, Nevada, 1970

VESIAC 20,327 VU

After many years of working with data from a few locally-recording outstations, we have now almost completed the installation of a statewide seismic telemetry system, and this system is already beginning to provide data which will make possible very detailed studies of earthquakes and explosions in the Nevada region. Based on analysis completed only a month ago, we are finding significant differences between local recordings of small earthquakes and mine blasts — in the relative generation of different seismic waves, amplitude ratios, and peak spectral frequencies.

As an extension of this very preliminary work, we are now compiling data aimed at separating out effects of specific source and station-site characteristics. Then, with a better understanding of relationships between various source parameters (focal depth, mechanism, etc.) and measurable characteristics of local recordings, we hope to be able to predict observable effects at greater epicentral distances for small-magnitude events.

RYALL, A., Seismic Identification at Short Distances, Sci. Rept., Contract AF-AFOSR 1564-68, Univ. of Nevada, Reno, Nevada, 1970

VESIAC 20,418 VU

After many years of working with data from a few locally-recording outstations, we have now almost completed the installation of a statewide seismic telemetry system, and this system is already beginning to provide data which will make possible very detailed studies of earthquakes and explosions in the Nevada region. Based on analysis completed only a month ago, we are finding significant differences between local recordings of small earthquakes and mine blasts — in the relative generation of different seismic waves, amplitude ratios, and peak spectral frequencies.

RYALL, A., Study of Seismicity, Mechanics of Faulting and Crustal Structure within the Basin and Range and Adjoining Provinces, with Emphasis on Seismic Information Provided by Nuclear Explosions, Final Sci. Rept., Contract AF-AFOSR 645-64, Univ. of Nevada, Reno, Nev., 1967.

VESIAC 16,046 VU
AD 647 414

This report covers the accomplishments of the seismological research program at the University of Nevada, for the period 1 May 1964 to 30 April 1966. Sections of the report treat (1) the establishment of new seismographic stations in the Nevada area; (2) development of new field instruments for studies of small and micro-earthquakes; (3) publication of a Nevada earthquake catalog and epicenter map for the period 1852-1961; (4) automation of routine seismological analysis, (5) focal depth studies; (6) study of the structure of Kilauea Volcano, Hawaii; (7) seismicity studies; and (8) microearthquake studies.

RYGG, E., H. BUNGUM, and L. BRULAND, Spectral Analysis and Statistical Properties of Microseisms at NORSAR, Sci. Interim Rept., Rept. No. 1, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1969

VESIAC 19,910 VU
AD 693 329

Below 0.7 cps the seismic noise recorded by the short period seismometers at NORSAR (Norwegian Seismic Array) is generally dominated by sources in the Atlantic and on the Norwegian coast.

When strong low pressure areas are observed outside the coast, the noise has a dominating direction of propagation from the low, and a velocity generally in the range 3-4 km/sec.

From the distribution of the sample variances it is assumed that the noise is stationary within half-hour intervals used in the noise analysis. The noise predictability has a maximum during periods with high microseismic activity.

RYKOV, G. V., "An Experimental Investigation of Stress Waves Produced by an Explosion in Sandy Soil," Zh. Prikladnaya Mekh. i Tekh. Fiz., No. 1, pp. 85-89, 1964, (Translated from Russian), Contract SD-78.

VESIAC 12,447 VU

Explosion waves were studied experimentally in sandy soils by Lyakhov, Pokrovskii, and Tsvetkov, in which the radial component of the stress field and the velocity field were studied in disturbed soil. The basic relationships characterizing the mathematical model of soft soil were formulated, and methods for their experimental verification were proposed. Such tests were performed and some of their results were published. Additional quantitative data obtained by the analysis of the results of these and newer tests are described in this article.

SABITAY, A., Digital Recording and Analysis of Seismic Data, Project GNOME, Contract No. VT/077, AF 33(600)-41840, Texas Inst., Inc., Dallas, Texas, 1962.

VESIAC 7346 VU

The nuclear explosion, detonated on Dec. 10, 1961, was recorded at two portable seismograph stations which TI set up at distances of 230 and 425 km in a northeasterly direction from ground zero. Linear arrays of vertical, low-frequency, refraction-type seismometers and three-component Benioff stations, with magnetic tape digital recording instrumentation, were utilized at each of the sites. Nearly all recorded data were clipped. Every effort likely to yield results was made to salvage information from the collected data.

SABITAY, A., Phase II, Wichita Mountains Seismological Observatory, Final Rept. Part 2, Contr. No. VT/077, AF 33(657)-12331, Texas Inst., Inc., Dallas, Texas, 1963.

VESIAC 7709 VU

The four sections of this report deal with the investigations of seismic signals and noise at WMSO, Fort Sill, Oklahoma. Section I is a compilation of information from the Johnson-Matheson seismometer array, including a large library of natural and man-made signals, ambient noise, and station calibration signals. Section II presents the mathematics of computer programs used to analyze data, and the synthesis and analysis of the multi-channel filter system for the array. Section III gives the results of a study of three-ten-channel samples of ambient seismic noise recorded. Section IV details the synthesis and evaluation of a ten-channel filter system designed on the basis of measured noise statistics and a theoretical signal model.

SABITAY, A., Seismometer Array Data Processing and Presentation System, Final Rept., Contr. No. VT/077, AF 33(657)-12331, Texas Inst., Inc., Dallas, Texas, 1964.

VESIAC 8149 VU
AD 441 282

Theory and equipment were developed for extracting low-level P wave signals from ambient seismic noise on the basis of the difference in spatial correlation statistics between signal and noise. Signal-to-noise ratio improvements of 20-25 db over a single seismometer were attained while preserving signal waveform on a small (less than 4 km) 19-element array. This is two to four times the square root of the number of seismometers (12.8 db) which is generally accepted as the limit of improvement afforded by simple summation. A practical on-line processor was constructed and successfully demonstrated in field implementation of multi-channel processing. Array stations for a surveillance network were shown to be improved in P wave detection capability by incorporating multi-channel filtering.

SABITAY, A., and T. HARLEY, Introduction to the Interpretation of Multiple Array Processor Seismic Data, Special Report - Phase III, Project VT/077, Contract AF 33(657)-12331, Texas Instr., Inc., Dallas, Texas, 1963.

VESIAC 10,511 VU

The authors compare old and new real-time data processing methods by means of field recordings and simplified, frequency (f) wave number (k) graphs. A composite set of graphs is presented which summarize MAP "filtering" facilities. These illustrate pass and attenuation regions in f - k and f - v (velocity) co-ordinates using an assumed model of signal and organized noise for one direction. The suppression of organized noise is shown to be increasingly effective from straight summation to beam steering to Ideal Isotropic Processing. The most processed trace (Ideal Isotropic Processing) can increase the S/N of P wave arrivals by an average factor of three compared to a filtered single seismometer. As an interpretational aid, the MAP system contributes in nine ways described here.

SAITO, M., Excitation of Free Oscillations and Surface Waves by a Point Source in a Vertically Heterogeneous Earth (THESIS), Contracts: AF 49(638)-1632, and AF 49(638)-1763, Mass. Inst. of Tech., Cambridge, Mass., 1966.

VESIAC 15,171 VU

Radiation patterns of surface waves and free oscillations for vertically heterogeneous elastic media are derived for arbitrary sources using variational equations. The results are expressed in terms of normal mode solutions and source functions, and show that additional calculations other than normal mode solutions are unnecessary to construct radiation patterns. Source functions for a single force, a single couple, and double couple without torque, all in arbitrary directions, are derived.

SAN CALIXTO OBSERVATORY (STAFF), Installation of the Peñas Acoustic Array, Final Report, Contract AF-AFOSR-1177-66, San Calixto Observatory, La Paz, Bolivia, 1967.

VESIAC 15,900 VU
AD 645 151

This report describes the Peñas acoustic array and gives examples of data recorded at the station. The use of an automatic correlator to facilitate the analysis of records and the identification of events is also discussed.

SANDERS, J. S., R. C. SNEED, S. B. RAY, and L. B. MAYER, Large Aperture Seismic Array Surficial Information Eastern Montana, Tech. Rept. No. 66-16, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 14,314 VU
AD 481 857

A large array of 525 shallow-hole seismometers, known as the Large Aperture Seismic Array (LASA) was emplaced on the plains of eastern Montana. Extensive field work, consisting of site selection, leasing and surveying, were required to provide the land and locations for logical system installation. This report forms a grouping of land data gathered during a 12-month period ranging from the initial regional field investigation to the settlement of landowner grievances after the array was put into operation. Also discussed are selection of subarray locations, land acquisition using saturation permitting by professional agents, positioning the individual shallow holes, and grievance settlements including a land restoration program.

SANDIA LABORATORIES (STAFF), Design Study for Ocean-Bottom Seismic System, Contract ARPA Order No. 611, Sandia Lab., Albuquerque, New Mexico, 1967.

VESIAC 16,658 VU

This report presents the results of a design study for constructing an ocean bottom seismograph system together with recommendations and alternatives suggested by the Sandia Corporation working group.

SANDIA LABORATORIES (STAFF), Unattended Seismological Observatory (Development Report), Report No. SC-M-69-403, Contract ARPA Order No. 611, Sandia Laboratories, Albuquerque, N. M., 1969.

VESIAC 20,460 VU

Unattended Seismological Observatories were designed by Sandia Laboratories under ARPA Order No. 611 covering work sponsored by the Advanced Research Projects Agency (ARPA) under Project VELA-UNIFORM. Sandia Laboratories was instructed to design, construct, install, and evaluate three seismological observatories to operate unattended for periods up to 120 days. The stations were installed near Fairbanks, Alaska, at the Uinta Basin Seismic Observatory, near Vernal, Utah, and on Sandia Base, Albuquerque, New Mexico. Design of the USO, installation procedures, and a preliminary approach for tamperproofing the system are presented.

SANDIA LABORATORIES (STAFF), Unattended Seismological Observatory, Final Evaluation Report, Rept. No. SC-M-68-60, Contract ARPA Order No. 611, Sandia Lab., Albuquerque, N. M., 1968.

VESIAC 18,784 VU

Unattended Seismological Observatories were designed by Sandia Corporation. Sandia Corporation was instructed to design, construct, install and evaluate three seismological observatories to operate unattended for periods up to 120 days. The stations were installed near Fairbanks, Alaska, at the Uinta Basin Seismic Observatory near Vernal, Utah, and on Sandia Base, Albuquerque, New Mexico. Results of the system evaluation, reliability study results, and recommendations for subsystem improvements to meet the objectives of an operational USO are presented.

SANFORD, A. R., A. G. CARAPETIAN, and L. T. LONG, Train Generated Microseisms at Socorro, New Mexico, Contract AF-AFOSR-658-64, New Mexico Inst. of Mining & Tech., Socorro, N. M., 1966.

VESIAC 14,950 VU

Trains moving through the Rio Grande Valley at Socorro generate short-period microseisms far stronger than noise produced by any other cultural or natural source. Power spectra at five different locations indicate that the train noise is confined to a narrow band of frequencies (less than 3 cps). In general, the frequency limits and peaks of the power spectra shift to lower values with an increase in distance from the source. Peaks in power spectra, which range from 1.80 to 4175 cps, do not correlate with known mechanical interactions of the train with the track. Also, particle motions for randomly selected samples of train noise are described, as well as phase velocity measurements at a distance of about 17,000 feet.

SANTO, T., Lateral Variation of Rayleigh Wave Dispersion Character, Appendix II to 24th Monthly Progress Report, AF 61(052)-702, Seis. Inst., University of Uppsala, Uppsala, Sweden, 1965.

VESIAC 13,069 VU

Eurasia has been divided into a number of regions according to the group velocity dispersion of Rayleigh waves. The area around Novaya Zemlya, the Baltic Sea, the Black and the Caspian Seas have dispersions corresponding to the "high mountainous" type, which could be explained by thick sedimentary layers, extremely low velocities are found for the Tibet plateau, less than normal continental structure is found for eastern Siberia.

SARMAH, S. K., Attenuation of Compressional Waves in the Earth's Mantle, Contract AF 49(638)-1403, Oregon State Univ., Corvallis, Ore., 1967

VESIAC 19,036 VU

Accurate determination of the apparent value of the dissipation parameter Q requires a thorough knowledge of the (1) displacement pulse used for source amplitude, (2) propagation path, and (3) pulse recorded at teleseismic distance. None of these were thoroughly known in this study. In case (1) the displacement pulses were not simple, and comparisons were made between the observed displacement pulse amplitudes used as source amplitudes and the theoretical source amplitudes for Gnome, Shoal, and Haymaker nuclear explosions.

In case (2), it was travel time and not the path length of propagation that was directly involved in computation, and the Q values were insensitive to small errors in the travel time. In case (3), since the true pulse length was not known at teleseismic distances, computations were made with the first cycle, and the first one and one half cycles of the recorded first P arrival and the direct wave where possible.

SATO, R., "Reflection and Transmission of Elastic Waves on a Discontinuity with an Intervenient Transient Layer," Zisin, Ser. II., No. 10, pp. 141-153, 1957, (Translated from Japanese), Contract SD-78.

VESIAC 9781 VU

In this paper, the present writer has investigated reflection and transmission of elastic waves at "discontinuity" for the incidence of SH-waves with various glancing angles, supposing that there is an intervenient layer of thickness H between two different media. In the intervenient layer, both density and rigidity vary continuously but steeply from the corresponding values of the upper medium to those of the lower one. He has found that the reflected wave is considerably affected by the existence of the intervenient layer if the wave-length of incident wave is very small compared with the thickness of the layer, but the transmitted wave is not affected very much.

SATO, R., and A. F. ESPINOSA, Dissipation Factor of the $_0T_2$ for a Homogeneous-Mantle Earth with a Soft-Solid or a Viscous-Liquid Core, Contract AF-AFOSR-887-65, Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1966.

VESIAC 14,170 VU

The fundamental mode of the torsional free oscillations of an earth model with a soft-solid core or a viscous-liquid core is investigated. The authors, taking dissipation in the mantle into account, derive a relationship between the mantle dissipation factor Q, determined from the fundamental mode of the torsional free oscillations, and the mean specific dissipation factor in the mantle, and the mean specific dissipation in the soft-solid core, or the viscosity in the viscous-liquid core. The specific dissipation factor Q is estimated to be about 220.

SAVAGE, J. C., The Implications of Radial Propagation of Rupture, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-U VU

The author discusses several implications of the fact that slip in faulting begins at a point and, initially at least, propagates radially outward on the fault plane from this point. For small earthquakes, this suggests that the radiated energy depends upon the cube of the fault length, and, therefore, a dependence upon the length cubed need not imply a volume source. The radial propagation of rupture favors radiation along the fault plane, thus distinguishing the fault plane from the auxiliary plane in first-motion studies. Finally, for small earthquakes, he shows that the stopping phase is likely to be much larger than the initial motion.

SAVARENSKII, E. F., "A Decade of Operations at the Moscow Central Seismic Station" Trudy Seysmol. Inst., No. 127, pp. 71-79, 1948, (Translated from Russian), Contract SD-78.

VESIAC 12,555 VU

The construction and the development of the Moscow Central Seismic Station is described. The station was organized in connection with the transfer of the Academy of Sciences from Leningrad to Moscow. During the past decade, the station has recorded over 2000 earthquakes originating in various parts of the world. At the present time, the station is preparing an apparatus for obtaining the exit angle of the seismic wave front in order to continue the work begun by Academician B. B. Golitsyn.

SAVARENSKII, E. F., "The Structure of the Earth's Mantle According to Seismic Data," Trudy Geogiz. Inst., Akad. Nauk, SSSR, No. 36, pp. 15-24, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,344 VU

The results of a review of conclusions about the structure of the earth's mantle are presented. The inadequacy of concepts of boundaries of a second kind is demonstrated. The possibility of the existence of transitional layers is examined.

SAX, R. L., Design, Test, and Evaluation of Pre-set Bandpass Filters, Scientific Rept., SDL No. 176, Contract VT/6702, F33657-67-C-1313, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 15,906 VU

Using a known signal added to Gaussian noise, the performance of several bandpass filters is evaluated. The results are about the same as previous exercises carried out on a real data. The gain in threshold for reliable detection and gain in SNR is approximately 8-9 db for a bandpass filter which suppresses both the .2 cops and 2 cps peaks but considerably less if a strong 2 cps peak is not suppressed.

SAX, R. L., Energy Partitioning in Rayleigh Noise, Rept. No. 4410-53-X, Contract SD-78 (ARPA), Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884-C VU
AD 452 596

Seismic noise attenuation as a function of depth is computed assuming all of the noise consists of surface wave modes. Thermal equilibrium is assumed so that the total energy driving each mode is equal. A method is introduced to estimate the relative coupling of the surface wave modes. Predictions show good agreement with observations of the attenuation with depth in wells in Texas; Eniwetok Atoll and Florida.

SAX, R. L., Estimation of P-Waves using Vertical and Small Aperture Horizontal Arrays, Rept. No. 257, Contract VT/0706, F33657-70C-0941, Teledyne-Geotech, Alexandria, Va., 1970

VESIAC 20,451 VU

This report covers the scientific work being done under Contract F33657-70-C-0941.

SAX, R. L., Feasibility of Linear Polarization Measurements for Detecting and Measuring Seismic Body Waves, Sci. Rept. No. 163, Contract VT/6702, AF 33(657)-15919, Teledyne Industries, Inc., Earth Sciences Div., Alexandria, Va., 1966.

VESIAC 14,971 VU
AD 489 618

The application of P-polarization measurements at teleseismic distances is evaluated with data synthesized by adding an observed teleseismic event to ambient seismic noise. Since the input SNR is controlled, signal distortion and the detection threshold of weak signals, as well as gains of strong signals, are evaluated from amplitude measurements. No increase in detectability is expected at teleseismic distances. Theoretical analysis of expected gain confirms the expected losses in P detection at epicentral distances greater than 40° but indicates substantial gains at lesser epicentral distances. Later phases should be more detectable in the teleseismic range using polarization measurements.

SAX, R. L., Frequency-Wave Number Analysis of Signals and Noise Recorded at the UBO Vertical Array, Rept. No. 201, Contract VT/6702, F 33657-67-C-1313, ARPA Order No. 624, Teledyne, Inc., Alexandria, Va., 1967.

VESIAC 17,139 VU

This report discusses measurements taken of the Fiji earthquake recorded on 30 December 1966, on a vertical-component vertical array. Analysis was done by means of a frequency-wave number power spectrum. Signal velocity and energy conversion at high frequencies were discussed.

SAX, R. L., Frequency-Wavenumber Analysis of Signals and Noise Recorded at the Vertical Array at Apache, Oklahoma, Contract VT/6702, F 33657-67C-1313, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 16,750 VU

The seismic data analyzed include an Aleutian earthquake, several samples of ambient noise along with the noise occuring before the event, and a 25 second sample of coda following the signal. A preliminary interpretation of the noise and signals strongly suggests the importance of energy conversions possibly due to the complex geology at APOK. The results indicated a predominance of obliquely incident up-going waves at all frequencies. Further, the signals and coda similarly displayed anomalous down-going pulses attenuated by about 6 db with respect to the up-going pulse. Also, the down-going pulse contains lower frequencies than the up-going pulse and has a much lower apparent vertical velocity. The results obtained by mirror imaging the vertical array indicated that a loss of about 3 db would be encountered in using a conventional signal model at this site.

SAX, R. L., General Solutions of the Wave Equation in Spherical Coordinates for a Special Class of Elastic Isotropic Inhomogeneous Medium, Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8857 VU

The elastic parameters in each shell of a layered elastic sphere are represented as continuously variable quantities. An approximate equation is derived for each isotropic inhomogeneous layer for which each elastic parameter varies with radial distance from the center of the sphere raised to any arbitrary power. General eigenfunction solutions are obtained which are only slightly more complicated than the solutions for the homogeneous shell. The order of magnitude of the maximum error in the equation can be evaluated for each inhomogeneous shell. A special kind of inhomogeneous medium is analyzed which results in an exponential eigenfunction solution for the radial part of the wave potential.

SAX, R. L., Noise Analysis of Single Channel Deghosting Filters, Scientific Rept., SDL No. 178, Contract VT/6702, F33657-67-C-1313, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 15,911 VU

Arrays of performance values showing the change in additive noise variance due to single channel deghosting indicate significant sensitivity to both the deghosting method and band pass filtering. Only part of the echo can be removed feasibly, for example, with less than one db increase in the noise, by the single channel deghosting filter. The maximum fraction of the echo which can be removed varies greatly with the echo time, especially if the noise was band pass filtered.

SAX, R. L., Response of Several Vertical Array Processors, Sci. Rept. No. 212, Contract VT/6702, F33657-67C-1313, Teledyne, Inc., Alexandria, Va., 1968.

VESIAC 17,995 VU
AD 828 959

Several of the simplest vertical array processors were evaluated by means of frequency-wavenumber spectral analysis. The processors analyzed were beamed sum, multichannel deghost, and the fan filter. Adequate responses were obtained in the specified signal pass-band for all of the processors.

SAX, R. L., Stability of Frequency-Wavenumber Noise Spectra at UBO, Rept. No. SDL-197, Contract VT/6702, F33657-67-C-1313, Teledyne Industr., Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 16,746 VU
AD 819 940

Seven four-minute samples of the ambient noise were subjected to frequency-wavenumber (F-K) spectral analysis in order to observe the range and character of variations in the F-K power spectrum. The observations are derived from the same normal population. The apparent variation in the underlying noise statistics or processes do not suggest gradual diurnal variations in the noise power, but large and apparently random interday fluctuations.

SAX, R. L., Synthesis of Additive Ambient Seismic Noise with a Gaussian Markov Model, Sci. Rept., Project VT/6702, Contract F 33657-67-C-1313, Teledyne Inc., Earth Sci. Div., Alexandria, Va., 1967.

VESIAC 16,081 VU
AD 814 689

The ambient seismic noise is modeled by a single Gaussian population from which independent realizations or states are taken as input to tuned filters with spectral peaks matched to those observed in noise samples, for example at .2 cps and 2. cps. For each spectral noise peak, the realization on channel i + 1 is equal to a constant times the realization on channel i plus another constant times a new realization on channel i + 1. The constants defining the Markov process can be used to theoretically derive the associated power spectral matrix of the noise model.

SAX, R. L., Vertical Array Frequency-Wavenumber (V-F-K) Spectra of Synthesized Rayleigh Wave and P-Wave Noise, Sci. Rept., Rept. No. 219, Contract VT/6702, F33657-68C-0945, Teledyne Indust., Inc., Alexandria, Va., 1968

VESIAC 18,523 VU

Vertical array frequency-wavenumber analysis of seismic data is an extension of the concept of power spectral analysis to the space variation of the seismic field observed along an array of seismometers displaced vertically below the surface. The resulting power as a function of frequency and wave number represents an analysis of the sampled seismic field in terms of plane waves.

SAX, R. L. and R. A. HARTENBERGER, Seismic Noise Attenuation in Unconsolidated Material, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8444 VU
AD 446 222

The amplitude of seismic noise in the earth's crust depends upon depth, frequency and the elastic properties of the rocks. Unconsolidated layers, such as alluvium and weathered layers, at shallow depths (less than 0.6 km), may have a significant effect on noise attenuation in the frequency range of 1-10 cps. This effect takes the form of rapid attenuation of noise energy with depth. Seismic noise is described by an admixture of normal modes. For a given noise energy, the combination of modes depends primarily upon the elastic parameters of the structure.

SAX, R. L. and R. A. HARTENBERGER, Theoretical Prediction of Seismic Noise in Deep Borehole, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 7068 VU

In order to protect total noise attenuation with depth, three models are used to determine the energy partition among the various modes. The models assume statistical equilibrium. The first model assumes that seismic noise consists of Rayleigh waves from sources distributed in the medium; the second model assumes that noise consists of Rayleigh waves from sources distributed near the earth's surface; the third model assumes that noise consists of Rayleigh waves from thermal motions at the free surface. The second model yields an accurate upper limit of the attenuation in the well under consideration.

SAX, R. L., and R. L. HAWKINS, Vertical Array Teleseismic Signal Measurements - SDL Rept. No. 170, Contract VT 6702, AF 33(657)-15919 (AFTAC), Teledyne Industr., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 15,166 VU
AD 803 759

This signal study demonstrates the possibility of reducing near surface reverberations due to geological effects near the vertical array receivers. Signals are deghosted to make up-going P-pulses appear similar on all of the vertical array sensors. A correlation record is computed to measure the similar component which occurs jointly on all of the array elements. The coda of a strong USC&GS zero focus event and 588 km focus event were considerably simplified. The coda of a USC&GS 60 km event from the Aleutians showed sufficient definition to improve detection of pulses occurring after the first P-pulse. Ten unobservable weak signals were processed and three were detected, based on proximity to Herrin times, amplitude and character.

SAX, R. L., and C. H. MIMS, Rectilinear Motion Detection (Remode), Rept. No. 118, Project VT/2037, Contract AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1965.

VESIAC 10,158 VU

A method is drawn from electrical engineering to determine the operator which extracts a least squares estimate of a common waveform present in two time series. For weak body waves, the application of the extraction operator improves the signal-to-noise ratio, and isolates phases which cannot otherwise be detected with a narrow band-pass filter. Strong body wave phases, which would otherwise be obscured by signal generated noise, are also isolated.

SAX, R. L., D. H. RABENSTINE, and R. W. MARINE, Energy Fluctuations in Seismic Noise, Scientific Report No. 167, Contract VT/6702, AF 33(657)-15919, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 14,968 VU

Observation of seismic noise has indicated a large standing wave or isotropic component composed of the admixture of many propagation modes. Statistical theories such as equipartition of energy have been reasonably successful for deriving the excitation of the modes. Since such models are classically described by waves from a zero-mean Gaussian population, the authors test this hypothesis by observing if the amplitude envelope is described by a Boltzman or exponential probability distribution. Results are affirmative in that, on comparing a large number of observations of seismic and thermal vacuum tube noise, they cannot distinguish between the two sets of data in fitting exponential distributions. The same holds for both narrow- and broad-band measurements of the noise.

SCHATZ, C. E., P. DEHLINGER, Oregon State University Seismological Bulletin No. 3, 1 January to 31 March 1964, Rept. No. 17, Contract AF 19(628)-2778, Oregon State Univ., Corvallis, Oregon, 1964.

VESIAC 8930 VU
AD 609 410

This report contains data from the stations at Corvallis and Klamath Falls for the period January 1 to March 31, 1964. Instrumentation of the stations is discussed, as well as station constants. Data includes dates of disturbances, times, periods and additional remarks.

SCHATZ, C. E., P. DEHLINGER, Oregon State University Seismological Bulletin No. 4, 1 April to 30 June, 1964, Data Rept. No. 18, Contract AF 19(628)-2778, Oregon State Univ., Corvallis, Oregon, 1965.

VESIAC 10,130 VU
AD 612 180

This bulletin contains a summary of the recordings made by the World-Wide Standard Seismograph Station at Corvallis (COR) and by the seismic station at Klamath Falls (KFO), Oregon

SCHATZ, C. E., P. DEHLINGER, Oregon State University Seismological Bulletin No. 5, 1 July to 30 September 1964, Data Rept., No. 19, Contract AF 19(628)-2778, Oregon State University, Corvallis, Ore., 1965.

VESIAC 13,720 VU
AD 470 459

Oregon State University operates a World-Wide Standard Seismograph Station at Corvallis (COR) and a seismic station at Klamath Falls (KFO), Oregon. This report includes seismic data recorded at seismic stations from 1 July to 30 September, 1964.

SCHEIDEGGER, A. E., A Specialized Type of Seismic Research, Final Rept., Contract AF-AFOSR-62-419, Univ. of Illinois, Chicago, Illinois, 1964.

VESIAC 8878 VU
AD 608 466

Investigated was the relation of the mechanisms of natural foci to the prevailing tectonic stress field in an area. After the determination of the relation, a criterion for distinguishing natural shocks from explosions was to be established. The project began in the fall of 1962, and has been concluded. Discussed in the following work: (1) theoretical relationships between focal mechanisms and tectonic stresses; (2) data of focal mechanisms in the literature were collected and tabulated; (3) the best statistical means for averaging parameters of fault plane solutions of earthquakes were developed; (4) the statistical connection between focal mechanisms and the tectonic stress field was established; (5) a criterion for distinguishing seismic from artificial shocks was proposed.

SCHEIDEGGER, A. E., The Tectonic Stress and Tectonic Motion Direction in the Pacific and Adjacent Areas as Calculated from Earthquake Fault Plane Solutions, Contract AF-AFOSR-62-415, University of Illinois, Chicago, Illinois, 1964.

VESIAC 8595 VU
AD 613 829

The best P and T axes as well as the best normals to the null directions were calculated for groups of earthquake fault plane solutions belonging to 29 areas of the Pacific Basin and vicinity. The method employed was one developed in an earlier paper of the writer; it is based on a calculation of the eigenvectors of a quadratic form. It is shown that the principal horizontal stress (PHS) directions obtained in this fashion are in excellent agreement with those obtained from other evidence. In the Western Pacific Basin and vicinity the calculations were sufficiently dense to determine PHS trajectories; the latter are shown and yield a consistent picture of the areas in question.

SCHICK, R., G. SCHNEIDER, Simulation of an Earthquake Focus in Model Seismology, Part 3 - Seismic Model Studies, Landeserdbebendienstes, Baden-Wurttemberg, Stuttgart, (Translated from German), 1964, Contract SD-78.

VESIAC 9399 VU

An ultrasonic model experiment is described, the object of which was the study of the radiation pattern of shear waves as a function of different ratios of fault length to wave length. For a fault length which is small compared to the wave length, the radiation pattern corresponds to a quadrupole. If the length of the source is increased, the pattern degenerates to that caused by a dipole.

Furthermore, the influence of a finite fracture velocity is studied. This phenomenon is associated with a head wave, which can only be observed at a certain angle of observation as a function of the fracture velocity.

SCHMIDT, O., "On the Propagation of Pulses in Liquids and in Solids," Z. f. Techn. Phys., No. 12, pp. 554-560, 1938, (Translated from German), Contract SD-78.

VESIAC 6025 VU

Contained herein are discussions of these subjects: (1) unexplained problems in wave theory; (2) the theory of the seismic head wave; (3) method and equipment for the new experiments; (4) the head wave at the boundary of two liquids; (5) "total reflection" in pulses; (6) the head wave at the boundary between solids and liquids; (7) method for the determination of seismic constants; (8) transmission of the transverse waves through a disk.

SCHNEIDER, W. A., Ocean-Bottom Seismometer Data Analysis Program, Final Rept., Contract AF 19(604)-8368, Texas Inst., Dallas, Texas, 1964.

VESIAC 8753 VU
AD 607 785

This final report covers three years of engineering, field measurements, and data analysis to investigate seismic energy as recorded in an ocean environment to 22,000 feet. Ocean-bottom data from three independent geographical locations (in Hawaii, the Aleutians and California) in the Pacific Ocean has been studied for consideration of means of detecting and identifying underground or underwater nuclear explosions.

The study of data suggests that signal detection gains of at least 3 db are possible by suitably combining pressure and vertical to suppress the coherent part of the noise energy.

SCHREIBER, E., Elastic Moduli of Single Crystal Spinel at 25°C and to 2 Kbar, Contract AF 49(638)-1355, Columbia Univ., Lamont Geol. Observ., Palisades, N. Y., 1967.

VESIAC 15,540 VU

The elastic properties of a synthetic single crystal spinel with a composition of $MgO \cdot 2.6\ Al_2O_3$ have been determined at 25°C and up to 2 Kbar by measuring propagational velocities of ultrasonic waves using the method of pulse superposition. The isotropic moduli and Poisson's ratio were computed from the single crystal values using the Voigt-Reuss-Hill approximation. Values of the elastic moduli at 1 bar and a 2 kbar are given. The bulk modulus was computed to be 2019.9 kbar, and the pressure derivative of the bulk modulus was found to be 4.18.

SCHREIBER, E., Measurement of P and S Sound Velocities Under Pressure on Laboratory Models of the Earth's Mantle, Semiannual Tech. Summ. Rept., Contract No. AF 49(638)-1355, Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 8395 VU

This report from Lamont Geol. Observ. covers the period Dec. 16, 1963 to June 15, 1964. During this time the following work was done: 1) a paper was written on the relation between index of refraction and density; 2) the laboratory was modified because of the space made available by the lunar seismograph environmental laboratory; 3) a high pressure system, with an initial capability of 75,000 psi was constructed; 4) the ultrasonic interferometer was assembled from standard components, except for the harmonic generator, which was built by a staff member; and 5) the pressure derivatives of sound velocity of polycrystalline Mg0 were measured.

SCHREIBER, E., Measurement of P and S Sound Velocities Under Pressure on Laboratory Models of the Earth's Mantle, Semiannual Tech. Summ. Rept., 16 June 1964 - 15 December 1964, Contract AF 49(638)-1355, Lamont Geol. Observ., Palisades, N. Y., 1965.

VESIAC 9449 VU

This report describes work completed at Lamont Geological Observatory during the period June until December, 1964, and gives an account of the present experimental work, including: (a) review of technique and first results; (b) velocity vs. pressure at constant temperature; and (c) velocity variation with temperature at 1 atmosphere of polycrystalline MgO. Other subjects discussed include: some related constants of MgO, the possibility of LV Zone for S Waves in a homogeneous mantle, and pressure temperature plots of sound velocity at high pressure and temperature.

SCHREIBER, E., Measurement of P and S Sound Velocities Under Pressure on Laboratory Models of the Earth's Mantle, Rept. No. 292-63-64, Semiannual Tech. Summ. Rept., 16 December 1964 - 15 June 1965, Contract AF 49(638)-1355, Lamont Geol. Observ., Palisades, N. Y., 1965.

VESIAC 11,764 VU

This report contains descriptions of the manuscripts published during the reporting period, and those submitted for publication. Work in progress is discussed. Discussed is the completed experimental work entitled "The Pressure Derivatives of the Sound Velocities of Polycrystalline Alumina (Lucalox)." Also described are sound velocity measurements and the pressure derivatives of the sound velocities on a small sample of alumina (Lucalox) by the method of "pulse superposition." The computed compression is determined up to 400 kilobars; it compares well with shock wave measurements.

SCHREIBER, E., Measurement of P and S Sound Velocities Under Pressure on Laboratory Models of the Earth's Mantle, Annual Summary Rept., Dec. 1965-Dec. 1966, Contract AF 49(638)-1355, Lamont Geol. Observ., Columbia University, Palisades, New York, 1966.

VESIAC 15,530 VU
AD 646 782

The results of velocity measurements performed on specimens of polycrystalline forsterite with 6% porosity, a single crystal spinel, and on obsidian, are reported. The velocities of compressional and shear waves were determined at both ambient (25°C and 1 bar) conditions and as a function of pressure on all three specimens. Velocity as a function of temperature was measured to 150°C at 1 atm on the obsidian specimen. The results are given by equations for two isotropic materials (forsterite and obsidian). The results for the spinel are given in terms of the single crystal elastic constants. The isotropic bulk modulus B, Poisson's ratio, and the pressure derivatives of the bulk modulus are given.

SCHULZ, G., "Reflections from the Crystalline Basement in the Region of the Pfalzer Bergland," Ztschr. f. Geophys., Vol. 23, pp. 225-235, 1957, (Translated from German), Contract SD-78.

VESIAC 9821 VU

A report is given here on the deep reflections observed in the region of the Pfalzer-Bergland. The depth of the reflecting boundary was determined to be about 18,000 m. It is probable that the Conrad discontinuity is involved.

SCHULZE, G. A., "Seismic Results of the Helgoland Blast," Die Naturwissenschaftern, Vol. 34, p. 288, 1947, (Translated from German), Contract SD-78.

VESIAC 6027 VU

The subject mentioned in the title was discussed at a meeting of the Royal Society on Nov. 20, 1947. A number of European countries participated, reporting on the measurements and giving some results. Willmore (Cambridge) presented a summarizing interpretation of the later breaks; he assumed that these are formed by energy oscillation between the boundaries of layers. On April 18, 1947, 6000 T of ammunition were detonated in Helgoland. Seismic waves were observed up to a distance of 1000 km. Discussed is the observation of Pn* waves, the velocities of the arrival times, and the presence of an additional higher boundary along with the longitudinal velocity in this layer.

SCHWAB, F., Accuracy in Model Seismology, AF-AFOSR-710-64, Univ. of Calif., Los Angeles, Calif., 1965.

VESIAC 10,558 VU
AD 463 441

The most common technique currently used in model seismology makes use of a fixed source of elastic waves and a single receiver. This receiver is moved from position to position on the model to determine relative spatial response to the source excitation. Although satisfactory for some purposes, this method is not particularly accurate. Significant errors arise due to the difficulty encountered in achieving the same receiver-model coupling each time the receiver is positioned at a new point on the model. In this paper is described a modeling method which eliminates this problem.

SCHWAETZER, T., "On the Identification of Seismic Refraction Markers in the Gulf of Lion," Acad. Sci. Paris Compt. Rendus, Vol. 256, No. 8, pp. 1815-1817, 1963, (Translated from French), Contract SD-78.

VESIAC 9415 VU

Velocity measurements made in the interior of petroleum boreholes on land around the Gulf of Lion seem to demonstrate that the markers found in a recent study of marine seismic refraction do not correspond to the Miocene, to the Jurassic, or to the granitic base, but rather to the Pliocene, the lower Tertiary and to the Jurassic.

SCOTT, J. H., R. D. CARROLL, and D. R. CUNNINGHAM, Interpretation of Electrical Resistivity and Self-Potential Measurement, Bilby Event, Yucca Flat Nevada, Technical Letter: NTS-67, Contract VT/042, U. S. Geological Survey, Denver, Colorado, 1964. (OFFICIAL USE ONLY)

VESIAC 8952 VU O

SEIFERT, K. E., R. E. RIECKER and L. C. TOWLE, Theoretical Considerations of Shear Deformation in Rocks, Contract No. GRD TASK 865211, Air Force Cambridge Research Labs., Wash., D. C., 1963.

VESIAC 8413 VU
AD 428 433

The AFCRL experimental rock deformation program yields data on the behavior of rock materials of lower crust-upper mantle composition under geophysically realistic conditions of high pressure and temperature. Experimental variables, temperature, pressure and rate of strain, are derived from calibration equattons based on observable physical variables. Mechanical behavior of the samples adduces in terms of two physical models; the Coulomb-Navier substance expressing brittle behavior, and the Bingham substance expressing ductile behavior. The nature of failure in shear experiments yields information on the origin of deep quakes, and the catalytic effect of shearing stresses may induce new high pressure polymorphs.

SELLEVOLL, M. A., Detection Seismology, Quarterly Prog. Rept. No. 1, 1 Nov. 1967 to 31 Jan. 1968, Contract F61052-68C-0019, University of Bergen, Bergen, Norway, 1968.

VESIAC 18,326 VU

This quarterly progress report on Detection Seismology discusses its research program, personnel, establishment, operation and maintenance of seismological stations, special problems and future plans.

SELLEVOLL, M. A., Detection Setsmology, Quarterly Progress Rept. No. 4, 1 August to 31 October 1968, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1968

VESIAC 19,281 VU

The operation of an array on signal enhancement is strongly dependent on space and time characteristics of the noise. These features are being examined for short period data from Øyer.

In addition to space and time characteristics of the power spectra, the same problem is approached through coherence estimates and calculations based upon these estimates. Velocity and direction estimates of the noise are made when the coherence level is high enough to justify such calculations.

Results of a Pn time term study based on recordings from several temporary stations and arrays are presented and a detailed study of first arrivals at Øyer has been carried out.

SELLEVOLL, M. A., Detection Seismology, Prog. Rept. No. 7, 1 May 1969 to 31 July 1969, Contract F61052-68C-0019, University of Bergen, Bergen, Norway, 1969

VESIAC 19,825 VU

Research progressed on the predictability of the group velocity of the 20 sec Rayleigh waves at LASA. All group velocities given by the matched filter peak output have been checked by ordinary dispersion analysis of the surface wave trains using the standard method of Ewing & Press. The results suggest mapping of the world as seen from LASA in terms of group velocities.

SELLEVOLL, M. A., Detection Seismology, Prog. Rept. No. 8, 1 August to 31 October 1969, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1969

VESIAC 19,936 VU

This progress report states that the Scientific Report No. 4 "Seismic Noise Structure at the Norwegian Seismic Array" was completed.

Several epicentral areas with different wavepaths to NORSAR have been selected for closer examination of dispersion characteristics. The intention is to look into the possibility of predicting the shape of surface wave trains from particular regions. The data from the deep seismic sounding project carried out in June 1969 are under preparation.

SELLEVOLL, M. A., Detection Seismology, Progress Rept. No. 9, 1 Nov. 1969 to 31 Jan. 1970, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1970

VESIAC 20,171 VU

During the period covered by this progress report, Scientific Report No. 4, "Seismic Noise Structure at the Norwegian Seismic Array", has been completed. The report gives the final results from our work on short period at Øyer subarray. 30 copies were shipped to ARPA 27 January 1970.

SELLEVOLL, M. A., Detection Seismology, Prog. Rept. No. 10, 1 March to 31 May 1970, Contract F61052-68C-0019, Univ. of Bergen, Bergen, Norway, 1970

VESIAC 20,344 VU

A reasonably quick and inexpensive way of digitizing seismograms was developed in order to deal most effectively with the already existing data base of the recordings of the standard stations and the Lillehammer station.

Body wave magnitudes calculated from Kongsberg seismograms have been compared with those reported by U. S. & C. G. S. in order to find out if regional anomalies in magnitudes calculated from recordings at Norwegian stations can be expected.

SELLEVOLL, M. A., A Publications Summary on Crustal and Upper Mantle Structure in Fennoscandia, Iceland, and the Norwegian Sea, VESIAC Rept. No. 4410-75-X, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8217 J VU

This paper is a three-part summary of publications and personal communications about the structure of the crust and upper mantle in: 1) Fennoscandia; 2) Iceland; and 3) the Norwegian Sea.

SELLEVOLL, M. A., A Study of Travel Times from an Earthquake in Northern Norway on 15 December 1962, Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 d VU

On 15 December 1962 an earthquake shook an area of 100,000 km^2 in Northern Norway. Epicentral coordinates and an origin time were obtained. The close spacing of the isoseismal lines suggests a shallow focus. A maximum intensity of V (Mercalli-Cancani scale) has been assigned to the earthquake. The epicenter determination and the travel-time calculations are based on records from 13 stations in the distance range from 287 to 960 km.

SELLEVOLL, M. A. and P. POMEROY, A Travel Time Study for Fennoscandia, Sci. Rept., Contract AF 61(052)-859, AF-AFOSR 887-65, Univ. of Bergen, Bergen, Norway, 1968

VESIAC 19,909 VU

The present paper is based on results obtained from a seismic refraction experiment utilizing 19 explosions detonated in Norway during the period from August 14, to September 4, 1965. In addition to recordings at 20 temporary stations, most of the larger explosions were well recorded at the permanent stations of the Fennoscandian seismological network. The following average travel times have been obtained using the network data:

$$t_{Pn}: (7.5 + \Delta/8.18)\text{sec} \qquad t_{Sn}: (12.0 + \Delta/4.63)\text{sec}$$

t_{Pb}: $(1.1 + \Delta/6.59)$sec t_{Sb}: $(1.8 + \Delta/3.77)$sec
t_{Pg}: $(0.1 + \Delta/6.10)$sec t_{Sg}: $(0.1 + \Delta/3.58)$sec

Improvement in phase identification by analog analysis techniques is illustrated, using records from the Lillehammer array.

SERGEEV, L. A., "Ultrasonic Echologger for Geophysical Purposes," Akad. Nauk. Prikladnaya Geofizika, Vol. 20, pp. 141-154, 1958, (Translated from Russian), Contract SD-78.

VESIAC 10,203 VU

Ocean experiments demonstrated the usefulness of the proposed combined method of ultrasonicecho logging for determining the layering of deposits composing the ocean floor. Along with a record on the echolog of the travel time of the signals, the distribution of the sound reflectivity of the bottom is also determined (by means of a cathode ray oscillograph connected with echologger) for a more reliable differentiation of the depth reflections on the echolog. The ultrasonic logging method is useful in the preliminary rapid exploration of ocean areas in complex studies of the ocean floor. The combination of two methods, ultrasonic echo logging and electroprofiling of the ocean floor, is very useful in determining the geological structure of the upper 10 meters of the ocean floor.

SERIFF, A. J., Seismic Noise in Deep Boreholes, Semiannual Technical Rept. No. 2, October 1963 - March 1964, Contract AF 19(628)-2785, Shell Develop. Co., Houston, Texas, 1964.

VESIAC 8399 VU

This report covers the work performed from October 1963 to March 1964. During this period, the field measurement program at the first well site in Hempstead, Texas, was essentially completed. The main purpose of the investigation is to discover whether worthwhile improvements can be made in detecting small, distant, underground nuclear explosions by stationing seismic instruments in boreholes. This report provides a preliminary sample of the data analyses and theoretical computations performed for the well. The first part of the report is largely concerned with the site, the instrumentation, signals received, selection criteria, analyses, noise spectra and variation, models. The second part is concerned with implication of theoretical studies.

SERIFF, A. J. and J. H. ROSENBAUM, Seismic Noise in Deep Boreholes, Semiannual Tech. Rept. No. 1, Contract No. AF 19(628)-2785, Shell Development Co., Houston, Texas, 1963.

VESIAC 6581 VU
AD 423 273

This report concerns short-period noise and signals consisting of frequencies near one cycle per second and with depth of the order of 10,000 feet. It contains no experimental results, but consists almost entirely of a specification of the initial approaches to the problem.

SERIFF, A. J., J. H. ROSENBAUM, C. J. VELZEBOER, and R. J. HAASE, Seismic Noise in Deep Boreholes, Semiannual Tech. Rept. No. 3, April-September 1964, Contract AF 19(628)-2785, Shell Development Co., Houston, Texas, 1965.

VESIAC 10,557 VU

This report contains primarily field data and theoretical calculations for a deep well site, near Juno, Texas. The authors have considered the existence of body waves incident from below the well in the noise, and the report includes theoretical calculations and data analyses bearing on this question. Included are least square error fits of power ratio and coherence data. Apparently useful data from the surface array have been obtained and discussed. Observations of the ratio of horizontal and vertical component motions at the surface are reported and compared with theoretical calculations. The theoretical mode calculations extend to deeper models, including the Moho.

SERIFF, A. J., J. H. ROSENBAUM, C. J. VELZEBOER, and R. J. HAASE, Seismic Noise in Deep Boreholes, Final Rept. No. AFCRL-65 490, Contract AF 19(628)2785, Shell Development Co., Dallas, Texas, 1965.

VESIAC 11,794 VU
AD 618 400

Described is the seismic noise in the frequency range 0.2 to 0.5 cps which was observed in three wells approximately 10,000 feet deep. Locations of the wells, depths of observations, instrumentation, power spectral ratio, and coherence and cross correlation phase are discussed. The theoretical response of appropriate plane layered elastic models to trapped Rayleigh and Love waves, was investigated in detail over the applicable frequency range for each of the three sites. Described are two essentially independent models for the noise that have been investigated.

SEYMOUR, F. F., Comparison of Seismograph Systems at UBSO, Tech. Rept. No. 65-124, Contract AF 33(657)-12373, Teledyne Industries, Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 13,432 VU
AD 626 529

Five seismograph systems that are routinely operated at the Uinta Basin Seismological Observatory were evaluated to determine their relative capabilities in detecting teleseismic P-wave arrivals. This evaluation includes a detailed analysis of microseismic background noise, signal characteristics, and S/N ratios, as recorded on a single element of the surface array of seismographs, both the filtered and unfiltered summation of the outputs of the elements of the surface array, the shallow-hole, and the deep-hole seismograph systems. In addition, system magnitude residuals relative to magnitudes reported by the USC & GS as well as apparent arrival-time residuals are presented.

SHABLINSKIY, G. N., "An Approximate Estimate of the Velocity of Propagation of Elastic Waves in the Upper Part of the Earth's Crust," Vses. Nauch. - Issled. Inst. Geofiz. Razved. Vop., No. 3, pp. 13-19, 1964, (Translated from Russian), Contract SD-78.

VESIAC 13,316 VU

A method of determining the magnitude and character of the velocity variation in crystalline rocks of the upper 10-15 km mass of the crust is presented. It permits the determination of the specific value for a given velocity region in the upper part of the crystalline rocks. It is known that the velocity variation in crystalline rocks depends mainly on their composition, pressure and temperature. Therefore, by examining separately the influence of each of these factors, and then combining them, it is possible to obtain a relatively complete characterization of the velocity variation with depth. The author examines the character of the variation of the propagation velocity of longitudinal waves for a group of rocks in acid and for groups of intermediate and basic rocks.

SHAN'GIN, N. V., and Yu. V. MAKAROV, "The Influence of Fissuring of the Medium on the Velocity and Amplitude of a Seismic Wave (Three Dimensional Model)" Uchenye Zapiski LGU, No. 324, pp. 136-140, 1964, (Translated from Russian), Contract SD-78.

VESIAC 13,050 VU

The authors discuss the fissuring of rock masses, a phenomenon which leads to weakening of the massif and to facilitation of flooding conditions, and an understanding of which is important in soil mechanics, soil geology, and industrial geophysics. The influence of the degree of fissuring on the velocity and amplitude of a longitudinal wave in a three-dimensional model of a medium was investigated with ultrasonic pulse equipment. The number of fissures (punctures) per unit of surface was changed by means of a special awl. The change in velocity of a longitudinal elastic wave with an increase in fissuring was determined with time-distance curves. The relation between the number of fissures, porosity and the velocity of the longitudinal elastic wave is given.

SHAPIRO, E. S., The Probability of Successful Search for the Radioactive Pool Resulting from Nuclear Detonation in the Ocean Phase I: Determination of the Optimal Area to be Searched, Contract ARPA Order No. 192, U. S. Naval Radio. Def. Lab., San Francisco, Calif., 1967.

VESIAC 16,752 VU

The solution to the problem of determining the optimal area to be searched to find the radioactive pool from an underwater nuclear explosion is given in both analytical and graphical form.

SHAPPEE, R. M., Deep-Hole Seismometer, Semiannual Rept. No. 1, Contract VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1961.

VESIAC 5564 VU

This report covers the work accomplished during the six months ending December 1, 1961. A copy of the work statement is included. A description of the work accomplished on each task is given, with specific details. Briefly, this work was accomplished: 1) Task 1a - study of the requirements to be met was undertaken; a design of a deep-well seismometer was completed; 2) Task 1b - a prototype seismometer was completed and a second assembly is in progress; 3) Task 1c - components of a complete system have been specified and ordered; handling fixtures have been fabricated; 4) Task 1d - laboratory tests of components of the system have been completed, and shake table and calibration and coil tests of the complete seismometer are planned in January.

SHAPPEE, R. M., Deep-Hole Seismometer, Semiannual Rept. No. 2, Contract No. VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1962.

VESIAC 5565 VU

This report covers the work performed during December 2, 1961 through May 21, 1962. A copy of the statement of work is included. A description of the work accomplished on each task is given, with specific details. Briefly, this work was accomplished: 1) Task 1a - study of the requirements to be met was undertaken, and the design of a deep-well seismometer has been completed; 2) Task 1b - two prototype seismometers have been completed; 3) Task 1c - components of a complete system have been received; handling fixtures have been fabricated; 4) Task 1d - laboratory tests of the deep-well seismometer have been completed; 5) Task 1e - reduction of laboratory test data has been completed; and 6) Task 1f - preparation and implementation of a field test program was begun.

SHAPPEE, R. M., Deep-Hole Seismometer, Semiannual Rept. No. 4, Phase III, Contract No. VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 6168 VU

This report covers work accomplished during December 1, 1962 through June 1, 1963. A copy of the work statement is included. A description of the work accomplished on each task is given, with specific details. Work on these tasks is reported: 1) Task 1h(1) - Investigate and catalog existing deep wells; 2) Task 1h(2) - prepare and occupy sites; 3) Task 1h(3) - conduct field measurements; 4) Task 1i(1) - operate and improve Grapevine Site; 5) Task 1i(2) - perform experiments at Grapevine site; 6) Task 1i(3) - improve seismograph design; 7) Task 1j - make installations near a permanent station; and 8) Task 1k - process data, perform detailed analysis.

SHAPPEE, R. M., Deep-Hole Seismometer, Semiannual Rept. No. 5, Contract No. VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7236 VU
AD 431 021

Surface noise was measured at 25 locations and used as an aid in the selection of deep-well sites. Four deep-well sites were found with amplitudes sufficiently low to make them worth further consideration. Recommendations were made to AFTAC for their preparation. Approval was received for the preparation of one well in Nevada and one in Wyoming. In addition, field measurements were made at deep-well sites near Orlando, Florida, on Eniwetok Atoll, and near Apache, Oklahoma. These field measurements are described in the report. Third, a deep-well site at the Uinta Basin Seismological Observatory, Vernal, Utah, was located and prepared for use. Data recorded at the deep-well sites were visually analyzed; spectral analyses were made of the tapes.

SHAPPEE, R. M., Deep-Hole Seismometer, Semiannual Rept., Contract No. VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8475 VU
AD 446 568

One hundred and ninety-eight deep wells were investigated as potential measurement sites. Five were investigated in detail, and listed in the deep-well catalog. Approval was received for the preparation of deep wells in West Virginia and Texas. These wells were prepared for use. Results of surface noise measurements have been drawn as contours on a tectonic map of the U. S. and correlate closely with major provinces. In addition, field measurements were made at deep-well sites in Oklahoma, Nevada, Wyoming, West Virginia, and Utah. Calibration improvements were made, and a special high-gain system was designed, tested, and used in measurements, and other experiments were performed at the Grapevine site. Visual and spectral analyses of data was accomplished.

SHAPPEE, R. M., Deep-Hole Seismometer (Variable-Reluctance Type), Final Report, Tasks 1 h Through 1 k, Contr. No. VT/1139, AF 33(600)-43369, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8760 VU
AD 450 630

The deep-hole seismometer that was developed and tested in earlier phases of the Project was used in a program designed to: a) investigate geological and other factors that influence signal-to-noise improvement obtained by operating the seismometer in deep holes; b) measure and study the physical characteristics of deep holes; c) determine methods of emplacing seismometers to optimize the detection of small signals in the presence of noise; d) make improvements in the seismograph; and e) provide data to make comparisons between theoretical and field measurements. 423 deep holes were investigated; 23 were studied further; 8 were prepared for field measurements. Also, the installation of deep- and shallow-hole seismographs at UBSO, and data analyses, are discussed.

SHAPPEE, R. M., Deep-Hole Symmetrical Triaxial Seismometer, Model 22700, Tech. Rept. No. 66-67, Contract VT/5051, AF 33(657)-13668, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,155 VU
AD 803 200

A deep-hole symmetrical triaxial seismometer was designed, laboratory tested, and field tested. The results of tests showed that the instrument met the design objectives and was ready for additional field testing and use.

SHAPPEE, R. M., Deep-Well Research, Semiannual Rept. No. 2, Rept. No. TR-65-112, Contract VT/5051, AF 33(657)-13668, Teledyne Indus., Inc., Geotech Div., Garland, Texas, 1965.

VESIAC 12,789 VU
AD 625 514

A deep-hole vertical array of six short-period seismometers was tested at Grapevine, Texas, and it performed satisfactorily. An array of four seismometers was then operated routinely in a deep hole near Apache, Oklahoma, to record noise and signals. Described also in this report are the results from a deep-hole triaxial seismometer which was constructed and tested, and a long-period response obtained from a short-period deep-hole seismometer by the use of filters and amplifiers. Finally discussed are routine measurements of noise and signals in deep holes made at sites in Oklahoma, Texas, and West Virginia. The measurements were used in a theoretical study program designed to increase understanding of the nature of noise and signals. Effort was expanded to define optimum processing techniques for signals recorded from triaxial and vertical seismometers. The results of this effort will lead to an optimum on-line processor for routine field use.

SHAPPEE, R. M., Off-Shore Measurements Program (Appendix 3 to TR 65-112), Contract AF 33(657)-13668, VT/5051, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 12,789-C VU

A deep-ocean seismograph was installed in the ocean approximately 200 nautical miles off Cape Hatteras in water with a depth of approximately 2000 fathoms. The seismograph consisted of: (a) a Model 20171 seismometer which is discussed in some detail in the report; (b) a Texas Instruments RA-3 amplifier; (c) a voltage controlled oscillator; (d) a telemetry transmitter; (e) a programmed calibrater; and (f) a seven-conductor, deep-hole cable. Other portions of the seismograph included a telemetry receiver, a discriminator, a Helicorder and a tape recorder. Four attempts were made to install the seismograph; the last was partially successful.

SHAPPEE, R. M., and E. J. DOUZE, Deep-Well Research, Semiannual Rept. No. 1, Tech. Rept. No. 65-15, Project VT/5051, Contract AF 33(657)-13668, Geotech. Corp., Garland, Texas, 1965.

VESIAC 10,126 VU

A vertical array of six deep-hole seismometers, Geotech model 11167, was designed. Operation and preliminary results are described. A short-period, deep-hole triaxial seismometer developed under VELA Project VT/072 was modified. Measurements were made in holes in South Dakota, Pennsylvania, West Texas, at the Uinta Basin Seismological Observatory, and at the Wichita Mountains Seismological Observatory. Instrumentation for these measurements is described. Results will be used to identify wave types and modes. Also discussed are: (a) operation of two seismometers at WMSO; and (b) measurements in South Dakota.

SHAPPEE, R. M., E. J. DOUZE, Deep-Well Research, Quarterly Rept. No. 4, Tech. Rept. No. 66-72, Contract VT/5051, AF 33(657)-13668, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 14,816 VU
AD 487 222

A vertical array of S-P triaxial seismometers was installed and operated at the deep-hole test site near Apache, Oklahoma. A digital recording system was used to make field records in computer-compatible format. Off-line and on-line digital data processing techniques were further refined. A limited amount of data was processed off-line.

SHAPPEE, R. M., and E. J. DOUZE, Deep-Well Research, Quarterly Rept. No. 5, 1 July Through 30 September 1966, Tech. Rept. No. 66-96, Contract VT/5051, AF 33(657)-13668, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,163 VU
AD 803 204

A vertical-array of four triaxial short-period seismographs was operated at Apache, Oklahoma. The outputs of the seismographs were digitally recorded.

Single-channel optimum filters were developed and tested off-line. Deghosting filters were used in conjunction with the optimum filters.

SHAPPEE, R. M., E. J. DOUZE, Deep-Well Research, Final Report, Technical Report No. 67-3, Project VT/5051, Contract AF 33(657)-13668, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,066 VU
AD 813 007

A deep-hole array of six S-P seismometers was tested at the test site near Grapevine, Texas. After a brief period of successful operation, half the array was moved to the site near Apache, Oklahoma and the other half was moved to the site near Franklin, West Virginia. Various techniques were employed to process the output of these arrays.

The information from wells and surface arrays was used to study S-P (6. 0-0.3 sec) noise and signals. An attempt was made to show that higher mode Rayleigh wa.es and body waves are present in the noise by comparing theoretical curves with experimental results. It was shown that surface waves generally predominate at the longer periods while body waves appear at the shorter periods at quiet sites.

A complete system, composed of four triaxial seismometers, a digital processor, and associated equipment, was installed and operated at Apache, Oklahoma. Data obtained from this array were processed using optimum filtering techniques. Although both single-channel and multichannel processes were employed, the results obtained to date indicated that a one-sided single-channel optimum filter was the most effective processor.

SHAPPEE, R. M., E. J. DOUZE, and R. F. KNIGHT, Deep-Well Research, Quarterly Report No. 2, TR No. 66-2, Contract: VT/5051, AF 33(657)-13668, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 13,844 VU

A five-instrument array of vertical seismometers was operated near Franklin, West Virginia, and a triaxial and a vertical seismometer were operated as an array at the site near Apache, Oklahoma. A test site near Grapevine, Texas, was operated throughout the period covered by this report. The coordinate transformed output of the triaxial seismograph was compared with the output of conventional seismographs. Minor differences were found. Wiener optimum filters were developed for use with digitally-processed data. An example of the degree of noise suppression achieved with one of the contemplated processing techniques is presented.

SHAPPEE, R. M., E. J. DOUZE, R. F. KNIGHT, Deep-Well Research, Quarterly Report No. 3, Tech. Rept. No. 66-46, Contract VT/5051, AF 33(657)-13668, Teledyne industries, Inc., Geotech Division, Garland, Texas, 1966.

VESIAC 14,306 VU
AD 482 923

The deep-hole triaxial seismometer array was installed and briefly operated at the test site near Grapevine, Texas. It will be moved to a site near Apache, Oklahoma and operated routinely. Analysis results showed that the energy in teleseismic signals recorded at depth agreed closely with theory for the first five seconds of the signal, but agreed less as a function of time after the onset of the signal. Inverse filter design was partially successful, but there were limitations in the design, discussed in the report. An off-line computer program was completed to unpack the field recordings. The program is highly efficient in that the data are not demultiplexed except at the final output.

SHAPPEE, R. M., B. M. KIRKPATRICK, and J. R. WISE, Long-Period Seismograph Development, Quarterly Rept. No. 3, 1 Jan. Through 31 March 1967, Tech. Rept. 67-16, Project VT/6706, Contract AF 33(657)-16406, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,067 VU
AD 814 642

The first module of a long-period triaxial borehole seismometer was assembled. Preliminary tests were conducted to determine its operating characteristics. An undesirable mass position versus temperature characteristic was observed. Probable causes have been determined and will be corrected.

SHAPPEE, R. M., and R. F. KNIGHT, Innovations in Deep-Well Instrumentation, Rept. No. 4410-83-X, Contract SD-78 (ARPA), Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884-E VU
AD 452 596

The deep-well seismometer, operating in a quiet, constant temperature environment, offers the possibility of obtaining a long-period output by filtering the short-period response and providing additional amplification.

Recent work permits remote weight-lift calibrations at normal operating gain levels, real time filtering of long period microseisms has been accomplished in the field, operational amplifiers have been used to raise the system magnification, and filter-amplifier combinations have been designed to produce a long-period response from the deep-well seismograph.

SHAPPEE, R. M., A. W. SIMMONS, B. M. KIRKPATRICK, Long-Period Seismograph Development, Quarterly Rept. No. 2, 1 October Through 31 December 1966, Rept. No. TR 67-1, Contract VT/6706, AF 33(657)-16406, Teledyne Industries, Geotech Div., Garland, Texas, 1967.

VESIAC 15,319 VU
AD 805 571

Details of the design of a L-P triaxial borehole seismometer were completed. Preparations were started for field use of the seismometer.

SHAPPEE, R. M., W. TROTT, and B. M. KIRKPATRICK, Long-Period Seismograph Development, Quarterly Rept. No. 1, 1 July Through 31 September 1966, Tech. Rept. No. 66-94, Contract VT/6706, AF 33(657)-16406, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,162 VU
AD 803 203

Equipment was designed and constructed to perform a thermal noise experiment. The objective of the experiment was to experimentally investigate the spectral distribution of noise energy in seismometers and galvanometers and their interconnections. The equipment used in the experiment is described.

A long-period triaxial borehole seismometer was designed. The design has preserved ideal "La Coste" geometry in that changes in period are accomplished through a controlled positive restoring force rather than through alteration of the geometry. Also, temperature compensation is designed to preserve the geometry. The seismometer is designed such that it will withstand shipping and installation acceleration while completely assembled.

VESIAC 17,451 VU

SHATASVILI, S. K., "A Three-Dimensional Problem on the Theory of Standing Elastic Waves for a Given Displacement at the Edge of the Medium," Doklady, Akad. Nauk, SSSR, Vol. 83, No. 6, pp. 809-811, 1952, (Translated from Russian), Contract DA 49-083 OSA-3137.

The three-dimensional dynamic problem and the theory of elasticity for a given displacement at the boundary of the medium is examined for the case of standing waves in elastic media.

VESIAC 17,038 VU

SHEBALIM, N. V., "Determination of Focal Depth on the Basis of Macroseismic Data with Consideration of the Influence of the Low-Velocity Layer," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 5, pp. 100-113, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

The article examines formulas proposed by various authors for determining focal depth on the basis of a decrease of intensity with epicentral distance. It is shown that the divergences between the formulas can be explained by an essentially different character of the intensity decrease at the earth's surface for normal and deep earthquakes. A universal set of master curves is proposed for a graphic determination of focal depth on the basis of macroseismic intensity data.

VESIAC 7707 VU
AD 452 566

SHELL DEVELOPMENT CO. (STAFF), Rock Failure in Torsion Tests, Semiannual Tech. Rept. No. 2, Contr. No. AF 19(628)-2784, Shell Development Co., Houston, Texas, 1964.

Discussed is the development of a new technique for jacketing hollow rock cylinders. Because of the difficulty of this project, those who worked on it used most of the six months covered by the report to work on it. They calibrated a new, more sensitive, internal force torque gauge, developed a technique for copper jacketing hollow rock cylinders internally and externally, and made several torsion tests on hollow cylinders of Solenhofen limestone. Still to be verified is the curve yielded by a plot of octahedral shear stress versus mean pressure at failure, which appears to lie between the triaxial compression and extension curves for the rock. Researchers may achieve of determining the influence of the intermediate principle stress on failure.

VESIAC 19,098 VU
AD 678 515

SHEPPARD, R. M., JR., Determinations of LASA Detection and Location Ability Using Kurile Islands Events, Tech. Note, Rept. No. ESD-TR-68-325, Mass. Inst. Tech., Lincoln Labs., Lexington, Mass., 1968

The Kurile Islands Ocean Bottom Seismographic Experiment of late 1966 provided a source of epicenters for small regional and local events in a seismic region. Epicenters obtained from ocean bottom seismometer data and from the U. S. Coast and Geodetic Survey were used to evaluate the Montana LASA epicenter location ability. Epicenters determined by a plane wave approximation method gave mislocation errors, relative to the CGS locations, that averaged about 60km. The same events were mislocated an average of 80 km when the epicenters were determined by a closely spaced grid of beams.

SHEPPARD, R. M., JR., Values of LASA Time Station Residuals, Velocity and Azimuth Errors, Tech. Note, Contract AF 19(628)-5167, Massachusetts Inst. Tech., Lincoln Labs., Cambridge, Mass., 1967.

VESIAC 17,021 VU

Some results are presented on work in the areas of station time corrections and P-wave velocity measurements at the Montana LASA. The value of the station correction in epicenter determination and beamforming is shown to be a significant factor in reducing gross errors in epicenters and thereby yielding a more accurate measurement of source and signal characteristics. Factors in the crust and mantle that contribute to the station errors are discussed and some inferences drawn from the data.

SHEPPARD, R. M., Jr., E. J. KELLY, and H. W. BRISCOE, Some Observations of Weak Japanese Earthquakes at the Montana LASA, Tech. Note, Rept. No. TN-1968-3, Contract No. AF 19(628)-5167, Lincoln Labs., Mass. Inst. of Tech., Lexington, Mass., 1968.

VESIAC 17,438 VU
AD 665 122

Data on small local earthquakes were obtained from a tripartite located on the island of Honshu, Japan. Epicenters and origin times were computed from the data but local magnitudes could not be determined. LASA beams were formed at and around the computed epicenters to determine if the event could be detected on the array. From the original population of about 150 events, only 28 could be detected or were marginal. The LASA epicenters were obtained by beamsplitting and were found to be consistent with the theoretical location errors expected for beams steered to Japan. Although the total number of events visible at LASA were small, it was consistent with a beam detection threshold of 3.5 for beams steered to Japan.

SHERMAN, D. I., "The Problem of the Stressed State of a Loadable Half-Plane with Two Recessed Circular Openings," Trudy Inst. Fiz. Zemli, A. N. SSSR, No. 2, pp. 187-210, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,121 VU

This report devises mathematical equations and tables to determine the effect of gravity in a medium with weakened zones or openings.

SHNEERSON, M. B., "Interpretation of Hodographs of Refracted Waves in the Exploration of Sloping Platform Structures," Akad. Nauk. Prik. Geofizika, Vol. 22, pp. 3-19, 1959, (Translated from the Russian), Contract SD-78.

VESIAC 10,211 VU

The exploration problem is such that none of the methods makes it possible to construct the deep boundaries from the exact method of time fields. Moreover, the method of the $t_o(x)$ curve-differences, like the method of $t_o(x)$ curves, is very approximate and in using the method of differences of reduced hodographs, it is necessary for the determination of velocity discontinuities to be very accurate. In connection with this, this paper gives a differential method of interpretation by means of which it would be possible to construct the deep boundaries using the time fields method without fixing the velocity discontinuities. This paper includes an analysis of the possible errors of interpretation in using the t_o or the method of differences of t_o in the case of vertically layered media.

SHOPLAND, R. C., Design of Portable Strainmeter System, Special Rept., 15 August to 30 December 1969, Rept. No. TR 70-6, Contract VT/8703, F33657-69C-0757, Geotech-Teledyne Co., Garland, Texas, 1970

V[illegible]AC 20,175 VU
AD 869 021

Six portable strainmeter systems were designed and built for deployment in mine tunnels and shallow trenches to measure strains induced by high yield underground events at epicentral distances as short as 30 km. The system is designed to detect earth strains of 5×10^{-10} or smaller over a horizontal interval of 6 meters in the period range 10 seconds to dc, and to record the signals on magnetic tape. Strains are detected by a variable-capacitance transducer attached to a quartz-tube translating member. Output signals are maintained within a dynamic range of 30 dB for an input-signal range of 66 dB by an offset biasing technique which uses a precision voltage-level detector and a digital-to-analog converter. Temperature measurements are resolvable to within 0.001 degree Centigrade by the same offset biasing technique. The strainmeter is calibrated with a temperature-compensated electromagnetic calibrator mounted at the fixed end of the quartz tubing. The strain detector is calibrated and the capacitor plates positioned over a range of 12×10^{-6} meters in steps of 5×10^{-9} meters by use of a stepping motor and motion reducer.

SHOPLAND, R. C., Evaluation of Field Operational Characteristics of the Portable Strainmeter System, Special Rept., 15 Dec. 1969 to 15 June 1970, Contr[illegible]ct VT/8703, F33657-69C-0757, Teledyne-Geotech, Garland, Texas, 1970

VESIAC 20,404 VU

This report covers an evaluation of the field operational characteristics of six portable strainmeter systems installed in near-surface tunnels and trenches on and near the Nevada Test Site to make measurements of induced strains from high yield underground explosions. Included is an evaluation of instrument operating characteristics; limitations imposed by environmental factors; and data processing techniques.

SHOPLAND, R. C., Multicomponent Strain Seismograph, Quarterly Rept. No. 2, Rept. No. TR 66-5, Project VT/5081, Contract AF 33(657)-15288, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 13,841 VU
AD 480 349

Three-component strain and inertial seismographs with matched phase and amplitude responses were developed and field tested at the Wichita Mountains Seismological Observatory (WMSO). Analog data recorded on magnetic tape were processed at Geotech's Central Data Processing Facility. Poor cancellation of seismic noise obtained by summing vertical strain and inertial instruments suggests that the noise might be contaminated with higher mode Rayleigh waves and/or body waves. On the other hand similarity in character of the seismic noise between horizontal strain and horizontal inertial seismographs, together with marked directionality of some of the noise, has led to a significant enhancement of signals using a directional strain array. This result may prove to be a breakthrough in the strain program. A special report of preliminary results on enhancement of P waves has been prepared and is appended to this report. A comparison of empirical strain measurements and strain computed from half-space theory indicates a 50% loss of vertical strain for fundamental Rayleigh waves at WMSO. To verify this result, a new variable-capacitance transducer-calibrator has been designed to obtain a more reliable calibrator motor constant for the vertical strain seismometer.

SHOPLAND, R. C., Multicomponent Strain Seismograph, Quarterly Rept. No. 3, Tech. Rept. No. 66-45, Contract VT/5081, AF 33(657)-15288, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1966.

VESIAC 14,305 VU
AD 482 922

Principal emphasis was placed on ascertaining that the vertical strain seismometer at WMSO has the correct phase response. Observations of P waves near 1 cps indicate the existence of a phase mismatch as large as 35 degrees between vertical strain and vertical inertial outputs; however, P waves at the same frequency do not indicate a phase discrepancy between vertical strain and crossed-strain outputs. Also discussed are the measurements of system phase using a recently installed variable-capacitance transducer on the vertical strain seismometer, results of phase measurements over a three month period, measurements to obtain a more reliable value of the motor constant for the magnetostrictive calibrator, and other subjects.

SHOPLAND, R. C., Multicomponent Strain Seismograph, Quarterly Report No. 4, 1 April to 30 June 1966, Technical Report No. 66-68, Contract VT/5081, AF 33(657)-15288, Teledyne Industries, Geotech Division, Garland, Texas, 1966.

VESIAC 14,625 VU
AD 485 535

Verification of the correct phase response of the variable capitance transducer has permitted the running of several tests to investigate phase discrepancies in the vertical strain seismometer. An indicated 20° phase shift has led to planning of more tests to determine whether the magnetostrictive calibrator or the instrument itself is the contributing factor. During this quarter, modification of the horizontal strain seismograph housing and drilling of a new borehole with compliant casing were completed. Instrumentation, preliminary strain measurements of Rayleigh waves from a limited number of earthquakes, and routine recording of strain data, are discussed.

SHOPLAND, R. C., Multicomponent Strain Seismograph, Quarterly Rept. No. 5, 1 July to 30 September 1966, Tech. Rept. No. 66-93, Contract VT/5081, AF 33(657)-15288, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,161 VU
AD 803 202

Phase response tests of the magnetostrictive calibrator on the vertical strain seismometer indicate that the calibrator is the chief cause of phase lag measured at the output of the seismometer during calibration. Further tests are necessary to resolve existing phase uncertainties, which are less than about 10 deg. at frequencies below 3 cps, and larger than 10 deg. above 3 cps. Spectra of microseisms recorded by the vertical strain, crossed horizontal strains, and their summation were examined to determine the similarity of the outputs of the strain seismographs. Further, a preliminary examination of the ability of the north and east summed horizontal strain and inertial seismographs to reject microseisms was undertaken employing spectra.

SHOPLAND, R. C., Multicomponent Strain Seismograph, Final Rept. No. TR 68-3, 1 July 1965 to 31 Dec. 1967, Project VT/5081, Contract AF 33(657)-15288, Teledyne, Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,336 VU
AD 832 951

A multicomponent system of strain and inertial seismographs has been developed and evaluated at Wichita Mountains Seismic Observatory. The capability of strain and inertial seismographs to operate as matched pairs has been demonstrated. The predicted response of strain seismometers to earth motion is verified by the existence of the proper phase and amplitude relationship and high coherence among selected seismographs for single-source signals.

SHOPLAND, R. C., Short-Period Multicomponent Strain System, Quarterly Rept. No. 1, 15 Feb. - 31 May 1968, Project VT/8704, Contract F33657-67C-0948, Teledyne, Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,322 VU
AD 834 227

A five-component system of matched short-period strain and inertial seismographs at Wichita Mountains Observatory was expanded to include a three-component system of matched long-period strain and inertial seismographs for recording large magnitude earthquakes. A data library and quality assurance procedure has been established. Calibration of the vertical strain seismometer with both a short rod and a rod of standard length shows an apparent mechanical signal loss of 22 percent and a corresponding phase change as large as four degrees.

SHOPLAND, R. C., Summary of Strain Seismograph Work at Geotech, Tech. Rept. 64-120, Project VT/072, Contract AF 33(657)-9967, Geotech. Corp., Garland, Texas, 1964.

VESIAC 8961 VU

The major purpose of this program is to enhance P-wave signals by a combination of strain and pendulum seismometers. Secondary purposes are to identify waves with this combination and to increase the capability of detecting long-period signals. Studies so far have revealed that the earth is straining as predicted by theory. The application of the azimuthal dependence of strain for enhancing P signals appears promising. The ability of a phase-matched combination of pendulum and strain seismographs to cancel a substantial amount of background noise is demonstrated. The designs of the horizontal and vertical strain instruments installed at Fort Sill also are shown.

SHOPLAND, R. C., R. H. KIRKLAND, Multicomponent Strain Seismograph, Quarterly Rept. No. 9, Rept. No. TR 67-59, Project VT/5081, Contract AF 33(657)-15288, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,030 VU
AD 822 424

Earthquake data and phase and amplitude responses measured at both the fixed and free ends of the horizontal strain seismometer show no discrepancies that would explain the apparent loss of motion between the ends during calibration. The capability of the long-period horizontal strain and inertial seismographs to operate as a matched pair has been demonstrated. The ability of the long-period strain directional array to discriminate between surface waves arriving simultaneously from different epicenters was also successfully demonstrated. An evaluation is given of the variable-capacitance transducer as a calibration monitor and as a transducer for recording seismic data.

SHOPLAND, R. C., and R. H. KIRKLIN, Short-Period Multicomponent Strain System, Quarterly Rept. No. 3, 1 September to 30 November 1968, Rept. No. 68-48, Contract VT/8704, F33657-68C-0948, Teledyne Indust., Inc., Geotech Division, Garland, Texas, 1968

VESIAC 19,153 VU
AD 844 690

An examination of film recordings of strain noise, pressure fluctuations inside and outside of the strain vault, and wind velocity at WMO suggests that the long-period noise observed on the strain traces is caused by wind-pressure fluctuations that are coupled more strongly through the ground or by compression of the vault structure than through leakage of air through the vault enclosure.

SHOPLAND, R. C., and R. H. KIRKLIN, Short-Period Multicomponent Strain System, Final Rept., 16 Feb. 1968 to 15 Feb. 1969, Rept. No. TR 69-11, Contract VT/8704, F33657-68C-0948, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969

VESIAC 19,542 VU
AD 850 890

A five-component system of matched short-period strain and inertial seismographs at Wichita Mountains Observatory (WMO) was expanded to include a three-component system of matched long-period strain and inertial seismographs for recording large magnitude earthquakes. An examination of film recordings of strain noise, pressure fluctuations inside and outside of the strain vault, and wind velocity at WMO suggests that the long-period (LP) noise observed on the strain traces is caused by wind-pressure fluctuations that are coupled more strongly through the ground or by compression of the vault structure than through leakage of air through the vault enclosure. A series of improvements reduced the noise level of the long-period strain seismographs substantially. However, study of the detection capability of the WMO LP strain seismographs shows that the environmental noise still severely limits detection. A study of the directional characteristics of the seismic noise shows that the predominant microseisms in the band 0.1 to 0.5 Hz can be partially rejected by horizontal strain-inertial seismograph combinations. From a study of S-wave enhancement, it is concluded that there is no one combination of seismograph outputs that can be used in general to provide enhancement of all recorded S waves. The P'P'P' phase from a magnitude 8.2 earthquake was enhanced by suppressing 20-sec Rayleigh waves with the short-period vertical strain and vertical inertial seismograph combination at WMO. The capability of rejecting 6-second microseisms was demonstrated using a long-period horizontal strain-inertial seismograph combination. A study of the wave composition of two explosions and one earthquake suggests that the less complex Pn coda of explosions may be a useful tool in discriminating between earthquakes and explosions. From recordings of the large NTS explosion BOXCAR it has been possible to isolate P, prograde, and retrograde motion in sections of the Pn coda, and SH motion in the Lg phase. In contrast with WMO, seismic noise at Garland, Texas, and Houlton, Maine, has been effectively suppressed by a matched combination of vertical strain and vertical inertial seismographs. A higher signal-to-noise ratio is necessary to evaluate the suppression of microseisms in the region of 1 Hz at WMO and Houlton. Using an improved electromagnetic calibrator, field tests at WMO indicate about a 20 percent loss of motion between fixed and free ends of both the vertical and the horizontal strain seismometers.

SHOPLAND, R. C. and R. H. KIRKLIN, Short-Period Multicomponent Strain System, Supplement to Final Rept., 8 November 1968 to 25 April 1969, Rept. No. TR 69-20, Contract VT/8704, F33657-68C-0948, Teledyne, Geotech. Div., Garland, Texas, 1969

VESIAC 19,674 VU
AD 853 413

A vertical strain seismograph and companion inertial seismograph were installed and operated at Houlton, Maine as a logical follow-up on the successful enhancement of P waves at Garland, Texas. Cultural noise at Garland was suppressed approximately 10 dB in the frequency range 1 to 3 Hz and noncultural microseisms at Houlton were suppressed an average of 10 dB in the frequency range 0.12 to 0.7 Hz. At both sites, lack of suppression of the microseisms near 1 Hz is attributed to either a low ratio of seismic signal-to-system noise; a complex mixture of seismic waves; or a threshold microseismic noise level below which the mechanical regime (composed of the country rock, the borehole casing, and the seismometer) does not respond properly to either the particle displacement or the differential particle displacement. The measurement of strain over a larger interval is recommended in order to increase the differential displacement acted upon by the seismometer, as well as to increase the ratio of microseisms-to-system noise. The relative merits of the technique of frequency filtering to enhance P waves was compared to the technique of combining vertical inertial and vertical strain seismograph outputs. In contrast to the successful application of the latter technique, frequency filtering not only failed to suppress microseisms in the frequency range of the P waves, but also attenuated first motion and distorted the P wave.

SHOPLAND, R. C., R. H. KIRKLIN, and J. R. SHERWIN, Short-Period Multicomponent Strain System, Quarterly Rept. No. 2, 1 June to 31 August 1968, Rept. No. 68-37, Contract VT/8704, F33657-68C-0948, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1968

VESIAC 18,779 VU
AD 840 291

The P'P'P' phase from a magnitude 8.2 earthquake was enhanced by suppressing 20-sec Rayleigh waves with the short-period vertical strain and vertical inertial seismograph combination at WMO. Signal enhancement by use of a continuous real-time spectral display of suppressed noise at WMO is not feasible in the frequency band 0.2-4.0 Hz because of a lack of time continuity of the spectral windows. True coherence of the seismic noise at WMO in the region of 1 Hz will remain indeterminable unless the ratio of seismic noise to system noise is substantially increased.

SHUMWAY, R. H., Frequency Dependent Estimation and Detection for Seismic Arrays, Sci. Rept., Rept. No. 242, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1970

VESIAC 20,117 VU
AD 866 634

A frequency dependent detection and estimation procedure based on the generalized likelihood principle is applied to several models appropriate for vertical and horizontal seismic arrays. When data is constructed so as to conform to the idealized model excellent agreement with theoretical detection limits is shown. Multiple signal models are analyzed in the frequency domain with the presence of various signal components indicated in terms of power spectral ratios. Table of the central and non-central F distribution are used to determine false alarm and signal detection probabilities. A number of examples using real seismic data are presented.

SHURBET, D. H., Study of the Earthquake P Phases which Have Penetrated the Earth's Core, Final Scientific Report, Contract AF-AFOSR-705-64, Texas Tech. College, Lubbock, Texas, 1966.

VESIAC 14,986 VU

Travel-times of all earthquake phases which enter the core as P and emerge as P are explained in terms of a core model containing two velocity discontinuities. Amplitudes of PKIKP and PKP change little with changes in distance from the source except in the range 142° to 152°. In this range large amplitudes are observed which result from the simultaneous arrival of two phases as well as large amplitudes which represent the PKP caustic. Amplitudes in the caustic might allow detection of events smaller than magnitude 4. In all distance ranges PKIKP and PKP are useful in magnitude determination, but added care must be taken if they are used in the distance range where amplitudes are large. Magnitudes determined from PKIKP and PKP are very consistent as are focal depths.

SIMMONS, A. W., Long-Period Triaxial Seismograph Development, Final Rept., 15 June 1966 to 28 February 1969, Rept. No. TR 69-17, Contract VT/6706, AF 33(657)-16406, Teledyne-Geotech, Garland, Texas, 1969

VESIAC 19,628 VU
AD 852 390

A long-period triaxial seismometer (Model 26310) was designed for shallow hole operation. The design has preserved ideal "La Coste" geometry, in that changes in period are accomplished through a controlled positive restoring force. Laboratory tests and field evaluations were made to determine the effect of temperature and tilt on mass position and free period of the seismometer. Redesign of the seismometer, based on engineering evaluation and field reports, resulted in a reduction of the number of components and functions required and in turn resulted in an overall cost reduction for a complete seismograph.

A thermal noise experiment was made and the spectra and coherence of the noise as recorded by the long-period triaxial and the standard long-period seismographs at UBSO were computed.

SIMMONS, G., Continuous Temperature Logging Equipment, Contract VT/1139, AF 33(600)-43369, Southern Methodist Univ., Dallas, Texas, 1964

VESIAC 8742 VU

Temperature logging of boreholes as a continuous function of depth yields more information than measurements made at discrete depths and requires no more time. Continuous logging equipment is described that has a resolution of about 0.01°C, and is suitable for use to depths of at least 10,000 feet.

SIMMONS, G., Experimental Study of Thermal Conductivity, Final Report, Contracts: AF-AFOSR-418-63, and AF-AFOSR-418-65, Southern Methodist Univ., Dallas, Texas, 1966.

VESIAC 14,629 VU

Temperatures have been measured in some 150 wells and extensive collection of cores from most of these wells has been made in an effort to determine the amount of heat flowing from the interior of the earth in the U. S. A logging system for measuring temperatures with a precision of .01°C was developed for this project and has been tested extensively in the field. An extensive collection of rock material for the measurement of physical properties was made.

SIMMONS, G., Experimental Study of Thermal Conductivity, Final Report, Contract AF 49(638)-1964, Mass. Inst. of Tech., Cambridge, Mass., 1967

VESIAC 20,075 VU

Three papers, a review of an article, and a map showing status of heat flow work in the United States in April 1966 were accomplished under this contract.

SIMMONS, G., Heat Flow in the Earth, A Short Review, Contract AF 49(638)-1694, Mass. Inst. Tech., Cambridge, Mass., 1966.

VESIAC 14,172 VU

In this report, the author reviews briefly those aspects of heat flow that are of interest and importance to earth scientists. After giving a resume of early modern determinations of heat flow, which is an effective tool for the interpretation of the interior of the earth, and discussing some of the highlights of the work in heat flow, the author discusses the following subjects: (a) the results that have already been obtained from the study of heat flow; especially mentioned here is the discovery of the approximate equality of continental and oceanic heat flow; (b) how heat flow is measured; (c) geothermal power; (d) geological aspects of heat flow; and (e) problems that remain.

SIMMONS, G., Seismic Coupling - Sci. Rept., Contract DA 49-183 OSA-3137, Mass. Inst. of Tech., Cambridge, Mass., 1968

VESIAC 19,301 VU

This report contains the results of a symposium on seismic coupling held at Stanford Research Institute during January 1968. Included are fourteen papers, three abstracts and one summary. The subject matter ranges from rock mechanics to implications of source parameters on seismic systems studies. Of prime concern is improving the estimation of reliable nuclear yields.

SIMMONS, G., Temperature Logging and Heat Flow, Contract AF 49(638)-1694, Mass. Inst. Tech., Cambridge, Mass., 1966.

VESIAC 14,100 VU

About 150 measurements of heat flow in the United States using well temperature logging techniques are currently under way. Preliminary results are given in this report.

SIMMONS, G., Ultrasonics in Geology, Contract AF-AFOSR-418-65, Southern Methodist University, Dallas, Texas, 1965.

VESIAC 12,575 VU
AD 626 113

Ultrasonics is used in geology for the determination of elastic properties of rocks and minerals. For measurements on rocks, techniques with precisions of a few percent have come into use; these measure delay times of elastic waves propagating through specimens several inches long. For single crystals, the techniques are the same as those used in solid state physics and are basically interferometric methods. Techniques of measurement are reviewed. An extensive bibliography is included.

SIMON, I., Tiltmeter Instrumentation for Deep Hole Operation, First Quarterly Rept., 15 June to 15 Sept. 1970, Contract F44620-70C-0074, Arthur D. Little, Inc., Cambridge, Mass., 1970

VESIAC 20,391 VU

This report covers the period from 15 June to 15 September 1970. During this period the work tasks on the development of a biaxial, deep borehole tiltmeter progressed.

SIMON, I., Tiltmeter Instrumentation for Deep Hole Operation, Second Quarterly Rept., Contract F44620-70C-0074, Arthur D. Little, Inc., Cambridge, Mass., 1970

VESIAC 20,461 VU

This report covers the period from 15 September to 15 December 1970. During this period the work tasks on the development of a biaxial, deep hole tiltmeter progressed to various stages of completion.

SIMON, I., M. L. COHEN, A. G. EMSLIE, and C. R. SMALLMAN, et. al., Development of a Three-Axis Long-Period Seismograph, Final Rept., Rept. No. 69429, Contract F44620-67C-0107, Arthur D. Little, Inc., Cambridge, Mass., 1970

VESIAC 20,084 VU

Three-axis, long-period, compact (borehole) seismometer system utilizing feedback-controlled seismic transducers based on magnetic suspension principle was developed, constructed and tested. The system includes digital tape recording and data processing. The overall system response is flat to 3db over a pass band from .02 to .07 Hz and the dynamic range is 60db. Results of tests show that surface waves from teleseismic events of $m_b < 5$ are consistently recorded. Horizontal components of surface waves from earthquakes as small as $m_b \approx 4.2$ in the Gulf of California region have been observed at the Ogdensburg, New Jersey test site.

SIMONS, R. S., Characteristics of Instruments and Seismic Noise in Two Shallow Holes at Hysham, Montana - Tech. Rept. No. 66-50, Contract VT/6703, AF 33(657)-16270 (AFTAC), Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,152 VU
AD 803 237

During August and September of 1965, a Geo Space Model HS-10-1/ARPA seismometer, and a Geotech Model 11167, deep-well seismometer were operated in two adjacent 500 ft holes at the center of LASA subarray F3 (near Hysham, Montana). The two seismographs were operated concurrently at six different depths from 71 to

500 feet. A reference short-period vertical Benioff seismograph was operated on the surface. Signal amplitudes were measured at all depths to cross-check seismograph magnifications, and noise samples were selected representing five arbitrary categories of noise situation - nighttime calm, daytime calm, traffic, moderate wind, and high wind. Power density spectra were computed. Both seismographs operated satisfactorily and recorded equivalent data.

SIMONS, R. S., Operation of Long-Period Seismographs in Deactivated Missle Silos, Tech. Data Rept. No. TR 68-4, Project VT/6703, Contract AF 33(657)-16270, F33657-67C-1457, Geotech Div., Teledyne Inc., Garland, Texas, 1968.

VESIAC 18,337 VU
AD 833 385

For a period of over six months, the Long-Range Seismic Measurements Program operated three-component long-period seismographs at the bottoms of two deactivated missle silos near Franktown, Colorado and Mountain Home, Idaho. The bottoms of these silos are approximately 150 feet below the surface. At each site, a three-component seismograph was also operated on the surface.

SIMONS, R. S., PHILTRE - A Surface Wave Particle Motion Discrimination Process, Tech. Rept. No. TR-67-55, Contract VT/6703, F33657-67C-1457, Teledyne Indust. Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,602 VU

A digital computer process is described which examines the three-component particle-motion pattern of seismic data as a function of frequency and uses this information to discriminate against all motion except surface waves arriving from some pre-assigned direction. Application of the process to long-period data shows that it can substantially improve the signal-to-noise ratios of Love and Rayleigh waves from earthquakes and underground detonations. The PHILTRE program includes a subroutine which provides a usable estimate of the peak amplitude of any surface wave propagating in the aimed direction.

SIMONS, R. S., and T. T. GOFORTH, Percentages Associated with the Detection of Long-Period Surface Waves from Low-Magnitude Events, Rept. No. 7885-1-X, Contracts: VT/4051, AF 33(657)-12145 - DA 49-083 OSA-3137, and VT/1124, AF 33(657)-12373 - SD 78, Teledyne Indust., Inc., Geotech Div., Garland Texas, 1967.

VESIAC 15,915-R VU

A statistical survey of LRSM Bulletin data was made to determine the percentage of earthquakes from which long-period surface waves are recorded, as a function of event magnitude. A survey of the seismological bulletin based on data from the five VELA UNIFORM observatories determined detection percentage for Rayleigh waves as a function of epicentral distance, magnitude, and magnification of the recording instrument. From these combined LRSM and observatory data, it is concluded that the detectibility of long-period surface waves decreased continuously and almost linearly with decreasing magnitude, with no apparent magnitude threshold below which earthquakes do not generate such waves. Also, the detectibility of surface waves is not highly sensitive to changes in epicentral distance. The greatest percentage increase in surface waves detected resulting from increased magnification is obtained in the lower magnitude ranges.

SIMONS, R. S., D. C. RASMUSSEN, and O. H. LINDQUIST, Comparison of the LRSM Noise Survey Method with an Integrated Power Spectrum Technique for Defining Seismic Noise Level, Technical Report No. 67-34, Contract VT/6703, F 33657-67-C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,122 VU

Measurements were made of seismic noise recorded by short-period vertical seismographs at ten LRSM sites. This was done by the standard LRSM survey method and an integrated power density spectrum procedure. This report describes these two approaches and discusses the results.

SIMONS, R. S., and W. R. WEBER, Preliminary Report on a Single-Channel Statistical Technique for Suppressing Long-Period Microseismic Noise, Tech. Rept., Rept. No. TR 68-25, Contract VT/8703, F33657-68C-0734, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 19,024 VU
AD 840 709

The probability distribution of the sample power of long-period microseismic noise at any frequency can be represented as that of a scaled chi-square variable. A computer program has been written which estimates the upper 90 percent probability limit on this distribution for a series of discrete frequencies representing the long-period spectrum, from a set of sequential samples of the noise. Subtraction of these upper 90 percent limits from the spectra of subsequent data samples results in a substantial improvement in the time-domain signal-to-noise ratios of any transient Rayleigh wave signals in the subsequent samples. Examples demonstrating the effectiveness of the technique are presented.

SIMPSON, S. M., Magnetic Tape Copies of MIT Geophysics Program Set II Time Series Programs for the IBM 709, 7090, 7094, Rept. No. AFCRL-65-306, Contract AF 19(604)-7378, Mass. Inst. of Tech., Cambridge, Mass., 1965.

VESIAC 10,750 VU
AD 616 254

MIT Geophysics Program Set II consists of 267 subroutines, written in Fortran, or in FAP compatible with FORTRAN-II, for the new IBM 709, 7090, 7094. They form an interlocking system of individually accessible routines for single and multiple time series analysis (correlation, spectral analysis, prediction, filtering, spectral and correlation factorization, polynomial operations, probability operations) but also include many general utility and administration routines. Comment cards in each symbolic deck give full documentation. Complete copies of the symbolic system are available and require two 800 BPI tapes.

SIMPSON, S. M., Studies in Optimum Filtering of Single and Multiple Stochastic Processes, Sci. Rept. No. 7, Contract No. AF 19(604)-7378, Mass. Inst. of Tech., Cambridge, Mass., 1963.

VESIAC 7350 VU
AD 428 509

This report treats the design of discrete filters for the detection of signals caused by nuclear explosions on the digitized seismic recordings. The theoretical aspects of the filter are treated, together with the setting up of the necessary formulas for realizing the filters on digital computers. Listed are the specific discrete filters so treated. Recursive computational schemes are presented for normal equations of Toeplitz form. For single processes the Levinson recursion for the extension of the prediction error operator and the extension of the general filter is developed, as well as the recursion to move the output origin. The prediction problem for single stationary time series is reviewed; the least square and Kolmogoroff solutions given.

SIMPSON, S. M., R. A. WIGGINS, and C. LAN, Sampling Events from U. S. C. & G. S. Earthquake Cards, Sci. Rept. No. 11, Contract AF 19(604) 7378, Mass. Inst. Tech., Cambridge, Mass., 1965.

VESIAC 11,990 VU
AD 618 209

Two computer programs are presented and illustrated for statistical selection of events from magnetic tapes containing images of U. S. C. & G. S. Earthquake Cards. The first program produces an output tape containing cards for all events within a given time range, depth range, and geographical area. The area is specified by arbitrary sets of trapezoids whose parallel sides are latitude lines. The second program selects, from the output tape of the first program, all events in given magnitude ranges. It then shuffles the events using the Rand random digits and deals out a selected number of them.

SISKIND, D. E., Special Technical Report on a Seismic Scale-Model Study of Refraction Arrivals in a Three-Layer Structure, Tech. Interim Rept., AFCRL-66-571, Contract AF 19(628)-238, Penn. State Univ., Univ. Park, Pa., 1966.

VESIAC 15,029 VU
AD 640 841

A crustal model having a narrow intermediate-velocity layer has been postulated for comparison with another model, previously studied, having a narrow region of constant velocity gradient. Both models have their narrow regions bounded above by a low-velocity region and below by a region of higher velocity.

It was shown experimentally that the same relationship between the velocity gradient and cutoff frequency was found for both studies, with the cutoff frequency being 1.7 times the velocity gradient. The cutoff frequency is that at which the spectrum of the refracted arrival begins to fall off rapidly from the spectrum of the direct wave. A part of the effect is accounted for.

SKORPEN, A. J., J. N. GALLAGHER, and P. DEHLINGER, Oregon State University Seismological Bulletin No. 7 - 1 January to 31 March 1965, Data Rept. No. 22, Contract AF 19(628)-2778, Oregon State Univ., Corvallis, Oregon, 1966.

VESIAC 18,335 VU
AD 634 349

Oregon State University operates a World-Wide Standard Seismograph Station at Corvallis (COR) and a seismic station at Klamath Falls (KFO), Oregon. Data recorded at the Portland (PTD), Oregon, seismic station, operated by the Oregon Museum of Science and Industry, are included in this Seismological Bulletin.

SLEMMONS, D. B., A. E. JONES, and J. I. GIMLETT, Catalog of Nevada Earthquakes, 1852-1960, Contract AF-AFOSR-62-285, Univ. of Nevada, Reno, Nevada, 1964.

VESIAC 9448 VU
AD 618 430

This catalog of Nevada earthquakes from 1852-1960 is part of a long-range seis. research program by the Univ. of Nevada. The catalog contains all events with felt reports and those instrumentally determined that have magnitudes of 4.0 or greater. Data for each earthquake include date and time of origin, latitude and longitude, magnitude, intensity, and an estimate of reliability.

Epicentral distribution is discussed,and three seismic zones of concentrated activity are defined.

SLEMMONS, D. B., A. RYALL, and J. I. GIMLETT, Study of Seismicity, Mechanics of Faulting and Crustal Structure Within the Basin and Range and Adjoining Provinces, with Emphasis on Seismic Information Provided by Nuclear Explosions, Final Report, Contr. No. AF-AFOSR 285-62, Univ. of Nevada, Reno, Nevada, 1964.

VESIAC 8599 VU
AD 442 551

During the report period, a long-range program was introduced at the University of Nevada. Two new seismographic installations near Tonopah and Golconda, and additional instruments at the Reno seismographic station, have greatly improved the University's capability to investigate seismic activity of the Basin and Range Province. A full search of newspapers, earthquake lists, bulletins and catalogs has produced an earthquake catalog for Nevada which is complete for the period 1852-1961. A fault map has been prepared for the Basin and Range Province from photogrammetric studies. Described is extensive use of IBM punchcards for recording of data on all phases of the seismological program. A focal depth determination method is described.

SLUTSKOVSKII, A. I., "Some Problems Related to the Efficiency of Frequency Selection and Resolving Power of Seismic Amplifiers," Akad. Nauk., Priladnaya Sbornik Statsi, Vol. 24, pp. 3-25, 1960, (Translated from Russian), Contract SD-78.

VESIAC 9428 VU

In an entire series of amplifiers of domestic and foreign seismic stations, the frequency filters are placed in front of the loop of the automatic amplification control (AAC), while stations exist where the frequency filters in the amplifiers are included in the AAC loop. The problem regarding the advantages or disadvantages resulting from either connection method of the frequency filters has not as yet been studied anywhere in the literature. This paper reviews the problem from the theoretical point of view, and also presents the results of experimental studies. Also included is a description of the method developed by the author for calculating the optimum frequency characteristics of frequency amplifiers based on given frequency spectra of useful waves and background.

SMETANIN, D. A., "The Hydrochemistry of the Region of the Kurile-Kamchatka Trench II. The Hydrology and Chemistry of the Upper Subarctic Water in the Region of the Kurile-Kamchatka Trench," Akademia Nauk SSSR Trudy Instituta Okeanologii, Vol. 33, pp. 43-86, 1959, (Translated from Russian), Contract SD-78.

VESIAC 10,455 VU

Regarding the hydrology and chemistry of the upper subarctic water in the region of the Kurile-Kamchatka Trench, the author draws these conclusions as a result of investigations of the early and middle 1920's: (1) the upper subarctic water enters the region of the Kurile-Kamchatka Trench mainly from the Bering Sea with the Kamchatka current; (2) temperature conditions of the upper 150-200 m layer (the upper subarctic water), given in the report, are determined mainly by local climactic conditions, and by previous cooling of the Bering Sea; (3) given is the content of oxygen in the upper 150-200 m layer; (4) the distribution of biogenic elements in the upper subarctic water is determined; (5) conclusions concerning the productivity of the waters and other matters are given.

SMIRNOW, L., An Introduction to the Geological Structure of Europe and Asia, Contr. No. AF 19(628)-222, Univ. of Toronto, Toronto, Canada, 1964.

VESIAC 7607 VU

This report is the first in a series by Dr. L. Smirnow on the general subject of the geology of Europe and Asia, with particular reference to structure.

SMITH, M. L., and J. N. FRANKLIN, A Geophysical Application of Generalized Inverse Theory, Sci. Rept., Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1969

VESIAC 19,272 VU

The generalized inverse theory and its application to a special case of geophysical inverse problems is discussed. It is pointed out that the theory provides results of computational utility.

SMITH, R., Design, Fabrication and Testing of an FM Seismic System, Final Report, Contract VT/070, AF 33(657)-7747, United Electro-Dynamics, Inc., Pasadena, Calif., 1964.

VESIAC 7547 VU

This final report indicates contract objectives, additional features, and then goes on to design considerations (with special attention to modulator design evaluation, power regulator design and discriminator evaluation), cable investigations, final system configuration, a lab test program, and a field test program.

SMITH, S. W., Broadband Digital Recording, VESIAC Rept. No. 4410-77-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8865F VU
AD 452 161

A direct digital recording seismograph system has been in continuous operation at Caltech for 2 years. The frequency band covered is 0.03 to 3.0 cps, and the dynamic range is 86 db. In principle, this single instrument could replace all of the existing seismograph systems recording at Pasadena. In practice, since the data retrieval and handling systems are geared for experimental work only, the digital seismograph does not replace any of the existing instruments, but it serves as a valuable addition for studies requiring digital analysis. The present system has been successfully used for a number of studies, and is being used in a number of projects now underway but not yet completed.

SMITH, S. W., An Investigation of the Earth's Free Oscillations (THESIS), Contract AF 49(638)-910, Calif. Inst. of Tech., Pasadena, Calif., 1961.

VESIAC 12,348 VU

The free oscillations of the earth excited by the Chilean earthquake of 1960 have been measured by power spectral analysis of strain and pendulum seismographs. A revised and more precise table of free oscillation periods is presented. Fine structure analysis has shown that for the first three spheroidal modes there is good agreement between the observed splitting and that calculated for a rotating earth. Results for the toroidal modes are uncertain. A theory is presented that allows recovery of some of the source properties from observations of phase differences for spheroidal modes. The results of a comparison of the theory with observation are given. Preliminary data on the effects of geomagnetic storms on the oscillations of the earth are given.

SOLOVEV, S. L., "On the Classification of Earthquakes According to Their Energy," Trudy Geofiz. Inst., A. N. SSSR, No. 30, pp. 3-21, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,158 VU

The present paper describes simplified methods for evaluating the energy of earthquakes which are presently being utilized; the approximate energy characteristics of Turkmenia earthquakes are given from 1912-1951 and the question is raised concerning the development of an energy scale for the classification of earthquakes.

SOLOVYEV, V. N., "Photoelectric Alarm for Strong Earthquakes," Trudy Geofiz. Inst., A. N. SSSR, No. 30, pp. 193-194, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,160 VU

This paper describes instruments which are installed at seismic stations and intended to alert the station personnel of an approaching earthquake, and also for turning on the additional filament of the illuminating lamp and the lowering of the seismograph sensitivity when sufficiently large amplitudes are incident.

SONNEMANN, H., LASA - Small Array Compatibility, Tech. Note, Contract: Agency Document, Advanced Research Proj. Agency, Wash., D. C., 1966.

VESIAC 17,626 VU
AD 823 052

During the last few months the question of compatibility of other array configurations with the Montana LASA has been raised by various groups. This Technical Note will attempt to delineate compati[illegible]ity of other arrays with LASA.

SONNEMAN, H., The Prototype Station, Contract Agency Document, Advanced Research Projects Agency, Washington, D. C., 1965.

VESIAC 13,858-W VU
AD 648 415

The purpose of this paper was to establish the basic requirements of a prototype seismological station. Continuing pressures on ARPA to be ready to build additional LASA stations has made it necessary to establish a basis for generating station specifications at an early date. The author goes through the various elements of the system and sets forth his interpretation of the requirements. Sixteen elements are considered.

SORNES, A., Seismology of Fennoscandia, Quarterly Progress Report No. 5, 1 April to 30 June 1966, Contract AF 61(052)-859, Univ. of Bergen, Bergen, Norway, 1966.

VESIAC 14,949 VU

This report covers four areas: (1) The Lillehammer Array Station. During the period covered by this report, the station has been recording continuously on all recorders installed except for short breaks due to maintenance work. The installation, use, and maintenance of equipment are described; (2) Playback Equipment. The arrival and the postponing of the arrival of various units are discussed; (3) Seismic Refraction Studies. The study of the data from the American refraction measurements in Norway in the summer of 1965 has been continued. A preliminary manuscript about the Lofoten - Vesteralen measurements has been prepared; and (4) Microseismic Noise Study.

SORNES, A., Seismology of Fennoscandia, Quarterly Progress Rept. No. 6, 1 July-30 September 1966, Contract AF 61(052)-859, Univ. of Bergen, Bergen, Norway, 1966.

VESIAC 15,174 VU

The Lillehammer Array Station is discussed. During the period covered by this report, the station has been recording continuously on 35 mm film with the Benioff recorders, on 16 mm film with the Develocorder, on heat-sensitive paper with the Heliocorder, and on inch-wide magnetic tape except for breaks due to maintenance work. The SP system magnification on the 16 mm film, inspection of vaults, inspection of the cables to the seismometers, installation of a Geotech Time Encoder MOD 15925A, and visitors to the station are mentioned. Playback equipment is discussed, and especially the arrival and operation of the two tape decks from Consolidated Electrodynamic Corporation. Seismic refraction studies are discussed. A microseismic noise study is mentioned.

SORNES, A., M. A. SELLEVOLL, Site Selection for a Seismic Array Station and Crustal Studies in Norway 1965, Final Sci. Rept., Contract AF 61(052)-859, Univ. of Bergen, Bergen, Norway, 1967.

VESIAC 16,385 VU

A study of a possible relocation of the seismic array station LHN (Lillehammer) in south-central Norway is reported in Part I. One new site is recommended. Part II reports results obtained from three widely separated seismic refraction profiles in Norway and a travel-time study for seismic waves in Fennoscandia. The Pn velocities found are very close to 8.20 km/sec. Indications of a phase with velocity of 7.50 km/sec are observed. A phase with a velocity of about 6.60 km/sec is well defined in the seismograms. The amplitude for this phase varies strongly. The velocity for the first direct longitudinal wave varies mostly from 6.00 km/sec to 6.15 km/sec. A crustal thickness from 31 km to 38 km has been determined.

SOROKHTIN, O. G., "A Multichannel Pulse Type Ultrasonic Seismoscope," Trudy Inst. Fiziki Zemli, Akad. Nauk. SSSR, No. 6, pp. 355-373, 1959. (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,034 VU

This report describes the construction and principles of operation of an 8 channel pulse type ultrasonic seismoscope, which allows seismo-acoustic observations to be made simultaneously at 8 points in an investigated media. This method can be used for studying models of seismic processes, ultrasonic seismic soundings and also in other areas of ultrasonic seismoscopy. A few oscillograms are presented which characterize the results of this method.

SORRELLS, G. G., W. C. CLACK and P. KOVACS, Observations on the Effects of Variation in Local Geology on the Signal-to-Noise Ratio of Teleseismic P Waves, Contract No. VT/1124, AF 33(600)-43486, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7409 VU

Two instrument stations, with matched seismograph systems, operated for two months on rock types of variable lithology near Sparta, Oregon, the object being to determine whether this factor had a significant effect on the signal-to-noise ratio of teleseismic P waves. One station remained fixed on granite; the other was located first on basalt, and then on greenstone. The distance between stations never exceeded 1.5 km. Results show that, while there may be much difference in the noise spectra at two sites as shown by the granite-basalt station pair, there is also a corresponding difference in signal spectra. Therefore, little significant difference is noted in the relative signal-to-noise ratio spectra.

SORRELLS, G. G., and Z. DER, Long-Period Seismic Noise and Atmospheric Pressure Variations, Tech. Rept., Rept. No. TR 70-12, Contract VT/8703, F33657-69C-0757, Teledyne-Geotech, Garland, Texas, 1970

VESIAC 20,296 VU
AD 871 959

Preliminary studies of the long-period seismic noise and the atmospheric pressure fields were made at the Kleer mine near Grand Saline, Texas, during the winter of 1968. The results of the studies indicate that during periods of atmospheric turbulence the vertical and horizontal components of the seismic noise field observed at the surface may increase in total power by as much as 16 and 34 dB within the period range from 20 to 60 seconds. In contrast, long-period systems operated in the mine show little change in power levels regardless of the atmospheric conditions at the surface. The observations are consistent with the hypothesis that the increase observed at the surface is caused by atmospherically-generated deformations of the earth. However, because of questions regarding the surface vaults capability to attenuate pressure changes, the possibility that the noise was caused by vault leakage must be considered an equally likely explanation at the present time. The results indicate that atmospherically-generated seismic noise can seriously degrade the capability of a long-period surface installation to detect surface waves. Because of this finding, further more definitive studies are recommended.

SOVIET GEOPHYSICAL COMMITTEE (STAFF), Report on Scientific Activity in Seismology and Physics of the Earth's Interior in 1960-1962, Soviet Geophysical Committee, Academy of Sciences of the USSR, Moscow, Russia, 1963, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 12,884 VU

This report is in four main sections: (1) Seismology. In this section are included information about seismological institutions of the USSR (including sections on scientific research institutions and seismic stations), and general information on activities in seismology. Section 1 has an Appendix, which is a list of seismic stations of the USSR; (2) Seismogeology; (3) Physics of the Interior of the Earth; and (4) Tectonophysics.

SPENCER, T. W., Application of Exact Ray Theory to Layered Elastic Systems, Special Rept. No. 2, Contract No. AF 19(604)-8344, Calif. Res. Corp., La Habra, Calif., 1963.

VESIAC 6110 VU
AD 415 692

The response function and spectra associated with a generalized transmission path in a multi-interface system are examined in detail. Second, Cagniard's theory is used to investigate the long time response to a step function point. The high frequency spectrum is completely determined by the behavior of the response function in the vicinity of the non-analytic points. By enclosing each non-analytic point within a short-time interval and properly truncating such time intervals, a new time function is obtained whose spectrum is in good agreement with the exact spectrum above a certain frequency. Other determinations and computations are made.

SPENCER, T. W., The Refracted Arrival from a Layer, Contract No. AF 19(604)-8344, Calif. Res. Corp., La Habra, Calif., 1964.

VESIAC 8435 VU

High-frequency geometric ray theory is used to investigate the refracted arrival from a high-speed layer embedded in an infinite medium. The theory predicts shingling and shows that it is distance limited. Next, a formula is derived which expresses the composite amplitude of these rays in the form of a series which contains either M or N + 1 terms (whichever is smaller).

SPENCER, T. W., Theoretical Studies Related to the Determination of Seismic Energy Source Depth, Final Rept., Contract AF 19(604) 8344, California Research Corp., La Habra, Calif., 1964.

VESIAC 8600 VU
AD 607 238

This report summarizes work on a number of different but related topics, as follows: The effect of seismic source depth on Rayleigh wave spectra is examined for a dissipative half space and for an elastic layer overlying an elastic half space.

Geometric ray theory is used to study the effects of layer thickness and range on the refracted arrival along a high-speed layer embedded in an infinite medium. The reflection of a plane compressional wave at a plane interface is analyzed with particular emphasis on the equation for continuity of the instantaneous energy flux.

SPIEKER, L. J., Seismometer Array and Data Processing System - Final Phase I, Rept. No. ARPA Order No. 104-60, Contract VT/077, AF 33(600)-41840, Texas Inst., inc., Dallas, Texas, 1960

VESIAC 19,023 VU
AD 286 441

This report describes the entire study in detail for other investigators but certain facts and conclusions of immediate importance to the aims of VELA UNIFORM are pointed out here. Under this project, Texas Instruments has investigated the optimum signal processing and data display system for this case. Following the separate analysis of each segment of this problem, a program for computer simulation of the entire theory was established. This simulation included seismometer outputs containing both signal and noise from a large array feeding into signal processing programs.

SQUIER, D. P., Analysis of a Program for Computing Theoretical Seismograms for Multilayered Media, Contr. No. AF 19(604)-8344, Calif. Res. Corp., La Habra, Calif., 1964.

VESIAC 8294 VU
AD 443 717

The numerical computation of the response to a compressional point-source in a layered elastic medium underlying a vacuum is considered. It is then concluded that this method is not very satisfactory, for the enormous jumps in the trasforms require that they be computed at about one million points in the plane of integration. The seismogram also suffers certain distortions due to the phase velocity truncation, particularly when the receiver is located on the same vertical as the source. Some results of a theoretical nature are deduced from the formulas.

STARODUBROVSKAYA, S. P., and G. N. PARISKAYA, "The Use of Dynamic Characteristics of Reflected Waves for the Location and Tracing of Layers with Variable Thicknesses," Razved. Geofiz., No. 2, pp. 3-12, 1964, (Translated from Russian), Contract SD-78.

VESIAC 13,322 VU

The use of dynamic characteristics (principally the spectral features) of waves reflected from layers with small thicknesses has been studied in a number of works. In the present study, the case of reflection of a longitudinal wave from a homogeneous layer has been studied in greater detail. A brief account is given of the results of the theoretical and experimental investigations conducted at the Inst. of Geophys. of the USSR Academy of Sciences in recent years on the dynamic features of waves reflected from thin layers. The authors illustrate the practical possibilities of the use of the spectral characteristics of reflected waves for the tracing of layers with variable thicknesses.

STARKEY, O. D., Characteristics of Spiral-Four Cable Transmission, Rept. No. TR 65-63, Contract: Agency Document, Geotechnical Corp., Garland, Texas, 1965

VESIAC 19,458 VU

The transmission properties of spiral-four cable were studied to provide empirical data which will aid in designing future transmission links for various telemetry systems. Two general experiments were conducted. The first dealt with measuring voltage amplitudes as a function of cable length, conductor arrangement, and signal frequency. This study demonstrated that within the signal frequency range of 500 Hz to 5000 Hz, the response of the spiral-four cable is a significant function of signal frequency and may well be the limiting factor in the quality of a transmission link.

The second series of experiments examined methods of compensating for and improving cable response, as well as studying cable properties. This study demonstrated that cable response may be improved to such a degree that for signals whose frequency components are below 10,000 Hz the response of the spiral-four cable can be made essentially independent of signal frequency.

STARKEY, O. D., Laboratory Evaluation - Electro-Tech SPA-10-1, Mandrel, Industries, Tech. Rept. No. 66-41, Contract VT/4051, AF 33(657)-12145, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,317 VU

Mandrel Industries Amplifier, Model SPA-10-1, has been evaluated for use in the Portable Seismograph System, Model 19282. Because of poor temperature characteristics and relatively high noise level of this amplifier, and the required operating specifications of the portable seismograph system, the amplifier is not recommended for use.

STARKEY, O. D., and R. D. WOLFE, Evaluation of Low-Noise, Low-Frequency Amplifiers and Short-Period Seismometers, Tech. Rept. No. 65-69, Contract VT/4051, AF 33(657)-12145, Geotechnical Corp., Garland, Texas, 1965

VESIAC 12,722 VU

This report presents laboratory and field test data on a number of amplifiers and seismometers which may be suitable for use in short-period seismographs. Data are given for noise levels, dynamic range, and other important parameters for each amplifier included in the study. The galvanometer-input type of amplifier and the RA-3 solid-state amplifier were found to be superior to all other amplifiers tested. The basic parameters and environmental characteristics of each seismometer tested are also given. A table is included which lists the threshold characteristics of all combinations of the seismometers and amplifiers tested.

STATON, R. R., Variable Filter, Model 16307, Contr. No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 7806 VU

A solid-state bandpass filter suitable for use in seismic observatories or seismic data-processing facilities has been designed. The instrument has adjustable cutoff frequencies and cutoff ratios, and it can be used for filtering data in real time or compressed time. Circuitry consists of cascaded RC low- and high-pass filters with selectable frequency determining components and damping. Variable gain is provided. A number of desirable features not found in commercial, laboratory-type frequency filters are found in the filter.

STAUDER, W., (S. J.), A Comparison of Multiple Solutions of Focal Mechanism Determinations, Semiannual Tech. Rept. No. 6, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6855 E VU

The substance of this report is a comparison of multiple solutions for the focal mechanism of the same earthquake. The agreement found suggests the scatter to be expected when many fault plane solutions for a given region are compared. The disagreement found likely reflects both differences in the data available to the investigators in drawing nodal lines and varying interpretations.

STAUDER, W., (S. J.), The Direction of Motion at an Earthquake Focus, Semiannual Rept. No. 1, Contract No. AF 19(604)-8054, St. Louis Univ., St. Louis, Mo., 1961.

VESIAC 5572 VU

The use of the S wave of earthquakes in studying the nature of the energy release at the source of an earthquake was investigated. Seismograms for earthquakes (magnitude 6 3/4 or greater) in Kamchatka and the Aleutian Islands during the years 1950-1960 were analyzed. Preliminary results are inconclusive but do show that S waves contain important data about the source mechanism.

STAUDER, W., (S. J.), The Direction of Motion at an Earthquake Focus, Semiannual Tech. Rept. No. 5, Contract No. AF 19(604)-8054, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6049 VU

This paper presents an analytical method to find the orientation of a single or double-couple focal mechanism model given the S wave polarization data. This analytical method has been applied to the solution of the focal mechanism of 62 earthquakes of the North Pacific area.

STAUDER, W., (S. J.), The Direction of Motion at Earthquake Foci - Final Rept., Contract No. AF 19(604)-8054, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 7206 VU
AD 426 263

The use of S wave data is shown to provide important information on the mechanism of earthquake foci and to permit a determination of the focal mechanism in cases where P wave data alone do not suffice. Regional compressive stresses are examined and the occurrence of earthquakes registering compressions at all azimuths is studied. The S wave techniques have been adapted to a least squares procedure for computer analysis of the data.

STAUDER, W., (S. J.), The Investigation of Phase Velocity Versus Frequency Relationship for Long-Period Seismic Surface Waves, Semiannual Tech. Rept. No. 2, Contract AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1961.

VESIAC 5573 VU

This report is concerned with two phases of research: 1) the installation and operation of a quadrilateral network of matched long-period seismographs in mid-continent United States, 2) the use of data from this network for crust and upper mantle studies and for focal mechanism studies. The first phase has been virtually completed. Work on the second phase, which has been awaiting the accumulation of data from the network, is getting well underway. A technical report has been prepared, submitted separately, which describes the performance characteristics of the network. One other technical report on angle of incidence of the S wave at the free surface has been submitted to the contract agency.

STAUDER, W., (S. J.), The Investigation of Phase Velocity Versus Frequency Relationship for Long-Period Seismic Surface Waves, Semiannual Tech. Rept. No. 3, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1962.

VESIAC 5574 VU

This report concerns four areas: 1) Reliable Rayleigh wave phase velocities in the period range of 17-60 seconds have been determined through tripartite observations in the area of the quadrilateral network—the central United States; 2) Studies of crustal and upper mantle wave velocities have been made for the GNOME blast on December 10, 1961, and a regional earthquake on February 2, 1962; 3) Investigations of P and S wave parameters will involve comparisons of the polarization, angle of incidence, and spectrum of the waves recorded at each station; and 4) Computer programs have been developed.

STAUDER, W., (S. J.), The Investigation of Phase Velocity Versus Frequency Relationship for Long-Period Seismic Surface Waves, Semiannual Tech. Rept. No. 6, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1963.

VESIAC 6855 VU

This report consists of five parts. Each part reports on a particular area of research: 1) the determination of S wave polarization angles for an earth model including crystal layering, 2) the effect of the crust on body waves, 3) a study of the crustal structure in Missouri by explosion seismology techniques, 4) phase velocity determinations in the central United States, and 5) a comparison of multiple solutions of focal mechanism determinations.

STAUDER, W., S.J., The Investigation of Phase Velocity Versus Frequency Relationship for Long-Period Seismic Surface Waves, ARPA Order No. 180-61, Semiannual Tech. Rept. No. 8, Contract No. AF 19(604)-7399, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 8909 VU

This report abstracts 7 articles, 2 technical reports, and 2 papers. The two papers, read at the meeting of the Eastern Section of the Seismological Society, Ann Arbor, October 8-10, 1964, were: (1) "A Comparison of Numerical and Graphical S Wave Focal Mechanism Determinations for Kamchatka-Kurile Islands Earthquakes"; and (2) "Influence of the Changes in the Elastic Parameters of the Crustal Layers on the Spectrum of Longitudinal Seismic Waves." The articles and reports are abstracted elsewhere.

STAUDER, W., (S. J.), The Investigation of Phase Velocity Versus Frequency Relationship for Long-Period Seismic Surface Waves, Contract AF 19(604)-7339, St. Louis Univ., St. Louis, Mo., 1965.

VESIAC 10,682 VU

The recently submitted Quarterly Report Number 19 outlined the areas of inquiry in which the members of the project have been engaged during the months preceding May 1965. Two of these areas are nearing completion and are selected for technical summary in this report. They are: (1) the determination of crustal thickness from the spectrum of P wave.; and (2) the spectrum of P waves radiating from point sources in a layered medium.

STAUDER, W., S.J., The Present Status of Fault-Plane Solutions from P and S Waves and the Relation of These Solutions to Tectonic Stress Fields, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-A VU

Three questions concerning the potential of the first-motion methods of studying earthquake mechanisms are answered. The first-motion methods are described and their limitations and capabilities are analyzed.

STAUDER, W., (S. J.), A Review of Russian Work in Magnitude Determination, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 B VU
AD 441 592

The author discusses the evolution of the magnitude scale in the USSR. This scale was developed more tardily in the USSR than in other countries. The author also indicates some of its areas of application in the USSR. He then outlines the development of an energy scale which has been an outgrowth of the magnitude scale in the USSR. In his opinion, the Russians have gone somewhat ahead of the seismologists from other countries, in developing an energy scale applicable to the routine determination of earthquake energies within limited epicentral distances.

STAUDER, W., (S. J.), The S Wave Project for Focal Mechanism Studies, Final Report, Contract AF-AFOSR-458-62, St. Louis Univ., St. Louis, Mo., 1966.

VESIAC 14,236 VU
AD 646 516

This report covers the routine investigation of the focal mechanisms of the larger earthquakes from 1962-1965. Mechanisms of thirty-six earthquakes of 1962, of thirty five earthquakes of 1963, and of forty-five earthquakes of 1964 have been determined. The Alaska earthquake sequence is discussed. Conclusions reported here include the establishment of S waves as an independent means of source mechanism investigation or as an adjunct to P-wave first motion, resolution of P-wave data in certain types of radiation patterns, and ability to exclude centers of compression in some cases as the sources of seismic waves.

STAUDER, W., S.J., Support of Visiting Seismologists, Final Scientific Rept., 1 September 1963 to 31 August 1966, AFOSR-66-2388, Contract AF-AFOSR-386-63, St. Louis Univ., St. Louis, Mo., 1966.

VESIAC 15,187 VU
AD 804 008L

As a result of research, progress has been made in the understanding of the focal mechanism of earthquakes whether considered as a point source, a volume source, or as a finite moving source, of the excitation and propagation of sea-wave generated microseisms, of the effect of focal depth on the transfer function of a point source in a layered medium, of P waves propagating in wedges, of the generation of seismic body waves by a buried explosive source, and of the amplitude-energy relation of seismic sources. Their findings are closely related to wave generation by earthquake vs explosive sources and to problems of wave propagation and microseismic noise.

STAUDER, W., (S. J.), and G. A. BOLLINGER, The S Wave Project for Focal Mechanism Studies Earthquakes of 1962, Contract No. AF-AFOSR 458-62, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 8429 VU

The Department of Geophysics of St. Louis University has instituted a routine program for the determination of the focal mechanism of the larger earthquakes of each year using methods developed for the use of S waves in focal mechanism studies. The primary data source consists of the 70 mm microfilm file of seismograms of the World Wide Standard Stations. Described are assembling of suites of records, and how the polarization of the S wave is determined. The results of applying the method to 36 of the 63 earthquakes of 1962 of magnitude greater than 6 1/4 are here reported. The advantage of using a combination of P and S wave data in focal mechanism determinations is shown. Regional patterns for the earthquake mechanism are described.

STAUDER, W., (S. J.), and G. A. BOLLINGER, The S Wave Project for Focal Mechanism Studies, Contract No. AF-AFOSR 458-62, St. Louis Univ., St. Louis, Mo., 1964.

VESIAC 8430 VU

The Department of Geophysics of St. Louis University has instituted a routine program for the determination of the focal mechanism of the larger earthquakes of each year using methods developed for the use of S waves in focal mechanism studies. Suites of records from selected stations are assembled from the WWSS microfilm file for each earthquake of interest. A combination of P wave first motion and S wave polarization data is then used to determine graphically the mechanism of the quakes.

STAUDER, W., (S.J.), and G. A. BOLLINGER, The S Wave Project for Focal Mechanism Studies - The Alaska Earthquake Sequence of 1964, Scientific Interim Rept. No. 1, AFCRL-66-572, Contract AF 19(628)-5100, St. Louis Univ., St. Louis, Mo., 1966.

VESIAC 14,990 VU
AD 639 386

Focal mechanisms have been determined for one pre-shock, for the main shock, and for more than 25 aftershocks of the Alaska earthquake of 28 March 1964. The results are here presented to infer in greater detail the character of the total fault motion and of the motion in the main shock. The author reports the following: (1) the polarity of the P-wave first motion in the main shock yields a single well determined nodal plane with strike N66°E, dip 85° to the southeast. The significance of this plane is discussed; (2) the focal mechanism of the earthquakes related to the main shock bear a remarkable similarity to one another and to the main shock. In all but three cases there is a single steeply dipping nodal plane of P; (3) the hypocenters of the three exceptions noted are discussed.

STAUDER, W., (S. J.), J. DOWLING, and W. H. JACKSON, The Billiken Calibration Shot in Southeast Missouri, Sci. Rept. No. 4, AF 19(604)-7399, St. Louis University, St. Louis, Mo., 1964.

VESIAC 8598 VU
AD 606 573

On June 28, 1963, a 20,000 lb. high-explosive "calibration-shot", BILLIKEN, was detonated near the epicenter of the magnitude 5 Southeast Missouri earthquake of March 3, 1963. Who suggested the experiment and the sponsorship for the shot are given. Using arrival times at stations comparable to those used in locating the March 3 earthquake, the instrumental epicenter of BILLIKEN was located within 2 to 4 kilometers of the shot point. The shot point has also permitted the "calibration" of the area, making possible epicenter locations using time differences of arrivals at pairs of stations. Agreements of travel times between BILLIKEN and previous earthquakes and of a current refractions survey are discussed.

STAUDER, W., (S. J.), and O. NUTTLI, Investigation of Phase Velocities of Long Period Surface Waves and Focal Mechanism Studies, Rept. No. AFCRL-65-727, Contract AF 19(604)-7399, St. Louis Univ., St. Louis, Missouri, 1965.

VESIAC 13,038 VU
AD 474 981

The research conducted under this contract concerned eight general areas of investigation: (1) Establishment of a network of seismic stations in the central U. S. suitable for the study of long period surface waves and other specialized studies; (2) Phase and group velocity studies for surface waves; (3) Reduction of ground motion to motion in the incident wave; (4) Focal mechanism determinations; (5) Focal depth; (6) Inversion of body wave data; (7) Effect of low velocity channels on travel times; (8) Local crustal structure, seismicity, P_n velocity.

A brief discussion of work accomplished is given in the report, followed by abstracts of papers published.

STEINBERG, B. D., Derivation of the Dimensions of the Teleseismic Beam of a Large Aperture Array, Tech. Note, Contract AF 19(628)-5981, General Atronics Corp., Philadelphia, Pa., 1966.

VESIAC 17,629 VU
AD 823 045

In earlier reports a presentation of teleseismic beam theory was given. Among the subjects discussed were the cross-sectional properties of a teleseismic beam, the depth of field of the array and a comparison of array properties for several seismic phases. Given also were a radial pattern showing side lobes from about 40^o to 100^o and the effects upon the sidelobe structure of a transient waveform.

Omitted at that time were the derivations of the three dimensions of a teleseismic beam. These derivations are the subject of this note.

STEINBERG, B. D., Large Aperture Teleseismic Array Theory, Contract: Agency Document, Advanced Research Projects Agency, Washington, D. C. 1965.

VESIAC 13,858-L VU
AD 648 415

Three topics in the theory of seismic arrays are discussed. The first is the theory of the formations of beam patterns in an idealized earth, and the derivations of parametric expressions relating the more important properties of the beams with measurable design parameters. The second deals with spatial coherence of seismic signals and of noise across an aperture. It concludes the theoretical dependence of array performance upon signal and noise coherence and measurements of the pertinent quantities. The third topic deals with the dependence of array performance upon travel-time residuals.

STEINBERG, B. D., Spatial Correlations Observed Across LASA from Longshot, Tech. Note, Contract AF 19(628)-5981, General Atronics Corp., Philadelphia, Pa., 1966.

VESIAC 17,631 VU
AD 823 046

P-coda correlation measurements and spatial cross-correlation measurements of the main P wave and the noise preceeding the LONGSHOT event have been used in a study of the correlation between seismometers spaced 200 km apart (LASA spacing). The first numerical results of this study are presented in this note.

STEPP, J. C., W. A. RINEHART, and S. T. ALGERMISSEN, Earthquakes in the United States 1963-1964 and an Evaluation of the Detection Capability of the United States Seismograph Stations, Final Report, Contract ARPA Order No. 620, U. S. Coast & Geodetic Survey, Washington, D. C., 1965.

VESIAC 14,459 VU
AD 631 935

For seismicity studies, it is desirable to know the approximate lower limit of magnitude for which it is expected all earthquakes will be located. Accordingly, in this report, the geographic distribution and operating characteristics of the U. S. network of seismograph stations are used to provide this knowledge. The statistical approach of Booker (1964) with minor modifications is used. Results are given in terms of the probability of detecting an event, with known hypocenters and magnitude, by at least five stations of the total network of seismograph stations. Part I of the report presents the seismicity based on earthquakes located in the U. S. during 1963-64. Part II is an evaluation of the capability of the existing network of stations.

STERLYAGOVA, G., "The Tectonics of the Southeastern Part of the Caspian Sea According to Marine-Seismic Data," Razved. I Promysl. Geofiz., No. 51, pp. 11-25, 1964, (Translated from Russian), Contract SD-78.

VESIAC 12,448 VU

Regional seismic investigations have been conducted in the water area of the southeastern part of the Caspian Sea by seismic parties of the NIMGE by the reflected wave method for the purpose of studying the geological structure of the inner, most submerged part of the South Caspian basin.

The data of seismic investigations by the reflected-wave method have in recent years made it possible to designate the principal elements of the tectonics of both the inner zone of the South Caspian basin and of the entire southeastern Caspian as a whole.

STEWART, S. W., A Study of the Crustal Structure in Missouri by Explosion Seismology Techniques, Semi-Annual Tech. Report No. 6, Contract AF 19(604)-7399, St. Louis University, St. Louis, Mo., 1963.

VESIAC 6855 C VU

This report consists of five parts. Each part will report on a particular area of research as follows: a) The determination of S wave polarization angles for an earth model including crustal layering; b) The effect of the crust on body waves; c) A study of the crustal structure in Missouri by explosion seismology techniques; d) Phase velocity determinations in the central United States; and e) A comparison of multiple solutions of focal mechanism determinations.

STOLEN, O., "A Collection of Norwegian Newspaper Clippings," Norway, 1963, Contract SD-78.

VESIAC 8016 VU

This is a collection of newspaper clippings treating the following: (a) an earthquake at 4 am, March 16, 1964, in the Lillehammer district; given are rough epicentral location and first impressions of the event by unmanned observers; (b) a follow-up of "a", locating the center of the earthquake, and describing it as "local" in character; (c) first accounts of another earthquake at 8 pm, March 16, in Ringebu; (d) a description of an American seismological team from Dallas, which, in early 1964, has recorded in NesAlmenning motions from Siberia to South America; (e) Plans, for 1963, of the AEC to follow the events around the areas of NesAlmenning in Ringsaker, Norway; (f) Bergundkavgen, Norway, as an instrument site for recording of explosions from USSR and USA.

STROEV, P. A., and A. G. GAINANOV, "The Structure of the Earth's Crust of the Indian Ocean According to the Data of Geophysical Investigations," Okeanologiya, Vol. 5, pp. 684-691, 1965, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 13,642 VU

After describing the history of geophysical investigations of the crust in the Indian Ocean, and showing that the Indian Ocean, in contrast with the Atlantic and Pacific Oceans, has been neglected so far as crustal studies are concerned, the authors discuss the findings of the Soviet nonmagnetic vessel Zarya as a result of five trips during the IGY. They also discuss the results of the expeditionary trips of the Soviet vessel Vityaz in 1959, 1960, and 1961. Findings concerning force of gravity, magnetic fields, thickness of bottom beds, thickness of the crust to the Mohorovicic Discontinuity, and other matters, are discussed. Two profiles are discussed in detail: (1) Cape Town (Africa)-Queen Maud Land (Antarctica); (2) Ceylon - the Shackleton Ice Shelf (Antarctica).

STUART, D. J., Study of Seismic Propagation Paths and Regional Travel-times in the Continental United States, Progress Rept., Contract ARPA Order No. 193-64, U. S. Geological Survey, Denver, Colorado, 1965.

VESIAC 14,955 VU
AD 624 001

The Geological Survey recorded seismic waves generated by an Arctic nuclear explosion at five stations on the Alaskan mainland, two stations on the Aleutian chain, five stations in Colorado, one station in Nevada, and one station in California, in addition to locations where the Geological Survey has a permanent-station recording capability. Distances ranged from 440 km at Attu to 5987 km at Trinidad, Colorado. Good quality seismograms were recorded at all stations. Reduced travel times of first arrivals are compared with the standard Jeffreys-Bullen curve.

SUTTON, G. H., M. E. ODEGARD, N. MARK, and N. J. LETOURNEAU, Research in Seismology Related to the Columbia Ocean-Bottom Seismograph, Sci. Final Rept., 1 Nov. 1967 to 31 August 1969, Rept. No. HIG 70-12, Contract F19628-68C-0083, Univ. of Hawaii, Honolulu, Hawaii, 1969

VESIAC 20,299 VU
AD 708 518

The report describes the history of the ocean-bottom seismograph, the location and instrumentation of OBS-III, the nature of research conducted under this contract and the personnel associated with the contract. The report also outlines results of research in the areas of spectral and correlation analysis, local earthquake studies, particle motion studies, detection ability studies, construction of a station log of events, microseism analysis and studies of interesting arrivals in local earthquake wave trains. Suggestions for further research related to an ocean-bottom seismograph are also discussed.

SUVOROV, A. I., "The Main Faults of Kazakhstan and Central Asia," Akad. Nauk SSSR, Geol. Inst., Trudy, Vol. 80, pp. 173-237, 1963, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 14,330 VU

This work is a further development of the investigation and evaluation of faults made by A. V. Peive, and tries to give, on the basis of new materials, presented here, a characterization of a majority of the most important faults of Kazakhstan and Central Asia. These faults are subdivided into groups, and certain regularities of their spatial disposition are examined. Horizontal displacements and thrust zones are discussed. The author's main conclusion is that the information presented in this report indicates that the forms of the manifestations of faults on an old surface are very varied. Given are a number of factors which determine the variety of the manifestations of large faults.

SWANSON, J. G., Magnitude Studies Conducted Under Projects VT/5054 and VT/5055, Tech. Rept. No. 66-73, Contracts VT/5054, AF 33(657)-12373 and VT/5055, AF 33(657)-14444, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,156 VU
AD 803 337

Station magnitude corrections are developed and the possibility of azimuthal dependence of station correction is investigated by means of a statistical model for BMSO, CPSO, TFSO, UBSO, and WMSO. Azimuthal dependence of station correction is not established at any of the observatories. Refined distance-depth magnitude correction factors are developed for epicentral distances between 20 deg. and 90 deg. for depths between 50 and 200 km and for distances between 0 and 110 deg. for depths less than 50 km. Results are given of the comparison of the mean observatory magnitude and the USC&GS magnitude.

SWINDELL, W. H., Convergence of Time-Domain Adaptive Maximum-Likelihood Filters for Stationary Data, Seismic Array Processing Techniques, Tech. Rept. No. 3, Contract VT/0701, F33657-70C-0100, Texas Inst., Inc., Dallas, Texas, 1970

VESIAC 20,258 VU
AD 870 777

The behavior of an adaptively designed time-domain maximum-likelihood multichannel filter during convergence on stationary data was examined. The covariance matrices of a measured seismic short-period prewhitened noise sample were used to generate 3300 time points of 13 channel stationary Gaussian data having the measured correlation structure. Using these data, 29-point adaptive filters were computed and applied. Their performance was evaluated as a function of time and compared with the performances of the beam-steer filter and the maximum-likelihood filter generated from the measured matrices.

Beginning with a beamsteer weighted initial filter, the filter was adapted for 3272 points. After 1000 adaptions, the adaptive filter was equally effective as the optimum filter in rejecting high-frequency noise. After 3272 adaptions, low-frequency noise rejection by the adaptive filter was much poorer than that of the optimum filter and not appreciably better than that of the beamsteer filter. Wideband noise reduction obtained by the best adaptive filter was about 3.5 db worse than optimum. The loss in performance was probably caused by incomplete convergence. Estimates of the gradient measurement noise are in good agreement with those predicted by theory.

TAKEUCHI, H., M. SAITO, and N. KOBAYASHI, "On the Jeffreys' Model of the Earths' Crust and Mantle," Geophysical Inst. Japan Zisin, Ser. 2, Vol. 15, No. 3, pp. 183-194, 1962, (Translated from Japanese), Contract SD-78.

VESIAC 7755 VU

Studies are made on the Jeffreys' model of the earth's crust and mantle, in which density ρ and rigidity μ in the mantle are 5/4 and 20/9 times those in the crust, respectively. Dispersion curves obtained are shown for the fundamental and first overtone of Rayleigh and Love waves. Corresponding displacement distributions in the crust are shown in Fig. 3 - 4 (fundamental Rayleigh), 5 - 6 (first overtone Rayleigh), 9 (fundamental Love) and 10 (first overtone Love), respectively. Finally, the excitations of these modes by a wave source of the Dirac type in space and time are discussed.

TALVIRSKII, D. B., "Seismic Exploration of the Substructure in the Southern Part of the Tobolsk Zone of the West Siberian Plain," Prikladnaya Geo[illegible]ika, No. 22, pp. 3-23, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,337 VU

This paper describes the characteristics of seismic data of the CMRW (correlation method of refracted waves) obtained in the Tobolsk tectonic zone of the eastern Ural region in connection with studying the surface relief of the folding substructure of this portion of the west Siberian plain. Shown were the prospecting possibilities of seismic exploration and in particular of the correlation method of refracted waves in studies of the Prejurrassic substructure of the west Siberian plain. Clear results were obtained reflecting the wedge-shaped arrangement of the layers, which can theoretically occur in different geological regions. Extensive new data were obtained on the tectonic structure of this territory.

TARCZY-HORNOCH, A., "On the Determination of the Focus of Earthquakes," Geofisica Pura e Applicata, (Translated from German), Vol. 49, pp. 43-60, May-August 1961, Contract: Da-49-083 OSA-3137 (ARMY).

VESIAC 14,386 VU

In the first part, an additional simple method is described for the plane determination of epicenters of near earthquakes. In the second and third part, correction terms are developed for distances or precision determinations in which the curvature of the earth plays a role. For still greater distances or precision requirements, it is of advantage to begin with spherical relations, the series expansion of which permits the consideration of additional terms. For fitting purposes, however, it will usually be more favorable to calculate the geographical coordinates of the epicenter.

TAYLOR, V. W., Investigation of System Response as a Function of Azimuth from Tonto Forest Seismological Observatory, Spec. Rept. 15, Project VT/070, Contract AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,804 VU
AD 609 532

As outlined in a letter to Captain C. Houston, subject: "Summary of Det[illegible]ion Capability Studies made at the TFSO", dated 25 June 1964, [illegible]rious methods of visual data evaluation are being employed to determine the detection capability of the TFSO. This report covers the progress made in correlating P-wave signal amplitudes with azimuth to the source and local seismometer site geology. Signals from both teleseismic and explosive sources were used for the study.

TEARE, J. D., and G. J. DREISS, Theory of the Shock Front. III. Sensitivity to Rate Constants, Rept. No. AFBMD-TN-60-2, Contracts: AF-04(647)-278, DA-19-020-ORD-4362, Avco-Everett Research Laboratory, Everett, Massachusetts, 1959

VESIAC 12,561 VU
AD 234 032

Computer programs for the calculation of relaxation phenomena were used in a study of the sensitivity of the features of the non-equilibrium shock front to certain of the pertinent rate constants. A summary is presented of the results of the survey with respect to the effect on some re-entry observables. Calculations are made at three Mach numbers (12, 17 and 20.8) for normal shock waves incident into air at a pressure $P_1 = 0.02$ mm Hg. (50 miles altitude). The features discussed are: (a) the NO concentration profile, with particular attention to the magnitude and location of the peak; (b) the electron density profile; and (c) the radiation profile for a typical molecular band system.

TELEDYNE INDUSTRIES (STAFF), Amplitude Anomalies at LASA, Rept. No. LL-4, Contract AF 19(628)-5167, Teledyne Industries, Earth Sciences Div., Alexandria, Virginia, 1967.

VESIAC 15,322 VU
AD 647 267

Average amplitude anomalies are presented as functions of source region. Data from approximately 220 events were used in this analysis.

TELEDYNE INDUSTRIES (STAFF), Bibliography of Array Literature, Rept. No. TR 65-114, Project VT/4051, Contract AF 33(657)-12145, Geotech. Div., Garland, Texas, 1965.

VESIAC 13,409 VU
AD 626 405

A bibliography of available literature on array technology has been compiled, embracing the disciplines of seismology, acoustics, and radio. Over one hundred articles from various scientific journals are listed. Most of the articles are abstracted and are grouped according to a major category: Field of Application, and a subcategory: Character of Content. The majority of the articles were published during the period 1955-1965.

TELEDYNE INDUSTRIES (STAFF), Bibliography of Array Literature, Appendix: A Review of Literature Related to the Design of Seismic Arrays for Nuclear Surveillance, Rept. No. TR 65-114, Contract VT/077, AF 33(600)-41840, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968

VESIAC 13,409 A VU
AD 626 405

This review calls attention to fundamentally similar problems dealt with in recent papers. It emphasizes papers that deal with theory and formulation, rather than engineering applications. Together with the pertinent papers it intends to help the designer avoid duplicating previous work or overlooking existing useable solutions.

TELEDYNE INDUSTRIES (STAFF), Construction Manual for the Long Period Signal Acquisition System of the Montana Large Aperture Seismic Array, Contract VT/6701, AF 33(657)-15190, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1966.

VESIAC 16,657 VU
AD 809 585

This report describes the instrumentation and field techniques used in installing the LASA long-period systems.

TELEDYNE INDUSTRIES (STAFF), Construction Manual for Signal Acquisition System of the Montana Large Aperture Seismic Array, Contract VT/5071, AF 33(657)-14104, Teledyne Indust., Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 16,671 VU
AD 809 586

This report presents a detailed description of the construction of the Montana LASA. Included are descriptions of the preparation of sites, installation of equipment and a list of materials.

TELEDYNE INDUSTRIES (STAFF), Quarterly Rept. No. 1, Deep-Well Research, Tech. Rept. No. 65-119, Contract VT/5051, AF 33(657)-13668, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1965.

VESIAC 12,897 VU
AD 625 515

This report contains results of data analyses from vertical array of four vertical seismometers operated in the deep hole at sites near Apache, Oklahoma, and Franklin, West Virginia. Also included is a discussion of a fifth deep-hole seismometer which was operated in a shallow hole adjacent to the deep hole as a surface reference. Discussed are design improvements and a vertical array of up to four tri-axial seismometers in one hole. System modification response, modifications and extensions, are discussed. The test site near Grapevine, Texas, and the work there is discussed. Data analysis and spectral analyses results are given.

TELEDYNE INDUSTRIES (STAFF), Deep-Hole Site Report Long No. 1, Centre County, Pennsylvania (Appendix 2 to 65-112), TR 65-105, Contact AF 33(657)-13368, VT/5051, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 12,789-B VU

The Long No. 1 was used in a deep-hole measurement program by special arrangement with Mobil Oil Company who drilled the hole to a depth of 4774 m in a highly folded and thrust-faulted section of Ordovician and Cambrian sediments. Deep-hole and surface seismographs were used to record both seismic signals and noise. Results of the measurements show that an improvement of 2.4 was obtained in the signal-to-noise ratio.

TELEDYNE INDUSTRIES (STAFF), Deep-Hole Site Report, University of Texas "EE" No. 1, Pecos County, Texas (Appendix 1 to 65-112), TR 65-104, Contracts: AF 33(657)-13668, VT/5051, AF 33(600)-43369, and VT/1139, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 12,789-A VU

The University of Texas "EE" No. 1 was prepared for use in a deep-hole measurement program. It was originally drilled by

Phillips Petroleum Company, to a world's record total depth of 7724 m.. Deep-hole and surface seismographs were used to record both seismic signals and noise. Results of the measurements show that only a small improvement in the signal-to-noise ratio was obtained at depth.

TELEDYNE INDUSTRIES (STAFF), Design, Installation, and Initial Operation of the Long-Period Seismic Array at the Tonto Forest Seismological Observatory, Installation Rept., 46-Kilometer Long-Period Array, Rept. No. TR 68-29, Contract VT/7702, AF 33(657)-67C-0091, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1968.

VESIAC 18,516 VU
AD 836 555

During the second half of 1967 and the early part of 1968, a 7-element long-period seismic array was constructed at the Tonto Forest Seismological Observatory. Each of the seven elements consists of a vertical long-period seismograph and two mutually-perpendicular horizontal seismographs. The elements are arranged in a hexagonal pattern and are distributed over an area of approximately 800 square miles. This report describes each aspect of the design, installation, and initial operation of the array.

TELEDYNE INDUSTRIES (STAFF), Design, Installation, and Preliminary Evaluation of the UBSO Long-Period Digital Data Acquisition System, Spec. Tech. Rept., Rept. No. TR 69-19, Contract VT/6705, AF 33(657)-16563, Teledyne, Inc., Geotech Div., Garland, Texas, 1969.

VESIAC 19,666 VU
AD 853 243

Construction and installation of a 7-element array of 3-component long-period seismographs at the Uinta Basin Seismological Observatory is summarized. Characteristics of the associated digital gain-ranging data transmission and acquisition system are described, and problems encountered during installation and initial checkout are reported. System frequency response data and comparative seismograms are presented.

TELEDYNE INDUSTRIES (STAFF), Designation of Data Recorded at the Tonto Forest Seismological Observatory, Project VT/5055, Contract AF 33(657)-14444, Teledyne Indust., Inc., Geotech Division, Garland, Texas, 1967.

VESIAC 16,634 VU

This report outlines the designators used to identify the seismic and meterological data recorded at the Tonto Forest Seismological Observatory.

TELEDYNE INDUSTRIES (STAFF), Evaluation of a Geotech Model 20171 Seismometer, Tech. Rept. No. 65-118, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotechnical Corporation, Garland, Texas, 1965.

VESIAC 13,045 VU
AD 480 394

Field test results of a Model 20171 Shallow-Hole Seismometer are presented. Tests were conducted with the seismometer located at various depths in a 152 m deep hole. Data are compared with recordings from a Model 11167 Deep-Hole Seismometer, located at a depth of 150 m in the same hole. Results indicate that the operation of the shallow-hole seismometer compares favorably with that of the deep-hole seismometer. Frequency-domain measurements of teleseismic signals recorded by both systems indicate that the signals are generally similar, but never identical. This difference can be explained by the different transducers used in each seismometer and by the slightly different frequency response of the two systems. Field evaluation of two solid-state FM amplifiers, was also conducted.

TELEDYNE INDUSTRIES (STAFF), Evaluation of Multiple Array Processors at the Uinta Basin Seismological Observatory, Tech. Rept., Contract VT/6705, AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,618 VU
AD 826 458

Two Multiple Array Processors, installed at UBSO, are described; their performance is evaluated, and recommendations for future work in processing are given.

TELEDYNE INDUSTRIES (STAFF), Interim Report No. 2, VT/4051, January 1963 Through June 1964, Tech. Rept. No. 66-78, Contract VT/4051, AF 33(657)-12145, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,151 VU
AD 803 201

The progress of the Long-Range Seismic Measurements Program (LRSM) during the period 1 January 1963 through 30 June 1964 is described. The administrative and technical information is categorized according to routine operations, evaluation of instruments and equipment, evaluation of seismograms, equipment modifications, and data processing.

TELEDYNE INDUSTRIES (STAFF), Interim Report No. 4, April 1966 Through May 196?, Tech Rept., Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,901 VU

The progress of the LRSM Program during the reporting period is described. The data contained in the report are categorized along the same lines as the organization of the LRSM program; that is, operations, data processing, equipment modifications, equipment and seismogram evaluation, and special projects.

TELEDYNE INDUSTRIES (STAFF), LASA Amplitude Scatter, Rept. No. LL-2, Contract AF 19(628)-5167, Teledyne Industr., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 15,169 VU
AD 645 332

Seismic signal amplitude scatter is shown by demonstration to be characteristic of present seismic arrays rather than a unique characteristic of LASA.

TELEDYNE INDUSTRIES (STAFF), LASA Operation and Maintenance, Final Rept., Rept. No. 616-0766-2088, Contract AF 33(657)-14104, VT/5071, Teledyne Industr., Earth Sci. Div., Pasadena, Calif., 1966.

VESIAC 15,172 VU
AD 803 185

The Montana Large Aperture Seismic Array sensor was installed, retrofit, and operated under contract by the Earth Sciences Division of Teledyne, Inc. In this final report are discussed: (a) facilities and equipment; (b) array plan; (c) instrumentation; (d) modifications to the LASA sensor; (e) communications; (f) maintenance; (g) additional programs completed; (h) recommendations. It is concluded that the Montana LASA is in a functioning state. The assumption of operational status is dependent on factors outside the scope of this report. Improved seismic signal-processing techniques may result in new instrumentation requirements. Consideration should be given to utilizing off-the-shelf instruments and equipment commensurate with the state-of-the-art.

TELEDYNE INDUSTRIES (STAFF), Long-Period Seismograph Development Program, Project Recommendation P-278, Contract VT/72, AF 33 (657)-9967, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1965.

VESIAC 18,528 VU

The objective of this project is to extend the state-of-the-art of long-period seismometers through the continued development of field instrumentation which is less sensitive to localized surface disturbances or can be economically installed in environments where localized surface disturbances are attenuated.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements - BOXCAR, Rept. No. 223, Contract VT/6702, F33657-68-C-0945, Teledyne Indust., Inc., Alexandria, Va., 1968.

VESIAC 15,905 VU

An analysis of seismological data from an underground nuclear explosion as a continuing study to provide information to aid in distinguishing between earthquakes and explosions. A table of travel-times and amplitudes of P, Pg, Lg, and surface waves are included along with other unidentified phases.

TELEDYNE INDUSTRIES (STAFF), The LRSM Mobile Seismological Laboratory, Tech. Rept. No. 66-27, Contract VT/4051, AF 33(657)-12145, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 14,318 VU

The mobile laboratories used in the Long-Range Seismic Measurements program are designed to facilitate the recording and processing of high-quality seismic data. The instrumentation and techniques employed in these laboratories compare favorably with those in many permanent seismological observatories. This report discusses the instrumentation, data processing facilities and power requirements found in the mobile laboratories.

TELEDYNE INDUSTRIES (STAFF), Seismological Bulletin - Long-Range Seismic Measurements Program, Bull. No. 47, Contract: VT/6703, AF 33(657)-16270, Teledyne Indust., Geotech Div., Garland, Texas, 1966.

VESIAC 14,185 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under a project of the Long Range Seismic Measurements Program. Included are: (a) data on all of the phases that have been associated with epicenters reported by the USC & GS; (b) data on the epicenters listed in the bulletin - as reported by the USC & GS; and (c) arrival time, period, amplitude, and distance for phases not associated with USC & GS epicenters. Instrumentation at each of the LRSM bulletin sites is described, with some exceptions.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 48, Contract: VT/6703, AF 33(657)-16270, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 14,309 VU

This report contains seismological data on earthquake phases recorded at ten of the mobile seismological stations being operated by Teledyne Industries, Geotech Division under the LRSM. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (a) Data on all of the phases that have been associated with epicenters reported by the USC & GS; (b) Data on the epicenters listed in the bulletin - as reported by the USC & GS; (c) Arrival time, period, amplitude, and distance for phases not associated with USC & GS epicenters.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements Program, Seismological Bulletin No. 49 - January 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,456 VU

This bulletin contains seismological data on earthquake phases recorded at ten of the mobile seismological stations being operated by Teledyne Industries, Geotech Division. It contains: (a) data on all the phases that have been associated with epicenters reported by the U. S. Coast and Geodetic Survey; (b) data on the epicenters listed in the bulletin - as reported by the USC&GS; (c) arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters. All phases are listed in chronological order, except that unassociated phases are not mixed with a sequence of associated phases.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program, Seismological Bulletin No. 50 - February 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,634 VU

This bulletin contains seismological data on earthquake phases recorded at ten of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, for the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 51, Contract AF 33(657)-16270, VT/6703, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 14,803 VU

This bulletin contains seismological data on earthquake phases recorded at ten of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under the Long-Range Seismic Measurements (LRSM) Program. It is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (a) data on all the phases that have been associated with epicenters reported by the U. S. Coast and Geodetic Survey (USC&GS); (b) data on the epicenters listed in the bulletin - as reported by the USC&GS; (c) arrival time, period, amplitude, and distance for phases not associated with the USC&GS epicenters. Instrumentation at each of the LRSM bulletin sites is also described.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 52 for April 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 14,956 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under the Long-Range Seismic Measurements (LRSM) Program. It is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (1) data on all of the phases that have been associated with epicenters reported by the U. S. Coast and Geodetic Survey (USC&GS); (2) data on the epicenters listed in the bulletin - as reported by the USC&GS; and (3) arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements Program - Seismological Bulletin No. 53 for May 1966, Contract VT/6702, AF 33(657)-16270, Teledyne Indust., Geotech Div., Garland, Texas, 1966.

VESIAC 14,967 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (1) data on all of the phases that have been associated with epicenters reported by the U. S. Coast and Geodetic Survey; (2) data on the epicenters listed in the bulletin - as reported by the USC&GS; (3) arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters. Instrumentation is discussed, and the column titles in the bulletin are interpreted for the reader.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 54 for June 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,042 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under the LRSM program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (a) data on all the phases that have been associated with epicenters reported by the USC&GS; (b) data on the epicenters listed in the bulletin - as reported by the USC&GS; (c) arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters. Instrumentation is discussed and column titles are interpreted.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 55 for July 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,184 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under the Long-Range Seismic Measurements (LRSM) Program. It is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (a) data on all the phases that have been associated with epicenters reported by the USC&GS; (b) data on the epicenters listed in the bulletin - as reported by the USC&GS; (c) arrival time, period amplitude, and distance for phases not associated with USC&GS epicenters.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements Program - Seismological Bulletin No. 56 for August 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Geotech Div., Garland, Texas, 1966.

VESIAC 15,331 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, under the LRSM Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains: (1) data on all the phases that have been associated with epicenters by the USC&GS; (2) data on the epicenters listed in the bulletin - as reported by the USC&GS; (3) arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 57 for September 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967

VESIAC 15,730 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, of the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 58 for October 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1967

VESIAC 15,731 VU

This bulletin contains seismological data on earthquake phases recorded at 11 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, of the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 59 for November 1966, Contract VT/6703, AF 33(657)-16270, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1967

VESIAC 15,732 VU

This bulletin contains seismological data on earthquake phases recorded at 11 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, of the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 60, Contract VT/6703, AF 33(657)-16270, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 15,903 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division for the LRSM program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 61, Project VT/6703, Contract AF 33(657)-16270, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1967.

VESIAC 16,360 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 62, Contract VT/6703, AF 33(657)-16270, Teledyne Corp., Geotech Div., Garland, Texas, 1967.

VESIAC 16,386 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Teledyne Industries, Geotech Division, of the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 63, Project VT/6703, Contract F33657-67C-1457, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,501 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech, A Teledyne Company, the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements Program - Seismological Bulletin No. 64, Contract VT/6703, F 33657-67C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,753 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech, for the LRSM Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 65, Contract VT/6703, F33657-67C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,909 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech for the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 66, Contract VT/6703, F33657-67C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 16,910 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech, for the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 67, Contract VT/6703, F33-657-67-C-1457, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 17,115 VU

This bulletin contains seismological data on earthquake phases recorded at 8 of the mobile seismological stations being operated by Geotech, under the LRSM Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 68, Contract VT/6703, F33-657-67-C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1967.

VESIAC 17,116 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech, under the LRSM Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 69, Project VT/6703, Contract F33657-67C-1457, Geotech, Teledyne Indust., Inc., Garland, Texas, 1968.

VESIAC 17,448 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech for the LRSM Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements Program - Seismological Bulletin No. 70, Contract VT/6703, F33657-67C-1457, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 17,603 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations being operated by Geotech, A Teledyne Company, under Project VT/6703, Contract F33-657-67-C-1457, the Long-Range Seismic Measurements (LRSM) Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams. The bulletin contains the following: a. Data on all of the phases that have been associated with epicenters reported by the U. S. Coast and Geodetic Survey USC&GS; b. Data on the epicenters listed in the bulletin - as reported by the USC&GS; c. Arrival time, period, amplitude, and distance for phases not associated with USC&GS epicenters.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 71, Contract VT/8703, F33657-67C-0734, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,000 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations operated by Geotech. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long-Range Seismic Measurements Program - Seismological Bulletin No. 72, Project VT/8703, Contract F33657-68C-0734, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,341 VU

This bulletin contains seismological data on earthquake phases recorded at 10 of the mobile seismological stations operated by Geotech, the Long-Range Seismic Measurements Program. The bulletin is intended to be an aid to interested observers in determining the extent of the earthquake data contained in the records from these teams.

TELEDYNE INDUSTRIES (STAFF), Long Range Seismic Measurements, Project 8.4, Texas-Louisiana Earthquake, SDL Rept. No. 114, Project VT/2037, Contract AF 33(657)-12447, Teledyne Systems Co., Alexandria, Va., 1965.

VESIAC 9782 VU
AD 457 252

The event and recordings are described and analyzed. Short-period signals were recorded by 30 stations. Rayleigh and Love waves were not observed because all long-period records showed signals for a coincidental New Guinea earthquake. The Texas-Louisiana earthquake had an average magnitude of 4.36.

The travel-time residuals from the Pn and P phase show considerable scatter of values. An attempt was made to reduce this scatter by revising the location and other parameters to conform to the general configuration of the SALMON graph. These revised statistics reduce the scatter considerably.

TELEDYNE INDUSTRIES (STAFF), Operation and Maintenance Manual for the Signal Acquisition System of the Montana Large Aperture Seismic Array, Rept. No. 616-0566-2081, Project VT/5071, Contract AF 33(657)-14104, Teledyne Industries, Inc., Earth Sciences Div., 1966.

VESIAC 15,720 VU
AD 487 354

This manual has been prepared for the use of field personnel in the operation and maintenance of the signal acquisition system of the Montana LASA. It is intended that technicians will make use of the manual first in familiarizing themselves with the system, and then in actual performance of maintenance requirements.

TELEDYNE INDUSTRIES (STAFF), Operation of the Tonto Forest Seismological Observatory, Final Rept., 1 May 1965 Through 31 December 1966, Contract VT/5055, AF 33(657)-14444, Teledyne Industries, Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,719 VU
AD 815 681

The work accomplished from 1 May 1965 through 31 December 1966, includes the operation, evaluation, and improvement of TFO located near Payson, Arizona. It also includes special research and test functions carried out at TFO. Research and development tasks performed by the Garland, Texas, staff using TFO data are included.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Quarterly Rept. No. 2, 1 August Through 31 October 1965, Contract VT/5055, AF 33(657)-14444, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1965.

VESIAC 16,665 VU
AD 625 469

Project VT/5055 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory located near Payson, Arizona. It also includes a discussion of special seismological investigations using data recorded by eight Long-Range Seismic Measurements Project seismological stations operating in an extended array configuration around the observatory.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Quarterly Rept. No. 1, 1 January 1967 Through 31 March 1967, Tech. Rept. No. 67-25, Contract VT/7702, AF 33(657)-67-C-0091, Teledyne Industries, Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,070 VU
AD 814 643

This is a report of the work accomplished during the report period on the operation, evaluation, improvement, and expansion of TFSO. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Geotech staff, using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the Tonto Forest Seismological Observ., Quarterly Rept. No. 2, 1 April Through 30 June, 1967, Project VT/7702, Contract AF 33(657)-67C-0091, Teledyne Indust., Inc., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,635 VU

This is a report of the work accomplished on Project VT/7702 from 1 April through 30 June 1967. Project VT/7702 includes the operation, evaluation, improvement, and expansion of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Final Rept., 1 January through 31 December 1967, Rept. No. TR 68-11, Contract VT/7702, AF 33(657)-67C-0091, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,005 VU
AD 828 521

This is a report of the work accomplished from 1 January 1967 through 31 December 1967. This project includes the operation, evaluation, and improvement of TFSO. It also includes the installation and initial operation of a 37-element, short-period array and the installation of a 7-element, long-period array. Special research and test functions undertaken at TFSO, and research and development tasks performed by the Garland, Texas, staff using TFSO data are included.

TELEDYNE INDUSTRIES (STAFF), Operation of the TFSO, Quarterly Report No. 1, 1 January Through 31 March 1968, Report No. TR 68-17, Contract VT/8702, AF 33657-67C-0766, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,011 VU
AD 832 195

This is a report of the work accomplished on Project VT/8702 from 1 January through 31 March 1968. Project VT/8702 includes the operation, evaluation, and improvement of the TFSO located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the Tonto Forest Seismological Observ., Quarterly Rept. No. 2, 1 April to 30 June 1968, Rept. No. TR 68-32, Contract VT/8702, AF 33657-68C-0766, Geotech, Teledyne Indust., Inc., Garland, Texas, 1968.

VESIAC 18,655 VU
AD 837 595

This is a report of the work accomplished on Project VT/8702 from 1 April through 30 June 1968. This Project includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the Tonto Forest Seis. Observ., Quarterly Rept. No. 3, 1 July to 30 Sept. 1968, Rept. No. TR 68-46, Contract VT/8702, AF 33657-68C-0766, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 19,032 VU
AD 842 572

This is a report of the work accomplished on Project VT/8702 from 1 July through 30 September. The Project includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Final Report, 1 January to 31 December 1968, Rept. No. TR-69-1, Contracts: VT/8702, F33657-68C-0766, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969.

VESIAC 19,405 VU

This is a report of the work accomplished on Project VT/8702 from 1 January through 31 December 1968. Project VT/8702 includes the operation, evaluation, and improvement of the TFSO located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the TFSO, Quarterly Rept. No. 1, 1 January to 31 March 1969, Rept. No. TR 69-16, Contract VT/9702, F33657-69C-0803, Teledyne-Geotech, Garland, Texas, 1969.

VESIAC 19,627 VU
AD 851 854

This is a report of the work accomplished on Project VT/9702 from 1 January through 31 March 1969. Project VT/9702 includes the operation, evaluation, and improvements of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Quarterly Rept. No. 2, 1 April to 30 June 1969, Rept. No. TR 69-27, Contract VT/9702, F33657-69C-0803, Teledyne-Geotech., Garland, Texas, 1969.

VESIAC 19,748 VU
AD 855 576

Project VT/9702 includes the operation, evaluation and improvements of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Quarterly Rept. No. 3, 1 July through 30 September 1969, Rept. No. 69-48, Contract VT/9702, F33657-69C-0803, Geotech-Teledyne Indust., Garland, Texas, 1969.

VESIAC 19,881 VU
AD 860 720

This is a report of the work accomplished on Project VT/9702 from 1 July through 30 September 1969. Project VT/9702 includes the operation, evaluation and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the TFSO, Final Rept., 1 January to 31 December 1969, Rept. No. TR 70-1, Contract VT/9702, F33657-69C-0803, Teledyne-Geotech., Garland, Texas, 1970.

VESIAC 20,127 VU
AD 866 599

Project VT/9702 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of TFSO, Quarterly Rept. No. 1, 1 January to 31 March 1970, Rept. No. TR 70-15, Contract VT/0704, F33657-70C-0733, Geotech-Teledyne Co., Garland, Texas, 1970.

VESIAC 20,176 VU
AD 868 869

Project VT/0704 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of the TFSO, Quarterly Rept. No. 2, 1 April to 30 June 1970, Rept. No. TR 70-27, Contract VT/0704, F33657-70C-0733, Teledyne-Geotech, Garland, Texas, 1970.

VESIAC 20,293 VU
AD 872 819

Project VT/0704 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of Tonto Forest Seismological Observatory, Quarterly Rept. No. 3, 1 July to 30 Sept. 1970, Rept. No. TR 70-32, Contract VT/0704, F33657-70C-0733, Teledyne-Geotech, Garland, Texas, 1970

VESIAC 20,423 VU
AD 875 988

Project VT/0704 includes the operation, evaluation, and improvement of the Tonto Forest Seismological Observatory (TFSO) located near Payson, Arizona. It also includes special research and test functions carried out at TFSO and research and development tasks performed by the Garland, Texas, staff using TFSO data.

TELEDYNE INDUSTRIES (STAFF), Operation of Two Observatories, Tech. Rept. No. 65-128, Contract VT/5054, AF 33(657)-12373, Teledyne Indus., Geotechnical Corp., Garland, Texas, 1965.

VESIAC 13,044 VU
AD 625 461

This report describes the operation of the Blue Mts Seis. Observ. and Uinta Basin Seis. Observ. during the period of 1 August through 31 October 1965. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatories are reported.

Also discussed is the progress of special investigations designed to evaluate and improve the detection capacity of the observatories.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 1, 1 January to 31 March 1969, Rept. No. 69-15, Contract VT/9703, F33657-69C-0759, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969.

VESIAC 19,537 VU
AD 851 911

This report describes the operations of the Uinta Basin Seismological Observatory (UBSO) from 1 January through 31 March 1969. Also discussed are the maintenance and testing of the UBSO digital data acquisition system.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 2, 1 April to 30 June 1969, Rept. No. TR 69-26, Contract VT/9703, F33657-69C-0759, Teledyne-Geotech, Garland, Texas, 1969.

VESIAC 19,749 VU

This report describes the operations of the Uinta Basin Seismological Observatory (UBSO) from 1 April 1969 through 30 June 1969. Also discussed is the maintenance of the UBSO digital data acquisition system.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 5, 1 April to 30 June 1970, Rept. No. TR-70-28, Contract VT/9703, F33657-69C-0759, Teledyne-Geotech., Garland, Texas, 1970.

VESIAC 20,343 VU
AD 872 629

This report describes the close-out operations of the Uinta Basin Seismological Observatory (UBSO) from 1 April through June 1970. All close-out operations were completed and the observatory was turned over to the National Science Foundation.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 7, 1 November 1967 through 31 January 1968, Rept. No. TR 68-13, Contract VT/6705, AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,006 VU
AD 829 140

This report describes the operation of the UBSO from 1 November 1967 Through 31 January 1968. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept., No. 8, 1 Feb. - 30 April 1968, Rept. No. TR 68-23, Project VT/6705, Contract AF 33(657)-16563, Teledyne, Inc., Geotech. Div., Garland, Texas, 1968.

VESIAC 18,321 VU
AD 834 697

This report describes the operation of the Uinta Basin Seismological Observatory from 1 February 1968 through 30 April 1968. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 9, 1 May to 31 July 1968, Rept. No. TR 68-36, Contract VT/6705, AF 33(657)-16563, Teledyne Indust., Inc., Geotech, Garland, Texas, 1968.

VESIAC 18,656 VU

This report describes the operation of the Uinta Basin Seismological Observatory from 1 May 1968 through 31 July 1968. Modifications and additions to the observatory instrumentation are described, and tests to improve the operations of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Final Rept., 1 May 1966 to 31 December 1968, Rept. No. TR 69-12, Contract VT/6705, AF 33(657)-16563, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1969.

VESIAC 19,400 VU
AD 850 032

This report describes the operation of the Uinta Basin Seismological Observatory from 1 May 1966 through 31 December 1968. Modifications and additions to the observatory instrumentation are described, and tests to improve the operation of the observatory are reported. Also discussed is the status of special investigations designed to evaluate and improve the detection capability of the observatory.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Quarterly Rept. No. 3, 1 July through 30 September, 1969, Rept. No. 69-49, Contract VT/9703, F33657-69C-0759, Geotech-Teledyne Indust., Garland, Texas, 1969.

VESIAC 19,880 VU
AD 860 642

This report describes the operations of the Uinta Basin Seismological Observatory (UBSO) from 1 July 1969 through 30 September 1969. Also discussed is the maintenance of the UBSO digital data acquisition system.

TELEDYNE INDUSTRIES (STAFF), Operation of UBSO, Final Rept., 1 Jan. to 31 Dec. 1969, Rept. No. TR 70-2, Contract VT/9703, F33657-69C-0759, Geotech-Teledyne Co., Garland, Texas, 1970.

VESIAC 20,174 VU
AD 868 748

This report describes the operations of the Uinta Basin Seismological Observatory (UBSO) from 1 January through 31 December 1969. Also discussed are the maintenance and testing of the UBSO digital data acquisition system.

TELEDYNE INDUSTRIES (STAFF), Operation of the UBSO, Quarterly Rept. No. 4, 1 January to 31 March 1970, Rept. No. TR 70-14, Contract VT/9703, F33657-69C-0759, Geotech-Teledyne Co., Garland, Texas, 1970.

VESIAC 20,177 VU
AD 868 851

This report describes the close-out operations of the Uinta Basin Seismological Observatory (UBSO) from 1 January through 31 March 1970.

TELEDYNE INDUSTRIES (STAFF), Final Report of the Operation of the Wichita Mountains Seismological Observatory, Contract VT/4054, AF 33(657)-13562, Teledyne Indust., Inc., Geotech., Garland, Texas, 1967.

VESIAC 16,650 VU
AD 480 345

The operation of the Wichita Mountains Seismological Observatory between 1 July 1964 and 31 October 1965 is discussed in this report. Modifications and additions to the observatory instrumentation are described and tests to improve the operation of the observatory are reported. Also discussed in this report is the progress of special investigations designed to evaluate and improve the detection capability of the observatory.

TELEDYNE INDUSTRIES (STAFF), Preliminary Evaluation of Long-Period Seismograph Tests at LASA Subarray F3, Rept. No. TR 65-47, Project VT/4051, Contract AF 33(657)-12145, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1965.

VESIAC 17,143 VU
AD 818 170

During April and May 1965, an experimental program was started at LASA subarray F3 to develop a reliable, unmanned seismograph system capable of producing high-quality long-period seismograms. The development of improved installation techniques was the principal objective of the program. Preliminary results indicate that the performance of the long-period vertical seismograph is excellent.

TELEDYNE INDUSTRIES (STAFF), Preliminary Study of TFSO Short-Period and Long-Period Noise Fields, Tech. Rept., Rept. No. TR 69-2, Contract VT/9702, F33657-69C-0803, Teledyne-Geotech, Inc., Garland, Texas, 1969.

VESIAC 19,625 VU

Short-period noise samples from three periods were selected for a study of the TFSO noise field. Power density spectra and coherence functions were analyzed for space and time stationarity. Coherences up to 0.8 were obtained at some frequencies for some station combinations with spacings of 5 kilometers. At 1.0 cps, however, coherences were low at 5-kilometer spacings. Power density spectra appeared to be space stationary, but varied somewhat with time.

Power density and coherence spectra were computed for noise samples recorded at each of the seven long-period sites at TFSO during three different periods. The power spectra may be space stationary but relative variations in the spectral level, especially at frequencies near the "6-second" notch filter, cause some doubt. The power spectra are not time stationary. The noise samples showed high coherence in the range 0.05 to 0.08 cps; to resolve the velocity structure of the noise at these coherent frequencies, the noise power was calculated as a function of wave number. Wave number analysis indicated that during December 1968 and January 1969, the predominant coherent noise was due to Rayleigh waves originating to the southwest of TFSO, presumably the Pacific coast, and propagating across the array at a velocity of 3.5 kilometers/second.

TELEDYNE INDUSTRIES (STAFF), Seismological Bulletin the Aleutian Island Experiment, 1964, Tech. Rept. No. 65-130, VT/4051, AF 33(657)-12145, AF 19(628)-4075, Teledyne Indust., Geotech Div., Garland, Texas, 1965.

VESIAC 13,599 VU

This bulletin contains seismological data derived from earthquakes and network calibration explosions recorded at six mobile seismological stations and two deep-ocean seismographs which participated in the 1964 VELA-UNIFORM Aleutian Islands Seismic Experiment.

A selected list of seismic events, both natural earthquakes and local explosions, are included in this bulletin. The explosions were detonated to provide time-field calibration for study of earthquakes occurring in the vicinity of the network. Pertinent source parameters for the calibration explosions are given in table 1. Positions of calibration explosions are plotted in figure 1.

TELEDYNE INDUSTRIES (STAFF), Solion Seismometer Environmental Tests, Tech. Rept. No. TR 68-1, Contract VT/7702, AF 33657-67C-0091, Teledyne Indust., Inc., Geotech Div., Garland, Texas, 1968.

VESIAC 18,013 VU
AD 832 237

Environmental tests were performed on a set of solion seismographs with emphasis on determination of noise produced by voltage variations, temperature variations, and pressure change at the seismometers. A long-period and a short-period response characteristic is obtained from each single seismometer by means of separate sets of filters in each amplifier. We concluded that useful short-period magnifications of more than 2 million and useful long-period magnifications of approximately 50 thousand could be obtained in a controlled field environment.

TELEDYNE INDUSTRIES (STAFF), Summary Report of Portable System Operations for Project LONGSHOT, Tech. Rept. No. 66-62, Contract VT/4051, AF 33(657)-12145, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,153 VU
AD 803 336

In October 1965, Teledyne Industries, Geotech Division was assigned to occupy five portable system sites in northern Canada and one portable system site in Greenland to record seismic data from the Project LONGSHOT detonation. The six portable seismographs successfully recorded data two weeks preceding and two weeks following LONGSHOT detonation.

Results of the operations indicate that the portable seismograph systems are an effective means of recording seismic data for short-periods of time in remote locations. This effectiveness is expected to be increased as the system operators become more familiar with the instrumentation.

TELEDYNE INDUSTRIES (STAFF), Support Systems for the B-1 and F-3 LASA Subarrays, Tech. Rept. No. 65-125, Project VT/4051, Contract AF 33(657)-12145, Geotech. Div., Garland, Texas, 1965.

VESIAC 13,843 VU
AD 480 341

The report deals with LRSM participation in the LASA Program during the installation and operation of the two experimental seismograph arrays near Miles City, Montana. The activities included the preparation and installation of three shallow-hole seismographs at the subarray centers and general support during subarray measurements experimentation. The report describes the central installations and the recording van modifications incorporated during the support period.

TELEDYNE INDUSTRIES (STAFF), Survey of Seismic Noise in the Montana LASA Area, Rept. No. TR-66-77, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Div., Garland, Texas, 1966.

VESIAC 15,545 VU
AD 487 573

This report describes seismic background noise measurements taken from short-period data recorded in the area of the Large Aperture Seismic Array (LASA) in Montana. Data are taken from the short-period vertical seismograph. The data compilation methods for the standard and random noise surveys are discussed. Percentage of occurrence curves and noise spectrum curves are developed for each study.

TELEDYNE INDUSTRIES (STAFF), Tonto Forest Seismological Observatory Extended Array Telemetry System, Tech. Rept. No. 65-97, Project VT/4051, Contract AF 33(657)-12145, Geotech. Div., Garland, Texas, 1965.

VESIAC 13,840 VU
AD 480 405

An extended array of seismographs has been installed in Arizona. This array consists of eight mobile LRSM seismological laboratories and the TFSO, with a telemetry network connecting the mobile laboratories to the observatory. A complete summary of the basic subsystems, their location, and relation to the extended array system, and a comprehensive description of the development, installation, and operation of the instrumentation comprising the telemetry system is included. This information forms what is essentially a "system manual" for the extended array.

TELEDYNE INDUSTRIES (STAFF), Travel-Time Anomalies at LASA, Rept. No. LL-1, Contract AF 19(628)-5167, Teledyne Industr., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 15,168 VU
AD 645 331

World-wide average travel-time curves are inadequate to permit optimum phasing of teleseismic signals. Phase alignment corrections in the form of station relative travel-time anomalies of LASA, based on approximately 350 events, are presented.

TENG, T. L., Attenuation of Body Waves and the Q Structure of the Mantle, Sci. Rept., California Inst. of Tech., Pasadena, California, 1967.

VESIAC 16,732 VU

The variation of Q_a with depth is studied using the spectrums of a large number of P waves from two deep earthquakes. Two assumptions are made: (1) the normalized source spectrum is not a function of the angle of radiation; (2) Q_a is independent of frequency, at least within the band of 0.01 to 0.2 cps. Spectral ratios of two body waves are used to eliminate the source effect and the effect of the wavefront divergence.

TENG, T. L., Body-Wave and Earthquake Source Studies - Parts I and II (THESIS), Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 14,633 VU

This report is a study on the radiation and propagation of seismic body waves. Based on a reformulated seismic ray theory and supplemented by the results of several associated boundary value problems, a method of body wave equalization is described which enables the extrapolation of body-wave fields from one point to another. Applications of this method to studies of earthquake source mechanism and earth's structure, specifically its anelasticity, are presented.

TENG, T. L., Reflection and Transmission from a Layered Core-Mantle Boundary, Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 15,185 VU

A class of transfer functions in terms of layer matrices are derived for the transmission and reflection of plane harmonic P or S waves incident from either side of a layered core-mantle boundary. These results can be used in the study of the structure of the core-mantle boundary and the attenuation of seismic waves inside the core. A computer program coded in complex arithmetic for an IBM 7094 is used to evaluate these functions. Numerical values obtained for five suggested models of the core-mantle boundary are compared and discussed. No attempt is made to deduce a model capable of explaining core-phase observation. The aim has been rather to formulate the method, and establish general criteria for planning of future experimental work.

TEXAS, UNIV. OF (STAFF), Quarterly Report of Progress Under U. S. Coast & Geodetic Survey Contract CGS-1198, Quarterly Status Rept. No. 3, Contract: CGS-1198, Univ. of Texas, Austin, Texas, 1964

VESIAC 10,454 VU

During the period 1 May through 31 July, work has continued on the design and construction of two types of seismometers. The construction of a solion vertical seismometer and a reduced-size solion horizontal seismometer is complete. Shake table experiments have been performed on these instruments at the Geotechnical Corporation, Garland, Texas. Both instruments were used for evaluation tests at the U. S. Coast and Geodetic Survey Seismic Laboratory, Albuquerque, New Mexico. The vertical seismometer performed very well, but the horizontal unit had spurious noise. Work has been planned to isolate the source of this noise and eliminate it. Reproductions of records made at Albuquerque are included. This report has been delayed to include these field test results.

TEXAS, UNIV. OF (STAFF), A Quarterly Report of Progress Under U. S. Coast and Geodetic Survey, 1 January Through 31 March 1965, Quarterly Status Rept. No. 5, Contract CGS-1198, Univ. of Texas, Austin, Texas, 1965.

VESIAC 12,018 VU

Work was done on the solion seismograph system. A new model solion seismometer has been built which is slightly different from the vertical unit described in Quarterly Status Report No. 4. The advantages derived from the addition of a leaf spring are discussed. This unit is also being prepared for the addition of an electromechanical shaker for calibration purposes. Some testing was done on this "2-way" instrument on the Geotech shake tables. No excessive noise was observed during recordings made using a horizontal seismometer which previously produced noisy records. A solion was built with a sensitivity of nearly 10 times that of previous units.

TEXAS, UNIV. OF (STAFF), A Quarterly Report of Progress Under U. S. Coast and Geodetic Survey, Annual Summary Report, 1 August Through 31 October 1964, Quarterly Status Rept. No. 4, Contract CGS-1198, Univ. of Texas, Austin, Texas, 1965.

VESIAC 12,017 VU

This report discusses further development of the solion seismometers carried out during the past year. The first unit designed and constructed is given; configuration and calibration are discussed. Two field tests were conducted at the Seismic Laboratory, Albuquerque, New Mexico. Results of these tests are presented. The solion horizontal seismometer records were noisy. Performance is discussed. Discussed are: (a) theory and operating principles of the Solion Seismometers; (b) future plans; (c) solion transducers for use in seismometers. An appendix contains figures of: (1) horizontal solion seismometer; and (2) vertical solion seismometer.

TEXAS INSTRUMENTS, INC. (STAFF), Large Array Signal and Noise Analysis, Quarterly Rept. 1, Contract AF 33(657)-16678, Texas Instr., Inc., Dallas, Texas, 1966.

VESIAC 15,555 VU

The quarterly report, covering the period from 16 May 1966 through 15 August 1966, consists of a short statement on the progress of the work. Work has included computer processing, a small ensemble of signals and noise, preliminary processing of one signal and one noise sample, and programming and evaluation of a method of detecting low-level wavelets in a Gaussian background. No segment of the proposed research is sufficiently completed to justify a detailed report at this time. A fairly extensive investigation of one noise sample should be completed in time to be presented at the forthcoming LASA conference.

TEXAS INSTRUMENTS, INC. (STAFF), Multiple Array Processor, Quarterly Rept. No. 1, 1 October 1964 Through 31 December 1964, Order No. 104, Contract AF 33(657)-13904, VT/5052, Texas Instr., Inc., Dallas, Texas, 1965.

VESIAC 10,434 VU

The first quarter of this contract has been spent primarily in engineering evaluation of components to be purchased for the processor. The delay lines used in the prototype system have been examined carefully, and no performance degradation was observed. Identical delay lines have been ordered for the second system. Design and ordering of delay line equalizers and equalizer amplifiers are discussed. The timing system preliminary design has been completed and the circuitry set up on "breadboards." Testing of the circuitry and the system enclosure modifications being made are discussed.

TEXAS INSTRUMENTS, INC. (STAFF), Multiple Array Processor, Quarterly Rept. No. 2, 1 January through 31 March 1965, Project VT/5052, Contract AF 33(657)-13904, Texas Instruments, Inc., Dallas, Texas, 1965.

VESIAC 10,594 VU
AD 625 491

References to the objectives included in Quarterly Report No. 1 for this contract should be made during the reading of this report. Progress is mentioned in these areas: a) two acceptable MCF systems have been developed for use at UBSO; b) wavenumber spectral estimates of the noise field at TFSO have indicated high-velocity noise to be dominant; c) good results from a MCF test set containing one input and two outputs have been obtained. More exact digital measurements are being made; d) hardware construction has begun and is proceeding on schedule.

TEXAS INSTRUMENTS, INC. (STAFF), Operational Manual for Ocean-Bottom Seismographs, Manual, Contract F33657-68C-0242, VT/8701, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 19,048 VU
AD 841 977

This manual contains operating and maintenance information on the OBS and auxiliary shipboard equipment required for OBS support during field operations. All three OBS configurations (Mark III, Mark IV, and Mark V) are included in this manual, and information presented pertains to all configurations unless otherwise noted.

TEXAS INSTRUMENTS, INC. (STAFF), Seismogram Atlas of Nuclear Explosions 1961, Contract AF 19(604)-8517, Texas Inst., Inc., Dallas, Texas, 1962 (OFFICIAL USE ONLY).

VESIAC 7761 VU O

TEXAS INSTRUMENTS, INC. (STAFF), Seismological Bulletin Blue Mountains Seismological Observatory, Vol. 1, Contract No. VT/1124, Texas Instruments, Dallas, Texas, 1962.

VESIAC 5546 VU

Included are data on the earthquakes recorded between 1 September 1962 and 31 December 1962. These data were recorded at the vertical array of the Blueridge Seismological Observatory, a quiet station with microseisms primarily of 2 and 4-second periods and occasional 3 cps wave trains. Data include date of earthquakes, system (Component used to measure arrival time), phase arrival time, compression or dilation, ground motion, type of earthquake (local, near-regional, regional, teleseismic) and remarks such as epicenter and region, origin times, foci depths, magnitude, and operational difficulties affecting data interpretation. The seismographs and their amplitude response, station constants, and arrangement of the vaults of the array are given.

THIELMAN, H. P., and R. SAX, Relation Giving the Phase Velocity in Terms of the Group Velocity of a Wave, Contr. No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 7994 VU

Using a mathematical relation between the phase and velocity and the group velocity in terms of the period, the author derives an explicit expression of the phase velocity in terms with the group velocity.

THIRLAWAY, H. I. S., Some Observations from Large Arrays, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 I VU
AD 441 592

The author discusses possible causes for the variation about the average magnitude of a well observed event. This variation is commonly one magnitude. One cause frequently given is a general azimuthal dependence, but the author shows that this breaks down in particulars. In amplitude studies of array teleseismic recordings, relative coupling factors of two or three are observed within areas of about 100 km which include the same rock type and regional structure. Still another contributing factor may be interference by spurious signals.

THIRLAWAY, H. I. S., E. W. CARPENTER, Seismic Signal Anomalies, Travel Times, Amplitudes, and Pulse Shapes, Contract SD-78, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966.

VESIAC 13,999 k VU

A simplified theoretical treatment of the body and surface waves from compressional-wave sources provides a model with which to compare experimental data.

Records from large arrays are used to illustrate anomalies in pulse shape, amplitude, and arrival time. Comparisons between arrays and between instruments in one array are discussed. As a by-product of these studies, the directional resolving power of the arrays is demonstrated.

THOMSON, K. C., Compendium of Measured Rheo-Optical Properties of Hysol 4485, AFCRL-65-358, Contract AF 19(628)-212, Weston Observ., Weston, N. J., 1965.

VESIAC 10,775 VU

A measuring program was conducted with the aim of determining the complete rheo-optical characterization of a certain Urethane rubber compound (HYSOL 4485) suitable for dynamic photoviscoelastic studies. The shift curve and the master curve at 60^{O}F are presented for both the shear storage modulus and the shear loss tangent. In determining the shear properties sinusoidal loading of specimens cut as hollow cylinders was used. Using a method designed originally by Selway and Brown the dynamic stress optic coefficient and the complex Youngs modulus were measured at room temperature.

THOMSON, K. C., Full-Field Seismic Modelling, Contr. No. GRD Task 865210, Air Force Cambridge Research Lab., Wash., D. C., 1963.

VESIAC 8284 VU
AD 419 653

This report discusses a modelling technique - a method of viewing and photographing the entire field of the wave simultaneously at all positions. Time dependence is obtained by sequential photography. Excitation of the model is produced by striking it repetively with a small metal pin operated by the cam follower on a 14-inch flywheel rotating at 30 cps. The models are transparent, permitting visualization and quantitative representation of the wave through the photoelastic effect. The waves appear to stand still or to propagate through the use of stroboelastic illumination and a continuously variable phase relationship between striking and flashing, controllable by the observer. Simultaneous full-field viewing of models up to 16-inches in diameter is possible. Photographs of waves are included.

THOMSON, K. C., and J. A. HILL, Seismic Model Impactor—No. 27, AFCRL-63-790, Project 865210, AF Cambridge Res. Lab., Washington, D. C., 1963.

VESIAC 9445 VU
AD 424 961

A new type of strobo-photoelastic impact source is described in detail, including specifications, design, and operation. This equipment extends the model size available, for photoelastic studies of propagating waves, from models having linear dimensions of an inch or two to models more than a foot square.

The seismic model impacter unit supplies a 1/8 inch deflection, within a time of 1 millisec, to the model material. This impact is repeated precisely 30 times per second.

THORPE, S. F., D. J. GLASSCOCK, L. C. LANDE, and F. P. VAN LEER, Long-Range Seismic Measurements - GASBUGGY, Rept. No. TR 68-7, Contract VT/8703, F33657-67C-0734, Geotech, Teledyne Indust., Inc., Garland, Texas, 1968.

VESIAC 17,917 VU
AD 828 523

An analysis of seismological data from a Project PLOWSHARE underground nuclear explosion as a continuing study to provide information to aid in distinguishing between earthquakes and explosions.

TOCHER, D., Semiannual Technical Report I, January 20, 1964-July 20, 1964, Contract ARPA Order No. 533, U. S. Coast and Geodetic Survey, Wash., D. C., 1964

VESIAC 8446 VU

This report deals with the VELA UNIFORM Experiment in the Aleutian Islands. Design and construction of instruments are discussed. Work was begun on the Operations and Analysis Plan for the Experiment in February. The submitting and carrying out of the plan are discussed. From the beginning, adverse weather conditions hampered the scheduled completion of various phases of the field operations. Planning for the preliminary analysis of the data from the Experiment was begun in March 1964. The seismicity in the Andreanof Islands in the past 6 years was reviewed; epicenters of four earthquakes were plotted on four maps. Four methods of determining the zero-depth epicenters of earthquakes and "unknown" bias in the Experiment were examined, and other matters.

TOCHER, D., Some Factors Affecting the Local Earthquake Magnitude Scale, VESIAC Rept. No. 4410-71-X, Contr. No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8128 H VU
AD 441 592

After discussing Richter's original definition of magnitude (made in 1935), and later attempts to extend the distances at which this table might be applied, the author considers some of the factors which influence the recorded amplitude. He discusses how a magnitude for each shock was established, and the results of instrument correction for each of the central California torsion instruments. These corrections were applied to the individuals of magnitude for each instrument and each earthquake, so that the sum of deviations of all central California values from the adopted values for all 24 earthquakes was zero.

TOCHER, D., A Study of Focal Mechanism and Aftershock Characteristics of Small Earthquakes, Semiannual Tech. Status Rept., Contract No. AF 49(638)-904, Univ. of Calif., Berkeley, Calif., 1961.

VESIAC 5580 VU

This semiannual technical report, covering the period from 1 January to 30 June 1961, summarizes progress made respecting the various specific tasks originally identified and assigned in Item 1— Research of Part I—Statement of Work of the subject contract.

TOKMAKOV, V. A., and D. A. KHARIN, "The Modification of the SPM-16 Seismic Receiver for Recording Accelerations during Low-Frequency Oscillations," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 5, pp. 126-130, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,119 VU

We have described the methods and results of modifying several of the structural components and circuits of the SPM-16 seismic receiver connected with an over-damped galvanometer for recording accelerations.

TOKSOZ, M. N., K. CLERMONT, Radiation of Seismic Waves from the Bilby Explosion, Rept. No. 183, Project VT/6702, Contract F 33657-67-C-1313, ARPA Order No. 624, Teledyne, Inc., Alexandria, Va., 1967.

VESIAC 16,381 VU
AD 814 690

The seismic surface wave and P-wave data generated by the Bilby explosion and the associated cavity collapse are studied comparatively to determine the radiation patterns of these waves. The asymmetric radiation patterns of P and Rayleigh waves as well as the presence of Love waves are explained in terms of a composite source. This consists of an isotropic dilatational component due to the explosion and a double-couple component due to tectonic effect. The relative strength of the multipolar component is 0.47 times that of the explosion.

TOKSOZ, M. N., Radiation of Seismic Surface Waves from Underground Explosions, Rept. No. 7885-1-X, Contract DA 49-083 OSA 3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-E VU

The radiation of surface waves from underground nuclear explosions is studied to determine the mechanism of the release of seismic energy. The spectra of the observed Rayleigh waves are corrected for propagation effects and the shapes of the pressure pulses are determined at the boundary of the linear zone for several explosions. This information, together with the initial shape of the pressure pulse, deduced from near-source calculations and observations, may be utilized to investigate the effects of the nonlinear region on the seismic pulses observed at some distance.

TOKSOZ, M. N., and R. T. LACOSS, Mode Structure and Source of Microseisms, Sci. Rept., Contract AF 49(638)-1632, Mass. Inst. of Tech., Cambridge, Mass., 1967

VESIAC 18,518 VU

Frequency-wavenumber spectra of microseisms have been obtained using a set of short period and long period seismometers at LASA. From the phase velocity and direction of body waves source areas have been determined. They coincide with the low pressure regions on the weather map. At longer periods microseisms consist of fundamental mode Rayleigh and Love waves, with the former being dominant.

TOOLEY, R. D., T. W. SPENCER, and H. F. SAGOCI, Reflection and Transmission of Plane Compressional Waves, Contract No. AF 19(604)-8344, Calif. Res. Corp., La Habra, Calif., 1963.

VESIAC 7380 VU
AD 429 797

The energy partition of a plane compressional (P) wave impinging upon a plane interface is analyzed. The mathematical solution is presented and discussed with particular emphasis on the nature of the transmitted waves when the angle of incidence exceeds the critical angle. Extensive tables of data are presented which cover a wide range of the input parameters. The data is discussed and representative data samples plotted.

TOWLE, L. C., R. E. RIECKER, Pressure Gradients in Bridgman Anvil Devices, Sci. Rept. No. AFCRL 65-707, Contract AF 19(628)-1646, Hq. AFCRL, OAR (CRJ), Bedford, Massachusetts, 1965.

VESIAC 13,122 VU
AD 623 933

Experimental evidence regarding pressure gradients in Bridgman anvil devices is reviewed and some new experimental data are presented. A simple empirical relationship describing the pressure distribution is derived which is consistent with experimental observation. The experimentally determined pressure is used to estimate errors introduced into various types of anvil experiments by pressure gradients. Given are numerical values for the correction factors. Results are given for analyses of shear experiments. Results regarding analysis in connection with the peripheral sample region are given.

TRAVIS, H. S., Interpolated Jeffreys and Bullen Seismological Tables, Tech. Rept. No. 65-35, Project VT/4051, Contract AF 33(657)-12145, Geotech. Corp., Garland, Texas, 1965.

VESIAC 13,842 VU
AD 480 406

The travel times for all body phases tabulated in the Jeffreys and Bullen Seismological Tables (1958) have been calculated by interpolation for distance intervals of 1 degree at each of the 14 focal depths established by Jeffreys and Bullen. Travel Times have similarly been derived for the phases "diffracted P" (P at distances beyond 105 degrees) and "PKPPKPPKP", based on data extracted from the Gutenberg and Richter travel-time charts (1934-1939). The digital computer program by which the calculations were affected is described. Techniques involved are discussed and fully interpolated tables in a convenient form are presented.

TRAVIS, H. S., R. A. WEISBRICH, and R. S. SIMONS, Statistics Associated with the Detection of Body and Surface Waves from Earthquakes and Underground Detonations, Tech. Rept. No. 66-83, Contract VT/6703, AF 33(657)-16270, Teledyne Industr., Geotech. Div., Garland, Texas, 1966.

VESIAC 15,158 VU
AD 803 340

A statistical survey of the LRSM Seismological Bulletin was made to determine the chances of detecting long- and short-period P, long-period S, and long-period surface waves from earthquakes at four different LRSM sites - LC-NM, MN-NV, RK-ON, and DH-NY. The probabilities were tabulated as joint functions of epicentral distance and magnitude, based on hypocenter information supplied by the USC&GS. A similar survey was made of 19 LRSM Shot Reports to determine the frequency with which these phases have been detected from underground detonations, all LRSM stations considered. An attempt was made to compare the earthquake and detonation statistics. Results concerning detection of body and surface waves are given.

TRESKOV, A. A., "Seismic Investigations of the Earth's Crust," Trudy Geof. Inst., Akad. Nauk, SSSR, No. 26, pp. 92-99, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 18,343 VU

A survey of data on the structure of the earth's crust is presented. The comparative advantages and shortcomings of the teleseismic methods proposed by the author for determining the thickness of the crust are discussed and the prospects of further work in that direction are designated.

TROTT, W., Experimental Investigation of Thermal Noise, Tech. Rept. No. 66-90, Project VT/6706, Contract AF 33(657)-16406, Teledyne Co., Geotech. Div., Garland, Texas, 1967.

VESIAC 16,375 VU
AD 815 676

The primary objective of the experimental investigation of thermal noise was to verify and apply an analysis derived by National Bureau of Standards which can spectrally describe thermal energy in seismographs. When applied to a typical, operational, long-period seismograph, the NBS analysis shows the need for 10 kg inertial mass for a system magnification of about 130 k at 25 sec. Two experiments were designed to verify the NBS analysis. Although the first experiment was only partially successful, the results of the second experiment were agreement with theory. There was sufficient agreement between the empirical and theoretical spectra to verify the validity of the NBS analysis. The NBS analysis was therefore recommended for present use.

TROYANSKII, V. T., "The Use of Extended Time-Distance Curves of Waves Reflected from Subsalt Boundaries to Study the Form of Salt-Dome Cores," Razved. Geofiz., No. 1, pp. 5-17, 1964, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 13,321 VU

Earlier articles, in which the interpretation of extended records of the waves reflected from some boundaries below the salt domes is discussed, omitted the analysis of the peculiarities of such waves passing through the lateral surface of a salt-dome. The author supplies this information on the basis of the theoretical calculations and field observations made in the southwestern Caspian region in 1962. Results concerning the reflections of waves from such a boundary, and the various distances at which these waves are registered and recognized, are described. For a proper choice of the distance between the seismographs, it must be remembered that the apparent velocities of a reflected wave may be very small if the angle of the slope of the lateral surface of a salt dome is large.

TSIMEL'ZON, I. O., "The Deep Structure of the Earth's Crust and Tectonics of Azerbaidzhan According to Data of Geophysical Investigations," Sovetskaya Geologiya, No. 4, pp. 103-111, 1965, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 13,634 VU

Reported is an investigation, conducted during 1959-1962, of the deep structure of the earth's crust of Azerbaidzhan and of the tectonics of its oil-bearing regions on the basis of results of a quantitative interpretation of gravity anomalies. Included are sections of the crust along seven profiles which were plotted schematically. Also included are structural schemes for the principal layers of the crust, and schematic drawings corresponding to them of the isolines for the total thickness. Results provided geological-geophysical profiles and tectonic schematic diagrams of the oil- and gas-bearing regions. Given is a scheme for comparison of the structural arrangement of the basis of the sedimentary complex of rocks with the regional deep structure of Azerbaidzhan.

TUCKER, B. L., Decoupling Estimates for Underground Explosions, Research Paper P-204, Contract SD-50, Institute for Defense Analyses, Washington, D. C., 1965.

VESIAC 13,081 VU
AD 624 715

A considerable body of data, reported in this research paper, indicates a decoupling factor of the order of two for a salt cavity compared with alluvium or valley tuff. The small-scale tests made by the IIT Research Institute (IITRI) with the High Explosives (HE) measured in ounces are reported. The author concludes that: 1) cavities in soft rock probably do not decouple at all but increase the seismic signal; 2) an increase in decoupling because of high-frequency absorption appears unlikely, but should such an effect exist, decoupling factors would probably still be less than ten; 3) cavity decoupling may actually increase detectability because of the lower background noise at the higher frequencies produced by the cavity.

TUEZOVA, N. A., "Relationship Between Some Physical Properties of Rocks in Southwest Turkmenia and the Regional Geology," Prikl. Geofiz., No. 23, pp. 91-99, 1959. (Translated from Russian), Contract SD-78.

VESIAC 12,442 VU

In studying the geological structure of southwest Turkmenia, and of the Pribalkhansk depression in particular, rather extensive data were collected on the physical properties of rocks of the Akchagyls. and Apsheronsk stages and the red colored layers of the Neogene.

The rock samples subjected to determinations were collected from exploratory holes drilled in small anticlinal folds which complicate the near-axial portion of the depression.

The anticlines of these folds are broken up, as a rule, by numerous joints and faults.

In the systematic study of the results of determinations of density, porosity, and rebound coefficient a certain coincident pattern was observed in the variation of these parameters over the areas.

TURCOTTE, F. T., The New England Seismic Network, Final Sci. Rept., 16 February 1962 to 15 September 1966, Rept. No. AFCRL-66-757, Contract AF 19(628)-358, Boston College, Chestnut Hill, Mass., 1966.

VESIAC 15,190 VU
AD 644 200

A S-P network of five stations in New England has been established and maintained. Seismic data from the four northern stations are telemetered to the fifth station at Weston.

Refraction studies have determined crustal thicknesses underlying the four northern stations. Correlation of these results south to Weston is questionable.

Anomalous departures of arrival times from the Jeffreys-Bullen travel-time tables have been observed as a function of azimuth of approach to the stations.

Seismicity of New England and adjacent areas is summarized from November 1962 through September 1966.

Work with crustal transfer functions applicable to New England is described, and a ray theory explanation given for the impulse response obtained.

TURCOTTE, F. T., The New England Seismic Network, Final Sci. Rept., Sept. 1966 Through Sept. 1967, Rept. No. AFCRL-67-0549, Contract F19628-67C-0021, Boston College, Chestnut Hill, Mass., 1967.

VESIAC 17,300 VU
AD 664 078

A description of the station sites and instrumentation forming the New England Seismic Network are presented.

Local earthquake activity recorded from September 15, 1966 to September 15, 1967 is summarized.

Magnification curves for the recording system form an Appendix.

TURNBULL, L. S. JR., D. G. LAMBERT, and C. A. NEWTON, Rayleigh Wave Discrimination Techniques Between Underground Explosions and Earthquakes, Sci. Rept., Rept. No. 211, Contract VT/6702, F33657-68C-0945, Teledyne Inc., Alexandria, Va., 1968

VESIAC 19,155 VU
AD 844 655

Discrimination between underground nuclear explosions and shallow earthquakes using the vertical component of the Rayleigh wave is achieved using several techniques. This analysis includes the previous developed area under the Rayleigh wave (ARZ), the newly applied total energy (ERZ) and the total energy transported across a unit width of the waveguide by the Rayleigh wave (REF). Results for several explosions and earthquakes of varying magnitudes are presented. Evaluation of these techniques and their applicability in an automated discrimination program is discussed. An attempt is made to incorporate a matched filter approach for weak signals.

TURNBULL, L. S., and D. B. RABENSTINE, Rayleigh Wave Analysis of Atmospheric Explosions, Sci. Rept., Rept. No. 228, Contract VT/6702 F33657-68C-0945, Teledyne Indust., Inc., Alexandria, Va., 1968

VESIAC 19,269 VU

During the month. of July through September, 1968, a series of atmospheric explosions was detonated in the South Pacific. The events analyzed are those of July 7, July 15, August 3, August 24, and September 3, 1968. The analysis includes matched filtering for relative amplitude measurements, body and surface wave magnitude comparisons phased summing, and ARZ-ERZ measurements. The events are discussed individually, and a summary of pertinent data is presented in several figures and tables.

TURPENING, R. M., A Linear Mode Filter for Seismic Waves, THESIS, Contracts: AF 49(638)-1170, AF 49(638)-1759, U. of Michigan, I. S. T., Ann Arbor, Michigan, 1966

VESIAC 19,037 VU

This paper describes a method of filtering P wave signals from Rayleigh wave type noise. The system is linear and thus operates well when the input signal-to-noise ratio is near one. Although the basic concept involves three-dimensional Fourier transforms here the theory and examples of application are given for a two-dimensional derivation.

TVALTVADE, G., "Some Data on the Structure of the Earth's Crust in the Abastumani-Tsnisi-Moktsevi Region (Eastern Georgia), Izv. Akad. Nauk SSSR, Ser. Geogr. i. Geof., Vol. 9, No. 1, pp. 36-38, 1945, (Translated from Russian), Contract SD-78.

VESIAC 12,333 VU

This is a preliminary report of an experimental investigation of the hydromagnetic interaction between rapidly moving, hot, ionized, and therefore conducting, gas and an intense magnetic field. The experiment has two essential features: the gas flow is so rapid that dynamical effects of compressibility are present; the system has axial symmetry.

UDINCEV, G. B., "The Relief of the Kurile-Kamchatka Trench," Trudy Instituta Okean. Acad. Sci., Vol. 12, pp. 16-61, 1955, (Translated from Russian), Contract SD-78.

VESIAC 10,930 VU

This long article on the relief of the Kurile-Kamchatka Trench contains four main sections: (1) A survey of the various trenches of the oceans of the world. (2) The history of the investigation of the relief of trenches. This section covers roughly the period 1880-1955, and is concerned with the expeditions and investigations of many countries; (3) The principle features of the relief of the Kurile-Kamchatka trench. This is the longest section of the article. Illustrated with a number of figures, it contains a thorough discussion of the subject; (4) The geological structure of the Kurile-Kamchatka trench.

UNDERWATER SYSTEMS, INC. (STAFF), CHASE III Source Data, Tech. Progress Rept. No. 7, Contract NOnr 4026(00), Underwater Systems, Inc., Silver Spring, Md., 1965.

VESIAC 12,136 VU

This report contains pertinent data obtained at sea from the explosion of the Coastal Mariner. The shot location was: latitude 37° 11.8 sec North, Longitude 74° 21.1 sec West; accuracy was estimated at plus or minus 250 yards. The water depth was estimated to be approximately 5000 feet. The shot depth was approximately 900 feet. The yield was approximately 700 tons TNT equivalent. Meteorological data and sequences of operations are given, and six figures are included.

UNDERWATER SYSTEMS, INC. (STAFF), CHASE IV Source Data, Tech. Progress Rept. No. 8, NOnr 4026(00), Underwater Systems, Inc., Silver Spring, Md., 1965.

VESIAC 12,622 VU

This report contains pertinent data obtained at sea from the explosion of CHASE IV. Included are data on shot location, water depth, shot instant, shot depth, and yield.

UNDERWATER SYSTEMS, INC. (STAFF), CHASE V Source Data, Tech. Progress Rept. No. 11, Contract NOnr 4026(00), Underwater Systems, Inc., Silver Spring, Md., 1966.

VESIAC 14,453 VU
AD 635 803

Pertinent data obtained at sea from the explosion of CHASE V (Issac Van Zandt) are: (1) Shot Location: Latitude 39° 28' North; Longitude 125° 48' West; Shot Location accuracy unknown; however; best guess is ± 1/2 mile; (2) Water Depth: 12,500 ± 100 feet; (3) Shot Instant: 05H49M06.85S ± 00H00M00.25S Zulu (GMT); (4) Shot Depth: 3,750 feet ± 250 feet; (5) Yield: 1.0 ± 0.2 kilotons.

UNDERWATER SYSTEMS, INC. (STAFF), Spectral Analysis of Hydroacoustic Signals Generated by the Chase Explosions, Tech. Progress Rept. No. 9, Contract NONR 4026(00), Underwater Systems, Inc., Silver Spring, Maryland, 1965.

VESIAC 13,410 VU
AD 652 389

Hamilton and Patterson reported on spectrogram analysis of the hydroacoustical signals received at Bermuda and generated by the Chase explosions. Copies of the magnetic tape recordings were forwarded to Underwater Systems, Inc., for tape loop analysis. This report presents typical results from that analysis. The analysis procedure, performed by transferring the signal of interest to a tape loop which is analyzed by a Panoramic Singer Metrics Analyzer, is described. Tape speed up and modification of the analysis band are discussed. Data and figures give results for Chase II, Chase III and Chase IV. Reverberation losses and conclusions are given.

UNITED ELECTRODYNAMICS, INC. (STAFF), Data Compression, Contract VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1963 (OFFICIAL USE ONLY).

VESIAC 7997 VU O

UNITED ELECTRODYNAMICS, INC. (STAFF), Digital Services, Rept. No. 3, Contract No. VT/2037, United ElectroDynamics, Alexandria, Va., 1963.

VESIAC 5543 VU

Discussed are the activities of the Computational Services Program of the VELA UNIFORM Data Analysis Center, and a list of the digital programs. The DATDC library of digital seismograms has grown to almost 600; the list of available digitized data is kept on punched cards and updated every two weeks for distribution within the DATDC. The tapes are binary, low density (200 frames per inch), and contain 120 integers per record. They are compatible with any IBM 7000 or 1400 series computer, but those with CDC 1604 computers may have copies of original tapes, and can be furnished copies of DATDC retrieval programs. Discussed is digitizing of short-period vertical, radial, and transverse components from LRSM stations and arrays, and other digitizing. Fortran was most often used.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, Project 8.4, AARDVARK, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Alexandria, Va., 1962.

VESIAC 5589 VU
AD 417 154

Data from this event of May 1962, a shot at NTS in tuff at a depth of 1434 feet with a magnitude of about 4.9 m_b, concern Pn and Pg for the most part. The data include arrival times, travel times, periods, amplitudes, and an amplitude/period versus distance plot. Also given for Pn alone are magnitudes and travel-time residuals.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements CACHE CREEK EARTHQUAKE and CACHE CREEK AFTERSHOCK, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Alexandria, Va., 1963.

VESIAC 6193 VU
AD 414 513

This report analyzes data from the Cache Creek, Utah earthquake (August 30, 1962) and aftershock as recorded on the LRSM film seismograms from 40 mobile field teams and several seismological observatories.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, CLIMAX, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8346 VU
AD 443 836

This report, prepared for the Air Force Technical Applications Center, Wash., D. C., by the Earth Sci. Division of United Electrodynamics, Inc., provides an analysis of signals from the following: operating mobile field teams; Wichita Mts. Observ., Oklahoma; Uinta Basin Observ., Utah; Blue Mts. Observ., Oregon; Cumberland Plateau Observ., Tenn.; Tonto Forest Observ., Arizona; and several experimental or temporary stations operated in connection with other research programs.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, Project 8.4, BILBY, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamic, Inc., Pasadena, Calif., 1963.

VESIAC 6844 VU
AD 423 073

The purpose of this report is to provide an analysis of the LRSM film seismograms from operating mobile field teams and from several experimental or temporary stations operated in connection with other research programs. Described are instrumentation and procedure, data and results. Tables and figures are provided, and attached to the report are illustrative seismograms showing the signals recorded at a number of locations.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, Project 8.4, BRIDGEPORT EARTHQUAKE, Contract No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Alexandria, Va., 1963.

VESIAC 6224 VU
AD 414 812

A long-range seismic measurements program was established under VELA-UNIFORM project 8.4 to record and analyze short- and long-period seismic data from a series of U. S. underground nuclear tests. This report analyzes the Bridgeport, California earthquake of April 5, 1962 as recorded on the LRSM film seismograms to provide data for comparison with shot data. Instrumentation at the mobile stations is presented. On April 5, 36 mobile stations were operational;

19 received short-period signals. No long-period phases were recorded. Station site information is given, as well as the measurements of the principal phases of the earthquake. Also shown are unified magnitudes and first-motion indication with reference to Technical Working Group II first motion criteria.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, Project 8.4, SALMON, Rept. No. 113, Project VT/2037, Contract AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8972 VU
AD 609 176

The event and recordings are described. Twenty stations recorded L-P signals, thirty eight S-P signals. Computed hypocenter as determined by a digital computer showed an epicenter shift of 13.5 km, N 07° E. The average magnitude was 4.58. The travel-time residuals for the Pn and P phase data corresponded favorably with those derived from the GNOME event. SALMON was recorded by LZ-BV at 5700 km. Illustrative seismograms of the signals are attached.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long-Range Seismic Measurements Project 8.4 Seismic Waves from the SS Village Explosions, Project VT/2037, Contract No. AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8875 VU
AD 451 532

The purpose of this report is to provide an analysis of the LRSM film seismograms from operating mobile field teams, and from several experimental or temporary stations operated in connection with other research programs. The report includes: a station status report; a map of recording stations and signals received; a description of instrumentation and procedure; data and results. Data and results include: principal phases, unified magnitudes, travel-time residuals, maximum amplitudes of Pn and P, maximum amplitudes of Lg, and multiples in a water layer.

UNITED ELECTRODYNAMICS, INC. (STAFF), Long Range Seismic Measurements, Project 8.4, SHOAL, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 7125 VU
AD 426 239

A long-range seismic measurements program was established under Project VELA-UNIFORM to record and analyze short- and long-period data from a planned series of U. S. underground nuclear explosions. The purpose of this shot report is to provide an analysis of the LRSM film seismograms from operating mobile field teams. The report contains: 1) a description of the SHOAL event; 2) station status report; 3) map of recording station and signals received; 4) general introduction, 5) instrumentation and procedure report; 6) statement of data and results. Also included are three appendices: a) recording site information and unified magnitudes from Pn and P waves; b) seismograph analysis diagram; and c) TGW-II first motion criteria and diagrams.

UNITED ELECTRODYNAMICS, INC. (STAFF), LRSM, Project 8.4, West Virginia Earthquake, Lab. Rept. No. 117, Project VT/2037, Contract AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 10,131 VU

The purpose of this report is to provide an analysis of the data from the West Virginia Earthquake of 25 November 1964 recorded by mobile field teams; Wichita Mountain Observatory, Oklahoma (WMSO), Uinta Basin Observatory, Utah (UBSO), Blue Mountain Observatory, Oregon (BMSO), Cumberland Plateau Observatory, Tennessee (CPSO), and Tonto Forest Observatory, Arizona (TFSO); and from several experimental or temporary stations operated in connection with other research programs.

UNITED ELECTRODYNAMICS, INC. (STAFF), Seismic Data Laboratory, Contract VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Alexandria, Va., 1964.

VESIAC 7537 VU

This is fourth in a series of reports cataloging seismic data and describing the activities of the Computation Services Section, Seismic Data Laboratory, and contains, in addition to digital programs and digitized seismograms (as in previous reports), a list of composite analog magnetic tapes of earthquakes and explosions. The main body of information is in four appendices: 1) Appendix A contains a list of digitized data available on IBM magnetic tapes in high or low densities; 2) Appendix B contains a list and short abstract of digital programs used at the Seismic Data Laboratory; further descriptions of programs can be obtained from VESIAC; 3&4) Appendices C and D contain lists of magnetic tape composites stored at the Seismic Data Laboratory.

UNITED ELECTRODYNAMICS, INC. (STAFF), A Statistical Discriminator, Contr. No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 7995 VU

A basic statistical method for classification of observations into one of two multivariate distributions is presented. Its applications to the problem of identifying seismic events as underground explosions or earthquakes might be: 1) examination of observed variables from events of known origin to evaluate quantitatively the power of the variables to discriminate between source types; 2) critical evaluation of proposed identification criteria; 3) application of this method to classify seismic events of unknown origin as explosions or earthquakes, on the basis of observed variables. In applications 1 and 2, significance levels can be derived; in application 3, probability of error in classification can be derived. In this sense, the method is quantitative.

UNITED ELECTRODYNAMICS, INC. (STAFF), A Sum-of-Squares Method of Seismic Phase Identification, Contr. No. VT/2037, AF 33(657)-7427, United ElectroDynamics, Inc., Pasadena, Calif., 1962.

VESIAC 7996 VU
AD 460 783

Considerable difficulty is often encountered in the determination of arrival times of the P_g and L_g signals on seismograms. Traces have been studied representing various combinations of the components of earth motion. From this study it has been found that the sum of the squares enhances signal noise ratio and facilitates determination of the P_g and L_g arrival times. It is felt that the results of this preliminary study are sufficiently encouraging as to warrant further investigation on a wider scale.

UNITED ELECTRODYNAMICS, INC. (STAFF), Tonto Forest Seismological Observatory, Semiannual Rept., 1 June 1964 to 30 November 1964, Contract AF 33(657)-7747, VT/070, United ElectroDynamics, Pasadena, Calif., 1964.

VESIAC 9441 VU

This semi-annual report of the TFSO, prepared for the Air Force Technical Applications Center, provides a brief history of TFSO and lists the activity of the observatory under five major sections: (1) operations, involving routine operattons, analysis and calculations; (2) system modification, involving station and field equipment and P-wave coherencey study instrumentation; (3) analytic development; (4) instrumental development; and (5) facilities. The report concludes with a short account of the support of other VELA contractors.

UNITED ELECTRODYNAMICS, INC. (STAFF), Tonto Forest Seismological Observatory Information Bulletin, Contract No. VT/070, AF 33(600)-42159, United ElectroDynamics, Pasadena, Calif., 1963.

VESIAC 7207 VU

This report presents information concerning the instrumentation and operation of the Tonto Forest Seismological Observatory, Payson, Arizona.

UNITED STATES ARMY ENG. WATERWAYS EXP. STATION (STAFF), Feasibility of Constructing Large Underground Cavities Background, Site Selection and Summary, Vol. I, Contract No. ARPA Order No. 260-62, U. S. Army Eng. Waterways Exp. Station, Vicksburg, Miss., 1964.

VESIAC 8342 VU

A feasibility study was conducted to determine whether construction of large underground cavities for large-yield decoupling is feasible from an engineering and construction standpoint. A review was made of various techniques which could possibly be used to develop or construct a cavity, and a literature search was made of all known and existing large manmade and natural cavities. On the basis of present knowledge, it appears that conventional mining techniques would be the most satisfactory method for excavating the cavity of the size and depth desired. The results of other investigations indicated that spherical cavities in salt could be constructed with spans of approximately 200 ft. Larger size cavities should preferably be excavated in dense competent rock.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Catalogue of Special Events and Earthquakes of Comparable Distance, Contr. No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1960.

VESIAC 7765 VU

Herein is a table of catalogued events with distances to recording stations. This table contains the calculated distances from the stations used to each event and the distances to the earthquakes used for comparison with the event. Distances to events less than 1000 km were computed by the Gauss mid-latitude method. Greater distances were computed by the use of the haversine method. Distances to earthquake epicenters were determined from the travel times of the P phase and have an accuracy of 25 kms. These events are included: 1) Ranier; 2) Promontory; 3) Walnut; 4) Poplar; 5) Socorro; 6) Logan; 7) Blanca; 8) Oct. 6, 1957; 9) Oct. 10, 1957; and 10) Ripple Rock.

UNITED STATES COAST AND GEODETIC SURVEY, (STAFF), Generalized Trouble Shooting Guide for the World-Wide Standardized Seismograph Network, Contr. No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1964.

VESIAC 7577 VU

This guide has to do with routine trouble-shooting of the World-Wide Standardized Seismograph System. It helps to locate or to isolate various malfunctions of the system, but makes not attempt to explain the repair of any module beyond the exchange of parts from the stations spare parts supply. The guide is generalized, and treats these areas: 1) Console; 2) Recording; 3) Radio; 4) Voltage Measurement List; and 5) Tests and checks for the WWSSN.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Seismological Bulletin Special Field Program Nueva Concepcion, El Salvador (NCS), Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963, (OFFICIAL USE ONLY).

VESIAC 7029 VU O

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Seismological Bulletin Special Field Program Nueva Concepcion, El Salvador (NCS), 1964, ARPA Order No. 173, U. S. Coast and Geodetic Survey, Seismology Div., Washington, D. C. 1965.

VESIAC 11,438 VU

A field seismograph station has been established by the U. S. Coast and Geodetic Survey at Nueva Concepcion, El Salvador, in cooperation with the Seismological Section of the Servicio Geologico Nacional. The Project's sponsor is given, and the objectives of the program. The preliminary bulletin includes only the data from the Benioff film records. Special processing of the magnetic tape records will be recorded later. Included in the report is a section on instrumentation. Also Included are: (a) a map of El Salvador showing seismograph stations; (b) graphs of response and magnification curves; and (c) tables showing physical constants, operations summary, epicenter computation, interpretations.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Seismological Bulletin Special Field Program, Nueva Concepcion, El Salvador (NCS) October 1963, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1964 (OFFICIAL USE ONLY).

VESIAC 7427 VU O

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, AARDVARK, Contract No. VT/2034, U.S. Coast and Geodetic Survey, Wash., D.C., 1963.

VESIAC 7271 VU
AD 427 094

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Worldwide Standard Station Seismic Measurements, Project 173-7, ALLEGHENY, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 7074 VU
AD 425 491

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), Worldwide Standard Station Seismic Measurements, Project 173-7, BANDICOOT, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 7075 VU
AD 425 803

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, BLACK, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6205 VU

In this shot report, the BLACK event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, BOBAC, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6604 VU

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, BRAZOS, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6206 VU

In this shot report, the BRAZOS event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, CHENA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 5482 VU
AD 411 962

This shot report is issued on behalf of the Advanced Research Projects Agency, Department of Defense, to provide information which may prove of value in the study of data from nuclear tests. The data contained in this report are preliminary and subject to later revision as may be necessary.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, CHINCHILLA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash. D. C., 1963.

VESIAC 6605 VU

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, CHINCHILLA II, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 5497 VU
AD 413 619

Data from this event of March 1962, at NTS in alluvium at a depth of 448 feet with a magnitude of about 4.3 (m_b), concern Pn and Pg, for the most part. The data include arrival times, travel times, periods, amplitudes, and an amplitude/period versus distance plot. Also given for Pn alone are magnitudes and travel-time residuals.

Useful signals were recorded out to 893 km. Hypocenter computation errors were 2.7 km in latitude, 2.6 km in longitude, and 3.1 sec in origin time; epicenter computation errors were 2.4 km in latitude, 2.8 km in longitude, and 0.3 sec in origin time.

An appendix presents seismic analysis diagrams, TWG II first-motion criteria, computation of azimuth and epicentral distance, and unified magnitudes from Pn or P waves.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, CIMARRON, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 5499 VU
AD 411 414

This report comprises an analysis of seismic data recorded from the CIMARRON event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, CODSAW, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6055 VU
AD 414 535

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, DAMON I, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

In this short report, the DAMON I event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, DEAD, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

In this short report, the DEAD event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, [illegible], Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

This report is an analysis of seismic data recorded from the [illegible] event at the Nevada Test Site by stations of the World-Wide Network of Standardized Seismographs. These data are supplemented by recordings at other U. S. Coast and Geodetic Survey stations having instruments similar to those of the standard stations.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, EEL, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

In this short report, the EEL event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, FEATHER, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

This report analyzes seismic data recorded from the FEATHER event at the Nevada Test Site by stations of the World-Wide Network of Standard Seismographs. These data are supplemented by recordings at U. S. Coast and Geodetic Survey stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, HOGNOSE, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC [illegible]-VU
AD [illegible]

In this short report, the HOGNOSE event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 172-7, HOOSIC, Contract No. VT [illegible], U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6211 VU
AD 414 [illegible]

In this shot report, the [illegible] event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, HUDSON, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6212 VU
AD 417 944

In this shot report, the HUDSON event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, HYRAX, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6213 VU
AD 417 [illegible]

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, JOHNNY BOY, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6214 VU

In this shot report, the JOHNNY BOY event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, LITTLE FELLER I, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6215 VU
AD 417 943

In this shot report, the LITTLE FELLER I event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, LITTLE FELLER II, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6216 VU
AD 418 008

In this shot report, the event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, MAD, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 5498 VU
AD 411 379

This report comprises an analysis of seismic data recorded from the MAD event at the NTS by the Standard Stations. These data are supplemented by recordings at the Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, MARSHA-MALLOW, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6053 VU

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standardized Seismographs and from certain supplementary stations having instruments with similar response characteristics.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PACA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6217 VU
AD 417 878

In this shot report, the event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PACKRAT, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6056 VU
AD 414 676

This report analyzes seismic data recorded from the PACKRAT event at the Nevada Test Site by stations of the World-Wide Network of Standard Seismographs. These data are supplemented by recordings at U. S. Coast and Geodetic Survey stations with similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PAMPAS, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6848 VU
AD 424 028

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PASSIAC, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6606 VU

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PERA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6847 VU
AD 423 522

This report is one of a series analyzing seismic data from a nuclear test explosion at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, PLATTE, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6057 VU
AD 414 702

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are recorded by stations of the World-Wide Network of Standard Seismographs and certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, RACCOON, Contract No. VT/2034, U. S. Coasi and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6218 VU
AD 417 942

In this shoi report, ihe event is described, and preliminary data on the seismic recording of ii are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Projeci 173-7, ROANOKE, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6219 VU
AD 418 062

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, SACRAMENTO, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6054 VU
AD 414 705

This report is a presentation of seismic data recorded from the SACRAMENTO event at the Nevada Test Site by stations of the World-Wide Standard Seismograph Network. Recordings at U. S. Coast and Geodetic Survey stations having similar instrumentation are used as supplementary data.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, SEDAN, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6220 VU
AD 417 678

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, SHREW, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 5481 VU
AD 411 966

This shot report is issued on behalf of the Advanced Research Projects Agency, Department of Defense, to provide information which may prove of value in the study of data from nuclear tests. The data contained in this report are preliminary and subject to later revision as may be necessary.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, SMALL BOY, Contract VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6607 VU

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, WHITE, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6221 VU
AD 417 677

In this shot report, the WHITE event is described, and preliminary data on the seismic recording of it are presented.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, WICHITA, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6222 VU
AD 418 051

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES COAST AND GEODETIC SURVEY (STAFF), World-Wide Standard Station Seismic Measurements, Project 173-7, YORK, Contract No. VT/2034, U. S. Coast and Geodetic Survey, Wash., D. C., 1963.

VESIAC 6223 VU
AD 417 915

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site. The data used are from stations of the World-Wide Network of Standard Seismographs and from certain supplementary stations having similar instruments.

UNITED STATES GEOL. SURV. (STAFF), Study of Seismic Propagation Paths and Regional Traveltimes in the Continental United States, Progress Report for the Month Ending December 31, 1965, Contract ARPA Order No. 193-64, U. S. Geol. Surv., Denver, Colorado, 1966.

VESIAC 14,804 VU
AD 626 834

This article reports on work in three areas: (1) R. D. Borcherdt and J. C. Roller report that a seismic-refraction survey made by the Geol. Survey in the vicinity of CPSO in June and July, 1965, indicates the velocity of seismic waves in the upper crustal layer (Pg) is 6.1 km/sec, in the intermediate layer (P*) is 6.7 km/sec, and in the upper mantle is 8.0 km/sec or slightly higher. Other results of this survey are included; (2) L. C. Parker and Robinson have prepared a new estimate of the abundance of the major elements in the continental crust of the United States. The method used is fully described; (3) A seismic noise study made by R. E. Warrick on twenty-one recording sites occupied during a long-range seismic-refraction program in Norway indicates no obvious correlation of noise levels with major geologic provinces.

URKOWITZ, H., Transmission Requirements for a World-Wide LASA Network, Contract Agency Document, Advanced Research Projects Agency, Washington, D. C., 1965.

VESIAC 13,858-V VU
AD 648 415

This paper presents a standard mode of operation for data transmission, consisting of transmission of detected-event reports for those events whose seismic magnitude is equal to or greater than 4.0. If the world data center to which the material is transmitted desires a processed and cleaned-up seismogram representing one particular event, this would be transmitted, upon request, by electromagnetic signalling (teletype, for example). Other modes of operation are considered. Requirements for these modes are considered.

URUPOV, A. K., "Kinematic Features of Multiple Mixed Waves," Akad. Nauk Prikladnaya Geofizika., Vol. 17, pp. 93-103, 1957, (Translated from Russian), Contract SD-78.

VESIAC 9386 VU

This paper deals with longitudinal seismic waves related to multiple reflection and single refraction at one boundary in any sequence. The existence of such waves was established experimentally. The possibility exists for recording in certain regions other types of mixed waves, and in particular, multiply refracted waves. It is also possible that these waves are recorded in zones of superposition but have not yet been recognized. The paper describes the major kinematic features of multiple mixed waves. The emphasis is on multiple reflected-refracted waves which as found in reference 1 of the report constitute in certain regions one of the main noises in working with reflected waves.

VALLE, P. E., "Measurement of the Group Velocity of Seismic Surface Waves," Annali di Geofisica, Vol. 2, No. 3, pp. 370-376, July 1949, (Translated from Italian), Contract DA 49-083 OSA-3137.

VESIAC 14,373 VU

The theory of the measurement of the group velocity of seismic surface waves is applied to the one-dimensional case. Moreover, the approximations implied in the procedure which is commonly used to perform such a measurement are demonstrated.

VANEK, J., and J. STELZNER, "Amplitude Curves of Seismic Body Waves," Gerlands Beitrage Zur Geophysik, Vol. 71, No. 2, pp. 105-119, 1962. (Translated from German), Contract SD-78.

VESIAC 8510 VU

Amplitude curves for seismic body waves (PH, PV, PPH, SH) were obtained in a broad interval of epicentral distances on the basis of the observations of four central European stations. The course of the amplitude curves found was controlled by the investigation of the magnitude-independent gradient curves. The sufficient number of observations permitted a detailed study of the fine structure of the amplitude curves. A distinct oscillatory character of the amplitude curves was observed, whose relationship with the structure of the earth's mantle is discussed together with other features of the curves.

VANEK, J., and J. STELZNER, "Uniform Determination of Earthquake Magnitudes for Central European Stations," Travaux de L'Institut Geophysique de L'Academic Tchecoslovaque des Sciences, No. 136, pp. 300-329, 1960 (Translated from French), Contract SD-78.

VESIAC 8509 VU

This study attempted to produce methodologically acceptable foundations for magnitude determinations at the network of four European stations in Prague, Jena, Collmberg, and Potsdam. By the application of the Prague calibration functions for body and MH waves to the near stations of Jena, Collmberg and Potsdam, it was possible to determine the integral values of the station constants for individual waves. A uniform equation was also derived for the determination of magnitudes from MV waves at the Prague and Jena stations. It is now possible to treat the observations of the amplitude values in this network of stations as a homogeneous system. This advantage was utilized for the derivation of the second approximation of the calibration functions for body waves.

VAN NOSTRAND, R., LRSM Seismic Data Laboratory, WAGTAIL, No. 122, Contract VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1965.

VESIAC 10,748 VU

This report provides an analysis of the LRSM film seismograms from operating mobile field teams for the WAGTAIL EVENT, 24 May, 1965. The operating mobile field teams and several experimental or temporary stations operated in connection with other research programs are given. Instrumentation and procedure are discussed. Station site information is presented. Amplitude measurement procedures are illustrated. The Technical Working Group II first motion criteria, and diagrams are included illustrating the elements involved in determining a compression or rarefaction. Table I gives a Status Report for WAGTAIL; data and results are included.

VAN NOSTRAND, R., Operation of the Data Analysis and Technique Development Center, Semiannual Tech. Summ. Rept., Contract VT/2037, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 6836 VU

In this report, discussion under Task C (Operation of the Data Analysis and Technique Development Center) relates to the appropriate work statement sub-tasks. Discussion under continuing work relates to analyses underway, and to support and routine projects necessary to the operation of the DATDC in performing its work within the VELA-UNIFORM Program.

VAN NOSTRAND, R., Reverberation Effects on Signal Amplitude, Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8752 VU
AD 450 449

When the signal amplitude recorded at several stations for a given event is plotted as a function of the epicentral distance, there is much scatter in the data. The same is true even when special care is taken to insure that the points represent the arrivals of the same single phase. In this paper the author investigates in a very simple way what possible variation in signal amplitude might be reasonably expected from changes in the near surface rocks and in particular from changes in the sedimentary section from station to station.

VAN NOSTRAND, R., Seismic Data Laboratory, Semiannual Tech. Summ. Rept., Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 7808 VU
AD 439 395

This report presents progress of six months of the ARPA Project, VELA UNIFORM. The report has 10 sections: 1) a report on signal and noise as a function of depth; 2) network capability; 3) a computation of nine ratios of energies within certain velocity windows to emphasize assumed differences between earthquake and explosion seismograms; 4) a preliminary evaluation of a method for linear array data processing; 5) evaluation of general shot and earthquake analyses; 6) noise and signal attenuation analyses at the TFSO 31-element array; 7) discussion of the project to arrive at P wave estimates for depth, motion, and source mechanism; 8) epicenter location program, 9) teleseismic model study; and 10) wave equation solutions in a layered sphere.

VAN NOSTRAND, R., Seismic Data Laboratory, Semiannual Tech. Summ. Rept., Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8858 VU
AD 451 041

This report covers work performed from April 1964 through September 1964. The discussion of work completed includes: a) signal and noise as functions of depth; b) teleseismic model study; c) confidence regions and error determinations for seismic event location; d) identification of nuclear explosions on the shape of initial P-phase for teleseismic events; e) a comparative study of the SHOAL event; and f) general wave equation research. Work currently in progress includes: a) recursive numerical filters with specified impulse response; b) design of arrays; c) array signal analysis of variance; and d) coherency of teleseismic P-waves. Service functions are discussed in the concluding section.

VAN NOSTRAND, R., Seismic Data Laboratory, Quarterly Tech. Summ. Report, Contract VT/2037, AF 33(657)-12447, UED, Teledyne, Inc., Alexandria, Va., 1965.

VESIAC 12,021 VU
AD 467 128 L

This report discusses the period April 1965 through June 1965, and is primarily concerned with research on the detection and identification of nuclear explosions, as distinguished from earthquakes. Also discussed are data services performed for other participants in the VELA UNIFORM Project. Much work had to do with LASA processing techniques; measurement of travel time anomalies across the TFSO extended array, and teleseismic signal and noise correlations are discussed. Event site location and focal depth determination with the aid of a digital program, linear array correlogram analysis, rectilinear motion detection and recursive numerical filters are discussed.

VAN NOSTRAND, R., Seismic Data Laboratory, Semiannual Tech. Summ. Rept., Project VT/2037, Contract AF 33(657)-12447, United Electro-Dynamics, Inc., Pasadena, Calif., 1965.

VESIAC 10,592 VU
AD 625 545

This report covers work performed from October 1964 through March 1965. Work completed includes: analysis of variance; solutions of the general wave equation; model studies; analysis of TFO extended array; automated bulletin process; shot and earthquake analyses; REMODE (Rectilinear Motion Direction); Supplemental analysis of SALMON data. Work in progress includes: Inversion of surface wave phase and group velocity dispersion observations; Perturbation theory; Recursive numerical filters; Correlogram analysis from linear arrays; Dispersion analysis of surface waves from deep well data; Array design; Partial coherency analysis; TFSO detection capability study.

VAN NOSTRAND, R., Seismic Data Laboratory, Quarterly Tech. Rept. No. 10, Project VT/2037, Contract AF 33(657)-12447, Teledyne Indust., Inc., UED Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 13,806 VU
AD 480 431

This report covers the period Oct. through Dec. 1965. Results of completed analyses are discussed in Section II under descriptive headings: (a) TFSO Travel-Time Anomalies, (b) Numerical Experiments with Partial and Multiple Coherence, (c) Shot and Earthquake Analyses, (d) Large Aperture Seismic Array, (e) Time Domain Filtering, (f) A Filtering Study to Enhance the Signal-to-Noise Ratio of Four Teleseismic Events, and (g) Miscellaneous Analyses. Work currently in progress, which has not reached the stage where results are available, is discussed in Section III.

VAN NOSTRAND, R., Seismic Data Laboratory Operations, Final Report, 17 August 1963 to 17 February 1966, Contract: VT/2037, AF 33(657)-12447, Teledyne Industries, Inc., Earth Sci. Div., Alexandria, Va., 1966.

VESIAC 14,301 VU

This report discusses the work performed for the period 17 August 1963 through 17 February 1966. It covers the research, the operations, and the capabilities of the Seismic Data Laboratory as they relate to the VELA UNIFORM Program. It is primarily concerned with seismic research activities leading to the detection and identification of nuclear explosions as distinguished from earthquake phenomena. Also discussed are the data services performed for other participants in the VELA UNIFORM Program.

VAN NOSTRAND, R., Seismic Data Laboratory Data Services Report Number 5, Project VT/2037, Contract AF 33(657)-7427, United ElectroDynamics, Teledyne, Inc., Alexandria, Va., 1965.

VESIAC 11,991 VU

This is a catalog of seismic data and digital programs generated and collected by the Seismic data laboratory. The descriptions include: digital programs in use at SDL, MIT Geophysics Program Set II, Digitized data, USCGS epicenters, earthquake bulletin data from the VELA UNIFORM observatories, and the LRSM teams, amplitude, period, and arrival times of phases from 50 U. S. nuclear explosions, analog composite tapes of explosions and earthquakes.

VAN NOSTRAND, R., Synthetic Earthquake Seismograms for Teleseismic Distances, Contr. No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 7813 VU
AD 600 103

The purpose of this study was to test the hypothesis that the initial strain of P-waves on seismograms recorded at teleseismic distances is more complicated for earthquakes occurring in the crust than for explosions near the earth's surface.

VAN NOSTRAND, R. and W. HELTERBRAN, A Comparative Study of the SHOAL Event, Contract No. VT/2037, AF 33(657)-12447, United ElectroDynamics, Inc., Pasadena, Calif., 1964.

VESIAC 8442 VU
AD 446 223

Data and background information are given of the SHOAL, FALLON, and HARDHAT events, in this comparative study of three man-made explosions. Insufficient data were obtained for an adequate test of teleseismic identification events because of the yield of SHOAL was too low. The study of identification criteria substantiated previous conclusions that nuclear explosions of magnitude 4 and above can be identified with high confidence if data are available from sufficient stations at regional and near-regional distances. In summary, the SHOAL event doubles the store of data for a well contained explosion in granite.

VANWORMER, J. D., Solid Earth Tides as a Triggering Mechanism for Earthquakes, Sci. Rept., Rept. No. AFOSR 67-2708, Contract AF-AFOSR 646-66, University of Nevada, Reno, Nevada, 1967

VESIAC 19,029 VU
AD 662 354

A review is presented of previous attempts to correlate earthquake occurrence with various other natural phenomena. These early studies were generally based on insufficient data, and therefore did not result in correlations that were acceptable to the scientific community.

Continuous, highly sensitive monitoring of the 1966 Truckee, California, earthquake sequence presented the first opportunity to study rates of occurrence using a large number of observations collected in a small area.

VANYAN, L. L., "Certain Problems of the Theory of Frequency Soundings of Horizontal Layers," Prikladnaya Geofizika, No. 23, pp. 3-45, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,132 VU

An approximate theory was developed for frequency sounding carried out on a sufficiently large spread. The basis of this theory is formed by the asymptotic representation of the components of the field in the region of relatively high and relatively low frequencies. For a sufficiently large spread (on the average, exceeding the depth to the reference level by a factor of 6) one can plot the complete curve of frequency sounding from asymptotic curves. The calculated curves of the apparent specific resistance found by frequency sounding have a number of fundamental advantages discussed in this report, over the ordinary curves of sounding obtained by using direct current. The method of frequency soundings is a promising one for solving oil geology problems in the USSR.

VASIL'EV, Y. I., "Results from the Analysis of the Coefficients of Reflection and Refraction of Elastic Waves," Trudy Inst. Fiziki Zemli, A. N., SSSR, No. 6, pp. 52-80, 1959. (Translated from Russian). Contract DA 49-083 OSA-3137.

VESIAC 17,117 VU

A series of general conclusions has been formulated regarding the dependence of the ratio of the coefficients of reflection and refraction of elastic waves on the discontinuity of two solid, ideally elastic homogeneous media on the angle of incidence of the wave and the parameters characterizing the properties of the media.

VESHNYAKOV, N. V., "Seismic Extensometer (Strain Seismometer)," Trudy Seismol. Inst., No. 127, pp. 107-111, 1948. (Translated from Russian). Contract SD-78.

VESIAC 12,431 VU

A device is described for recording the compression and tension of a linear soil element during earthquakes. A sample of the obtained record is given which is compared with a seismogram obtained with a regular seismograph.

VESIAC (STAFF), Proceedings of the VESIAC Conference on the Current Status and Future Prognosis for Understanding the Source Mechanism of Shallow Seismic Events in the 3 to 5 Magnitude Range, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78 Univ. of Mich., Inst. of Sci. and Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915 VU
AD 811 481

The VESIAC La Jolla Special Study Conference was held in La Jolla, California at the Scripps Oceanographic Institute on 22-24 March 1965. Nineteen papers dealing with the source mechanism of shallow events were presented in Session A, eighteen of which are included here. The four papers concerning the physics of earthquake sources presented in Session B are also included.

VESIAC, (STAFF), Proceedings of the VESIAC Special Study Conference on Seismic Signal Anomalies, Travel Times, Amplitudes and Pulse Shapes, Rept. No. 4410-99-X, Contract SD-78, VESIAC, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1966

VESIAC 13,999 VU

This report contains 14 papers presented at the VESIAC Special Study Conference on seismic signal anomalies, travel times, amplitudes, and pulse shapes, which was held in Beaugency, France, near Paris, in October 1964. Investigations of these topics from the United States, New Zealand, Canada, Norway, Holland, West Germany, France, Spain, Italy, and the United Kingdom are included.

VESIAC (STAFF), Seismic Event Location Determination, Contract No. SD-78, Univ. of Mich., Inst. of Sci. & Tech., Willow Run Labs., Ann Arbor, Mich., 1963.

VESIAC 6578 VU

These articles are from the VESIAC Special Working Group, meeting in Boulder, Colorado, 1963, on Seismic Event Location Determination. There is a brief agenda of the meeting, with statements of the seismological problem and of the statistical problem. The first article, "Errors Associated with the Location of Epicenters," deals mathematically with the problem of locating a seismic disturbance, on or near the earth's surface. The second article is titled, "On Some Theory of Mixed Linear Theory Models and its Application in the Estimation of a Missile Trajectory," and is followed by notes by the author on event location determination. The third article, "Statistical Aspects of Seismic Event Location," and the fourth, dealing with confidence regions for epicenter determinations, complete the report.

VESIAC (STAFF), VELA UNIFORM Sponsored Research Publications in Seismology, Rept. No. 7885-5-X, Contract SD-78, Univ. of Mich., I.S.T., Ann Arbor, Mich., 1966.

VESIAC 14,063 VU

This booklet contains a list of technical articles published in journals covering research sponsored by the Advanced Research Projects Agency, under Project VELA UNIFORM.

VESIAC (STAFF), VESIAC Conference Proceedings: Progress of VELA UNIFORM BOREHOLE Research, Rept. No. 4410-83-X, Contract SD-78, Inst. of Sci. & Tech., Univ. of Mich., Ann Arbor, Mich., 1964.

VESIAC 8884 VU
AD 452 596

This report is a collection of papers presented at the VESIAC conference, held 9 and 10 March 1964, to outline progress in deep borehole research since the conference of 9 October 1961. Also included are transcripts of summary comments by the conference participants at the closing session of the meetings.

VIETSMAN, P. S., E. I. GAL'PERIN, I. P. KOSMINSKAY, and B. S. VOL'-VOSKII, The Method of Deep Seismic Sounding on Land and at Sea (Translated from Russian), All-Union Scientific Res. Inst. of Geophys. Methods of Surveying, Contract DA-49-083, OSA-3137, 1966.

VESIAC 14,470 VU

After discussing the importance and the history of deep seismic sounding, the authors give a definition of the deep seismic sounding method, briefly examining the main stage of the development of the method, and describing the place of deep seismic sounding among the other seismic methods of studying the earth's crust. In addition, they discuss the problems solved with the use of deep seismic sounding and special features of the method. They list the main shortcomings of the method, and, in addition, give a list of special studies which should be carried out in the future in order to improve upon the method.

VINNIK, L. P., "The Structure of Four- to Six-Second Microseisms," Doklady Akad. Nauk SSSR, Vol. 162, No. 5, pp. 1041-1044, 1965, (Translated from Russian), Contract SD-78.

VESIAC 13,397 VU

Discussed is a new method for studying the structure of four- to six-second microseisms, based on the principle of directional reception accomplished by a group of stations. The field material used in the work was obtained in October 1961, in Eastern Kazakhstan in the region of Ust'Kamenogorsk. The stations and the instrumentation are described. The results were obtained mainly in processing the recordings of vertical seismographs. The method involves a summation of the recordings of the individual stations with time shifts, which linearly depend on the coordinates of the station on a plane and on the mean-square calculation of that sum with different group adjustments.

VOGEL, A., "Irregularities of the Outer Boundary of the Earth's Core on the Basis of Seismic Waves Reflected at the Core," Gerlands Beiträge zur Geophysik, Vol. 69, No. 3, pp. 150-174, 1960 (Translated from German), Contract SD-78.

VESIAC 8225 VU

Investigations on the outer boundary of the earth's core by means of different seismological methods indicate a depth of about 2900 km.

For a world-wide investigation of the depth of the earth's core, the waves reflected at the boundary of the core appeared to be very suitable. The travel time dispersions of the PcP, ScS, PcS and ScP waves were considered as consequences of a nonuniform reflection depth.

The core depth anomalies that can be delineated over wide regions for the period 1950-1954 indicate clear relationships to the magnetic non-dipole field and to the gravity field of the earth.

If the core depth anomalies and the non-dipole field of the earth's magnetic field change with time, time-wise changes of the earth's gravity field necessarily follow due to the above correlations.

VOLIN, A. P., and A. G. RUDAKOV, "Seismic Exploration Using Transverse Waves," Prikladnaya Geofizika, No. 15, pp. 53-62, 1956, (Translated from Russian), Contract SD-78.

VESIAC 12,135 VU

This seismic work carried out by using the method of transverse waves is the first in a series of preliminary investigations in applying the conclusion of the dynamic theory of propagation of elastic waves to problems of seismic exploration. The major conclusion drawn from this work (important in determining the future direction of studies) is that the laws established for the elastic model are well supported, at any rate in the qualitative sense, in real geological media. Thereby it becomes possible to predict theoretically the results of seismic experiments. Three conclusions are reached regarding the method of transverse waves; future tasks are outlined.

VON SEGGERN, D. H., Effects of Radiation Patterns On Spectra and Magnitude Estimates, Sci. Rept., Rept. 233, Contract VT 9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1969.

VESIAC 19,803 VU
AD 856 110

According to surface-wave radiation pattern theory, amplitude at any given period is a function of azimuth for a given tectonic source at a given depth. Also the shape of the observed spectra is dependent upon azimuth as well as depth and source type. Body-wave radiation pattern theory predicts that amplitude will be dependent on take-off angle as well as azimuth. The combined effect of radiation pattern on M_s and m_b should account for much of the scatter on M_s versus m_b plots, especially when these measures are averages of only a few stations at random azimuths. For surface waves there is a significant improvement in the consistency of the M_s measure if stations are spaced around the source in even intervals of azimuth.

VON SEGGERN, D. H., A Long-Period Noise Study at Murphy Dome, Alaska (LRSM Site FB-AK and ALPA Site 3-4), Sci. Rept., Rept. No. 247, Contract VT 9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1970

VESIAC 20,006 VU
AD 864 172

Long-period signals and noise samples recorded at Murphy Dome, Alaska, on standard LRSM instruments and the Geotech triaxial seismometer were subjected to spectral analysis. System noise tests showed that recorded seismic noise was limited to a band from .02 to 0.2 cps. Spectra representing many recording periods between January and August 1969 revealed the background noise to be of variable character and the RMS to range from 2.5 millimeters to 5.2 millimeters on a trace magnified 10^5 times with the standard LRSM system response. Due to its location at depth the triaxial instrument significantly reduced background noise on horizontal components caused by atmospheric pressure changes. Coherence between triaxial components of motion and corresponding LRSM components was excellent for most signals analyzed.

VON SEGGERN, D. H., Relative Location of Explosion Using Surface Waves, Sci. Rept., Rept. No. 259, Contract VT/0706, F33657-70C-0941, Teledyne-Geotech, Alexandria, Va., 1970

VESIAC 20,289 VU
AD 872 606

A method of relative location for explosions using Rayleigh waves is developed and tested. It involves cross correlating a wavetrain with a previously recorded signal from the same source region and determining a relative "travel-time" from the peak in the cross correlation trace. Locations are fairly accurate, but do not compare with the precision obtained with body waves and relative travel-time corrections. A number of causes of errors are discussed, and it is estimated that a sophisticated application of this method would yield location comparable to relative travel-time locations for large events.

VON SEGGERN, D. H., Surface-Wave Amplitude-Versus-Distance Relation in the Western United States, Rept. No. 249, Contract VT 9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1969

VESIAC 20,254 VU
AD 870 769

For epicentral distances less than 15° in the Western United States, a new correction factor is proposed for use in the common Gutenberg formulation for surface-wave magnitude. The data on which this is based are 684 Rayleigh-wave amplitudes from Nevada Test Site explosions measured visually on the records of LRSM mobile stations and VELA observatories. The need for the variable T (period) in the magnitude calculation is discounted on empirical evidence. Magnitudes at distances less than 15° when recomputed using the new correction factor are in excellent agreement with teleseismic magnitudes and show less scatter among themselves than previously. An estimate of the effective Q_R in the crust from the data is about 130. Amplitude losses should reflect other causes than anelasticity, and this value is undoubtedly much lower than the real Q_R.

VON SEGGERN, D. H., D. G. LAMBERT, Dependence of Theoretical and Observed Rayleigh-Wave Spectra on Distance, Magnitude, and Source Type, Sci. Rept., Rept. No. 240, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1969

VESIAC 20,008 VU
AD 864 299

Theoretical source spectra which are closely tied to empirical evidence from explosions and earthquakes are presented. The effects of the transfer functions of a layered media upon these source spectra are shown and a theoretical earthquake-explosion spectral ratio is defined for Rayleigh waves. Using spectral estimates on many widely distributed events, it has been found that explosions and earthquakes can be separated by splitting Rayleigh-wave energy between 10 and 50 seconds into two period bands and calculating their ratio. Explosion ratios are confined to a narrow range. Earthquake ratios have a large scatter because they depend on depth and source mechanism parameters.

VOYUTSKII, V. S., "Bunching of Seismic Receivers," Akad. Nauk Prikladnaya Geofisika, Vol. 14, pp. 23-46, 1956, (Translated from Russian), Contract SD-78.

VESIAC 9385 VU

Bunching of seismographs is a very effective means of eliminating noise in seismic exploration. In its time the widespread use of bunching resulted in an increase in the quality and quantity of observed reflections which made it possible to explore a series of oil-carrying regions previously inaccessible to seismic surveys. Recently, the interest in bunching rose with the need for a significant increase in the technical and methodological level of survey work in new areas where it was very difficult or impossible to obtain correlating reflections by the usual methods. Interest is also due to the use of bunching in combination with mixers. The advantages of such combined systems are discussed. This paper describes newest developments in the field of bunching of seismic mixers.

VOYUTSKII, V. S., "Detection of Weak Seismic Signals by Accumulation," Akad. Nauk. Prikladnaya Geofizika, No. 15, pp. 14-23, 1956, (Translated from Russian), Contract SD-78.

VESIAC 9287 VU

This paper discusses the so-called method of synchronous accumulation for the detection of weak signals on a background of noises that exceed them in intensity. The essence of the method is the periodic repetition of a signal which, together with the noise superimposed on it, is sent from the output of the receiver to an accumulator where it is repeated for a certain period of time. The signals, repeated for a certain number of times, are superimposed on one another in the accumulator and are summed, the summation following different laws for the noise. The paper has two parts; the first deals with theory, and the second with experimental verification, involving a 1954 series of experiments conducted to verify the method of asynchronous accumulations.

VOYUTSKII, V. S., "Method of Registration of Seismic Vibrations with Signal Accumulation," Priladnaya Geofizika, No. 33, pp. 45-59, 1962, (Translated from Russian), Contract SD-78.

VESIAC 12,866 VU

Described is the inadequacy of the synchronous method of accumulation for the registration of seismic oscillations—it does not meet the need for synchronous repitition of the explosions. The method of asynchronous accumulation, or, as it is sometimes called, the method of two channel correlation reception, is discussed. It does not require synchronization and can be used for the reception of seismic vibrations without repetition of the explosions. In contrast with ordinary methods of registration, when asynchronous accumulation is used, the instantaneous values of the vibration amplitudes are not registered, but the values of the function of the mutual correlation of the oscillatory processes on the output of two spaced receiving systems. This method is described.

VVEDENSKAYA, N. A., "Bulletin of Powerful Earthquakes in the USSR During 1961," Akad. Nauk, SSR, Trudy Inst. Fiz. Zemli, No. 33, pp. 123-143, 1964, (Translated from Russian), Contract SD-78.

VESIAC 9583 VU

This bulletin reports and charts the earthquakes with intensity equal to 4 or greater. Charts showing epicenters, distributions, and figures for individual zones of seismic activity are provided as well as descriptions of the year's most important regional seismic events.

VVEDENSKAYA, N. A., and N. V. KONDORSKAYA, "Bulletin of Strong Earthquakes in the USSR During 1956," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 5, pp. 3-19, 1959, (Translated from Russian), Contract DA 49-083 OSA-3137.

VESIAC 17,308 VU

The work contains generalized data of instrumental and non-instrumental observations of all fairly strong earthquakes in the territory of the USSR during 1956.

The Bulletin of Strong Earthquakes, which is proposed to be compiled annually, will be a systematic summary simultaneously generalizing all the instrumental and non-instrumental data on strong earthquakes occurring on the territory of the USSR.

WALKER, J. C. G., Geomagnetic Observations in the Arctic Ocean Drift Station Arlis II, June 3 to August 21, 1962, Contr. No. NONR 266(82), Lamont Geol. Observ., Palisades, N. Y., 1964.

VESIAC 8148 VU

A nuclear resonance magnetometer was operated on Drift Station Arlis II in the Arctic Ocean during the summer of 1962. The measurements reported here cover the period June 3 to August 21, 1962.

WALSH, J. B., and W. F. BRACE, A Bibliography on Decoupling, VESIAC Special Rept., Rept. No. 7885-39-B, Contract DA 49-083 OSA-3137, Univ. of Mich., I. S. T., Ann Arbor, Mich., 1969

VESIAC 19,672 VU
AD 850 944

This bibliography was prepared for a study of a specific problem in the analysis of decoupling - the response of the 'transition zone' in underground blasts. In spite of the rather restricted scope of the investigation, we have tried to include items pertaining to related topics and work of general interest. Undoubtedly, though, important entries not directly related to our immediate interest have been omitted. Titles are separated according to year of publication, with a special section for bibliographies.

WALTER, E. J., Analysis of the Relationship Between Associated Volcanic and Seismic Events, Final Rept. No. AFCRL-64-986, Contract AF 19 (628)-218, John Carroll Univ., Cleveland, Ohio, 1964.

VESIAC 10,196 VU
AD 613 298

This project was undertaken to study earthquakes that occur in volcanic regions and result from volcanic processes. The purpose was to determine whether or not these volcanic quakes are the same as ordinary earthquakes, and if not, how they differ and what seismic parameters can be used to identify them. Discussed are: the areas selected for investigation; the analyses of the seismic data from the three areas analyzed. How epicenters were located is discussed, as well as the distinct tectonic characteristics of Hawaiian volcanic earthquakes. Characteristics of Japanese earthquakes and of Vesuvius are considered. Amplitude distance relationships are discussed. One conclusion: volcanic quakes occur in swarms.

WANIEK, L., "Foundations of the Piezophotographic Methods of Measuring Pressure Wave Amplitudes," Geofysikalni Sbornik, pp. 229-304, No. 154, 1961, (Translated from Russian), Contract SD-78.

VESIAC 7718 VU

Treated are the physical bases and possibilities of application of a method for the measurement of powerful compression wave amplitudes. It is necessary to have a pressure indicator whose deformation takes place immediately after the exerted pressure. Inertia of the indicator has to be minimized. Described is an application of the pressure effect on photostatic emulsions, which required further photophysical studies on the influence of pressure on the photographic coating. The validity of this method with the use of commercial emulsions lies between 750 to 22,000 kg/cm^2. Relative experimental error is at least 1.5% and results in the highest amplitude values.

WARD, P. L., and G. HADE, Design and Deployment of Five High-Gain, Broad-Band, Long-Period Seismograph Stations, Tech. Rept., Contract F44620-70C-0038, Lamont-Doherty Geol. Observ., Columbia Univ., Palisades, N. Y., 1970

VESIAC 20,453 VU

Five high-gain, broad-band, long-period seismograph stations are being installed around the world. The instruments will probably have gains on the order of 100,000 or more at periods of 40 to 50 sec. This high sensitivity, some 50 to 100 times greater than previously attainable at these periods, should lead to a similar increase in the data now available in the long-period band. The purpose of this report is to describe the instruments, present a preliminary parts list, and present technical drawings of most of the newly designed components. The five sites are also briefly described. This report is written at a time when construction has begun at four sites.

WARD, R. W., Preliminary Long-Period Discrimination Results from NORSAR, Tech. Note, Rept. No. ESD-TR-69-9, Contract AF 19(628)-5167, Lincoln Labs., M. I. T., Lexington, Mass., 1969

VESIAC 19,623 VU
AD 686 419

Data from the short period vertical subarray near Øyer and the multicomponent long-period seismograph near Faldalen, Øyer and Trysil, Norway, were used to investigate the discrimination of earthquakes and underground nuclear detonations using long-period to short-period energy ratio (M_s vs m_b).

WARREN, D. H., and B. L. TIBBETTS, Seismic-Refraction Measurements of Nuclear Explosions ANTLER, GNOME, HARDHAT, CHINCHILLA, CIMMARRON, Contract ARPA Order No. 193-63, U. S. Geological Survey, Denver, Colorado, Undated. (OFFICAL USE ONLY)

VESIAC 6261 VU O

WARREN, D. H., B. L. TIBBETTS and R. C. RESLER, Seismic-Refraction Measurements of Nuclear Explosions, Contract No. VT/065, U. S. Geol. Survey, Wash., D. C., 1963 (OFFICIAL USE ONLY).

VESIAC 6166 VU O
AD 415 626

WARREN, D. H., B. L. TIBBETTS, and R. C. RESLER, Seismic-Refraction Measurements of Nuclear Explosions BRAZOS, HOOSIC, DORMOUSE PRIME, PLATTE, AARDVARK, HAYMAKER, Contract ARPA Order No. 193-63, U. S. Geological Survey, Denver, Colorado, 1963. (OFFICIAL USE ONLY)

VESIAC 6262 VU O

WARREN, D. H., B. L. TIBBETTS, and R. C. RESLER, Seismic Refraction Measurements of Nuclear Explosions SEDAN, MERRIMAC, WICHITA, YORK, BOBAC, HYRAX, Contract ARPA Order No. 193-63, U. S. Geological Survey, Denver, Colorado, 1963. (OFFICIAL USE ONLY)

VESIAC 7968 VU O

WARREN, N. M., R. G. REAKES, D. C. RASMUSSEN, B. J. MICKUS, and W. H. FRYE, Long-Period Seismograph Installation, La Paz, Bolivia, Tech. Rept. No. 66-60, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1966.

VESIAC 14,818 VU
AD 487 223

The L-P seismograph installation at La Paz, Bolivia (LZ-BV), was improved by methods previously untried within the LRSM program. Radical departures in vault construction made it possible to increase the magnification of the three-component L-P seismograph system from a nominal 20k to above 200k. As a result, a better understanding of some problems and their remedies was gained which will be extremely helpful in the operation and maintenance of other L-P seismographs.

WARRICK, R. E., D. FLOUFF, Seismic Noise in Norway, Tech. Letter No. 46, Contract ARPA Order No. 193-64, U. S. Geol. Survey, Denver, Col., 1966.

VESIAC 14,802 VU
AD 487 476

This technical letter co... ns samples of seismic noise that were recorded at 21 locations in Norway by the U. S. Geol. Survey during a program of seismic refraction measurements between Aug. 14 and Sept. 3, 1965. Estimates of noise amplitudes were obtained from samples of peak-to-peak amplitude measurements on paper monitor records and from digital analysis of magnetic tape recordings.

WATSON, R. J., and S. C. MERDLER, Estimation Procedure for Focal-Depth Determination of Seismic Disturbances, Rept. No. 7885-1-X, Contract DA 49-083 OSA-3137, SD-78, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1967.

VESIAC 15,915-Q VU

In this paper, we propose a method of estimating the depth of focus of seismic disturbances. The method depends upon a signal model which includes initially downgoing as well as surface-reflected energy. We design an array of inverse filters to suppress the reflected energy in the signal. The parameters used to design the filters are the amplitude and delay of the reflected events relative to the initially downgoing events. That inverse filter which does the best job in reflected-wave suppression is assumed to have been designed with the most correct delay value, which is the parameter to be estimated in this part of the technique.

We select the most successful filter by subjecting the output of each filter to a measure of energy concentration; that output which has maximum concentration is assumed to be the correct version of the initially downgoing events. With the relative delay selected in this manner, we then translate the delay into focal depth using travel-time curves based on average near-surface velocities.

WEART, W. D., Project GNOME, Particle Motion Near a Nuclear Detonation in Halite, Final Report, Contract No. Proj. 44.1 and Proj. 1.1, Sandia Corp., Albuquerque, N. M., 1963.

VESIAC 6294 VU

Strong motion parameters from the Project Gnome operation were measured in the region extending 60 to 480 meters from the center of detonation or working point along both vertical and horizontal radii. Travel-time data from the horizontal radius reveals three distinct arrivals. Vertically, the velocity varies from 5.1 km/sec at about 60 meters above the shot to 0.785 km/sec a few meters below the surface. Peak accelerations in the salt are best fitted by the relations $A = 890\ R^{-5.3}$ from 60 to 122 meters and $A = 560R^{-2.7}$ from 122 to 480 meters, where R is in hundreds of meters and A is in units of gravity. Motion of the ground above the shot reveals that spalling occurred at several horizons. The deepest spall separation was below 92 meters.

WEART, W. D., VELA UNIFORM, Project SHOAL, Free Field Earth Motion and Spalling Measurements in Granite, Final Rept. VUF-2001, Proj. 1.1, Sandia Corp., Albuquerque, N. M., 1965.

VESIAC 12,775 VU

Project Shoal was a 12.5 kiloton nuclear detonation emplaced 1205 ft deep in a highly faulted, granitic intrusive body. In connection with Shoal, azimuthal asymmetry, peak accelerations, and peak particle velocities are discussed. Spall, although atypical in some respects, is present in the upper 400 ft of granite above the detonation. Peak ground motion parameters at surface zero are given.

Residual upward displacement as obtained from Project 1.1 instruments ranged from 18 to 20 inches.

WEBER, M., "On the Approximation of Travel Time Functions from Discrete Data with Restricted Power Series," Geofisica Pura e Applicata, Vol. 49, pp. 1-12, May-August 1961, (Translated from German), Contract DA 49-083 OSA-3137.

VESIAC 14,387 VU

An approximation to travel-time functions by restricted power series is treated. For numerical computations convenient tables are calculated and an example is given.

WEBER, M., "An Exact Seismometer," Geofisica Pura e Applicata, Vol. 48, pp. 35-39, January-April 1961, (Translated from German), Contract DA 49-083 OSA-3137.

VESIAC 14,391 VU

The construction and characteristics of an improved exact seismometer are described.

WEBER, M., "The Interpretation of Seismic Refraction Measurements in the Limit Case of $c_o = 0$," Geofisica Pura e Applicata, Vol. 49, pp. 119-128, May-August 1961, (Translated from German), Contract DA 49-083 OSA-3137.

VESIAC 14,388 VU

In connection with a previous article, "The Travel Time Function and its Interpretation in Refraction Seismology of the Monoaxial Inhomogeneous Body", the interpretation of seismic refraction measurements in the limit case of $c_o = 0$ is discussed in detail.

WEBER, M., "Segmented Representation of a Measured Travel Time Curve with Restricted Power Series and its Evaluation in Refraction Seismology," Geofisica Pura e Applicata, Vol. 38, pp. 57-73, 1957, (Translated from German), Contract DA 49-083 OSA-3137.

VESIAC 14,157 VU

A simple and convenient method of numerical calculation for the direct interpretation of travel-time curves in seismic refraction measurements is developed. An example of this method Firm and Ice Thickness Measurements in Baffin Island, by H. Rothlisberger is given.

WEISBRICH, R. A., Project DRIBBLE, SALMON Event, Volunteer Team Program, TR 65-17, Project VT 4051, Contract AF 33(657)-12145, Geotech. Corp., Garland, Texas, 1965.

VESIAC 10,157 VU

The Volunteer Team Program was established in 1960 to facilitate the participation of oil companies, universities, research organizations, and other scientists in the VELA-UNIFORM research program. Sixty-two teams participated in the Program for SALMON and 38 of these monitored the event. Twenty-three teams withdrew from the program before SALMON was detonated.

This report describes the purpose of Project DRIBBLE and of the SALMON event which is one of three nuclear test detonations planned for Tatum Dome, Mississippi. It also describes the part which the Volunteer Teams took in monitoring this explosion and the results they obtained.

VESIAC 14,813 VU

WEINSTEIN, M. S., CHASE VII Source Data, Technical Progress Report No. 12, Contract NOnr 4026(00), Underwater Systems, Inc., Silver Spring, Maryland, 1966.

Pertinent data obtained at sea from the explosion of CHASE VII (SS HORACE GREELEY) are contained in this document. Source data included here are: (1) Shot Instant: 29 July 1966; (2) Shot Location; (3) Shot Depth: 3,000 feet; (4) Water Depth: 7,500 feet (from chart); and (5) Yield: 400 tons.

VESIAC 13,858-U VU
AD 648 415

WELLEN, J. B., SDL Hardware and Software, Contract: VT/5071, AF 33(657)-14104, Teledyne Inc., UED, Alexandria, Va., 1965.

This report describes the equipment and computer programs at the Seismic Data Laboratory (SDL) as they may relate to the processing of LASA data. Shown is the configuration of the SDL Data Processing System as of June 1965. The primary input to this system is described, as is system modifications. A program that was written to read a multiplexed LASA tape and to input from cards, parameters such as starting time, time interval to process, angle of incoming signal, and velocity is described.

VESIAC 14,320 VU
AD 480 350

WESTHUSING, J. K., The Effect of Crustal Structure on Teleseismic P-Wave Travel-Time Anomalies at the TFSO Extended Array, Arizona, Tech. Rept. No. 66-17, Contract VT/4051, AF 33(657)-12145, Teledyne Industries, Inc., Geotech Division, Garland, Texas, 1966.

This study examines observational data from 33 teleseismic events received at stations of the TFSO extended array in Arizona to determine travel-time anomalies for array stations relative to TFSO. Using a crustal model resulting from recent seismic refraction surveys, it has been determined that crustal travel-time differences between stations cannot account for the travel-time anomalies and that a more thorough study of the upper mantle must be made if causal relationships are to be determined. Some methods of accomplishing this are suggested.

VESIAC 5723 VU

WESTIN, M. E. and N. L. NUHN, Semiannual Report to U. S. Coast and Geodetic Survey, Contract No. DA-49-146-XZ-186, Planetary Sciences, Santa Clara, Calif., 1962.

This report describes progress from August to December 1962, on preliminary analysis and interpretation of the digitized strong-motion seismograms. Nine digital-computer programs are being flowcharted, coded, and debugged on the IBM 1620. Test problems have been run.

One code prepares strong-motion data for finite Fourier analysis, the output being the alpha and beta coefficients. Another calculates the phase and amplitude for these values. Two codes provide information directly usable for particle-motion plots. Another is for card-to-card conversion. Another provides the phase and amplitude values for the Fourier integral. Another performs integration of the strong-motion seismograms.

VESIAC 7408 VU

WHALEN, J. M., Instrumentation Noise of Long-Period Seismographs, Tech. Rept., Contract No. VT/072, AF 33(600)-41824, Geotechnical Corp., Garland, Texas, 1963.

The most common forms of system noise observed on high-magnification long-period seismograms are the effects of wind noise, atmospheric pressure changes, and temperature gradients inside the seismometer case. Evidence is given to show that these changes in environment are coupled directly to the seismometer. Other sources of system noise are long lines between the seismometer and the amplifier, seismic galvanometers, spurious vibrations in the seismometer elements, tilt, etc. Methods of system installation and operation are given that make it possible to operate amplified systems at magnifications of 50,000 or greater at periods of 20 to 40 seconds.

VESIAC 15,546 VU
AD 488 144

WHALEN, J. M., A Portable Seismograph, Rept. No. TR-65-74, Contract VT/4051, AF 33(657)-12145, Geotech. Corp., Garland, Texas, 1965.

This paper describes a portable seismograph system for use in the LRSM Program. The system was designed to fulfill the requirement for a reliable system that can be moved to the field, set up quickly, and allowed to run for up to seven days without attention. All of the major components, except the seismometers and the thermoelectric generators, are mounted in Fiberglas suitcases and are transportable as air freight. The system contains approximately 20 pieces and weighs 1500 pounds with L-P capability. Total weight of the system, instrumentation for recording data in the frequency range of 0.01 to 10 Hertz (cps), a magnetic tape recorder, and other facts about the system are discussed.

VESIAC 12,350 VU

WHERRY, M. S., Noise Analysis for Tonto Forest Seismological Observatory, Technical Report, Contract AF 33(657)-13904, VT/5052, Texas Instr., Inc., Dallas, Texas, 1965.

This analysis presents ambient seismic noise data taken from a 19-element, nonsymmetric, short-period surface array at Tonto Forest Seismological Observatory.

VESIAC 15,724 VU
AD 488 352

WHITE, J. D., Interpretation and Usage of Seismic Data, Long-Range Seismic Measurements Program, Rept. No. TR-65-43, Project VT/4051, Contract AF 33(657)-12145, Geotech Corp., Garland, Texas, 1965.

This report provides information for the interpretation of data compiled under the LRSM Program.

The report outlines the operations schedule and operational tolerances, and presents information necessary for interpreting calibrations, routine recordings, and special event data.

Particular emphasis is placed on the interpretation of data contained in special event composite records, prepared by the LRSM magnetic-tape laboratory.

The final section provides interpretive information about data obtained from the Portable Seismograph System, Model 19282, currently being integrated into the LRSM Program.

WHYTE, W. W., and R. S. SIMONS, Geotech Analog Spectrum Analyzer, Tech. Rept. No. 65-67, VT/4051, AF 33(657)-12145, Teledyne Industr., Geotech. Div., Garland, Texas, 1965.

VESIAC 13,046 VU

The Geotech analog spectrum analyzer and the manner in which it operates are discussed in general terms. The fundamentals of Fourier analysis, as they relate to the operation of the system, are outlined. Sufficient detail is provided to give a working comprehension of the analyzer and the spectrograms it produces. The results of various tests on the electronic characteristics of the system are presented. These include frequency and phase response, noise level, and linearity. An assessment is made of the overall accuracy of the spectrograms. The spectra of simple repetitive waveshapes and transients are discussed and examples given.

WIGGINS, R. A., On Factoring the Correlations of Discrete Multivariable Stochastic Processes, AFCRL-65-207, Contract AF 19(604)-7378, Mass. Inst. of Tech., Cambridge, Mass., 1965.

VESIAC 10,376 VU

This thesis is an extension of the theory of discrete scalar time series analysis to multivariable processes and is facilitated by expanding the algebra of polynomial matrices (matrices with polynomial elements).

WILKINS, W., Large-Array Signal and Noise Analysis - Rept. No. 19, Noise Suppression by Long-Period Infinite-Velocity Processors, Spec. Sci. Rept., Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 18,777 VU
AD 839 119

Various infinite-velocity processing schemes were applied to two long-period noise samples recorded at the Montana LASA on 2 and 3 December 1966. Straight summation, multichannel signal extraction with an infinite-velocity signal model, and multichannel prediction filtering were applied to the presence of ambient noise. From the comparison of the various processing schemes, the 9-element array using multichannel filtering was found to be more effective than any straight summation for separating P-wave signals or surface modes widely separated from the noise and very nearly as effective as the 12-channel MCF.

WILKINS, W. W., Large-Array Signal and Noise Analysis, Special Sci. Rept. No. 22, Extraction of Long-Period Rayleigh Waves from Ambient Noise, Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 19,044 VU
AD 842 355

This report presents the results of an investigation of processing techniques for extracting long-period Rayleigh waves from ambient noise by using various geometries of the LASA long-period vertical array. Delay-and-sum and multichannel signal extraction are the processing schemes evaluated.

WILKINS, W. W., and L. N. HEITING, Large-Array Signal and Noise Analysis, Special Rept. No. 25, Location Statistics for Frequency-Wavenumber Processing, Contract VT/6707, AF 33(657)-16678, Texas Inst., Inc., Dallas, Texas, 1968

VESIAC 19,156 VU
AD 844 919

Results of a computer study which theoretically determined the detection and location capabilities of various wavenumber spectra techniques are presented in this report.

WILLDEN, R., Seismic-Refraction Measurements of Crustal Structure Between American Falls Reservoir, Idaho, and Flaming Gorge Reservoir, Utah, Technical Letter Crustal Studies No. 21, Contract ARPA Order No. 193-64, U. S. Geological Survey, Denver, Colorado, 1964. (OFFICIAL USE ONLY)

VESIAC 8400 VU O

WILLIAMS, B. M., Multiple Array Processor and Presentation System, Semiannual Tech. Rept., Contract No. VT/077, AF 33(657)-12371, Texas Inst., Dallas, Texas, 1963.

VESIAC 6167 VU

The results of the initial six month's operation of the Multiple Array Processor (MAP) at Cumberland Plateau Seismological Observatory (CPO) indicates that the detection capability of that observatory can be improved. Data show that the perceptibility has been increased by 0.4 magnitude, and that with MAP this observatory compares favorably with Uinta Basin and Blue Mountains Seismological Observatories. Operation of the system over the months under consideration, beginning with a discussion of filter settings obtained from an assumed model of seismic signal and noise, is presented. The MAP equipment has been operated seven days a week, 24 hours a day. Emphasis of the evaluation has been changed to the objective of detecting teleseismic events. Engineering design objectives have been achieved.

WILLIS, D. E., Effect of Water Depth on Seismic Waves Produced by Underwater Explosions, Contract Nos. AF 49(638)-911, AF 49(638)-1170, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 8390 VU

A series of 10,000 lb. high-explosive shots were fired at various water depths off San Clemente Island, California during August 1961. These shots were recorded on magnetic tape at one fixed station (123 km) and at portable stations located at 180, 196, 500, and 518 km. The effect of water depth on the amplitude and spectra of the seismic waves generated by these shots are discussed and a comparison is made with the maximum displacement of underground shots. A spectral comparison is also made with a local earthquake recorded at two of the shot recording sites.

WILLIS, D. E., An Investigation of Seismic Wave Propagation in the Eastern United States - THESIS, Contracts: AF 49(638)-1170, AF 49(638)-1759, Univ. of Michigan, Ann Arbor, Michigan, 1968

VESIAC 18,342 VU

This paper describes the travel-time anomalies and attenuation losses of seismic compressional waves generated by a series of underwater explosions in the eastern United States. The efficient tamping of the shots fired in water provided a seismic source that could be detected at much larger ranges than could be accomplished by equivalent sized shots fired underground.

WILLIS, D. E., J. M. DE NOYER, and C. G. BUFE, Seismic Refraction Study and Attenuation Measurement Program in the Great Lakes Region, Rept. No. 5767-1-F, Contr. No. AF 49(638)-1170, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 7987 VU

The University of Michigan operated several mobile seismograph stations to record a series of one-ton underwater shots fired in Lake Superior during July 1963. The instrumentation for these stations is given. Seventy-eight shots were recorded at 31 sites for a total of 473 recordings. Preliminary interpretations of the seismic travel time data indicate a P wave velocity in the upper crust of 6.6 km/sec. Other velocities are given, especially in connection with a shallower layer, and P_n velocities for shots fired in the western portion of Lake Superior and recorded on the Keweenaw Peninsula. An investigation of the first and maximum compressional wave and maximum shear wave attenuation data for the recordings at the Copper Harbor hydrophone station are discussed.

WILLIS, D. E., J. DE NOYER, and J. T. WILSON, High-Frequency Energy in Seismic Signals Recorded from Different Type Sources, VESIAC Special Rept. No. 4410-52-X, Contr. Nos. SD-78, AF 49(638)-1170, AF 19(604)-8809, AF 19(604)-6642, Univ. of Mich., Inst. of Sci. & Tech., Ann Arbor, Mich., 1964.

VESIAC 7742 A VU
AD 438 709

This paper presents some of the data collected during the past eight years on high-frequency seismic energy contained in signals which were recorded up to 100 km or farther from the source. The term "high-frequency seismic energy" is used to designate frequencies greater than several cps. Several types of presentation are used: paper seismograms made by playing back the magnetic tape recordings through different filter passbands to separate the seismic energy; particle velocity vs. frequency graphs to show detailed frequency analyses for specific events; and energy/power density graphs which show in real time the amplitude-frequency relationship for the entire recording.

WILLIS, D. E., and P. L. JACKSON, Collection and Analysis of Seismic Wave Propagation Data, Final Report, Rept. No. 5178-64-F, Contract AF 49(638)-1170, Univ. of Mich., Inst. of Sci. and Tech., Ann Arbor, Mich., 1966.

VESIAC 14,987 VU
AD 640 212

This report summarizes four years of theoretical and applied research on propagation of seismic waves and techniques for analyzing data. The following research is discussed: (1) coherent optical processing techniques for analyzing seismic data; (2) linear mode filtering, employing Fourier techniques, of seismic data; (3) frequency-analysis techniques involving optical, analog computer, digital computer, and active electronic filters, and their development and evaluation; (4) radiation patterns from the regions of cylindrical and elliptical sources; (5) source motion studies using data from short-distance compressional waves; (6) theoretical studies of the scattering caused when an incident wave encounters an elliptical obstacle.

WILLIS, D. E. and P. L. JACKSON, Collection and Analysis of Seismic-Wave Propagation Data, Annual Rept., 1 June 1967 to 31 May 1968, Rept. No. 8071-15-P, Contract AF 49(638)-1759, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Michigan, 1968

VESIAC 18,776 VU
AD 675 057

This report discusses the results of an extensive long-range reversed refraction profile which traverses the Michigan Basin and the Appalachain Mountains. Particular emphasis is placed on the attenuation of first compressional wave arrivals and on crustal upper mantle structure. Also included are results of a survey on lake bottom seismic background noise in Lake Superior. Although large signal levels were obtained in the lake bottom, long periods of high background noise indicated that land based seismographs are superior. Theoretical studies in elastic wave scattering were made to evaluate the effect of nonhomogeneities on the propagation of elastic waves.

WILLIS, D. E., P. L. JACKSON, I. K. MC IVOR, and H. N. POLLACK, Collection and Analyses of Seismic Wave Propagation Data, Seventh Semiannual Tech. Summ. Rept. for Period Covering 1 May 1965 Through 30 October 1965, Rept. No. 05178-56-L, Contract AF 49(638)-1170, Institute of Science and Technology, Univ. of Michigan, Ann Arbor, Mich., 1965.

VESIAC 13,150 VU

This report is a technical summary of the research in seismic wave propagation studies performed on this contract for the time period May 1, 1965 through October 30, 1965. Included is a list of reports that were prepared or published during this report period. Also included are three articles: (a) "Mode Filtering" by R. M. Turpening; (b) "Scattering of Elastic Waves by Elliptical Obstructions" by I. K. McIvor; and (c) "Optical Processing" by P. L. Jackson. Statements about future work are included, as well as 33 figures.

WILLIS, D. E., P. L. JACKSON, and R. M. TURPENING, Collection and Analysis of Seismic Wave Propagation Data, Tech. Semiannual Summ. Rept., 1 June to 30 November 1969, Contract AF 49(638)-1759, Univ. of Mich., WRL, Inst. of Sci. and Tech., Ann Arbor, Mich., 1970.

VESIAC 20,003 VU

The scope of this contract includes S-wave mode filtering, seismic ray tracing, and microearthquake investigations. After much delay pertinent LASA tapes have been obtained; the LASA data processor has been interfaced with the PDP-8/I computer located in the Geophysics Laboratory to perform the S-wave mode filtering.

Highly accurate seismic ray simulation through two-dimensional heterogeneous velocity distributions has been achieved, and the extension to three dimensions with selective regions for sampled or mathematically represented data is being programmed. Preliminary analysis of seismograms recorded before and after the JORUM underground nuclear explosion indicate that there was no significant difference in the occurrence of local micro-earthquakes before and after this explosion.

WILLIS, D. E., P. L. JACKSON, and R. M. TURPENING, Seismic Wave Propagation Studies, Final Rept., 1 June 1966 to 31 May 1970, Rept. No. 8071-33-F, Contract AF 49(638)-1759, Univ. of Mich., IST, Willow Run Labs., Ann Arbor, Mich., 1970

VESIAC 20,405 VU

A new method of simulating seismic rays, computing travel times, and approximating amplitudes in earth models has been developed. The digital computer is used to model a spherical or a flat earth. Two- or three-dimensional models are employed. The method can be used for heterogeneous models, and includes computation of multiple reflections. Travel times have been obtained for a model of a cross-section underlying LASA.

A data processing capability specifically intended for the study of the S-wave particle variations across LASA was built on this contract. The LASA data processor, which existed in this laboratory for the optical analyses of LASA data, was modified to interface with this laboratory's PDP-8 computer. This data processing capability was not used due to funding limitations.

Microseismic investigations in connection with JORUM indicated that the firing of a large yield underground shot did not produce any measurable tectonic release of energy in active fault regions at a distance of 60 to 100 km from the source. Seismic measurements of DIAMOND DUST indicated decoupling was achieved but the accurate determination of the efficiency of the decoupling will have to be determined by additional tests. A pronounced asymmetry in seismic wave characteristics was observed.

Travel time studies of PcP and P were used to determine the surface configuration of a portion of the earth's core. An extensive study was made on the attenuation and travel times of seismic waves in the Eastern United States. Theoretical studies were made to determine the scattering effects of plane elastic waves by surface imperfections and to determine the sources of error in the time-term method in refraction seismology.

Spectral studies were made of underground nuclear shots and earthquakes recorded at teleseismic, regional and near distances. An additional study was made of the characteristics of seismic background noise recorded on the bottom of Lake Superior.

WINSTON, T., The Design, Fabrication, and Laboratory Testing of a Deep Well Inertial Seismometer, Contract VT/1129, AF 33(600)-42890, United ElectroDynamics, Inc., Pasadena, Calif., 1961

VESIAC 10,653 VU

This research was to design, fabricate, and test in the laboratory a modular deep well, moving coil, inertial seismometer with a large enough seismic mass to eliminate the need for an integral pre-amplifier. It was designed to sense earth motions as small as approximately one angstrom unit while operating at a depth of 10,000 ft. in the earth. The instrument was not over 5 inches O. D. and was not affected by tipping from the vertical of up to 10°.

WINSTON, T. and L. BLUM, Electrically Coupled, Modular Seismometer Error Analysis, Contract No. VT/1129, AF 33(600)-42890, United ElectroDynamics, Alexandria, Va., 1961.

VESIAC 5599 VU

This is a special project report on the development of a deep-well seismometer that can be lowered into and function at the bottom of a well 10,000 feet deep. Using a random number table, the resulting frequency response errors of a highly probable seismometer were calculated. Calculations were based on the assumptions that the seismometer would be built up of 10 individual seismic modules connected in series, that the modules would have a plus or minus 2.5% tolerance on their natural frequencies, and a plus or mtnus 5% tolerance on damping. They were also based on the assumption that the frequency and damping errors would be distributed normally.

WOLD, R. J., A Mtniaturized Precision Chronometer, Contract No. AF-AFOSR-363-63, University of Wtsconsin, Madison, Wisc., 1964.

VESIAC 7381 VU

A time source has been designed and constructed to provide a precision time base for the remote controlled recording hydrophone stations of the Univ. of Wisconsin, Geophysical and Polar Research Center. The device employs a three hundred cycle tuning fork osctllator as its frequency standard, frequency division stages using silicon controlled swttches, and power output stages. The outputs constst of sawtooth pulses every .016 seconds (sixty cycles), 0.1 seconds (ten cycles), ten seconds, and thtrty seconds and a gated output of pulses every second and thirty seconds suitable for driving a magnetic tape head.

WOMACK, J. R., Horizontal Strain Seismograph, Contr. No. VT/072, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8258 VU
AD 442 641

The installatton, instrumentation, and results of preliminary tests of horizontal strain seismometers at WMSO are discussed. The results obtained from seismograms of various combinations of inertial seismometers and horizontal strain seismometers are given. Seismograms show that the summed crossed-horizontal strain seismograph is omnidirectional tn response to Rayleigh waves and cancels Love waves in accordance with theory. The results of the summation of verticai pendulum and crossed strain signals show good canceliations of microseisms for some periods of time; at other times there appear to be no cancellations.

WOMACK, J. R., Improved Seismographs, Semiannual Prog. Rept. No. 5, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7221 VU

The work accomplished on this task was concerned with: a) Inclined Seismometer, b) Galvanometers, c) Filtering, d) Amplifiers, e) Digitizer, f) New Methods of Signal Presentation, g) Improved Seismograph Testing Facilities, h) Stable Table, i) Stratn Seismograph, and j) Experimental Investtgation of Thermal Notse. Each one of these ten tasks is rather fully discussed in the body of the report.

WOMACK, J. R., Improved Seismographs, Semiannual Prog. Rept. No. 7, Contr. No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8855 VU

Discussed in this progress report is work on these tasks: a) inclined seismometer; b) galvanometers; c) filtering; d) amplifiers; e) digitizers; f) new methods of signal presentation; g) improved seismograph testing facilities; h) stable table; i) strain seismograph;

j) investigation of thermal noise. Specific details about work on all of these tasks are included.

WOMACK, J. R., Induction Modulator Amplifier, Contract No. VT/072, AF 33(657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8474 VU

The induction modulator amplifier was conceived as a low-power substitute for phototube amplifiers in seismic instrument systems. A moving-coil modulator imposes modulation on a high-frequency carrier signal, which is amplified by conventional solid-state amplifiers. A detector recovers the amplified low-frequency component of the modulated wave. Since no light source is required, power consumption is less than for a phototube amplifier; however, the noise level is greater and the circuit is more complex.

WOMACK, J. R., Long-Period Seismometers, Task 1a, Contract No. VT/072, AF 33(600)-41824, Geotechnical Corp., Garland, Texas, 1963.

VESIAC 7235 VU
AD 427 274

Test results are given for the prototype Long-Period Vertical Seismometer Model 7505, and Long-Period Horizontal Seismometer, Model 8700. Both utilize moving-coil, electromagnetic transducers. The natural periods of both seismometers are adjustable from 10 to 30 sec. The vertical seismometer has a LaCoste pendulum with cross-flexure hinges. In the horizontal seismometer, the inclined pendulum system is attached to an Invar post by cross-flexure hinges.

WOMACK, J. R., Short-Period Digitizer, Contract No. VT/072, AF 33 (657)-9967, Geotechnical Corp., Garland, Texas, 1964.

VESIAC 8476 VU
AD 446 567

A short-period digitizer, using solid-state electronic circuits which convert analog seismic signals to digital form has been developed. The analog signals are sampled and stored 50 times per sec, and each sample is converted to a 12-bit natural binary number. The digitizer operates on battery voltage with a power consumption of 1.1 w. The frequency response is from dc to 10 cps over a temperature range of -50 to +50^{o}C. The seven plug-in circuit cards comprising the digitizer may be incorporated in a galvanometer-phototube amplifier or packaged as a self-contained unit for use with a separate amplifier.

WOOLSON, J. R., Analysis of Strain Seismograph Data, Sci. Rept., Rept. No. 250, Contract VT/9706, F33657-69C-0913, Teledyne Indust., Inc., Alexandria, Va., 1970

VESIAC 20,118 VU
AD 866 743

Noise power on the short period pendulum and strain instruments has been compared at WMO and HNME. In the response band of the short period instruments, there are approximately four decades of relative power at HNME, and two decades at WMO. In one case analyzed the noise power at HNME is about 2 1/2 times the noise power at WMO at 1 Hz.

Coherence was estimated as a measure of the existence of a linear transfer function between the vertical strain and the vertical pendulum. At HNME there exists a well-defined linear transfer function in the band 0.1 to 0.6 Hz. The low coherence at higher frequencies at HNME and throughout the 0.1 to 3.0 Hz band at WMO rule out the possibility of a linear transfer function between the vertical strain and vertical pendulum.

Multiple coherence, and rotation of the horizontal short period seismograms were used to infer the existence of unidirectional noise components. At HNME about 80 percent of the noise power is unidirectional in the 0.3 to 0.4 Hz band. At WMO the noise field has no apparent single preferred direction. Preliminary work on rotation of the horizontal strain instruments at WMO is presented. The technique uses a third horizontal instrument to establish the shear component of strain.

Examples of detailed analysis to establish wavetype using the vertical strain, together with the vertical pendulum and horizontal pendulum instruments are included.

WOOLSON, J. R., Field Study of Variation in Characteristics of Seismic Noise and Signals with Geologic and Geographic Environment, Semi-annual Rept., VT/078, Contract AF 33(600)-42048, United Electro-Dynamics, Inc., Pasadena, Calif., 1961.

VESIAC 9568 VU

This report describes equipment and progress of Project VT/078, which maintains stations from Point Arguello through southern Nevada to Death Valley. Analyzing noise by writing a power spectral density plot of noise power as a function of frequency (by means of a wave analyzer), and determining the source of the noise by considering two related noise samples, the scientists have reached tentative results but need better equipment to surmount difficult calculating problems. Among the most interesting data concerning noise level are the discoveries that some stations in Death Valley have about the same noise level in the period range 0.5 to 1.5 sec as the Master Station in the Sierra Nevada.

WOOLSON, J. R., The (pP - P) Time Difference, Scientific Report, SDL Rept. No. 177, Project VT/6702, Contract F 33657-67-C-1313, Teledyne Industries, Inc., Earth Sciences Div., Alexandria, Va., 1967.

VESIAC 15,914 VU
AD 810 590

An investigation to combine REMODE with velocity filtering over a three component array in order to enhance depth phases experienced considerable difficulty in aligning P and pP phases simultaneously. To explain this difficulty, seismograms from four earthquakes were analyzed at the 9 sites in the TFO Extended Array. The depth phase (pP) is well-defined on these seismograms. It is established that the time difference (pP-P) at the 9 stations of the array differs by as much as 0.5 seconds for the same earthquake. It is concluded that each phase P, pP, and in one case sP, has its own travel-time anomalies for the TFO Extended Array. It is further concluded that REMODE should be applied to the three component seismograms, rather than to the sum of the horizontal and vertical components of the array.

WOOLSON, J. R., Field Study of Variation in Characteristics of Seismic Noise and Signals with Geologic and Geographic Environment, Contract No. VT/078, AF 33(600)-42048, United ElectroDynamics, Alexandria, Va., 1961.

VESIAC 5598 VU

Test results show that system magnifications obtained by the Benioff Develocorder galvanometer direct coupled system and the Johnson-Matheson solid state amplifier Develocorder system are within a small percentage (10% or less) of each other. Figures 1 and 2 are typical of a number of teleseisms which show that the Benioff system has a slightly higher amplitude than the Johnson-Matheson system at -60 db.

WU, C. and G. C. PHILLIPS, Seismic Wave Propagation from Salt-Dome Environments, VESIAC State-of-the-Art Report, Rept. No. 4410-79-X, Univ. of Michigan, Inst. of Sci. & Tech., Ann Arbor, Michigan, 1964.

VESIAC 8388 VU
AD 435 047

Buried explosions in salt domes generate seismic waves and fracture the medium around the detonation. Results show that the mechanics and dynamics of fracturing are not quantitatively known in detail. Seismic waves can be used to delineate the structural configuration of a salt dome. A continuous velocity log shows that the velocity in the salt is constant, while the velocity in the surrounding sediment varies with depth. The connection of salt domes with a single mother salt bed at depth may be tested by using the velocity contrast between salt and sediments. Decoupling effects are examined. Conclusions regarding proper equations of motion, theoretically computed waveforms, and the decoupling factor are given.

WU, F. T., Energy of Earthquakes, Amendment No. 9, AF 49(638)-1337, California Institute of Technology, Pasadena, Calif., 1965.

VESIAC 13,544 VU

The basic formulas for estimating the energy in body and surface waves are derived. Frequency domain operations are used in equalization and total energy in each phase is obtained by integration over frequency. The formulas take into account the radiation pattern of the source attenuation and in the case of Rayleigh and Love wave, the velocity-density structure of the earth.

The energy in P, S, Rayleigh and Love waves from the Iranian earthquake of September 1, 1962 has been worked out as an example.

WU, F. T., The Inverse Problem of Magnetotelluric Sounding, Sci. Rept., Contract AF 49(638)-1337, California Inst. of Tech., Pasadena, Calif., 1968.

VESIAC 17,621 VU

Based on the model of a flat layered earth, a non-linear least-square method is used to invert magnetotelluric sounding curves to obtain the layer resistivities and thicknesses. Partial derivatives of the apparent resistivity with respect to layer parameters are displayed to show the manner in which the layer parameters are contributing to the apparent resistivities. Uniqueness of the inversion is not guaranteed, but when the partial derivatives are linearly independent and the relative magnitudes of the layer resistivities of the initial guess are not too far from the correct ones, the convergence of the method to the correct values seems to be insured.

WU, F. T., Lower Limit of the Total Energy of Earthquakes and Partitioning of Energy Among Seismic Waves - Pt. I, Pt. II - Reflected Waves and Crustal Structures, Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966

VESIAC 19,767 VU

The basic formulae for estimating the energy in the seismic waves are derived. The formulae take into account the radiation pattern of the source, the compensation for the non-elastic absorption of the waves, the velocity-density structure of the earth, the effects of the crustal structure under the receiver and the response of the recording instruments. Operations are performed in the frequency domain.

Estimation of the seismic energy of an earthquake is closely related to the determination of the source mechanism and the radiation pattern of the source. We have determined the surface wave radiation pattern of a shallow shock and the P wave radiation pattern of an intermediate shock to show the correspondence between the fault-plane solutions and the fault mechanisms derived from radiation pattern.

We have obtained the energies of the two earthquakes mentioned above as well as 7 other earthquakes with known fault-plane solutions and/or radiation patterns. The "total" seismic energies for these earthquakes (magnitudes between 6 1/2 and 7 1/2) using the present procedures are at least an order of magnitude higher than those arrived at from the current magnitude-energy formula. The S wave energies are approximately an order higher than that of the P waves. The surface wave energies for the shallow shocks are three orders of magnitude less than the body wave energies. Thus, the S wave seems to be the main seismic wave energy carrier.

WU, F. T., Research in Seismic Phenomena Connected with Earthquakes and Explosions - Parts I and II (THESIS), Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 14,626 VU

This report defines the lower limit of the total energy of earthquakes and the partitioning of this energy among seismic waves. Also presented is a study dealing with reflected waves in relation to crustal structure.

WU, F. T., Research in Seismic Phenomena Connected with Earthquakes and Explosions - Part I: Lower Limit of the Total Energy of Earthquakes and Partitioning of Energy Among Seismic Waves (THESIS), Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 14,626-A VU

The basic formulae for estimating the energy in the seismic waves are derived. The formulae take into account the radiation pattern of the source, the compensation for the non-elastic absorption of the waves, the velocity-density structure of the earth, the effects of the crustal structure under the receiver and the response of the recording instruments. Operations are performed in the frequency domain.

WU, F. T., Research in Seismic Phenomena Connected with Earthquakes and Explosions - Part II: Reflected Waves and Crustal Structures (THESIS), Contract AF 49(638)-1337, Calif. Inst. of Tech., Pasadena, Calif., 1966.

VESIAC 14,626-B VU

Haskell's formulation for reflection of the body waves at the base of a solid crust is extended to include overlying liquid layers. Normalized displacement and the phase shift at the base of the crust as a function of angle of incidence and frequency are calculated for two continental models and an oceanic model. Complex reflection coefficients are inverse-Fourier transformed numerically to the time domain to show the change of pulse shape upon reflection. These time traces show that the water layer of the oceanic model causes the main difference between continental and oceanic reflections. Sample seismograms from a deep shock were compared to the theoretical records; they are found to be consistent.

WYSS, M., T. C. HANKS, and R. C. LIEBERMANN, Comparison of P-Wave Spectra of Underground Explosions and Earthquakes, Sci. Rept., Contract F44620-69C-0067, Calif. Inst. of Tech., Pasadena, Calif., 1970

VESIAC 20,345 VU

The P-wave displacement spectra of the underground explosions MILROW and LONGSHOT are compared to those of four shallow earthquakes of comparable body-wave magnitude (m_b) in the Aleutian Islands. The spectral data ($0.4 < T < 40$ sec) have been obtained from three vertical instruments at Pasadena, approximately 50° from the epicentral region common to the six events. A NOVAYA ZEMLYA explosion of comparable m_b was also analyzed.

YASUI, Y., "Volcanic Earthquakes and Tremors Accompanying the Activity of the Volcano Sakurajima in the Period from 1955 to 1957," Seismology News, Vol. 23, No. 1, pp. 35-45, 1958, (Translated from Japanese), Contract SD-78.

VESIAC 9829 VU

This report presents the results of an investigation carried out on the volcanic earthquakes and tremors induced by the eruption of the Sakura Island Volcano. First, induced earthquakes were classified into types A, B, C, and D, and the emphasis was placed on the observation of type B earthquakes. The characteristics of type B earthquakes are that their frequency increases prior to eruption, reaches a maximum, and then the eruption occurs, while the number of type B earthquakes decreases at the same time. This characteristic is not influenced by the duration of the volcanic activity. Type D earthquakes will be dealt with in a future report.

YEARSLEY, J. R., Internal Waves in the Arctic Ocean, Tech. Rept. No. 5, CU-5-66, Contract NOnr 266(82), Lamont Geol. Observ., Columbia Univ., Palisades, N. Y., 1966.

VESIAC 15,176 VU

A theoretical investigation is made of free internal gravity waves in a rotating fluid. An exponential density profile similiar to that of the Canada Basin of the Arctic Ocean is used. The dispersion relation and eigenfunctions of the vertical amplitude are calculated.

An experimental investigation of temperature fluctuations at 60 and 125 meters was conducted at T-3 in the Arctic Ocean. Power spectra of the records show a rapid decrease of power with increasing frequency.

YEPINATYEVA, A. M., "Comparison of Experimental and Theoretical Data on Refracted Waves Corresponding to Weak Interfaces," Trudy Inst. Fiziki Zemli, Akad. Nauk, SSSR, No. 14, pp. 135-144, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,509 VU

Experimental data on refracted waves forming in different media are analyzed and the results are compared to those expected from the theoretical formulas developed in previous chapters. Media with high velocities are considered as well as media with relatively low velocities.

YEPINATYEVA, A. M., "Comparison of the Data of Experiment and Theory on Refracted and Reflected Waves Beyond the Origin," Trudy Inst. Fiziki, Zemli, Akad. Nauk, SSSR, No. 14, pp. 221-243, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,520 VU

In this chapter, experimental data on the dynamics of reflected waves at different angles of incidence and on the amplitude ratio of reflected and refracted waves are compared with the results of theoretical calculations.

YEPINATYEVA, A. M., "Experimental Data on Reflected and Refracted Waves Near the Initial Points," Trudy Inst. Fiziki Zemli, Akad. Nauk. SSSR, No. 14, pp. 169-220, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,510 VU

In this chapter, experimental data are presented on both reflected waves at different angles of incidence on the reflecting boundary and on refracted waves near their origin.

YEPINATYEVA, A. M., "Experimental Data on Refracted Waves in Horizontally Layered Media with Small Velocity Differences," Trudy Inst. Fiziki Zemli, Akad. Nauk. SSSR, No. 14, pp. 90-133, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,511 VU

In this chapter, the characteristics of waves forming in media with small velocity differences are presented. The wave characteristics corresponding to weak interfaces are compared to those corresponding to strong interfaces.

YEPINATYEVA, A. M., "Kinematic and Certain Dynamic Features of Refracted Waves in Layered Media with Small Velocity Differences," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 14, pp. 64-89, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,137 VU

In this report certain questions of the kinematics of the propagation of waves are examined theoretically with regard to media with small velocity differences, and an attempt is made to approach the consideration of certain dynamic features of waves forming in such media. Distinctive features in the analysis and correlation of waves are examined, as well as certain features of the screening effect of layers in media with small velocity differences compared to media with strong velocity differences.

YEPINATYEVA, A. M., "A Method of Constructing Isoamplitude Maps of Refracted Waves," Trudy Geofiz. Inst., Akad. Nauk, SSSR, No. 35, pp. 146-158, Undated, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 17,450 VU

A method is presented for constructing isoamplitude charts of refracted waves; examples are given.

YEPINATYEVA, A. M., "Reflecte. and Refracted Waves in the Region Close to the Origins of Refracted Waves," Trudy Inst. Fiziki Zemli, A. N. SSSR., No. 14, Vol. 181, pp. 145-167, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,377 VU

This report presents a study of the characteristics of reflected and refracted waves close to their origins. Theoretical calculations of wave characteristics corresponding to interfaces with velocity and density differences are compared with experimental data obtained in real media.

YEPINATYEVA, A. M., "Refracted Waves in Media with Small Velocity Differences-Chapter I - Some Results of Analysis of Formulas for the Amplitudes of Refracted Waves," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 14, pp. 7-44, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,134 VU

A comparison is made of the expressions for the amplitude of refracted waves for different types of media and different sources. An analysis is made of formulas for the amplitudes of refracted waves in liquid media with harmonic sources.

YEPINATYEVA, A. M., "Some Questions in the Quantitative Interpretation of Seismic Data on Amplitudes," Trudy Inst. Fiziki Zemli, A. N. SSSR, No. 14, pp. 45-62, 1960, (Translated from Russian), Contract DA-49-083 OSA-3137.

VESIAC 16,132 VU

In this report, which is a chapter of a larger work, the problem of approximating the seismic amplitude-distance relation by a power function of the form K/X^n, where X^n is the dispersion function, is examined. Also examined are the differences in the methods of determining the exponent of the dispersion function and the absorption coefficient.

YOLE, R. W., Effects of Location of Seismograph Stations on the Records Obtained, Contract AF-AFOSR-702-67, Arctic Inst. of North America, Montreal, Quebec, Canada, 1967.

VESIAC 16,508 VU

A brief discussion of the results of a time-domain study of 41 teleseismic events recorded during the Alberta experiment of 1965 is given.

YOUNG, D. F., Spectral Analysis of Seismic Signals Generated by CHASE VII and CHASE V Detonations, Tech. Prog. Rept. No. 17, Contract Nonr 4026(00), Underwater Systems, Inc., Silver Spring, Md., 1967

VESIAC 19,162 VU

The CHASE VII event consisted of the underwater explosion of 400 tons TNT equivalent at a nominal detonation depth of 3000 feet. The CHASE V event had a yield of 1000 tons and was detonated at a nominal depth of 4000 feet. Narrow band spectra of the seismic signals generated by these events as received at a number of LRSM stations and Vela observatories are presented. Source-receiver distances of selected stations range from approximately 700 to 5000 kilometers.

YOUNG, D. F., D. D. WOOLSTON, and M. BLAIK, Spectral Analysis of Hydroacoustic Signals Generated by the CHASE V, CHASE VII, NOL-VELA, and Arctic Explosions, Tech. Prog. Rept. No. 21, Contract Nonr 4026(00), Underwater Systems, Inc., Silver Spring, Md., 1968

VESIAC 19,105 VU

Results of narrow band spectral analyses of hydroacoustic signals generated by underwater explo. .ons in several programs are presented. Analyses were performed for explosion data obtained at ranges varying from several kiloyards to thousands of miles.

YUNUSOV, N. K., "Making Corrections for the Upper Layer in Hodographs of Reflected Waves on the Eastern Border of the Russian Platform," Prikladnaya Geofizika, No. 15, pp. 115-129, 1957, (Translated from Russian), Contract SD-78.

VESIAC 12,129 VU

In the exploration of mildly sloping structures the correction for an upper layer which is characterized by an inconstant thickness and average velocity must be made with a high degree of accuracy. A main source of systematic errors in making the corrections is the variation of the average velocity in the super-Kungar layer over the area. To study the velocity characteristics over the area in which the seismic work is conducted, it is necessary to drill control bore holes. The number of control bore holes needed, according to circumstances, and ways in which to reduce their number, are discussed. To establish the relationship between v_1 and the section of the upper layer one has to study carefully all data on the section.

YURCHENKO, P. I., "A Method of Seismic Prospecting for Gently Sloping Structures," Prikladnaya Geofizika, No. 17, pp. 104-114, 1957, (Translated from Russian), Contract SD-78.

VESIAC 12,134 VU

The following conclusions were reached as the result of the work reported here: (1) It is impossible to raise the geological effectiveness of seismic exploration using the method of reflected waves for exploring mildly sloping structures without further technique improvements in the seismic exploratory apparatus; (2) Experimental work has to be organized on a wide scale for the frequency analysis of oscillations in a number of regions which would help in selecting the frequency characteristics of the filters; (3) The introduction of multichannel seismic stations makes possible the simultaneous recording of oscillations using different filtrations. In connection with this, there is a need for changing the order of technical and economic organization of parties.

ZABLOCKI, C. J., Electrical Transients Observed During Underground Nuclear Explosions, Technical Letter Crustal Studies 28, Final Report, Contract ARPA Order No. 193-61, U. S. Geological Survey, Denver, Colorado, 1965. (OFFICIAL USE ONLY)

VESIAC 13,234 VU O

ZABLOCKI, C. J., D. B. JACKSON, Electrical Transients From Nuclear Explosion in Salt (Project Dribble - Salmon Event), Tech. Rept. No. 37, Contract ARPA Order No. 193-61, U. S. Geological Survey, Denver, Colorado, 1964.

VESIAC 12,567 VU
AD 470 820

The radial and transverse components of the electric field induced in the earth during the SALMON event were recorded at 272 meters from the surface projection of ground zero. Sensitive instruments 5.30 and 55.2 km east of ground zero failed to detect a resultant transient. The recorded transient was characterized by a quasi-sinusoidal pulse and a half-cycle wave, both of which are fully described. The polarization of the initial pulse was about 10 degrees south of the radial direction from the shot point, being positive toward the shot point. One possible source mechanism was a horizontal electric dipole formed by the Compton electron flux with a strength of about 10^4 ampere-meters. Another was a magnetic dipole with a strength of about 10^7 ampere-meters^2.

ZAIDEL'SON, I. I., V. A. REDKOLIS, and V. I. RIKHTER, "Investigation of the Electrohydraulic Effect in Seismic Surveying," Fizika Zemli, No. 7, pp. 106-114, 1965, (Translated from Russian), Contract SD-78.

VESIAC 13,021 VU

Attempts to create automatic seismic instruments and to eliminate the shortcomings inherent in explosive work has stimulated the Kuibyshev Petroleum and Geophysics Trust to seek new ways and sources of excitation of elastic waves. The utilization of the electrohydraulic effect, or Yutkin effect, based on an electrical charge of high potential in a liquid medium, appeared to be promising for these purposes. Experimental work on these matters was carried on between 1961 and 1963. Described are: (1) Operating Principle and Description of the Electrohydraulic Source of Pulses; (2) Experimental Field Work - Seismological conditions of the working region; (3) Experimental investigation on the profile.

ZAKASHANSKII, M. S., "Density of the Meso-Cenozonic Deposits in the West Siberian Plain," Prikladnaya Geofizika, No. 23, pp. 100-111, 1959, (Translated from Russian), Contract SD-78.

VESIAC 12,133 VU

This paper contains certain results obtained by the systematic study and analysis of data on the density of the sedimentary rocks of the Meso-Cenozoic cover of the southern part of the west Siberian plain.

ZATONSKII, L. K., V. F. KANAEV, and G. B. UDINTSEV, "Geomorphology of the Underwater Part of the Kurile-Kamchatka Chain," Oceanologyial Investigations, No. 3, pp. 124-136, 1961, (Translated from Russian), Contract SD-78.

VESIAC 8502 VU

This is a report on the marine geological studies of the Kurile-Kamchatka chain. This study was undertaken by the Institute of Oceanography of the Academy of Sciences of the USSR. The report discusses topics such as: the Kurile-Kamchatka chain as a distinct morphological complex, profile of the Kurile-Kamchatka trough, the mountain formations in the chain, the underwater slope, distribution of earthquake foci, underwater volcanic structures, barrier for tidal waves, and the thickness of the sedimentary stratum. Although many questions remain unanswered, the author feels further work will produce many new results.

ZAV'YALOV, V. D., "Interpretation of Seismograms in Zones of Interference," Prikladnaya Geofizika, Sbornik Statei, Vol. 24, pp. 26-53, 1960, (Translated from Russian), Contract SD-78.

VESIAC 9407 VU

In an earlier paper, the author studied the problem of the shape of the hodographs of reflected waves theoretically, in the case of non-planar reflecting boundaries. He also developed the method of imaginary lines, permitting the construction of a reflecting layer of any complex shape provided that the hodograph of the reflected wave corresponding to this layer is found. Uses and limitations of the method of imaginary lines are discussed; it was difficult to use in the solution of reverse problems. In this paper, the attempt was made to explain that the fundamental law of phase correlation of waves in an interference zone is a natural outgrowth of studies in the field of the interpretation of complex seismic data.

ZBUR, R., P. KLASKY, W. FEETHAM and G. FRANCIS, Tonto Forest Seismological Observatory, Semiannual Rept., Contract No. VT/070, AF 33(657)-7747, United ElectroDynamics, Inc., Pasadena, Calif., 1963.

VESIAC 7237 VU

This report is divided into five sections: 1) facilities; 2) operation; 3) calibration; 4) development and evaluation; and 5) analysis. The text is a summary and is followed by several appendices covering the details for each section of the report.

ZENGENI, T. G., Azimuthal Correction for dT/dΔ for a Single Dipping Plane Interface, Sci. Rept., Contract AF 49(638)-1687, Stanford Univ., Stanford, Calif., 1969

VESIAC 19,833 VU

A relation is derived for correcting $dT/d\Delta$ for a single dipping interface under a seismic array:

$$\left(\frac{dT}{d\Delta}\right) = \left(\frac{dT}{d\Delta}\right)' \frac{\sin(\Omega-\omega')}{\sin(\Omega-\omega)}$$

The formula depends only on the azimuth angles: ω is the computed azimuth, ω' is the observed azimuth, Ω is the azimuth of the normal to the tilted interface, and $(dT/d\Delta)'$ is the observed quantity. The relation is explicitly independent of the dip and the velocities of the media on either side of the interface.

ZOEPPRITZ, K., "Reflection and Transmission of Seismic Waves Through Discontinuity Surfaces," Kgl. Ges. d. Wiss., Nachr., Math.-phys. KL, No. 1, pp. 66-84, 1919, (Translated from German), Contract SD-78.

VESIAC 10,167 VU

The author develops formulas for discussing reflection and transmission of elastic waves through the interface between two elastic media of any type. Included are: (1) calculations for two cases of the incident wave (when it is longitudinal, and when it is transverse); (2) calculations for total reflection; (3) Assuming a viscous magma layer would be present at a low depth (considering both the liquid and elastic layer), the author concludes that there is no generally distributed magma layer, a conclusion which agrees with the findings of geology. The author suggests conducting earthquake observations near a large active volcano to recognize the attenuating influence on forerunner waves which deep magma must exert if the fluid focus is sufficiently extensive.

ZVOLINSKII, N. V., "Wave Problems in the Theory of Elasticity of a Continuous Medium," Izv. Akad. Nauk Assr. Mekh., No. 11, pp. 109-123, 1965, (Translated from Russian), Contract SD-78.

VESIAC 12,449 VU

The author describes in a brief survey the accomplishments in this field. He points out current trends and theories of the elastic oscillations of a continuous medium.