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AUTHORITY

usaf ltr, 25 jan 1972

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TEXAS INSTRUMENTS

INCORPORATED

13500 NORTH CENTRAL EXPRESSWAY · DALLAS TEXAS

SERVICES GROUP

9 September 1970

STATEMENT #2 UNCLASSIFIED

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Attention:	Lt. John Woods
Subject:	Fourth Quarterly Report Covering Period 1 June through 31 August 1970
Identification:	AFTAC Project No.: VELA/T/0702/B/ASD
	Project Title: Seismic Discrimination
	ARPA Order No.: 624
	ARPA Program Code: 9F10
	Name of Contractor: Texas Instruments Incorporated
	Contract Number: F33657-70-C-0311
	Effective Date of Contract: 25 August 1969
	Amount of Contract: $222,250
	Contract Expiration Date: 14 September 1970
	Project Manager: Stanley J. Laster

Gentlemen:

MAJOR ACCOMPLISHMENTS

Most of the work during the fourth quarter was directed toward long period discrimination studies and to combined use of long and short period discriminants.

1) Long and short period recordings from LASA were available for 38 shallow Asian earthquakes and 26 presumed explosions. These were used for combined long period - short period classification using the Seismic Event Classification Software Package. Of these events, two earthquakes and two explosions were misclassified using m_b vs. M_s criteria. No improvement in classifying this set of events was obtained by using additional short or long period discriminants. Work is now underway to classify events not in these two ensembles.

2) Long-period discriminants were computed for an additional 23 events (earthquakes with miscellaneous source region) recorded at LASA. Short-period recordings were not available for some of these events. The resulting discriminants were plotted on the same two dimensional plots as the 38-26 ensemble discussed above. Except for two deep events, all the points fell in with the 38 earthquakes.

3) A group of nine events recorded at ALPA were obtained from the Seismic Array Analysis Center. These consist of Nevada Test Site explosions and some small Western U. S. earthquakes. Signal-to-noise ratio on five events is so low that signals are not visually apparent. Long-period discriminants were completed for these events and were plotted as above. The Handley event, which had the best signal-to-noise ratio, fell slightly on the earthquake side of the line best separating the 38 earthquakes and 26 explosions (m_b vs. M_s). The earthquakes, for which the discriminants were noise-limited, fell on both sides of this line.

4) Recently long-period data has been obtained for three events recorded teleseismically at both LASA and ALPA. One of these is presumed to be an explosion, and plots of the raw ALPA data for this event show no visible signal. All the events will be plotted, and discriminants computed, so that values at the two arrays can be compared.

5) A magnetic tape containing eight events recorded at two sites was obtained from the contract monitor. These events have been read off the tape and plotted. These were run through the Seismic Event Calssification Software Package, and a report has been prepared.

6) A list of 30 events to be run through SECSP at SAAC was compiled in March by the contract monitor. Many of these events had not been processed by the SAAC short-period event processor. As the event processor output is the required input to SECSP, the classification processing was delayed until the events could be run through the event processor. It now appears that twelve of the events are ready for input to SECSP, and further that the remaining eighteen events will not be available as they were either not recorded or were on tapes that were re-cycled.

7) The literature search comparing teleseismic signatures of chemical and nuclear explosions has been completed. A report has been prepared and will be submitted. No significant quantitative information was found, although it was found that one (possibly two) teleseismic chemical explosions from Asia have been recorded by U. S. array stations in recent years.

8) Studies on the detection of higher modes by the Markov spectral estimate technique are nearing completion, and a report is being prepared. The technique has been shown to give very good results when applied to synthetic data for which the answer is known. Probable higher modes have been for some regional events recorded at LASA. However, no significant amount of higher mode energy has been found for a group of about 35 teleseismic events recorded at LASA.

9) Results of work performed through 15 July 1970 were reported at the ARPA sponsored Seismic Discrimination Symposium, July 20-23, 1970 at Woods Hole, Massachusetts.

ACTION BY AFTAC

None

FINANCIAL STATUS

Financial status for this contract will be reported in the AMSR to be submitted later in September.

Very truly yours,

TEXAS INSTRUMENTS INCORPORATED

Stanley J. Laster
Program Manager

SJL:np

REPORT OF PROGRESS AGAINST SELECTED MILESTONES
(See Instructions on reverse before filling in)

APPLICATION NUMBER 624

2. PROJECT
AFTAC Project No. VELA T/0702

3. COMPONENT
SEISMIC DISCRIMINATION TECHNIQUES

4. NAME AND LOCATION OF PREPARING ACTIVITY
Texas Instruments Incorporated
Services Group
Dallas, Texas 75222

5. CONTRACT NUMBER
F33657-70-C-0311

6. REPORT FOR MONTH ENDING
31 Aug 70

Code a	Milestone b	Scheduled Completion Date c	Estimated Completion Date d	Date Completed e	Remarks f
A-1	Checkout SECSP programs; send to Washington; successfully process one event	1 Dec 69	15 Jan 70	15 Jan 70	
A-2	Determine discriminants to use in SECSP; submit recommendation to AFTAC for approval	15 Dec 69	1 Sept 70	1 Sept 70	
A-3	Specify offline processing needed to use LP discriminants in SECSP for data recorded at LASA	15 Nov 69	1 June 70	1 June 70	
A-4	Determine modifications necessary and statistics to use in applying SECSP to ALPA events	1 Jan 70	1 June 70	1 June 70	
A-5	Complete processing of Eurasian seismic events (recorded at LASA and ALPA) using SECSP	1 Sep 70	15 Sept 70		
A-6	Prepare special report summarizing results of SECSP processing	15 Sep 70	15 Sep 70		
B-I	Conduct literature search and publish report on differences between seismic signatures of nuclear and chemical explosions	1 May 70	15 Sept 70		
C-I	Obtain data ensembles with continental paths recorded at LASA and ALPA	15 Feb 70	15 Aug 70	15 Aug 70	

TYPED NAME AND TITLE
Stan Laster, Program Manager

SIGNATURE

TELEPHONE
214-238-2997

DATE SIGNED
9 Sept 70

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REPORT OF PROGRESS AGAINST SELECTED MILESTONES (See instructions on reverse before filling in)				1. ARPA ORDER NUMBER 624	
2. PROJECT AFTAC Project No. VELA T/0702			3. COMPONENT SEISMIC DISCRIMINATION TECHNIQUES		
4. NAME AND LOCATION OF PREPARING ACTIVITY Texas Instruments Incorporated Services Group Dallas, Texas 75222				5. CONTRACT NUMBER F33657-70-C-0311	
				6. REPORT FOR MONTH ENDING 31 Aug 70	
Code a	Milestone b	Scheduled Completion Date c	Estimated Completion Dat d	Date Completed e	Remarks f
C-2	Prepare special report comparing various methods of detecting and isolating higher-mode surface waves and usefulness of such waves for discrimination	15 May 70	15 Sept 70		
C-3	Investigate effectiveness of various methods for designing matched filters used in detecting long-period Rayleigh-wave energy	15 Jan 70	1 July 70	1 July 70	
C-4	Specify methods to use, if any, to remove noise before computing long-period discriminants	15 Dec 69	15 July 70	15 July 70	
C-5	Prepare special report discussing effects of noise on various discrimination statistics	1 Aug 70	15 Sept 70		
C-6	Specify statistics to use in evaluating combined discrimination capability of LASA and ALPA	1 Jun 70	1 Aug 70	1 Aug 70	
C-7	Complete processing of previously recorded LASA and ALPA events	1 Sep 70	15 Sept 70		
C-8	Prepare special report summarizing combined LASA-ALPA discrimination capabilities	15 Sep 70	15 Sep 70		
C-9	Prepare final report summarizing all research performed under contract	15 Sep 70	15 Sep 70		

TYPED NAME AND TITLE Stan Laster, Program Manager	SIGNATURE	TELEPHONE 214-238-2997	DATE SIGNED 9 Sept 70

SD FORM 350

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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*	2a. REPORT SECURITY CLASSIFICATION
Texas Instruments Incorporated P.O. Box 5621 - Services Group Dallas, Texas 75222	Unclassified
	2b. GROUP None

3. REPORT TITLE

STATISTICAL DISCRIMINATION, QUARTERLY REPORT NO. 4

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Third Quarterly, 1 June 1970 to 31 August 1970.

5. AUTHOR(S) *(First name, middle initial, last name)*

Stanley J. Laster, Program Manager

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
9 September 1970	5	0

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
F33657-70-C-0311	
b. PROJECT NO. VELA T/0702/B/ASD	
c.	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*
d.	

10. DISTRIBUTION STATEMENT

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
ARPA Order No. 624	Advanced Research Projects Agency Department of Defense, The Pentagon Washington, D. C. 20301

13. ABSTRACT

Work done under this contract for the period 1 June to 31 August 1970 is reviewed.

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KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Discrimination						
ALPA						

Discrimination

ALPA