

AD-A160 607 BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS
SUPPLEMENT 13(U) ARMY ENGINEER TOPOGRAPHIC LABS FORT
BELVOIR VA E J BOOKS ET AL. MAY 85 ETL-0395

BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS
SUPPLEMENT 13(U) ARMY ENGINEER TOPOGRAPHIC LABS FORT
BELVOIR VA E J BOOKS ET AL MAY 85 ETL-0395

1/1

UNCLASSIFIED

F/G 8/2

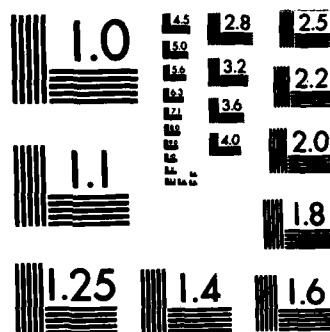
NL

2000

END

[illegible]

OTFC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

ETL - 0395

(13) (12)

AD-A160 607

**Bibliography of in-house
and contract reports,
supplement 13**

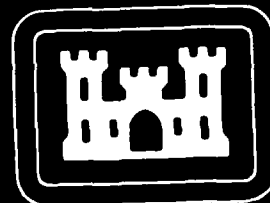
E. James Books
Margaret F. Fox
Alice L. Holmes

May 1985

DTIC
ELECTE
OCT 28 1985
S D B

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

Prepared for
U.S. ARMY CORPS OF ENGINEERS
ENGINEER TOPOGRAPHIC LABORATORIES
FORT BELVOIR, VIRGINIA 22060-5546



E

T

L



85 10

DTIC FILE COPY

Destroy this report when no longer needed.
Do not return it to the originator.

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

The citation in this report of trade names of commercially available products does not constitute official endorsement or approval of the use of such products.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0395	2. GOVT ACCESSION NO. AD-A160 607	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS, SUPPLEMENT 13		5. TYPE OF REPORT & PERIOD COVERED Bibliography, Supplement 13 1 Jan 84 - 31 Dec 84
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) E. James Books Margaret F. Fox Alice L. Holmes		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060-5546		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, Virginia 22060-5546		12. REPORT DATE May 1985
		13. NUMBER OF PAGES 67
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release; Distribution Unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Author and title indexes are provided for the ETL "Bibliographies of In-House and Contract Reports." The indexes are designed to be used in conjunction with the 13 published bibliographies and refer to them by year and page: AD-877 653L(1970); AD-890 066L (1971); AD-905 548L(1972); AD-B005 275L(1975); AD-B010 642L(1976); AD-B019 966L (1977); AD-A055 468(1978); AD-A068 744(1979); AD-A084 111(1980); AD-A099 803 (1981); AD-A113 006(1982); AD-A128 400(1983); AD-A141 778(1984). The indexes were prepared by the staff of the Scientific and Technical Information Center.		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

PREFACE

This is Supplement 13 to the report titled "Bibliography of In-House and Contract Reports" (AD-877 653L), (Supplement 1, AD-890 066L), (Supplement 2, AD-905 548L), (Supplement 3, AD-B005 275L), (Supplement 4, AD-B010 6421), (Supplement 5, AD-B019 966L), (Supplement 6, AD-A055 468), (Supplement 7, AD-A068 744), (Supplement 8, AD-A084 111), (Supplement 9, AD-A099 803), (Supplement 10, AD-A113 006), (Supplement 11, AD-A128 400), (Supplement 12, AD-A141 778). It is a continuing bibliography of reports prepared by and for the U.S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia. This bibliography includes reports that were published from 1 January 1984 through 31 December 1984.

Reports with AD numbers can be purchased by Department of Defense agencies from the Defense Technical Information Center; other agencies and individuals can purchase copies from the National Technical Information Service, Springfield, Virginia 22161. Reports with a "B" in the AD number are limited in distribution to U.S. Government agencies unless permission for release is granted from the controlling office. Reports are available on an interlibrary loan from the Scientific and Technical Information Center (STINFO), U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia 22060-5546.

COL Alan L. Laubscher, CE was Commander and Director, and Mr. Walter E. Boge, was Technical Director of the Engineer Topographic Laboratories during the report preparation.

Accession For	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
For all other cases	
By	
DTIC/STINFO	
1000 1st St. SW	
Alexandria, VA 22304	
Date	
A-1	



CONTENTS

PAGE

PREFACE	i
REPORTS	1
PAPERS	20
INDEXES	
Titles	22
Corporate Authors	24
Contract Numbers	25
Personal Authors	26
AD Numbers	27
APPENDIX	
Titles – 1970-1984	29

**AIR PHOTO ANALYSIS, PHOTO INTERPRETATION LOGIC,
AND FEATURE EXTRACTION**

June 1984

**Rinker, J.N.
Corl, P.A.**

Keywords: Photo Analysis, Photo Interpretation Logic, Feature Extraction, Air Photo Keys, Image Analysis, Remote Sensing, Vegetation Classification, Knowledge Based Systems

This is a status report about some of the research efforts within the Center for Remote Sensing (CRS) that are associated with image analysis. Emphasis has been placed on the manual procedure of photo analysis, photo interpretation logic, classification schemes, and knowledge based systems. Information derived from other sources and information presented by contributors are acknowledged in the appropriate sections.

DIGITAL PRE-PRESS SYSTEM DESIGN STUDY
December 1983

Lianza, Thomas

EIKONIX Corporation

DACA76-83-C-0006

Keywords: Cartography, Computers, Electronic Pre-press, Graphic Arts, Mapping

This report recommends an approach, hardware/software requirements, and design specifications for a digital pre-press system. This system will process digital cartographic data and create composited, symbolized, and edited data files formatted for input to digital graphic arts reproduction systems.

**METHODOLOGICAL PRELIMINARIES TO THE DEVELOPMENT
OF AN EXPERT SYSTEM FOR
AERIAL PHOTO INTERPRETATION
January 1984**

Hoffman, Robert R.

Keywords: Aerial Photo Interpretation, Artificial Intelligence, Psychology of Perception, Experimental Methods

This report describes an investigation of the psychological aspects that affect the reasoning of expert aerial photo interpreters. The purpose of the study is to help develop an artificial intelligence expert system to aid terrain analysis. Artificial intelligence offers tools for studying and representing expert knowledge and reasoning. This study examines four methods for extracting the expert's knowledge: The Standard Terrain Analysis Method, the Structured Interview Method, the Limited Information Task, and the Method of "Tough Cases." Criteria are presented for analyzing the four methods, and criteria that must pertain to aerial photo interpretation in order for expert systems tools to be applicable are described. This report discusses the structure of expert systems, in general, and the structure of an expert system for photo interpretation, in particular.

**SYNTHESIS GUIDE FOR RIVER CROSSINGS
(Report No. 11 in the ETL series on Guides for Army Terrain Analysts)
October 1983**

Messmore, Jeffrey A.

Keywords: Military Geographic Information, River Crossing, Tactical Gap Crossing, Terrain Analysis

This report provides a method for evaluating watercourse segments for suitability as river-crossing areas. The primary source of information for this evaluation is the preformatted Watercourses/Water Bodies data field. General guidance is given concerning how additional data fields and terrain analysis products such as Roads and Related Structures, Concealment, and Cross-Country Movement could be used to refine this evaluation further.

ETL-0346

AD-A142 728

**A MATHEMATICAL METHOD FOR INVERSION IN
ATMOSPHERIC REMOTE SENSING**

November 1983

Margerum, Eugene A.

Keywords: Integral Equations, Inversion Methods, Radiative Transfer, Remote Sensing

A method is developed for solving Fredholm integral equations of the first kind. The method is particularly intended for use in obtaining atmospheric profiles from remotely sensed radiance measurements, and should be generally useful for numerical inversion problems where the solution can be expressed as a linear superposition. Some discussion of general mathematical and physical considerations is also given.

ETL-0347

AD-A141 772

**ANALYSIS OF INTERACTIVE IMAGE CLEANSING
VIA RASTER-PROCESSING TECHNIQUES**

November 1983

Friend, Nancy J.

Keywords: Interactive Image Cleansing, Raster Processing, STARAN Associative Array Processor, Binary Imagery

An Analysis of an interactive image-cleansing program, RASTER, is presented. RASTER is utilized for cleansing binary imagery in a fast and effective manner via nine programmed functions, which are herein described and illustrated.

ETL-0348

AD-A140 197

**INTERACTIVE DIGITAL IMAGE PROCESSING FOR
TERRAIN DATA EXTRACTION, PHASE 4
November 1983**

Heydt, Howard
Karkhanis, Vijay
Wescott, Thomas

General Electric Company

DAAK70-79-C-0153

Keywords: Digital Image Processing, Terrain Analysis, Feature Classification, Raster to Polygon Conversion, Digital Mosaicking

This phase of the study concentrated on refinement of vegetation extraction techniques developed in phases 1 through 3. Software was also generated for scaling and mosaicking vegetation data derived from separate adjacent scenes, as appropriate for covering a given map area. The raster format classification files were converted to polygon vector files in the Standard Interface Format.

ETL-0349

AD-A142 698

**VOICE INTERACTIVE SYSTEMS TECHNOLOGY (VIST) RESEARCH
January 1984**

DeYoung, Tice F.

Keywords: Automated Word Recognition, Speech Recognition, Speech Synthesis, Voice Technology, VTAG

This report discusses the results to date of the VIST research at the U.S. Army Engineer Topographic Laboratories (ETL), and describes in detail how to make the Interstate Electronics Corporation Voice-Recognition Module and Voice-Synthesis Module work on Hewlett-Packard 1000, Data General Eclipse S-250, and Digital Equipment Corporation PDP-11/45 minicomputers.

ETL-0350

AD-A141 766

**REGISTRATION OF A LANDSAT IMAGE TO A
DTM-AN ERROR ANALYSIS**

January 1984

Crombie, Michael A.

Shine, James A.

Moore, William

Allton, Glenn

Keywords: Digital Image, DTM, Error Propagation, LANDSAT, Least Squares, Pattern Recognition

A mathematical model is postulated and tested that will enable a user to relate a digital LANDSAT image to a digital terrain matrix (DTM). The practicality of the procedure is examined and evaluated.

ETL-0351

AD-B086 190L

DIRECT DIGITAL COLOR PROOFING TECHNOLOGY OVERVIEW

January 1984

Harris, Barry

Dunn Technology, Incorporated

DAAK70-83-C-0162

Keywords: Computers, Color Proofing, Graphic Arts, Electronic Prepress, Electronic Picture Processing

As the use of capital-intensive electronic picture processing equipment, such as color scanners and color electronic prepress systems, becomes more widespread in Defense Mapping Agency (DMA) production activities, the need for an accurate, economical, and fast Direct Digital Color Proofing (DDCP) system must be considered.

Reviewed in this report are the market forces driving the development and commercialization of DDCP in general, the photographic color materials available for use in DDCP, conventional prepress proofing materials/systems that form the technology base for DDCP, potential electrophotographic proofing methods, DDCP systems that provide a hard copy output without the use of intermediates, and obstacles to adapting this emerging technology to meet DMA's requirements.

ETL-0352

AD-A147 637

TERRAIN ANALYSIS PROCEDURAL GUIDE FOR SURFACE CONFIGURATION
(Report No. 12 in the ETL Series on Guides for Army Terrain Analysts)
March 1984

Mintzer, Olin
Messmore, Jeffrey A.

Keywords: Terrain Analysis, Remote Sensing, Topography, Aerial Photography, Military Military/Geographic Information, Geology/Soils, Factor Mapping, Surface Roughness, Slope, Landform, Photo Interpretation

This procedural guide is an instructional manual for the use of the U.S. Army Terrain Analyst when preparing the following factor overlays: slope, landform, and surface roughness. These overlays are constructed from the analysis of the combined data extracted from literature, topographic maps, and aerial/LANDSAT imagery. A catalog section includes the descriptions of photo pattern, topographic map, and surface roughness data elements for thirty-seven typical topographic/geologic forms.

ETL-0353

AD-A141 778

BIBLIOGRAPHY OF IN-HOUSE AND CONTRACT REPORTS
SUPPLEMENT 12
March 1984

Barrón, Rosalinda P.

Author and title indexes are provided for the ETL "Bibliographies of In-House and Contract Reports." The indexes are designed to be used in conjunction with the 12 published bibliographies and refer to them by year and page: AD-877 653L(1970); AD-890 066L(1971); AD-905 548L(1972); AD-B005 275L(1975); AD-B010 642L(1976); AD-B019 966L(1977); AD-A055 468(1978); AD-A068 744(1979); AD-A084 111(1980); AD-A099 803(1981); AD-A113 006(1982); AD-A128 400(1983).

The indexes were prepared by the staff of the Scientific and Technical Information Center.

ETL-0354

AD-A142 918

TERRAIN ANALYSIS PROCEDURAL GUIDE FOR BUILT-UP AREAS
(Report No. 13 in the ETL Series on Guides for Army Terrain Analysts)
April 1984

Frodigh, Roland J.

Keywords: Terrain Analysis, Topography, Photo Interpretation, Urban Areas, Military Geographic Information

This procedural guide provides the Army Terrain Analyst with the methods and procedures to generate thematic, or factor overlays, with supportive tables, for portraying approximately 20 built-up area elements. Retrieval of information from these basic sources (topographic maps, photography, and literature) is considered, and applied techniques for development of factor overlays are documented in a step-by-step sequence.

ETL-0355

AD-A148 295

LOW COST GYROCOMPASS
June 1984

Kishel, Joseph F.

GYROART, Incorporated

DAAK70-83-C-0168

Keywords: Azimuth, Gyrocompass, Gyroscope, North-finding

This report summarizes study and analysis efforts that were directed towards using gyro-technology to define true north to an accuracy of 2 milliradians in 2 minutes time in the presence of vibration environments encountered on launch vehicles. It concludes that a device could be fabricated to meet stated requirements by using a design approach that avoids the dynamics problems inherent in all pendulous suspensions for the gyro.

ETL-0356

AD-B088 848L

AUTOMATIC CONTROL OF DIGITAL STEREO CORRELATION METHODS

June 1984

Pfirman, Eric S.
Barrett, Scott A.
Barth, Stephen W.
Kinn, Gerald J.

PAR Technology Corporation

DACA76-83-C-0003

Keywords: Digital Stereo Correlation, Feature Extraction, Image Classification, Pixel Matching, Rule-Based Heuristics, Symbolic Image Processing

This report describes the approach used and results obtained in the process of combining two independent methods for automatic stereo correlation into one operational program. One method is the Symbolic Matching for Automatic Stereo Correlation (SMASC) program, which uses symbolic image processing techniques to match stereo images of predominantly urban areas. The second is the Digital Image Matching Program (DIMP), which uses conventional pixel matching to determine correlation between images and is more appropriate in rural areas. By combining the two methods, a single approach is obtained which is generally more applicable to a wider range of stereo images than either of its independent parts.

ETL-0357

AD-A142 388

DATA INTEGRITY FACTORS AFFECTING THE CONSTRUCTION OF THE MAPPING, CHARTING, AND GEODESY DATA BASE

July 1983

Friedman, S.Z.

Jet Propulsion Laboratory

Numerous data integrity problems were encountered while processing the digitized map data used for the research task, "An Image Based Approach to Mapping, Charting, and Geodesy" (JPL Task No. RD-182, Amendment 125). Increased interest in those problems has prompted this separate report. Specific data integrity problems are analyzed and methods for their solution are described. Although many of the problems described herein are project specific, this document contains information which could be useful to data base specialists who are concerned with data integrity problems associated with building large cartographic data bases.

ETL-0358

AD-B083 114L

VERTICAL OBSTRUCTION STUDY, FINAL REPORT
April 1984

Dam, A.L.

Helava Associates, Incorporated

DAAK70-82-C-0028

Keywords: Computers, Digital Image Processing, Photogrammetry

This report documents some basic studies in extracting possible candidates for vertical obstructions from digitized aerial imagery using various digital processing techniques.

ETL-0359

AD-A143 250

**MANUAL AND AUTOMATED LINE GENERALIZATION AND
FEATURE DISPLACEMENT**
June 1984

Zoraster, Steven
Davis, Dale
Hugus, Marc

ZYCOR, Incorporated

DAAK70-82-C-0149

Keywords: Automated Cartography, Line Generalization, Feature Displacement, Line Smoothing, Map Compilation, Map Generalization

The primary objective of this effort was to examine map compilation techniques used for manual and automated line generalization and feature displacement. Manual techniques used at several Defense Mapping Agency compilation sites are described in detail. An extensive survey of algorithms suggested in the cartographic, image processing, and computer science literature is provided. Possible criteria for evaluating algorithm performance are discussed and line generalization algorithms are ranked according to certain of these measures.

HEXAGONAL DATA BASE STUDY, PHASE II
October 1984

Gibson, Laurie
Gomer, William
Lucas, Dean

Interactive Systems Corporation

DAAK70-82-C-0133

Keywords: Hexagonal Data Structures, Automated Mapping, Polygon Processing

This is a final report for a study in the application of hexagonal data structures to handling geographic information. This report presents the results of an experimental software implementation utilizing hexagonal data structures as applied to test data base.

SATELLITE OBSERVATIONS OF WIDESPREAD FOG
June 1984

Wexler, Ruth L.

Keywords: Fog, Degraded Visibility, Satellite Observation, Dissipation, Temperature Changes, Pressure Changes, Weather Impact

This case study of widespread fog, as revealed by satellite observations, is part of an Army-wide investigation of problems causing battlefield obscuration. The purpose of the study is to develop a spatial and temporal model of fog dissipation by the use of satellite imagery. It is expected that such a model will be of aid to field commanders in their analyses of operational constraints of men and materiel. Satellite photographs of fog on 6 October 1982 as well as associated surface weather observations, are used to present a weather scenario of extensive fog over the Eastern United States. From a sequence of satellite images, one could determine the rate of the inward shrinking of the fog area with time, based on measurements of the fog periphery. The fog initially covered an area of $8.6 \times 10^4 \text{ km}^2$ in the early morning and shrank to an area of $5 \times 10^3 \text{ km}^2$ by mid-afternoon. From aloft, the behavior of the fog tended to reveal, rather than conceal, certain terrain features, such as mountains, valleys, coastlines, and rivers. The temporal and spatial changes of temperature, pressure, and visibility near the center of the fog were compared with those near the edges or outside the fog. The variation of such parameters within fog should be of interest to users of electro-optical sensors. This study illustrates that satellite observations can provide valuable military intelligence on visibility conditions not readily attainable by other means.

DESIGN ISSUES IN VIDEO DISC MAP DISPLAY

October 1984

Olson, Judy M.

Keywords: Map Design, Optical Disc, Screen Resolution, Video Disc Mapping, Video Disc Technology

Design of maps for video disc display presents new challenges for the cartographer. Design issues cover the map itself, the disc, and the hardware and software system. Topographic map design for video disc should contain all the desired earth area within a 3.75x5cm map size. This assures that the graphic area will be resolved on a standard television monitor at normal reading distances. Maps with less detail may be filmed in larger sizes. Potential design features to consider include sheet overlap that would eliminate seams in images and legends that fit to monitor width. Existing maps could be modified to preserve readability of small symbolism. The disc itself could be examined for possible areas of improvement for holding map images. Areas for experimentation include user abilities to deal with the equivalent of small map portions; the overlap problem; and the problem of designing maps that portray the same area at different scales, and allow the user to recognize that they are all of the same area.

STUDY OF RASTER METAFILE FORMATS

November 1984

Taylor, Marshall R.
French, Peter N.

Resources Planning Associates, Incorporated

DAAG29-81-D-0100

Keywords: Computer Graphics, Data Transfer Standards, Metafiles, Graphic Kernel System (GKS), Virtual Device Metafile (VDM), Raster Reformatting System (RRS)

This report examines raster compatible, metafile systems in view of the needs of the Defense Mapping Agency Hydrographic-Topographic Center, and the U.S. Army Engineer Topographic Laboratories. Background material is presented regarding the role of a graphic metafile standard in ETL/DMAHTC's cartographic applications. The issues relevant to the design of a raster compatible metafile system are examined. A recommendation is made to ETL/DMAHTC for adoption of the American National Standards Institute - Virtual Device Metafile proposed national standard.

**DIURNAL FREEZE-THAW FREQUENCIES IN SELECTED REGIONS
OF THE HIGH LATITUDES
July 1984**

Wexler, Ruth L.

Keywords: Daily Maximum Temperatures, Daily Minimum Temperatures, Diurnal Freeze-Thaw, Diurnal Temperatures Range, Freeze-Thaw Cycles, Frost Days, Ice Days

The purpose of this study is to provide information on the incidence of daily freezing conditions, i.e., frost days ($\min \leq 0^{\circ}\text{C}$), ice days ($\max \leq 0^{\circ}\text{C}$), and freeze-thaw days ($\min \leq 0^{\circ}\text{C}$ $\max > 0^{\circ}\text{C}$), per month or year throughout Alaska, Eastern Siberia, Iceland, and Greenland. Tables are provided of the above parameters. In addition, linear regression equations were developed for each area for deriving the above information from ordinary climatic data. Station models of percent days per month with freeze-thaw throughout the year are also given for a range of climates in the regions indicated as well as for several German stations representing a range of elevation. Another set of models shows that the percent freeze-thaw per month could be expressed as a function of mean monthly temperature. The constants for the latter (sine) function reflect the continentality of the station. The various models presented demonstrate the relationship between daily freezing conditions and the temperature regime. The results should improve understanding of periglacial activity and provide a means of predicting possible climatic effects on the construction of buildings, roads, and airport runways.

**INTELLIGENT ADVISORS FOR CROSS-COUNTRY ROUTE PLANNING
May 1984**

Smart Systems Technology, Incorporated

DAAK70-83-P-3175

Keywords: Artificial Intelligence, Computer Science, Expert Systems, Military Planning

Several methods for computing good cross-country routes between map positions from information contained in map data bases and other intelligence sources are evaluated. The problem of determining cross-country mobility from features gathered from map data bases is addressed, with the goal of finding the optimal path between two positions on a map.

IMAGE-BASED APPROACH TO MAPPING, CHARTING, AND GEODESY
February 1982

Friedman, S.Z.

Jet Propulsion Laboratory

Keywords: Digital Processing, Geographic Analysis, Geographic Information Systems, Remote Sensing

Use of the Jet Propulsion Laboratory Image-Based Information System (IBIS) is explored for mapping, charting, and geodesy. Methods and capabilities are detailed, and recommendations are made on ways to expand the system. A comparison is made of the approaches used in geographic information systems by the Jet Propulsion Laboratory and the Analytical Sciences Corporation.

RWPF SPATIAL DATA STUDY
August 1984

Hirsch, Stephen A.
Quinn, Thomas A.
Marino, Lori Beth

Brooks, Chris A.
Mandico, Nancy A.

PAR Technology Corporation

DACA76-83-C-0002

Keywords: Geographic Information Systems, INGRES, Relational Data Base Management, Spatial Data Structure, Spatial Knowledge Base, Symbolic Data Files

This document is the final report for the "RWPF Spatial Data Study" contract. This study evaluates critical requirements of an MC&G Spatial Knowledge Base (SKB) in supporting standard Geographic Information System capabilities and efficiently representing spatial information. The current spatial data structure residing in RWPF's Symbolic Data Files is evaluated. The potential role of a relational data base management system in support of SKB is examined. DMA's Standard Linear Format data is analyzed to determine how it might reside in a relational component of a Spatial Knowledge Base.

DESIGN STUDY OF A LARGE FORMAT PRINTER (LFP)
September 1984

Nothmann, Gerhard A.

Xerox Special Information Systems

DAAK70-80-C-0112

Keywords: Map Printer, Map Copier, Xerographic Color Printer, Xerographic Color Copier, Color Digital Output Printer, Proofing Printer, Laser Color Printer, Large Format Xerographic Printer

The results of a study program conducted for the U.S. Army Engineer Topographic Laboratories (USAETL), show that on theoretical grounds the feasibility of a 44 by 60 inch large format multicolor xerographic map printer is not limited by any technological barriers. When printing either from hardcopy originals or from digital files, such a printer would provide the powerful advantages of fast turnaround, input information diversity, and revision flexibility exhibited by computer-compatible imaging systems. Several feasibility issues identified in this study can be resolved only by experimental verification in a subsequent project. The study is based on the current 24 by 30 inch Quick Response Multicolor Printer (QRMP) program as a point of departure. Mechanical, optical, xerographic, and electronic subsystems and digital interface requirements are discussed in detail. Comparative product cost and operating cost data are included.

ETL-0369

AD-B086 854L

**DEVELOPMENT OF DESCRIPTOR SETS FOR THE UNAMBIGUOUS
CHARACTERIZATION OF GEOGRAPHIC FEATURES ON SAR IMAGERY**
August 1984

Pascucci, Richard F.
Huffman, Edward T.

Autometric, Incorporated

Keywords: Feature Descriptors, Radar Exploitation

One approach toward the automated extraction of terrain features from SAR imagery is the development of sets of descriptors that uniquely and unambiguously characterize each feature. This investigation involved a detailed examination 167 SAR image examples covering 17 types of manmade terrain features and the extraction of the descriptors by means of which image analysts identify those features. Thirty-nine such descriptors were identified that, in sets of from three to nine, were found to be necessary and sufficient for the unique characterization of each terrain feature and for its unambiguous identification. It was found that although 287 sets of descriptors were required for the identification of the 17 types of features, all descriptor sets were unique and all of the sets characterizing any individual feature could be formulated in a single Boolean expression.

ETL-0372

AD-B087 383L

**DIGITAL MAP COLOR PROOFING METHODOLOGIES EVALUATION
FINAL REPORT
September 1984**

Dunn, S. Thomas

Dunn Technology, Incorporated

DAAK70-83-C-0162

Keywords: Computers, Color Proofing, Graphic Arts, Electronic Prepress, Electronic Picture Processing

As the use of capital-intensive electronic picture processing equipment such as color scanners and color electronic prepress systems becomes more widespread in Defense Mapping Agency (DMA) production activities, the need for an accurate, economical, and fast Direct Digital Color Proofing (DDCP) system must be considered.

This report summarizes the results of an indepth analysis of DDCP methodologies and technologies applicable to direct digital color proofing of digital cartographic data files. It identifies and reports on candidate systems/technologies and recommends a course of action for successful development of a digital map color proofer in the 1985-1990 timeframe.

ETL-0373

AD-B087 292L

**DIGITAL MAP COLOR PROOFING METHODOLOGIES EVALUATION
FINAL REPORT (PROPRIETARY)
September 1984**

Dunn, S. Thomas

Dunn Technology, Incorporated

DAAK70-83-C-0162

This annex to ETL-0372 contains proprietary information only.

**INTERACTIVE DIGITAL IMAGE PROCESSING FOR TERRAIN
DATA EXTRACTION, PHASE 5
September 1984**

Heydt, Howard
Karkhanis, Vijay
Peterson, Chris

General Electric Company

DAAK70-79-C-0153

Keywords: Terrain Analysis, Digital Image Processing, Interactive Analysis, Digital Image Data Base, Digital Image Mosaic, Image Rectification, Thematic Classification, Terrain Roughness, Aerial Imagery, Satellite Imagery

Some techniques were investigated for extracting terrain surface roughness data from digital aerial imagery. Measurement of tonal changes in the imagery is one feasible approach. A digital image data base was assembled containing 10 image planes, 4096 x 4096 pixels/plane, 8 bits/pixel. The planes contain Landsat Thematic Mapper image data, four digitized aerial photos which were rectified, registered to the Thematic Mapper image and mosaicked, and digitized aerial radar imagery, all for the same scene. From the digital photomosaic, open water and forested areas were extracted using a gray level-texture classification.

**AUTONOMOUS GROUND VEHICLES: CONTROL SYSTEM
TECHNOLOGY DEVELOPMENT
October 1984**

Ruoff, C.	Hanson, J.	Brooks, T.
Bowyer, J.	Holmes, K.	Wilcox, B.

Jet Propulsion Laboratory

Keywords: Ground Transportation Equipment, Cybernetics, Navigation and Guidance, Lunar and Planetary Exploration (Advanced)

A phased research and development plan for autonomous (robotic) vehicle perception/control systems, developed by the Jet Propulsion Laboratory, is presented. Vehicle capabilities and mission descriptions are projected in a reconnaissance context for the near (2 to 5 years), mid (5 to 10 years), and far (10 to 20 years) terms. A hierarchical perception/control system architecture based upon these projections is described in detail along with broad control system functional needs. Supporting material includes operational needs, a projection of microelectronic and systems technology, and an extensive control system description including a brief assessment of control requirements. The research plan identifies tasks, estimates resource requirements, and gives a broad time phasing of research activities.

**APPLICATION OF HIERARCHICAL DATA STRUCTURES TO GEOGRAPHICAL
INFORMATION SYSTEMS (PHASE III)**

November 1984

Samet, Hanan
Rosenfeld, Azriel

Computer Vision Laboratory

DAAK70-81-C-0059

Keywords: Geographical Information System, Data Structure, Quadtrees, Region-Base Quadtrees, Point Quadtrees, Attribute Attachment

This document is report of Phase III of an investigation of the application of hierarchical data structure to geographical information systems. It deals primarily with enhancements and improvements to the information system package, an evaluation of design decisions and the collection of empirical results to indicate the utility of the software and justify the design decisions. Tasks reported on include: Attribute attachment, DMA SLF compatibility, memory management improvements and data base enhancements.

FEATURE EXTRACTION ASSESSMENT STUDY , FINAL REPORT
November 1984

Carlotta, M.J.
Tom, V.T.
Wallace, G.K.

The Analytic Sciences Corporation

DACA76-82-C-0004

Keywords: Cartographic Feature Extraction, Image Processing, Pattern Recognition, Image Analysis, Remote Sensing

The purpose of the feature extraction assessment study (FEAS) is to assess the degree to which the DMA feature extraction process can be automated by 1985. The major conclusion of the study is that given the state-of-the-art in image understanding and pattern recognition, a fully automated system for extracting DMA features cannot be built by 1985 using either conventional black and white or multi-spectral/multi-source imagery. Based on an assessment of feature extraction processes operating solely on black and white imagery, a concept of operation for a semi-automated system is formulated, however, which involves the use of machine vision techniques to support the image analyst in a synergistic fashion. An assessment of multi-spectral and multi-source (MS/MS) imagery is also performed to determine if its use would benefit the feature extraction process. A concept of operation for a system to extract DMA features in MS/MS imagery is then developed. It is shown that a key step in the process, the determination of surface material type, can be automated to a large degree given current technology. Moreover, it appears possible to employ 2-d image understanding techniques to infer the presence of certain kinds of DMA features once a surface material map has been derived. Preliminary results indicate the approach to be promising and in need of further examination.

**ANALYSIS AND TESTS OF ENVIRONMENTAL EFFECTS
ON GYROCOMPASSING ACCURACY**

October 1984

Craig, R.J.
Kim, Dong

Incosym, Incorporated

DAAK70-83-C-0169

Keywords: Earth Rate, North, Gyrocompass, Azimuth, Axis, Angular Rate, Heading, Align, Inclination, Rotate, Milliradian, Time Constant, Bias, Gyro, Accelerometer

Analysis was performed to determine a mechanization for a Northfinding system using a single two-axis, dynamically tuned gyro to determine earth rate and a single two-axis accelerometer, used as an inclinometer, to determine level. A breadboard system was built, software was written, and tests were performed to establish the feasibility and practicality of the approach. Tests were performed in both the laboratory and a test vehicle. Data showed that the breadboard system could find North to an accuracy of approximately one milliradian under typical operational conditions, and the gyrocompass time was reduced from 4 minutes to 2.7 minutes by changing the software during the test period.

DIGITAL LASER PLATEMAKER MODIFICATIONS

December 1984

Technology Applications, Incorporated

DAAK70-83-C-0165

A series of investigations were conducted on the Army's digital laser platemaker to identify and correct deficiencies and increase system overall operability. A new footbar was designed and installed which reduced media loading errors. Accuracy testing indicates that inter-image error is less than 0.002", while intra-image error is not within tolerance. Testing results are encouraging that intra-image errors can be further reduced but additional work is needed in the areas of accuracy testing and alignment of some of the optical components. While the existing machine is functional, there are several areas where components should be redesigned for a production model.

PAPERS

Baussus von Luetzow, Hans. "The Effect of Inertial Systems on the Surveying Profession Under Consideration of the Global Positioning System, Gravity Gradiometry, and Applications." *FIG Engineering Survey Conference*, Washington, D.C., 10-12 March 1984.

Caldwell, Douglas R. "Automating Generalization and Displacement: Lessons Learned from Manual Methods." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 216.

Carroll, Roberta and Edwards, Daniel L. "DTM Synthesis from Three-Dimensional Cartographic Data." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 211.

Costanzo, Daniel J. "Requirements and Specifications for Cartographic Video Discs." *1984 Army Science Conference*, West Point, N.Y., 19-21 June 1984. AD-A144 906.

Costanzo, Daniel J. "An Experimental Video Disc for Map and Image Display." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 215.

Eastes, John W. "Effects of Weathering and Lichen Cover on the Middle Infrared Spectra of Rocks." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 228.

Eastes, John W.(ETL) and Low, M.J.D.(New York University). "Middle Infrared Spectral Studies of Geologic Materials in their Natural State Using Photothermal Beam Deflection Spectroscopy." *International Symposium on Remote Sensing of the Environment, 3rd Thematic Conference, Remote Sensing for Exploration Geology*. Colorado Springs, Colorado, 15-19 April 1984. AD-A144 894.

Edwards, Daniel L. See Carroll, Roberta.

Leighty, Robert D. "Terrain Navigation Concepts for Autonomous Vehicles." *1984 Army Science Conference*, West Point, N.Y., 19-21 June 1984. AD-A144 994.

Low, M.J.D. See Eastes, John W.

Lukes, George E.(ETL) and McKeown, David, Jr.(Carnegie-Mellon University). "Digital Mapping and Image Understanding." *15th Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS)*, Rio de Janeiro, Brazil, 17-29 June 1984.

PAPERS (continued)

McKeown, David, Jr. See Lukes, George E.

Mattson, Kathleen M. "Video Discs—What Are They and Where Do They Fit In?" 1984 *DOD Mapping, Charting and Geodesy Conference*, Cameron Station, Alexandria, Virginia, 22-25 October 1984. AD-A154 166.

Porter, Elizabeth D. "The Terrain Analyst Work Station." *Technical Exchange and Coordination Workshop on Environmental Support for C²I/Tactical Decision Aids*, San Diego, California, 12-14 June 1984.

Porter, Elizabeth D. "The Terrain Environmental Analysis System." *Technical Exchange and Coordination Workshop on Environmental Support for C²I/Tactical Decision Aids*, San Diego, California, 12-14 June 1984.

Rand, Robert. "Cartographic Feature Extraction on ETL's DIAL System." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 230.

Satterwhite, Melvin B. "Discriminating Vegetation and Soils Using Landsat MSS and Thematic Mapper Bands and Band Ratios." *American Congress on Surveying and Mapping - American Society of Photogrammetry (ACSM-ASP) Annual Convention*, Washington, D.C., 11-16 March 1984. AD-A140 198.

INDEXES

TITLE	PAGE
Air Photo Analysis, Photo Interpretation Logic, and Feature Extraction	1
Analysis and Tests of Environmental Effects on Gyrocompassing Accuracy	19
Analysis of Interactive Image Cleansing Via Raster-Processing Techniques	3
Application of Hierarchical Data Structures to Geographical Information Systems (Phase III)	17
Automatic Control of Digital Stereo Correlation Methods	8
Autonomous Ground Vehicles: Control System Technology Development	16
 Bibliography of In-House and Contract Reports, Supplement 12	 6
 Data Integrity Factors Affecting the Construction of the Mapping, Charting, and Geodesy Data Base	 8
Design Issues in Video Disc Map Display	11
Design Study of a Large Format Printer (LFP)	14
Development of Descriptors Sets for the Unambiguous Characterization of Geographic Features on SAR Imagery	14
Digital Laser Platemaker Modifications	19
Digital Map Color Proofing Methodologies Evaluation, Final Report	15
Digital Map Color Proofing Methodologies Evaluation, Final Report (Proprietary)	15
Digital Pre-Press System Design Study	1
Direct Digital Color Proofing Technology Overview	5
Diurnal Freeze-Thaw Frequencies in Selected Regions of the High Latitudes	12
 Feature Extraction Assessment Study, Final Report	 18
 Hexagonal Data Base Study, Phase II	 10
 Image-Based Approach to Mapping, Charting, and Geodesy	 13
Intelligent Advisors for Cross-Country Route Planning	12
Interactive Digital Image Processing for Terrain Data Extraction, Phase 4	4
Interactive Digital Image Processing for Terrain Data Extraction, Phase 5	16

INDEXES (Continued)

TITLE	PAGE
Low Cost Gyrocompass	7
Manual and Automated Line Generalization and Feature Displacement	9
Mathematical Method for Inversion in Atmospheric Remote Sensing, A	3
Methodological Preliminaries to the Development of an Expert System for Aerial Photo Interpretation	2
Registration of a LANDSAT Image to a DTM—An Error Analysis	5
RWPF Spatial Data Study	13
Satellite Observations of Widespread Fog	10
Study of Raster Metafile Formats	11
Synthesis Guide for River Crossings	2
(Report No. 11 in the ETL Series on Guides for Army Terrain Analysts)	
Terrain Analysis Procedural Guide for Surface Configuration	6
(Report No. 12 in the ETL Series on Guides for Army Terrain Analysts)	
Terrain Analysis Procedural Guide for Built-Up Areas	7
(Report No. 13 in the ETL Series on Guides for Army Terrain Analysts)	
Vertical Obstruction Study, Final Report	9
Voice Interactive Systems Technology (VIST) Research	4

CORPORATE AUTHORS

TITLE	PAGE
Analytic Sciences Corporation, The	18
Autometric, Incorporated	14
Computer Vision Laboratory	17
Dunn Technology, Incorporated	5,15
EIKONIX Corporation	1
General Electric Company	4,16
GYROART, Incorporated	7
Helava Associates, Incorporated	9
Incosym, Incorporated	19
Interactive Systems Corporation	10
Jet Propulsion Laboratory	8,13,16
PAR Technology Corporation	8,13
Resources Planning Associates, Incorporated	11
Smart Systems Technology, Incorporated	12
Technology Applications, Incorporated	19
Xerox Special Information Systems	14
ZYCOR, Incorporated	9

CONTRACT NUMBERS

	PAGE
DAAG29-81-D-0100	11
DAAK70-79-C-0153	4,16
DAAK70-80-C-0112	14
DAAK70-81-C-0059	17
DAAK70-82-C-0028	9
70-82-C-0133	10
70-82-C-0149	9
DAAK70-83-C-0162	5,15
70-83-C-0165	19
70-83-C-0168	7
70-83-C-0169	19
70-83-P-3175	12
DACA76-82-C-0004	18
DACA76-83-C-0002	13
76-83-C-0003	8
76-83-C-0006	1

PERSONAL AUTHORS

NAME	PAGE	NAME	PAGE
Allton, Glenn	5	Lianza, Thomas	1
Barrett, Scott A.	8	Lucas, Dean	10
Barrón, Rosalinda P.	6	Mandico, Nancy A.	13
Barth, Stephen W.	8	Margerum, Eugene A.	3
Bowyer, J.	16	Marino, Lori Beth	13
Brooks, Chris A.	13	Messmore, Jeffrey A.	2,6
Brooks, T.	16	Mintzer, Olin	6
		Moore, William	5
Carlotto, M.J.	18		
Corl, P.A.	1	Nothmann, Gerhard A.	14
Craig, R.J.	19		
Crombie, Michael A.	5	Olson, Judy M.	11
Dam, A.L.	9	Pascucci, Richard F.	14
Davis, Dale	9	Peterson, Chris	16
DeYoung, Tice F.	4	Pfirman, Eric S.	8
Dunn, S. Thomas	15		
		Quinn, Thomas A.	13
French, Peter N.	11		
Friedman, S.Z.	8,13	Rinker, J. N.	1
Friend, Nancy J.	3	Rosenfeld, Azriel	17
Frodigh, Roland J.	7	Ruoff, C.	16
Gibson, Laurie	10	Samet, Hanan	17
Gomer, William	10	Shine, James A.	5
Hanson, J.	16	Taylor, Marshall R.	11
Harris, Barry	5	Tom, V.T.	18
Heydt, Howard	4,16		
Hirsch, Stephen A.	13	Wallace, G.K.	18
Hoffman, Robert R.	2	Wescott, Thomas	4
Holmes, K.	16	Wexler, Ruth L.	10,12
Huffman, Edward T.	14	Wilcox, B.	16
Hugus, Marc	9		
		Zoraster, Steven	9
Karkhanis, Vijay	4,16		
Kim, Dong	19		
Kinn, Gerald J.	8		
Kishel, Joseph F.	7		

AD NUMBERS

NUMBER	PAGE	NUMBER	PAGE
AD-A139 899	2	AD-A152 169	17
AD-A140 197	4	AD-A153 322	11
AD-A141 766	5	A153 531	11
A141 772	3	A153 926	1
A141 778	6	AD-B080 577L	2
AD-A142 388	8	AD-B082 993L	1
A142 698	4	AD-B083 114L	9
A142 728	3	AD-B086 190L	5
A142 918	7	B086 606L	13
AD-A143 250	9	B086 824L	14
A143 922	12	B086 854L	14
AD-A144 059	13	AD-B087 012L	10
AD-A147 276	12	B087 292L	15
AD-A147 637	6	B087 383L	15
AD-A148 295	7	AD-B088 755L	16
A148 580	16	B088 848L	8
AD-A150 176	10	AD-B089 385L	19
A150 189	18		
A150 190	19		

APPENDIX – TITLES
1970 – 1984

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Accuracy of Cartometric Data	1970	102
Accurate Ephemeris Time Determination and Geocentric Stations Position from Photographs of the Moon Against Stellar Background	1975	18
Acousto-Optic Technology for Topographic Feature Extraction and Image Analysis	1982	11
Acquisition and Evaluation of Thermal Standard Data	1981	8
Adjunct Development Test II (DT II) of Position and Azimuth Determining System AN/USQ-70	1981	7
Advanced Continuous Tone Plate and Process Compatible with Present Military Lithographic Reproduction Equipment and Practices	1977	52
Advanced Correlation Studies	1971	90
Advanced Edit System	1983	3
Advanced Feature Symbolization for Three Dimensional Views	1981	11
Advanced Methods for the Calibration of Metric Cameras	1971	60
Advanced Radar Topographic Application	1975	98
Advanced Satellite Hardware/Software System Study	1981	12
Advanced Satellite Tracking Instrumentation Study	1971	96
Advanced Study of a Position and Azimuth Determining System	1971	79, 80
Advanced Techniques for the Reduction of Geodetic SECOR Observation	1971	56
Aerial Triangulation by Least Squares	1971	85
AGFA Contour Film	1975	61
Airborne Positioning and Attitude Data Application Study, Phase I	1971	83
Airborne Positioning and Attitude Data Applications Study, Phase II	1971	84
Algorithms For Digital Terrain Data Modeling	1983	16
All-Weather Mapping Contour Plotting Program	1971	67
All-Weather Mapping System Analysis and Equipment Study	1971	67
Altimeter, Surveying, 4500 Meters, 2-Meter Divisions	1971	10
Altitude Deviation Study	1971	71
Analog Graphic Processing for 3-D Terrain Displays, Profiles, and Elevation Layer Tints	1976	77
Analog to Digital Converter to Digital Magnetic Recorder Interface	1972	11
Analysis and Development of Digital Mapping System Software	1975	134

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Analysis and Development of Image Statistics and Redundancy Removal	1981	19
Analysis and Simulation of Discrete Digital Image Matching	1982	22
Analysis of a Relaxation Scheme to Improve Terrain Elevation Data, An	1983	14
Analysis of GEOS PC-1000 and SECOR Data	1971	14
Analysis of LANDSAT Systems for Cartographic and Terrain Information (Report No.9 in the ETL Series on Remote Sensing)	1978	32
Analysis of Multispectral Scanner Data for Location of Sand and Gravel Deposits	1970	55
Analysis of Radar Calibration Data	1971	67
Analysis of SECOR Data	1971	60
Analysis of the Max-Min Texture Measure, An	1983	6
Analysis, Storage and Retrieval of Elevation Data With Applications to Improve Penetration	1980	24
Analytic Aerotriangulation: Triplets and Sub-Blocks Including Use of Auxiliary Data	1971	57
Analytical Aerial Triangulation	1971	16
Analytical Aerial Triangulation Error Analysis and Application of Compensating Equations to the General Block Triangulation and Adjustment Program	1971	80
Analytical Aerotriangulation Using Triplets in Strips	1971	57
Analytical Aerial Triangulation with Large Computer (Analytical Simultaneous Block Triangulation Technique	1971	26
Analytical Aerial Triangulation with Small Computer	1971	22
Analytical Photogrammetric Position System (APPS)	1975	65
Analytical Photogrammetric Positioning System (APPS) to Support the Field Army	1975	68
Apparent Temperature and Emissivity of Natural Surfaces at Microwave Frequencies	1971	16
Appendix III Narrative Report for Geoscience Overlays	1971	76
Application of a Feature Selection Technique To Samples of High Resolution Synthetic Aperture Radar Imagery	1984	18
Application of a Phase Comparison Radiolocation System to Distance and Position Measurement over Mountainous and Desert Terrain	1971	18
Application of Biorthogonal Filter Functions to Pattern Recognition and Feature Extraction	1981	10
Application of Coriolis Force to Geodetic Measurements	1971	63

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Application of Hierarchical Data Structures to Geographical Information Systems	1983	16
Application of Hierarchical Data Structures to Geographical Information Systems (Phase II)	1984	21
Application of Inertial Techniques to Surveying	1971	80
Application of Image Sensing Arrays to Metrology, Detection and Instrumentation	1971	22
Application of Image Sensing Arrays to Metrology, Detection and Instrumentation	1975	85
Application of Image Sensing Arrays to Metrology, Detection and Mapping, Interim	1975	141
Application of LORAC to Precision Terrestrial Line-length Measurement and Position Fixing	1971	21
Application of Scalar Renormalization to the Scattering of Electromagnetic Waves from a Three-Dimensionally Inhomogeneous Medium with Strong Dielectric Fluctuations	1977	7
Applications of Advanced Accelerometers to Surveying and Geodesy I	1971	62
Applications of Advanced Accelerometers to Surveying and Geodesy II	1971	63
Applying Photogrammetry to Real Time Collection of Digital Image Data	1983	5
Approach to the Evaluation of Strategies in Insurgency	1971	86
APPS-IV Civil Works Data Extraction/Data Base Application Study (Phase I)	1983	18
APPS-IV Civil Works Data Extraction/Data Base Application Study (Phase II)	1984	21
APPS-IV Remote Sensing Applications Guide	1984	20
ARK-1 Gyro Aiming Circle (Wild Heerbrugg Instruments, Inc.)	1971	29
ARMIDOP/ZERO-DOP Positioning Technique	1972	1
Army Terrain Information System	1977	42
Artifact Removal in Frequency Domain Compressed Imagery	1981	16
Artillery Survey System, Phase I - Study of Methods	1971	63
Aspects and Methods of Nonisotropic Land Navigation Error Control Including Consideration of Topography	1972	1
Assessment of Inertial Technology for Gravity Survey Applications	1983	11
Assessment of Means for Determining Deflection of the Vertical	1984	4
Associative Array Processing of Raster Scanned Data for Automated Cartography	1977	36

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Associative Array Processing of Raster Scanned Data for Automated Cartography II (Improved Resolution and Data Handling)	1979	10
Associative Array Processing for Topographic Data Reduction	1975	129
Associative Array Processing for Topographic Data Reduction, Final Report	1976	14
Astronomical Attachment Azimuth Determination, Reflecting, for Transit or Theodolite	1971	10
ATF-Hadego Photocompositor Photolettering Machine	1971	11
Atmospheric Refraction	1971	14
Atmospheric Refraction for Satellite Photography	1971	14
Automated Processing of Geographic Information in Image Data Forms	1978	50
Automated Technique for Measuring Built-up Urban Areas from Map Graphics Through Analog Image Processing	1976	61
Automatic Contour Digitizer (ACD)	1971	6
Automatic Contouring Instrumentation	1970	15
Automatic-electro Optical Satellite Triangulation System	1970	5
Automatic Feature Extraction An Annotated Bibliography	1980	38
Automatic Map Compilation System	1970	99
Automatic Point Marking Measuring and Recording Instrument	1970	65
Automatic Point Transfer Instrument	1970	66
Automatic Reseau Measuring Equipment (ARME)	1978	27
Automatic Stereo Perception of Aerial Photography by Means of Optical Correlation	1970	66
Automatic Type/Symbol-Placement Developments	1976	38
Automation of Airborne Profile Recorder Data Reduction	1970	79
Background Study and Selection Criteria Analysis of MIL-STD-810C: Environmental Test Methods	1979	42
Backscattering of Electromagnetic Waves from a Slightly Rough Surface with a Lossy Layer	1976	40
Backscattering of Electromagnetic Waves from a Surface Composed of Two Types of Surface Roughness	1972	2
Backscattering of Radar Waves by Vegetated Terrain	1978	35
Backscattering of Radar Waves from a Tilted, Slightly Rough Surface	1978	62
Base Plant Correlator	1972	9

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Base Plant Correlator (Final)	1975	99
Basic Factors Limiting the Accuracy of Mapping and Aerotriangulation by Photo- grammetric Procedures	1970	85
Bayesian Approach to Identification of a Remotely Sensed Environment	1970	78
Bibliographic Literature Search Concerning the Relationship Between Soils and Plants in Arid and Semi-Arid Regions in North America	1980	14
Bibliography and Abstracts of Analytical Photogrammetry	1970	15
Bibliography of In-House and Contract Reports	1971	7
Bibliography of In-House and Contract Reports, Supplement 1	1972	5
Bibliography of In-House and Contract Reports, Supplement 2	1975	38
Bibliography of In-House and Contract Reports, Supplement 3	1976	62
Bibliography of In-House and Contract Reports, Supplement 4	1977	30
Bibliography of In-House and Contract Reports, Supplement 5	1978	34
Bibliography of In-House and Contract Reports, Supplement 6	1979	24
Bibliography of In-House and Contract Reports, Supplement 7	1980	26
Bibliography of In-House and Contract Reports, Supplement 8	1981	7
Bibliography of In-House and Contract Reports, Supplement 9	1982	11
Bibliography of In-House and Contract Reports, Supplement 10	1983	7
Bibliography of In-House and Contract Reports, Supplement 11	1984	11
Bibliography of Remote Sensing of Resources	1970	52
Bimodal Display	1978	43
Broad-Spectrum Electromagnetic Spectrum Backscatter	1971	17
Brush Surfaced Lithographic Press Plates	1970	13
Camera Calibration Study	1971	15
Capabilities of Remote Sensors to Determine Environmental Information for Combat	1978	5
Cartographic Application of Conflex 1	1970	97
Cartographic Design Standards - A Preliminary Investigation	1970	96
Cartographic Drafting Methods and Equipment	1970	8

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Cartographic Drafting Methods and Equipment (Plastic Scribing Process) Second Interim Report	1970	9
Cartographic Electron Beam Recorder (EBR) System	1978	44
Cartographic Electron Beam Scanner Design Study	1982	12
Cartographic Scanner Plotter	1975	86
Change Detector Maintenance Instructions	1970	69
Change Detector Operation Manual	1970	69
Change Detector Studies	1970	69
Characterization and Optimization of an Electro-Optic Imaging Device for Real-Time Map Profiling	1976	10
Characterization of the PROM for Coherent Optical Processing Applications	1977	46
Charging Equipment, Mobilé (CEM)	1978	11
Chemical Array Studies	1978	67
Circularly Polarized Measurements of Radar Backscatter from Terrain	1981	3
Circularly Polarized Measurements of Radar Backscatter from Terrain and Snow Covered Terrain	1981	16
Circumpolar Method for Determining Azimuth	1984	9
Classification and World Distribution of Vegetation Relative to V/STOL Aircraft Operations	1975	51
Classification of Cartographic Features Through Walsh Transforms	1983	11
Classification of Metamorphic Rocks and Their Applications to Air Photo Interpretation Procedures, The	1984	23
Coated Paper and Developer for Continuous Tone Electrophotography	1970	61
Cold Weather Testing of 10-Second Direction Theodolite, 1-Minute Direction Theodolite (Foreign Model), Astronomical Attachment, and Winterization Kit	1970	8
Color Contact Printer Mark III	1971	5
Color Ink-Jet Demonstration Program	1980	49
Color Orthophotomaps	1975	4
Color Separation System Evaluation	1970	72
Combination Map Reproduction Van Body	1970	17
Combined Engineering and Service Tests of the Copy and Supply Van Section of the Motorized Photomapping Train	1970	13
Combined Engineering and Service Tests of the Map Revision Van Section of the Motorized Photomapping Train	1970	13

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Combined Engineering and Service Tests of the Multiplex Van Section of the Motorized Photomapping Train	1970	17
Combined Engineering and Service Tests of the Photomapping Van Section of the Motorized Photomapping Train	1970	12
Combined Engineering and Service Tests of the Rectifier Van Section of the Motorized Photomapping Train	1970	18
Command Retrieval Information System/Direct Input (CRIS/DI)	1970	80
Comparative Aerotriangulation Tests of the Multiplex Kelsh Plotter, Stereo- planigraph, Wild Autograph Model A-5, and Wild Stereoplotter Model A-6	1970	9
Comparative Study of Photography for Soils and Terrain Data	1970	27
Comprehensive Summary of Project Trend	1977	29
Computer for Army Artillery Inertial Survey System (GEISHA)	1970	64
Computer Program to Simulate Scenario Functions	1977	9
Computing a Line-of-Sight Using Digital Image Matching and Analytical Photogrammetry	1976	78
Concept Development of Automated Image Analysis	1980	46
Concept Development of Automatic Instrumentation for Monitoring Movement of Dams	1980	34
Concept for an Ultraprecise Geodetic Baseline	1970	5
CONPLOT I - A Contour Generating Program	1971	14
CONPLOT II - A Contour Generating Program	1971	14
CONRAD - A Program to Contour Radar Data	1975	124
Continuous-Tone Electrophotography	1970	92
Contour Digitizing and Tagging Software (CONTAGRID)	1981	14
Contribution to the Philosophy of Climatic Design Limits for Army Materiel: Extreme Hot-Desert Conditions	1975	58
Contributions to the Law of the Proportionality of Inertia and Gravity	1971	19
Control Unit for Army Artillery Inertial Survey System (GEISHA)	1970	64
Controlled Color for Contact Printing Aerial Imagery	1975	57

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Coordinate Measurement Research: Basic and Applied Experiments with the Negative-Reticle Concept	1975	89
Corona Study Relevant to Electrostatic Printing Process	1972	10
Corps of Engineers Maintenance Package for Inertial Survey Equipment	1970	64
Correlation of Noisy Images	1981	15
Data Base Sizing Methodology Applied to the Army Terrain Information System (ARTINS)	1979	34
Data Weighting Analysis	1970	92
Decision Path Approach to Guidance for Climatic Environmental Test Planning (MIL-STD-810C)	1980	29
Delta Pulse Code Modulation Compression Relative to Stereo Image Matching	1979	46
Demonstration and Evaluation of the Utilization of Side-Looking Airborne Radar for Military Terrain Analysis	1976	73
Derivation and Potential of New Filter Equations for Numerical Weather Prediction	1975	13
Description of Instrumentation Data Analysis and Reduction for an Atmospheric Seeing Monitor	1970	60
Design and Analysis of a High-Production Mini-Computer System for Regridding Digital Terrain Elevation Matrices	1982	3
Design and Development of a Position and Azimuth Determining System (PADS)	1972	12
Design and Development of an Advanced Electron Beam Control System	1977	12
Design and Development of Power Package for Surveying Instrument: Azimuth, Gyro, Lightweight	1971	18
Design and Development of Surveying Instrument: Azimuth, Gyro, Lightweight (SIAGL)	1971	18
Design and Fabrication of a 70 Millimeter Interference Imaging System	1971	22
Design and Fabrication of an Experimental Multiband Camera	1975	82
Design and Feasibility Study of an Off-Line Digital Orthoprinter for Field Use	1979	32
Design and Feasibility Study of HOC as a Van Mounted Stereo Model Digitizer	1978	42

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Design, Fabrication, and Test of a Position and Azimuth Determining System (PADS)	1975	104
Design, Modification, Fabrication, and Test of a Prototype Miniaturized North Reference Unit (MINRU)	1982	21
Design of a Laser Experiment for the Verification of the Inverse Scattering Theory	1970	81
Design of a Map Update Capability for Engineer Topographic Units	1978	38
Design of an Experimental Program for Evaluation of LBR Systems	1980	28
Design of Engineering Test Model, Topographic Data System	1970	81
Design Studies and Prototype Model Development of a Small North Orienting Device (Miniaturized Gyrocompass)	1971	14
Desk Model Fotosetter Photo-Lettering Machine	1970	9
Detecting Line-Road and Road-Intersection Patterns at Various Angles	1983	4
Determination of Height Differences from Gravity and Gravity Gradients	1971	16
Determination of Level Sensitivity (Field Calibration with the Level on the Instrument)	1975	29
Determination of the Anomalous Gravity Potential from Satellite and Terrestrial Data Under Utilization of Modern Gravimetric Theory	1975	21
Determination of the Geometrical Quality of Comparators for Image Coordinate Measurements	1970	1
Determinations and Statistical Studies of Gravimetric Deflections	1975	139
Determinations and Statistical Studies of Gravimetric Deflections, Final Report	1976	68
Determinations of Direct and Inverse Azimuths, Zenith Distance, Hour Angle, Declination and Distance Between Two Points on Normal Sections	1970	4
Developing a Data Base for Predicting Soviet Tactical Behavior	1976	65
Development of a High Precision Capability for Monitoring Structural Movements of Locks and Dams	1978	58
Development of a Prototype Family of Military Geographic Intelligence Products to Support Airmobile Operations	1971	4

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Development of a Small North Orienting Device	1970	53
Development of a Terrain Profile Recorder Image Point Transfer Instrument	1970	55
Development of a Variscale Stereo Point Marking Instrument	1970	55
Development of an Evaluation Model - Change Detector	1970	69
Development of an Experimental Family of Military Geographic Intelligence (MGI) Products to Support Battlefield Sensor Activities	1975	55
Development of Finite Element Models for the Earth's Gravity Field Phase I: Macro Gravity Model for Satellite Orbit Integration	1978	23
Development of Finite Element Models for the Earth's Gravity Field Phase II: Fine Structure Disturbance Gravity Representations	1978	24
Development of Height Finder Oblique, Topographic	1970	11
Development of High Speed CRT Print Head Systems for Cartographic Applications	1981	6
Development of Improved Area Correlation Techniques	1975	123
Development of Lightweight Long-Range Survey System (LRSS)	1970	91
Development of Spherical Map Sections and Transparent Conforming Overlays	1970	13
Development, Service Tests, and Production Model Tests, Autofocusing Rectifier	1970	9
Development, Test, Preparation, Delivery, and Installation of Algorithms for Optimal Adjustment of Inertial Survey Data	1984	5
Developmental Optical Correlator	1977	14
Digest of High Temperature Storage Literature	1979	38
Digital Automatic Map Compilation System	1970	72
Digital Cartographic Study and Benchmark	1980	9
Digital Cartographic Study and Benchmark - First Interim Technical Report	1978	13
Digital Cartographic Study and Benchmark - Second Interim Technical Report	1978	15
Digital Cartographic Study and Benchmark - Third Interim Technical Report	1978	16
Digital Cartographic Study and Benchmark - Fourth Interim Technical Report	1978	18
Digital Computer Program for the Solution of a Photogrammetric Net (Preparation of Maps from Aerial Photographs)	1971	15

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Digital Data Editing System	1979	28
Digital Data to Pressplate Study	1977	33
Digital Image Manipulation and Enhancement System (DIMES) User's Handbook	1975	106
Digital Mapping Glossary	1975	143
Digital Mapping System Concepts Study	1975	80
Digital Mapping System: Mathematical Processing	1975	136
Digital Mapping System Study	1975	79
Digital Planimetric Compiler	1975	3
Digital Radar Restitution	1970	72
Digital Rectification of Side-Looking Radar (DRESLR)	1975	121
Digital Simulation of a Radar Image of Pisgah Crater Test Site, California	1977	5
Digital Terrain Data Compaction Using Array Algebra	1978	40
Dimensionally Stable Opaque Cartographic Bases	1970	14
Direct Electronic Transforms for Feature Extraction	1979	17
Discrete Scattering Approach to Vegetation Modeling	1981	6
Discrimination of Tropical Land Use in Puerto Rico: an Analysis Using Multispectral Imagery	1972	11
Display Technologies for Topographic Applications, Assessment of State-of-the-Art and Forecast	1976	66
Distribution of Mean Monthly Precipitation and Rainfall Intensities	1975	41
Doppler Satellite for Army Field Operations	1970	101
Doppler Translocation Test Program	1970	27
Doppler Translocation Test Program	1976	24
Earth's Gravitational Field from Observation of Near-Earth Satellites and Terrestrial Gravity Measurements	1970	6
EBR Extension of Graphics Generator to Include Symbols	1975	142
Effects of Supersonic and Hypersonic Aircraft Speed upon Aerial Photography	1970	100
Effects of Supersonic and Hypersonic Aircraft Speed upon Aerial Photography	1971	22
Effects of the Atmosphere on Aerial Photography	1971	13
Effects of Soil Moisture and Vegetation on Surface Temperature, The	1984	13
Electrofax Specifications for Army Five-Color Map Reproducing Equipment	1970	92
Electron Beam Recorder Applications Study	1978	56
Electronic Angle-Measuring Device	1972	3

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Electronic Pointing Device (Microwave) System (Electrotransit)	1970	57
Electronic Survey Equipment and Tests	1971	21
Electro-Optical Image Processing with an Image Storage Tube	1970	90
Electrophotographic Imaging Materials Evaluation	1982	17
Electrostatic Paper and Toner Development	1970	81
Elevation Data Compaction by Polynomial Modeling	1979	18
Elevation Data Edit Terminal	1984	17
Emergency Target Location Function	1970	23
Engineer Design Test and Evaluation of a Plani- metric Compiler	1970	26
Engineer Design Tests and Evaluation of a Multi- power Army Stereoscope	1970	22
Engineer Route Reconnaissance Feasibility Study	1970	61
Engineer Test and Evaluation of the Command - Retrieval Information System/Direct Input (CRIS/DI)	1970	27
Engineer Tests of 2.5X Reduction Printer	1976	27
Engineering Design Test Report: Inertial Surveying Equipment (ISE)	1970	23
Engineering Evaluation of Pulsed Xenon Light Sources for Graphic Arts Use	1970	20
Engineering Test Report: Elevation Meter, Ground	1970	21
Engineering Test Report: Lightweight Gyro Azimuth Theodolite (Lear North-Seeking Gyro Model No. 11NG530A)	1970	22
Engineering Test Report of the Integrated Mapping System	1970	21
Engineering Test Report Short Range Electronic Positioning Equipment (SREPE)	1970	21
Engineering Tests and Evaluation of a 9 by 18 inch Electronic Printer	1970	20
Engineering Tests and Evaluation of Multiplex Reduction Printer for Metrogon and Distortion- Free Photography	1970	12
Engineering Tests and Evaluation of Printers for the Preparation of 9 1/2- by 9 1/2-inch Diapositives for the Precision Stereoplotter	1970	17
Engineering Tests and Evaluation of the Photo- grammetric Transforming Printer for 20° Convergent Photography	1970	16
Engineering Tests of a Temperature-controlled Processing Unit, Deep-tank, for Photomechanical Film	1970	19
Engineering Tests of Diapositive Processing Unit	1970	19

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Engineering Tests of Interim Target Location Systems for Use in Controlled Areas	1970	16
Engineering Tests of Interim Target Location Systems for Use in Uncontrolled Areas	1971	2
Engineering Tests of Opaque Cartographic Bases	1970	8
Engineering Tests of Scanning Stereoscope	1970	15
Engineering Tests of the Cartographic Grid Ruler	1970	15
Engineering Tests of the Cartographic Van Section of the Motorized Photomapping Train	1970	10
Engineering Tests of the PPI Radar Presentation Restitutor	1970	19
Engineering Tests of Translucent Cartographic Bases	1970	14
Engineering Tests of Two Printer-Developers, Ammonia Process, 24 Inch	1970	8
Enhanced Photomap Evaluation Study	1970	53
Enlarging Printer, 3X	1977	41
Environmental Conditions Experienced by Rockets and Missiles in Storage, Transit, and Operations	1976	3
Environmental Conditions Experienced by Rockets and Missiles in Storage, Transit, and Operations, Supplement	1976	4
Environmental Conditions in a Tropical Forest Region in Thailand	1978	65
Environmental Position Errors of the GPS-Army User Equipment	1977	50
Equilibrium Figures and the Normal-spheroid of the Earth Mass - Functions and Isostasy	1970	98
Equipment and Techniques for the Utilization of Convergent Photography in Mapping	1970	19
Error-Free Compression of Digital Imagery	1977	87
Error Propagation into Orbital Positions	1975	111
Error Propagation in Two-Photo Intersection	1975	14
Error Statistics for Astrogeodetic Positions for an RGSS Test Course	1982	18
Errors in Automatic Pass Point Mensuration Using Digital Techniques	1981	15
Establishment of an Ideal World Geodetic System	1970	86
ETL 211-OD Gravitational Model, A Union Solution of Optical and Doppler Satellite Determinations	1970	6
Evaluating Soil Moisture and Textural Relation- ships Using Regression Analysis	1981	12
Evaluation and Comparison of Terrain Classification Methods (Type III)	1970	66
Evaluation and Test of a Five-Color Electrostatic Printing Machine for the Reproduction of Topo- graphic Maps and Charts	1970	24

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Evaluation and Test of a Modified Plate Process Section, a Proposed New Photomechanical Process and a Redesigned Brush-Surfacing Machine	1970	18
Evaluation and Test of a Self-Contained Vehicle Land Navigation System	1980	8
Evaluation and Test of a Single-Color Electrostatic Printing Machine for the Reproduction of Topo- graphic Maps and Charts	1970	23
Evaluation of a New Electrostatic Recording Medium	1978	30
Evaluation of a Xerographic Process for Preparing Zinc Oxide-Silicone, Binder-Type Lithographic Plates	1970	18
Evaluation of Automatic Mapping APQ as a Radar Mapping System	1970	25
Evaluation of Coherent Radar Photography	1970	23
Evaluation of Color Recognition Devices for Making Color Separations from Multicolor Maps and Charts	1970	11
Evaluation of Color Test Photography for Military Geographic Analysis - A Literature Review	1971	3
Evaluation of Components for Some Elevation- Determining Systems	1970	62
Evaluation of Conventional Correlation Methods When Matching Infrared Imagery to Panchromatic Imagery	1980	48
Evaluation of Experimental Xerographic Process for Lithographic Platemaking	1970	12
Evaluation of High Precision SHORAN-Controlled Photography	1970	15
Evaluation of Land Use Techniques for Processing MGI	1970	97
Evaluation of Multiband and Color Aerial Photo- graphy for Selected Military Geographic Intelligence in a Subtropical Desert Environment	1971	2
Evaluation of Offset Collotype Printing for the Field Reproduction of Aerial Photographs	1970	14
Evaluation of Pointing to a Sharp Edge	1970	101
Evaluation of Published Criteria for Identifying Metamorphic Rocks on Air Photos: Two Case Studies in the Northeastern United States	1984	15
Evaluation of Registering Image Gradients When Matching Infrared Imagery to Panchromatic Imagery	1982	8
Evaluation of Single and Multicolor Map and Chart Reproduction Equipment	1977	88
Evaluation of the Accuracy of SHORAN Controlled Photography	1970	75
Evaluation of the Method of Determining Parallax from Measured Phase Difference	1979	27

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Evaluation of the Prototype, Natural-Image Computer	1970	29
Evaluation of the Stellar-Moon Camera System	1970	86
Evaluation Tests of Royal Zenith, 29 Press	1970	15
Experimental Assessment of Improved Spatial Resolution LANDSAT Data	1982	18
Experimental Correlator Studies	1970	90
Experimental Determinations of Fringe Counting Errors Associated with Rotation of a Corner Cube Forming an Arm of a Laser Interferometer	1970	5
Experimental Heterodyne Optical Correlator	1977	74
Experimental Production of Military Geographic Intelligence Products from Side-Looking Airborne Radar Imagery	1970	92
Extension of Kendall's Concordance Test Where Ties Are Allowed, An	1984	9
Extraction of Mapping Detail from Radar Photography	1970	70
Extreme 24-Hour Snowfalls in the United States: Accumulation, Distribution, and Frequency	1975	45
Feasibility of Objective Color Systems	1970	52
Feasibility of Using Optical Power Spectrum Analysis Techniques for Automatic Feature Classification from High Resolution Thermal, Radar, and Pan- chromatic Imagery	1980	32
Feasibility Study for an All-Weather Surveying Signal Light	1970	26
Feasibility Study for Field Generation of Input for Radar Scene Generation from DLMS Terrain and Elevation Data	1980	56
Feasibility Study of a Quick Response Multicolor Printer (QRMP)	1982	5
Feasibility Test of a Proposed 3-D Radar System	1970	68
Feasibility Test Program for Measurement of Gravity Anomaly Changes Using 2 MICRO-g Accelerometer in the Inertial Platform	1976	6
Feature Analysis and Reduction of Laws Texture Measure	1984	24
Feature Component Reduction Through Divergence Analysis	1983	17
Feature Extraction of the Illiac IV	1980	41
Feature Tagging	1981	13
FEED Evaluation	1984	12
FEED Software Documentation	1984	20
Fictitious Data Generator for Analytical Aero- triangulation	1970	93
Field Artillery Plotting Equipment	1970	12
Final Report, Development of Mirror Stereoscope	1970	11
Final Report on Stable Cartographic Bases	1970	17

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Final Report, Study of Digital Matching of Dissimilar Images	1981	19
Finite Element Models of the Earth's Gravity Field Phase IV	1980	53
Five-Color Separation Investigation	1970	97
Fixed and Multiple Frequency Angle Measurements with 35-GHz Microwaves	1970	26
Floodplain Tree Species: A Bibliographic Literature Search with Abstracts	1980	44
Flux Valve Heading Reference System	1978	71
Forced Dynamics of Asymmetric Spacecraft	1977	26
Forecast for the 1970's in Mapping, Charting, and Geodesy Research and Development	1971	13
Formulas for Computing Atmospheric Refraction for Objects Inside or Outside the Atmosphere	1970	2
Formulation of a Space Oblique Mercator Map Projection	1978	69
Fort Belvoir Text Placement System, Final Technical Report	1981	3
Fourier Transform Autocorrelation	1980	30
Frequency Dependence of Backscatter from Rough Surfaces (An Experiment with Broad-Spectrum Acoustic Waves)	1970	77
Full View Holograms	1972	9
Further Investigation of an Electronic Angle- Measuring Device	1975	63
Gamma-Ray Spectrometer Study	1976	55
GEISHA Computer Theory of Operation	1970	65
General Climatological Guide to Daily Freezing Conditions: Frost Days, Ice Days, and Freeze-Thaw Days, A	1983	9
General Noniterative Solution of the Inverse and Direct Geodetic Problems	1970	3
General Programming on a Parallel Processor	1977	60
Geocentric Position and/or Orbital Parameters with Star Satellite Photography from a Single Camera Station	1970	54
Geodetic Control by Means of Astronomic and Torsion Balance Observations and the Gravimetric Reduction of Levelling	1970	87
Geodetic Control without Triangulation, Trilater- ation, or Gravity Data and Gravimetric Reduction of Levelling	1970	87
Geodetic SECOR	1970	57
Geodetic SECOR Ground Equipment	1970	58
Geodetic SECOR Satellite	1975	72
Geodetic SECOR Wide-Band RF Subsystem	1970	58

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Geodetic SECOR Wide-Band RF Subsystem for SECOR Ground Equipment Sets	1970	58
Geodetic SECOR Wide-Band System	1970	58
Geodetic Spacecraft	1970	58
Geodimeter, Models I and II	1970	16
Geographic Modelling of Insurgency Resources	1970	88
Geoid Representation from Satellite-Determined Coefficients	1970	72
Geologic Evaluation of Radar Imagery from Darien Province, Panama	1970	77
Geometric Simultaneous Multistation Determination, with Constraints, Using Data from Geodetic Satellites	1970	5
Geometrical Quality of Lunar Mapping by Photo- grammetric Methods	1970	2
Geomorphic Evaluation of Radar Imagery of South- eastern Panama and Northwestern Columbia	1971	17
Geopotential Determination from Satellite to Satellite Tracking and Satellite Altimetry	1976	16
Geopotential Determination from Satellite to Satellite Tracking and Satellite Altimetry, Supplement I	1976	18
GEOPS	1970	5
Geoscience Potentials of Side-Looking Radar	1970	93
Geo-Spin Precision Inertial Survey	1979	12
Gigas-Zeiss Digital Control Unit	1975	8
Gradiometer-Aided Rapid Gravity Survey System	1978	46
Graphic Arts Symbol Generating Hardware for a Gerber Plotting System	1975	144
Graphic Data Handling Techniques	1970	100
Gravimetric Geodesy Free of Density Estimates through Analysis of Discrete Gravity Data	1970	3
Gravity Anomalies as Indicators of Groundwater Reserves in Glacial Deposits	1975	117
Gravity Correlation Studies for Determination of Earth	1970	57
Gravity Study Program, Final Report	1982	15
Gravity Study Program, Interim Report	1982	10
Hail and Its Distribution	1975	44
Hexagonal Data Base Study	1984	22
High Resolution Optical Power Spectrum Analyzer	1979	6
High Resolution Orthophoto Output Table (HIROOT)	1970	97
High Resolution Orthophoto Output Table	1975	5
High Speed Disc Memory and a Color Image Display for a Small Computer	1971	17
High Speed Parallel Sensing Scheme	1978	54

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
History of U.S. Army Engineer Topographic Laboratories (1920 to 1970)	1975	47
Holographic Compensation of Wavefront Aberrations in Optical Systems	1976	33
Holographic Optical Elements With Low Q-Factors	1978	61
Holographic Ray Tracing and Spot Diagrams	1977	44
Holographic Stereogram Display Techniques for the Viewing and Mensuration of Stereo Photogrammetric Imagery	1975	130
Holographic Terrain Displays	1978	7
Holography and Stereoscopy	1972	9
Horizontal Gradients of Gravity in Geodesy	1970	88
Horizontal Gradients of Gravity in S.W. Ohio	1970	88
Hot Weather Testing of 10-Second Direction Theodolite with Universal Tribach and Universal Tripod, Astronomical Attachment, Universal Sun Compass, Lensatic Compass, and Wrist Compass	1970	8
Air Photo Patterns		
Image Alignment and Correlation System	1981	18
Image Correlation on a Parallel Processor	1977	58
Image Enhancement by Chemical Intensification	1976	63
Image-Processing Precision and Affecting Relative Orientation	1972	1
Image Scanner Technology Study	1979	14
Image Tube Validation Study	1971	20
Implications of Symbol Usage on US Army Maps for an Automated Cartographic System	1970	53
Improvement Program Automatic Map Compilation System	1970	100
Inertial Platform Subsystem for Army Artillery Inertial Survey System (GEISHA)	1970	63
Inertial Positioning System Test Data Summary Report	1976	80
Inertial Survey Applications to Civil Works	1984	6
Inertial Survey Equipment (GEISHA)	1970	65
Inferential Techniques for Soil Depth Determinations: Part I, <u>Coleogyne ramossissima</u> Torr. (Black-Brush)	1977	20
Inferential Techniques for Soil Depth Determinations, PART II: <u>Artemisia filifolia</u> Torr. (Sand Sagebrush)	1980	21
Influence of Atmospheric Refraction on Directions Measured to and from a Satellite	1970	3
Instrument for Measuring Absolute Acceleration of Gravity	1970	4

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Interactive Digital Correlation Techniques for Automatic Compilation of Elevation Data	1982	20
Interactive Digital Image Processing for Terrain Data Extraction	1982	4
Interactive Digital Image Processing for Terrain Data Extraction, Phase 2	1983	5
Interactive Digital Image Processing for Terrain Data Extraction Phase 3	1983	13
Interactive Digital Image Processing Investigation	1980	15
Interactive Digital Image Processing Investigation, Phase II	1981	10
Interactive Image Analysis System Design	1984	7
Interactive Knowledge-Based Cartographic Feature Extraction	1982	21
Interagency Energy and Environmental Survey	1978	72
Interferometer Data Reduction Study	1970	101
Interim Solution Rectifier Van	1970	10
Interim Technical Progress Report, Ninth Semi-Annual Technical Report, Sep 1971-Mar 1972, Project THEMIS, A Center for Remote Sensing	1975	84
Interpolation of Deflections from Horizontal Gravity Gradients	1970	88
Interpolation of Gravity Anomalies and Deflection of the Vertical Components from Rapid Gravity Survey System Data	1977	80
Interpretation of Radar Imagery for Terrain Analysis in Tropical Environments	1970	78
Instrument to Monitor the Tilt of Large Structures, An	1984	7
Instrumentation for Color Aerial Photography	1971	1
Inverse Scattering Applications in Determining Terrain Feature Parameters	1983	6
Investigation and Evaluation of Planigon Lens Distortion Characteristics	1970	14
Investigation, Experiments, and Study of Electron Beam Recorder (EBR) Techniques for Map Production	1975	115
Investigation of Bjerhammar's New Gravity Reduction Method	1970	96
Investigation of Cartographic Pressplate Recording from Digital Data	1977	31
Investigation of Continuous Photoconductive Layer Arrays	1976	59
Investigation of Discrete Function Technology for Topographic Sciences	1979	54

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Investigation of Electro-Acoustic Technology for Topographic Application	1979	52
Investigation of Extrema in Digital Images for Texture Analysis	1981	5
Investigation of Fusion and Fixation Disparity Limits for Photogrammetry	1970	91
Investigation of Linear Transformations for Automatic Cartographic Analysis	1980	27
Investigation of Multiband Photographic Techniques, Vol. I	1970	90
Investigation of Multiband Photographic Techniques, Vol. III	1971	20
Investigation of Photographic Mapping Detail and Data Encoding	1970	72
Investigation of Techniques to Generate Contours from Stereo-Pairs	1977	10
Investigation of the Application of "Array Algebra" to Terrain Modeling	1979	20
Investigation of the Electronic Distance Measuring Equipment Electrotape	1970	98
Investigation of the Geometrical Quality of the Relative and Absolute Orientation Procedures and the Final Results of the Photogrammetric Procedure	1970	2
Investigations into the Problems of Relative Orientation in Stereo Aerial Photogrammetry	1970	88
Investigations of Basic Geometric Quality of Aerial Photographs and Some Related Problems	1970	1
Investigations of the Use of Conventional Films in the ETL Cartographic EBR	1980	22
Investigations Related to the Establishment of a World Geodetic System	1970	89
Joint Analyses in Glen Canyon National Recreational Area	1977	77
Kalman Filtering and Smoothing in Fotonap for Orbit Determination using GPS Measurements	1979	53
KANDIDATS	1971	17
Knowledge-Based Images Analysis	1982	13
KT2 Gyro-theodolite (Otto Fennel GMBH & Co)	1971	3
Land Cover Classification from LANDSAT Data: Phase III of a Joint OCE/NASA Demonstration	1980	19
LANDSAT D: Corps of Engineers Interface with Advanced NASA Ground Systems Study	1979	36
Light, Target for Ranging Pole	1970	11
Lightweight North-Seeking Gyro Azimuth Surveying Instrument, Model 11NG531A	1970	79

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Lightweight North-Seeking Gyro Azimuth Surveying Instrument, Model 11NG531B	1970	79
L.N.K. Software Systems for Transferring, Merging, and Displaying DFAD/DTED Data on AMS/CAPIR	1984	10
Long Range Survey System	1970	58
Long Range Surveying System	1970	59
Low Light Level Photography	1970	26
Manual for Maintenance and Operation of the MB-1 Multiband Aerial Camera	1977	28
Map Coating Concept Studies	1970	66
Map Illuminator Test, Phase I	1977	16
MAPCON Design Study	1970	97
Mapping Camera Image Errors Due to Star Camera Identification and Measuring Errors	1975	20
Mapping from Airborne Radar Scope Presentations	1970	84
Mapping from Radar Presentations, Second Interim Report	1970	11
Mapping from Side-Looking Radar	1970	93
Mapping with Minimum Ground Control	1970	14
MAT Transponder Model No. 10002	1970	75
Materials Research for Holographic Recording (Report No. 1, Multiple Image Storage of Continuous Tone Data in Volume Holograms)	1978	10
Materials Research for Holographic Recording (Report No. 2, Bleaching Methods for Photographically Recorded Holograms)	1979	44
Materials Research for Holographic Recording (Report No. 3, Hardened Gelatin Holographic Recording Materials)	1980	51
Mathematical Analysis of a Technique for the Calibration of a Synthetic Aperture Radar	1970	28
Mathematical Techniques for Automated Cartography	1975	101
Mathematics of Geodetic SECOR Data Processing	1970	59
Matrix Evaluation of Remote Sensor Capabilities for Military Geographic Information (MGI)	1975	59
MATS Performance with the SECOR System	1970	75
MATS Transponder	1970	75
Measurement of the Change in the Deflection of the Vertical with a Schuler-Tuned North- Slaved Inertial System	1979	15
Measurement Techniques of Electrical Parameters of Surface Materials in the X-Band Region	1983	17
Mensuration and Reduction Accuracy and Precision Standard Applicable to an Integrated World- Wide Topographic System	1971	3
Methodology for Military Geographic Analysis	1970	26

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Methods and Results of Remote Barometric Altimetry and Views on the Estimation of Meteorological Field Variables	1975	22
Methods for Calculating Atmospheric Refraction and Its Perturbation	1983	15
Micromap Camera Display Systems	1972	4
Microreduction and Enlargement of Graphic Information Study (MEGIS)	1978	3
Microwave Pointing Variations and Angle Measurements	1970	24
Military Applications of Multiband Aerial Photography (Report No. 5 in the ETL Series on Remote Sensing)	1976	82
Military Geographic Intelligence Products Associated with the SLAR Topo Map Test in Panama	1971	5
Military Potential Test of Selected Items of Hydrologic Survey Equipment	1972	8
Military Significance of the USAETL Research Note "A New Solution for the Anomalous Gravity Potential Resulting from a Modification of Molodensky's Linear Approximation, Its Practical Significance, and Numerous Ramifications"	1970	7
Miniaturized Gyrocompass	1983	10
Miniaturized Gyrocompass (Small North-Orienting Device)	1971	5
Minipim-MK II Precision Indicator of the Meridian (British Aircraft Corp.)	1970	28
Mini Raster-to-Vector Conversion	1983	4
Mod II Power Supply for Army Artillery Inertial Survey System (GEISHA)	1970	64
Modeling and Contouring Irregular Surfaces Subject to Constraints	1976	12
Modes of Satellite Triangulation Adjustment	1970	93
Modification of a Cartographic Mapping Camera from Type T-11 to Type KC-4B (with Automatic Exposure Control)	1972	2
Modification of the MUSAT Aerotriangulation Programs to Accommodate Bathymetric Image Points	1984	4
Modifications to FOTONAP	1978	52
Mono Versus Stereo Analytical Photogrammetry	1970	71
Morphometry of Landforms: Quantification of Slope Gradients in Glaciated Terrain	1975	16
Multi-Altitude Transponder	1970	74
Multi-Image Correlation System Study for MGI	1970	76

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Multi-Image Correlation Systems Study, Quantitative Evaluation of Electronic Multi- Image Processor	1970	76
Multi-Image Pattern Recognition: Ideas and Results	1970	78
Multiparametric Figures of Equilibrium; Curvature of the Plumb Line	1970	99
Multiparametric Theory of Spheroidal Equilibrium Figures and the Normal Spheroids of Earth and Moon	1970	99
Multiple Camera Analytical Triangulation Program	1970	93
Multiple Station Analytical Triangulation Program	1970	93
Multipower Army Stereoscope	1970	55
Multisensor Study of Plant Communities at Horsefly Mountain, Oregon	1970	78
Multisensor Approaches for Determining Deflections of the Vertical	1984	8
Multisource Image Analysis	1981	4
Multispectral Capability of H&W Film (Photographic Technology Series)	1978	29
Multispectral Experiment No. 2	1970	52
Multispectral Target Signatures	1980	7
MUSAT IV	1971	20
Natural Image Computer	1970	90
Natural Image Computers	1970	91
Near-Real-Time Application of Digital Terrain Data in a Minicomputer Environment	1979	22
Near-Surface Bathymetry System, Report No. 11 in the ETL Series on Remote Sensing	1979	56
New Analyses and Methods Leading to Improved Target Acquisition Requirements Involving Systems, Geodetic and Reentry Errors, and Increased Weapons Effectiveness for Conventional Weapons (Part I)	1970	7
New Analyses and Methods Leading to Improved Target Acquisition Requirements Involving Systems, Geodetic and Reentry Errors, and Increased Weapons Effectiveness for Conventional Weapons (Part II)	1971	1
New Analytical Methods for Simulation/Estimation of Asymmetric Satellite Dynamics	1975	126
New Formulas Useful When Changing Ellipsoidal Parameters or Orientation	1970	1
New Insights and Results Regarding L.F. Richard- son's Turbulence Criterion	1975	15
New Method for Determining Azimuth and Latitude Independent of Time and Zenith Distance	1970	4

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
New Solution for the Anomalous Gravity Potential Resulting from a Modification of Molodensky's Linear Approximation, Its Practical Significance and Numerous Ramifications	1970	6
Noncontact Array Velocimeter	1977	84
North-Seeking Gyrocompass, Final Technical Report	1982	8
Occurrence of Ice in the Form of Glaze, Rime, and Hoar-Frost with Respect to the Operation and Storage of V/STOL Aircraft	1975	42
On the Energy Integral for Satellites	1970	6
On the Thermal Nature and Sensing of Snow-Covered Arctic Terrain	1975	23
Optical-Electronic Precision Pointing System	1970	54
Optical Power Spectral Analysis for Machine- Readable Factor Maps	1982	3
Optical Power Spectrum Analysis (OPSA) (Report No. 1 Recording Optical Spectrum Analyzer System Hardware)	1976	42
Optical Theodolite Readout	1970	89
Optimized Digital Automatic Map Compilation System	1970	73
Optimized Method for the Derivation of the Deflection of the Vertical from RGSS Data	1978	59
Optimized Post-Mission Determination of the Deflection of the Vertical Using RGSS Data	1979	57
Optimum Intelligence Exploitation of Coherent Radar Signals	1970	71
Orthographic Radar Restitutor Engineer Design Test	1976	26
Orthophoto Viewer and Transfer Device	1970	69
Parallel Optical Processing to Convert Elevation Data to Slope Maps. Phase I: Theoretical Analysis	1976	30
Parallel Optical Processing to Convert Elevation Data to Slope Maps. Phase II: Practical Considerations	1976	35
Parallel Profile Plots for Visual Terrain Display	1978	51
Particulate Matter Considerations in the Design of V/STOL Aircraft	1975	37
Performance Evaluation of the Position and Azimuth Determining System (PADS) with an Improved Vertical Accelerometer	1979	59
Phoenix Laser and Terrain Profile Test	1970	53
Photo Analysis of a Desert Area	1978	4
Photo-Geomorphology of Coastal Landforms, Cat Island, Bahamas (Vol. II)	1975	53
Photogrammetric and Tracking Network Analysis Pro- gram	1975	119

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Photogrammetric and Tracking Network Analysis Program for the UNIVAC 1108 Computer	1977	3
Photogrammetric Applications to Field Artillery	1971	3
Photogrammetric Aspects of the Heterodyne Optical Correlator	1978	21
Photogrammetric Flash Triangulation for Corps of Engineers Field Use	1970	66
Photographic Visibility of Light Images on Aerial Film	1970	56
Photomap Reproduction System	1970	73
Pilot Program of Lunar Photography for Precise Selenodesy	1970	63
Planimetric Radar Mapping System	1970	68
Plastic-Scribing Color Separation for Military Cartography	1970	15
Platform Orientation System Test Program	1978	28
Point Light Source Contact Printer Photographic Technology Series	1978	9
Position and Azimuth Determining System (PADS)	1975	9
Position and Azimuth Determining System (PADS) Helicopter Study	1976	57
Position and Surveying System (PASS)	1975	108
Possibility of Adapting a Land Navigation System to Perform Artillery Survey	1977	85
Post-Mission Smoothing and Analysis of the Measurements of the Change in the Deflection of the Vertical Obtained by the Rapid Geodetic Survey System (RGSS) at the White Sands Test Range	1977	64
Potential of Thermal IR Imagery for Supplemental Map Information in Snow-Covered Areas	1977	55
Potential Sand and Dust Source Areas	1975	36
Practical Field Accuracy Limits for a Wild T-2 Theodolite	1970	25
Practical Second-Order Theory for the Disturbance Potential and Deflections of the Vertical, Including an Analysis of the Limitations of the Molodensky/Brovar Series and Downward Continuation of Gravity	1972	1
Practical Tests of the Theoretical Accuracy of Aerial Triangulation	1970	1
Precise Photogrammetric Orientation and Data Determination of HIRAN Mapping System AN/APQ 73	1970	53
Precision Enlarging Printer (4X)	1970	25
Precision 2.0X Enlarging Printer	1971	2
Precision 3.3X Enlarging Printer	1972	4
Precision STARAN Correlator	1978	70
Predesign Data for the Radar Stereo Equipment Program	1970	68

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Preliminary Image Data Extraction Experiments with the Phase I, Automated Image Data Extraction System - I	1976	29
Preliminary Radar Feature Extraction and Recognition Using Texture Measurement	1984	8
Preliminary Reliability Prediction - MATS	1970	75
Preliminary Report on a Multispectral Experiment	1970	52
Preliminary Study into the Principles of Continuous Tone Electrophotography	1970	54
Preproduction Model Cartographic EBR System	1982	6
Proceedings of the International Symposium Figure of the Earth and Refraction	1970	71
Product Improvement Test Report of Astronomic Surveying Equipment	1970	25
Production of Military Geographic Intelligence Products Associated with SLR-Topo Map Test in Panama	1970	95
Program and Test Procedures to Determine the Geocentric Coordinates and Orbital Parameters of an Unidentified Satellite	1970	95
Program Maintenance Manual for the Reference Scene Software (RSS)	1977	68
Programmer for Army Artillery Inertial Survey System (GEISHA)	1970	65
Project SAND - Availability of Construction Materials in the Mekong Delta	1970	76
Project SAND (Phase III) Analysis of Remote Sensor Imagery of Selected Areas in the Mississippi Delta	1972	2
Project THEMIS: A Center for Remote Sensing	1970	77, 78
Project THEMIS: A Center for Remote Sensing	1971	17
Project THEMIS: A Center for Remote Sensing	1972	11
Project THEMIS: A Center for Remote Sensing	1976	5
Propagation of Very Short Radio Waves Through the Ionosphere and the Investigation of Ionospheric Models	1975	25
Proposed Stereophotogrammetric System for Topographic Mapping from Photography Taken at Altitudes up to 100,000 Feet	1970	17
Prototype Automatic Mosaicking System	1970	23
Prototype Electrostatic Image Reproducer	1977	18
Prototype Image Spectrum Analyzer (PISA) for Cartographic Feature Extraction	1980	57
Prototype Lithographic Enlarging Projection Platemaker	1975	6
Prototype Stereomat System	1970	20
Quantitative Geography: Achievements and Prospects	1972	10
RACOM System Supplemental Design Study	1970	54

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
RACOMS Cartographic Module	1971	4
RACOMS Compilation Module I	1971	4
RACOMS Data Processing Module	1971	4
RACOMS Image Processing Module I	1970	28
RACOMS Image Processing Module II	1971	4
RACOMS Map Revision Module	1971	4
RACOMS Operations Module	1970	28
RACOMS Pass Point Marking and Measuring Instrument	1971	2
RACOMS Reproduction Module	1971	5
Radar Backscatter from a Vegetated Terrain: A Discrete Scattering Approach	1980	5
Radar Bridge Patterns Extraction and Recognition	1984	13
Radar Calibration Study	1970	101
Radar Image Simulation of Seasonally Dependent Reference Scenes	1980	36
Radar Image Simulation Project	1978	25
Radar Image Simulation Project: Development of a General Simulation Model and an Interactive Simulation Model, and Sample Results	1977	38
Radar Image Simulation: Validation of the Point Scattering Model, Volume I	1979	3
Radar Image Simulation: Validation of the Point Scattering Model, Volume II	1979	5
Radar Image Simulation: Validation of the Point Scattering Method Addendum	1980	3
Radar Mapping Beacon Analysis	1975	128
Radar Mapping Test Ranges	1970	53
Radar Network Adjustment	1970	84
Radar Presentation Restitutor	1970	61
Radar Sketching Device	1970	23
Radar Stereo Equipment Program	1972	10
Radar, Thermal Infrared, and Panchromatic Image Collection and Analysis	1982	7
Radiative Transfer in One-Dimensional Discretely Stratified Media	1981	17
RADOT Code for the Tracking of Radar Incident on Trees	1979	29
RADOT Code System to Calculate the Radar Return from a Forested Area	1980	60
Rainfall Intensities in the Conterminous United States and Hawaii (Supplement 1 to ETL-SR-72-5: Distribution of Mean Monthly Precipitation and Rainfall Intensities)	1975	49
Rapid Cartographic Processing System Study	1970	74
Rapid Combat Mapping System Evaluation	1971	5
Rapid Geodetic Survey System	1977	79

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Rapid Geodetic Survey System (RGSS) Deflection of the Vertical and Gravity Anomaly Test at White Sands Missile Range, 1980	1983	18
Rapid Gravity Survey System Aided With Supplemental Gravimetric Data	1978	48
RC-135A/USQ-28 Category II Test (The Photographic Resolution Capabilities of the KS-78A Camera Subsystem)	1971	13
R & D Plan for Army Applications of AI/ROBOTICS	1983	13
Recognition of Handprinted Symbols for Computer-Aided Mapping	1975	81
Recording and Scanning Advances in Cartographic EBR Systems	1982	17
Reduction and Classification of the Data Base List	1970	98
Reduction Procedures for Absolute Direction and Geodetic Azimuths from Optical Observations of Satellites	1970	3
Reflection and Identification Studies Applied to Terrain Imaging Radar	1984	18
Refraction in Selected Model Atmospheres	1970	63
Relation Between the Spectrum of Surface Slopes and the Spectrum of Surface Elevations and its Usefulness in the Theory of Electromagnetic Wave Scattering from Rough Surfaces	1971	1
Relational Data Base Management Study	1979	13
Remote Sensor Image Capabilities for Acquisition of Terrain Information	1977	48
Remote Sensor Imagery Analysis for Location of Construction Materials in the Mekong Delta - Project SAND (Phase II)	1971	2
Replacement of Photographic Imagery Equipment (RPIE)	1977	24
Report on Atmospheric Obstructions to Visibility: Volume I - Study Results	1980	11
Report on Atmospheric Obstructions to Visibility: Volume II - Results of Literature Search	1980	13
Research and Design of a PROM Coherent Optical Processor	1981	8
Research and Development Acceptance Test Report Surveying Instrument: Azimuth, Gyro, Lightweight (Lear Siegler Inc. Models)	1970	24
Research and Development of a Prototype Laser Point Marking Instrument	1970	89
Research in Space Photogrammetry	1970	83
Research in Surveying, Mapping and Geodesy	1970	62
Research Institute Lectures on Geography	1971	7

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Research on Instrumentation of Satellites and Other Hypersonic Vehicles for Precise Surveying, Mapping, and Target Location	1970	83
Research on Refinement and Interpretation of Gravity Anomaly Computations	1970	85
Research Studies Related to Mapping, Geodesy, and Position Determination	1970	82
Research Studies Related to Mapping, Geodesy, and Position Determination	1971	19
Results of Space Triangulation Adjustments from Satellite Data	1970	3
Results of the Effect of a Specific Flight Environment on Mapping Photography	1970	74
Review and Analysis of U.S. Army Geodetic SECOR System and Development	1971	7
Review of New Geographic Methods and Techniques	1970	61
Review of Photosensitive Materials for Holographic Recordings	1979	8
Robotic Vehicle Terrain-Navigation Subsystem: Conceptual Design Phase	1984	19
RPIE Symbol Placement Accuracy	1977	82
Ruggedized Geodetic SECOR	1970	59
Ruggedized Geodetic SECOR System	1970	59
Sand and Dust Considerations in the Design of Military Equipment	1975	60
Satellite Angulation	1970	4
Satellite Geodesy Based on Stellar Orientation of Lines Between Unknown Stations	1970	6
Satellite-to-Satellite Tracking for Orbit Improvement and Determination of a $1^{\circ} \times 1^{\circ}$ Gravity Field	1977	62
Satellite-to-Satellite Tracking Study for the Global Positioning System (Rotating-Y Configuration)	1975	54
Satellite, US Army Type II, Geodetic	1970	73
Scale Problems in Geographic Research	1972	9
Scattering from a Vegetation Layer with an Irregular Vegetation Soil Boundary	1982	19
Scattering of a Code-Modulated Radio Signal and Associated Multipath Range Errors	1978	63
Scene Classification Results Using the Max-Min Texture Measure	1983	15
Selected Bibliography of Corps of Engineers Remote Sensing Reports	1978	64
Semiautomatic Coordinate Reader	1972	4

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Semi-Automatic Pass Point Determination Using Digital Techniques	1977	43
Sensing Array System With Image Statistics Processing, A	1983	14
Sequential Independent Model Block Analytical Triangulation (SIMBAT)	1970	94
Service Tests and Subsequent Modifications and Test of Compass Sun, Universal, 0 to 90 Degrees North and South Latitudes, with Case	1970	12
Shaded Relief Images for Cartographic Applications	1982	14
Side-Looking Radar Data Requirements for Automated Mapping on the UNAMACE	1975	96
Side-Looking Radar Presentation Viewing and Measuring Instrument	1970	24
Side-Looking Radar Presentation Viewing and Measuring Instrument (Boller and Chivens, Inc.)	1970	55
Side-Looking Radar Viewing	1970	85
Signal Signatures of Topographic Features Using Analog Technology	1980	31
Simulation of a Radar Image for Garden City Test Site	1976	53
Single-Lens, Four-Channel Multiband Camera (Report No. 3 in the ETL Series on Remote Sensing)	1976	22
Single Photo Analysis of Sampled Aerial Imagery	1976	32
Solution of the General Analytical Aerotriangulation Problem	1970	57
Some Relations Between the Geometrical Quality of Topographic Mapping and Aerial Photogrammetry	1970	2
Spatial Light Modulators: Test and Evaluation	1980	42
Spatial Sampling: A Technique for Acquisition of Geographic Data from Aerial Photographs and Maps	1971	20
Spectral Reflectivity Data: A Practical Acquisition Procedure	1971	17
Spectral/Spatial Resolution Targets for Aerial Imagery (Report No. 1 in the ETL Series on Remote Sensing)	1975	67
Stable Platform Assembly for Army Artillery Inertial Survey System	1970	63
Stable Platform Electronics for Army Artillery Inertial Survey System (GEISHA)	1970	64
Star Pattern Recognition and Spacecraft Attitude Determination	1980	17
Star Pattern Recognition and Spacecraft Attitude Determination	1982	14
Star Pattern Recognition and Spacecraft Attitude Determination, Phase II	1981	5

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
STARAN Image Processing	1982	5
Stars' Position Determined by Combining Micrometric Observations with an Observed Known Star in a Vertical Plane Close to the Meridian		
State-of-the-Art of Slope Mapping	1977	57
Status of Aerial Color Photography in Government Agencies	1970	30
Stereo Analysis of a Specific Digital Model Sampled from Aerial Imagery	1977	76
Stereo Radar Analysis	1975	145
Stereo Radar Techniques Study, Phase I, Vol. 1 - Analysis	1970	95
Stereoplotter, Topographic, Projection-type, High Precision	1970	19
Stereoscopic Terrain Display for Measurement Applications	1976	46
Stress Analysis, Study of the M4 Van Expansible and Adapter, Detachable Running Gear	1970	67
Structural Analysis from Radar Imagery, Eastern Panamanian Isthmus	1971	16
Studies in Zinc Oxide Photoconductivity	1970	70
Studies of Gravity in Space According to Bjerhammar	1970	96
Study and Analysis of the Position and Azimuth Determining System (PADS) Field Maintenance Concept	1976	20
Study and Analysis of the Position and Azimuth Determining System (PADS) for Mapping, Charting, and Geodesy Applications	1975	110
Study and Prototype Model Design of a Miniaturized Gyrocompass	1970	54
Study of a Digital Interface Design for the Quick Response Multicolor Printer (QRMP)	1984	16
Study of Attitude and Position Determining Components for a Rapid Combat Mapping System	1970	55
Study of Classification and Nomenclature of Vegetation	1977	54
Study of Digital Matching of Dissimilar Images	1982	6
Study of Environmental Monitoring and Information Systems	1972	11
Study of Knowledge-Based Systems for Photo Interpretation	1981	17
Study of Lithographic Fountain Solutions	1970	70
Study of Panoramic-Metric Image Matching for Photogrammetric Instrumentation	1970	74

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Study of Potential Application of Holographic Techniques to Mapping	1971	20
Study of Potential Application of Holographic Techniques to Mapping	1972	12
Study of Solution of a Large System of Linearized Normal Equations and the Inversion of the Associated Coefficient Matrix	1970	99
Study of Stereophotogrammetric Systems for Topographic Mapping with Very High Altitude Aerial Photography	1970	10
Study of the Accuracy of Visual Planimetric Pointings to Photographic Edges with Different Characteristics	1972	12
Study of the Application of Piezoelectric Techniques to a Small North-Orienting Device	1970	79
Study of the Characteristics of the Holographic Stereomodel for Application in Mensuration and Mapping, Part I	1975	113
Study of the Characteristics of the Holographic Stereomodel for Application in Mensuration and Mapping, Part II	1975	114
Study of the Effect of a Specific Flight Environment on Mapping Photography	1970	100
Study of the Effect of Corona Conditions on Electrostatic Processes	1975	95
Study of the Effects of an X-15 Type Flight Environment on Coherent Doppler Side-Looking Radar Mapping Systems (Volume II)	1970	101
Study of the Effects of Nonhomogeneous Target Backgrounds on Photogrammetric Coordinate Measurement	1970	92
Study of the Human Visual System in Support of Automated Feature Extraction	1982	20
Study of the Impact of the Global Positioning System on Army Survey	1977	72
Study of the Interaction of a Positive Corona with Selenium Coatings Relevant to the IFAX Printing Process	1975	137
Study of the Long Range Position Determination System	1970	56
Study of the Long Range Position Determination System	1971	15
Study of Visual Stereoscopic Acuity	1970	96
Study to Establish a Method of Selecting Input Photographic Material for Automated Compilation Equipment	1972	9

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Study to Optimize Performance of the Rapid Geodetic Survey System - Interim Technical Report	1982	9
Study to Optimize Performance of the Rapid Geodetic Survey System Second Interim Report, A	1983	3
Study to Optimize Performance of the Rapid Geodetic Survey System Addendum Report, A	1984	12
Supplement to Preliminary Report on a Multispectral Experiment	1970	52
Surface Climate of the Arctic Basin	1972	2
Surface Gravity Effects of Subterranean Tunnels	1977	70
Surface Materials and Terrain Features of Yuma Proving Ground, Part I Summary Description	1976	70
Survey of Digital Image Display Systems (Soft Copy)	1977	91
Survey of Digital Image Scanning Systems	1977	93
Survey of Display Devices (Hard Copy)	1977	92
Survey of Mass Storage Systems	1977	90
Surveying Instrument: Azimuth, Gyro, Lightweight (SIAGL) (Lear Siegler, Inc.)	1972	3
Synthesis Guide for Cross-Country Movement (Report No. 4 in the ETL series on Guides for Army Terrain Analysts)	1981	9
Synthesis Guide for Lines of Communication (Report No. 7 in the ETL Series on Guides for Army Terrain Analysts)	1982	16
Synthesis Guide for Obstacle Siting (Report No.9 in the ETL Series on Guides for Army Terrain Analysts)	1983	8
System Analysis of the Entire Topographic Support System (TSS), Final Report	1979	50
System Analysis of the Entire Topographic Support System (TSS), Interim Report	1979	47
System and Design Study for an Advanced Drum Plotter	1971	15
System for Automatic Secure Transmission and Reception of Topographic Information - Maps, Photographs, or Alphanumeric Facsimile - at TV Rates	1972	2
System for Topographic Inquiry - No. 1, Micrographic Subsystem	1975	11
System for Topographic Inquiry - No. 2, Alphanumeric Subsystem	1976	48
System for Topographic Inquiry - No. 3, Alphanumeric Subsystem Data Base Listing	1976	49
System for Topographic Inquiry - No. 4, Program Conversion Procedures	1976	50
System for Topographic Inquiry - No. 5, Alphanumeric Subsystem Users Guide	1976	84

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Systematic Correction and Weighting of Analogue Aerial Triangulation Observations and Their Use in Strip and Block Adjustments	1970	89
Systematic Investigations of Geodetic Networks in Space	1970	98
Systems Concepts for Military Geographic Intelligence	1970	97
Tactical/Strategic Point Positioning Study	1984	11
Technical Data on KC-Film, Toners, and Processes	1981	11
Technical Report for Automatic Line Follower	1975	96
Television Display of Topographic Information	1971	15
Television Display of Topographic Information, Phase II	1972	10
Terrain Analysis Procedural Guide for Climate (Report No. 5 in the ETL Series on Guides for Army Terrain Analysts)	1981	20
Terrain Analysis Procedural Guide for Drainage and Water Resources (Report No. 8 in the ETL Series on Guides for Army Terrain Analysts)	1983	9
Terrain Analysis Procedural Guide for Geology (Report No. 3 in the ETL Series on Guides for Army Terrain Analysts)	1980	63
Terrain Analysis Procedural Guide for Railroads (Report No. 10 in the ETL Series on Guides for Army Terrain Analysts)	1984	6
Terrain Analysis Procedural Guide for Roads and Related Structures (Report No. 2 in the ETL Series on Guides for Army Terrain Analysts)	1980	59
Terrain Analysis Procedural Guide for Soil (Report No. 6 in the ETL Series on Guides for Army Terrain Analysts)	1982	10
Terrain Analysis Procedural Guide for Vegetation (Report No. 1 in the ETL Series on Guides for Army Terrain Analysts)	1980	23
Terrain Analyst Synthesizer Station	1981	15
Terrain Data of Mount Hayes D-4 Quadrangle, Fort Greely, Alaska (Report No. 4 in the ETL Series on Remote Sensing)	1975	73
Terrain Effects Analysis Routine for an MGI System	1976	58
Terrain Eigenvector Dyad Analysis	1970	84
Terrain Factor Analysis and Automatic Color Coded Mapping Utilizing the IDECS	1975	87
Terrain Intelligence Input to the Tactical Operations System (TOS) of Automatic Data Systems within the Army in the Field	1970	73
Test and Evaluation of a Baudot-FIELDDATA Code Converter, Paper Tape	1970	22

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Test and Evaluation of 9 by 18 Rectifier for 12- and 24-inch Focal Length Photography	1970	13
Test and Evaluation of Target Map Coordinate Locator Equipment	1970	22
Test and Evaluation of the Analytical Photogrammetric Positioning System, Advanced (APPS-II)	1983	12
Test and Evaluation of the Direct Viewing Stereoplotter, Wernstedt-Mahan Type	1970	14
Test and Evaluation of the Headliner, Model 400	1970	18
Test and Evaluation of the Interim Halcon Mapping System	1970	20
Test and Evaluation of the Interim Stereoplotter, Topographic, Projection Type, High Precision	1970	16
Test and Evaluation of the Kelsh Plotter, Model 5000, Manufactured by the Instruments Corp.	1970	9
Test and Evaluation of the Near Real Time Exploitation System	1983	7
Test and Evaluation of the Prototype Side-Looking Radar Restitutor	1970	25
Test and Evaluation of the Santoni Cartographic Stereomicrometer	1970	19
Test and Evaluation of the 720 Plotter Manufactured by Bausch and Lomb Optical Co.	1970	9
Test and Evaluation of the Stereopontometer and Adapted Multiplex	1970	10
Test and Evaluation of the Stereopontometer with Kelsh Type Stereoplotters	1970	12
Test and Evaluation of Ultrasonic Scribing Equipment	1970	19
Test and Investigation of the Photonymograph (PN-4)	1970	17
Test of Map-Read Magnetic Declination Accuracy	1979	31
Test of Reconnaissance Photographic Transposer AN/GSH-1()	1970	18
Test Results of a Singer, Kearfott Division Modified Land Navigation System	1981	18
Test Results of the Lear Siegler, Singer and Sperry Gyro Heading Reference Systems	1983	10
Test Results of the Litton Low-Cost Semi-Strapped- Down Inertial Land Navigation System	1980	55
Test Strategy for High Resolution Image Scanners, A	1984	24
Testing and Evaluation of the Shiran System by Advanced Data Reduction Methods	1970	60
Testing of an Experimental Viscous-Friction Coupled Small North Orienting Device	1971	18
Tests and Evaluation of an Automatic Point Reading, Plotting, and Grid Ruling Machine	1970	21

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Tests and Evaluation of an Earth Curvature Correction Device	1970	21
Tests and Evaluation of the AS-11A Stereoplotter	1970	29
Tests and Evaluation of the Zeiss Stereotype Stereoplotting Instrument	1970	18
Tests and Evaluation of Ultrawide-Angle Mapping Photography	1970	21
Tests and Evaluations of Precision Coordinatographs	1970	20
Tests of Basic Geometrical Qualities of Photogrammetric Plotting Instrument	1970	2
Tests on the Change Detector	1970	70
Texture Tone Study - Category Maps, Gradient and Homogeneity Images	1975	107
Texture Tone Study - Classification Experiments	1975	93
Texture Tone Study (Quantizing on the IDECS/PDP)	1975	83
Texture Tone Study: Summary and Evaluation	1976	51
Texture Tone Study with Application to Digitized Imagery	1971	16
Texture Tone Study with Application to Digitized Imagery	1972	12
Texture Tone Study with Application to Digitized Imagery	1976	8
Theodolite with Shaft Angle Encoder and Display	1970	89
Theoretical and Experimental Study of Wave Scattering from Composite Rough Surfaces	1975	132
Topographic Data Output Study	1970	91
Topographic Eigenvector Analysis	1970	84
Topographic Radar Mapping Systems Design Study	1970	68
Topographic Relaxation Study	1981	4
Total Optical Color System (Report No. 2 in the ETL Series on Remote Sensing)	1975	12
Toward Automatic Extraction of Cartographic Features	1979	40
TPLOT: A Simple Program for Plotting Percent Composition Data on Ternary Diagrams	1975	27
Training Course on Data Reduction of Radar Topographic Imagery	1970	95
Transformation of Coordinates of Cartographic Digital Data	1976	36
Transformations for Dimension Reduction and Expansion of the Discrete Fourier Transform Under Scanning	1975	28
Transforming Printers	1970	79
Transforming Printers: Acceptance and Engineering Tests	1970	27
Transitional Design Study of the Position and Azimuth Determining System (PADS)	1976	44

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Tribach, Universal	1970	13
Tripod, Universal, Final Report on Project 8-35-10-107	1970	11
Two Approaches to a Portable Color-Measuring System	1970	3
Two-Way Linear Interpolation	1972	1
Type I Geodetic Satellite	1970	75
Typro Composer Photolettering Machine	1970	16
Unified Approach to Mapping, Charting, and Geodesy (MC&G) Data Base Structure Design	1979	25
Unified Geodetic Parameter Program (GEOPS), Vol. 1 of 2 - Mathematical Analysis	1970	101
Unified Geodetic Parameter Program (GEOPS), Vol. 2 of 2 - Program Description	1970	102
Universal Analog Rectification System for Map Revision	1970	24
Universal Automatic Map Compilation Equipment	1970	29
Universal Automatic Map Compilation Equipment (Bunker Ramo Contract)	1970	56
Universal Radar Signal Processor (Correlator)	1970	69
US Army Type II Geodetic Satellites	1970	75
Use and Calibration of Distance Measuring Equipment for Precise Mensuration of Dams	1977	40
Use and Calibration of Distance Measuring Equipment for Precise Mensuration of Dams (Revised)	1980	40
Use of a Vidicon to Digitize Certain Types Target Image in a Photographic Background	1970	71
Use of Array Algebra in Terrain Modeling Procedures	1978	20
Use of Edges of Photographic Images as Specifiers of Image Quality	1975	91
Use of Radar Images in Terrain Analysis: An Annotated Bibliography	1976	75
Use of Side-Looking Airborne Radar (SLAR) Imagery for Engineering Soils Studies	1970	28
Use of SLAR Imagery for Engineering Soils Studies	1970	91
User's Guide to Data Preparation, Photogrammetric Navigation Analysis Program Fotonap	1979	60
User's Manual for the Reference Scene Software (RSS)	1977	66
Using Terrain Analysis to Predict Likely Minefield Sites	1984	14
Utility of Radar Imagery in the Production of Tactical Terrain Data. Military Capabilities Report	1977	34
Utilization of a Photogrammetric Facility (PF) in Human Engineering Laboratories Battalion Artillery Test Number Two (HELBAT II)	1972	5

<u>TITLE</u>	<u>YEAR</u>	<u>PAGE</u>
Variscale Stereo Point Marking Instrument	1970	27
Vegetation and Terrain Effects on Digital Classification of LANDSAT Imagery	1983	12
Vegetation and Terrain Relationships in South-Central New Mexico and Western Texas	1981	20
Vegetation Cover Effects on Soil Spectral Reflectance	1983	8
Vegetation Data Extraction Software Documentation/User's Manual	1984	22
Video Stream Processors: A Cost-Effective Computational Architecture for Image Processing	1981	14
Visual Factors Affecting the Precision of Coordinate Image in a Photographic Background	1970	71
Weather Extremes Around the World (Revision of NLABS Report TR-70-45-ES	1975	70
Weighted Line-Finding Algorithm	1980	54
Wind Design Criteria for Field Shelters - A Study	1977	22
Wire List GEISHA Computer	1970	65
World Areas More Humid Than the Canal Zone During the Wet Season (Note 3 of "Studies to Aid TECOM in Analyses of Environmental Risks to Materiel")	1975	34
World Areas with Higher Precipitation Intensities and Frequencies than the Tropic Test Center, Canal Zone	1976	71
World Areas With Higher Temperatures than the Yuma Proving Ground During Summer (Note 2 of "Studies to Aid TECOM in Analyses of Environmental Risks to Materiel")	1975	32
World Areas With Lower Temperatures than the Arctic Test Center During Winter (Note 1 of "Studies to Aid TECOM in Analyses of Environmental Risks to Materiel")	1975	30
Worldwide Distributions of Ambient Temperatures and Temperatures of Materiel Exposed to Direct Solar Radiation	1975	43
Worldwide Distribution of Mean Dewpoint: Surface and Lower Atmosphere	1975	39
Worldwide Distribution of Mean Monthly Dewpoint (Supplement to ETL-SR-72-4 "Worldwide Distributions of Mean Dewpoint: Surface and Lower Atmosphere")		
Xerox 6500 Color Copier	1978	37
Zoom Transfer Scope	1975	7

END

FILMED

12-85

DTIC