SCAN LINES

LARS · Purdue University · Vol. 3 · No. 6 · January 18, 1978

SPECIAL SEMINAR

* DR. THOMAS HAASE of Solabs County, California, will present an illustrated seminar at 3:30 PM, Thursday, January 19, in the Flexlab II Conference Room. He will discuss the work his group has been doing on radiation from avocado and citrus stress measured from an airplane platform at 10,000 feet, north of San Deigo, California.

TRAVEL: SEMINARS & ADDRESSES

* Several LARS staff members participated in the SR&T project quarterly review held at NASA/Johnson Space Center on December 12-14. Presentations of research results were made by:

MARVIN BAUER	- Analysis of LACIE Field Measurements Data
LEROY SILVA	- Calibration and Correlation of Field Measurements Spectral Data
	- Thermal Band Canopy Modeling
PAUL ANUTA	- Scanner System Parameter Study
BARBARA DAVIS	- ECHO Evaluation
	- Technology Evaluation and Development
ROGER HOFFER	- Training and Classification Techniques for Forestry

DAVID LANDGREBE, principal investigator, and ROYAL SAND also attended.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

* LUIS BARTOLUCCI has accepted the position of Technical Director of Training at LARS, beginning November 1, 1977. This is a joint appointment through the Department of Agronomy and Geosciences. Dr. Bartolucci is responsible for the development of training activities offered by Purdue University in the field of remote sensing directed toward resource problems of interest to potential trainees. His new office is located in Flexlab II.

* Recently Dr. Bartolucci travelled in Latin America to confer with various members of the remote sensing community. As chairman of the Plenary Session he presented a paper on "Remote Sensing Technology Transfer to Developing Countries: at the Symposium sponsored by the United States Agency for International Development (USAID) in LaPaz, Bolivia, November 28-30.

  During the Symposium, he also chaired the Discussion Round-Tables on Technology Transfer which established a permanent Latin American Committee on Remote Sensing. Dr. CARLOS E. BROCKMANN was unanimously selected as its chairman. Plans were made for the formation of an Executive Working Group in July 1978 at the Brazilian National Institute for Space Research (INPE), San Jose dos Campos. This working group will discuss the feasibility and procedures for establishing regional remote sensing training centers in Latin America.

  Bartolucci met with remote sensing specialists from most of the Latin American countries to discuss possible cooperative programs with LARS. He also met with representatives of international funding agencies (United Nations, USAID, NASA, Canadian International Development Research Center, IDB) to discuss possible funding sources for remote sensing technical assistance to developing countries.

  Drs. Bartolucci and Brockmann also conferred on the preparation of a proposal to IDB for continuation of the ongoing LARS/Bolivian projects. Funding was requested for training of Bolivian scientists at LARS over a period of two years, and for completion of LARSYS implementation in the Bolivian DEC System 10 Computer Facility.

* During the first two weeks of December LUIS BARTOLUCCI was part of a selection committee which chose visiting scientists from five Central American countries to participate in a training program at EROS Data Center and the Central American projects at LARS from March 27-July 27, 1978.

  Twenty scientists in all were chosen, four each from Costa Rica, Nicaragua, Honduras, El Salvador and Guatemala, to study photo-interpretation at EROS. Of these 20, two scientists from each country will then study computer analysis and digital processing at LARS.

  Bartolucci also advised each country during the selection of test sites and helped plan the gathering and reduction of appropriate support data (ground truth).

On January 5, Dr. Bartolucci presented a report on these activities in Central America to the International Development Bank (IDB).

* PAUL ANUTA is in San Francisco, California to attend the Automated Cartography Conference and to visit Comarc, Inc. in support of the data base task of the St. Regis project.

  Anuta will also travel to NASA/Wallops Flight Center, Wallops Island, Virginia, on January 24-25, to assemble and edit the system plan for a LARS based radar - Landsat data registration system.

* A two-day symposium/workshop was held in the Krannert Building, Purdue University, on November 17-18, 1977. The future information requirements of policy and decision-makers from an improved global information system for food and fiber was considered. Twenty-five Purdue staff persons joined 25 specialists from industry, agricultural production, research, government agencies and international development organizations in projecting future information needs. One of the objectives of this study is to provide guidelines for research which is required through the next decade to assure development of an optimal operational system.

VISITORS

* On November 30, Mr. MEL DAVIS, Administrator of SCS/USDA and Dr. KLAUS FLASH, Assistant Administrator for Soil Survey, SCS/USDA, Washington; Mr. BUELL FERGUSON, State Conservationist and Mr. RAY SINCLAIR, State Soil Scientist, Indianapolis, visited LARS for a briefing on the use of digital analysis of multi-spectral data for mapping and characterizing soils.
* BO ANREASSEN, Copenhagen, Denmark, visited LARS on December 7-8, for a briefing on research in water resources. He was hosted by DOUG MORRISON, STEVE KRISTOF and MARION BAUMGARDNER.

VISITING SCIENTIST

* Dr. HELMUT BONARIUS began his two month visiting scientist program with LARS on January 9, by participating in the monthly short course. Dr. Bonarius is the Senior Soil Scientist with the Deutsche Forschungsgemeinschaft (German Agency for Technical Co-operation, Ltd.), West Germany. His training will consist of remote sensing applications to the study of soil and land use surveys in semi-arid and arid areas.

ITEMS OF INTEREST

* In a recent release, the Universities Space Research Association (USRA) announced the appointment of ROGER M. HOFFER to the Science Council of the Earth Resources Program. The membership of USRA includes 51 major universities throughout the United States, and is directed toward the development of knowledge associated with space science and technology.

  Dr. Hoffer is currently on sabbatical until the first of August in Ft. Collins. Colorado.

* The Soil Conservation Service, USDA, Washington D.C., has established a new position at Purdue University to be fully supported from the national office. Under a cooperative agreement between the Purdue Agricultural Experiment Station and SCS, this position will carry an appointment in the Agronomy Department with full-time assignment to LARS. This appointment will continue the cooperative effort in developing and refining techniques for the use of digital analysis of multispectral data for characterizing and mapping soils.

* A portable display describing PY work in the Jasper County soil projects has been completed. One copy is at LARS, one copy at the SCS State Office and one copy at the SCS Washington Office.

* VALAIRAT SONTIRAT has successfully completed the requirements for her Masters degree and departed West Lafayette on December 22, 1977 to return to Bangkok, Thailand. The title of her thesis is "Land Use Classification of the Bangkok, Thailand, Area by Digital Analysis of Landsat Multispectral Data."

COMING ATTRACTIONS

* The following seminars are scheduled to begin at 3:30 PM in the Flexlab II conference room.

Jan. ?	Crop Canopy Thermal Modeling (date to be announced) DAN TRAXLER
Wed., Jan. 25	Food & Fiber MARION BAUMGARDNER
Tue., Feb. 7	ECHO Results JIM KAST and BARBARA DAVIS
Tue., Feb. 21	Soil Research Results FRANK KIRSCHNER and DICK WEISMILLER
Tue., Apr. 4	St. Regis DICK MROCZYNSKI

Anyone interested in presenting a seminar should contact LARRY BIEHL, ext. 266.

NEW PROJECTS FUNDED

* SYNTHETIC APERTURE RADAR REGISTRATION STUDY - A two month extension on this project (until February 28, 1978) has been received from NASA/Wallops Flight Center, Wallops Island, Virginia. PAUL ANUTA is principal investigator.

* CENTRAL AMERICA - A two month training program for 10 visiting scientists from Central America, two each from Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica. LUIS BARTOLUCCI will direct their training in computer aided-analysis and digital processing.

* FORESTRY TOPOGRAPHIC STUDY - A one year, with possible extension to two years, project designed to study the influence of topography on forest classification using Landsat multispectral imagery over test sites in Colorado. ROGER HOFFER is principal investigator; LUIS BARTOLUCCI will be directing the project in his absence, working with MIKE FLEMING.

NEW LARS TECHNICAL REPORTS

091577 A Simplified Design Procedure for Image Restoration and Enhancement Filters by C. D. McGillem and N. Y. Chu.

A method for simplifying the design procedure of image restoration filters is presented. The procedure is extended to include optimal interpolation-restoration processing for sharpening and enlarging Landsat images Preliminary experimental results is included.

The results reported in this paper were supported by the National Science Foundation under Contract No. ENG-7614400.

010478 Estimating Agricultural Production by the Use of Satellite Information: An Experiment with Laotian Data by R. Hooley, R. Hoffer, and S. Morain.

Developing countries need information on the level and composition of agricultural production. Existing methods of measuring the level of agricultural activity leave much to be desired when applied to Least Developing Countries (LDC's). The use of satellite data can make an important contribution to the speed with which data on area under cultivation are available, to improved cost effectiveness, and hence to a shortening of the length of the reporting period. Relatively simple, manual interpretation techniques can be utilized to provide many LDC's with methods that are relatively cheap and that do not require the availability of very highly specialized computer processing capabilities. This paper reports the results of one study in the country of Laos.

The work reported in this paper was sponsored by the Asia Foundation.

110877 In Perspective: Meeting the Image Processing Challenge for Remote Sensing by P. H. Swain

Image processing technology as applied to remote sensing of earth resources has been evolving for more than a decade. After outlining the unique aspects of the problem, this paper surveys the progress which has been made in developing computer-based techniques for image enhancement, image analysis, and the formating, storage and retrieval of results. Needs for the future are also discussed.

121277 Detection of the Green and Brown Wave in Hardwood Canopy Covers Using Multidate, Multispectral Data from Landsat-1 by B. O. Blair and M. F. Baumgardner.

Phenologic events which may be related to yields of economic plant species in humid and subhumid temperate regions are difficult and expensive to observe and measure. Sequential multispectral reflectance data obtained by an orbiting satellite multispectral reflectance data obtained by an orbiting satellite (Landsat-1) over 14 preselected sites in central and eastern United States during a 14-month period were examined. Analysis of data from four reflectance bands (0.5 to 1.1μm) indicated that foliage color, leaf sensescence, and regrowth differences among hardwood timber stands can be detected and quantified. The results suggest the need for continued development of these monitoring techniques for use in detecting and quantifying conditions of economic plants which may affect yeild.

The work reported in this paper was sponsored by Purdue Agricultural Experiment Research Station under Project No. NE-69 and NASA under Contract No. NAS5-21781.

NEW LARS PUBLICATIONS

110677 Demonstration of LARSYS on a Data 100 Terminal - Student's Notes by John Lindenlaub and Staff.

This unit provides the student with an introduction to the remote terminal hardware he will be using and introduces him to some aspects of the LARSYS software system. The demonstration requires an instructor to present the material and guide the student. The students notes provide objectives and activities to reinforce the concepts presented.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-14970.

110777 Data 100 Remote Terminal - A Hands-On Experience - Student's Notes by J. D. Russell.

In this unit the student is instructed in the use of the terminal by means of an audio-tape accompanied by these student notes. Details concerning interactive use of a CRT or typewriter console and a Data 100 Remote Terminal are presented.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-14970.

LARS System Services 1-18-78

CORRECTION!

* The description of commands for Data-100/2780 users on page 15 of the November 30 issue of Scanlines needs a correction.

  The BACKSPAC nnnn and the BACKSPAC FILE commands will not work if you put an E on the end of the words BACKSPAC as shown. If you leave off the E, they will work fine! Yes, I know that doesn't make much sense, but...

PERSONNEL

* KEITH PHILIPP has been promoted from Reformatting Technical Assistant to Software Analyst. He will assist with definition, programming and testing of hardware, and prepare for and perform system generation, installation and testing new releases of manufacture supplied software.

APPLICATIONS NEWS FROM JEANNE ETHERIDGE

* BILL SHELLEY Bill is now in the Systems Analysis Group, formerly known as Application Systems. Two of his duties are to be responsible for LARSYS and LARSYSDV. So, be sure and give him a call if you have a LARSYS problem. Or, come over and welcome him to his new position. Since he has other responsibilities besides LARSYS, though, you may not be first in line; but, you won't be forgotten.

* UNSUPPORTED LIBRARY NIM CHU is the first user to respond to last month's call for programs for the Unsupported Library. He has written a package of subroutines which he calls IMGROUP. The subroutines were written to ease the programming burden for an image processing course he has taken. He also included examples of two main programs which make use of sets of his IMGROUP subroutines. The first example is a program to find the autocorrelation function of a 2-dimensional noise. The second example filters a 1-dimensional signal via a Fourier transform. His abstract reads as follows:

IMGROUP consists of a number of short Fortran-callable subroutines for the purpose of signal or image processing, especially at developing or experimental stages. Proper arrangement of successive calls to these routines may allow a user to perform manipulations of signals or images, such as to set picture values, move or shift picture data, carry out two-dimensional Fourier Transforsm, and print pictures in numerical matrix form or plot a one-dimensional signal or line printer. Other facilities include generation of random number, integration of Gaussian density function and linear convolution.

CHUCK SMITH has used the package and recommends it to other users. Contact me if you are interested in using it.

Are there any other programs any of you are aware of that you feel should become part of the Unsupported Library? If you know of any but are not the programmer who wrote them, let me know, and I will contact the programmer myself.

* LARSYSDV BILL SHELLEY has modified the Photo function on LARSYSDV to accept multiple block cards. So, if you wish to photograph more than one block of a large classification area, you do not have to restart the function each time. The program accepts up to 10 block cards. After the first photograph is completed, the program loops to display the next block when you press the PROCESSING COMPLETED button.

* LARSYS UPDATE There is a new color chart for PHOTO that MIKE COLLINS developed. Check the bulletin board near the digital display. Also, now you can initialize data tapes in DUPLICATERUN - use the INITIALIZE option on the control card. The REFERENC file has been updated to reflect this change.

* NEWS TO COME IN NEXT SCANLINES
  - new MERGESTATISTICS

  - DUPLICATERUN on LARSYSDV

Interlab Notes

ITEMS OF INTEREST

* The Measurements program area has completed its move to Unit D of Flexlab II. Their new facilities include an optical and electronics lab, associated offices and an equipment room. Space is also provided for Visiting Scientist offices.

  Work on renovating the old Measurements area, along with construction of the new main entrance to Flexlab I, is under way.

* The LARS Christmas Party was held December 16, at the 4-H A-frame. Approximately 70 people attended. Games, puzzles, singing and lots of good food were enjoyed by all. Many thanks to the committee this year - BARBARA PRATT, chairman, ERIC STONER, CRAIG DAUGHTRY, SUE SCHWINGENDORF, CHRIS METTES and MARLENE HODGE.

  Santa Claus visited Flexlab II, Thursday afternoon, December 22, much to the delight of all the children. While awaiting Santa's arrival, everyone sang carols to the lively accompaniment of MARION BAUMGARDNER on the harmonica. Santa was greeted by the clapping of felt mittens and bells and with a deep and resonant voice told the story, "T'was the Night Before Christmas." He then gave each child (and little Glenda!) a gift, and laying a finger aside his nose flew out the door with a hearty, "Ho, ho, ho and a Merry Christmas to All!" Our compliments to SUE SCHWINGENDORF, DOUG MORRISON, MARION BAUMGARDNER and IDA TENDAM for a fine job.

COMING ATTRACTIONS

* MARK YOUR CALENDARS: Sunday, February 12, is the Annual LARS Skating Party. ACA-Y-ALLA has been reserved from 6:30-8:30 for all LARSians, their families and friends. The more the merrier! Skate rental is available for 50¢.

PERSONNEL CHANGES

* HOWARD GRAMS is leaving LARS on January 20, to continue his career with TWA in Kansas City, Missouri. Howard will be responsible for the VM systems with the TWA Data Processing Division. We wish him lots of success in his new venture. Howard, LARS will miss you.

* The new receptionist in the Director's Office is SUE KLOSOWSKI. Sue is also the Turret Attendant.

* MARWAN J. MUASHER, a new graduate student of DAVID LANDGREBE's will be working on Taks 2.2a (Pattern Recognition) of the SR&T Contract with BARBARA DAVIS. In addition, he will be working with Dr. Landgrebe on the EE696 projects concerned with determining the quality of training samples.

* GETULIO BATISTA is a new graduate student in the Agronomy Department who will be working under MARVIN BAUER in Crop Inventory. Mr. Batista is on the staff of the Brazilian National Institute for Space Research (INPE) where he is responsible for crop production surveys.

SCAN LINES

LARS·Purdue University·Vol.3·No.7·February 28, 1978

TRAVEL: MEETINGS & SYMPOSIA

* A short course on the LARS Computer System was given at NASA/Johnson Space Center, Houston, Texas, February 21-23, in response to their implementation of EOD LARSYS on the LARS 370/148.

JEANNE ETHERIDGE, NANCY FUHS, and SUE SCHWINGENDORF presented material which included CP/CMS 370, statistical packages, design of software systems, and algorithm implementation, to JSC/LEC (Lockheed Electronics Corporation) personnel as part of SR&T 2.4 subtask techniques interchange.

Increased computer usage by JSC is expected and plans look firm for JSC/LEC personnel to reciprocate with a short course at LARS on Procedure 1 analysis concepts and software. Procedure 1 is an analysis approach developed at JSC/LEC as part of the LACIE Analysis Research. This software (implemented in EOD LARSYS) is on the LARS 370/148 and is just waiting to be tried out.

MARK MARCH 6-7, ON YOUR CALENDARS FOR THE JSC/LEC SHORT COURSE. Topics will include an overview of Procedure 1 and a workshop on how to use the algorithms. Specific schedules will be posted; for further information, contact RON BOYD, ext. 294.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

* Recent travel for MARION BAUMGARDNER began with a trip to New Windsor, Maryland, January 13-14, to sit on the board of the United Methodist Committee on Relief, which allocates aid funds in projects to more than 50 countries.

  He participated in a conference on "Human Resources and Agricultural Development for Sahelian Africa", in Las Cruces, New Mexico, January 30-February 1, funded under a Lilly Endowment.

  On February 15-17, Dr. Baumgardner attended the annual meeting of the American Association for the Advancement of Science in Washington D.C. and held discussions with officials of the U.S. Department of Agriculture. CHRIS STELLON and LOU NASH were also in Washington during this time to pursue the objectives of the global wheat statistics study. They spent a day at the National Agricultural Library and met with officials of the U.S. Department of Agriculture, the Argentine Embassy, and the International Food Policy Research Institute.

* Upcoming travel for MARION BAUMGARDNER includes a Workshop on Assessment of Erosion in Europe and the United States in Ghent, Belgium, on February 28-March 3. He will present a paper entitled: "Digital Analysis of Landsat Data for Soil Survey and Erosion Assessment". Dr. Baumgardner will participate in a conference on remote sensing held in Nairobi, Kenya, on March 6-10. This conference is sponsored by the International Development Research Centre of Canada. Results of the LARS work in Bolivia and Sudan funded by IDRC will be included in the presentations.

* TERRY PHILLIPS and JIM KAST were in Houston, Texas, February 6-8, to inform NASA/JSC of progress under the SR&T Task 2.4, and to investigate plans of the Earth Observation Division's use of the LARS 370/148 computer.

* January 25-26, MARVIN BAUER and BARBARA DAVIS visited NASA/JSC to plan experiments to be conducted in 1978-79 on corn and soybeans in the Cornbelt.

  Drs. BAUER, BARRETT ROBINSON, and LEROY SILVA also met with JSC staff to discuss the need for multiband radiometers in future field research projects.

* DAVID LANDGREBE attended a USRA Board of Directors' meeting February 13-14, at the Lunar Science Institute, Houston, Texas.

* JOHN PETERSON will present an invited paper March 9, at the symposium on Development of Optimum Crop Production Systems for the Mid-South; a part of the Plant Science Center dedication exercises at the University of Arkansas, Fayetteville, Arkansas. The paper is entitled: "Monitoring Production and Environmental Programs."

VISITORS

* Dr. WILLIAM SCHREIBER, a well-known researcher in Image Processing from MIT, visited with DAVE LANDGREBE on January 17.

  Dr. Landgrebe also met with Dr. LOUIS WALTER, Goddard Space Flight Center, on January 31, to discuss agricultural remote sensing research at Goddard.

  February 7, Dr. Landgrebe and two USRA officials met with Dr. FROSCH, the Administrator of NASA, to discuss the posture of NASA relative to USRA and the academic community.

* Two groups of representatives from St. Regis, Southern Timberland Division Headquarters, visited recently in connection with the LARS/St. Regis Forest Resource Information project. BOB BARKER and JIM NEWBERRY met with DICK MROCZYNSKI and BUD GOODRICK to learn about classification and training of data over the Fargo test site located in northern Florida and Southern Georgia.

  During the week of February 20, DAVE FREEMAN directed VIE HARRIS's and ROGER BEATTY's study of digitizing cartographic maps, correlating Landsat data, and then inputing this map data to a magnetic tape.

NEW PROJECTS

* A project designed to determine the heat loss in ten sample homes of West Lafayette, Indiana, began in February. Funded under the PY project, its principal investigator is DICK WEISMILLER, with other personnel involved including: LEROY SILVA, project director in charge of data acquisition, DAVE DEWITT, supervising the heat transfer aspects of the project, STEVE SPENCER and SALEEM MOMIN, undergraduate research assistants at LARS, JOHN KNOPF, West Lafayette Community Director, and Prof. PERRY ACHOR, Department of Building and Construction Technology, Purdue University.

  LARS will use an instrument designed under the NDM projects, the digital thermograph, to precisely measure where heat losses are occuring. This project is a feasilility study to determine if an economical and rapid instrumentation procedure can be developed.

NEW TECHNICAL REPORT

011278 Landsat, Computers and Development Projects by P. M. Adrien and M. F. Baumgardner.

Data provided by earth-orbiting satellites and analyzed through specific computer techniques are rapidly providing policy-makers around the world with new information on the location and extent of their countries' renewable and nonrenewable resources. This paper describes new data acquisition and analysis techniques and provides numerous examples of how this new technology may be used to survey and monitor the land, vegetation, water and mineral resources of the world.

NEW LARS PUBLICATION

110577 The LARSYS Educational Package: Instructor's Notes for use with the Data 100. by J. C. Lindenlaub and J. D. Russell.

The LARSYS Educational Package is a set of instructional materials developed to train people to analyze remotely sensed multispectral data using LARSYS. A computer software system developed at LARS/Purdue. The materials included in this volume have been designed to assist LARSYS instructors as they guide students through the LARSYS Educational Package. All of the materials have been updated from the previous version (Information Note 110574) to reflect the use of a Data 100 Remote Terminal.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-14970.

System Services 022878

APPLICATIONS NEWS from BILL SHELLEY and JEANNE ETHERIDGE

* LINEGRAPH and COLUMNGRAPH were intermittently plotting data values one value too large. Corrected versions of these functions are available under LARSYSDV. BUD GOODRICK brought this one to our attention.

* The ambitious LAYERED CLASSIFIER was continuing execution after discovering a singular covariance matrix and also when statistics for a requested channel didn't exist. It now terminates upon discovery of such errors. Our thanks to SUE KAMINSKY and SALEEM MOMIN for pointing this out to us.

* TAPUTL COPY under LARSYSDV has been enhanced to further enable compatibility with PUCC. In the past we had the capability of translating EBCDIC to BDC or BCD to EBCDIC. Additionally, we may now translate EBCDIC to PUCC's character display code or PUCC's display code to EBCDIC. Also, when copying a nine track tape to a seven track tape the possibility exists of having inadequate space on the output tape. To alleviate this, multiple output tapes may now be specified. Example control cards reflecting these modifications are as follows:

```
TAPIN(5555), TOPUCC, TAPOUT(6666,7777)
TAPIN(8888), FROMPUCC, TAPOUT(9999)
```

  Please feel free to contact BILL SHELLEY concerning any questions you may have.

* ATTENTION MERGESTATISTICS Users:

  A new version of MERGESTATISTICS will replace the current version of MERGESTATISTICS on the LARSYSDV system on March 13, 1978. At that time, the present version of MERGESTATISTICS will become BMERGESTATISTICS. A reference file for the new MERGESTATISTICS is presently available on the LARSYSDV system by typing "REFERENCE NMERGESTATISTICS". After March the 13th, this file will become the reference file for MERGESTATISTICS obtained by typing "REFERENCE MERGESTATISTICS" and the reference file for the present MERGESTATISTICS will be obtained by typing "REFERENCE BMERGESTATISTICS".

  The new version of MERGESTATISTICS was written by WILLIAM FREESTONE and uses standard LARSYS programs with as few modifications as possible. The new version contains more versatile CLASSES and INCLUDE cards in place of the old CLASSES and POOL cards. One reason they are more versatile is because hyphens are valid between two numbers; for example 2-6 means 2, 3, 4, 5, and 6 are to be included. The new

CLASSES card has three formats which can be used (see the reference file for MERGESTATISTICS for an explanation). The new version of MERGESTATISTICS allows for up to 30 decks with 60 classes per deck as input.

A sample Control Card deck for the old version of MERGE-STATISTICS follows:

```
*MERGE
CLASSES INCLUDE(1/1,2,3,4,5,6/),
        DELETE(2/32,33,34,35,36,37,38,39,40/)
POOL    CORN(1/1,4/,2/1,3/), POL2(1/2/), POL3(1/3/),
        POL4(1/5/), POL5(1/6/), POL6(2/2/),
        POL7(2/4/), POL8(2/5/), . . . POL34(2/31/)
DATA
        STAT DECK #1 with 20 classes
DATA
        STAT DECK #2 with 40 classes
END
```

The same deck with new MERGESTATISTICS control cards is:

```
*MERGE
INCLUDE D1(1-6), D2(1-31)
CLASSES CORN(1/1,4/,2/1,3/)
DATA
        STAT DECK #1 with 20 classes
        STAT DECK #2 with 40 classes
END
```

The INCLUDE card specifies that classes 1, 2, 3, 4, 5, and 6 of the first statistics deck are to be included and that classes 1 thru 31 inclusive of the second deck are to be included. The CLASSES card specifies that pool 1 will have as its pool name CORN and will consist of classes 1 and 4 of deck 1 and classes 1 and 3 of deck 2. Pool 2 will be class 2 of deck 1 with its class name as the pool name, pool 3 will be class 3 of deck 1 with its class name as the pool name, pool 4 will be class 5 of deck 4 with its class name as the pool name, pool 5 will be class 6 of deck 1 with its class name as the pool name, pool 6 will be class 2 of deck 2 with its class name as the pool name, pool 7 will be class 4 of deck 2 with its class name as the pool name, pool 8 will be class 5 of deck 2 with its class name as the pool name, . . . pool 34 will be class 31 of deck 2 with its class name as the pool name.

It is recommended that any user of MERGESTATISTICS obtain a copy of the control card listing for the new version by typing "REFERENCE NMERGESTATISTICS" for an explanation of the other features of the new control cards.

DISK SPACE SHORTAGE

* We are currently faced with a shortage of available disk space on our 2314's. Our policy in the past concerning disks of ID's that are taken off the system is that we hold the disk for three months and if it is not needed by then, we reassign it to another ID, when needed.

  In the future when we know for sure that an ID is to be taken off, we will contact the user of that ID two or three days prior, asking them to be sure and back the disk up. If they would like for us to back it up prior to taking it off we can do so for a small staff charge. Once the ID is taken off, these cylinders will be free to assign to others.

  We would like for everyone to help in trying to solve this disk problem by doing the following:

  A. Purge all unneeded files on your disks to free more space.

  B. Any user with a disk of 4 cylinders or larger should determine if any number of those cylinders can be freed for us to reassign.

  C. Let us know if there are any ID's currently on the system with assigned disks which haven't been used and probably won't be used in the future.

  Questions or comments regarding this disk problem, should be brought to the attention of Mike Collins (ext. 221).

CONTACTS

* To eliminate some communication problems concerning who to contact for various needs, a list is provided:

Manuals	JOANNE RAYBURN
Tapes	JOANNE RAYBURN
Service Calls	JOANNE RAYBURN
Computer Supplies	JOANNE RAYBURN
ID's	MIKE COLLINS

GOODBYE 2741'S?

* In order to help LARS with its computer support problems, NASA is expecting to increase the use of our computer by folks at JSC. Consequently, a need for additional terminals at Houston has arisen. Due to hardware limitations on our computer's communication controller (IBM 3705), we have three options:

1. Reduce the number of terminals at LARS

2. Spend a good deal of money on an upgraded 3705

3. Replace the IBM 2741 hardcopy terminals

The four IBM 2741 Selectric typewriter terminals (two at Flex I and two at Flex II) require a special piece of hardware on our computer. Replacing this hardware with a different piece of equipment (which will not support 2741's) will allow up to 12 additional terminals to be attached to our computer and will cost around $5 less per month.

Our current plan is to replace the two 2741's at Flex I with a Lear-Siegler ADM3A terminal and an Intertec Superterm and replace the two IBM 2741's at Flex II with a Lear-Siegler ADM3A and a Decwriter II.

The Lear-Siegler terminals are CRT's similar to the GTX and Hazeltine terminals already available at both buildings. The Electrical Engineering Department has several Lear-Siegler terminals and we have heard very good reports about them.

The Intertec Superterm is a hardcopy matrix print terminal. There is currently a dial-up version of this terminal at Flex II. The Superterm has a programmable character set (which means the user may define his own symbols, if he so desires), can print either 6 or 8 lines per inch, can print double width characters, and prints at twice the speed of an IBM 2741.

The Decwriter terminal is a matrix print device like the Superterm. The PDP 11/34 at Flex II uses a Decwriter as an operator's console. The Decwriter prints at twice the speed of the IBM 2741, but unlike the Superterm, does not have programmable characters, line per inch control or double width characters.

This proposed change will cut the number of hardcopy terminals at each building from two to one. Since the proposed replacement terminals are more than twice as fast as the IBM terminals, the total terminal hardcopy output possible should remain about the same. In addition, it is now possible to secure a hardcopy of console output for any terminal (including CRT's) by issuing the CP command 'SPOOL CONSOLE START'.

Currently we are intending to replace the 2741's in mid-March. At this point, our plans are flexible, however. If you wish to comment on the need for hardcopy terminal, the acceptability of the Decwriter and the Superterm as 2741 replacements, or ask any specific hardware questions, please contact KEITH PHILIPP at extension 297.

SUMMARY OF 370/148 COMPUTER USAGE FOR JANUARY, 1973

Overall Usage -	Basic Rate CPU time used	8.13 hrs.
	Priority Rate CPU time used	89.41 hrs.
	Total CPU time used	97.54 hrs.
	Terminal Sessions	2551
	Batch Jobs	395

Usage by Time of Day -

Time Period	Hours of CPU used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	11.42	7%
Mon-Fri 8AM - 4PM	53.01	32%
Mon-Fri 4PM - midnite	25.92	16%
Weekend	7.19	7%

Batch Job Usage -

Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	195	0.27 min.	0.06 min.
BATSHORT	104	4.31 min.	0.37 min.
BATMED	52	16.89 min.	1.02 min.
BATONITE	10	31.11 min.	1.39 min.
BATLONG	25	38.78 min.	10.39 min.

Keyboard Terminals -

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	Hazeltine 1200	103	99.70 hrs.	0.97 hrs.
Flexlab2	31	Hazeltine 1200	167	114.19 hrs.	0.68 hrs.
Flexlab2	32	Hazeltine 1200	188	125.16 hrs.	0.67 hrs.
Flexlab2	33	Infoton GTX	248	237.51 hrs.	0.96 hrs.
Flexlab2	34	2741	101	72.03 hrs.	0.71 hrs.
Flexlab2	35	Infoton GTX	233	190.63 hrs.	0.82 hrs.
Flexlab2	36	Infoton GTX	216	179.25 hrs.	0.83 hrs.
Comp. Room	37	2741	109	33.58 hrs.	0.31 hrs.
Flexlab1	40	Infoton GTX	125	90.55 hrs.	0.72 hrs.
Flexlab1	41	Infoton GTX	116	106.47 hrs.	0.92 hrs.
Flexlab1	42	2741	64	42.26 hrs.	0.66 hrs.
Flexlab1	43	2741	88	49.13 hrs.	0.56 hrs.
Dial-Up	50	First in use	100	79.12 hrs.	0.79 hrs.
Dial-Up	51	Second in use	41	54.11 hrs.	1.32 hrs.
Dial-Up	52	Third in use	14	11.28 hrs.	0.81 hrs.
Dial-Up	53	Fourth in use	35	25.33 hrs.	0.72 hrs.
Dial-Up	54	Fifth in use	2	2.17 hrs.	1.04 hrs.
Houston	61,62,63	(various)	457	257.68 hrs.	0.56 hrs.
Wallops	64	2741	10	2.71 hrs.	0.27 hrs.
ISU	66,67	(various)	104	49.01 hrs.	0.47 hrs.

Interlab Notes

PERSONNEL CHANGES

* On February 6, RUTH JARRET began her new duties as Clerical Supervisor and Secretary to the Office of the Deputy Director. She fills the vacancy created when COURTNEY BROWN accepted a Research Assistantship in the Department of Sociology and Anthropology.

  DIANNA JENNINGS has filled Ruth's vacancy as Secretary to the Computational Facility Managers. CONGRATULATIONS to Ruth and Dianna on their promotions!

* CHUCK SMITH was promoted February 1, to Reformatting Technical Assistant under DAVE FREEMAN. He will perform and coordinate data reformatting operations in the LARS Computer Facility.

* The Earth Sciences program area was joined on January 1, by LOU NASH, Technical Assistant to CHRIS STELLON, in the Wheat Production Statistics projects.

  CHRIS SEUBERT also joined LARS on January 1, as a new graduate student (Ph.D.) in Agronomy. Chris will be working in the Earth Sciences area on the use of Landsat data for assessing soil erosion.

* LARS computer users will be glad to hear the news that TAI SEN YU has passed his Ph.D. oral final exam, and after a few final changes in his thesis, will be leaving for Minneapolis, Minnesota, to work for CDC.

* SHIRLEY DAVIS has returned from a year and a half abroad with her husband and family. She is currently working ½ time on technology transfer projects in Flexlab 2.

* JIM MARIGA has been promoted to the position of Business Administrator for the Engineering Experiment Station. He assumed his new duties February 1, but will continue to handle our fiscal affairs until his current position is filled. This promotion is certainly a well-deserved one and we congratulate Jim on this new opportunity.

THANK YOU

* MIKE COLLINS and his computer staff are to be commended for staying beside the computer during the last snow emergency and keeping it up and running. Their efforts made possible the use of the computer by the remote sensing sites during this time.

ITEMS OF INTEREST

* The LARS symposium on Machine Processing of Remotely Sensed Data, originally scheduled for June 1978, has been cancelled due to several conflicting symposiums at the same time.

* Former LARSian, TINA CARY, with the Geography Department of Columbia University, New York, recently returned from two months in Kenya collecting ground observations for an NSF project involving Landsat analysis. While in Kenya, she talked to second-year remote sensing students at the University of Nairobi, and plans to return in May to lecture on machine processing.

* A NASA/Johnson Space Center organizational chart and phone list for all JSC/LEC personnel is now available by contacting JIM KAST.

* Full-color xerox copies are now available in paper or acetate transparency format from either a 35mm slide or color prints. Single copies cost $1.25 each, while 100 copies of the same image cost $.70 each. For more information, contact SUE FERRINGER, ext. 290.

SCAN LINES

LARS · Purdue University · Vol. 3 · No. 8 · March 31, 1978

LANDSAT 3 ACTIVATION COMPLETED

* Landsat 3 was launched March 5, from Vandenberg Air Force Base, California, on a McDonnell Douglas Delta. Two weeks later a phasing maneuver was conducted with the satellite to coordinate its orbit with that of Landsat 2 so that both will pass over the same areas of the earth every nine days, providing repetitive coverage.

  Final major instrument activation occurred March 20, when the spacecraft's new thermal infrared imageing capability was demonstrated for the first time. NASA/Goddard Space Flight Center controllers indicated that images from the first four channels are meeting advance expectations. It is expected to take several months before good quality thermal images will be available.

  Aviation Week & Space Technology (March 20, 1978, page 62) reports that the new Landsat, built by General Electric, contains improvements involving:

* "RETURN BEAM VIDICON (RBV) CAMERAS The Landsat 3 carries two cameras with a 40-meter (131-ft.) resolution compared with 80 meters (262 ft.) on Landsat 1 and 2. The RBV system will be exercised much more on Landsat 3 than on the previous vehicles, which carried three such cameras. Landsat 3's

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

system views objects essentially in the visible range, allowing a reduction of one camera. The cameras will be used much more for mapping the earth's surface. Return beam vidicon images taken will total about 20-25% of the total of multispectral scenes transmitted."

* "THERMAL INFRARED Landsat 3 carries a fifth multispectral scanner channel calibrated for thermal infrared data. Resolution of this sensor is 237 meters (778 ft.) compared with 80 meters (264 ft.) for the other four multispectral bands. In spite of the gross resolution, this thermal infrared band will aid in better characterization of agricultural fields. It also will be able to take data at night and provide information on the thermal characteristics of rocks and soils."

* "DATA SYSTEM National Aeronautics and Space Administration and the U.S. Geological Survey's Landsat data center will go into all digital operations with Landsat 3. This will provide much finer image quality and, after about one year, reduce the time it takes for a scene to leave the spacecraft and reach the user from five to seven weeks to as little as two weeks."

ADVANCED TOPICS IN THE ANALYSIS OF REMOTE SENSING DATA

* The second offering of the LARS Advanced Short Course will be held April 10-14, at Stewart Center, Purdue University. The course, taught by PHIL SWAIN, MARVIN BAUER, BARBARA DAVIS, DAVID LANDGREBE, JOHN LINDENLAUB, and CLARE MCGILLEM, will treat advanced techniques in the numerical analysis of remote sensing data. It builds on the basic pattern recognition oriented methods implemented in such systems as Image 100, LARSYS, IDIMS, MDAS, VICAR, ERIPS, and others, treating such topics as multitemporal analysis techniques, and statistical methods for results evaluation.

  LARS data analysts may wish to consider sitting in. For further information, contact PHIL SWAIN.

SPECIAL SEMINAR

* Dr. J. A. Allan from London, England, will present an illustrated seminar at 3:30 pm, Tuesday, April 18, in the Flexlab 1 Conference Room. He will discuss land-use mapping in semi-arid areas of the developing world using Landsat imagery.

  Examples will be drawn from Dr. Allan's work in South Asia, the Mediterranean, and northern Africa, where he is involved in a project to examine the possibility of monitoring land use. The discussion will include both digital and image-interpretation techniques.

Dr. Allan is associated with the Geography Department of the School of Oriental and African Studies, University of London.

* DICK MROCZYNSKI is scheduled to present a seminar on the St. Regis Project (What Is It?), Tuesday, April 4, at 3:30 pm, in the Flexlab 1 Conference Room.

LARS WELCOMES CENTRAL AMERICAN VISITING SCIENTISTS

* Ten Central American visiting scientists began a four month training program at LARS on March 27, after completing their study of photo interpretation at EROS Data Center under the direction of Dr. William Draeger.

  The following scientists are participating in the program:

  Costa Rica
  José A. Venégas, Geodesy
  Luis F. González, Agronomy

  El Salvador
  Luis A. Bermúdez, Agronomy
  José Bustamante, Civil Engineering

  Guatemala
  Jorge M. del Valle, Agronomy
  Carlos P. Lemmerhofer, Industrial Engineering

  Honduras
  Porfirio Salgado, Agronomy
  Raúl Andino, Industrial Engineering

  Nicaragua
  Noel Alvarado, Civil Engineering
  Carlos A. Eustakio, Agronomy

  A special session of the monthly short course was held March 27-31, to introduce the scientists to computer-aided analysis. Their studies will continue with application of machine processing techniques to Landsat imagery over test sites in each country.

  LUIS BARTOLUCCI will direct the project under the sponsorship of MARION BAUMGARDNER. Dr. Bartolucci will also be heavily involved in the training of the scientists.

  After the training phase of the project is completed, Dr. Richardo Isla Marco will coordinate regional classification accuracy tests and field verification over the test sites. This activity will be based in Guatemala.

SHORT COURSE ACTIVITIES

* The monthly short course held March 6-10, was presented in individualized workshop format to Siegried Haberl. Mr. Haberl travelled to LARS from Munich, West Germany where he is a Photogrammetrist for Bausch & Lomb.

* The Land Research Science of the University of Guelph, Canada, is sponsoring Professor Richard Protz and Brian Brisco, his graduate student, and four Bangladesh visiting scientists in a training program during April. This program will begin with introductory study of remote sensing technology in the April monthly short course.

  Other participants of the April course include:

  Tony Meunier (physical sciences, ice and rock studies)
  USGS

  Terry Rojahn (regional and thermal mapping)
  NUS Corporation
  Ecological Sciences Division

  ROSS GARMOE
  LARS System Services

  Alicia Watson
  NASA/Goddard Space Flight Center

  Robert Arnone (geology)
  Naval Coastal Systems Lab

  G. J. King
  Agriculture Canada
  Economics Branch

VISITORS

* Lee F. Werth, College of Forestry, University of Minnesota, spent March 20-24, as a visiting scientist at LARS. Mr. Werth, working with DONNA SCHOLZ, applied pattern recognition techniques to achieve a machine classification of the Minneapolis-St. Paul metropolitan wetlands (12 information classes) using Landsat CCT's.

* Kitty Havens Ahlers, Pat Aucoin, and Stan Yao, of Lockheed Electronics Corporation, were at LARS March 6-8. Kitty and Pat presented a course on EOD LARSYS and Procedure 1 to LARS staff. Stan met with DAVE FREEMAN to discuss geometric correction and registration capabilities.

* Paul Travis and Tom McBride, Control Data Corporation, were here February 28, to meet with TERRY PHILLIPS and to present an illustrated seminar. They discussed the Cyber 171 to acquaint LARS personnel with CDC capabilities for performing remote sensing related computations.

* On April 11, DAVID LANDGREBE and CLARE MCGILLEM will meet with W. R. Davenport, Head of the Department of Electrical Engineering at MIT and a well known Communications Systems Researcher. Dr. Davenport will visit LARS as part of a review of the Department of Electrical Engineering.

* DAVID LANDGREBE will host three NASA/JSC officials: Bob MacDonald, Chief of the Earth Observations Division, Gene Rice, Manager of the Earth Resources Program Office, and Dick Johnston, Director of Space and Life Sciences, during their visit to LARS. On April 13, they will receive an introduction and review of LARS, and the next day a review of FRIS.

LARS TRAVELOGUE

* BARRETT ROBINSON, MARVIN BAUER, Jon Erickson, and Bob MacDonald met with Gene Rice, Manager of the Earth Resources Program Office, at NASA/JSC, Houston, on March 2. They gave a briefing on the multiband radiometer and field measurements research.

* The SR&T Quarterly Review was held during the week of March 13. Those attending from Purdue were MARVIN BAUER, PAUL ANUTA, JIM KAST, BARBARA DAVIS, and CHRIS STELLON.

* The results and accomplishments of LACIE were described at the March 3 review attended by MARVIN BAUER and JIM KAST. A four day symposium describing LACIE is planned for September or October.

* PHIL SWAIN made a presentation on agricultural remote sensing to a Study Panel on Machine Intelligence and Robotics at NASA/Headquarters, Washington D. C. on March 8, 9. Future data analysis research needs were also discussed.

* DAVID LANDGREBE will be participating in two outside short courses during the month of April. The School of Electrical Engineering will hold a short course on Image Processing and Pattern Recognition on April 17-21, and IBM will sponsor one on Image Processing in Mexico City April 24-28.

* LUIS BARTOLUCCI met with Dr. Carolos E. Brockmann, Director of the Bolivian Remote Sensing Program, and IDB officials in Washington D.C. on March 1, to discuss future Bolivian projects.

  Dr. Bartolucci also travelled to Caracas, Venezuela, March 12-17, to discuss technology transfer programs with the Minister of Agriculture and the Minister of Mines and Hydrocarbons.

* PAUL ANUTA will attend the Acoustics, Speech, and Signal Processing IEEE Conference in Tulsa, Oklahoma, on April 11, 12.

* JOHN PETERSON will be in Las Cruces, New Mexico, from March 27-April 26, as a Distinguished Visiting Professor at New Mexico State University.

  While in New Mexico, Dr. Peterson will present seminars on University Research, Education, and Administration in the Land Grant System and on Remote Sensing in Agriculture. He will meet with staff both formally and informally on specific areas of crops and soils research.

Dr. Peterson will counsel New Mexico State University on the establishment of Doctoral programs in the Agricultural Sciences, and review the progress of their Agronomy Ph.D. program. International study and research in Agronomic Science will also be discussed.

NEW LARS TECHNICAL REPORTS

111477 Delineating Salt-affected Soils in the Ganges Plain, India, by Digital Analysis of Landsat Data by A. N. Singh, S. J. Kristof, and M. F. Baumgardner.

A study was conducted to determine the feasibility of delineating salt-affected soils using computer-aided analysis of Landsat-1 data in an area of the Ganges Plain, Meerut district, India. The multispectral scanner data were obtained on the 2 December 1972 Landsat pass. Both supervised and unsupervised classification techniques were used. Four spectral classes of salt-affected soils were separated. The results indicate that Landsat data can be successfully used for differentiating salt-affected soils.

The work reported in this paper was sponsored by UNDP under Contract No. TE323-IND/76/018.

011678 Optimum Filter for Minimization of Image Registration Error Variance by C. D. McGillem and M. Svedlow.

The problem discussed is the design of an optimum filter for registration of two images of the same scene. The optimum filter was previously shown to be a matched filter. This report shows that in addition to being optimum in the sense of maximum signal to noise ratio at the match position it also minimizes the variance of the registration error.

The work reported in this paper was sponsored by NASA, Contract No. NAS9-14016.

011778 Measurements of Temperature Distribution at Electrosurgical Dispersive Electrode Sites by K. M. Overmyer, J. A. Pearce, and D. P. DeWitt.

The superficial temperature distribution for various types of dispersive electrodes applied to human subjects and a surrogate medium are presented. Typical temperature distributions on the human thigh display a high temperature perimeter and cooler central area, with the temperature extremes and contours peculiar to the electrode design. These patterns persist for several minutes after electrode removal. A series of experiments were conducted on a surrogate medium to determine the extent of volumetric (ohmic) heating, to evaluate influence of media properties on the temperature distribution, and to evaluate the use of the medium for simulation of the human system. It

was found that volumetric heating is appreciable and that appropriate alteration of the medium resistivity with depth produced patterns having similar characteristics to those obtained with the same electrode on a human thigh. A simplified model to analytically predict the temperature distribution is presented and the results are similar to those observed on human subjects.

The work reported in this paper was sponsored by NDM.

022478 Origins of the Land Grant Philosophy and Its Influence on Agronomic Education by J. B. Peterson.

Agronomic education today reflects an evolution in educational philosophy at the college level that was developing as early as the late 1700's. This was, in effect, a belief that practical people who engaged in mechanical and/or agricultural occupations would profit from advanced learning in science, technology, and cultural subjects. This view was not broadly implemented until the passing of the Morrill Act in 1862. The number of agricultural colleges grew steadily following the Civil War. Agronomy as a discipline became a part of this development. In this century agronomic education has reflected the steady advances in agronomic science, and a parallel advance in educational methods, particularly the audiotutorial approach. The changes in national interests and falling proportion of farm families in the population are having an effect on agronomic education. Many persons are studying agronomic subjects because of their interest in the environment and women and urban students are electing phases of agronomy as careers.

030178 Bayesian Classification in a Time-Varying Environment by Philip H. Swain.

This paper deals with the problem of classifying a pattern based on multiple observation made in a time-varying environment. The identity of the pattern may itself change. A Bayesian solution is derived, after which the conditions of the physical situation are invoked to produce a "Cascade" classifier model. Experimental results based on remote sensing data demonstrate the effectiveness of the classifier.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-14970.

System Services 033178

APPLICATIONS NEWS from BILL SHELLEY and JEANNE ETHERIDGE

* RECOVER There is a program called RECOVER on LARSYSDV that can be used to scan any tape you have in case you are not sure what is on it. RECOVER determines whether a tape file contains LARSYS results, an MSS data run, CMS files, or "unknown information" which means it contains something else besides the above three types of files. If you have initialized a tape and want to recover a results file that still exists on the tape somewhere past the end-of-tape mark, you can scan the tape past the end-of-tape mark, locate the file you wish to recover, and copy it to another tape; i.e., RECOVER will do the equivalent of the COPYRESULTS function.

  After you type I LARSYSDV, simply type

  RUN RECOVER

  and the program will prompt you to type in the tape number. From then on, RECOVER will print information at the terminal and on the printer and ask you how far down the tape you wish to go.

* EXCOMD There are three additions that have been made to this main LARSYS executive routine. You may now type the LARSYS command

  BATCH machinename

  and send a control card deck to the specified batch machine. If you just type the LARSYS command BATCH, the deck will be sent to BATLONG. This command, though, checks to see if the machinename you typed is a valid batch machine, and BATONITE is not in the list. This will be changed in the next LARSYS update.

  Second, if you have typed

  EXCOMD SAVEDISK

  from CMS in order to enter LARSYS mode, you may now abbreviate SAVEDISK to simply S.

  Third, EXCOMD in the past was only set up to execute EXEC routines or programs in TEXT deck format which are located on any disk you may have logged in at the time. This feature may be used to execute CMS commands from LARSYS mode. That is, if you have an EXEC on your P-disk called, for example, named XC with these two lines

```
&STACK LIFO &1 &2 &3 &4 &5 &6 &7 &8 &9 &10
&READ 1
```

and then type

XC EDIT CLU CC

from LARSYS mode, you can then edit the file called CLU CC.

* BATCH MACHINES RON BOYD set up the following batch job deck for someone at Goddard so that a LARSYS job could be run in a batch machine and the statistics file generated sent to the user's virtual reader.

```
BATCH MACHINE machinename
BATCH ID userid username
BATCH OUTPUT printsite punchsite
EXEC$$
CP XFER D TO userid
EXEC EXCOMD BATCH
$$
*CLUSTER
PUNCH STATS
.
.
.
END
```

You can add GETDISK LARSYSDV immediately after the XFER command if you wish to use LARSYSDV. Ron also wrote an EXEC routine to test to see if there is enough room on the user's P-disk for the statistics deck. Ask him about this EXEC if you are interested.

* MERGESTATISTICS Just a reminder - the MERGESTATISTICS function you have all used in the past is now called BMERGESTATISTICS and there is a new MERGESTATISTICS on LARSYSDV. If you have any suggestions or questions, contact BILL SHELLEY. He is interested in knowing about any final changes that should be made to control card formats. BMERGESTATISTICS will be left on the disk as long as he knows there are problems with the new MERGESTATISTICS.

REMOTE HIGHLIGHTS by SUSAN SCHWINGENDORF

* BACKGROUND LARS has four remote terminal locations outside of Purdue/LARS which have been with us for a number of years. These are at NASA/Johnson Space Center (JSC) in Houston, Texas, NASA/Wallops Flight Center in Wallops Island, Virginia, Indiana State University (ISU) in Terre Haute, Indiana and NASA/Goddard Space Flight Center in Greenbelt, Maryland. In future issues of SCANLINES we can discuss the configuration of the various terminals, any research news we receive, newly developed software, equipment changes or any other items you bring to our attention relating to the terminals or use of the Purdue/LARS computer. This month JSC/Houston is in the news with the acquisition of new equipment.

* JSC TERMINAL UPGRADE GLEN PROW, remote site co-ordinator for the Houston remote terminal, was at LARS March 14 and 15 to complete installation and testing of the new communications equipment which expands the capabilities of the Houston terminal. JSC now has a second direct phone line to LARS which operates their new DATA100 terminal (with a tape drive) at 9600 bits per second. (The location identifier for this terminal is JSCTEXAS.) In addition, a back-up 4800 bps modem was installed for their IBM 2780 terminal to increase the reliability of that terminal.

  The current JSC terminal configuration supports the IBM 2780 and three typewriter terminals over one of the direct phone lines, but this will be expanded in the next few months to handle eight typewriter terminals, with further expansion plans being considered. This should eliminate the need for JSC users to dial-up LARS long distance.

* TAPE TRANSFER An exciting new capability will be available for JSC and LARS with the development of software to support the DATA100 tape drive at JSC. BRUCE CLARKE travelled to JSC March 13 and 14 to help identify a number of problems which DATA100 must solve. Once these are resolved, Bruce can test his programs, and it will be possible to transfer tape information in either direction between JSC and LARS. Watch for further updates on this!

* OUTPUT DESTINATION--HOUSTON JSC terminal users will want to watch the log message for instructions to send their output to JSCTEXAS (the DATA100 terminal) instead of HOUSTON, should the IBM 2780 terminal be in need of repair (that never happens!!)

* EOD LARSYS CONVERSION On January 26, 1978, the EOD LARSYS Conversion Program was successfully tested by the RT&E Group of the Applications Software Section at JSC. Priority processors DOTDATA, ISOCLS, LABEL, CLASSIFY and DISPLAY of the

EOD LARSYS System were shown to be successfully converted from IDSD UNIVAC EXEC2 to the Purdue/LARS computer. Approximately 20,000 lines of Fortran code was involved in this conversion.

* COURSE ON PROCEDURE 1 KITTY HAVENS AHLERS and PAT AUCOIN from JSC presented a course at LARS March 6, 7, and 8 on the development and use of Procedure 1 for LACIE. Computer examples were provided and other processors available in EOD-LARSYS were also discussed. As stated in the article above, this system is available on the Purdue/LARS computer, and currently is being used by DONNA SCHOLZ at LARS. A training course on Procedure 1 is also planned at JSC for the end of March.

* PROCEDURE 1 DOCUMENTATION AT LARS Two manuals on EOD-LARSYS and Procedure 1 are available for your reference in the terminal areas at Flexlab1 and Flexlab2, and in the offices of JEANNE ETHERIDGE, BARB DAVIS, JIM KAST, and MIKE FLEMING. The manuals are entitled:

    1. User Documentation
       EOD-LARSYS
       Earth Observations Division Version of the Laboratory for Applications of Remote Sensing System
    2. "As Built" Design Specification for EOD-LARSYS Procedure 1

You can contact SUSAN SCHWINGENDORF for extra copies of the second manual, or the course notes.

* CONSULTANT-IN-RESIDENCE BILL SHELLEY was stationed at JSC from March 15 through March 23 as a programming consultant to help any of the JSC users of the Purdue/LARS computer who had questions or programming problems. During the slack times he worked on improving the capabilities of the EXEC file which runs EOD-LARSYS, and other enhancements for running this system on the LARS computer.

COLOR STRIPE COMPUTER CARDS

* A couple of years ago LARS users and programmers were using color stripe computer cards for identifying their punched card decks. Orange cards were used for assembly decks, blue for data and exec decks, brown for text and yellow for Fortran decks.

  Because of the decrease in color stripe card requests, we now have a surplus of these in our inventory. In order to lower the inventory, we need to decrease orange cards by 33 boxes, blue cards by 54 boxes, brown by 37 boxes and yellow by 7. A box of computer cards contains 2,000 which gives us a total of 262,000.

  Beginning April 3rd, the computer operators will be placing color stripe cards in the punch units. They will switch off and on in order to keep the colors at an even inventory. Unless someone specifically requests a punch file to be punched in a designated color, all decks will be punched on these color stripe cards until our inventory has decreased. Normally single cards or small decks are punched on natural computer cards but there will no longer be an abundance of them as there has been in the past. Once our inventory has leveled off, natural cards will be placed back in the bins and punch units.

Overall Usage - Basic Rate CPU Time Used 5.36 hrs.
Priority Rate CPU Time Used 135.82 hrs.
Total CPU Time Used 141.18 hrs.
Terminal Sessions 3217
Batch Jobs 550

Usage by Time of Day -

Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	14.83	11%
Mon-Fri 8AM - 4PM	70.06	45%
Mon-Fri 4PM - midnite	44.79	28%
Weekend	11.50	12%

Batch Job Usage -

Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	125	4.44 min.	0.09 min.
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Flexlab2	32	Hazeltine 1200	170	157.13 hrs.	0.92 hrs.
Flexlab2	33	Infoton GTX	306	256.70 hrs.	0.84 hrs.
Flexlab2	34	2741	124	66.75 hrs.	0.54 hrs.
Flexlab2	35	Infoton GTX	247	210.35 hrs.	0.85 hrs.
Flexlab2	36	Infoton GTX	256	211.56 hrs.	0.83 hrs.
Comp. Room	37	2741	101	31.14 hrs.	0.31 hrs.
Flexlab1	40	Infoton GTX	181	176.15 hrs.	0.97 hrs.
Flexlab1	41	Infoton GTX	202	172.93 hrs.	0.86 hrs.
Flexlab1	42	2741	97	96.01 hrs.	0.99 hrs.
Flexlab1	43	2741	99	85.65 hrs.	0.87 hrs.
Dial-Up	50	First in Use	131	109.66 hrs.	0.84 hrs.
Dial-Up	51	Second in Use	72	63.30 hrs.	0.88 hrs.
Dial-Up	52	Third in Use	41	29.75 hrs.	0.73 hrs.
Dial-Up	53	Fourth in Use	36	36.41 hrs.	1.01 hrs.
Dial-Up	54	Fifth in Use	23	19.19 hrs.	0.83 hrs.
Houston	61,62,63	(various)	477	264.61 hrs.	0.55 hrs.
ISU	66,67	(various)	383	121.34 hrs.	0.32 hrs.

Interlab Notes

SPRING FEVER

* Yes, in spite of the weather, the Purdue Staff Golf League will resume play in several weeks. Any LARS staff member who would like to join the returning "letterpersons" or "veterans" of DAVE FREEMAN, PAUL ANUTA, BARBARA PRATT, or DOUG MORRISON, should contact Doug by April 14, as the team roster deadline is April 17. Anyone who can shoot 9 in 56 or less is welcome.

FUTURE LARSIANS

* Congratulations to Beth and RON BOYD, and their 5-year-old daughter, Michelle, on the birth of Melissa Ann, March 7.

PERSONNEL CHANGES

* LARS welcomes Ms. GLORIA PETERSON, who began her duties as Business Administrator during the last week of February. Ms. Peterson has been employed as Conference Coordinator for Purdue Conference Division and most recently as the Executive Director of the Greater Lafayette Community Centers.

* CHRIS HAMILTON joins LARS in the Ecosystems/System Services areas under the supervision of DAVE FREEMAN and LUIS BARTOLUCCI. His responsibilities will include programming for the Colorado Forestry Topographic project. He will be working with MIKE FLEMING.

* The Technology Transfer area will be RON BOYD's new full time location. He will continue as Remote Sensing Data Analysis and Training Specialist, with his responsibilities expanded in the areas of short course and visiting scientist instruction, updates of the short course content and format, and other Technology Transfer activities such as coordination of the remote terminals.

* ROSS GARMOE joins LARS April 3 as Manager of Software Systems, filling the position vacated by Howard Grams. He will be participating in the April short course as an introduction to remote sensing technology.

  Before coming to LARS Ross worked for the Purdue University Computing Center as Manager of Special Projects, and at

McDonnell Douglas Automation Company. He has a B.S. from Iowa Wesleyan College in Mathematics and a M.S. in Computer Science from Purdue University.

A big welcome to Ross, his wife and their four children.

SCAN LINES

LARS · Purdue University · Vol. 3 · No. 9 · May 10, 1978

ITEMS OF INTEREST

* Four Bangladesh scientists recently completed their training at LARS, April 3-28, in the application of remote sensing for conducting surveys of Bangladesh's Karnaphull area as applied to land use management.

  Under the Landsat/Bangladesh projects Abdul Gafoor, hydrology, Shafiqur Rahman, fisheries, Ashraful Islam, forestry and M. Abu Bakr, geology, worked with RON BOYD, and Dr. Richard Protz and Brian Brisco of the International Development Research Centre of Canada (sponsoring agency).

  Objectives of this multidisciplinary team study of the Kaptai Lake area were to:

  1. Clearly define requirements of future multidisciplinary teams.
  2. Recommend training programs for ground truth personnel at the Bangladesh Landsat Center.
  3. Make recommendations on distribution of The Fundamentals of Remote Sensing minicourses in Bangladesh.
  4. Choose a reference library.
  5. Understand the resolution capacity of Landsat 1, 2, 3, for each specific discipline represented, and to estimate the value of increased resolution on Landsat D to future studies in Bangladesh.

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

6. Evaluate output products available and assess their requirements in the light of the World Bank map productio project.
7. Recommend a system of ground truth teams in Bangladesh after establishing the needs of research and/or inventory programs.

* Dr. Moro, director of data processing, and Dr. Nadal-Amat, of INIA (Instituto Nacional de Investigaciones Agrarias), Madrid, Spain, visited LARS as part of a three-week trip through various United States organizations.

  During their visits they hoped to assess the practicality of improving the accuracy of crop acreage estimation using remote sensing, learn how to retain and reformat the crop information collected in Central Spain for use as ground-truth data for calibration of Landsat imagery analysis systems and to study the charactersitics of the software developed to analyze the CCT.

  On April 27, 28, they met with DOUG MORRISON, PAUL ANUTA, DICK MROCZYNSKI, PHIL SWAIN, LUIS BARTOLUCCI, TERRY PHILLIPS and MARION BAUMGARDNER to discuss these objectives.

LARS TRAVELOG

* In preparation for the new "Multicrop" inventory program, NASA/Johnson Space Center, JSDA and NOAA hosted a three-day seminar on corn and soybeans, May 1-3. Speakers from agri-business and land grant universities addressed:
  - World trade and marketing patterns
  - Physiology, growth and development, and effects of the environment on yield
  - Cultural and management practices
  - Growth and yield models
  - Spectral characteristics and remote sensing

  Dr. Harold Reetz, Agronomy, made a presentation of the corn yield model developed at Purdue University, and Dr. MARVIN BAUER, LARS/Agronomy, discussed spectral characteristics of corn and soybeans, and remote sensing of these crops.

* DAVID LANDGREBE recently attended a briefing of the ad hoc working group on Research Applications of Multispectral Linear Arrays. The multispectral linear array is a proposed new sensor which may be flown on a Landsat satellite after Landsat D. It would have several spectral bands between .4-1 μm with spatial resolution equal or finer than the thematic mapper. It would be pointable such that data from a given area might be able to be gathered as often as every other day.

  Dr. Landgrebe also presented lectures at two Short Courses on Image Processing and Pattern Recognition. On April 18, 19, he

participated in one sponsored by the School of Electrical Engineering, Purdue University, and on April 25, 26, he participated in one presented at the IBM Scientific Center in Mexico City.

* At the AAMI (American Association for Medical Instrumentation) 13th Annual Meetings, BARRETT ROBINSON presented a paper entitled: "A Non-invasive Optical Method for Detection of Neonatal Jaundice." The meeting was held April 1, in Washington, D.C.

* PAUL ANUTA attended a briefing on SEASAT radar data processing at NASA/Headquarters on April 4, and then travelled to the Jet Propulsion Laboratory, Pasadena, California, to discuss the SEASAT sensors, data processing and data availability.

  He also visited with Terry Lehman and others on the staff of the Cities Services Corporation remote sensing group on April 10, in Tulsa, Oklahoma. A review of the research and the final report from the LARS Citgo project were discussed.

* MARION BAUMGARDNER was in Pittsburgh, Pennsylvania, April 12, 13, to participate in the annual spring meeting of the United Methodist Committee on Relief, Board of Global Ministries. Dr. Baumgardner presented a paper entitled: "Futurism and Its Implications for UMCOR."

  Dr. Baumgardner, DICK WEISMILLER and FRANK KIRSCHNER also travelled to Indianapolis to present the LARS "soil mapping" program at the annual meeting of the Cornbelt SCS State Conservationalists. They also informed SCS representatives of the potential of using computer-aided analysis of satellite derived multispectral scanner data.

VISITORS

* The following NASA visitors, Bob MacDonald, Chief, Earth Observations Division; Gene Rice, Manager of Earth Resources Program Office; Dick Johnston, Director of Space and Life Sciences; Olav Smistad, Manager, Operations Planning and Requirements Office; and Bill Stephenson of the Operations and Planning Office were here for a 2 day visit on April 13, 14.

  There was an extensive introduction and review of LARS and its program presented to them on April 13. This included a visit to the National Weather Service office on campus. On Friday they took part in the quarterly review of the St. Regis project.

* Twenty-nine learned members of the remote sensing community spent April 10-14, as participants of the LARS' Advanced Topics in the Analysis of Remote Sensing Data short course. Many indicated that the course should be offered again; the staff of PHIL SWAIN, MARVIN BAUER, BARBARA DAVIS, DAVID LANDGREBE, JOHN LINDENLAUB and CLARE MCGILLEM are considering the possibility.

* There was a demonstration on May 3, of some water quality instruments manufactured by MARTEK, Inc., Irvine California. Mr. Daryl Deliwar from MARTEK, Inc. indicated that they would demonstrate "for remote sensing applications, a combination system of water quality analyzer - data logger - data reader - computer interface that serves to increase the parameter of importance and transmit the data in standard serial ASCII form via a RS232 Connector. From there, it is broadcast to a satellite."

* Ray Sinclair visited the Earth Sciences program area to collect information on the applications of remote sensing technology to the national soil survey program. This information will be presented to the SCS State Soil Scientists of the northeastern United States in May.

  Dr. J. A. Allan, School of Oriental & African Studies, University of London, England, also visited members of the Earth Sciences program area and LARS in general, to discuss items of mutual interest. Topics covered included geometric correction of data, LARSYS, and technology transfer programs.

SHORT COURSE ACTIVITIES

* The following attended the May short course:

  K. Vincent Campbell (geology)
  Division of Geotechnical Engineering
  Asian Institute of Technology
  Bangkok, Thailand

  Thomas J. Filip, Jr. (geology)
  Defense Mapping School
  Ft. Belvoir, Virginia

  Ralph O. Fullerton (geology & geography, land use analysis)
  Middle Tennessee State University
  Department of Geography and Earth Science

  Thomas F. Kelsey (pattern recognition, land use)
  Department of Geography
  University of Pittsburgh

  David Kunde
  University of Illinois

  P. N. Mosher (photographic systems, applications, processing)
  Plant Industry Branch
  N. B. Department of Agriculture
  Fredericton, N. B. Canada

  Dale A. Quattrochi (digital approach to Landsat data)
  Department of Forestry
  Mississippi State University

Harold R. Tallmon (applicability)
Soil Conservation Service

Robert F. Turner (photographic systems)
USFS Regional Office - Engineering

Fearn R. Vest (land use applications)
Williams Brothers Engineering Co.
Tulsa, Oklahoma

JOhn Conrad, Jr.
General Electric Space Division

RECENT JOURNAL ISSUES

REMOTE SENSING OF ENVIRONMENT

An Interdisciplinary Journal

Volume 7, Number 1, 1978

Contents

IBM Journal of research and development

IBM J. Res. Develop., Vol. 22, No. 2, pp. 111-210, March 1978

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLIV April 1978 *Number 4*

NEW LARS TECHNICAL REPORT

112277 Computer-Aided Analysis Techniques for an Operational System to Map Forest Lands Utilizing Landsat MSS Data by M. D. Fleming and R. M. Hoffer.

The objective of this research was to define an effective and efficient computer-aided analysis technique that can be utilized to map natural resources, particularly forest lands, in areas of rugged terrain using digital multispectral scanner data collected from satellite altitudes. Six alternative procedures for developing training statistics were defined and tested. The results indicated that the "Multi-Cluster Blocks" approach was "optimal" since it required the smallest amount of support data, required relatively few man-hours of analyst time, reduced computer (CPU) time, and resulted in the highest overall classification accuracy. This approach was tested and evaluated on six additional test sites and with both Landsat and Skylab data. The various steps involved in the Multi-Cluster Blocks procedure, which include the selection of heterogeneous blocks of MSS data, individual clustering of each block, identifying cluster classes, and pooling spectral classes into informational classes, are described in detail in this report.

The work described in this report was sponsored by NASA under Contracts NAS9-13380, NAS5-21880 and NAS5-20948.

022178 Crop, Soil, and Geological Mapping from Digitized Multispectral Satellite Photography by P. E. Anuta, S. J. Kristof, D. W. Levandowski, T. L. Phillips, and R. B. MacDonald.

A study of digitized multispectral satellite photography obtained in March 1969 over Imperial Valley, California was conducted to develop a computer map showing distinguishable surface features. Samples of data from each of the classes defined by the clustering technique were selected and used for training the pattern classifier. In order to evaluate the classification accuracy quantitatively, many test fields were extracted from the test site. Using the three bands of the Apollo 9 photography the separability of the soil patterns was established. Also, the map constructed from the spectral classification simulated the geologic map quite well. The per field classification was carried out by crop type identification.

The research reported in this paper was sponsored by NASA under Grant No. NGL 15-005-112 and USDA under Contract No. 12-14-100-10292(20).

022278 The Effect of Cultural Practices on Multispectral Response from Surface Soil by E. R. Stoner and E. H. Horvath.

Computer-implemented maps which display various soil parameters, such as organic-matter content, texture, color, and soil type, have proved that a high correlation exists between multispectral scanner data and ground observations when the soil is non-vegetated and uniformly cultivated. However, when a variety of tillage methods or cropping patterns exists in a field being mapped by multispectral pattern recognition techniques, the problem of delineating soil boundaries is greatly confounded. Cultural practices, such as plowing and disking, and the amount and kind of vegetative cover affect the multispectral response of surface soils. An attempt was made to eliminate the significance of these effects.

The work reported in this paper was sponsored by NASA under Grant No. NGL 15-005-112.

System Services 051078

APPLICATIONS NEWS from BILL SHELLEY

* CMS370 Those using CMS370 may have noticed the carriage control characters being printed instead of being used on their printer output. This may be corrected by issuing the following FILEDEF (when using CMS370):

  FILEDEF 6 PRINTER (RECFM FA

  If you have any questions please contact BILL SHELLEY.

* LARSYSDV The REGION processor inadvertently lost the capability of putting a results file to disk when a subroutine it uses was modified. This problem has been corrected. Our thanks to BUD GOODRICK for pointing this out.

* LARSYSDV Some problems with the new MERGESTATISTICS have been discovered by MARILYN HIXSON and BUD GOODRICK. These are currently being worked on and should be corrected shortly. If anyone else is experiencing difficulties with the new MERGESTATISTICS please let us know and we will be glad to help.

COMPUTER OPERATING SCHEDULE

* In February of this year the computer operating schedule for week-end shutdowns changed from 17:00 Saturday through 15:00 Sundays to 17:00 Saturday through 07:00 on Mondays. The change was made because of the energy crisis due to the coal miners strike. Even though the energy crisis has improved we are still operating on the revised schedule.

  The current plan calls for reconverting to the original operating schedule beginning week of May 22nd. There are two reasons for this and one is due to a temporary shortage of operating personnel. Second is because of the low computer usage on the midnight to 8A.M. shifts. We hope this doesn't cause any burdens on anyone for the next three weeks.

25 CYLINDER TEMP DISKS

* During the last two months there has been an increasing demand for 25 cylinder temp disks. During the second week of April, 3 additional 25 cylinder temp disks were put on the system giving a total of 7. Since then we haven't heard from anyone having problems obtaining a 25 cylinder temp disk so we hope we have resolved this problem.

REMOTE HIGHLIGHTS from SUSAN SCHWINGENDORF

* GODDARD ACQUISITION The ESL Interactive Digital Image Manipulation System (IDIMS) has recently been installed at NASA Goddard Space Flight Center and acceptance tests are underway. Hardware components of this system include an HP3000 computer, the ASAP Array Processor, a tape drive, 2 Versatec electrostatic printer/plotters (11" and 24"), a color Comtal display unit, a Talos digitizer, a Tektronix CRT and hard copy unit, and 2 CRT graphics terminals. The system processes digital images with a variety of image manipulation and display functions incorporating analysis techniques from a number of remote sensing laboratories around the country. Still to be tested is the capability for the ESL system to emulate an IBM 2780, so that it could also act as a remote terminal to the Purdue/LARS computer.

* BMD FIX In the past, users at NASA/JSC and NASA/Goddard have requested information about the availability of the Biomedical Computer Programs (BMD) on the Purdue/LARS computer. As a quick introduction, or review, these statistical programs are stored on a tape at LARS, but may be easily accessed through LARSYS. Once the user has made his control card deck available to the computer through a disk file or in the card reader, he enters the LARSYS command

  RUN BMD

  and the system will request him to enter the name of the BMD program he wishes to run. The system then takes care of loading the BMD program from tape and executing it.

  Recently, a problem in using one of these programs, BMDX85, was reported by a NASA/JSC user. It turned out that this program and three others allow the user to supply Fortran statements in his control cards, which must be read and loaded with the BMD program before actual execution begins. A modification to handle this situation is now available on LARSYSDV, and the user must provide one or more additional parameters when he wants to supply Fortran statements. The first parameter is still the name of the BMD program, the second parameter is F (if Fortran statements are supplied) and the third and fourth parameters are the filename and filetype of the control card file if it is on the user's P-disk. For information or documentation on the usage of the BMD programs on the Purdue/LARS computer you may contact SUSAN SCHWINGENDORF.

LITER DEVELOPMENT STATUS (OR, "WHERE IS MY PLOT?")

* Please excuse the lengthy delays currently experienced by users desiring Varian plotter output. We are updating and improving both hardware and software capabilities of the PDP 11/34 - Varian plotter system and experiencing the inevitable delays and problems typically associated with this type of upgrading process. All attempts will be made to keep delays to a minimum.

HOW TO: FOOLPROOF PLOTS

One way the user can decrease the turnaround time for plot generation is by producing smaller plots. A 12,000 record file on the 370 will require at least 50 minutes to transfer to the PDP and take about 45 minutes to plot one copy. Plots should never exceed a maximum of 15,000 records in size, or the plot will exceed the capacity of the disk on the PDP. When this occurs, the operator experiences a multitude of problems which usually result in a system crash. Because of this, the operators have been instructed to purge all LITER files which exceed the 15,000 record criteria. A good rule of thumb to follow is not to create a plot larger than every line and sample of one channel of one-half of a Landsat frame.

Among the changes to look for in the future for LITER:

* A new operating system is being installed. RSX11-M Version 3.1 will replace the current Version 2.0 operating system. This system is more "conversational" than Version 2, permitting user-ids with passwords and the more familiar system access method of logging in and logging out. Version 3.1 also permits a more efficient time sharing capability, with several users permitted on the system at the same time.
* Increased memory capacity from our current 32K storage to 64K. This should be available in six to eight weeks.
* Floating point hardware. Currently, all numerical operations involving real numbers must go through a special set of software to enable the computer to handle these numbers. The new hardware will permit much faster handling of real numbers. Digitizing software will directly benefit from this change.
* Additional disk packs and another cabinet to permit future expansion of the LITER system.
* A new interface between the PDP 11/34 and the Varian plotter which will increase the plotting speed on the Varian.

A special note of gratitude should be given to BRUCE CLARKE for his time, energy, and exceptional work he has devoted to the LITER system.

HOW MUCH IS A LITER?

Effective May 1, users of the Varian plotter will be charged 35 cents per foot and table digitizer users will be charged $20 per hour. These rates were established in order to

recover fixed costs of supplies and materials, as well as computer facility support for these products.

* Note: Until further notice, the use of grayscale patterns wider than 16 dots (e.g., PATTERN(H16W20GRAY), etc.) should be discontinued. This problem should not inconvenience most plotter users.

DATA REFORMATTING

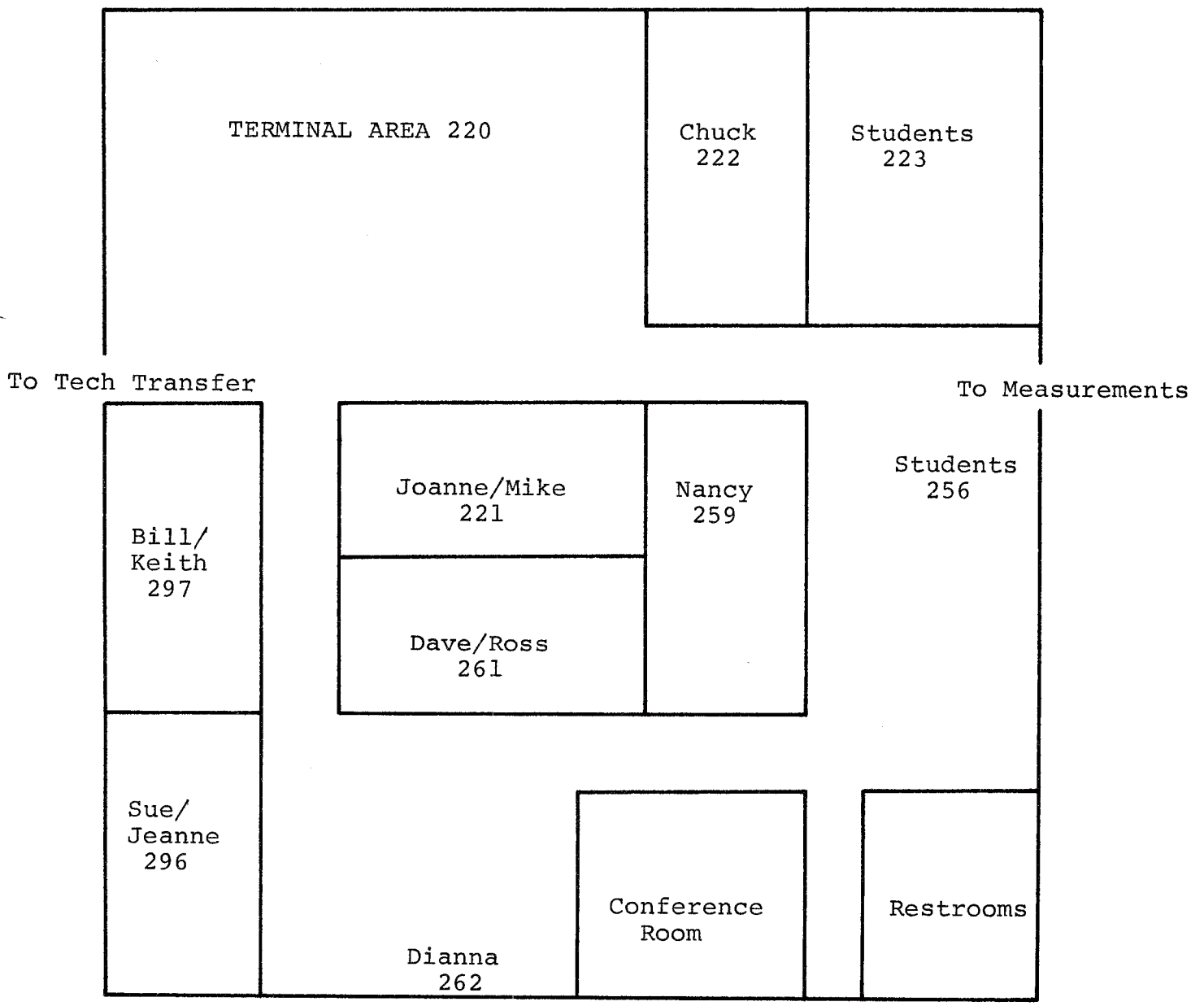
* DAVE FREEMAN will be in Iran from May 10th until June 10th. If you have any need to discuss matters concerning data reformatting, please contact CHUCK SMITH, KEITH PHILIPP, or ROSS GARMOE.

SYSTEMS NEWS from ROSS GARMOE

* The IBM 2741 hardcopy terminals and the Hazeltine 1200 CRT terminals have been taken off of lease and will be returned to the vendors. A SUPERTERM terminal has been leased to provide hardcopy output for FLEX I and a DECwriter II has been purchased to provide hardcopy for FLEX II. Five VISTAR GTX terminals have been purchased to replace the CRT terminals and the other 2741s.

* The card punches on the Data 100 terminals in FLEX I and FLEX II will be removed in the near future because the amount of use does not justify the yearly cost. Punched card output will be available from the punch attached to the 370/148 in the computer room. Educational package referencing the Data 100 punches will be rewritten for internal LARS use. After the punches are removed, RSCS will purge punch files routed to FLEX I or FLEX II.

* Quite a few people in the Computer Facility have moved lately. Below is a diagram of the current offices and phone numbers. Next month's Scan Lines will include an organizational chart for all System Services people. A list of responsibilities for each person will be included.



Overall Usage		
	Basic Rate CPU Time Used	24.74 hrs.
	Priority Rate CPU Time Used	201.96 hrs.
	Total CPU Time Used	226.71 hrs
	Terminal Sessions	2791
	Batch Jobs	659

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	23.18	18%
Mon-Fri 8AM - 4PM	103.23	65%
Mon-Fri 4PM - Midnite	72.56	45%
Weekend	27.25	32%

Batch Job Usage - Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	171	0.38 min.	0.08 min.
BATSHORT	214	9.83 min.	0.62 min.
BATMED	157	21.61 min.	2.68 min.
BATONITE	79	16.60 min.	3.97 min.
BATLONG	23	99.41 min.	36.11 min.

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	Hazeltine 1200	237	142.81 hrs.	0.60 hrs.
Flexlab2	31	Hazeltine 1200	224	165.49 hrs.	0.74 hrs.
Flexlab2	32	Hazeltine 1200	297	183.73 hrs.	0.62 hrs.
Flexlab2	33	Infoton GTX	281	328.61 hrs.	1.17 hrs.
Flexlab2	34	2741	145	64.98 hrs.	0.45 hrs.
Flexlab2	35	Infoton GTX	280	263.66 hrs.	0.94 hrs.
Flexlab2	36	Infoton GTX	241	295.80 hrs.	1.23 hrs.
Comp. Room	37	2741	163	72.98 hrs.	0.45 hrs.
Flexlab1	40	Infoton GTX	181	176.35 hrs.	0.97 hrs.
Flexlab1	41	Infoton GTX	193	212.45 hrs.	1.10 hrs.
Flexlab1	42	2741	103	98.06 hrs.	0.95 hrs.
Flexlab1	43	2741	120	65.92 hrs.	0.55 hrs.
Dial-Up	50	First in Use	192	131.09 hrs.	0.68 hrs.
Dial-Up	51	Second in Use	102	88.79 hrs.	0.87 hrs.
Dial-Up	52	Third in Use	56	55.95 hrs.	1.00 hrs.
Dial-Up	53	Fourth in Use	49	51.02 hrs.	1.04 hrs.
Dial-Up	54	Fifth in Use	22	24.39 hrs.	1.11 hrs.
Houston	61,62,63	(various)	417	381.28 hrs.	0.91 hrs.
ISU	66,67	(various)	473	161.96 hrs.	0.34 hrs.

Interlab News

PERSONNEL

* BRENDA PRATHER recently transfered from the Physics Department to become the new secretary in the Ecosystems program area. She has been with Purdue University six years.

* It was with great sadness that LARS learned about the death of Dr. Ival Persinger. According to Dr. Glenn Robinson, Dick Gilbert and Ival were in northern Saudi Arabia collecting ground truth for the Saudia Arabian Soils Classification project under JECOR, when Ival was fatally bitten by a sand viper. JOHN PETERSON has also been working with this project.

COMING ATTRACTIONS

* The Annual LARS Picnic is scheduled for Saturday, June 24, at Happy Hollow Park. Fun & games begin at 2 pm, dinner at 5 pm. More details later.

SCAN LINES

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LACIE SYMPOSIUM

* A four day symposium, October 23-26, will be held at Houston, Texas, to describe the design and results of the Large Area Crop Inventory Experiment (LACIE).

  LACIE was initiated in 1974 as a joint project by NASA, USDA, and NOAA. It has evaluated the capacity of space remote sensing technology to inventory wheat production on a global scale.

LARS TRAVELOG

* MARION BAUMGARDNER and MARVIN BAUER participated in a seminar sponsored by the Inter-American Development Bank in Washington D. C. on May 30. The seminar was on the use of remote sensing by satellite for agricultural development in Latin America. Dr. Baumgardner presented a paper on information systems for agricultural development and Dr. Bauer spoke on the role of remote sensing in measuring crop production.

* SUE SCHWINGENDORF was at NASA/Houston from May 22-26, to test and demonstrate a variety of capabilities developed at LARS under the joint SR&T Task 2.4 (Computer Processing Support) with Houston. These capabilities include a CMS/370 batch

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

machine, a tape transfer program which transfers tapes from Houston's Data 100 tape drive to one of LARS's tape drives, the EXOSYSDV routines, developed by LARRY BIEHL, utilizing GCS, and an EXEC routine developed for users of EOD-LARSYS.

* On May 31, DICK WEISMILLER and FRANK KIRSCHNER travelled to Washington D.C. to meet with Ray Daniels, Head of Soil Investigation, and Klaus Flach, Assistant Administrator for Soil Survey of the SCS.

  At this Soils Investigation Committee meeting they discussed the development of a working plan for the remote sensing of soils for use in soil survey. A soils advisory would then be sent to all State Conservationalists to inform them of remote sensing programs soon to be operational.

* DICK WEISMILLER and FRANK KIRSCHNER will also travel to the SCS State Office, Champaign, Illinois, on June 15, to discuss remote sensing and soil survey at the annual State SCS Staff Planning Conference.

* During the Agronomy Field Days, on June 22, LARS will have a display at the Agronomy Farm. Dr. JOHN PETERSON and FRANK KIRSCHNER will attend to discuss remote sensing.

* DAVID LANDGREBE was in Canberra, Australia, from May 16, to June 1, to participate in the joint United States/Australian interchange on Image Processing Techniques for Remote Sensing.

  On June 2, Dr. Landgrebe was in Chicago, Illinois, to attend the IEEE Image Processing & Pattern Recognition meeting.

* BARRETT ROBINSON visited the Indiana University Medical Center, Indianapolis, on May 24, to talk with Dr. Ned Hornbeck about a potential new thermal project in bioengineering.

  He then travelled to Chicago, Illinois, to discuss microprocessors for NDM multiband radiometer project with Motorola, Inc.

* PHIL SWAIN presented an invited paper entitled: "In Perspective: Meeting the Image Processing Challenge for Remote Sensing," at the American Federation of Information Processing Societies (including IEEE) meetings. These meetings were held in Anaheim, California on June 6-8.

  From June 17, to July 2, Dr. Swain will be in Bonas, France, to participate in an Advanced Study Institute on Image processing. He will lecture on the application of image processing in remote sensing.

* PAUL ANUTA visited NASA/Wallops on May 3-4 to discuss the final report for the Wallops Radar Study, and to plan future activities.

VISITORS

* MARION BAUMGARDNER recently hosted Colin Rudeforth, Soil Survey of England & Wales, from June 1-5. They discussed remote sensing in relation to soil survey and land use.

* Two visiting scientists from the Instituto Forestal, Santiago, Chile, were among 16 participants in the June short course. Sergio Avila Fuenzalida and Jorge Sepulveda Vallejos were at LARS from May 30, to June 9, to study remote sensing applications to forestry.

Other participants in the June short course include:

David Beckles (remote sensing application for forestry)
Facility of Natural Sciences
University of West Indies

Bretislav Boucek (practical application for forestry)
Natural Resources Division
Lindsay, Ontario

James J. Centorino (pollution levels of air and water)
Marine Studies Program
Salem State College, MA

Rahimzadeh Farmarz (geology)
Central Treaty Organization
Ankara, Turkey

Roger D. Goldsmith (natural resources management)
Ft. Leonard Wood, MO

N. E. Hardy (geography)
Department of Geography
Erindale College, U. of Toronto

David Hawley (ground truth collection; processing; registration and calibration of imagery (thermal and SLAR)
EG & G, Inc., CA

Donald F. Kiel (data processing techniques)
School of Natural Resources
University of Michigan

Ravindra Nath (hydrogeological groundwater and water resource problems)
Central Water & Power Research Station, India

B. N. Raina (geology)
Himalayan Geology Division
Geological Survey of India

Dianna Rebel (vegetation analysis especially for non-agricultural; geologic applications)
EG & G, Inc., NV

Glenn H. Robinson
Carbon, IN

J. Pastor and P. Roussel
Centre d'Informatique
Universite Paul-Sabatier, France

SEMINAR SCHEDULE

Date	Time	Speaker(s)	Topic
June 22	3:30	VERN VANDERBILT	Model for Structure of a Canopy
July 6	3:30	ED HANLEY	Reflectance Analysis for Skin Cancer and Jaundice Detection.
July 13	3:30	PHIL SWAIN	Classifiers
July 20	3:30	MARILYN HIXSON MARVIN BAUER	Bilateral Project Both US & USSR Results
Aug. 3	3:30	JOHN ALRICHS	Analysis of Exotech 20C Data Collected at Williston, North Dakota

PAPERS PRESENTED

* The 11th Congress of the International Society of Soil Science will be held June 19-27. Four LARS staff members will be presenting papers, as follows:

  ERIC STONER - "Factors Influencing Soil Reflectance"

  SUE KAMINSKY - "An Overview of Remote Sensing as Related to Soil Survey Research"

  ERIC HINZEL - "Landsat Data for Mapping Soils at Scales of 1:281,600 to 1:15,840"

  MARION BAUMGARDNER - "Digital Analysis of Landsat Data . . . An Aid In Soil Mapping"

  Other papers presented recently by the Earth Sciences Program Area include:

  "Inventory of a Nature Preserve Area in Lake County, Indiana, Using Satellite MSS Data" by STEVE KRISTOF, DICK WEISMILLER, and SUE KAMINSKY. This paper appears in the Proceedings of the Indiana Academy of Science, 1976-77.

  "Computer-Aided Analysis of Landsat Data for Surveying Texas Coastal Zone Environment" by STEVE KRISTOF and DICK WEISMILLER. This Paper appears in the Proceedings Image Processing-Interactions with Photogrammetry and Remote Sensing, Graz, Austria, 1977.

ADVANCED DEGREES

* BIJAN MOBASSERI - Ph.D. in Electrical Engineering
  "A Parametric Multiclass Bayes Error Estimator for the Multispectral Spatial Model Performance Evaluation"

* ERIC WISWELL - Ph.D. in Electrical Engineering
  "Analytical Techniques for Study of Some Parameters of Multispectral Scanner Systems for Remote Sensing"

* NIM-YAU CHU - M.S. in Electrical Engineering
"Methods and Performance Bounds for Constrained Image Restoration"

* DON CRECELIUS - M.S. in Agronomy
"The Time of Day Effect on the Reflectance of Spring Wheat Canopies in the Four Landsat MSS Bands"

* STEVE KAISER - M.S. in Electrical Engineering
"Spatial Correlation in Remotely Sensed Multispectral Image Data"

System Services 061478

APPLICATIONS NEWS from BILL SHELLEY

* JEANNE ETHERIDGE will be on vacation from May 31st until June 19th. Any matters concerning the APPLICATIONS SYSTEMS GROUP should be directed to BILL SHELLEY in her absence.

* LARSYSDV The known problems with the new MERGESTATISTICS have been corrected. For a description of the added capabilities see the REFERENCE file on LARSYSDV. If you experience any additional difficulties with MERGESTATISTICS please let us know and we will be glad to help.

* LARSYSDV The MINIMUM DISTANCE CLASSIFIER is now available on LARSYSDV. For a description of its use type REFERENCE MINIMUM after ipling LARSYSDV.

FLEXLAB2 TI TERMINAL SIGN-OUT

* When taking the TI terminal from the cabinet in Flexlab II, please be sure to sign it out even though you're planning to use it in the lab. Because of the increase in terminal usage it's important that we (operations) as well as users looking for the terminal know where it is. Your cooperation will be greatly appreciated.

COMPUTER ROOM TERMINAL (2741)

* I would like to review for everyone the policies concerning the use of the operators backup terminal in the computer room.

  1. If a user is on the terminal they should be aware of the possibility of being disconnected from the terminal due to the following emergency conditions:

     A. The display operators console goes down and the operator needs to reconnect as the Operator.

     B. If an important Directory needs to be run. This includes adding, deleting and modifying ID's on the system.

     C. If RSCS needs to be reconnected to start or check on a linkid such as JSCTEXAS, ISU, etc.

     D. To check on a hung system services batch machine. (Batshort, Batmed, etc.)

     E. The only persons authorized to declare an emergency for use of the terminal are MIKE COLLINS, all computer operators, KEITH PHILIPP, and ROSS GARMOE.

Because of the conditions listed above users may have to be given a notice to immediately disconnect for our use. In some cases it won't take too long to do what we have to do so the user can disconnect and then reconnect when we finish.

TAPE DRIVE PRIORITIES

* Due to the recent surge in tape drive usage, we have had up to six and seven users waiting in line for a tape drive. A couple of years ago this usage was fairly common and it was necessary to establish priorities as to who should be given drives first. Priorities are given for users tape requests as follows:

    1st Digital Display User
    2nd Remote User (Houston, ISU, Goddard, Wallops)
    3rd Local Users
    4th Batch Machines

  Users will be informed by the operator as to what position they are in line for a tape drive and if any position changes are made. Users desiring two tape units should try to inform the operators on duty that they will be requesting two. This information will be helpful for the operator in helping you determine your position for tape units, if necessary because of heavy usage.

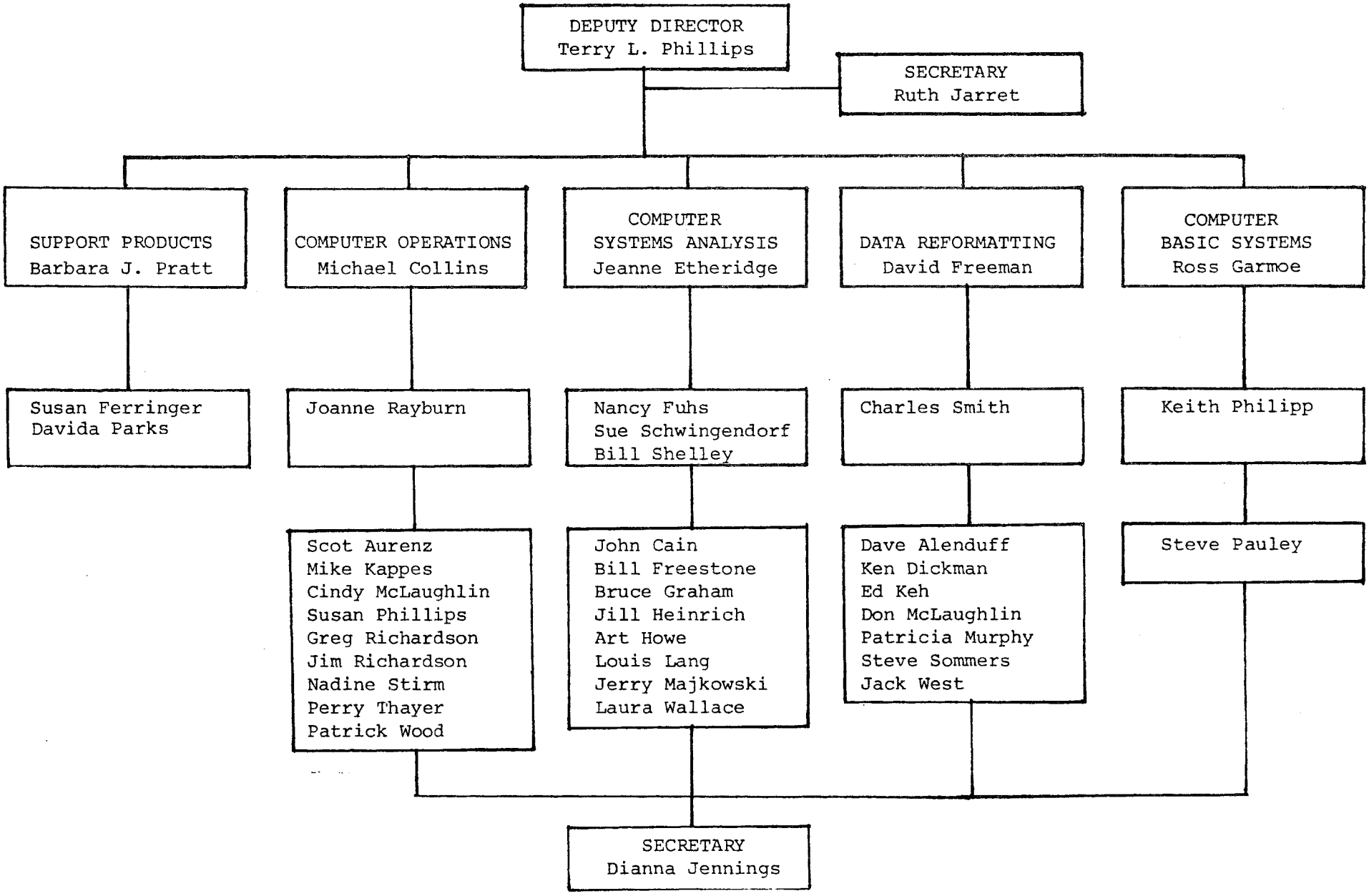
  The Computer Operators' goals provides for tape unit attachment of one unit within 10 minutes; two units within thirty minutes; and greater than two units within five hours of the request. We try to always meet these goals but there are times it is impossible because of the usage.

  I hope everyone will be patient and understanding of our situation when it is necessary to place you in line for tape drives.

SYSTEM SERVICES ORGANIZATION

* The basic organization of LARS System Services is provided on the next few pages. It includes a chart of all System Services personnel, information on their responsibilities, and a list of user contacts.

SYSTEM SERVICES ORGANIZATIONAL CHART



BASIC SYSTEMS - ROSS GARMOE, MANAGER

* RESPONSIBILITIES

- Computer hardware and software - support, planning and policy, VM, RSCS
- Directory and CP accounting programs
- Computer User's Guide
- SHARE - IBM users group
- System Services batch machines

CONTACTS ROSS and/or KEITH PHILIPP

- RSCS
- CP/CMS commands
- Batch machines

SYSTEMS ANALYSIS - JEANNE ETHERIDGE, MANAGER

* RESPONSIBILITIES

- Project support - personnel for analysis, programming, management, etc.
- Project monitoring - contact project managers concerning problems, computer facility plans and policies, billing statements.
- "Standard" LARSYS
- Fiscal accounting programs
- "Unsupported" library

CONTACTS

- "Standard" LARSYS problems and questions - BILL SHELLEY
- "Standard" LARSYS suggestions - JEANNE or BILL
- Requests for analysts, programmers, etc. for project support; requests for short-term programming needs, information about the "Unsupported" library - JEANNE
- Remote Terminals - SUE SCHWINGENDORF (Houston)
  BILL SHELLEY (Wallops)
  NANCY FUHS (ISU)
  RON BOYD (Goddard)

OPERATIONS - MIKE COLLINS, MANAGER

* RESPONSIBILITIES

- Computer operations - planning, policy, personnel
- Computer system and system services accounting - run programs, work with Pat Shoemaker on new and overrun accounts
- Establishing or altering computer user ID's and resources
- Computer manuals and program abstracts
- Maintain digital display
- Maintain computer supplies
- Hardware maintenance

CONTACTS

- Requests for new magnetic tapes and changes to ring in ID's, tapecopies - JOANNE RAYBURN
- Manuals and abstracts - JOANNE
- Computer user ID changes and additions - MIKE
- Requests for Maintenance on terminals, tape drives, etc. - MIKE
- Digital Display - MIKE

REFORMATTING - DAVE FREEMAN, MANAGER

* RESPONSIBILITIES

- Reformatting products planning, policy
- Provide reformatting products
- LARSYS runtable updates
- PDP, varian and table digitizer planning, policy, and maintenance

CONTACTS - DAVE

- Requests for products
- Questions about PDP, Varian, table digitizer

SUPPORT PRODUCTS - BARBARA PRATT, MANAGER

* RESPONSIBILITIES

  - Support products planning and policy
  - Provide support products
  - Support products fiscal responsibility

  CONTACTS

  - Artwork, slides, and Scan Lines - SUE FERRINGER
  - Duplicating, LARS publications, and Bibliography - DAVIDA PARKS

REMOTE HIGHLIGHTS from SUSAN SCHWINGENDORF

* TAPE TRANSFER BREAKTHROUGH On May 24, 1978 a major event in the life of the DATA 100 tape drive at JSC occurred! It was able to receive data transferred from a tape at LARS, thanks to a software fix provided by DATA 100. With the ability to copy tapes from JSC to LARS already working, the tape transfer system is now available for general use by JSC and LARS people who need this service. While operator procedures are being determined and training sessions are being scheduled, interested JSC users should contact Glen Prow, and users at LARS may talk to JIM KAST about tapes to be transferred.

* CONSULTANT IN HOUSTON During the week of May 22, SUSAN SCHWINGENDORF visited NASA/Johnson Space Center in Texas to assist JSC terminal users accessing the Purdue/LARS computer. A seminar on batch machines was presented, IMSL was discussed, CMS370 was introduced to several new users and EODLARSYS software developments were presented to several individuals.

* 370 BATCH The 370 batch facility which was introduced to several JSC terminal users might be of interest to other Purdue/LARS users. Basically, the job deck submitted to batch would consist of the following three sections:

  1) Batch header cards
  2) EXEC control cards — EXEC$$ / : / any CP, CMS370 or EXEC commands / : / $$
  3) Data cards

An example which will compile and run a program, which a user (JSC111) has put on his disk, follows:

Section 1

```
ID        BATCH (this card omitted if transferring deck from
                 disk to BATCH reader)
BATCH MACHINE BATEOD (BATEOD is the 370 batch machine)

BATCH ID userid username

BATCH OUTPUT printsite punchsite
```

Section 2

```
EXEC$$

SPOOL E HOLD (puts printer output in hold status)

GETDISK TEMP 10CYL A (gets a bigger A-disk for the batch
                      machine)
GETDISK JSC111 191 193 B R PASS=JOE (accesses JSC111 191 disk
                                     to read program TEST)
GLOBAL TXTLIB FORTRAN CMSLIB
```

```
FILEDEF 5 READER

FILEDEF 6 PRINTER

FORTRAN TEST (PRINT)  (compiles the file TEST FORTRAN and
                       prints listing)
LOAD TEST

START

$$
  .
  .
Data cards to be ready by program TEST
  .
  .
```

Section 3

Note: This deck set-up is also valid for any of the CMS360 machines (BATQUICK, BATSHORT, BATMED, BATLONG, BATONITE)

If you are new users of 370 batch machines and are having trouble doing what you want to do, JSC users should contact SUSAN SCHWINGENDORF or JEANNE ETHERIDGE, and other users may talk to the appropriate computer facility personnel for their projects. (If you don't know who this is, BILL SHELLEY or Jeanne Etheridge will help you.)

* IMSL The IMSL Library of mathematical and statistical subroutines is being made available on the Purdue/LARS computer, primarily for employees at JSC and Purdue/LARS personnel supporting the SR&T contract. It consists of a collection of about 425 subroutines callable from your FORTRAN programs and they are reputed to employ the latest methods for various types of computations. You will find subroutines for anything from basic statistical computations, analysis of experimental data, differential equations and linear algebraic equations to non-parametric statistics, vector-matrix arithmetic and linear programming. Use the CMS command

```
GETDISK JSCDISK 19E
```

to access text decks for these subroutines. A number of subroutines have single and double precision versions. Only the single precision is currently available; in the near future the double precision versions will also be provided. Documentation is available at JSC (see Glen Prow) and at LARS, Flexlab2 (see SUSAN SCHWINGENDORF). If you encounter any problems accessing these routines please call Susan Schwingendorf.

* 1976, 1977 DATA BASES The 1976 Phase II data base (consisting of 110 magnetic tapes) and the 1977 Phase III data base (containing 222 tapes) have been received at LARS and entered into the tape library. Directories of the tapes, file numbers and contents of each file are available from SUSAN SCHWINGENDORF, for LARS users needing this information.

SUMMARY OF 370/148 COMPUTER USAGE FOR MAY, 1978

Overall Usage

Basic Rate CPU Time Used	12.72 hrs.
Priority Rate CPU Time Used	201.05 hrs.
Total CPU Time Used	213.77 hrs.
Terminal Sessions	3825
Batch Jobs	969

Usage by Time of Day

Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite - 8AM	22.68	14%
Mon-Fri 8AM - 4PM	116.36	63%
Mon-Fri 4PM - Midnite	62.31	34%
Weekend	12.40	15%

Batch Job Usage

Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	247	0.90 min.	0.14 min.
BATSHORT	338	10.55 min.	0.90 min.
BATMED	188	17.68 min.	2.93 min.
BATONITE	40	13.54 min.	3.22 min.
BATLONG	98	25.19 min.	5.27 min.
TAPTRAN	43	7.55 min.	1.01 min.

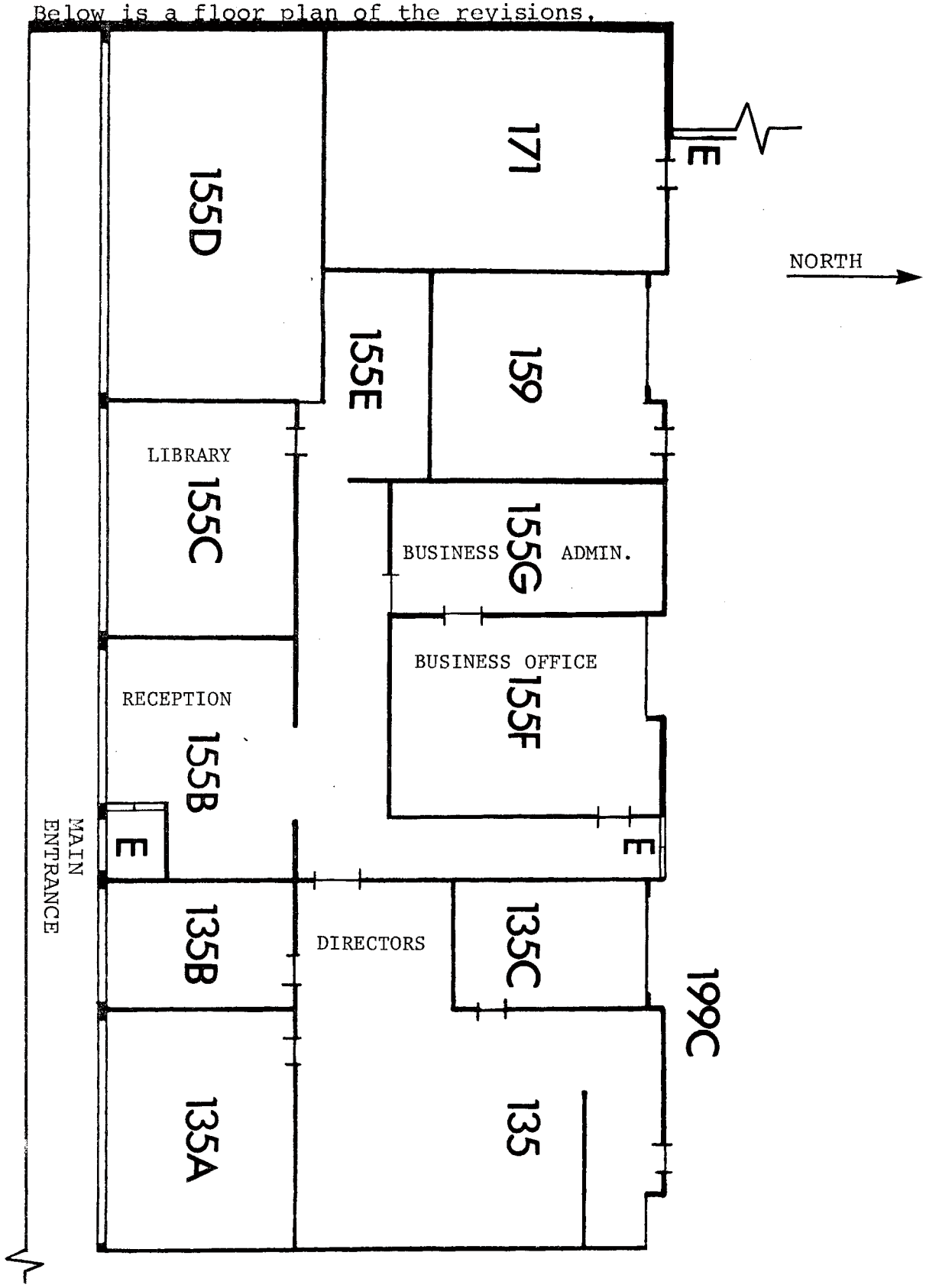
Keyboard Terminals

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	Hazeltine 1200	221	211.89 hrs.	0.96 hrs.
Flexlab2	31	Hazeltine 1200	255	196.36 hrs.	0.77 hrs.
Flexlab2	32	Hazeltine 1200	335	193.70 hrs.	0.58 hrs.
Flexlab2	33	Infoton GTX	358	290.87 hrs.	0.81 hrs.
Flexlab2	34	2741	200	107.17 hrs.	0.54 hrs.
Flexlab2	35	Infoton GTX	335	261.40 hrs.	0.78 hrs.
Flexlab2	36	Infoton GTX	258	307.51 hrs.	1.19 hrs.
Comp. Room	37	2741	225	127.80 hrs.	0.57 hrs.
Flexlab1	40	Infoton GTX	209	182.22 hrs.	0.87 hrs.
Flexlab1	41	Infoton GTX	223	228.20 hrs.	1.02 hrs.
Flexlab1	42	2741	122	77.95 hrs.	0.64 hrs.
Flexlab1	43	2741	116	71.15 hrs.	0.61 hrs.
Dial-up	50	First in Use	198	169.43 hrs.	0.86 hrs.
Dial-up	51	Second in Use	136	115.40 hrs.	0.85 hrs.
Dial-up	52	Third in Use	65	73.94 hrs.	1.14 hrs.
Dial-up	53	Fourth in Use	60	62.70 hrs.	1.04 hrs.
Dial-up	54	Fifth in Use	40	26.32 hrs.	0.66 hrs.
Houston	61,62,63	(various)	398	313.26 hrs.	0.79 hrs.
ISU	66,67	(various)	437	173.56 hrs.	0.40 hrs.

Interlab Info

REMODELLING OF FLEX I

The new reception area, business offices and entrance to the director's offices are now completed.
Below is a floor plan of the revisions.



PERSONNEL

* We would like to welcome the following student employees who have joined the LARS staff recently. JOHN CAIN, BRUCE GRAHAM, JILL HEINRICH, ART HOWE, LOUIS LANG and LAURA WALLACE will be working in the Systems Analysis Group under the supervision of Jeanne Etheridge. PAT MURPHY and STEVE SOMMERS will be working in Reformatting under the direction of Dave Freeman. Also recently employed were JOHN DOLAN and TOM GAUTSCHI who will work with Jim Kast, GREG RICHARDSON working with Mike Collins in Operations, and ALAN SAWCHUK and MIKE STABENFELDT working in Measurements under Barrett Robinson.

* A big welcome is extended to CATHY KOZLOWSKI, Applications Programmer in Reformatting. Cathy joined the staff on June 1 following the completion of her M.S. Degree in Computer Science this May. She will be sharing an office with Chuck Smith and her extension is 222.

* BARBARA DAVIS is leaving LARS on June 16 to accompany her husband to Indianapolis where he will continue his medical Studies at the IU Medical Center.

  Barbara will begin at Indiana Bell as a statistician on June 19. She will be working on sampling and survey design, sampling to establish rates, and economic forecasting.

THE PICNIC IS COMING!

* CLUCK, CLUCK, CLUCK... It's getting to be that time of year again, folks, and the LARS picnic committee has been hard at work. SQUAWK. In between all the clucks and squawks plans are being made for the biggest and best picnic ever. The date has been set for Saturday, June 24th and the fun starts at 1:00 at Happy Hollow Park. Everyone be sure and get there early because the games committee is hard at work (squawk) planning activities. At 5:00, when we've all worked up an appetitie, barbecued chicken will be ready and waiting. CLUCK, CLUCK, CLUCK... The price for an afternoon of fun and chicken is $2.00 per adult and $1.00 per child. Mere chickenfeed. Contain your excitement for now but watch for more "flyers" to be sent out soon.

SCAN LINES

LARS · Purdue University · Vol. 4 No. 1 · July 31, 1978

IMAGE PROCESSING IN BONAS, FRANCE

The weather in southern France from June 19 to July 1, was cool and wet -- quite out of character for this time of year. But that made it easier for PHIL SWAIN and about 60 others to maintain good attendance at the lectures and workshops of a NATO Advanced Study Institute on Image Processing.

Swain contributed a state-of-the-technology survey of remote sensing image processing. Other fare ranged from tutorials to research reports, covering topics from digital filtering to pattern recognition and a variety of applications. A visit to CNES, the French space agency at Toulouse, France, was also included.

Keep in mind that this event will probably be repeated in 1980, and that NATO offers "scholarships" to students wishing to attend from any NATO country.

The weather did cooperate for the day-and-a-half weekend break, during which time the attendees scattered throughout southern France and northern Spain.

REMOTE SENSING EDUCATORS

SHIRLEY DAVIS attended a Conference of Remote Sensing Educators sponsored by NASA/Ames Research Center, in Palo Alto, California, June 26-30.

Davis was part of a three-person team to conduct a pair of workshops on "Multimedia Educational Aids and Use of Machine-Aided Teaching Methods for Remote Sensing" and on two evenings gave demonstrations of the LARS minicourses to groups of interested remote sensing educators. LARS was also represented by a technology transfer display in the trade show.

On June 1, SHIRLEY DAVIS visited NASA's Lewis Research Center in Cleveland, Ohio, to meet with Calvin W. Weiss, Chief of the Educational Services Office, to discuss possible cooperative projects.

US/AUSTRALIAN JOINT SEMINAR

DAVID LANDGREBE was invited to present three papers at the United States/

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

Australian Joint Seminar on Image Processing Techniques for Remote Sensing in Canberra, Australia, on May 22-26. The seminar was co-sponsored by the United States National Science Foundation and the Australian Department of Science, under the United States/Australian Cooperative Science Program. There were six participants from the United States, 16 from Australia and one each from Canada, India and New Zealand.

A major motivation for the joint seminar is the fact that the Australian government has recently made the commitment to establish a Landsat ground station in Alice Springs, Australia, by late 1979.

MULTIBAND RADIOMETER

LEROY SILVA has been meeting with various manufactureres during July to discuss specifications for the proposed data logger for the Multiband Radiometer.

Silva consulted with the following companies:

Datel Corporation Canton, MA
MFE Corporation Salem, NH
Analogic Corporation Wakefield, MA
United Systems Corporation Dayton, OH
Electro General Corporation
Minneapolis, MN
John Fluke Corporation Seattle, WA
Tektronix Portland, OR
Accurex Corporation Mountain View, CA
Martek Instruments Irvine, CA

On July 21, Silva concluded his travels with a trip to Phoenix, Arizona, to meet with Ray Jackson, USDA, a potential user and member of the advisory group developing the data logger.

Work is progressing on the newest addition to the Field Measurement's vehicle stable this summer. The Central Machine Shop has altered a pick-up truck to carry a boom and calibration platform for use with the Multiband Radiometer.

VIC FLETCHER has installed the boom which will hold the sensor staionary approximately 20 feet above the crop and 10 feet from the truck. The calibration platform will be fixed over the cab, enabling the truck to act as a self-contained measurement/calibration system.

The truck is a research prototype which will test different construction materials as well as being used in field research at the Purdue Agronomy Farm.

Equipment resulting from this research vehicle will have to meet the standards of being: (1) light weight, (2) easy to use, (3) strong and durable and (4) field-tested.

LARS TRAVELOG

DAVID LANDGREBE traveled to Houston, Texas, on June 28, to confer with several NASA people regarding our SR&T work.

Landgrebe also presented a paper in Chicago, Illinois, at the IEEE Pattern Recognition and Image Processing meeting on "The Development of a Spectral/Spatial Classifier for Earth Observational Data."

The International Soil Science Congress was held in Alberta, Canada, from June 19-27. MARION BAUMGARDNER served as chairman for the remote sensing session. He and SUE KAMINSKY gave oral presentations at the technical sessions. ERIC HINZEL and ERIC STONER gave poster papers. In addition, Baumgardner was elected vice-chairman of the Working Group on Remote Sensing & Soil Survey.

On July 3-4, at the International Conference of Friends (Quaker Church), held in Oskaloosa, Iowa, Baumgardner gave a paper on the scientist's view of "New Approaches to Peacemaking".

JOHN AHLRICHS presented two papers at the ISP&IUFRO Symposium 1978 on Remote Sensing for Observation and Inventory of Earth Resources and the Endangered Environment. The papers Ahlrichs presented were:

"Relation of Crop Canopy Variables to the Multispectral Reflectance of

Small Grains" by JOHN AHLRICHS, MARVIN BAUER, MARILYN HIXSON, DON CRECELIUS and CRAIG DAUGHTRY.

"The Design and Implementation of a Multiple Instrument Field Experiment to Relate the Physical Properties of Crops and Soils to their Multispectral Reflectance" by BARRETT ROBINSON, MARVIN BAUER, LARRY BIEHL and LEROY SILVA.

CHUCK CURTIS and JOHN MAYO are spending the summer at University Hospital in Indianapolis, working on research and development of a probe for detection of neonatal jaundice.

ADVANCED DEGREES

NIM-YAU CHU - Ph.D. in Electrical Engineering - "Methods and Performance Bounds for Constrained Image Restoration" (This is a correction from the June 14, issue of Scan Lines)

ED HANLEY - PH.D. in Mechanical Engineering - "Noninvasive Medical Diagnostics Through Multispectral Skin Reflectance Analysis: Jaundice Detection and Erythema Assessment"

VISITORS

Earth Sciences hosted three visitors during June and July. John Townshend, Department of Geography, University of Reading, England, was asked to review and critique the Earth Sciences Program Area during his stay of June 10, to July 28.

Colin Rudeforth, Soil Survey of England and Wales, Aberystwyth, Wales, visited LARS June 1-6, to review soil survey research.

Osvaldo Stepancich, Argentine Ministry of Agriculture, visited LARS from June 3, to July 21, to contribute to the SR&T Task 2.3. While here he described, nd documented Argentine methods of acquiring, analyzing and reporting wheat production statistics.

Richardo Isla Marco, Regional Coordinator of the Central American Project, was at LARS from July 17-28. As a consultant to the Inter-American Development Bank (IDB), Dr. Isla worked with LUIS BARTOLUCCI and the ten visiting scientists on their final reports.

Norberto Max, representative of IDB, Training Division, visited LARS on July 28, to oversee completion of the Central American Project.

NEW LARS PUBLICATION

083077 ECHO User's Guide
by J. L. Kast, P. H. Swain, B. J. Davis and P. W. Spencer

Over the past several years, the ECHO classifiers have been developed to incorporate spatial as well as spectral information into the classifier decision criteria. This document contains a comprehensive description of the functional organization of the supervised and the nonsupervised ECHO processes, the manner in which they are invoked and controlled. It is written primarily for individuals who intend to make use of the ECHO classifiers, although it is also of value to those wanting to understand or implement the ECHO algorithms.

The research reported in this paper was sponsored by NASA under Contract NAS9-14970.

NEW LARS TECHNICAL REPORTS

051578 The Development of a Spectral/Spatial Classifier for Earth Observational Data
by D. A. Landgrebe

Over the last several years a classifier for earth observational image data has been under development which is intended to achieve improved performance by utilizing spatial characteristics of the data as an adjunct to multispectral ones. This paper provides an overview of the conception, development, evaluation and documentation of this spectral/spatial classifier. The research program leading to this classifier is described, the algorithms of the current implementation called ECHO are outlined, and results show it to have improved accuracy, with greater computation efficiency, and only slightly increased operator complexity.

The research reported in this paper was sponsored by NASA under Grant NGL -005-112, Contract NAS9-14016 and Contract NAS9-14970.

061578 A Parametric Multiclass Bayes Estimator for the Multispectral Scanner Spatial Model Performance Evaluation
by B. G. Mobasseri, C. D. McGillem, and P. E. Anuta*

Analytical models are developed to enable evaluation of multispectral scanner performance without a physical realization of a real system. The scanner IFOV and noise characterisitics are represented by statistical models. Probability of correct classification is estimated via numerical solutions using Gaussian distribution functions.

The research reported in this paper was sponsored by NASA under Contract NAS9-15466.

*Contact author for a copy of this Technical Report.

061678 Methods and Performance Bounds for Constrained Image Restoration
by N. Y. Chu and C. D. McGillem*

The report addresses the problem of designing image filters for compensating for the effect of finite scanner apertures. Methods are studied for minimizing a properly selected narrowness measure on the point spread function of the composite system while restricting the total output noise power to within some pre-set level.

The research reported in this paper was sponsored by the National Science Foundation under Contract ENG 76-14400.

*Contact author for a copy of this Technical Report.

System Services 073178

NEW COMPUTER RATES

In spite of increased costs, most computer rates will remain the same due to a projected increase in usage.

Two rates have been refigured for the 1978-79 fiscal year. Priority service went up from $55 to $80 per CPU. Disk storage went down from $17 to $6 per megabyte month.

RAID! (OR, "WE KILLED A LITER BUG")

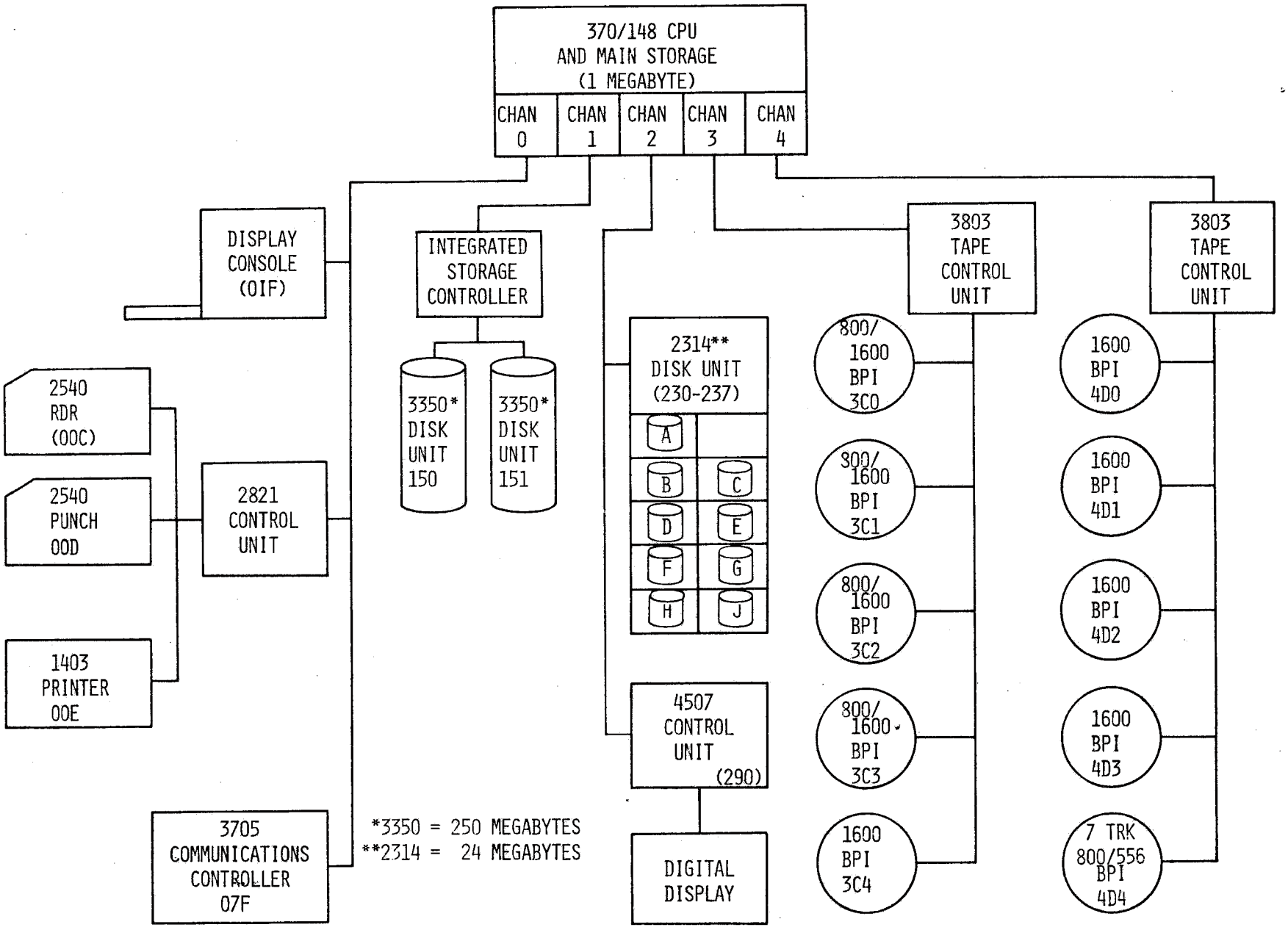
It is now possible to produce gray-scale plots using patterns wider than 8 bits (e.g., the "JASPER" pattern). For technical reasons due to software, it is still not possible to produce patterns exactly 8 bits wide. We hope to have this problem corrected by the time Scan Lines goes to print.

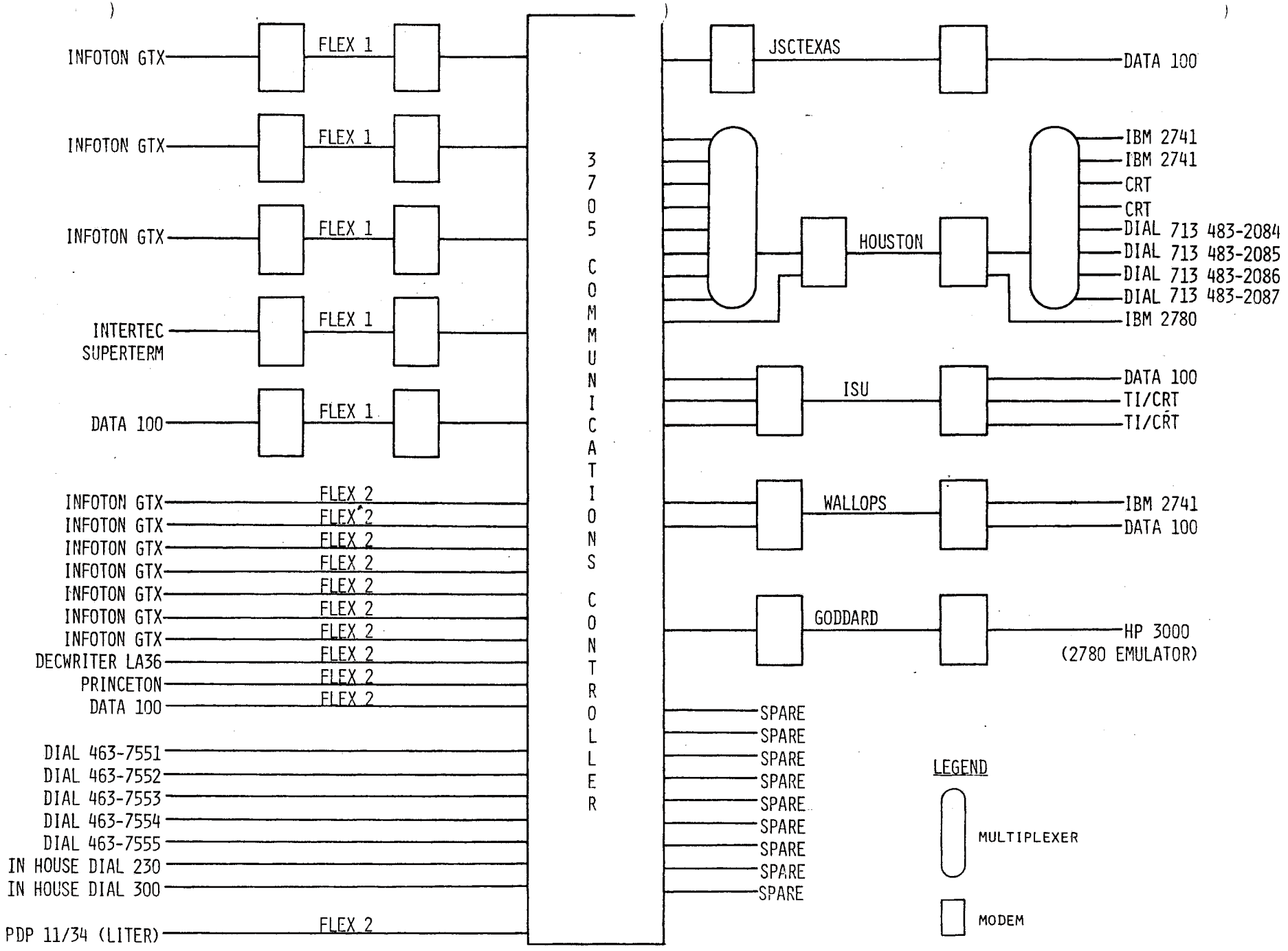
The coming of summer has also brought along the typical LITER problems associated with high humidity. The digitizer has a rather irritating habit of giving the user strange values whenever the map or table is damp. Please be aware of this problem and double-check the resulting digitized values when the room is muggy.

Although scheduling time with the PDP has become less of a problem in recent weeks, a few reminders are in order. Your best chance to use the PDP will be through the sign-up sheet. Also, please record all pertinent information on the log sheet on the clipboard by the DecWriter. The PDP is reserved for plotting during the midnight to 8am period. Users may sign-up for the PDP at any other time, with priority going to table digitizer users and programmers developing LITER software.

CPU AND TERMINAL CONFIGURATIONS

On the following two pages current CPU and terminal configurations of the LARS 370/148 (as of July 15) are provided.


370/148 CPU
AND MAIN STORAGE
(1 MEGABYTE)
CHAN 0
CHAN 1
CHAN 2
CHAN 3
CHAN 4
DISPLAY CONSOLE (01F)
INTEGRATED STORAGE CONTROLLER
3803 TAPE CONTROL UNIT
3803 TAPE CONTROL UNIT
2540 RDR (00C)
2540 PUNCH 00D
1403 PRINTER 00E
2821 CONTROL UNIT
3350* DISK UNIT 150
3350* DISK UNIT 151
2314** DISK UNIT (230-237)
A
B
C
D
E
F
G
H
J
800/1600 BPI 3C0
800/1600 BPI 3C1
800/1600 BPI 3C2
800/1600 BPI 3C3
1600 BPI 3C4
1600 BPI 4D0
1600 BPI 4D1
1600 BPI 4D2
1600 BPI 4D3
7 TRK 800/556 BPI 4D4
4507 CONTROL UNIT (290)
DIGITAL DISPLAY
3705 COMMUNICATIONS CONTROLLER 07F
*3350 = 250 MEGABYTES
**2314 = 24 MEGABYTES


INFOTON GTX
FLEX 1
INFOTON GTX
FLEX 1
INFOTON GTX
FLEX 1
INTERTEC SUPERTERM
FLEX 1
DATA 100
FLEX 1
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
INFOTON GTX
FLEX 2
DECWRITER LA36
FLEX 2
PRINCETON
FLEX 2
DATA 100
FLEX 2
DIAL 463-7551
DIAL 463-7552
DIAL 463-7553
DIAL 463-7554
DIAL 463-7555
IN HOUSE DIAL 230
IN HOUSE DIAL 300
PDP 11/34 (LITER)
FLEX 2
3705 COMMUNICATIONS CONTROLLER
JSCTEXAS
DATA 100
HOUSTON
IBM 2741
IBM 2741
CRT
CRT
DIAL 713 483-2084
DIAL 713 483-2085
DIAL 713 483-2086
DIAL 713 483-2087
IBM 2780
ISU
DATA 100
TI/CRT
TI/CRT
WALLOPS
IBM 2741
DATA 100
GODDARD
HP 3000
(2780 EMULATOR)
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
LEGEND
MULTIPLEXER
MODEM

SUMMARY OF 370/148 COMPUTER USAGE FOR JUNE, 1978

Overall Usage

Basic Rate CPU Time Used	19.04
Priority Rate CPU Time Used	209.97
Total CPU Time Used	229.01
Terminal Sessions	3950
Batch Jobs	1175

Usage by Time of Day

Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite - 8AM	29.18	17%
Mon-Fri 8AM - 4PM	114.28	65%
Mon-Fri 4PM - Midnite	69.09	39%
Weekend	16.03	15%

Batch Job Usage

Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	262	0.94 min.	0.17 min.
BATSHORT	439	6.67 min.	0.93 min.
BATMED	259	10.99 min.	1.38 min.
BATONITE	19	62.01 min.	2.80 min.
BATLONG	49	33.49 min.	17.77 min.
TAPTRAN	71	13.62 min.	2.03 min.

Keyboard Terminals

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	209	219.03 hrs.	1.05 hrs.
Flexlab2	31	INFOTON GTX	292	212.22 hrs.	0.73 hrs.
Flexlab2	32	INFOTON GTX	287	140.14 hrs.	0.49 hrs.
Flexlab2	33	INFOTON GTX	339	296.32 hrs.	0.84 hrs.
Flexlab2	34	INFOTON GTX	235	92.30 hrs.	0.39 hrs.
Flexlab2	35	INFOTON GTX	337	262.22 hrs.	0.78 hrs.
Flexlab2	36	INFOTON GTX	333	294.87 hrs.	0.89 hrs.
Comp. Room	37	DECwriter	306	123.43 hrs.	0.40 hrs.
Flexlab1	40	INFOTON GTX	246	159.35 hrs.	0.66 hrs.
Flexlab1	41	INFOTON GTX	256	214.51 hrs.	0.84 hrs.
Flexlab1	42	INFOTON GTX	102	57.49 hrs.	0.56 hrs.
Flexlab1	43	SUPERTERM	91	47.65 hrs.	0.52 hrs.
Dial-up	50	First in Use	113	146.96 hrs.	1.30 hrs.
Dial-up	51	Second in Use	137	146.53 hrs.	1.03 hrs.
Dial-up	52	Third in Use	83	105.27 hrs.	1.27 hrs.
Dial-up	53	Fourth in Use	72	70.68 hrs.	0.98 hrs.
Dial-up	54	Fifth in Use	49	40.57 hrs.	0.83 hrs.
Houston	60-63, 6A-6D	(various)	671	655.03 hrs.	0.98 hrs.
ISU	66,67	(various)	175	83.04 hrs.	0.48 hrs.

Interlab Info

PARTIES - PAST AND FUTURE

On Saturday afternoon, June 24, well over 100 LARS staff, families, friends and visitors gathered at Happy Hollow Park to enjoy the LARS Annual Picnic.

Barbecued chicken simmered on the grill with Bob Hodge and assistants as the chefs. If that wasn't enough to whet everyone's appetites, one delectable dish after another kept arriving until the dinner call was sounded at 5pm.

Volleyball, cards, basketball, catch ball and a parachute game were played throughout the afternoon and early evening hours. A good time was had by all!

Many thanks to this year's committee: BARRETT ROBINSON, BARBARA DAVIS, GLORIA PETERSON, PAT SHOEMAKER, SUE KLOSOWSKI, VERN VANDERBILT, JIM KAST, MIKE COLLINS, JEFF KOLLENKARK and MARLENE HODGE, Ch.

The committee for the LARS Christmas Party was announced at the picnic. There's nothing like getting started early! They are: RUTH JARRET, Ch., JEANNE ETHERIDGE, BONNIE MISNER and DICK WEISMILLER. If the staff has suggestions for the Christmas Party, please pass them on to these people.

NEW FACES

Ms. Carol deBranges has accepted an offer to fill the position of Statistician/Analyst in PHIL SWAIN's Data Processing Research Program area.

A resident of the Lafayette area for some time, Carol has a Master's degree in statistics from Purdue and several years' experience in using computers and statistics for data analysis problem solving.

Carol's outside interests are quite varied and include: Bach Chorale Singers, local theater, amateur photography, carpentry and vegetable gardening. She's also an avid reader of detective stories (she has quite a collection of the British variety) and likes to trade them with other mystery buffs.

LARS looks forward to CAROL DE BRANGES joining us on August 1.

SCAN LINES

LARS · Purdue University · Vol. 4 · No. 2 · September 18, 1978

HARVARD COMPUTER GRAPHICS WEEK

TERRY PHILLIPS and BILL SHELLEY recently attended a conference from July 24-28, at the Harvard University Laboratory for Computer Graphics and Spatial Analysis, Cambridge, Massachusetts.

An excellent review of the state-of-the-art of using computers for mapping purposes was presented. According to Phillips, "the highlight of the conference was the presentations showing how far each mapping application has progressed!"

"The computer mapping techniques currently used on an operational basis are best typified by the papers presented by Robert L. Dupree, Staff Computer Analyst of the Standard Oil Company of Indiana, and Alan Paller, President of Applied Urbanetics, Inc.

"Mr. Dupree showed the results of computer mapping for Amoco. The purpose of these maps is to provide information to the entire company with respect to land ownership, political boundaries, well locations, seismic information, pipelines, electric lines, and all other kinds of mapping requirements met by storing this information in the computer and making it available to the various users within the company. The Amoco system consisted of four 370/168's located in Tulsa, Oklahoma, connected to various terminals at four to six regional centers. Each terminal consisted of at least one 370/158.

"Mr. Paller presented a paper showing his company's help to people interested in consumer information. His company provides computer output products showing what kind of consumers and their locations for his clients. Paller uses information available from his client and from the Bureau of Census to produce maps and tables showing his clients' consumers and information about potential consumers from the Bureau of Census data."

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 273).

Other sessions of the conference dealt with such subjects as the following:

1. Several mapping type programs put together by the Harvard Laboratory
2. Case Studies of Computer Mapping Applications in Education
3. Computer Mapping Software Review
4. Case Studies of Computer Mapping Applications by Federal, State and Local Governments
5. Computer Cartography as a Methodology of Geographical Pathology
6. Case Studies of Computer Mapping Applications in the Commercial Sector
7. Data bases
8. The impact of Landsat on computer cartography

The materials gathered at the conference have been placed in notebooks available from TERRY PHILLIPS. These notebooks include information about the conference, papers given and exhibits presented at the conference.

LARS REPRESENTED AT CANADIAN SYMPOSIUM

Two participants from LARS attended the Fifth Canadian Symposium on Remote Sensing held August 27-31, in Victoria, British Columbia.

PHIL SWAIN presented a paper (with an educational kit) entitled: "An Approach to the Use of Texture in Remote Sensing Data Analysis." STEVE KRISTOF presented a poster-format paper, co-authored with DICK WEISMILLER, entitled: "Observation of Spectral Variability Within Wetland Environments Using Landsat MSS Data."

CLASSIFICATIONS CHECKED IN CENTRAL AMERICA

LUIS BARTOLUCCI is visiting Guatemala, Costa Rica, El Salvador, Honduras, and Nicaragua, Central America, from August 1 September 15. He will deliver the final reports and field-check the final classifications from the recently completed Central American Project.

Bartolucci will also meet with the Remote Sensing National Coordinator from each of the five countries in San José, Costa Rica. They will discuss the recommendations regarding future remote sensing in Central America which will be submitted to the Inter-American Development Bank (IDB).

LARS TRAVELOG

MARION BAUMGARDNER was in Rome, Italy, from August 7-23, under the sponsorship of the FAO. He was working as senior author of a book being written jointly with Dr. John Howard, senior officer of FAO's Remote Sensing Unit. The book, which will be a handbook for developing nations, is entitled: "Remote Sensing and Food Production."

PAUL ANUTA was at NASA/Headquarters, Washington, D.C., on July 28-29. He attended the Space & Terrestrial Applications Advisory Committee meeting; reviewed and commented on NASA's 5-year plan in Agricultural Remote Sensing.

The quarterly review will be held at NASA/JSC during September 10-20. The following people will be attending from LARS: DAVID LANDGREBE, TERRY PHILLIPS, ROGER HOFFER, BIJAN MOBASSERI, DICK WEISMILLER, CLARE MCGILLEM, PAUL ANUTA, MARVIN BAUER, MARILYN HIXSON and JIM KAST.

LEROY SILVA travels to Chattanooga, Tennessee, on September 19-21, to attend the Thermosense I Conference. Silva will give an informal technical presentation on measuring heat loss from buildings using digital thermography.

EPORT OF THE REMOTE SENSING APPLICATIONS DIVISION (from Photogrammetric Engineering and Remote Sensing, July 1978, the Journal of the American Society of Photogrammetry)

"During the past year a number of significant changes and activities have occured within the Division. The most significant was the renaming of the division to Remote Sensing Applications (RSA) Division (formerly Remote Sensing and Interpretation). This change was directed by Dr. Roger Hoffer, Chairman of the Committee on Technical Division Reorganization. The report on the division reorganization is available from the ASP Headquarters to all interested members. Dr. Hoffer has accomplished and successfully completed the assigned task in an extremely professional manner, against all odds, in an extremely short time. I (George A. Rabchevsky, Director) respectfully congratulate Dr. Hoffer on this accomplishment and thank him for is dedication to our profession."

ROGER HOFFER has returned from his sabbatical with the U. S. Forest Service at Fort Collins, Colorado. He will report on the developing use of remote sensing for resource inventory and mapping of federal agencies in the next issue of Scan Lines.

VISITING SCIENTIST PROGRAMS

Dr. Jack Ford, Shippensburg State College, Shippensburg, Pennsylvania, was at LARS from August 22-25. He worked with RON BOYD on the analysis of a partial Landsat frame which included two counties of Pennsylvanian valley.

Ford plans to return in early October, and after gathering additional ground truch data, will complete his studies of remote sensing.

Three Mexican visiting scientists, Leopoldo Uribe-Reima, David Perez-Gavilan, and Miguel Medina, began their studies at LARS by taking the hands-on computer option with LUIS BARTOLUCCI. They then attended the first LARSYS Programming Short Course given by JEANNE ETHERIDGE, SUE SCHWINGENDORF, BILL SHELLEY, and BUD GOODRICK.

This training will be used in their natural resources inventory work at the Comision del Plan Nacional Hidraulico, where a version of LARSYS has been implemented.

Lee Werth recently returned to LARS to finish his work on wetland inventories in Minnesota. Werth produced new classification results using geometrically corrected, precision registered, multitemporal data, which was then generated as Mead output products.

Three visiting scientists from the Institute of Geodesy and Cartography, Warsaw, Poland, began their training during the September short course. Jacek Domanski and Stanislaw Morawski will be at LARS three months, Leszek Baraniecki will be here one month. The scientists will be working with STEVE KRISTOF to analyze an agricultural portion of a Landsat frame over southeastern Poland.

BUREAU OF LAND MANAGEMENT REPRESENTATIVE TO TRAIN AT LARS

William D. DiPaolo, BLM, will begin a one year training program on September 1. The purpose of this program is two-fold: (1) to train the U.S. Department of Interior, Bureau of Land Management (BLM) representative in the state-of-the-art of soil inventory procedures; and (2) to aid him in producing a spectral map delineating pertinent soil features for the Bruneau/ Saylor Creek planning unit in southeastern Idaho.

SEPTEMBER SHORT COURSE PARTICIPANTS

William DiPaolo (land use)
Bureau of Land Management
Glendale, AZ

Randy K. Scoggins
USAE Waterways Experiment Station
Vicksburg, MS

Mark Seeley (crops)
Lockheed Electronics Co.
Houston, TX

Lee C. Yang (forestry)
Taiwan Forestry Bureau
Taipei, Taiwan

Dr. W. Van der Zel (forestry)
c/o South African Consulate General
New York, NY

Jacek Domanski
Stanislaw Morawski (agriculture & forestry)
Leszek Baraniecki
Institute of Geodesy & Cartography
Warsaw, Poland

VISITORS

Dr. Keith Henderson travelled from NASA/JSC, August 1-4, to discuss the field research program at LARS with CRAIG DAUGHTRY, MARVIN BAUER, LARRY BIEHL and BARRETT ROBINSON. Henderson also observed and participated in the data collection activities at the Agronomy Farm.

Dr. Paul Pinter, Water Conservation Lab, USDA, Phoenix, Arizona, visited LARS from August 7-18. After attending the Short Course, Pinter participated in field research programs, and discussed measurement techniques and the multiband radiometer.

Another visitor to the Measurements Research area, Oscar Montgomery, Alabama A&M University, made measurements of Alabama soils using the Exotech Indoor System, and discussed the multiband radiometer.

R. D. Bowman, ACUREX Corp., Mt. View, California, also discussed the multiband radiometer data logger project with LEROY SILVA.

Chong Supp Shim, President of the National Jeon-bug University, Korea, visited DAVID LANDGREBE August 17, to learn about LARS and the courses available in remote sensing.

ADVANCED DEGREES

JOHN ALRICHS - M.S. in Agronomy - "Relation of Crop Canopy Variables to the Multispectral Reflectance of Spring Wheat."

NEW LARS TECHNICAL REPORTS

112077 Agronomists and the Food Chain by J. B. Peterson

Agronomists have played a leading role in increasing the world-wide capability of using the land for optimum food production. Their efforts are helping to meet the problems which arise from a capricious climate on a world-wide basis and the ever-growing threat of populations out running possible food supplies in many parts of the world.

061778 Analytical Techniques for the Study of Some Parameters of Multispectral Scanner Systems for Remote Sensing by E. R. Wiswell and G. R. Cooper.

Analytical techniques for selecting wavelength bands are needed for design of future scanner systems for remote sensing. Information theory techniques and statistical models of crop spectra were used to develop a band selection approach. Average mutual information is shown to be a useful concept for the study of multispectral scanner systems.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-15466.

System Services 091878

REMOTE HIGHLIGHTS FROM SUSAN SCHWINGENDORF

IMSL

The installation of the IMSL library of mathematical and statistical subroutines on the PURDUE/LARS computer has recently been completed. A majority of the IMSL routines are available in single and double precision versions, while a few have just single precision routines, and some are provided only in double precision. Two text libraries have been created on JSCDISK for use under CMS370, one containing all single precision subroutines, (SIMSLIB), and one consisting of all double precision routines (SIMSLIB). To use IMSL, a person must issue the following CMS370 commands (from his terminal or through an EXEC file):

```
GETDISK JSCDISK 19E
GLOBAL TXTLIB CMSLIB
  FORTRAN SIMSLIB DIMSLIB.
```

The text library names SIMSLIB and DIMSLIB should be reversed if the double precision version of a subroutine, which has both a single and double version, is to be used.

Since the text libraries are on a 3350 disk, IMSL users will need to obtain text files from tape if they are running under CMS360. The IMSL source, listing and text files are on tapes 523, 524, and 525 respectively, and can be accessed using the CMS TAPE command. (See the June 1978 issue SCANLINES for previous IMSL information.) Any problems should be reported to SUSAN SCHWINGENDORF, LARS.

NEW NIGHT BATCH MACHINE

In response to the needs of a number of remote terminal users at JSC, BATJSC has recently been added to the Purdue/LARS system as a night batch machine which, like BATLONG or BATONITE, is only charged the basic computer service rate. However, unlike the other two night machines, BATJSC runs under CMS370 with 2M core, and hence can support LARSYSP1 use. BATJSC is available to anyone with a LARS computer account, and has a time limit of 150 CPU minutes.

MULTIPLEXER INSTALLATION

On June 24, Glen Prow and Craig Utterback (JSC/LEC) travelled to LARS to install new communications equipment and increase from three to eight the number of direct low speed terminal lines for JSC into the Purdue/LARS computer. This means that users at JSC have four typewriter terminals directly connected to the LARS computer and four local dial-up lines at JSC which they can call to access Purdue/LARS. It also frees up the five dial-up ports (463-7551) for other users.

JULY CONSULTANTS IN HOUSTON

The week of July 10-14, two LARS Computer Facility personnel BILL SHELLEY and KEITH PHILIPP, were in Texas to assist users at JSC in the use of batch machines, to demonstrate the new IPL system, LARSYSP1, and to answer other user questions about the Purdue/LARS computer. They also received information on replacement candidates for the IBM 2780 terminal at JSC.

GODDARD VISIT

RON BOYD and ROSS GARMOE (LARS) visited our remote terminal site at the Goddard Space Flight Center in Maryland to meet LARS system users there, assess communications hardware and software problems, and test the ESL system's IBM 2780 emulation software. Since then, Goddard terminal users have been directing their output to the ESL's HP3000 computer for subsequent printing at Goddard.

NSF VISITORS FROM ISU

On Wednesday, August 9, 19 high school students visited LARS to tour the computer facility and observe the use of the digital display. These students were part of a 6 week NSF program on Remote Sensing of Earth Resources at Indiana State University's Department of Geography and Geology under the direction of Dr. Robert Howe. In addition to lectures and field trips on a variety of topics, members of ISU's Remote Sensing Laboratory, including Dr. Paul Mausel, Len Alger, and Steve Stadler, introduced the students to computer-assisted classifications of remotely sensed data. During the final week, each student worked on a classification project to exercise his newly acquired knowledge.

REMINDER TO CMS370 USERS

I have received a number of calls from remote terminal users about how to prevent the carriage control characters from appearing on their printer output. For those of you who missed this item in the May, 1978 issue of SCANLINES, the required FILEDEF in CMS370 is:

FILEDEF 6 PRINTER(RECFM FA

COMPUTER ID TIDBITS

Some of the terminal users at the Goddard Space Flight Center thought it would be much easier to have the backspace represent a character delete instead of the @. The computer directory entries for their IDs have been revised to permit this. Other optional items which users can define for their IDs besides disks and read or write passwords are:

-a system to automatically be ipl'ed at logon time.
- a line delete character (default is ¢ or ₡)
- a line end character (default is #)
-an escape character (default is ")
-maximum core (default is 512K)

Talk to your LARS computer facility representative if you feel any of these items would help you in your use of the system.

WHEN WILL I SEE MY VARIAN PLOT OR VARIAN PLOTTING SCHEDULES

Varian users please pardon the inconvenience you may have experienced obtaining your plots. Night operations have been suspended pending the training of new night operations personnel. Temporarily plots generated before 11 AM each day will physically run off the Varian each afternoon by student staff. As many plots as possible will be placed in mail runs through 1630 each day. The remaining plots may be picked up at Flexlab II as they are completed. A policy of clearing the queue of plots each day will be followed. At the earliest opportunity, normal night operations will be resumed. Please bear with us as we do our best to serve your needs.

SUMMARY OF 370/148 COMPUTER USAGE FOR JULY, 1978

Overall Usage -	Basic Rate CPU Time Used	51.03	(18%)
	Priority Rate CPU Time Used	235.87	(82%)
	Total CPU Time Used	286.89	(100%)
	Terminal Sessions	4572	(80%)
	Batch Jobs	1117	(20%)

Usage by Time of Day - Time Period		Average Percent CPU Utilization
Mon-Fri midnite-8AM	54.08	34%
Mon-Fri 8AM-4PM	113.71	72%
Mon-Fri 4PM-Midnite	83.35	52%
Weekend	35.74	26%

Batch Job Usage	Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
	BATQUICK	199	0.65 min.	0.14 min.
	BATSHORT	389	10.13 min.	1.34 min.
	BATMED	232	22.30 min.	3.06 min.
	BATONITE	110	24.91 min.	2.79 min.
	BATLONG	47	92.46 min.	50.11 min.
	TAPTRAN	23	9.04 min.	0.94 min.
	BATEOD	107	16.98 min.	0.92 min.

yboard erminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	188	222.44 hrs.	1.18 hrs.
Flexlab2	31	INFOTON GTX	275	211.75 hrs.	0.77 hrs.
Flexlab2	32	INFOTON GTX	181	115.57 hrs.	0.64 hrs.
Flexlab2	33	INFOTON GTX	325	266.22 hrs.	0.82 hrs.
Flexlab2	34	INFOTON GTX	298	213.05 hrs.	0.71 hrs.
Flexlab2	35	INFOTON GTX	282	241.17 hrs.	0.86 hrs.
Flexlab2	36	INFOTON GTX	287	283.26 hrs.	0.99 hrs.
Comp. Room	37	DECwriter	160	62.88 hrs.	0.39 hrs.
Flexlab1	40	INFOTON GTX	214	164.56 hrs.	0.77 hrs.
Flexlab1	41	INFOTON GTX	206	200.49 hrs.	0.97 hrs.
Flexlab1	42	INFOTON GTX	177	151.81 hrs.	0.86 hrs.
Flexlab1	43	SUPERTERM	162	93.11 hrs.	0.57 hrs.
Dial-up	50	First in Use	153	110.97 hrs.	0.73 hrs.
Dial-up	51	Second in Use	80	65.15 hrs.	0.81 hrs.
Dial-up	52	Third in Use	17	13.97 hrs.	0.82 hrs.
Dial-up	53	Fourth in Use	31	30.69 hrs.	0.99 hrs.
Dial-up	54	Fifth in Use	46	37.90 hrs.	0.82 hrs.
Houston	60	Hazeltine 2000	166	108.60 hrs.	0.65 hrs.
Houston	61	Hazeltine 2000	252	112.37 hrs.	0.45 hrs.
Houston	62	2741	122	112.37 hrs.	0.92 hrs.
Houston	63	2741	163	115.84 hrs.	0.71 hrs.
ISU	66	(various)	338	102.43 hrs.	0.30 hrs.
ISU	67	(various)	333	117.67 hrs.	0.35 hrs.
Houston	6A	Dial-1st in Use	193	157.43 hrs.	0.82 hrs.
Houston	6B	Dial-2nd in Use	137	93.86 hrs.	0.69 hrs.
Houston	6C	Dial-3rd in Use	103	63.98 hrs.	0.62 hrs.
Houston	6D	Dial-4th in Use	67	24.57 hrs.	0.37 hrs.

SUMMARY OF 370/148 COMPUTER USAGE FOR AUGUST, 1978

Overall Usage -	Basic Rate CPU Time Used	18.38	(7%)
	Priority Rate CPU Time Used	239.73	(93%)
	Total CPU Time Used	258.11	(100%)
	Terminal Sessions	4903	(82%)
	Batch Jobs	1074	(18%)

Usage by Time of Day -	Time Period		Average Percent CPU Utilization
	Mon-Fri midnite-8AM	29.55	16%
	Mon-Fri 8AM-4PM	124.55	68%
	Mon-Fri 4PM-Midnite	88.78	49%
	Weekend	15.21	14%

Batch Job Usage -	Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
	BATQUICK	106	0.38 min	0.11 min
	BATSHORT	451	11.72 min	1.34 min
	BATMED	217	13.65 min	2.00 min
	BATONITE	32	37.50 min	1.88 min
	BATLONG	108	20.43 min	4.37 min
	TAPTRAN	38	20.01 min	4.24 min
	BATEOD	90	19.03 min	0.38 min

Keyboard Terminals - Location	Port	Terminal	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	187	186.71 hrs.	1.00 hrs.
Flexlab2	31	INFOTON GTX	237	223.50 hrs.	0.94 hrs.
Flexlab2	32	INFOTON GTX	299	213.34 hrs.	0.71 hrs.
Flexlab2	33	INFOTON GTX	358	282.94 hrs.	0.79 hrs.
Flexlab2	34	INFOTON GTX	231	198.70 hrs.	0.86 hrs.
Flexlab2	35	INFOTON GTX	334	282.27 hrs.	0.85 hrs.
Flexlab2	36	INFOTON GTX	306	266.29 hrs.	0.87 hrs.
Comp. Room	37	DECwriter	263	81.15 hrs.	0.31 hrs.
Flexlab1	40	INFOTON GTX	186	167.07 hrs.	0.90 hrs.
Flexlab1	41	INFOTON GTX	256	220.34 hrs.	0.86 hrs.
Flexlab1	42	INFOTON GTX	183	169.22 hrs.	0.92 hrs.
Flexlab1	43	SUPERTERM	124	105.05 hrs.	0.85 hrs.
Dial-up	50	First in Use	100	92.39 hrs.	0.92 hrs.
Dial-up	51	Second in Use	37	23.89 hrs.	0.65 hrs.
Dial-up	52	Third in Use	9	7.84 hrs.	0.87 hrs.
Dial-up	53	Fourth in Use	10	3.33 hrs.	0.33 hrs.
Dial-up	54	Fifth in Use	7	2.60 hrs.	0.37 hrs.
Houston	60	Hazeltine2000	228	178.29 hrs.	0.78 hrs.
Houston	61	Hazeltine2000	266	140.81 hrs.	0.53 hrs.
Houston	62	2741	132	150.26 hrs.	1.14 hrs.
Houston	63	2741	165	149.29 hrs.	0.90 hrs.
ISU	66	(various)	395	88.09 hrs.	0.22 hrs.
ISU	67	(various)	464	125.12 hrs.	0.27 hrs.
Houston	6A	Dial-1st in use	231	141.38 hrs.	0.61 hrs.
Houston	6B	Dial-2nd in use	183	123.92 hrs.	0.68 hrs.
Houston	6C	Dial-3rd in use	153	90.35 hrs.	0.59 hrs.
Houston	6D	Dial-4th in use	77	36.84 hrs.	0.48 hrs.

BATCH MACHINE INFO

Batch Machine	Time Limit	Time Machine Operates	Charges Priority Service
BATQUICK	1 CPU Mins.	24 hours	Yes
BATSHORT	15 CPU Mins.	24 hours	Yes
BATMED	45 CPU Mins.	24 hours	Yes
BATONITE	30 CPU Mins.	Midnight-8AM*	No
BATLONG	500 CPU Mins.	Midnight-8AM*	No
BATJSC **	150 CPU Mins.	Midnight-8AM*	No
BTREF	600 CPU Mins.	Midnight-8AM*	No
BATEOD **	240 CPU Mins.	24 hours	Yes

* These batch machines will normally be brought up between the hours of midnight to 8 A.M. If anytime after 6 P.M. daily the computer operator on duty feels the system is slow, they will be brought up then.

** These are CMS370 batch machines.

CPU Rate = $250.00 per hour
Priority Service Rate = $80.00 per hour

Interlab Info

WELCOME BACK TO JIM RUSSELL

Russell, who is an Associate Professor of Education, will be at LARS 25% this semester working on the minicourse project.

NEW PERSONNEL WELCOMED

In this issue of SCANLINES, Flex II introduces our Southern Belle, SHIRLEY MAPLES CAMPBELL. Shirley joined LARS on August 9 as Secretary to the Computer Facility Managers, filling the vacancy created when Dianna Jennings joined Schurman-Lange Moving Co. Shirley came to Purdue from Knoxville, Tennessee and is rapidly teaching all to speak Southern-ese. Her extension is 262.

Clerical changes in Flex I include GEORGIANN JOHNSON, new secretary to the Crop Inventory Research area, replacing Lisa Afanador who moved to Ohio. The new receptionist/operator is NANCY KLINE, and Data Processing and Analysis welcomes back JULIE HANOVER who replaced Bonnie Misner.

GREG WALBURG joined LARS and the Agronomy team as a graduate research assistant. He will be working with CRAIG DAUGHTRY and MARVIN BAUER.

JIM TILTON is a new graduate student in EE who joins the Data Analysis Research area from the University of Arizona. Tilton has prior background in remote sensing, and will be working on his Ph.D. in EE.

New personnel in the Computer Facility include LINDA SEARS, who recently began work as the full time Computer Operator on the midnight to 8 AM shift.

The following students have joined the Operations group this semester: DON KING, CINDY MURPHY, MIKE HOLMES, MIKE DISCAVAGE, M TULLY, FATHALLAH SANII, and JUDITH DIERCKMAN.

FOUR OPERATIONS PERSONNEL DEPART

Joanne Rayburn, who has been working as the full time Computer Operator on days, has transferred to a secretarial position with the Geosciences Department on campus.

Student Operators Jim Richardson, Nadine Stirm and Scot Aurenz have also left LARS. Jim graduated in May 1978 and left Operations in August to work on an advanced degree in Chemistry at Iowa State University. Nadine has accepted a position with the Physicians Clinical Laboratory in Lafayette as a medical technician while still continuing her education at Purdue. Scott has accepted a co-op position with DIGITAL in Lawrence, Massachusetts.

SCAN LINES

LARS · Purdue University · Vol. 4 · No. 3 · November 13, 1978

REMOTE SENSING TO BE USED IN INVENTORY

The resource planning group of the U.S. Forest Service is currently working on developing a procedure to implement the Resources Planning Act (RPA) passed by Congress.

ROGER HOFFER reported on some aspects of the RPA after returning from sabbatical with the U.S. Forest Service at Colorado State University.

The RPA requires that the U.S. Forest Service inventory all forest and rangeland resources (including private, corporate, and government lands of about 1.6 billion acres) every ten years. The resource planning group is working on developing an Integrated Inventory System which will coordinate information on various parts of the resource base, such as wildlife habitats, recreational facilities, watershed and soil characteristics, as well as timber resources. This information will then be used in long range planning activities.

The feasibility of using satellite imagery has been studied, and it was determined that Landsat data would be used as the beginning step in a multi-stage sampline scheme.

Specifics of the Integrated Inventory System are only beginning to be worked out. A detailed procedure for field crews is being developed. Questions about the ultimate accuracy (probably to the county level) and format of the inventory information (complete map vs. sample base) are being considered.

Time estimates call for various stages of the RPA implementation to be accomplished in the 1980's. Finally the Forest Service will then be able to give an assessment of and recommendation for the best usage of the United States forest and rangeland resources.

Similar legislation has been enacted for the Soil Conservation Service (SCS) and the Bureau of Land Management (BLM).

Prepared by the Laboratory for Applications of Remote Sensing for distribution at Purdue. Contact Susan Ferringer, SCAN LINES editor, to be placed on the mailing list (749-2052, ext. 290).

LACIE SYMPOSIUM HELD

The Large Area Crop Inventory Experiment (LACIE) was initiated in 1974 as a "proof of concept" experiment in the application of satellite remote sensing and global meteorological data. The goal was to develop an experimental system, test it for a single important commodity - wheat - and establish the technical and cost feasibility of global agricultural monitoring systems.

To assess the present status of and to disseminate the knowledge gained from this experiment, a LACIE Symposium was held at the Johnson Space Center, Houston, Texas, on October 23-26, 1978.

The program was divided into eight sessions:

- Plenary - Introduction and Project Overview
- Experiment Design
- Applications and Evaluation Systems Implementation and Operations
- Data Processing Systems Design for Applications Research
- Experiment Results and Accuracy
- Supporting Research and Technology
- USDA Applications Test System
- LACIE Evaluation and Outlook

MARVIN BAUER presented a paper entitled: "Design, Implementation, and Results of LACIE Field Research". The paper was co-authored by M. C. McEwen (NASA), W. A. Malila (ERIM), and J. C. Harlan (Texas A&M University).

Other LARS staff members attending the Symposium were: DAVE LANDGREBE, TERRY PHILLIPS, CRAIG DAUGHTRY, MARILYN HIXSON, NANCY FUHS, JIM KAST, CAROL DEBRANGES, LARRY BIEHL, LUKE KRAEMER, and from Ag Econ, Don Paarlberg. There were also a number of former LARS staff members there, including: Ralph Shay, Roger Homes, Lu Eisgruber, and Chris Johannsen.

SHORT COURSE HELD AT NASA/JSC

On October 27, LARRY BIEHL, MARILYN HIXSON, NANCY FUHS, and MARVIN BAUER presented a one-day short course to researchers at NASA/JSC. The course introduced them to software systems for analysis of the LACIE Field Measurements data available via their terminals to the LARS' computer.

MINICOURSE SALES

Over 1800 minicourses on The Fundamentals of Remote Sensing have been sold since they became available in August 1976. Of these approximately 35% have gone to foreign countries and the remaining 65% to these United States groups: educational institutions (31%), governmental agencies (21%), and business and industry (13%).

ADVANCED SHORT COURSE

The dates for the third short course on Advanced Topics in the Analysis of Remote Sensing Data have been set for May 14-18, 1979.

As in previous years, the course treats advanced techniques in the numerical analysis of remote sensing data (e.g., multitemporal; context and texture; data transformations) and is intended for individuals who have already acquired knowledge of and experience with the fundamentals of quantitative remote sensing.

The course teaching staff consists of PHIL SWAIN, DAVE LANDGREBE, CLARE MCGILLEM, MARVIN BAUER, ROGER HOFFER, JOHN LINDENLAUB, and MARILYN HIXSON; SHIRLEY DAVIS is the coordinator/consultant for technology transfer.

The complete brochure and registration will be available in December. Questions about course content and prerequisites should be directed to PHIL SWAIN, the course chairman.

NEWS FROM THE SPSS USERS CONFERENCE

Every statistical algorithm used in the IBM version of SPSS, Release 8, has now been documented. (JEANNE ETHERIDGE and CAROL DEBRANGES have copies of this document).

The IBM OS version of Release 8 should be distributed in November. However, it is not known how soon the conversion to CMS will be made.

Changes in Release 8 include:

1. A new report generator procedure has been written, with provisions for heading, footnotes, subtotals, and labelling options.
2. DISCRIMINANT has been totally rewritten.
3. A SURVIVAL procedure has been added.
4. SORT CASES may be done anywhere in the job instead of just at the end. Further procedures may be done using the newly sorted data file.

SPSS, Inc. is working hard on a general linear model MANOVA procedure. It will contain everything that is currently in the CDC version of MANOVA, plus more. However, it will not be ready in time for Release 8.

Future plans, short term and long term, were described at the conference. There was energetic debate as to how SPSS should set its priorities for future development. Should it focus on providing elaborate statistical routines for the sophisticated user, or should it provide more general ~bilities for the naive user? Should it .evelop complex file handling abilities, or leave that for Data Base Management Systems? (There are current DBMS's that are capable of creating SPSS system files. However, they are expensive to purchase). Should SPSS use its limited programming resources to provide warning messages when it appears that statistical assumptions are being violated?

CAROL DEBRANGES reports that overall the conference was well organized with many good speakers and lively discussion. If anyone is interested in further details, please see her.

LARS TRAVELOG

JOHN PETERSON travelled to St. Louis, Missouri, October 26, to give a speech on remote sensing to the Agricultural Chemical Branch of the American Marketing Association.

DAVE LANDGREBE spoke on "Image Processing for Remote Sensing" at the monthly meeting f the IEEE Computer Society, Central Indiana Chapter, held September 26. Dr. Landgrebe's presentation provided an overview of the conception, development, evaluation, and documentation of a classifier for earth observational satellite image data which utilized the spectral/spatial characteristics of this data.

ASP MEETINGS

Three LARS staff members attended the American Society of Photogrammetry meetings held October 16-20, in Albuquerque, New Mexico. DOUG MORRISON spent his time promoting the Short Course, Minicourse Series, and Visiting Scientist programs, aided by DAVE FREEMAN when he was not attending the various sessions.

ROGER HOFFER participated in a panel group on "Experiences in Teaching Remote Sensing in Natural Resources" which discussed the needs and problems of current teaching programs. Dr. Hoffer also presented a paper entitled: "A Comparison of Landsat and Forest Survey Estimates of Forest Cover" co-authored by DICK MROCZYNSKI and STEVE NOYER.

The keynote address of the meetings was given by Sen. Harrison Schmidt, back-up pilot on Apollo 15 and pilot of the Lunar Landing Module on Apollo 17. Schmidt gave a presentation on a bill he authored in which he proposed to establish a commercial corporation, ERIESAT, to be an operational data collection and dissemination system. Request for copies of this bill and/or any feedback can be addressed to Sen. Schmidt.

VISITING SCIENTIST PROGRAMS

Two Spanish visiting scientists began a six-month training program at LARS in late October. Ing. Ramon Bermudez, Instituto Geografico Nacional, is an electrical engineer interested mainly in digital image processors and field measurement instrumentation and data gathering techniques. Ing. Juan Gonzalez, Instituto Nacional de Investigaciones Agrarias, is interested in remote sensing data analysis as applied to agriculture.

Two other visiting scientists will begin their training with the November Short Course. Tsuyoshi Akiyama, National Grassland Research Institute, Japan, will be at LARS for nine months studying remote sensing as related to crops. N. V. Madhavan Unni, National Remote Sensing Agency, India, will be at LARS for two months. He is interested in Forestry.

SHORT COURSE PARTICIPANTS FOR OCTOBER AND NOVEMBER (*INDICATES HANDS-ON)

Gylan C. Allen*
Department of Energy
Las Vega, Nevada

Dale Baer* (forest inventory)
PNW Forest & Range Experiment Station
Portland, Oregon

Ray McKinney*
NASA/JSC
Houston, Texas

N. N. Shinde (forestry)
Hindustan Paper Corporation, Ltd.
New Delhi, India

Ir. O. Soekotjo Tjokrosoewarno* (land use)
Jl. Letjen. S. Parman
Jakarta, Indonesia

Tsuyoshi Akiyama* (crops)
National Grassland Research Institute
Nishinasuno, Tochigi, Japan

Ramon Bermudez* (digital image processing)
Instituto Geografico Nacional
Madrid, Spain

Dennis Enberg* (geography)
Department of Geography
North Carolina Central University
Durham, North Carolina

Juan Gonzalez* (forestry)
Institution Nacional de Investigaciones Agrarias
Madrid, Spain

Clyde Henry* (geography)
University of Southern California
Los Angeles, California

John W. McDonald* (geography)
University of Southern California
Los Angeles, California

N. V. Madhavan Unni* (forestry)
National Remote Sensing Agency
Hyderabad, India

Doug Finn (thermal infrared interpretation)
Technitrol Canada, Inc.
Dorval, Quebec, Canada

VISITORS

Richard Weinstein from the Technology Transfer Division of NASA Headquarters visited LARS on November 1, to discuss NASA's Regional Applications Program and to explore areas of possible cooperation with LARS' Technology Transfer.

Drs. Ray Jackson, USDA/SEA; Glen Boatwright, USDA/SEA; Michael McEwen, NASA/JSC; Blaine Blad, University of Nebraska; and William Malila, ERIM; were at LARS on October 11, to review the specifications of the multiband radiometer and data recording/handling system for field research. This system is currently being designed at LARS.

Dr. Gerard Guyot, National Institute of Agronomic Research, France, visited LARS on September 9-10, to discuss field research on the spectral characteristics of crops and soils being conducted by his laboratory and LARS.

Professors I. Camargo, B. Fernandes, C. Batista, J. Fliho, M. Loureiro, and J. Sadlietti, Federal University of Viscosa, Brazil, visited LARS on September 25. SHIRLEY DAVIS and JIM RUSSELL hosted their visit in which they saw the Fundamentals of Remote Sensing minicourses and discussed the usefulness of this medium in a variety of learning situations. They also discussed methods for development of similar materials.

Twenty-one members of Purdue's Geoscience Society visited LARS on October 24. SHIRLEY DAVIS introduced them to remote sensing for use in geosciences and to LARS' work in that area.

NEW LARS TECHNICAL REPORTS

110477 Analysis of the Effects of Interpolation and Enhancement of Landsat-1 Data on Classification Accuracy by N. Chu, C. McGillem and P. Anuta

The effect of resolution and enhancement on Landsat classification is investigated. Crop classification in northern Illinois and water body classification in Indiana are used as examples. Results are mixed for crop classification but show improvement in lake area estimation.

The work reported in this paper was sponsored by NASA under Contract No. NAS9-14970.

SYSTEM SERVICES 111378

APPLICATIONS NEWS FROM BILL SHELLEY

GDATA on LARSYSDV may now generate gray scale plots without line and column labels, since this is occasionally desirous when using large patterns. To do this, include a PRINT NONUMBERS card in your control card deck.

GRESULTS is now also capable of generating plots without line and column lables. Also, the users of GLPRESULTS should be happy to know the acreage calculations are now available in GRESULTS.

TAPDMP under TAPUTL on LARSYSDV now contains the additional capability of being able to dump the specified records in both hexadecimal and character format by using the BOTH function.

Some updated and new REFERENCE files have been included on LARSYSDV. These are the GDATA, GRESULTS, TAPUTL, DUPLICATERUN, PHOTO, FINDFRAME, and BROWSE REFERENCE files. To get a copy of these and the other REFERENCE files on LARSYSDV, type REFERENCE LARSYSDV while under LARSYSDV, or you may REFERENCE an individual file of interest.

REMOTE HIGHLIGHTS FROM SUSAN SCHWINGENDORF

BATEOD TIME LIMIT

In the last issue of SCANLINES (September 18) the time limit on the CMS370 batch machine, BATEOD, was incorrectly given. Please note that the time limit is currently set at 60 CPU minutes.

CARD PUNCH UNITS REMOVED

Our "remote" sites at Flexlab I and Flexlab II were recently relieved of their Data 100 card punches. Since RSCS will purge any punch file to a non-existing unit, LARSYS users at these locations will need to use the PUNCH COMPUTER command (in LARSYS) to punch cards in the computer room. Cards are delivered to Flexlab I users on the next mail run (if they have a proper name on them). Until WHERE EXEC is modified, CMS fans who normally issue a WHERE command to get default print and punch locations can try one of the following CP commands to punch cards in the computer room:

```
SPOOL D OFF
SPOOL PUNCH OFF
REMOTE D OFF
```

BATCH PUNCH LOCATIONS

Users expecting punched output from a batch job should be sure to specify the proper location on the BATCH OUTPUT card. If only a location for printer output is given, punched output will default to the same location.

LOCAL TERMINALS

LUKE KRAEMER has recently been put in charge of local terminals. The unreliable Superterm terminals were removed to the computer room for return to the company, and Luke has ordered a Decwriter terminal for Flexlab I, scheduled to arrive within 6 weeks. If you have comments or suggestions about the locations, reliability, availability, etc. of the local typewriter terminals, talk to Luke or send him a short note.

FILEDEF

A rumor exists at JSC that people are experiencing difficulties with CMS370 when they issue FILEDEFs for units 3, 8, 9 and 10. JEANNE ETHERIDGE would like to have anyone with an example contact her so that she can resolve this issue.

DATA REFORMATTING NEWS FROM CHUCK SMITH

TABLE DIGITIZER SCHEDULING

We have a new menu but a lonely table! The project work which was creating a scheduling bottleneck with the PDP 11/34 has subsided. The table digitizer is again free for use at almost any time. Digitizing software improvements include a new control menu which is easier to use than previous menus. To reserve a time to use the table digitizer, call

CHUCK SMITH (222), DAVE FREEMAN (261) or STEVE SOMMERS (223).

NEW VARIAN PAPER

Varian plots are now being produced on a new type of electrostatic paper, and we need your opinion! Please let us know what you think of the new paper, pro or con. We would also welcome comments on other plotter-related software ideas or problems observed with existing software.

MEAD PROCESSING

Mead photo processing software has been improved to include a color key below the image and above the legend. It is no longer necessary to rely upon a word description of each color since a sample of each color used is placed below the image. A maximum of 32 colors is possible, but 7 or 8 colors in one image usually produces the most attractive picture. Our latest experience shows turnaround time is 30 days or less. A color chart for Mead photos is available from the reformatting staff.

SEFEL PROCESSING

SEFEL photo processing has made a comeback due to a request from PY for a 12-level false color photo of Jasper County, Indiana. If you would like to have a SEFEL print created from your data, or would like to see an example of SEFEL photo processing, please see DAVE FREEMAN.

SCHEDULE YOUR DATA REFORMATTING NOW

The data reformatting schedule is rapidly filling up for this fall, and we would like to request that project managers begin to consider what data reformatting requirements their projects will need during the remaining fiscal year. DAVE FREEMAN will be contacting all project managers during the next two weeks to inquire about anticipated reformatting needs.

PERSONNEL

MARY ELLEN PIERSON joined the Computer Operations Group on October 1 as the Full-Time Computer Operator on the 8 am to 5 pm shift.

JIM MCDERMOTT recently joined the Operations Group as a Student Computer Operator and will have the responsibility of running plots on two midnight to 8 am shifts during the week.

SYSTEM DIRECTORY SCHEDULE

Due to the increased requests for directory changes, Tuesdays and Fridays have been chosen as the only two days in which modifications will be made to the System Directory. All directory requests should be sent to MIKE COLLINS.

POLAROID FILM MAGAZINES

Anyone knowing the whereabouts of two magazines used for Polaroid film on the digital display should contact MIKE COLLINS at Flexlab II. The magazines need to be accounted for and therefore should not be taken from the digital display area.

ORDER OF SEARCH (CMS370)

Recently a question was posed concerning the search order used to locate text files. For all the rest of you pondering this question, the answer can be found on page 128 of the "IBM VM/370: CMS Command and Macro Reference." Basically, the loader looks for specified TEXT files on accessed disks (the standard search order is A through G, S, Y, Z), repeats this same search for files corresponding to unresolved references (unless the NOAUTO option is specified), and finally searches active text libraries (specified by a GLOBAL command) in the order that the libraries were specified.

But maybe you were wondering what CMS looks for when you issue a command! Then look to page 16 of the "IBM VM/370: CMS Command and Macro Reference." When you enter a command name at the terminal, CMS begins searching for a "command" of that name, in the following order:

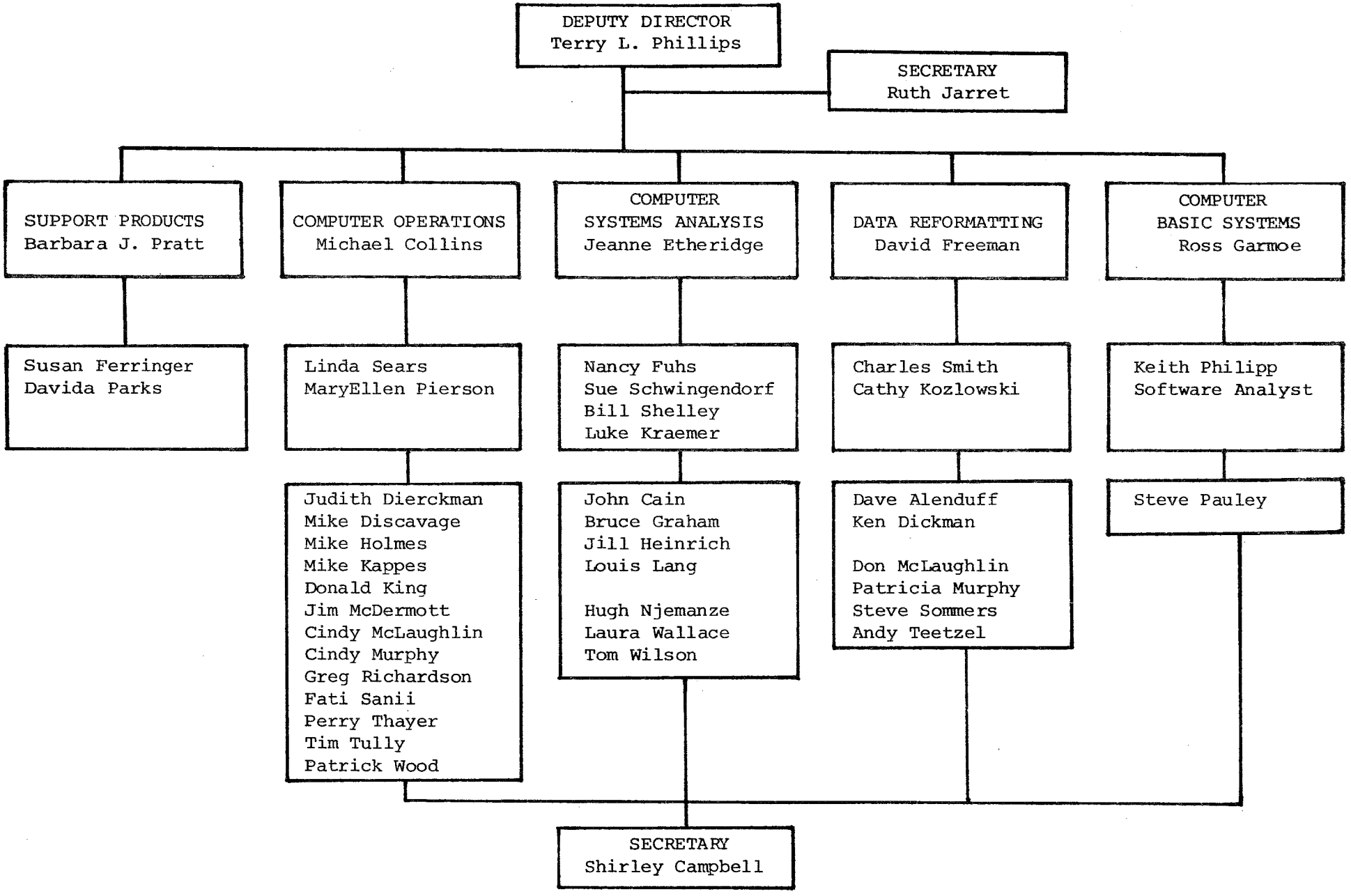
1. An EXEC file with the given name, using the standard search order for accessed disks (A through G,S,Y,S).
2. Regular CMS commands
3. A MODULE file with the given name on a currently accessed disk (standard order of search).

See the manual to find out where command abbreviations fit into this sequence. Note that since EXEC files are located first, it is permissible (and even recommended) that your EXEC file have the same name as the main program it executes.

CONTROLLING SEARCH ORDER

When there are files and/or commands with duplicate names, the order of search can be controlled with the ACCESS and RELEASE commands. The simplest way is to just release those disks containing files you don't want used. Or, access the disk with the file you do want, using a disk mode that will be searched before others. The standard order of search for disks is alphabetical-A through G, S, Y and Z. This standard order of search can be altered by making a disk a read-only extension of another disk. It is even possible to limit the search on read-only extensions to specific files or groups of files. (A description of the ACCESS command begins on page 26 of the "IBM VM/370: Command and Macro Reference").

SYSTEM SERVICES ORGANIZATIONAL CHART



SUMMARY OF 370/148 COMPUTER USAGE FOR SEPTEMBER, 1978

Overall Usage -

Basic Rate CPU Time Used	21.88	12%
Priority Rate CPU Time Used	166.98	88%
Total CPU Time Used	188.86	100%
Terminal Sessions	39.92	86%
Batch Jobs	633	14%

Usage by Time of Day -

Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	21.90	14
Mon-Fri 8AM-4PM	90.18	57
Mon-Fri 4PM-Midnite	52.27	31
Weekend	24.50	19

Batch Job Usage -

Batch Machine	Jobs Run	Avg. Clock Time	Avg.CPU Time
BATQUICK	92	0.41 min	0.05 min
BATSHORT	200	10.89 min	1.10 min
BATMED	114	18.80 min	1.58 min
BATONITE	12	76.92 min	2.51 min
BATLONG	17	33.02 min	7.25 min
TAPTRAN	24	6.32 min	0.95 min
BATEOD	62	22.13 min	5.85 min
BATJSC	93	20.15 min	8.23 min

Keyboard Terminals -

Location	Port	Terminal	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	150	132.76 hrs.	0.84 hrs.
Flexlab2	31	INFOTON GTX	191	134.44 hrs.	0.70 hrs.
Flexlab2	32	INFOTON GTX	228	142.30 hrs.	0.62 hrs.
Flexlab2	33	INFOTON GTX	319	215.82 hrs.	0.68 hrs.
Flexlab2	34	INFOTON GTX	200	167.66 hrs.	0.84 hrs.
Flexlab2	35	INFOTON GTX	220	203.98 hrs.	0.93 hrs.
Flexlab2	36	INFOTON GTX	235	235.38 hrs.	1.00 hrs.
Comp.Room	37	DECwriter	192	75.37 hrs.	0.39 hrs.
Flexlabl	40	INFOTON GTX	152	161.79 hrs.	1.06 hrs.
Flexlabl	41	INFOTON GTX	211	192.35 hrs.	0.91 hrs.
Flexlabl	42	INFOTON GTX	165	165.65	1.00 hrs.
Flexlabl	43	SUPERTERM	148	70.16 hrs.	0.47 hrs.
Dial-up	50	First in Use	81	64.82 hrs.	0.80 hrs.
Dial-up	51	Second in Use	37	22.54 hrs.	0.61 hrs.
Dial-up	52	Third in Use	6	2.23 hrs.	0.37 hrs.
Dial-up	53	Fourth in Use	1	1.70 hrs.	1.70 hrs.
Dial-up	54	Fifth in Use	7	2.51 hrs.	0.36 hrs.
Houston	60	Hazeltine2000	187	128.28 hrs.	0.69 hrs.
Houston	61	Hazeltine2000	258	104.36 hrs.	0.40 hrs.
Houston	62	2741	78	131.25 hrs.	1.68 hrs.
Houston	63	2741	132	112.55 hrs.	0.85 hrs.
ISU	66	(various)	125	44.90 hrs.	0.36 hrs.
ISU	67	(various)	156	72.50 hrs.	0.46 hrs.
Houston	6A	Dial-1st in use	234	152.36 hrs.	0.65 hrs.
Houston	6B	Dial-2nd in use	203	109.37 hrs.	0.54 hrs.
Houston	6C	Dial-3rd in use	121	85.31 hrs.	0.65 hrs.
Houston	6D	Dial-4th in use	94	52.18 hrs.	0.56 hrs.

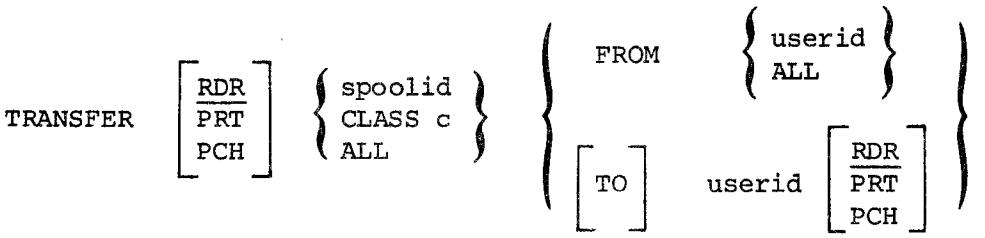
SYSTEM SERVICES 113077 REPRINT

ENHANCED TRANSFER COMMAND

We have installed a new version of the TRANSFER command that is completely compatible with the original IBM command, but that has two new operational operands added to it. These allow a user to specify which queue (PRT or PUN or RDR) is to be searched for the specified file(s), and also which queue (PRT or PUN or RDR) the files are to be transferred to. Both operands can be omitted, in which case they default to RDR, making the command identical to the original IBM command. Only the following combinations are valid:

1) 'RDR' type files may be transferred to a RDR queue
2) 'PRT' and 'CON' type files may be transferred to a RDR or PRT queue
3) 'PUN' type files may be transferred to a RDR or PUN queue

The enhanced format of the TRANSFER command is as follows:



Example 1: You have a printer file that has been sent to RSCS to be printed on the FLEXLAB2 Data 100. You want to retrieve it, and have it printed instead on the computer printer

```
TRANSFER 1749 FROM RSCS
TRANSFER RDR 1749 TO SP2 PRT
```

The file will now be printed at the computer site. (In this and the following examples, if your own ID isn't SP2, then use your own ID instead of SP2 in the command).

Example 2: You may have XFERED a printer file into your own card reader, then changed your mind and decided you wanted to print it after all.

```
QUERY READER  (to find spoolid of PRT type file)
TRANSFER RDR 1738 TO SP2 PRT
```

The file will now be printed at the computer site.

Example 3: Same as above, but you want to print it at the FLEXLAB1 Data 100:

```
QUERY READER   (to find spoolid of the PRT type file)
TAG FILE 1743 FLEXLAB1
TRANSFER RDR 1743 TO RSCS
```

Example 4: You have created a printer file that is set to be printed in the computer room. You want to retrieve it and send it to be printed on the FLEXLAB2 Data 100.

```
QUERY PRINTER  (to find spoolid of PRT file)
TRANSFER PRT 1827 TO SP2 RDR
TAG FILE 1827 FLEXLAB2
TRANSFER RDR 1827 TO RSCS
```

CMS370 INFORMATION

The following information may be helpful for persons interested in trying out some of the features of CMS370. It supplements the information found in the IBM Documentation (see August SCANLINES, pg. 14-15).

a. The CMS370 S-disk is at address 290. If it is not already attached to your virtual machine, you can link to it using the command:

```
LINK LARSLIB 290 290 RR
```

You can have a permanent directory entry made so that you will always have it when you log in--see MIKE COLLINS. After you have a 290 disk attached, you can IPL CMS370.

b. If you have a PROFILE EXEC on your 191 disk, it probably contains CMS360 EXEC commands that are not compatible with CMS370. This problem can be solved by structuring your EXEC as in this example:

```
&COMMENT FOLLOWING CODE IS VALID FOR EITHER
&COMMENT CMS360 or CMS370
    CP SET EMSG ON
    CP REMOTE 9 TO XXXXXXXX
    .
    .
    .
&COMMENT NOW WE MUST BRANCH, DEPENDING ON WHICH
&COMMENT VERSION OF CMS
    &IF X&DISKS EQ XCMS &GOTO  -CMS370
-CMS360 &TYPEOUT OFF
    EXEC WHERE
    LOGIN XXX X
    &EXIT
-CMS370 &CONTROL OFF
    ACCESS XXX X
    GLOBAL MACLIB CMSLIB
    FLOBAL TXTLIB FORTRAN CMSLIB
    FILEDEF 5 READER
    FILEDEF 6 PRINTER (RECFM FA)
    FILEDEF 7 PUNCH
       :
       :
&COMMENT FOLLOWING DEFINES : AS TAB CHARACTER FOR
&COMMENT EDITOR
    SET INPUT : 05
    &EXIT
```

Note that RECFM FA is needed for carriage control characters to be interpreted.

c. We have installed the same Fortran G compiler on CMS370 that we had installed on CMS360. You can invoke it the same way, namely FORTRAN filename. If you type FORTRAN ? you can get a list of options available.

d. To execute Fortran programs you need to issue FILEDEF's for all I/O units used by the program - including units 5, 6, 7, 15 and 16. If you do not issue a FILEDEF for any unit, it defaults to disk. You may want to include suitable default FILEDEF's in your PROFILE EXEC. Also, unlike CMS360, FILEDEF's are not cleared after execution of a Fortran program.

e. Unlike CMS360, there are no default GLOBAL's. This means that you must issue the command GLOBAL TXTLIB FORTRAN CMSLIB before you can execute a Fortran program. You may want to include that GLOBAL in your PROFILE EXEC also.

f. Text decks that have been compiled under one version of CMS can be used under the other version of CMS. However, MODULE's and TXTLIB's are not compatible.

g. The programs TAPMOUNT, GETDISK and BACKUP are presently available under CMS370, and work the same as their CMS360 counterparts. (However, the heading of listings produced by BACKUP is not as complete as it is for the CMS360 version).

h. We have installed an enhanced version of LISTFILE that was written at the University of Maine and obtained through SHARE (an IBM computer user's organization). This version of LISTFILE can do everything that the standard IBM version can do, and in addition, it has numerous additional options to provide expanded capabilities:

   File Sorting. Default sort is by filetype, filename. Other sorts include creation data, time and block/record counts (filesize). The sort can be ascending or descending order.

   Creation date selection allows specification of a file created within a range of dates. BEFORE, AFTER, FROM and THROUGH options may be specified alone or together.

   PREFIX/SUFFIX options allow users control of the number of &1 &2 EXEC-type tokens to either precede or follow output if creating file CMS EXEC.

   Most uses of asterisks in file specifications are now allowed, e.g., *001, or ABC*, or A*01.

   You can obtain full information on the expanded LISTFILE command by using the CMS370 command PRINT LISTFILE DOCUMENT S or TYPE LISTFILE DOCUMENT S.

i. The CMS370 editor has no TABDEF command. You can use the SET INPUT command (in CMS environment, not EDIT environment) to define a logical tab character as follows:

   SET INPUT $ 06

   (This defines $ to be the logical tab character).

j. If you expect to do any conversion of CMS360 programs or EXEC files into CMS370, you should request a copy of a 16-page information sheet entitled "Appendix E: Compatibility of CM/370 with CP-67/CMS". The sheets are available from ROSS GARMOE, and are worth their weight in gold.

To get started:

CMS360 Command	CMS370 Command
alter	rename
combine	copyfile
login	access
offline print	print
offline read	readcard
printf	type
stat p	query disk a
stat ?	query search

RSCS COMMANDS FOR DATA 100 AND 2780 USERS

A user at a Data 100 or 2780 terminal site can make use of a number of commands that can be read into the card reader. In most cases, these commands will produce printed output (or at least a confirmation message) on the line printer. These commands can be read in at any time. The printer output will be produced (nearly) immediately unless a file is currently being printed, in which case it will wait until the current file finishes.

Note that all of these RSCS commands must be input from the card reader. They cannot be input to a keyboard terminal you are logged in at.

It should not be necessary to point out that some of the capabilities described below should only be exercised using good judgment, paying full attention to the interests of the other users at your terminal site. For example, good sense dictates that you not purge or change characteristics of files belonging to other users. "Do unto others as you would have them do unto you."

Situation	Command Card
You want to terminate printing or punching the file that is currently coming out. Note: Leave out the ALL if you want to terminal only the current copy of a multiple-copy file. Note: FLUSH only works for the file currently active. Use PURGE to get rid of a file that hasn't started to come out yet.	FLUSH * ALL
You want to terminate printing or punching the current file, but want to save the file so it can later be started over. Note: Later, when you want to restart the file, use the CHANGE spoolid NOHOLD command.	FLUSH * ALL HOLD
You want to backspace the current printer (or punch) file nnn pages (or cards).	BACKSPAC nnnn
You want to backspace back to the beginning of the current printer (or punch) file.	BACKSPAC FILE
You want to skip forward in the current printer (or punch) file by nnn pages (or cards).	FWDSPACE nnn

Situation	Command Card
You want to send a message to the computer operator Note: To send a message to any logged-in user's terminal, replace CP with the user's ID.	MSG COMPUTER CP message-text
You want to send a message to be printed on the printer of a Data 100 or 2780 terminal (for example at Houston).	MESSAGE HOUSTON message-text
You want to obtain a listing of all the files in the queue to be printed or punched at your Data 100 or 2780 terminal (for example at Flexlab1) Note: See item about RSCS modifications (a few pages back) for a description of the information listed for each file. Note: The active file (if any) is listed at the bottom, while the rest of the list is in the order in which the files will be produced, with the first one being listed at the top.	QUERY FLEXLAB1 QUEUE
You want to change one or more of the attributes of a file listed by the QUERY XXXXXX QUEUE command. Note: The "spoolid" is listed for the file on the output from the QUERY command. Note: More than one item can be included on the same command card. Note: Priority 99 is the system default and is lowest priority. Highest priority is 0. Note. If a file was in HOLD status when created and sent to RSCS, this is the only way it can be unheld.	CHANGE spoolid COPY nn CHANGE spoolid CLASS c CHANGE spoolid PRIORITY nn CHANGE spoolid HOLD CHANGE spoolid NOHOLD
You want to change the order in which files will be printed (or punched). Note: The "spoolids" are listed on the output from the QUERY command. Note: The files you mention will be moved to the top of the queue so they will come out first, in order.	ORDER spoolid1 spoolid2 spoolid3
You want to get rid of a file before it is printed or punched. Note: PURGE only works for files that are not active. If the file is listed as active, you use the FLUSH command to get rid of it. Note: You can list more than one file on the same PURGE command.	PURGE spoolid

INTERLAB NOTES

ITEMS OF INTEREST

The LARS/WBAA radio broadcast was aired on October 9 at 7:30 pm. It was then fed to the NPR network on October 17. Seventy-five of the 210 NPR stations carried the program. 1/3 of them doing so live. A tape is in the Directors' Office for check out with MARLENE HODGE.

The Annual Report to the University has been completed and is now being distributed to the Purdue University administration.

PERSONNEL

RICK LATTY is a new graduate student in Forestry and Natural Resources working under ROGER HOFFER on the Colorado Forest Topography Study. Rick began in September and will be working 25% at LARS.