SCAN LINES

LARS · Purdue University · Vol. 6 · No. 1 · January 9, 1980

SYSTEM SERVICES: A SUCCESSFUL YEAR IN REVIEW

LARS System Services was formed in 1975 to provide unique products and services needed by the research community. Several accomplishments during 1979 will enable them to provide better support for the work carried out by Purdue's Laboratory for Applications of Remote Sensing.

Many remote sensing research activities require specialized computer capabilities. Chief among the 1979 System Services accomplishments was a change in the computer systems. In September 1979, the IBM Model 148 was replaced by an IBM 3031. The 3031 increases the cost of computer services only about 10%, while providing roughly three times the computational capacity. Installation of the 3031 was made necessary and possible by heavy, sustained use of the LARS computer facility by researchers at Johnson Space Center (JSC), LARS and other remote sites. The sharing of a computational environment with JSC has improved communication between LARS and its chief sponsor, as well as providing many cost savings and software technique exchange opportunities.

The installation of the 3031 was accomplished with minimal effect on users of the LARS system. No software conversion was required and users were without access to the system for only a three-day weekend. As a result of usage increase to the saturation point on the 370/148, and then the additional usage increase once the 3031 was installed, the effective charge for computer time in December of 1979 is 57% of the charge of a year ago. In addition a 16% reduction in computer rates is planned for January, 1980.

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).

Another major accomplishment of 1979 was the establishment of a mechanism allowing LARS to acquire capital equipment. The deans of engineering and agriculture have provided LARS with seed money to purchase capital equipment. After the equipment is installed the money will be repaid through a rate charge for use of the hardware. When the fund is built back up, more hardware may be acquired. The first equipment to be acquired through this mechanism is a color digital display system. The ability to procure capital equipment will make work at LARS both more effective and less expensive in the future.

Several new services were added to the System Services product line and other services were expanded during 1979. LARS Multispectral Data Analysis System (LARSYS), the Statistical Package for the Social Sciences (SPSS), the Statistical Analysis System (SAS), and the LARS Spectroradiometer Analysis System (LARSPEC) were established as products under the new product category "Software Products". Disk space available for user storage increased threefold during 1979. The Support Products group at LARS expanded its capabilities by acquiring a typesetter.

Finally, two new remote terminal sites were added to the network: St. Regis Paper Company and Alabama A&M University. In addition, the Environmental Research Institute of Michigan (ERIM) has been provided access to the LARS system through dial-up equipment.

System Services wishes everyone another productive year of research and utilization of remote sensing technology in 1980.

LARS TRAVEL LOG

H.J. SIEGEL travelled to Rochester, New York, to give two seminar presentations on "PASM: A Partitionable Multimicrocomputer System for Image Processing and Pattern Recognition." Siegel spoke to the University of Rochester on November 12, and to Xerox Webster Research Center on November 13.

PAUL ANUTA reviewed plans for the implementation of a registration capability for all AgRISTRARS segments with personnel at Johnson Space Center, Houston, Texas, on November 15-16.

Several LARS staff members were at NASA/JSC, Houston, Texas, to present the monthly introductory short course "Numerical Analysis of Remotely Sensed Data" on November 25-December 1. Fifteen people participated in the course; eight also elected the hands-on computer option. DOUG MORRISON, Ron Boyd, and LUIS BARTOLUCCI were instructors for the basic course material, which was supplemented by seminars from PHIL SWAIN and ROGER HOFFER. BUD GOODRICK, DONNA SCHOLZ, LUIS BARTOLUCCI, and Ron Boyd taught the hands-on computer option.

BARRETT ROBINSON met with representatives of the Barnes Engineering Company, Stamford, Connecticut, on November 29-30, to prepare a preliminary design report for the Multiband Radiometer.

The following LARS staff made presentations at the SR&T Quarterly Review held in Houston, Texas, on December 3-7.

MARILYN HIXSON	Application and evaluation of Landsat training, classification, and sampling procedures for crop identification and area estimation.
CRAIG DAUGHTRY	Spectral inputs to corn growth and yield models.
BARRETT ROBINSON	Development of a multiband radiometer for field research.
PHIL SWAIN	Multispectral data analysis research; multistage and contextual classification.
JIM KAST	Computer processing and data base support.

VERN VANDERBILT gave a seminar on results of the analysis and modeling of the reflectance properties of wheat canopies which he has been conducting. SHIRLEY DAVIS also attended the review.

UPCOMING TRAVEL

Purdue/LARS will be well represented this summer at the 14th International Congress of the International Society for Photogrammetry. PHIL SWAIN, ROGER HOFFER, and MARVIN BAUER have been invited to present papers at the Congress, to be held in Hamburg, West Germany, July 13-25, 1980.

BASIC RESEARCH

NASA's basic research planning activity is making good progress, according to PHIL SWAIN, in the pattern recognition/image analysis area. The working group in this area has tentatively scheduled workshops on Registration and Rectification (January), Digital Image Modeling (February), and Digital Image Pattern Recognition (March).

The purpose of these workshops is to help determine the nature of the basic research which will be needed in a medium-to-long-range time period to support earth observational remote sensing applications. The working group hopes to have formulated a research plan by mid-1980.

Questions about this activity may be addressed locally to PHIL SWAIN.

VISITORS

Dr. S. I. Rasool, Chief Scientist, NASA Office of Space and Terrestrial Applications, visited LARS on November 29. Presentations on Purdue/LARS history and organization, as well as recent research programs, were given by DAVID LANDGREBE, MARION BAUMGARDNER, and MARVIN BAUER. Other Purdue staff meeting with Dr. Rasool included: J. C. Hancock, Dean of Engineering, B. J. Liska, Director of the Agricultural Experiment Station, and M. W. Phillips, Head of Agronomy.

Dr. Kaew Nualchawee and a colleague, representing the Asian Institute of Technology, Thailand, visited LARS on December 19-20. The Asian Institute plans to establish a Remote Sensing Center to train 30-40 people for a period of a few months over the next several years. The Thais discussed how they might best plan the training needed to transfer remote sensing technology. They were hosted by ROGER HOFFER, LUIS BARTOLUCCI, and SHIRLEY DAVIS.

ADVANCED DEGREES AWARDED

DONNA SCHOLZ recently completed work under her major professor DON LEVANDOWSKI, to earn the degree of M.S. in Geosciences. Her masters' project is the new Purdue/LARS minicourse "Mineral Exploration Using Remote Sensing."

LISETTE ERNST recently completed work under her major professor ROGER HOFFER, to earn the degree of Ph.D. in Forestry. Her dissertation, "Digital Processing of Remotely Sensed Data for Mapping Wetland Communities," involved preliminary work with Exotech 100 data. She then performed an analysis of Landsat data with soil overlays using the layered classifier algorithm.

PETE JOBUSCH recently completed work in the School of Industrial Engineering under his major professor Jim Solberg, to earn his M.S. degree. His masters thesis is titled "Experimental Investigation of Heuristic Scheduling Strategies in a Business Data Processing Environment."

PROJECTS FUNDED

Title: Digital Image Processing Services, Sponsor: State of Washington, Principal Investigator: LUIS BARTOLUCCI, Duration: 10/12/79 to 1/15/80.

Title: Use of Spectral Data to Estimate the Relationships Between Soil Moisture Tensions and Their Corresponding Reflectances, Sponsor: Office of Water Research and Technology, Principal Investigator: JOHN PETERSON, Duration: 10/1/79 to 9/30/80.

NEW LARS TECHNICAL REPORTS

011579 Digital Processing of Landsat MSS and Topographic Data to Improve Capabilities for Computerized Mapping of Forest Cover Types by R. M. Hoffer, M. D. Fleming, L. A. Bartolucci, S. M. Davis and R. F. Nelson.

This study involved the development and evaluation of two techniques for using a digital data base of Landsat MSS and digital topographic data to increase the accuracy of mapping forest cover types. The first approach involved the development of a topographic distribution model, a quantitative description of each of the forest cover types as a function of elevation, aspect and slope, thereby providing the topographic training statistics. Spectral training statistics were developed using two different procedures and the combined spectral/topographic data set was then classified using several methods. The use of topographic data in combination with the spectral data significantly improved the overall accuracy of forest cover types. The elevation data alone improved the classification accuracy by over 15%.

The second approach, a reflectance geometry correction model, involved the alteration of the reflectance values of the Landsat scanner data to remove spectral variation due to topography. The reflectance geometry correction model removed a great deal of the spectral variations due to topography. However, classification accuracy estimates did not indicate any improvement due to the "correction" model.

The research described in this report was sponsored by NASA under Contract No. NAS9-15508.

060679 Clustering of Landsat MSS Data: Certain Limitations by L. A. Bartolucci and R. Bermudez de Castro.

During this investigation the performance of the LARSYS clustering algorithm has been studied under different conditions. Certain limitations of this algorithm when applied to Landsat MSS data have become apparent, including (1) the dependence of the clustering performance on the degree of data correlation, (2) the undesired variability of the clustering output when the clustered area is shifted slightly, and (3) anomalous performance of the clustering algorithm when differential sealing factors are applied to the different axes of the feature space. A number of recommendations are suggested to overcome these limitations.

102579 Design, Implementation and Results of LACIE Field Research by M. E. Bauer, M. C. McEwen, W. A. Malila and J. C. Harlan.

The design, implementation, and results of a three year experiment at three sites in the Great Plains region of the United States are described. The overall objective of the project was to acquire, process, and analyze fully annotated and calibrated multitemporal sets of spectral measurements of crops and soils along with agronomic and meteorological data. The data serve as a data base for determining the spectral-temporal properties of wheat, soil and other crops: developing advanced spectral data analysis techniques; and defining sensor requirements.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

111579 Atlas of Soil Reflectance Properties by E. R. Stoner, M. F. Baumgardner, L. L. Biehl and B. F. Robinson.

A compendium of soil spectral reflectance curves together with soil test results and site information is presented in an abbreviated manner, listing those soil properties most important in influencing soil reflectance. Results are presented for 251 soils from 39 states and Brazil. A narrative key describes relationships between soil parameters and reflectance curves. All soils are classified according to the U. S. soil taxonomy and soil series names for ease of identification.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES January 9, 1980

RATE CHANGES BY ROSS GARMOE

Effective January 1, 1980, the Computer Service rate was lowered to $275/hour and the Priority Service rate was lowered to $200/hour. When the 3031 was installed in September, usage was expected to be equivalent to the 370/148 and these rates were set to generate income sufficient to recover our expenses during the fiscal year. The 3031 usage has been much higher than expected and accumulated balances for these services are getting larger. These new rates are set to recover our expenses through the end of the fiscal year. If usage increases or decreases from the expected amount, the rates will have to be adjusted again at a later date.

VM370 RELEASE 6 AND BASIC SYSTEMS EXTENSION PACKAGE 2.0 BY ROSS GARMOE

On February 23, VM370 Release 6 and the Basic System Extension Program Product (BSEPP) 2.0 will be installed as the operating system in control of the LARS 3031. These are the latest versions of the IBM operating system and provide many new capabilities and features. A later SCAN LINES will give full details about these new and improved features.

During the process of installing the system, we decided not to carry forward several LARS modifications. The features not implemented are available through other commands or cause difficulty in maintaining the system. The following list contains these features and the recommended replacements.

XFER — This command is a synonym for the SPOOL command. All uses of XFER should be replaced by SPOOL.

Q REALUNIT XXX — This command is generally used to check for the existence of a virtual device at address XXX. This can be accomplished by issuing the command:

QUERY VIRTUAL XXX

and branching on a non-zero return code if the device does not exist. Other uses of Q REALUNIT are not as easily replaced so we will provide under Release 6 a CMS transient routine called QREAL which will provide equivalent responses to Q REALUNIT.

SPOOL — LARS has supplied a modification to SPOOL to allow the form SP x ON y. The ON parameter is equivalent to CLASS and, therefore, will not be implemented in Release 6.

The 16 character distribution code (none) will not be implemented in Release 6. It will be possible to set a name of 16 characters and query the name and get all 16 characters returned. However, only the first 8 characters will be used as the distribution code for spool files.

REMOTE TERMINAL HIGHLIGHTS BY SUSAN SCHWINGENDORF

CMS COURSE AT JSC

During the week of December 10-14, LUKE KRAEMER, PETER JOBUSCH, SUSAN SCHWINGENDORF, CAROL JOBUSCH and LARRY BIEHL travelled to Houston to present a series of seminars on using CMS and how to access other software available on the Purdue/LARS computers. The course included two beginning sessions covering logging-on to the computer, basic Edit commands and basic CMS commands. Other sessions presented more CMS commands, Edit commands, CMS commands for programmers, EXEC files, batch jobs, statistical packages, IMSL, CSMP, the RT&E data bases, graphics programming capabilities, and LARSPEC.

CMS NOTES AND AUDIO CASSETTES

Additional copies of the CMS course notes are being made. Anyone at JSC who needs a copy of the course materials should give their name to Mike Pore or Ken Baker. Others desiring sections of the course notes should contact SUSAN SCHWINGENDORF. We also plan to record each session on an audio cassette to provide a means of training individuals on the use of CMS.

LARSPEC BY JERRY MAJKOWSKI

On November 11, LARSPEC was updated to give users the ability to create and use a disk file as a data base for LARSPEC jobs. The disk file can be created by selecting runs found on as many as five LARSPEC data tapes via the IDLIST processor. This file can then be used by any of the three LARSPEC processors and stored on a backup tape for future reference.

These capabilities are primarily controlled by three new options:

1. DDISK terminal command in the LARSPEC environment:

   The forms of this command are:

```
DDISK CREATE   ['filename' 'filetype']
      BACKUP   'tapeno'  [(FILE 'fileno']
      TAPE     'tapeno' 'fileno'  ['filename' 'filetype']
      ACCESS
      COPY     ['filename' 'filetype' 'filemode']
```

   CREATE prepares for the creation of a disk data base file by accessing a temp disk and making appropriate file definitions. BACKUP allows the user to store a disk data base on tape. TAPE retrieves a previously created disk data base and prepares the disk for use by a LARSPEC job. ACCESS is used to re-access a disk data base which had been released earlier in the current terminal session. COPY allows the user to copy a data base, which was stored on another disk, to the disk used by the LARSPEC jobs. The COPY option was not added until December 11 and is discussed below.

2. OPTION COPYDISK in the IDLIST processor.

   COPYDISK is an option which has been added to the normal IDLIST OPTION control card. It specifies that a LARSPEC disk data base is to be created based on the selection criteria of the current set of IDLIST control cards. Any job using this option must be preceded by a DDISK CREATE command, and will destroy any other LARSPEC disk data files created in the current terminal session unless they are saved on tape or another disk.

3. $DISK monitor control card.

   This card is a complement of the $TAPE card and specifies that the following processors are to read data from a previously established disk data base as described under points 1 and 2 above.

Details on the use of these options (except DDISK COPY) including important considerations in determining the maximum number of observations that can be included in a disk data base file can be found in the November 13 LARSPEC memo.

On December 11, there was another LARSPEC update which included various additions and corrections:

1. Addition of the DDISK COPY option as mentioned above. This option allows users to conveniently establish a disk data base which had been previously created and saved on another disk. Originally the data base can be saved by using the CMS COPY command as follows:

   COPY 'filename' 'filetype' B1 = = 'filemode'

   where: 'filename' 'filetype' is the user defined filename and filetype for the data base specified in the DDISK CREATE option; default is MSPEC BASE. 'filemode' is the disk mode to which the data base will be copied.

   Care must be taken since a disk data base can be very large. The DDISK COPY option will then restore the file to the B disk and prepare it to be used by LARSPEC jobs.

2. LARSPEC was made more efficient in reading data from tape and disk.

3. The DDISK and BATCH BACKUP terminal commands were expanded to include the (FILE and (INIT parameters of the CMS BACKUP command. DDISK and BATCH BACKUP now include all the options of the CMS command.

4. A problem in the GSPEC processor involving the omission of printing the name of the first class on graph outputs was corrected.

5. A problem with the graphing of radiometer data in which one band was missing was corrected.

6. A problem concerning the terminal message indicating the proper location of PUNCH output in response to the PUNCH terminal command was corrected.

7. The BATCH terminal command without the BACKUP options will now set up the batch deck as follows:

```
BATCH MACHINE machine
BATCH ID userid username
BATCH OUTPUT printsite punchsite
I LARSPEC
RUN LARSPEC RUN
```

With the BACKUP option the cards will be:

```
BATCH MACHINE machine
BATCH ID userid username
BATCH OUTPUT printsite punchsite
EXEC$$
EXEC CONFIGUR LARSPEC
&STACK RUN LARSPEC
EXEC LARSPEC PUNCH DISK
EXEC BACKUP tapeno D
$$
```

The development of the LARSPEC User's Manual by NANCY FUHS and LARRY BIEHL is nearing completion. It is expected that copies will be available for users by mid-January. Other LARSPEC developments underway are the expansion of the identification record punching capabilities and inclusion of the DECwriter terminal as a graphics output device.

LARSYS NEWS BY JOAN BUIS

LARSYS has been successfully tested on CMS release 6, so we expect no delays when the operating system is updated.

There is now a new version of MERGESTATISTICS. After receiving input from several users, we created a new version of merge which has capabilities from MERGESTATISTICS, BMERGESTATISTICS, CMERGESTATISTICS and XPMERGE, it also has capabilities which were previously unavailable. After February 1, 1980, this will be the only version of merge on line. The reference file follows:

R E Q	Key Word (COL.1)	CONTROL PARAMETER	FUNCTION	DEFAULT
+	MERGESTATISTICS		Select the MERGESTATISTICS function to modify and/or combine existing statistic files.	(None)
	PRINT	FIELDS	Print list of training fields.	No training fields printed
		STATS	Print summary of modified statistics file.	No statistics printed

R E Q	Key Word (COL.1)	CONTROL PARAMETER	FUNCTION	DEFAULT
		COSPEC	Print one coincident spectral plot of all pools or of all classes if pools are not requested (The scale card may be used to adjust this plot.	No coincident spectral plots printed
		MEANS (CI,CJ)	Print one Bi-spectral plot of channel I vs. channel J. (scale card may be used to adjust this plot.)	No bi-spectral plots printed
		MEANS (CI,CJ,CK, CL)	Prints one Bi-spectral plot of the average of channel I and J vs. the average of channel K and L. (scale card may be used to adjust plot)	No bi-spectral plot printed
	PUNCH	(None)	Punch class means and covariance matrices in binary format	No punching
		CHARACTERS	Punch class means and covariance matrices in character format	Binary format
		ONEFIELD	A single dummy field description card is punched for each class of the modified statistics file.	All field description cards punched
	CHANNELS	I,J....	Channels I,J....are selected (see note below)	Channels common to all statistics decks are used
+	CLASSES	ENTIRE (D1,D2...)	All classes in decks D1, D2...are included in new statistics file.	

REQ	Key Word (COL.1)	CONTROL PARAMETER	FUNCTION	DEFAULT
		DELETE (DN/CI,CJ-CM, CN/,DM/CI, CJ,CK-CP/)	Classes I,J through M and N of deck N, and classes I,J,and K through P of deck M are to be deleted from new statistics file.	
		INCLUDE (DN/CI,CJ-CM/, DM/CI,CJ, CK-CP,CQ/)	Classes I,J through M, of deck N and classes I,J,K through P, and Q of deck M are to be included in new statistics file.	
	POOL	NAME (DN/CI,CJ-CK,CP/, DM/CI,CK/)	Classes I,J through K and P of deck N and classes I and K of deck M are to be pooled to create a new class with name of "NAME". If a pool card is used, all desired pools and classes must be explicitly requested.	No pooling
	DISK	READSTATS	Deck 1 will be read from disk	All decks read from cards
	SCALE	SPCLOW (D)	Set low end of coincident spectral plot to D.	D=0.00
		SPCINT (E)	Set coincident spectral plot interval to E.	E=1.00
		ORIGIN (N,X.XX)	On the Bispectral plot, this will set the origin for channel N to X.XX. If the plot is of four channels, i.e. means (CI,CJ,CK,CL), the origin for the left most channel will be used for each axis. e.g. if you are ploting channel 3 & 4 vs 8 & 7, the origin for 3 will affect the plot, but, an origin for Channel 4 will not affect the plot. Similarly, an origin for Channel 8 will affect the plot, and an origin for Channel 7 will not affect the plot.	X.XX=0

R E Q	Key Word (COL.1)	CONTROL PARAMETER	FUNCTION	DEFAULT
		UNIT (N,Y.YY)	On the bispectral plot, this will set the interval for Channel N to Y.YY. The left most channel per axis rule as explained above applys here also.	Y.YY = 1.00
	DATA		----------START OF DATA DECK---------- I DECK 1 -- LARSYS VERSION 3 STATISTICS DECK I	
	DATA		--CONTINUE USING DATA CARD IN FRONT OF EACH STATISTICS DECK-- I LARSYS VERSION 3 STATISTICS DECK IN THE ORDER GIVEN BY THE CLASSES CARDS I	
+	END	(None)	END OF FUNCTION	(None)

Notes... If a channel selected is not in any of the statistics decks or it is in some but not in all of them, artificial means and covariances will be generated (zeros are used). This feature was implemented for analysis of multitemporal data using. For example, the layered classifier.

... Multiple bi-spectral plots may be requested.

... After each bi-spectral plot is printed, a table with the following information for each class will be printed: class number, symbol, mean values, class name and number of points in each class.

DIGITAL DISPLAY NEWS BY BARBARA PRATT

The Digital Display Committee extends a special thanks to all LARS personnel who helped with the rearrangement of the Flex 2 users area - the people who physically moved the equipment and the users whose full cooperation made the move as smooth as possible. THANKS!!

EQUIPMENT ARRIVAL SCHEDULE

Excitement is growing as the arrival dates of the soon-to-be-delivered digital display equipment draw closer. Let's hope there are no "murphyisms" to interfere with the predictions!

COMTAL Digital Display	May 1980
SI Disk Drives (here!)	December 1979
DEC RX 211 Floppy Disk	March 1980
Tektronix Graphics Display	March 1980
Camera and Tripod	January 1980

The committee will keep you apprised of any changes.

SUMMARY OF IBM 3031 COMPUTER USAGE FOR NOVEMBER 1979

Overall Usage	Basic Rate CPU Time Used	16.56
	Priority Rate CPU Time Used	118.81
	Total CPU Time Used	135.37
	Terminal Sessions	4354
	Batch Jobs	896

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	16.07	10%
Mon-Fri 8AM-4PM	75.97	48
Mon-Fri 4PM-midnite	34.74	22
Weekend	8.48	8

Batch Job Usage — Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	174	0.60	0.04
BATSHORT	133	2.57	0.18
BATMED	181	7.14	0.64
BATONITE	10	4.76	1.50
BATLONG	32	16.08	1.62
TRATRAN	5	8.73	0.68
BATEOD	233	7.57	0.58
BATJSC	95	36.56	8.33

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	251	171.34	0.68
Flexlab2	31	INFOTON GTX	219	149.73	0.68
Flexlab2	32	INFOTON GTX	344	173.89	0.51
Flexlab2	33	INFOTON GTX	421	189.05	0.45
Flexlab2	34	INFOTON GTX	288	143.41	0.50
Flexlab2	35	INFOTON GTX	412	167.50	0.41
Flexlab2	36	INFOTON GTX	369	181.50	0.49
Comp. Room	37	DECwriter	237	73.39	0.31
Flexlab1	40	INFOTON GTX	197	121.99	0.62
Flexlab1	41	INFOTON GTX	201	147.84	0.74
Flexlab1	42	INFOTON GTX	192	151.26	0.79
Flexlab1	43	SUPERTERM	155	81.51	0.53
Dial-up	50	1st in Use	112	69.50	0.62
Dial-up	51	2nd in Use	29	26.53	0.91
Dial-up	52	3rd in Use	9	2.19	0.24
Dial-up	53	4th in Use	3	1.30	0.43
Dial-up	54	5th in Use			
Dial-up	5E	In-House 1st	9	4.59	0.51
Dial-up	5F	In-House 2nd	13	5.06	0.39
Houston	60	Hazeltine 2000	128	60.47	0.47
Houston	61	Hazeltine 2000	216	119.64	0.55
Houston	62	2741	187	88.02	0.47
Houston	63	2741	203	127.07	0.63
Alabama	64	DECwriter	50	34.33	0.69
Alabama	65	INFOTON GTX	37	44.05	1.19
ISU	66	(various)	46	21.45	0.47
ISU	67	(various)	154	71.58	0.46
Houston	6A	Dial-1st in Use	204	145.59	0.71
Houston	6B	Dial-2nd in Use	170	104.88	0.62
Houston	6C	Dial-3rd in Use	146	95.50	0.65
Houston	6D	Dial-4th in Use	146	83.23	0.57
St. Regis	4A	DECwriter			

INTRALAB NOTES

RECENT ACQUISITIONS IN THE LARS LIBRARY

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLV October 1979 *Number 10*

COVER PHOTO — This controlled, standard false-color Landsat mosaic of Alaska has recently been constructed by Nairn Albert, Clint Steele, and Ron LeCompte (U.S. Geological Survey, Geologic Division, Branch of Alaska Geology). Copies of the mosaic, which includes 143 Landsat scenes, are available at 1:1,000,000, 1:2,500,000, 1:5,000,000, and 1:9,000,000 scales from the EROS Data Center, Sioux Falls, South Dakota. Rectification of imagery in the northern part of the state, printing of the individual scenes into Cibachrome, and photography of the constructed mosaic were conducted by Jim Penrod and Homer McMahon (Photo Science Incorporated, Gaithersburg, Maryland).

TECHNICAL ARTICLES

PROPOSALS SENT OUT

Title: International Symposium, Sponsor: NASA, Principal Investigator: MARION BAUMGARDNER, Duration: 1/1/80 to 8/31/80.

Title: Training Course Entitled "Remote Sensing for Mineral Specialists," Sponsor: Bureau of Land Management, Principal Investigator: DONNA SCHOLZ, Duration: 1/1/80 to 5/31/80.

MINI-LARSIANS

Andy and MARTA DZIUBINSKYJ are the proud parents of a second child, a daughter, Adrianne Belinda. She was born at 9:38 a.m., on December 21, and weighed 10 lbs. 5 oz.

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 2 · February 8, 1980

GOVERNMENT OFFICIALS VISIT LARS

Dr. S. I. Rasoul, Chief Scientist for Space and Terrestrial Applications of NASA Headquarters, visited LARS on November 29. He was accompanied by R. B. MacDonald of NASA/JSC. They received a brief tour of both buildings and an extensive briefing on LARS programs and organization. Since his return to Washington, D.C., Dr. Rasoul has written to thank LARS for the briefing and indicates as follows: "It is very clear to me that LARS should be a major asset for our programs in renewable resources. The strong interdisciplinary expertise that Purdue has to offer can certainly be of great value to NASA as we embark upon building a stronger research base in the area of agronomy from space."

Dr. William Kibler, head of the Statistical Reporting portion of USDA/ESCS, visited on December 17, to receive a briefing on LARS programs and organization. This was his first visit to Purdue and to LARS, and he expressed his appreciation for this initial direct exposure to our work. Dr. Kibler was accompanied to the laboratory by Earl Park, the head of the State Agricultural Statistics office.

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).

Dr. Klaus Flach, Administrator for Soil Survey, Buell Ferguson, State Conservationist, and Ray Sinclair, State Soil Scientist, all from USDA/SCS were at LARS on January 30, to visit with MARION BAUMGARDNER, DICK WEISMILLER, JOHN PETERSON, STEVE KRISTOF, FRANK KIRSCHNER, LANNY LUND, Bernie Liska, and Marv Phillips. They reviewed ongoing soils projects and discussed future cooperative work.

GROUND TRUTH GATHERED IN UPPER VOLTA

CHRIS SEUBERT recently returned from a one month stay in Upper Volta where he was collecting ground truth data for use in an eight-month project sponsored by Africare.

Computer-aided analysis of Landsat MSS data will be used to complete a land use potential survey over the 1500 square kilometer area of Upper Volta called the Seguenega.

On February 1, Roger Kissou will begin a six week visiting scientist program under Seubert and MARION BAUMGARDNER. Kissou will participate in the LARS monthly short course and other training activities before finishing work on the land use potential map of the Seguenega area. Other personnel involved in the project include: STEVE KRISTOF and LANNY LUND.

LARS TRAVEL LOG

PAUL ANUTA attended a workshop on Remote Sensing Data Rectification and Registration at College Station, Texas on January 9-11. MARVIN BAUER and VERN VANDERBILT participated in a Scene Modeling workshop at Vicksburg, Mississippi, on January 23-25. Both of these workshops were part of the fundamental research planning activity sponsored by NASA.

MARVIN BAUER, CRAIG DAUGHTRY, MARILYN HIXSON, LARRY BIEHL, JIM KAST, and PAUL ANUTA gave a presentation to NASA/JSC, January 11, on SR&T project implementation plans.

ROGER HOFFER and MIKE FLEMING were in Houston, Texas on January 7-9, to present the following two papers at the National Forestry Remote Sensing Research Review.

"Mapping and Classification of Forest Cover Types"

"Forestland Classification with Thematic Mapper and SLAR (Imaging Radar) Data"

On January 24, Hoffer also presented a special seminar for the Civil Engineering Department of Purdue University, entitled: "Remote Sensing of Natural Resources."

MARION BAUMGARDNER was in Ankeny, Iowa, on January 9-10, to attend a planning meeting for the National Conference on Remote Sensing for Resource Managers. On January 28-29, Baumgardner visited Washington, D.C., to participate in discussions of research project priorities with Dr. Anson Bertrand, Director of Science and Education Administration, USDA.

PHIL SWAIN spent January 15-25, in Linkoping, Sweden. He participated in the teaching of a short course in Advanced Image Processing Techniques at the Swedish National Defense Research Institute.

On January 19-21, BARRETT ROBINSON was in New York City to examine instrumentation at the Nikon House, and in Stamford, Connecticut, to review final designs for the multiband radiometer with Barnes Engineering Company personnel.

LEROY SILVA travelled to Pasadena, California, on January 23-25, to attend the NASA/ERSAR Workshop on spaceborne radar sensors. Silva was also in Tampa, Florida, on January 28-29, to consult with Sperry Microwave.

VISITORS

Ray Sinclair, State Soil Scientist, and Ben Smallwood, Soil Scientist, both with the Soil Conservation Service (SCS), were at LARS on January 31, to plan a field trip for the 1980 Joint Symposia on Machine Processing of Remotely Sensed Data, Soil Information Systems and Remote Sensing and Soils Survey. The field trip will look at applications of spectral data to soil survey in Jasper County, Indiana.

Michael Bradshaw, from the College of St. Mark & St. John in Plymouth, England visited LARS from February 2-6, to discuss technology transfer activities with SHIRLEY DAVIS.

PROJECTS FUNDED

Title: Evaluation of SLAR and Simulated Thematic Mapper MSS Data for Forest Cover Mapping Using Computer-Aided Analysis Techniques (extension of previous contract). Sponsor: NASA. Principal Investigator: ROGER HOFFER. Duration: 12/1/79 to 11/30/80.

Title: Earth Resources Data Processing Remote Terminal Support (extension of previous contract). Sponsor: Alabama A&M University. Principal Investigators: JIM KAST and S. SCHWINGENDORF. Duration: 10/1/79 to 9/30/80.

Title: Training Course Entitled: "Remote Sensing for Mineral Specialists." Sponsor: Bureau of Land Management. Principal Investigators: DONNA SCHOLZ and SHIRLEY DAVIS. Duration: 1/1/80 to 5/31/80.

NEW LARS TECHNICAL REPORTS

041279 Evaluation of Several Schemes for Classification of Remotely Sensed Data: Their Parameters and Performances by D. Scholz, N. Fuhs, M. Hixson and T. Akiyama.

The overall objective of this study was to apply and evaluate several currently available classification schemes for crop identification. Seven agricultural data sets were used in the study and were selected to sample variability in major crops, soils, climate, and agricultural practices. Test site location and classifier both had significant effects on classification accuracy of small grains; classifiers did not differ significantly in overall accuracy. The majority of the difference among classifiers was attributed to training method rather than to the classification algorithm applied. The complexity of use and computer costs for the classifiers also varied significantly.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

082679 Calibration Procedures for Measurement of Reflectance Factor in Remote Sensing Field Research by B. F. Robinson and L. L. Biehl.

A means by which measurements of the optical properties of crops and soils can be knowledgeably compared from site to site and instrument to instrument is presented in detail. The definition of bidirectional reflectance factor is reviewed and discussed. Procedures for field implementation are illustrated and discussed. Spectral and goniometric properties of laboratory and field reference surfaces and typical environmental subjects serve as a basis for analysis of uncertainties introduced by differing illumination conditions. Results of a comparison of the performance of three spectrometer systems are presented and discussed. It is concluded that intelligent use of the bidirectional reflectance factor technique is an accurate and practical means to obtain the spectral, optical properties of crops and soils needed for advancements in agricultural remote sensing.

The research described in this report was sponsored by NASA under contracts NAS9-15466, NAS9-15970 and NAS9-14016.

082979 Multiband Radiometer for Field Research by B. F. Robinson, M. E. Bauer, D. P. DeWitt, L. F. Silva and V. C. Vanderbilt.

To develop the full potential of multispectral data acquired from satellites, increased knowledge and understanding of the spectral characteristics of specific earth features is required. Knowledge of the relationships between the spectral characteristics and important parameters of earth surface features can best be obtained by carefully controlled studies over areas, fields,

or plots where complete data describing the condition of targets is attainable and where frequent, timely spectral measurements can be obtained. The currently available instrumentation systems are either inadequate or too costly to obtain these data. The instrument system discussed in this paper is a prototype of an economical system which can be utilized by many researchers to obtain large numbers of accurate, calibrated spectral measurements. As such, it is a key element in improving and advancing the capability for field research in remote sensing.

The research described in this paper was sponsored by NASA under contract number NAS9-15466.

102679 Computer-Aided Processing of Landsat/MSS Data for Classification of Forestlands by R. F. Nelson and R. M. Hoffer.

This report documents a preliminary study to compare a modification of the P-1 technique to other methods of developing training statistics for classifying forest cover types. The conconcept behind the P-1 approach has potential for forestry situations where point sample data, such as forest inventory data, exist. The study indicated that (1) the P-1 approach using ICOCLS in an unseeded, iterative mode and (2) the Multicluster Blocks approach using CLUSTER were the two best approaches for developing training statistics. The P-1 procedure used in LACIE was not an effective method for developing training statistics for purposes of classifying forest cover types.

The research described in this report was sponsored by NASA under Contract No. NAS9-15508.

SYSTEM SERVICES February 8, 1980

NEW OPERATING SYSTEM TO BE INSTALLED FEBRUARY 23

INTRODUCTION

A large part of this issue of SCAN LINES is devoted to detailed information about the new version of VM that will be installed on February 23. Most of the following articles discuss specific details about the new or improved features. A few of the articles will discuss older features developed by LARS that were not carried forward to the new system. For those features not reimplemented, suggested replacements are given. In this and the following articles, we will show some of the reasons for installing the new release of VM, and how we decided which LARS modification to reimplement for the new release.

IBM announced the availability of VM370 Release 6 in the early part of 1979 when they made the 4341 announcement. At the same time, IBM made available version 2.0 of the Basic System Extension Program Product (BSEPP). VM Release 6 is required to operate a 4341 and BSEPP 2.0 is required to operate the new disk storage devices which IBM has also announced. In February of 1979, we placed an order for a 4341 and two of the new disk storage devices. At the same time, we made plans to install VM370 Release 6 and BSEPP2.0. The 4341 and the new disks are currently scheduled for delivery in late 1981. We evaluated the system software in view of this delivery schedule and decided to go ahead with installation of VM Release 6 and BSEPP for several reasons.

1. IBM strongly recommends that every installation use the current system software. On a regular basis, IBM distributes a Program Level Change (PLC) tape which contains all of the available fixes for known system problems. Hopefully, these PLC tapes will correct many of the problems before they are encountered on our system. Also, for new problems, system support is simplified if the production system is close to the system being used within the IBM support center.

2. Release 6 of VM will allow us to use some new micro-code assist features available in the 3031. These micro-code assist features help to reduce operating system overhead. With our current system load, this overhead reduction is not significant, but as the number of users increase, we expect the assist to be helpful.

3. The Basic System Extension Program Product (BSEPP) contains several features we felt to be important even without the 4341.

* A new scheduler which more fairly shares the system resources, especially for large compute-bound jobs.
* A greatly improved file system for CMS.
* Labelled tape support under CMS.
* A HELP facility under CMS.
* The ability to dump and restore spool files.

Once we made the decision to install VM Release 6 and BSEPP, we had to make several decisions about the LARS modifications to VM. Many of these modifications were originally made to ease the transition from CP-67 to VM and to support CMS360. We decided to eliminate as many local modifications as possible since each one impacts our ability to support users. Each modification was evaluated using the following criteria:

* The modification must supply an essential feature not currently available, or it must significantly improve an existing feature.
* The modification should be as limited in scope as possible and change as few routines as possible, preferably one.
* System structure such as control block formats should not be altered.
* If a feature is essential, then it should be implemented as a CMS routine or an EXEC file if at all possible.
* Documented features of VM and CMS must continue to operate correctly.

SEVERAL OF THE FOLLOWING ARTICLES GIVE THE RESULTS OF THIS EVALUATION IN MORE DETAIL. PLEASE READ ALL OF THE ARTICLES CAREFULLY AND IF YOU NEED MORE INFORMATION, CONTACT ROSS GARMOE, PETE JOBUSCH OR MON LI TANG.

NEW MANUALS FOR CP AND CMS

All of the CP and CMS manuals required to use the system will change with the installation of Release 6 and BSEPP. You should already have received the following set of manuals, supplements and TNLs. If you have not, please contact MARY ELLEN PIERSON at Ext. 221.

Title	Form No.	Supplement No.	Date
VM/370: Introduction	GC20-1800-9	SD23-9015-1	30 Mar 79
		GN25-0489	1 Aug 79
		SN25-0498	15 Aug 79
VM/370: System Messages	GC20-1808-10	GN25-0485	1 Aug 79
VM/370: CMS Command and Macro Reference	GC20-1818-2	SD23-9023-1	30 Mar 79

Title		Form No.	Supplement No.	Date
VM/370:	CMS User's Guide	GC20-1819-2	SD23-9024-1	30 Mar 79
VM/370:	CP Command Reference for General Users	GC20-1820-3	GN25-0494	1 Aug 79

SEPARATOR PAGE CHANGE

Beginning with the installation of Release 6, the format of the printer separator page will change. Only the first eight characters of the name entered at logon or via the SET name command will be used as the distribution code. We are installing the separator page change because we are not carrying forward the LARS modification that uses the full 16 character name as a distribution code. Because we are no longer modifying the format of the control blocks for spool files, a system cold start will be required during the installation process. This means that all spool files in the system will be lost.

The decision to not modify the spool file format will greatly simplify system maintenance. The modified spool file format caused changes to 22 routines in CP. We have retained the ability to set and query a 16 character name because this information was required for accounting purposes.

USERS ADVISED TO XFER TO THE SPOOL COMMAND

The XFER command was the CP/67 equivalent of the CP SPOOL command. With the installation of Release 6, XFER will no longer be supported as an alias for SPOOL. Users of XFER (CP/67) will be able to use SPOOL (CP) just as they did under Release 5 without being aware of it (both commands executed the same program).

Users of the ON operand will, likewise, have to use the CLASS parameter instead: Thus:

```
XFER PRT ON A
SPOOL PRT ON A
XFER PRT CLASS A
```

all become:

```
SPOOL PRT CLASS A
```

HELP

One of the user-oriented features of BSEPP is the CMS HELP feature. Using HELP, you can obtain information about CP and CMS commands and error messages. Detailed information about HELP can be found in the CMS Command and Macro Reference GC20-1818-2 after it has been updated with the BSEPP supplement SD23-9023-1. Also, if you enter HELP with no parameters, information about HELP itself will be displayed at the terminal.

CMS FILE SYSTEM EXTENSIONS

Under BSEPP, there are two major changes in the logical file structure of CMS. Both are extensions to current capabilities. No changes in existing files, minidisks, programs, execs, or procedures will be required to maintain compatability.

The first change is that CMS now supports 26 file mode letters. Any letter of the alphabet may be used as a file mode. The automatic file modes assigned during IPL (190: "S" (CMS system disk), 191: "A") have not changed. All system routines which check file modes have been changed to accept any letter as valid (with the exception of GETDISK, which cannot accept M, R, or W unless the "MODE" keyword is used).

The second change is that all limits on file and minidisk size have increased to the point that they are effectively eliminated. This change affects only disks formatted with block sizes of 1024, 2048, or 4096 bytes. For disks formatted in 800-byte blocks, the limits of 3400 files, 65,533 records, and 246 cylinders for a minidisk still exist. For disks formatted in the larger block sizes, physical characteristics of the disk are the only limit for cylinder count and number of files. The maximum number of logical records in a single file is 2,147,483,647.

Programs written in high-level languages (i.e., FORTRAN) can create files of any size without problems. Assembly language programs should be modified to include "FORM=E" as an operand on all FSCB, FSREAD, FSSTATE, FSPOINT, and FSWRITE macros if the program is expected to read or write files of length greater than 65,533 records. This change is not necessary for smaller files, regardless of the disk foramt.

NEW PHYSICAL BLOCKSIZES FOR CMS MINIDISKS AVAILABLE

With all previous releases of CP/CMS, the physical block size for CMS disk files was 800 bytes. Under Release 6 with BSEPP, users have the option of changing the physical blocksize of their disks to 800, 1024, 2048, or 4096 bytes. Proper selection of the block size for a minidisk can result in increased storage capacity and/or improved performance.

Before discussing block sizes further, three points should be noted:

1. All minidisks are, without modification, compatible with the Release 6 CMS/BSEPP system. No users will have to reformat any of their disks.
2. In many cases the optimal block size for a disk will be the 800 byte format already in use.
3. For some processors, only the 800 byte block size will work. (This includes the current release of SAS and the PETAPE module). All non-standard routines must be tested with the larger block sizes.

The following table shows the capacity of a one cyl. CMS minidisk stored on a 3330 disk drive.

Format	Number of Blocks	Total Capacity
800 byte blocks	266	212,800 bytes (207.8K)
1024 byte blocks	209	209K
2048 byte blocks	114	228K
4096 byte blocks	57	228K

1024 bytes (1K) is the default block size for Release 6.

Before reformatting all of your disks to the 2K or 4K block sizes to gain an extra 10% in capacity, please remember that CMS allocates space to your files in blocks, not bytes. This means that a short file will occupy a minimum of one block, which could waste more space than was gained by using the larger block size. Generally, only minidisks with a few large files on them should use the larger block sizes.

In addition to allowing more information to fit onto a given size minidisk, use of the larger block sizes can reduce the amount of disk I/O activity by transferring more data on each read or write operation.

The block size of a minidisk is set when it is formatted. Users who wish to experiment with different block sizes should remember that formatting a disk erases all files on the disk. For information on how to set a disk's block size, use the "HELP FORMAT" command.

"REALUNIT" OPTION OF CP QUERY COMMAND REMOVED

The LARS supplied "REALUNIT" option of the CP "QUERY" command has, with Release 6, been removed. There are two options available to "QUERY REALUNIT" users to perform the same functions.

One option is to use the (standard) "QUERY VIRTUAL" command to test for the existence of a device at the requested address. Note that with "QUERY VIRTUAL", a return code of zero indicates the presence of a device, not the absence of a device as it did with "QUERY REALUNIT".

The other option is to use the new CMS "QREAL" command. This new command was written as a CMS transient and required no modification to CP or CMS to implement. The syntax of the command is:

QREAL vaddr [(STACK]

where the STACK option will cause the real disk label and minidisk size to be placed in the console stack. Return codes set by "QREAL' are the same as those set ty "QUERY REALUNIT" except for minidisk devices. For these "QREAL" returns the device type (such as "3330") where "QUERY REALUNIT" returned an indication of the real device address. Complete documentation of "QREAL" may be obtained by using the "HELP" command.

BUGS KNOWN TO EXIST IN RELEASE 6

Three problems discovered during the preparation and testing of Release 6 have been turned over to IBM for solution.

The first of these affects FORTRAN G programs using the BACKSPACE command for a tape file containing variable length records. The backspace operation is not performed. Programs using the LARS TAPOP routines are not affected.

The second problem is with return codes set by the CP QUERY command. The LINK, SYSTEM, and TDSK options will always set a return code of zero, even when errors occur.

The third problem deals with programs which "mod" files on 800 byte format disks. At the present time, these programs begin rewriting the file from the beginning instead of appending information to the file's end. This problem affects the SAS output listing file.

SAS PROBLEMS UNDER RELEASE 6

Our current release of CMS/SAS (79.2B) was designed to work with Release 5 of CP/CMS. The next release (79.3), which is expected to arrive in late March, is designed to work with Release 6.

In the intervening month, we will be using a version of SAS release 79.2B modified to work with CMS Release 6. There are two known problems with this modified release.

1. User defined FORMATs will not work (their use will cause the job to abend).
2. If the LISTING file is written to an 800 byte blocked disk, only the output from the last procedure run will be available.

There is no circumvention for the first problem other than to avoid using user-defined FORMATs. The second problem can be avoided by using a 1024, 2048, or 4096 byte block formatted minidisk or by using the PRINT option to create SAS output directly to your virtual printer.

Instructions for incorporating user written procedures into Release 79.2B SAS jobs have been received, and are somewhat cumbersome. This situation will change with release 79.3. Users needing to incorporate their own procedures into release 79.2B SAS jobs should contact CAROL JOBUSCH at LARS, extension 246.

MORE STORAGE REQUIRED FOR SOME PROGRAMS - VIRTUAL MACHINES TO BE LARGER

Some of the control blocks used by CMS to keep track of minidisk files under Release 6 have expanded to allow for the "extended data formats" (the 1K, 2K and 4K blocksizes).

As a result, some programs may require larger storage sizes to run properly. To help avoid any problems this might cause, all 768K virtual machines have been increased in size to 960K.

LISTFILE COMMAND ENHANCED - CONTENTS NOW AN EXEC

The LARS enhanced LISTFILE command in Release 5 has more optional parameters than documented in the CMS manuals. This extended LISTFILE is carried over to Release 6. A new parameter, MEMO, has been added to the Release 6 LISTFILE. LISTFILE with MEMO option is equivalent to the CONTENTS command. For example, the following two commands are equivalent:

```
LISTFILE * * B (MEMO
      and
CONTENTS B
```

These commands will create a "CONTENTS MEMO A5" on your A-disk containing the statistical information on the accessed B-disk and a sorted list of all the files on the B-disk.

CONTENTS exists as an exec file in Release 6 whereas it was a module in Release 5. Therefore, CONTENTS called from an exec file must be so indicated.

```
"EXEC CONTENTS mode"
```

For detailed information on LISTFILE or CONTENTS, enter "HELP LISTFILE" or "HELP CONTENTS" at the terminal when Release 6 becomes available.

IPL SYSTEM NAMES AND MESSAGES, "S" DISK ADDRESS CHANGED

The IPL command loads CMS in a virtual machine and executes an exec file based on the system name IPL'ed. There are several CMS system names defined in Release 6. Most of these names are familiar to users because they were used in either CMS360 or Release 5 of CMS370. The defined system names are listed below:

CMS	CMS370
LARSYS	LS370
LARSPEC	
LARSYSDV	LSDV370
LARSYSP1	
BATCH	BATCH370
REFORM	REF370

Synonyms are listed on the same line. By issuing 'IPL LARSYS' or 'IPL LS370', for example, one enters the LARSYS environment.

After you issue 'IPL SYSTEMNAME' at your terminal, the system responds as follows:

```
CMS / BSEPP REL 2 MM/DD/YY HH:MM
DMSINS100W CMSZER SYSTEM NAME 'CMSZER' YSTAT NOT AVAILABLE.
```

You will receive these two messages regardless of the system name IPL'ed. The first message identifies the system and gives the date and time the CMS nucleus was last altered.

The second message merely says that the Y-disk is not found at IPL time. You can ignore this message because no Y-disk is defined. The only two disks defined at logon time are the system disk (S-disk) and the user's "A" disk.

The S-disk is defined at virtual address 190 in Release 6 instead of at 290 in Release 5. Because VADDR 190 is now reserved for the S-disk, changes to your files will be necessary if 190 is being used for other purposes. By the same token, reference to VADDR 290 as the S-disk must change to 190.

Following these two messages, responses depend on the system name IPL'ed. With CMS and CMS370, this completes the IPL process and CMS is ready for your commands. All other system names cause execution of 'CONFIGUR EXEC' to link to and access all required disks and enter the specified environment.

NEW SCHEDULING ALGORITHM GOES BLIP

Available with the BSEPP extensions to CP is a new scheduling algorithm which provides for more equitable sharing of computer resources among all users, and which may reduce the resources required to perform long running tasks. As you may have noticed in the response to the INDicate command, users of the computer are divided into two categories, labeled Q1 and Q2. Interactive users are normally in Q1 and receive highest priority for computer resources. With the BSEPP algorithm, the non-interactive users (Q2) are split into two groups (Q2 and Q3). Q3 is reserved for longer running jobs (e.g. virtual machines that have used eight or more Q2 time slices without becoming interactive). Q3 users receive longer, but less frequent, time slices than either Q1 or Q2 users. This reduces the total load they place on the system by reducing the number of times they are swapped in and out (i.e., the number of time-slices they receive). Savings of as much as 50% have been observed for certain long running jobs.

Unfortunately, the CMS BLIP facility effectively cancels Q3 for normal, connected, use by transmitting the BLIP character after every two seconds of virtual processor use. It is, therefore, recommended that users of long running programs issue the "SET BLIP OFF" command so that their jobs will execute more quickly and will less total impact upon the system.

INDICATE LOAD COMMAND RESPONSE CHANGES

The responce to the INDICATE LOAD command in Release 6 will include additional information on system loading. The new response is:

CPU-nnn% APU-nnn% Q1-nn Q2-nn STORAGE-nnn% EXPAN-nnn
PAGING-nnn/sec, STEAL-nn%, LOAD-nnn%

where:

CPU indicates the percentage of time that the main processor is running and is derived from the smoothed value maintained by the scheduler.

APU is the percentage of time the attached process is running (and will be zero since the LARS 3031 is a uniprocessor system).

Q1, Q2 The contention for the processor is represented by average number of users in queuel and queue2, maintained by the scheduler.

STORAGE is a measure of the usage of real storage. It is an approximation of the ratio of the number of pages in storage for in-queue virtual machines to the number of pageable pages in the system, expressed as a percentage.

EXPAN is a measure of the total delay in response time that a virtual machine experiences due to contention for both real storage and the processor. If there is no contention for either resource, EXPAN is maintained at a minimum value of 1.

PAGING is the average number of page I/O operations (page reads and writes) performed per second.

STEAL is the percentage of page read operations that required a real storage page to be stolen from another in-queue virtual machine.

LOAD is an artificial value that attempts to measure (in terms of elapsed time) the percentage of the system devoted to paging because of real storage contention. Estimated processor time involved in paging, the amount of time spent in pagewait, and the percentage of steals are factored into the calculation.

QUERY COMMAND RESPONSE CHANGES FOR DISKS

Another modification that has been dropped with the installation of Release 6 is the change in response to the CP command "QUERY VIRTUAL DASD". Under previous releases, the response to this command included the starting and ending cylinder numbers for each minidisk. This information is not sufficiently useful to justify maintaining a modification to the operating system. The standard response contains a cylinder count, which should be adequate for most purposes.

The LARS modified response:

```
>query virtual dasd
DASD 191 3330 VMUSR2 R/W (CYL 689-693)
DASD 192 3330 VMUSR2 R/W (CYL 578-591)
```

will change to the standard:

```
>query virtual dasd
DASD 190 3350 VMSYS1 R/O    40 CYL
DASD 191 3330 VMREL6 R/W    10 CYL
```

Also changing, though not through removal of a LARS modification, is the response to the "QUERY DISK" command. The Release 5 format has been:

```
>query disk a
A (191): 154 FILES; 1291 REC IN USE, 39 LEFT (of 1330), 97% FULL (5 CYL), 3330, P
R; T=0.01/0.04 13:40:02
```

The Release 6 response shown below allows for the longer minidisks now allowed and displays the block size of the disk (which was previously fixed at 800 bytes and can now be 800, 1024, 2048, or 4096 bytes).

```
>query disk a
LABEL  CUU M  STAT CYL TYPE BLKSIZE   FILES  BLKS USED-(%) BLKS LEFT  BLK TOTAL
PLJ191 191 A   R/W  10 3330  1024        63        881-42       1209       2090
R; T=0.01/0.04 13:41:23
```

DISK BACKUP TAPE FORMATS CHANGED

The CMS tape dump format has been changed under BSEPP. Two blocking factors are now provided: the old format of 800-byte blocks is still available, and a new format of 4096-byte blocks is also used. When reading a tape, it is not necessary to specify which format the tape was written in. When dumping to tape, the 4096-byte block size is used unless "BLKSIZE 800" is specified as an option.

For users of the "PETAPE" command, we have not been able to modify this command to meet BSEPP requirements for extended format disks. PETAPE will function properly only when dumping from, or loading to, disks formatted with 800-byte blocks.

REMOTE COMMAND

Available with Release 6 will be an enhanced version of the LARS written CP REMOTE command. The REMOTE command combines the CP SPOOL and TAG commands required to route output to remote sites. The format of the command is:

```
                                    ( [TO]    ( sitename )  )
                                    (         ( COMPUTER )  )
                 ( vaddr  )         (         ( FOTOQUAL )  )
REMOTE           (        )         (                       )
                 ( device )         (                       )
                                    (  OFF                  )
```

This new version is upward compatible from the current version and includes the following enhancements:

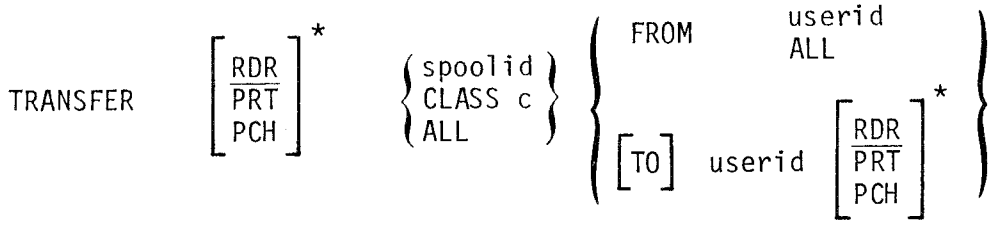
1. The device being REMOTEd may be specified either mnemonically or by virtual address (i.e., PRinter, PRT, PUNch, etc. as well as 00E, E, and D).
2. The word TO is optional.
3. The sitename will be checked and invalid sitenames rejected by the command (at the present time, REMOTE will put an invalid TAG on the file, causing it to be discarded by RSCS and lost).
4. Output may be REMOTEd to a site of COMPUTER to be printed in the computer room (which is equivalent to specifying the OFF parameter.)
5. Output REMOTEd to FOTOQUAL will continue to be printed in the computer room, spooled to CLASS F.

ENHANCED TRANSFER COMMAND

The Release 6 system will include the enhanced version of the TRANSFER command in use under Release 5. This version is completely compatible with the original IBM command, but has two new operational operands. 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 an RDR queue
2. 'PRT' and 'CON' type files may be transferred to an RDR or PRT queue
3. 'PUN' type files may be transferred to an RDR or PUN queue.

The enhanced format of the TRANSFER command is as follows:



*operands added by LARS.

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 SPOOLed 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
```

NOTE: While files routed to RSCS may be retrieved and printed in the computer room, they cannot be transferred to another remote site with this command.

MAIL

A new version of the LARS MAIL facility will be available beginning with installation of Release 6. MAIL provides users with the capability to send extended messages to any user of the LARS comptuer system whether or not the user is logged on when the mail is sent. The receiving user will receive notification of pending mail if the ID is logged on at the time the mail is sent. If the ID is not logged on, no further attempt is made to notify the user that mail is available at logon time. MAIL also allows the user to set up distribution lists that enable one mail item to be sent to several users simultaneiously, and to designate synonyms for userids. Finally, the MAIL command can be used to pick up mail.

Any existing file can be sent through the mail system, providing it is fixed-length format, 80-character line length. Alternatively, if no file is specified, the CMS editor is used to create the mail file.

Mail pickup is accomplished by calling MAIL with no operands. It is strongly suggested that all users add "EXEC MAIL" to their PROFILE EXEC to pick up pending mail at logon. MAIL is designed to save and restore the console stack, so that stacked data will not interfere with MAIL when interaction with the user is required. The user has the option of saving each individual mail item; if any mail is saved, the filename that mail is copied to will be displayed for the user.

Detailed instructions on the use of the mail system will be available through the HELP system installed with Release 6. This replaces the "MAIL ?" option.

LARSYS, LSDV, and LARSPEC users should note that MAIL must be called by "EXEC MAIL" while the user is not in a standard CMS environment.

TROUBLE

A new version of the LARS problem reporting system will be installed with Release 6. The calling command has not changed - 'TROUBLE' (or "EXEC TROUBLE" for LARSYS, LSDV, LARSPEC users), with no operands. The major change is that users will now be able to use the CMS editor to enter problem descriptions. Also, because the editor allows the user to review the report, TROUBLE will no longer display the report automatically after the user stops entering input.

Also, the "TROUBLE ?" option has been replaced. Online instructions will be available through the HELP system that will be installed with Release 6.

DIAGNOSE '8' INTERFACE ENHANCED

The CP DIAGNOSE '8' interface is the mechanism which allows programs to execute CP commands from a virtual machine. In Release 6, this interface has been modified to allow the command response to be received in a user specified virtual storage location. The interface allowing the response to appear on the virtual machine's console is unchanged. Further information may be found in the System Programmer's Guide (GC20-1807).

ASSEMBLY LANGUAGE PROGRAMS NEED NEW MACRO LIBRARY

Many of the CMS macros, used by Assembly language programs to interface with the operating system, have been modified under BSEPP. In all cases, the modified macros, as described in the CMS Command and Macro Reference (GC20-1818-2, with supplement SD23-9023-1), should be used.

However, both versions of the macros are available on the system. A new macro library, called "CMSBSE", contains the BSEPP versions; "CMSLIB" contains unmodified macros that are essentially unchanged from Release 5. CMSLIB is still necessary, though, because not all macros have been changed. The proper GLOBAL statement for assembling routines to run under CMS Release 6 with BSEPP is:

```
GLOBAL MACLIB CMSBSE CMSLIB OSMACRO
```

Any private macro libraries required by the user should precede CMSBSE.

M CP'S IN DANGER FROM M OP

Since the initial installation of VM/370, LARS has provided for the use of CP as an alias for the system operator in the MESSAGE command in order to retain compatability with CP/67. Users of this option should be advised that this modification will not be made to Release 7 of VM. The acceptable, standard, two letter abbreviation for 'OPERATOR' is 'OP'. "M OP message" will send a message to the system operator. All programs and EXECs should be modified at your convenience to use M OP instead of M CP.

LARSYS NEWS BY JOAN BUIS

We've heard that a few of you have used the new version of *MERGESTATISTICS and have been pleased with it, but we'd like to remind the rest of you that all other versions of MERGE will be going off-line February 29th. Please try out the new *MERGESTATISTICS before then, and let us know what you think of it. Remember that the control cards are different, so look at the REFERENCE file before trying to use the new *MERGESTATISTICS.

This month, we've made programming corrections to clear up problems in the following processors: DUPLICATERUN, BIPLT, LEVELS, PRINTRESULTS, GRESULTS, and DATAMERGE. Be sure and let us know if you have any problems using LARSYS or LARSYSDV.

As you know, Release 6 is coming on-line February 23. After this date you should IPL LARSYS instead of LS370, and you should IPL LARSYSDV instead of LSDV370. Thanks!

REMOTE TERMINAL HIGHLIGHTS BY SUSAN SCHWINGENDORF

ALABAMA TERMINAL ADDITIONS

Support for the remote terminal located at Alabama A&M University has recently been extended to October, 1980. Included in this contract is the addition of a third typewriter terminal to their configuration. They will then have a Data 100 card reader/printer/punch, two Infoton CRT terminals and a DECwriter terminal. The hardware for this addition has just arrived and will be installed during February.

SRTNEWS REVIEW

Recent articles in SRTNEWS include suggestions on freeing-up JSC dial-up lines, the location of NOAA weather data tapes in the LARS tape library, and a list of current LARS products and rates. To see these articles, type

SRTNEWS or SRTNEWS PRINT print-location [HOLD / NOHOLD] [COPY n / 1]

LARSPEC BY JERRY MAJKOWSKI

LARSPEC was updated on December 20, 1979. The changes were:

1) Problem corrected causing 'open error code 6 on file FT01F001' to be printed at the terminal for some GSPEC control card decks.

2) Problem corrected causing 'FINDRN Error 22' to be printed for some LARSPEC jobs.

3) Reference file descriptions updated.

Copies of the new LARSPEC User's Manual are in the Flexlab 1 and 2 terminal areas. Additional copies are being made for distribution. Contact NANCY FUHS, LARRY BIEHL, or JERRY MAJKOWSKI for copies of the manual or any comments concerning the manual.

Presently, LARSPEC is being tested on VM370, Release 6.

DIGITAL DISPLAY NEWS BY BARBARA PRATT

If you haven't seen the rearranged Flexlab 2 User Area, please accept this cordial invitation to stop by. VIC FLETCHER has done an extra special job of designing and building terminal tables; not only are they functional, but most attractive too. Most of the equipment, tables, and other miscellany have been put in their permanent places awaiting the arrival of the new digital display hardware.

Despite much concerted effort, a "Murphyism" has crept into the tentative equipment arrival/installation schedule. The SI disk drives, which arrived in December, have yet to be installed due to some unanticipated difficulties. These problems should soon be resolved and the drives should be operational by mid-February.

LARS has received confirmation that the Tektronix Graphics Display will arrive in early April.

To assist with the installation/operation of the digital display, one or two LARSians plan to attend the COMTAL training school in late May or early June.

PERSONNEL

Computer Operations extends a welcome to DEBBIE ANDREWS and RUTH COX who joined our staff in January as student computer operators.

Debbie obtained a B.S. degree in Child Development in 1978 and is presently working on an A.D. degree in Nursing and will graduate in May of 1980.

Ruth is going to Purdue working on a degree in Electrical Engineering and will graduate in May of 1982.

SUSAN ROTH joined the staff in January as an undergraduate student in Field Measurements. Susan is a junior in Electrical Engineering and will be working in the Measurements lab as well as out in the field.

STEVE MEGIVERN began working at LARS recently on digital information systems. Steve is pursuing his masters degree in Geosciences.

SUMMARY OF 370/148 COMPUTER USAGE FOR DECEMBER, 1979

Overall Usage	Basic Rate CPU Time Used	5.92
	Priority Rate CPU Time Used	88.63
	Total CPU Time Used	94.55
	Terminal Sessions	3296
	Batch Jobs	483

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	8.63	7
Mon-Fri 8AM-4PM	55.86	39
Mon-Fri 4PM-midnite	21.51	15
Weekend	8.56	6

Batch Job Usage — Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	109	0.26	0.03
BATSHORT	75	5.21	0.29
BATMED	9	6.38	1.32
BATONITE	7	5.94	0.29
BATLONG	21	28.15	9.53
TAPTRAN	5	7.30	0.56
BATEOD	218	9.43	0.78
BATJSC	37	40.61	4.06

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	203	87.69	0.43
Flexlab2	31	INFOTON GTX	211	141.82	0.67
Flexlab2	32	INFOTON GTX	185	117.55	0.64
Flexlab2	33	INFOTON GTX	278	175.63	0.63
Flexlab2	34	INFOTON GTX	187	102.39	0.55
Flexlab2	35	INFOTON GTX	269	144.63	0.54
Flexlab2	36	INFOTON GTX	207	150.89	0.73
Comp. Room	37	DECwriter	132	44.03	0.33
Flexlab1	40	INFOTON GTX	173	124.84	0.72
Flexlab1	41	INFOTON GTX	183	109.23	0.60
Flexlab1	42	INFOTON GTX	159	121.54	0.76
Flexlab1	43	DECwriter	107	56.27	0.53
Dial-up	50	1st in Use	51	32.83	0.64
Dial-up	51	2nd in Use	7	5.65	0.81
Dial-up	52	3rd in Use			
Dial-up	53	4th in Use			
Dial-up	54	5th in Use			
Dial-up	5E	In-House 1st	3	4.43	1.48
Dial-up	5F	In-House 2nd	5	7.26	1.45
Houston	60	Hazeltine 2000	235	97.19	0.41
Houston	61	Hazeltine 2000	223	160.96	0.72
Houston	62	2741	189	85.81	0.45
Houston	63	2741	167	81.16	0.49
Alabama	64	DECwriter	30	34.81	1.16
Alabama	65	INFOTON GTX	4	7.96	1.99
ISU	66	(various)	11	21.06	1.91
ISU	67	(various)	79	37.48	0.47
Houston	6A	Dial-1st in Use	173	149.08	0.86
Houston	6B	Dial-2nd in Use	110	107.33	0.98
Houston	6C	Dial-3rd in Use	126	87.45	0.69
Houston	6D	Dial-4th in Use	107	67.72	0.63

INTRALAB NOTES

ANNUAL REPORT AVAILABLE

Our Annual Report is out. Any staff members who would like to have a copy please see MARLENE HODGE.

THANKS FOR THE CHRISTMAS PARTIES

A special thanks to this years' Christmas party committee: JO ALBERT, JOAN BUIS, and MARK SWENSON. The party was well attended and everyone enjoyed the top sirloin dinner and dancing to band music afterwards. Thanks also to PHIL SWAIN and Gene Davis for leading us in Christmas carols to close the party. A good time was had by all!

Also, the Children's Christmas party committee did a super job of providing entertainment for approximately 30 children and their parents. Hats off to GAY BENSON, DEE DEE DEXTER, DONNA SCHOLZ and MARK SWENSON.

MINI-LARSIANS

Congratulations to Vera and GETULIO BATISTA on the birth of a 7# 6 oz. son, Tulio, on December 15. Batista is currently working on his Ph.D. in Crops.

STAFF CHANGES

JOHN RICHARDS returned to Sydney, Australia, February 1, to his teaching position as Senior Lecturer in Electrical Engineering at the University of New South Wales.

Dr. Richards just completed a six-month sabbatical as a Visiting Professor at Purdue University where he taught EE301 - Signals and Systems.

He has also worked on the Ambiguity Reduction Project at LARS with DAVE LANDGREBE and PHIL SWAIN. CAROL JOBUSCH will continue his work on the project, aided on theoretical issues by Dr. Richards. Two manuscripts have been prepared and submitted for publication on the results to date.

John, his wide Glenda, and their two children Matthew and Jennifer will complete their United States visit with a 3-day stop-over in San Francisco.

DONNA SCHOLZ is leaving LARS February 8, to accept a job at EROS Data Center, Sioux Falls, South Dakota, as Senior Data Analyst. Donna will be working on geological applications of remote sensing and as a consultant to applications personnel in biological and geological sciences. LARS wishes Donna, her husband Gary, and daughter Sarah the best of luck.

PROPOSALS SENT OUT

Title: The Abandoned Mine Lands Inventory Prototype Study for Indiana. Principal Investigator: R. MROCZYNSKI/R. WEISMILLER. Duration: 2/1/80 to 1/31/81. Sponsor: Office of Surface Mining.

Title: 4th Revision - The Application of Remote Sensing Techniques for Waterfowl Habitat Inventory. Principal Investigator: R. MROCZYNSKI. Duration: 2/1/80 to 12/31/80. Sponsor: Ducks Unlimited.

RECENT ACQUISITIONS IN THE LARS LIBRARY

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLV December 1979 *Number 12*

TECHNICAL ARTICLES

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI January 1980 *Number 1*

COVER PHOTO — A Landsat scene produced directly on the Optronics C-4300 Colorwrite from computer tapes obtained from the EROS Data Center. The scene depicts the Colorado River/Fry Canyon area (mostly southeastern Utah) with data having been arranged to maximize color representation over the full response range of the film. Photo was provided by Optronics International, Inc., of Chelmsford, Massachusetts.

TECHNICAL ARTICLES

EE577 FEATURES ENGINEERING ASPECTS OF REMOTE SENSING

PHIL SWAIN is teaching EE577 Engineering Aspects of Remote Sensing this semester (Tues., Thurs., 2:30 - 3:45). Anyone interested in obtaining a tentative lecture schedule should contact Phil. The class enrollment includes a multidisciplinary lot of 27 graduate and undergraduate students.

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 3 · March 7, 1980

PROGRAM LEADER NAMED FOR TECHNOLOGY TRANSFER

Dr. LUIS BARTOLUCCI has been appointed Program Leader for the Technology Transfer Program Area. This promotion comes in recognition of the increasing responsibilities Dr. Bartolucci has been carrying in recent months and his excellent contribution to the field.

Dr. JOHN LINDENLAUB has had increased responsibilities on campus, and he will continue at LARS as Senior Scientist for Technology Transfer.

Luis received his B.S., M.S., and Ph.D. in Geophysics from Purdue University and has been involved in remote sensing research since 1969 here at LARS. He has played an active role in the development of remote sensing technology for applications in the area of water resources and has also made outstanding contributions in the field of thermal infrared radiation for remote sensing applications. Dr. Bartolucci has served as consultant to the U.S. Information Agency, the U.S. Agency for International Development, the Inter-American Development Bank, and to several Latin American development agencies.

He has been Principal Investigator and Project Director for several domestic and international research and training programs involving computer-aided processing and analysis of remotely sensed data for earth resources inventories, and is the author of over thirty scientific publications in the area of remote sensing. His primary research activities involve the application of remote sensing techniques for water quality assessment, spectral response mixture problems, topographic influence on the spectral response of ground cover types, radiometric calibration of Landsat data, and the design of integrated information systems for developing countries.

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).

HONORABLE MENTION RECEIVED FROM ASP

PAUL ANUTA has been informed that a paper authored by N. Chu and him, entitled "Automatic Color Map Digitization by Spectral Classification," which appeared in the April 1979 issue of Photogrammetric Engineering and Remote Sensing, has been selected for honorable mention for the Talbert Abrams Award. Anuta will be present at the American Society of Photogrammetry Convention, March 9-14, 1980, to receive recognition for the award.

POSITION OF ASSOCIATE DIRECTOR OPEN AT LARS

The Purdue University Agronomy Department is seeking candidates for the position of Associate Director of the Laboratory for Applications of Remote Sensing (LARS). A position announcement has been distributed nationally, and a search committee established. Dr. Marvin Phillips, Head of the Agronomy Department, and Dr. DAVID LANDGREBE, Director of LARS, chair this committee.

Although not absolutely essential, Drs. Phillips and Landgrebe hope to obtain someone with administrative experience and some background in remote sensing. Associate Director is a key position, particularly with regard to coordinating remote sensing applications as related to agriculture. The position is available July 1, 1980, and would hold the rank of Associate or Full Professor, Department of Agronomy.

Applicants must have a Ph.D. in one of the plant or soil science research areas. Full details are available from Marvin Phillips, (317) 749-2891, or David Landgrebe, (317) 749-2052. Purdue University is an equal opportunity/affirmative action employer.

LARS TRAVEL LOG

DAVID LANDGREBE travelled to Washington, D.C., on February 5 to participate in the Advanced System Verification Test (ASVT) Review Panel composed of NASA personnel, faculty from several universities, and representatives from federal and non-federal governmental agencies. The panel evaluated technology transfer related proposals from NASA regional centers which were submitted to NASA/Headquarters. Rank ordering was assigned these proposals according to probable value and success.

Dr. Landgrebe was also in Crawfordsville, Indiana, to present a seminar to Wabash College, February 7. His presentation on the state-of-the-art of remote sensing technology was part of the weekly lecture series sponsored by the Department of Biology which is open to the entire college.

JIM KAST and MARVIN BAUER attended the Foreign Commodity Production Forecast and Supporting Research Project Reviews held at NASA/JSC on February 13-14. Jim described the computer support tasks and Marvin made presentations on the field research and crop development stage modeling tasks.

GLORIA PETERSON was in St. Louis, Missouri, on February 24-26, to attend a professional development workshop sponsored by the Central Association of College & University Business Officers.

ROGER HOFFER was in Greenbelt, Maryland, on February 28, to give a talk at Goddard Space Flight Center and confer with NASA officials.

The Quarterly Review was held at NASA/JSC, Houston, Texas on March 3-5. The following LARS staff attended: MARVIN BAUER, CRAIG DAUGHTRY, MARILYN HIXSON, LARRY BIEHL, VERN VANDERBILT, DICK WEISMILLER, and DAVID LANDGREBE.

CRAIG DAUGHTRY, VIC POLLARA, and CHRIS SEUBERT attended the Biological Systems Simulation Workshop on March 4-6.

ROGER HOFFER plans to attend the Annual Convention of ASP and participate in meetings of Regional ASP Presidents on March 9-11, in St. Louis, Missouri. PHIL SWAIN plans to visit the Canadian Centre for Remote Sensing, March 11, to present a seminar and become acquainted with their facilities.

VISITORS

Dr. Edward Yost, Spectral Data Corporation, visited LARS on February 20-21, to investigate possible technology transfer training programs. He met with LUIS BARTOLUCCI, TERRY PHILLIPS, DAVID LANDGREBE and Dr. Woods Thomas, IE&R.

Twenty foreign liason officers from several European, Asian and African countries visited LARS on February 22, to tour the facilities and receive a briefing on remote sensing technology. The met with MARY ELLEN PIERSON, DOUG MORRISON and LARRY BIEHL.

Comodoro Rodolfo Gnus, Mision Permanente de la Republica Argentina ante las Naciones Unidas, was at LARS from February 4-18. He attended the monthly short course and spent another week investigating the potentials of remote sensing for earth resources assessment and management; meterology and geoscienses were emphasized. Comodoro Gnus met with PHIL SWAIN, LUIS BARTOLUCCI, JOAN BUIS, DOUG MORRISON, BARRETT ROBINSON, and JOHN PETERSON.

GOVERNMENT ADMINISTRATIVE REQUIREMENTS STUDIED

The Office of Manpower and Budget Circular A-21 directs how colleges and universities keep track of the way they use their resources, including personnel, property and funding.

The newly revised A-21 will significantly effect this record keeping by requiring an increased degree of accountability. Several task forces have been set up to propose procedures for implementing these revisions. TERRY PHILLIPS is serving on the Task Force on Specialized Service Facilities and DAVID LANDGREBE is serving on the Task Force on Effort Reporting. Dr. Landgrebe plans to give a report on the unique LARS Administrative Information System (LAIS) to the Task Force on Effort Reporting.

APPLE II DEMONSTRATED

DAVID LANDGREBE demonstrated his personal home computer, an Apple II Plus with 32,000 bytes of memory and assessory Floppy Disk Drive, on February 21, at Flexlab 2.

Several programs using BASIC computer language, as well as the color graphics capability of the machine were shown. Possible uses of the personal computer in information processing systems were discussed, including one user who has programmed his machine to analyze Landsat data. The potential for remote sensing technology transfer applications is also an exciting possibility.

BASIC RESEARCH PLANNING CONTINUES

NASA's Basic Research Planning Activity in the "renewable resources" area is progressing. The Working Group on Mathematical Pattern Recognition and Image Analysis held a workshop in January on image registration and rectification. The second workshop, on image modeling, was held February 21-22, at Texas A&M University. Purdue University has been represented by PHIL SWAIN and civil engineering professor Ed Mikhail, both Working Group members, and by PAUL ANUTA and electrical engineering professor Robert Mitchell.

The third and final workshop in this series, on digital image pattern recognition, will be held at Texas A&M University on March 26-28. The Working Group hopes to finish its deliberations by June 1980 so that NASA will be prepared to begin funding the Mathematical Pattern Recognition and Image Analysis basic research program in FY81.

HOW TO SUBMIT AN ARTICLE TO SCAN LINES

Those wishing to contribute articles to SCAN LINES should submit rough drafts to SCAN LINES' editor, SUE FERRINGER, at least two weeks prior to the date of publication (see table below). All users of the LARS system, Purdue staff and remote sensing researchers are invited to submit articles for consideration.

To submit an article, address a draft to:

SCAN LINES
Laboratory for Applications of Remote Sensing
Purdue University
1220 Potter Drive
West Lafayette, Indiana 47906

Be sure to include your name and phone number with your article.

SCAN LINES SCHEDULE

ISSUE	INFORMATION NEEDED BY	SCAN LINES DISTRIBUTED
APRIL	Mon. Mar. 24	Mon. Apr. 7
MAY	Wed. Apr. 23	Wed. May 7
----------NO SCANLINES DUE TO OVERLOAD FROM SYMPOSIUM----------		
JULY	Tue. Jun. 17	Tue. Jul. 1
AUGUST	Fri. Jul. 18	Fri. Aug. 1
SEPTEMBER	Mon. Aug. 18	Mon. Sep. 1
OCTOBER	Wed. Sep. 17	Wed. Oct. 1
NOVEMBER	Mon. Oct. 20	Mon. Nov. 3
HOLIDAY	Fri. Dec. 5	Fri. Dec. 19
------NO SCAN LINES DUE TO OVERLOAD FROM CONTRACT YEAR END AND HOLIDAYS---		
FEBRUARY	Mon. Jan. 19	Mon. Feb. 2

NEW LARS TECHNICAL REPORTS

080879 An Investigation of Analysis Techniques of Landsat MSS Data Designed to Aid the Soil Survey by S. A. Kaminsky, R. A. Weismiller and B. O. Blair.

Four Landsat data point selection schemes were investigated to determine the best classification representation of the soils within the county. Of the four classifications, those considering parent material boundaries proved to be the most representative. Within these classifications drainage characteristics, soil erosion, and textures could easily be identified by spectral definitions.

The research described in this report was sponsored by NASA under Grant No. NGL 15-005-186.

121579 Data Acquisition Through Remote Sensing by E. R. Stoner and M. F. Baumgardner.

The case is presented that remote sensing technology provides a useful tool for acquiring certain kinds of data for land use planning purposes. A brief description is given of current methods and specifications of data acquisition systems. Several examples are given for using digital analysis of remotely sensed data to identify and map earth surface features of interest to the land use planner.

SYSTEM SERVICES March 7, 1980

REMOTE TERMINAL HIGHLIGHTS BY SUSAN SCHWINGENDORF

OLD VERSION OF IMSL TO BE REMOVED

On March 17, 1980, the original version (Edition 6) of IMSL which was installed on the Purdue/LARS computer will be erased from the system. This version was accessed by typing

GETDISK JSCDISK 19E

You may access the Edition 7 IMSL routines on JSCDISK 29E. If you have any questions, please contact Bob Goode (JSC) or SUSAN SCHWINGENDORF (LARS). The old version is being removed in preparation for the installation of the latest IMSL modifications in the near future.

FEBRUARY 23RD SYSTEM UPDATE

If any remote site terminal users encountered CP/CMS commands or programs which suddenly didn't work after the February 23rd system revision, please check the February 1980 SCAN LINES or call SUSAN SCHWINGENDORF for assistance.

TAPE DRIVE RESOURCES BY MIKE COLLINS

As most of you are aware, our usage has increased during the past couple of weeks. As our usage increases so does the need for resources such as tape units. In the past, we have tried to limit the number of tape units per user during the peak usage shift of 8 a.m. to 5 p.m. Two drives per user occasionally cause a temporary shortage of drives for others, but with one and two users on the system desiring three, lengthy delays in obtaining drives do occur. Even with the speed of the 3031 in processing jobs, drives become temporarily unavailable to users due to the number of drives being used per user and the increased load.

We would appreciate everyone's cooperation in relieving burdens on others by running jobs after 6 p.m. and during the midnight to 8 a.m. shifts requiring three drives. In special cases, users may use three drives during these hours by contacting MARY ELLEN PIERSON or MIKE COLLINS before starting the job.

ADDITIONAL DISK STORAGE SPACE BY MIKE COLLINS

A CDC 33502 disk unit has been ordered for LARS and should be installed and available to users by the end of April. The unit has the capacity of 4-IBM 3350 disks or a total of 1,012 megabytes.

NEW MACRO LIBRARY BY MON LI TANG

A new macro library called 'DMSLARS', was added to the system containing LARS modification to the CMS macros. In order to get the modified version, this library must be included in the GLOBAL statement:

GLOBAL MACLIB DMSLARS CMSBSE CMSLIB OSMACRO

CMSBSE is the library containing BSEPP modified version of the CMS macros; whereas CMSLIB is the unmodified version from Release 5. Any private macro libraries required by the user should precede DMSLARS.

MULTILITER NEWS BY CHUCK SMITH

Two new applications programs are available for general use on the PDP1134A: BLDPAT and CFIELD. BLDPAT will put together a new grayscale pattern with up to 60 symbols for use with GDATA and GRESULTS using symbols from existing patterns. BLDPAT prompts the user for all symbols to be used in the pattern, allows you to check the symbol list and make any changes or corrections, then builds the pattern. The user can then punch off or transfer the new pattern file to an IBM virtual machine using the LITER command file.

CFIELD permits a user to create LARS12 formatted field description cards from line printer printouts digitized on the table digitizer using the menu-based program BNDRY. CFIELD prompts the user for all necessary information. The user can then punch off or transfer the field description cards to an IBM virtual machine using the LITER command file.

HELP files will soon be available on the PDP for all user-available programs, including BLDPAT, CFIELD, and LITER. If you have any questions about these programs or using the PDP, please contact CHUCK SMITH.

Note: New symbols are wanted for our pattern library. Please contact CHUCK SMITH if you have a pattern you would like to contribute.

DIGITAL DISPLAY NEWS BY DAVE FREEMAN

The Tektronix software was delivered February 27, and is currently being evaluated for any changes that will be needed before it is used with the new Tektronix graphics display which is scheduled to arrive in early April.

PERSONNEL

CAROL MCKIEL has joined the Computer Operations Staff effective February 25. Carol will be the full time Computer Operator on the 4 p.m. - midnight shift once her training is completed. Carol comes to LARS with IBM 370 hardware experience and experience with associated hardware.

SUMMARY OF 370/148 COMPUTER USAGE FOR JANUARY, 1980

Overall Usage	Basic Rate CPU Time Used	20.13
	Priority Rate CPU Time Used	118.36
	Total CPU Time Used	139.49
	Terminal Sessions	3988
	Batch Jobs	646

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	21.45	12
Mon-Fri 8AM-4PM	71.07	41
Mon-Fri 4PM-midnite	32.35	18
Weekend	13.62	12

Batch Job Usage — Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	173	0.19	0.04
BATSHORT	64	4.26	0.20
BATMED	40	10.70	1.23
BATONITE	24	4.90	0.62
BATLONG	4	192.20	10.62
TAPTRAN	8	9.99	2.63
BATEOD	244	12.92	1.31
BATJSC	79	40.79	14.13

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	206	104.60	0.51
Flexlab2	31	INFOTON GTX	346	168.67	0.49
Flexlab2	32	INFOTON GTX	285	183.59	0.64
Flexlab2	33	INFOTON GTX	364	210.37	0.58
Flexlab2	34	INFOTON GTX	322	199.07	0.62
Flexlab2	35	INFOTON GTX	325	211.37	0.65
Flexlab2	36	INFOTON GTX	300	200.21	0.67
Comp. Room	37	DECwriter	219	82.99	0.38
Flexlab1	40	INFOTON GTX	188	117.28	0.62
Flexlab1	41	INFOTON GTX	198	166.72	0.84
Flexlab1	42	INFOTON GTX	209	131.89	0.63
Flexlab1	43	DECwriter	112	57.32	0.51
Dial-up	50	1st in Use	60	58.35	0.97
Dial-up	51	2nd in Use	20	14.60	0.73
Dial-up	52	3rd in Use	4	4.39	1.10
Dial-up	53	4th in Use	1	0.94	0.94
Dial-up	54	5th in Use			
Dial-up	5E	In-House 1st	2	1.33	0.67
Dial-up	5F	In-House 2nd	12	8.88	0.74
Houston	60	Hazeltine 2000	213	128.72	0.60
Houston	61	Hazeltine 2000	250	171.42	0.69
Houston	62	Trendwriter	239	141.09	0.59
Houston	63	Trendwriter	197	130.41	0.66
Alabama	64	DECwriter	60	70.75	1.18
Alabama	65	INFOTON GTX	33	34.61	1.05
ISU	66	(various)	20	2.76	0.14
ISU	67	(various)	84	48.80	0.58
Houston	6A	Dial-1st in Use	215	203.20	0.95
Houston	6B	Dial-2nd in Use	150	153.54	1.02
Houston	6C	Dial-3rd in Use	144	137.50	0.95
Houston	6D	Dial-4th in Use	149	129.74	0.87
St. Regis	4A	DECwriter			

INTRALAB NOTES

PERSONNEL CHANGES

Dr. VERN VANDERBILT was appointed in January to the position of Research Engineer. Vern has been with LARS nearly 10 years, first as a graduate assistant, and more recently as a post-doctoral research associate. He is in the Measurements Program Area and will be conducting research on the analysis and modeling of the radiation properties of crops and soils under MARVIN BAUER.

JOAN BUIS has been promoted to Systems Training Specialist under the supervision of LUIS BARTOLUCCI. This is a joint position between Technology Transfer and System Services. Her responsibilities include teaching the monthly short course, working as a visiting scientist instructor and assisting in the development of training materials. She is also responsible for maintenance of LARSYS processors.

TERRY PHILLIPS announced several promotions as a result of updating job descriptions in the System Services area: ROSS GARMOE is responsible for the computer products as Manager of Computer Systems; PETER JOBUSCH is responsible for systems software as Senior Computer Analyst under the supervision of Ross. Both LUKE KRAEMER and CATHY KOZLOWSKI are now classified as Systems Analyst II. Luke will be working under JIM KAST, with increased responsibility for systems analysis, software development and task management. Cathy will be working under DAVE FREEMAN. She is responsible for all program and product documentation and maintenance for reformatting, and implementation of new processors.

MARTA DZUIBINSKYJ has resigned her position in the Business Office to stay home with her new daughter, Adrianne. NANCY KLINE has been promoted to Account Clerk to fill the vacancy. Nancy will take care of bi-weekly payroll, travel, purchasing and other Business Office duties. Nancy was the LARS Flexlab I receptionist since August 1978. STEPHANIE STILES has been hired as the new Flexlab 1 receptionist.

Jim Mariga, previous LARS Business Administrator, has accepted a promotion to the position of Assistant Director, Purdue Budget Office.

PROPOSALS SENT OUT

Title: Digital Information System for the Oruro Department, Bolivia
Sponsor: Programa ERTS/Bolivia
P.I.: LUIS BARTOLUCCI and TERRY PHILLIPS
Duration: February 1, 1980 - July 31, 1981

Title: The Application of Photo-Interpretation Techniques to Assess Episodic Storm Damage
Sponsor: U. S. Army Corps of Engineers
P.I.: RICHARD MROCZYNSKI
Duration: March 1, 1980 - December 31, 1980

Title: Research in Remote Sensing of Agriculture, Earth Resources, and the Environment (proposal addendum)
Sponsor: NASA
P.I.: MARVIN BAUER
Duration: March 1, 1980 - November 30, 1980

Title: Processing of Landsat Computer Compatible Tapes
Sponsor: DMA/IAGS Panama
P.I.: LUIS BARTOLUCCI
Duration: April 14-18, 1980

Title: Phase III of NASA Contract NAS9-15325 (proposal addendum)
Sponsor: NASA
P.I.: RICHARD MROCZYNSKI
Duration: April 1979 - July 1980

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 4 · April 9, 1980

BLM SHORT COURSE SUCCESSFUL

LUIS BARTOLUCCI, SHIRLEY DAVIS, DON LEVANDOWSKI and Donna Scholz (consultant from EROS Data Center, Sioux Falls, South Dakota) formed the teaching staff of a one-week short course presented at Denver, Colorado, to fourteen Bureau of Land Management (BLM) geologists. These fourteen BLM staff members represent the western United States area and are responsible for making recommendations about usage of government owned lands from a geologic point-of-view.

The course content presented in Denver, March 24-28, emphasized the visual interpretation of Landsat imagery, and included a brief introduction to numerical analysis and a demonstration of the IDIMS computer system. BLM is planning a second one-week short course, which will emphasize digital analysis.

Mike Radel (Medical Illustration) accompanied the LARS teaching staff as a cameraman. He recorded the whole course on videotape as an aid to future instructors.

INTERNATIONAL SYMPOSIA TO FEATURE SOILS

Advances during the past decade in data acquisition and data analysis systems designed to observe and monitor the Earth surface have been dramatic. Early in the 1970's, Purdue University held its first symposium to highlight research results in computer-aided information extraction techniques applied to data related to land, mineral, vegetation, and water resources.

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).

The purpose of the sixth symposium on Machine Processing of Remotely Sensed Data, June 3-6, 1980, is to provide another creative forum for the presentation and discussion of research results and their applications to Earth resources. This year the symposia is jointly featuring Soil Information Systems, Remote Sensing and Soil Survey, as well as the traditional Machine Processing of Remotely Sensed Data.

Approximately forty long papers and forty short papers will be given; a significant percentage of which were contributed by foreign researchers. Opening and closing plenary sessions will include presentations on the following topics:

Future Global Information Needs for Land Resources

Future Earth Observation Systems

A Survey of Soil Information Systems

New Opportunities in Soil Survey for Remote Sensing

Storage, Retrieval, and Analysis of Resource Data in the 1980's

Prospects for Improving Resource Information Delivery

Research Agenda for the New Decade: A Better Understanding of the Agricultural Scene

One afternoon will also be devoted to technical and/or cultural field trips. Informal discussions of "hot" issues will occupy the evenings for anyone interested.

In addition, a special short course on Applications of Digital Analysis of Multispectral Data to Soils will be offered the week following the symposium, June 9-13, 1980. Some spaces are still available for this special course.

The course will cover the concepts of data processing, pattern recognition, and numerical analysis, then show how this technology has been and can be applied to soils projects. Content of the regular LARS monthly short course will be modified significantly incorporating soils discussions, seminars, and field demonstrations. Considerable interaction with Purdue Soil Science faculty will be achieved through these activities and daily luncheons.

To register for either the symposium or the special short course on soils, or for further information, contact:

Douglas B. Morrison
LARS/Purdue University
1220 Potter Drive
West Lafayette, Indiana 47806 USA

Telephone: (317) 749-2052

OPERATIONAL LAND REMOTE SENSING SATELLITE PROGRAM PLANNED

"The Presidential decision to go forward with the development of an operational land remote sensing satellite program was announced November 1979. The National Oceanic and Atmospheric Administration (NOAA), in the Department of Commerce, was designated to manage the program. NOAA, through its National Environmental Satellite Service (NESS), has been conducting the Nation's civilian operational meteorological satellite program since 1966."

"Developing an operational service for users of land remote sensing satellite systems calls for NOAA to understand fully the needs of the user community, and particularly of non-Federal users. It also makes it necessary for these non-Federal users and NOAA, together, to establish and continue a dialogue that will ensure that the operational system is as responsive to user needs as technology and available resources will allow." (from conference brochure)

SHIRLEY DAVIS, DICK MROCZYNSKI, LANNY LUND, BUD GOODRICK, and DOUG MORRISON attended the one-day conference held for the midwestern region in Chicago, Illinois, on March 17.

The five regional conferences were held to inform users of the planning now under way, and to gather more information about future user requirements. This information will be used by NOAA in fashioning the transition plan for moving from the experimental NASA Landsat system of today to the operational NOAA land satellite system that will begin in this decade and carry on through the turn of the century.

LARS PAPERS PRESENTED AT ERIM SYMPOSIUM

Several of LARS staff will be participating in the 14th International Symposium on Remote Sensing of the Environment. The conference is sponsored by the Environmental Research Institute of Michigan (ERIM) and will be held in San Jose, Costa Rica, April 23-30.

A plenary address will be given on "Remote Sensing Applications in Latin America" by LUIS BARTOLUCCI and Thomas Wagner (ERIM). Bartolucci will also present a paper in the Technology Transfer technical session co-authored by TERRY PHILLIPS and SHIRLEY DAVIS on "Building Locally Adapted Remote Sensing Programs in Developing Nations." In the same session PHIL SWAIN will present an invited paper co-authored with SHIRLEY DAVIS and Pierre Adrien (Inter-American Development Bank) entitled: "Remote Sensing Decoded: Meeting the Challenges of Multidisciplinary and International Remote Sensing."

Finally, ROGER HOFFER will present a paper on "Mapping Land Cover in Latin American Countries by Computer-Aided Analysis of Satellite Scanner Data" which Bartolucci also co-authored. TERRY PHILLIPS and RICK LATTY will also be attending the conference.

VISITORS

On March 10, Professor Victor Riemenschneider and five students from IUPUI visited LARS for a discussion of how remote sensing relates to problems of the environment.

Oscar Montgomery and three students from the Department of Natural Resources and Environmental Studies, Alabama A&M University, visited LARS March 11. They met with DOUG MORRISON, MARY ELLEN PIERSON, LARRY BIEHL, BUD GOODRICK, JOAN BUIS, and CHUCK SMITH to discuss LARS capabilities and tour Purdue University.

Four French representatives: Gilbert Nicolaon, Scientific Attache from Chicago; Michel Bernon, Head of Biology and Agriculture, Michele Cheverl, Scientific Attache, French Embassy, Washington D.C.; and Gilbert Weill, Head of the Remote Sensing Program, French Space Agency, visited LARS on March 12. They met with LUIS BARTOLUCCI, BARRETT ROBINSON, VERN VANDERBILT, and MARVIN BAUER to exchange information about common research activities in remote sensing.

LARS TRAVEL LOG

DAVE L'HEUREUX travelled to S.E. Arizona, March 8-14, to field check classification results using the new LARS gamma ray spectrometer. Several potential mineral sites were inspected and gamma ray data collected.

PHIL SWAIN was at Texas A&M University on March 26-28, to participate in the third workshop on the NASA Basic Research Planning Working Group on Pattern Recognition and Image Analysis. The three day workshop, the last in the series, was on pattern recognition. (The previous two were on registration and rectification, and image modeling).

DAVE LANDGREBE has been appointed a member of the Committee of Data Management and Computation of the National Research Council's Space Science Board and will be attending a meeting and making a presentation on April 2-4, at the National Academy of Science in Washington, D.C.

LUIS BARTOLUCCI will be presenting a short paper on "Manipulation of Computer-Compatible Tapes" from April 14-18, in Panama. The course is a remote sensing training activity of the Defense Mapping Agency and Inter-American Geodetic Survey (DMA-IAGS) Cartographic School. Bartolucci will be teaching the course in Spanish.

NEW PROJECTS FUNDED

Title:	The Application of Remote Sensing Techniques for Waterfowl Habitat Inventory
Sponsor:	Ducks Unlimited
P.I.:	DICK MROCZYNSKI
Duration:	February 1, 1980 - December 21, 1980.

NEW LARS PUBLICATION

121279 LARSPEC User's Manual by N.C. Fuhs and L.L. Biehl

LARSPEC is a system of Fortran and assembler computer programs used to access and analyze data obtained from spectrometer or multiband radiometer systems that have been used for laboratory or field research. The LARSPEC software system is designed to be used on an IBM computer operating under VM370/CMS.

The purpose of the "LARSPEC User's Manual" is to describe the capabilities of the LARSPEC system to researchers and how to access and use the system.

REMINDER

Closing registration date is April 30, 1980 for the Advanced Topics in the Analysis of Remote Sensing Data short course, May 12-16, 1980. For information about prerequisites and course content, write or phone the chairman, PHIL SWAIN, at LARS. For information about registration and lodging, write or call JOHN ALMON, Division of Conferences, Rm. 116, Stewart Center, Purdue University, West Lafayette, IN 47907, U.S.A., (317) 749-2533.

SYSTEM SERVICES April 9, 1980

SAS AT LARS BY CAROL JOBUSCH

PREFACE

This is a condensed and modified version of the reference document produced by SAS Institute. I have tried to include all the information that a new SAS user would need. Anyone who would like a copy of the original (14-page) document, please ask Carol Jobusch at LARS or Cecil Hallum at JSC.

PART 1. INTRODUCING CMS/SAS

The information presented here is intended to document the differences between SAS in OS environments and CMS/SAS. Duplication of information found in the SAS User's Guide, 1979 Edition, has been avoided where possible.

CMS/SAS operates in two modes. In non-interactive mode, you create SAS programs using the CMS editor and then process these programs with SAS. In interactive mode, you interact with the SAS system by entering SAS program statements and receiving the results of these statements on the terminal.

[NOTE: The SAS "non-interactive" mode is not a BATCH mode. You use CMS interactively even when SAS is used "non-interactively." SAS cannot be run in a BATCH machine.]

A summary of the basic information on using CMS/SAS in non-interactive mode follows:

1. Log on a terminal and ipl CMS.

2. Create a CMS file containing the SAS statements to be processed by CMS/SAS. This file must have a filetype of SAS but may reside on any accessed disk (usually your A disk).

3. Issue the SAS command:

SAS	filename [(options]
	options: [Print TYpe NOPrint] [TErm NOTErm] [SAS options]

The SAS command operands are described below:

filename specifies the name of the CMS file of SAS statements to be processed by CMS/SAS. This file of SAS statements must have a filetype of SAS but may reside on any accessed disk.

options are options to be used either by SAS itself or by the CMS/SAS interface program. The options that may appear on the SAS command are described below.

Options that may be used to control the behavior of the CMS/SAS interface (Upper case characters indicate the shortest allowed abbreviation.):

TErm specifies that SAS error messages are to be displayed on the terminal as they are produced, along with, if possible, the line in which the error was detected. (default)

NOTErm specifies that SAS error messages are not to be displayed on the terminal.

Print specifies that the output from SAS procedures is to be printed on the virtual printer.

NOPrint specifies that the output from SAS procedures is to be written on disk. (default)

TYpe specifies that the output from SAS procedures is to be typed on the terminal as it is produced.

In addition to these CMS/SAS Interface options, the SAS options described in Appendix 2 of the SAS User's Guide, 1979 Edition, may also be specified on the command line.

SAS options may also be specified in an OPTIONS statement within the SAS program. If you choose to specify SAS options in the command line, the equals sign (i.e., =) between keyword options and their values should be omitted. For example, to specify that fifty observations are to be processed, enter the command as follows:

```
SAS filename ( OBS 5Ø
```

File Conventions: Input Sources, Output Destinations

In non-interactive mode, the SAS command processes a file with a filetype of SAS. This file may be stored on any disk that you have accessed. As a result of processing the input file, SAS may produce several disk files, all of which are stored on the disk that contains the input file specified in the command line. If this disk is read-only, the output files are stored on your A disk. These files have the same name as the input file.

Output Files Produced

The file "filename SASLOG" is the SAS log file. It contains a numbered list of all your SAS program statements, as well as SAS error messages and notes. The SASLOG file is created with carriage control characters. If you print a SASLOG file on the high speed printer, you should specify the CC option in your CMS PRINT command, or use the SASPR command described below.

The file "filename LISTING" contains the output from the SAS procedures invoked by your program and output directed to FILE PRINT from any DATA steps in your program (unless you have used the Print or TYpe options of the SAS command). The output from each procedure starts on a new page.

The file "filename SASPUNCH" contains punched output generated by SAS procedures and output directed to FILE PUNCH from any DATA steps.

After you have executed SAS, you can use the SASPR command to obtain a printed copy of your SAS, SASLOG, and LISTING files. The format of the SASPR command is

SASPR	filename1 [filename2 ...]

where:

filename1 ... are the names of SAS programs.

PART 2: THE DATA STEP

SAS can read data from disk or tape and write data to disk or tape. To make such files available to your SAS program, enter a FILEDEF command for the file to be read from or written to either before entering the SAS command or in the SAS program prior to the DATA statement. The FILEDEF could appear in the SAS program prefixed by 'CMS' and followed by ';' as shown below (see Part 4 for more information):

```
CMS FILEDEF ddname DISK filename filetype filemode ;
```

The "ddname" specified in the FILEDEF command must be the same as the ddname given in the SAS INFILE or FILE statement and must be different from the filetype used for any CMS/SAS data base. The following ddnames should not be used for files referenced by FILE or INFILE statements:

```
Any name beginning with TAPE,
FT11F001, FT12F001, FT13F001, FT15F001,
LIBRARY,  SYSIN,    USER,     WORK.
```

SAS Data Base

A CMS/SAS data base is represented by a collection of CMS files with the same filetype and different filenames. Every SAS program has access to a temporary SAS data base with a filetype (and ddname) of WORK. [CAUTION: Since SAS erases all files with a filetype of WORK both prior to execution and at termination, you should not have any files of that filetype.] Any SAS data sets you want to keep for later use should be written with a filetype other than WORK. If CMS/SAS terminates abnormally, you may want to issue the CMS command ERASE * WORK, especially if failure is due to a "disk full" condition.

You can create or access SAS data bases on your A disk by referencing DATA=filetype.filename in your SAS program without issuing any prior FILEDEF. This filetype (or ddname) used for a SAS data base should be unique -- there should not be any non-SAS data sets on your minidisk with that filetype. SAS data sets with a filetype other than WORK are not erased when CMS/SAS terminates and can be accessed in a later SAS job. If you want to direct a SAS data base to a disk other than A, issue a FILEDEF to indicate the disk mode, either before or after entering the SAS environment. For example, in your SAS program:

```
CMS FILEDEF DD1 DISK DUMMY DD1 C ;
 DATA  DD1.PARTS ;
```

directs the SAS data set DD1.PARTS to the C disk. The ddname and the filetype (DD1) should be identical, since the ddname becomes the CMS filetype. The filename specified (DUMMY) is not used since the second half of the SAS data set name becomes the filename for the CMS file (in this case, PARTS DD1 C1).

For efficiency, the maximum block size for a "work" file is 4000 bytes. This implies a limit of 498 numeric variables in a SAS data set in the WORK data base. If you exceed this limit, your SAS program will terminate with an I/O error. A CMS/SAS data base with a ddname other than WORK will have a block-size of up to 32760 bytes.

For ddnames other than WORK, one CMS file is written for each SAS data set created. In addition, a CMS file identified as #DIRE ddname filemode, containing the SAS directory for that SAS data base, is created. The individual files are not usable by SAS without the #DIRE file. We recommend that you not use CMS ERASE to eliminate any part of a CMS/SAS data base since the directory entries would remain. To eliminate SAS data sets (both the directory entry and the CMS file), use:

```
PROC DELETE DATA=...;
or
PROC DATASETS DDNAME=ddname; DELETE ...;
```

If the entire data base is to be deleted, then you may use "ERASE * ddname filemode" without adverse effect.

PART 3: THE PROC STEP

Unsupported SAS Procedures

The following procedures are not presently supported by CMS/SAS

BMDP	CONVERT	COPYVOL	COXREGR
OPSCAN	PDS	PDSCOPY	RELEASE
SAS72	SETINIT	SOURCE	SURVTEST
TAPECOPY	TAPELABEL	TPLSAS	

In addition, the following procedures have restrictions or special considerations in CMS/SAS:

CONTENTS	COPY	DATASETS	DELETE
FORMAT			

PART 4: FEATURES UNIQUE TO CMS/SAS

An additional SAS statement of the form:

```
CMS <CP> <command> ;
```

has been added to allow execution of CMS SUBSET and CP commands in the SAS environment. The CMS statement is valid in both interactive and non-interactive modes. The CMS statement allows you to include commands in your SAS program to gain access to disk and tape files used in the program. Examples:

to issue a CMS command:

```
CMS FILEDEF MYFILE DISK FN FT FM ;
```

to issue a CP command:

```
CMS CP LINK USER 191 193 RR ;
```

SAMPLE SAS PROGRAM

The SAS program NAMESORT reads a list of names and extension numbers from a CMS disk file, sorts the list by extension, "prints" the sorted file (as NAMESORT listing), and writes a new CMS disk file containing the sorted list.

```
.type namesort sas

CMS FILEDEF DATIN DISK NAME LIST;
CMS FILEDEF DATOUT DISK TELEPHON LIST;
DATA;  INFILE DATIN;
       INPUT NAME $CHAR20. EXT 21-23;
PROC SORT;  BY EXT;
PROC PRINT;
DATA;  SET DATA1;
       FILE DATOUT;  PUT EXT NAME;


.type name list

FUHS, NANCY          245
HIXSON, MARILYN      249
JOBUSCH, CAROL       246
JOBUSCH, PETER       297
KAST, JIM            289
VANDERBILT, VERN     245

.sas namesort
SAS RELEASE 79.2B

$ $ SAS PROGRAM FINISHED
R; T=2.99/5.83 16:27:31

.type telephon list

245 FUHS, NANCY
245 VANDERBILT, VERN
246 JOBUSCH, CAROL
249 HIXSON, MARILYN
289 KAST, JIM
297 JOBUSCH, PETER


.listfile * * (date
FILENAME FILETYPE  FM  FORMAT   RECS  BLKS    DATE      TIME
NAME     LIST      A1  F     80    6     1   3/26/80 16.15.13
TELEPHON LIST      A1  F     80    6     1   3/26/80 16.27.29
NAMESORT LISTING   A1  V    133   20     1   3/26/80 16.27.29
NAMESORT SAS       A1  F     80   11     1   3/26/80 16.24.05
NAMESORT SASLOG    A1  V    133   28     2   3/26/80 16.27.30
```

DIGITAL DISPLAY NEWS BY BARBARA J. PRATT

THE TEKTRONIX GRAPHICS DISPLAY HAS ARRIVED!! The unit was powered up in March and stand-alone testing has begun. Subsequent separate terminal mode attachment and operation will be made to the PDP11/34A and IBM 3031 computers. Software to support the unit in the terminal mode has also arrived but development will be low level as the Comtal display has priority. Please take a few extra moments to see our latest acquisition.

We have it on good authority that the COMTAL display will arrive sometime between late April and early May. The utility software is currently being planned and programmed for display support and operation. Multispectral and classification data will be transferred from the IBM computer to the PDP utilizing a LARSYS Duplicaterun style processor. A few members of the original digital display planning committee (DDPC) will help in assigning priorities for the implementation of application software. Be sure to keep the DDPC apprised of your special needs for the display.

Digital Equipment Corporation delivered and installed the dual diskette (floppy) storage drives mid-March. This installation has allowed us to schedule the DEC RSX-11M V3.2 system upgrade for April 15, 1980 -- sooner than originally expected. The operation of the diskette drives (RX211) is dependent on this operating system.

REMOTE TERMINAL NEWS BY JOAN BUIS

ALABAMA A&M VISITORS

On March 11 and 12, Dr. Oscar Montgomery, Miss Jackie Battle, Mr. Delaney Johnston and Mr. Mohammed Ghafori, from Alabama A&M University in Huntsville, Alabama visited LARS. In their 1½ day visit, they met with JOAN BUIS, BUD GOODRICK, LARRY BIEHL, BARRETT ROBINSON, CATHY KOZLOWSKI, MARY ELLEN PIERSON, DOUG MORRISON and CAROL JOBUSCH. Dr. Montgomery's three students are frequent users of LARSYS, so it was exciting for them to be able to really see what LARS is all about. We enjoyed having them here, and look forward to our continued relationship through their remote terminal site.

REMOTE TERMINAL HIGHLIGHTS BY SUSAN SCHWINGENDORF

JSC DIAL-UP LINE AVAILABILITY

Because of the heavy use of the JSC dial-up lines, the following suggestions were made by Bob Goode (JSC) to improve the availability of the lines. (These suggestions appeared in SRTNEWS in January).

1. Dial-up users have been using the logoff hold command to terminate their terminal session yet keep the phone line established. This works great when someone is waiting to use that terminal, but ties the phone line up for the next 10, 15, 60, 120 etc. minutes if no one is there waiting. Therefore, if no one is waiting, please use the normal logoff command and then hang up the phone.

2. After you perform the normal logoff and the phone line loses the carrier, please remember to hang up the phone. If not, the computer has disconnected you, but the phone company still thinks you're on the line and gives a busy signal to incoming callers. When someone finally notices what has happened, someone has to call the phone company and explain why we need their help in clearing the lines.

3. This recommendation combines both 1 and 2. Users should be aware that when a terminal session is terminated with the log hold command, the computer will eventually disconnect the line. This in itself is good, but then the phone is still off the hook and no one else can use that phone line.

Therefore, in the spirit of teamwork, cooperation and fairplay, please use the log hold command only when someone is waiting to use that terminal, and remember to return the receiver to the cradle after logging off.

IMSL - EDITION 7 UPDATE BY SUSAN SCHWINGENDORF

A maintenance tape for IMSL Edition 7 has been received, and about 40 IMSL subroutines have been updated on the Purdue/LARS computer. The update serves to correct software and documentation errors. No new subroutines were added, and the calls to existing subroutines remain the same. User's at JSC should see Bob Goode for information on the documentation updates. To access the updated IMSL you should now use

```
GETDISK IMSL
```

in addition to the GLOBAL command for the IMSL text libraries, SIMSLIB and DIMSLIB. Please call SUSAN SCHWINGENDORF (LARS) if you experience any difficulty in accessing IMSL.

COMPUTER COSTS BY SUSAN SCHWINGENDORF

A number of questions have been raised as to the actual computer costs of running different types of jobs. The following computer services are ones you are most likely to use when logged on to the computer. (Users are charged all applicable rates).

COMPUTER SERVICE - $275/CPU hour. This is a basic charge for access to the Purdue/LARS computer and all its hardware and software. The charge is based on the time which the computer central processor is devoted exclusively to the execution of the user's program.

PRIORITY SERVICE - $200/CPU hour. This is charged in addition to the Computer Service rate above for users accessing the system in the interactive mode, or for users of batch machines with rapid turnaround.

LOCAL TERMINAL - $6/hour of clock-time attached. This rate supports the terminal facilities used by FLEXLAB1 and FLEXLAB2 personnel, and also provides dial-up access to the Purdue/LARS computer.

LARSYS - $350/CPU hour. Any jobs accessing the LARSYS or LARSYSDV programs for analyzing multispectral scanner data are charged this rate to support its maintenance and upgrades.

LARSPEC - $10/CPU minute. This rate is charged to users of the LARSPEC system for analyzing spectroradiometer data to provide for its software maintenance and modification.

STATISTICAL SERVICES - $500/CPU hour. This rate provides the user with access to SPSS and other statistical routines in addition to assistance in the use of these routines.

Let's look at a few specific examples:

Case 1: Running a LARSYS job from a remote site terminal

For each CPU hour used you will be charged

Computer Service	$275/CPU hour.
Priority Service	$200/CPU hour
LARSYS	$350/CPU hour
Total	$825/CPU hour

Case 2: Running SPSS from a terminal at Flexlab1 or Flexlab2

For each CPU hour used you will be charged:

Computer Service	$275/CPU hour
Priority Service	$200/CPU hour
Statistical Services	$500/CPU hour
	$975/CPU hour
Plus Local Terminal	$ 6/#hrs. connected

Case 3: Editing a Control Card Deck, Inputting Data, or Testing and Revising a Fortran Program Using a Dial-Up Terminal at home.

For each CPU hour used, you will be charged

Computer Service	$275/CPU hour
Priority Service	$200/CPU hour
	$475/CPU hour
Plus Local Terminal	$ 6/number hours connected

Case 4: Running an Overnight Batch Job

For each CPU hour used, you will be charged

Computer Service	$275/CPU hour

LARSPEC UPDATE BY JERRY MAJKOWSKI

The new LARSPEC User's Manual is now available for distribution. If you have not yet received a copy and would like one, contact NANCY FUHS or LARRY BIEHL, to whom also much thanks and credit is due for compiling this vital publication.

Work on the use of the DECwriter II terminal as a medium resolution graphics device for both LARSPEC and 2D-GCS is nearing completion. Currently there is one terminal which has the graphics capability; it is located in the Flexlab I terminal area. Memos detailing the use of the DECwriter for both LARSPEC and GCS will be made available.

Progress is also being made on the expansion of the punch capabilities in LARSPEC. The new options will add four new ID record groups including one for punching all ID information. There will also be increased flexibility by allowing the user the capability to specify his own ID parameters and punch formats.

TEMP DISK BY MIKE COLLINS

During the week of March 17th, two additional 3 meg temp disks were put on the system. With our increased usage, it has been very difficult at times for users to get a 3 meg temp, so hopefully the 2 additional temps will help.

SUMMARY OF 3031 COMPUTER USAGE FOR FEBRUARY 1980

Overall Usage	Basic Rate CPU Time Used	4.18
	Priority Rate CPU Time Used	135.27
	Total CPU Time Used	139.46
	Terminal Sessions	4950
	Batch Jobs	478

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	8.23	5
Mon-Fri 8AM-4PM	76.19	45
Mon-Fri 4PM-midnite	45.16	27
Weekend	9.84	8

Batch Job Usage	Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
	BATQUICK	173	0.26	0.04
	BATSHORT	47	5.90	0.35
	BATMED	14	7.17	0.43
	BATONITE	38	7.69	0.67
	BATLONG	11	6.47	1.80
	TAPTRAN			
	BATEOD	144	5.94	0.55
	BATJSC	26	56.05	6.69

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	151	103.14	0.68
Flexlab2	31	INFOTON GTX	276	145.38	0.53
Flexlab2	32	INFOTON GTX	325	144.93	0.45
Flexlab2	33	INFOTON GTX	319	178.95	0.56
Flexlab2	34	INFOTON GTX	311	173.38	0.56
Flexlab2	35	INFOTON GTX	254	170.73	0.67
Flexlab2	36	INFOTON GTX	221	148.55	0.67
Comp. Room	37	DECwriter	213	82.59	0.39
Flexlab1	40	INFOTON GTX	228	131.35	0.58
Flexlab1	41	INFOTON GTX	219	184.55	0.84
Flexlab1	42	INFOTON GTX	249	131.91	0.53
Flexlab1	43	DECwriter	120	84.80	0.71
Dial-up	50	1st in Use	126	109.18	0.87
Dial-up	51	2nd in Use	58	43.61	0.75
Dial-up	52	3rd in Use	20	12.83	0.64
Dial-up	53	4th in Use	10	2.43	0.24
Dial-up	54	5th in Use			
Dial-up	5E	In-House 1st	7	2.61	0.37
Dial-up	5F	In-House 2nd	17	9.07	0.53
Houston	60	Hazeltine 2000	209	127.13	0.61
Houston	61	Hazeltine 2000	250	177.31	0.71
Houston	62	Trendwriter	225	160.15	0.71
Houston	63	Trendwriter	210	165.11	0.79
Alabama	64	DECwriter	128	90.19	0.70
Alabama	65	INFOTON GTX	75	44.40	0.59
ISU	66	(various)	97	40.34	0.42
ISU	67	(various)	171	89.96	0.53
Houston	6A	Dial-1st in Use	198	231.13	1.17
Houston	6B	Dial-2nd in Use	177	180.93	1.02
Houston	6C	Dial-3rd in Use	186	178.55	0.96
Houston	6D	Dial-4th in Use	173	159.45	0.92
St. Regis	4A	DECwriter	1	0.80	0.80

INTRALAB NOTES

PERSONNEL

FRIEDA DOBBINS joined the Computer Operations Staff on March 31. Frieda will eventually be working on the midnight to 8 a.m. shift. She comes to LARS as a transfer from PUCC Computing Center on Campus where she has been the midnight to 8 a.m. computer operator for approximately a year and a half.

A big welcome back is extended to KAY HUNT who returned to LARS on March 11 as a Systems Analyst working under JIM KAST. Kay previously worked at LARS from 1969-1973 as Manager of Applications Programs. She is working on the implementation of a new LAIS, providing software support to JSC and becoming responsible for a portion of the Software Products.

Some new student employees have joined the staff recently. TODD PLANTENGA started at LARS on February 1. Todd is helping the Field Measurements staff process their field research data. His supervisor is LARRY BIEHL. PETER LIESENFELT joined the staff on February 6 as a student programmer assigned to the Computer Processing Task under LUKE KRAEMER. MICHELLE PETERSEN, assistant to SUE FERRINGER, began work on March 4. RAY FROST, assigned to the Ducks Unlimited project, began work on March 10. He is supervised by CHUCK SMITH.

MINI-LARSIANS

Congratulations and best wishes are extended to STEVE and Patty SOMMERS who recently became parents of a daughter. Stephanie Lynn was born on March 16, 1980 and weighed 6 lb. 11 oz. and was 20 inches in length.

A FOND FAREWELL

A farewell luncheon was held on Wednesday, April 2 for both BILL SHELLEY and FORREST (BUD) GOODRICK who left LARS on April 4, to join the staff of the St. Regis Paper Company located in Jacksonville, Florida.

PROMOTION

Congratulations to PHIL SWAIN on his promotion to Associate Professor of Electrical Engineering. Phil is Program Leader of the Data Processing and Analysis Research program area at LARS. He also teaches courses in remote sensing and computer engineering in the School of Electrical Engineering.

PROPOSAL SENT OUT

Project Name: "The Development of Remote Sensing Training Course Curricula Including All Materials". Sponsor: U.S. Department of the Interior. Principal Investigator: S. Davis. Project Duration: 7/1/80 - 6/30/81.

FORE ! ! !

ATTENTION: All budding Arnold Palmers, Nancy Lopezes or latent Jack Nicholi -- the LARS Golf Team -- the LARSERS CHARGERS -- is in need of golfers -- tall ones, short ones, male, female, good, not-so-good. If you fall into any of these categories and are interested, please call DOUG MORRISON.

Play is generally on Monday and Thursday afternoons with tee-off time between 3:30 and 5:00 p.m. Cost last year was $2.65 per 9-holes plus an initial $2 price investment (some even earned "interest" on their investment!).

We need at least 7 persons, so don't hesitate to call Doug at Ext. 291.

ENGINEERING CATALOG

We have received from Libraries/Audio-Visual Center a microfiche copy of the Engineering Library Catalog. It is divided into four sequences; author, title, subject and shelf list (Dewey Decimal order). The Catalog contains bibliographic information about books held in the Engineering Library published 1970 to date. Periodicals and serials are not included. Locations of books held in the Engineering Library and other libraries are shown.

The catalog is updated and reproduced every quarter and we hope staff will use it. It will be available for checkout in our Library. A microfiche reader is located in the Business Office.

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 5 · May 15, 1980

A HISTORICAL LOOK AT THE DIGITAL DISPLAY BY DAVE FREEMAN AND BARBARA PRATT

As we view the Comtal Digital Display located in the Flex 2 Users Area today, we have to think back to November 1978 when the idea of acquiring a display for LARS was conceived.

In review, most LARSians contributed to its acquisition. Interviews were held by DAVE FREEMAN and Professor David Anderson from the ME Graphics Design Laboratory to determine criteria. Professor Anderson advocated a moderately-priced color unit attached to the PDP minicomputer and presented these findings in a mid-December seminar at LARS. DAVE FREEMAN's questionnaire of LARS users determined the following needs:

1. Screen containing 512 x 512 picture elements
2. Minimum image recording capability by manual means
3. Ability to display image rastor as well as line vector data separately or combined
4. Image access within 15 minutes

Based upon all information gathered via questionnaire and interviews with vendors and display users in other facilities, we decided to get a display with maximum capability requiring minimum personnel support. The display was to have on-board processing and programming capability and be a highly interactive color unit. Special attention was given to the problems of image storage and data transfer between the IBM and PDP computers.

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).

To refine these recommendations, a digital display planning committee was established. The primary planning staff included LARRY BIEHL, DAVE FREEMAN, LUKE KRAEMER, BARBARA PRATT, PHIL SWAIN and DICK WEISMILLER. In early March 1979, a bid/quotation request resulted from the committee's input. By mid-April all prospective bids had been returned. Hardware parameters had been prioritized and the bids were scored according to these priorities. The Comtal Vision One/20 was LARS' choice.

While the committee was making its determinations, the Directors were exploring means of finding financial support. In August 1979, the Schools of Engineering and Agriculture were establishing a capital equipment fund to help LARS purchase this equipment. This became a reality in September and the orders were processed. In the interim changes to equipment allowed us to upgrade the Tektronix Graphics Unit from a 4014 to a 4054.

Equipment began to arrive in early November, but according to Murphy's Law, an item needed last (the camera) arrived first! Shortly thereafter the 67 megabyte System Industries disk drives were delivered. In February these large disk units were installed and the DEC RX211 Diskette (floppy) disk drive unit arrived and was also installed. These required an upgrade to the RSX11M operating system which was completed on April 15, 1980. All drives and peripherals work under this new operating system.

The Tektronix and Comtal units arrived within two weeks of each other and were initially brought up in stand-alone mode as each has its own mini/micro computers on board. Both were later attached to the PDP 11/34A and the 4054 Graphics Display unit was also connected to the IBM 3031. Eventually a switch will allow the 4054 to be easily logged in on either system. The Interactive Graphics Library (IGL) software for the 4054 has already been successfully loaded and executed on the PDP.

The Comtal is currently running in an experimental mode. Some Chicago, Lafayette and Pensacola, data sets are all available for transfer from the large disks of the PDP. You will find the images sharp and clear and the color striking. "ROAM' and "ZOOM" are two of the more powerful capabilities of the display hardware. These and other key features will be detailed in future issues of SCAN LINES.

INNOVATIVE TEACHING RECOGNIZED

JOHN LINDENLAUB, professor of electrical engineering and senior scientist at LARS, received the 1980 "Helping Students Learn" award from the Purdue University Alumni Foundation on April 26. The award was presented during the 106th Founders Day Banquet in the Memorial Union ballrooms. The annual prize was established by the Purdue Class of 1922 to improve the educational experience of students by stimulating teachers to create innovative approaches to learning.

Lindenlaub, who joined the Purdue faculty in 1957, is director of the Center for Instructional Development in Engineering. He designed the undergraduate laboratory program and developed the undergraduate self-study program in the School of Electrical Engineering. He was nominated for

"his systematic application of instructional technology to undergraduate engineering education." Today more than 1,400 students a year utilize the audio-tutorial and self-study techniques used in the four courses under his supervision.

Professor Lindenlaub has been associated with LARS since 1969, where he helped form the Technology Transfer program area which is responsible for the development of remote sensing teaching materials. His extensive contributions include the initial educational materials used in training new remote terminal personnel and the Fundamentals of Remote Sensing Minicourses Series--19 multimedia self-study courses.

HONORARY DEGREE

MARION BAUMGARDNER will be awarded the honorary degree of Doctor of Science from DePauw University in Greencastle, Indiana, during their graduation ceremony on May 18.

LATIN AMERICA DEMONSTRATES ACTIVE INTEREST IN REMOTE SENSING

LUIS BARTOLUCCI recently returned from three weeks in Latin America where he worked hard at strengthening their understanding of remote sensing technology.

During the week of April 14-18, Bartolucci was in Panama to teach a short course on "Manipulation of Computer Compatible Tapes" to eighteen Latin American participants at the Defense Mapping Agency--Inter American Geodetic Survey (DMA-IAGS) Cartographic School. Dr. Robert Frost and Dr. Jack Rinker (United States Army Engineer Topographic Laboratories) and Lawrence Goldstein (DMA-IAGS) were also instructors for the course which was quite well received by all participants. The course will be offered again in September.

Bartolucci then travelled to San Jose, Costa Rica, to attend the 14th ERIM International Symposium on Remote Sensing of the Environment. He was joined by TERRY PHILLIPS, PHIL SWAIN, ROGER HOFFER, and RICK LATTY. LARS was well represented by three technical presentations and an opening plenary address on "Remote Sensing Applications in Latin America" by LUIS BARTOLUCCI and Thomas Wagner (ERIM).

Emphasis on work in Latin America was heavy throughout the symposium; the diversity of remote sensing specialists who participated made possible a special meeting of 48 representatives, including almost all Latin American countries.

Bartolucci chaired this meeting which considered the problems of technical communication between countries. An organizing committee was selected to pursue the eventual creation of a Latin American Council for Remote Sensing. This committee is chaired by Ing. Alberto Segovia, Executive Director of CLIRSEN (Equadorian Remote Sensing Center), and is scheduled to meet again in Quito, Equador, sometime late in 1980 or early in 1981.

SPECTRAL MAPS AID IN SOIL SURVEY

LARS and the Soil Conservation Service (SCS) are continuing their work in the application of remote sensing technology to aid the soil survey. DICK WEISMILLER, STEVE KRISTOF, LANNY LUND (visiting professor from the University of California, Riverside), Mike Kiefer and Earl Voss (SCS, Illinois), Shelby Bromfield and William Harrison (SCS, Idaho), are currently working on two projects.

A level two soil survey (mapping units of only a few acres) was initiated in Ford County, Illinois, in October 1979. To aid this survey spectral maps have been developed by computer-aided digital analysis of Landsat data. A layered classification technique was used with the initial decision in the decision tree being related to parent material boundaries that were applied to the data set after field investigations. A systematic sampling procedure was used to develop statistics to apply in the final classification. The maps were developed at a scale of 1:15,840.

STEVE KRISTOF and LANNY LUND visited Ford County, May 7, to give a presentation on the development of these spectral maps to the SCS initial field review.

A low order soil survey (mapping units of tens of acres) is being conducted in South Central Idaho. Satellite imagery was obtained for approximately 1.2 million acres on the remote Great Rift Zone of the Central Snake River Plain. Using an analytical technique, large-scale land patterns were determined by cluster analysis at a scale of 1:24,000. Field examination of previously selected cluster sample points was done to obtain a correlation of soil surfaces, miscellaneous land types and vegetation species to various reflectance values recorded by the satellite camera. Upon computer analysis of the cluster point sample data, a level of similarity was determined and classes selected for the major land and vegetation patterns. This data is useful as a "tool" in generating a general soils map, preliminary mapping, and mapping unit design, and has helped personnel map this remote area with a higher degree of accuracy and confidence.

SYMPOSIUM SPECIAL EVENTS SCHEDULE BY PAM BURROFF

As the buds begin to open and the blossoms begin to appear, the LARS Symposium is drawing very near. This year we're looking forward to a very informative symposium. Along with the long and short papers to be presented, several special events have been planned.

A barbeque will be held Tuesday evening, June 3 at the local historical landmark, Fort Ouiatenon. This will be an excellent opportunity for all symposium attendees to get to know one another in an informal setting before the various Technical Sessions begin Wednesday morning.

Six different field trips are planned for Wednesday afternoon (June 4). Sign up sheets will be posted in the exhibit room. The scheduled field trips are:

1. Jasper County, hosted by DICK WEISMILLER
2. Agronomy Farm, hosted by MARVIN BAUER and LARRY BIEHL
3. Electrical Engineering and Potter Center, hosted by DAVE LANDGREBE and PHIL SWAIN
4. Agronomy Department (Life Science Building), hosted by Joe E. Yahner
5. Cultural and Historical Landmarks, hosted by SHIRLEY DAVIS and Helmut Konke
6. R&R (relaxation and recreation) hosted by DOUG MORRISON

Two informal evening discussion groups are scheduled. Wednesday, June 4, (8:30-10:00 p.m.) will feature soils, chaired by Chris Johannsen and/or Klaus Flach; Bill Moldenhauer will coordinate and follow-up the discussion. Thursday, June 5 (8:30-10:00 p.m.) will feature data processing chaired by PHIL SWAIN.

Friday, June 6 from 2:00-4:00 p.m. LARS welcomes all Symposium participants to an OPEN HOUSE in the Flex Lab 2 Conference Room.

This year LARS is very proud to dedicate the 1980 Symposium Proceedings to the memory of Ival Persinger, who had close professional and personal ties with Purdue University and the Laboratory for Applications of Remote Sensing. His energy and creative spirit will continue to inspire those who were privileged to know and work with him.

A special short course on Applications of Digital Analysis of Multispectral Data to Soils will be offered the week following the symposium, June 9-13, 1980. Some spaces are still available for this special course. To register for either the symposium or the special short course on soils, or for further information, contact:

DOUGLAS MORRISON
LARS/Purdue University
1220 Potter Drive
West Lafayette, Indiana 47906 USA
Telephone: (317) 749-2052

BAUER APPOINTED JOURNAL EDITOR

MARVIN BAUER has been appointed Editor-in-Chief of Remote Sensing of Environment. This journal is interdisciplinary and serves the diverse remote sensing community with publication of scientific and technical results on theory, experiments, and system design in remote sensing technology and applications. It is published by Elsevier North-Holland, Inc., New York.

LARS-ERIM INTERACTION INCREASES

The Environmental Research Institute of Michigan (ERIM) recently joined the LARS remote terminal network. Two of their system specialists, Dan Rice and Orest Mykolenko, visited LARS on April 23-25.

They received basic instruction and hands-on experience in using CMS from LUKE KRAEMER and discussed the upcoming Corn/Soybean Pilot project with ROSS GARMOE, PETER JOBUSCH and JIM KAST.

Plans were also finalized on the CMS Short Course which will be presented at ERIM, Ann Arbor, Michigan, on May 13-15. SUE SCHWINGENDORF, PETER JOBUSCH and CAROL JOBUSCH will be teaching the course.

In addition, a leased telephone line between LARS and ERIM is scheduled to be operational by May 15. This line will support 4 terminals and a remote job entry (Data 100) and increase ERIM's access to the LARS system.

LARS TRAVEL LOG

PAUL ANUTA attended the Pecora Symposium in Sioux Falls, South Dakota, on April 14-17. He presented a poster paper on "Generation of Multi-type Data Sets for Geophysical Exploration."

MARVIN BAUER, VERN VANDERBILT and MARILYN HIXSON were in Houston, Texas, on April 21-23, to meet with NASA/JSC personnel to develop field research plans.

ROGER HOFFER and RICK LATTY will visit an area northeast of Columbia, South Carolina, for the Forestry SAR project. They will obtain reference data in support of two aircraft flights over this test site. RB57 x-band synthetic aperture radar data will be gathered from 50,000 feet and NC130 multispectral scanner data--to simulate the thematic mapper--will be gathered at 20,000 feet.

JIM KAST, MARVIN BAUER, CRAIG DAUGHTRY, MARILYN HIXSON, VERN VANDERBILT, PAUL ANUTA and PHIL SWAIN will attend the SR&T Quarterly Review on May 19-21 at NASA/JSC, Houston, Texas.

VISITORS

Dr. Gilbert Saint, Centre Spatial de Toulouse, France, visited LARS on April 17, to discuss spectral measurements and relationships with MARVIN BAUER, BARRETT ROBINSON and VERN VANDERBILT.

On April 22, Marvin Phillips brought 8 participants from the USDA American Agriculture Policy Seminar to visit LARS. JOHN PETERSON, DICK WEISMILLER and DOUG MORRISON hosted the guests and discussed the application of remote sensing to agriculture with them.

Ray Schmidt and Terry Nerassen visited LARS April 28-May 1. Schmidt, employed by IDS, is one of the Waterfowl Habitat Inventory project technical monitors under contract to Ducks Unlimited. Nerassen is the Manitoba regional biologist on staff at Ducks Unlimited.

They brought alot of ground truth with them, and together with JOAN BUIS and DICK MROCZYNSKI, began classifying some of this Canadian data. In addition, they viewed the minicourses and videotapes, and met with CHUCK SMITH and DAVE FREEMAN to make plans for the rest of the project. All agreed that the week was very beneficial.

Thirty-three participants of the Purdue University Image Processing and Pattern Recognition short course toured LARS on April 30, as part of DAVE LANDGREBE's section on Remote Sensing Applications. Landgrebe was one of five instructors at the School of Electrical Engineering sponsored course.

THE MICROCOMPUTER SHOW IS COMING

The annual Microcomputer Show, sponsored by the Central Indiana Chapter of the IEEE Computer Society and the Indiana Section of IEEE, is scheduled to be held July 1, in Indianapolis. This extravaganza will feature lots of opportunities for hands-on the equipment, as well as technical seminars by the manufacturers.

Watch for further details, or contact PHIL SWAIN.

REMOTE SENSING INDUSTRY DIRECTORY TO BE COMPILED FOR STATE AND LOCAL GOVERNMENTS BY NED BUCHMAN

Public Technology, Inc., a not-for-profit, public interest, science and technology transfer organization which works nationally with state and local governments, is compiling a directory of United States remote sensing firms in cooperation with NASA's Regional Remote Sensing Applications Transfer Program. This directory will be published as part of a set of remote sensing procurement guidebooks aimed at assisting state and local governments to more effectively utilize the private sector to provide remote sensing products, services, and equipment. These guidebooks and industry directory will be available in the Fall, 1980.

The scope of the guidebooks and industry directory will include acquisition of aerial and satellite imagery including aerial photography, multispectral imagery, thermal infrared surveys, and real and synthetic aperature radar surveys; also value-added services such as photo processing, image enhancement, analysis, interpretation, mapping, and reproduction; and equipment and systems including cameras, digitizing, processing, viewing, analytical, interpretation, and plotting equipment.

Organizations wishing to be included in the Remote Sensing Industry Directory should request a directory quentionnaire form from Public Technology, Inc., 1140 Connecticut Avenue, N.W., Washington, D.C. 20036, Attention: Ned Buchman, Remote Sensing Coordinator.

BASIC RESEARCH WORKSHOP TO BE HELD AT PURDUE

MARVIN BAUER announced that a workshop on Optical and Geometric Measurements for the NASA sponsored Basic Research Program will be held on June 16-18 at Purdue University. Twenty representatives from various agencies will be involved.

The meeting will include demonstrations of the field research experiments and measurements being acquired by LARS at the Purdue Agronomy Farm. Bauer will serve as chairman of the workshop with the assistance of BARRETT ROBINSON and VERN VANDERBILT.

NEW PROJECTS FUNDED

Title: Processing of Landsat Computer Compatible Tapes
Sponsor: DMA/IAGA
P.I.: LUIS BARTOLUCCI
Duration: 4/1/80-4/30/80

Title: University of California
Sponsor: University of California
P.I.: DICK WEISMILLER
Duration: 3/17/80-3/16/81

NEW LARS TECHNICAL REPORTS

042879 Automatic Color Map Digitization by Spectral Classification by N. Y. Chu and P. E. Anuta.

A method of converting polygon map information into a digital form which does not require manual tracing of polygon edges is discussed. The maps must be in color-coded format with a unique color for each category in the map. Color scanning using a micro-densitometer is employed and a three-channel color separation digital data set is generated. The digital data are then classified by using a Gaussian maximum likelihood classifier, and the resulting digitized map is evaluated. Very good agreement is observed between the classified and original map.

The research described in this report was sponsored by NASA under Contract No. NAS9-14970.

111679 Physicochemical, Site, and Bidirectional Reflectance Factor Characteristics of Uniformly Moist Soils by E. R. Stoner and M. F. Baumgardner.

A laboratory procedure was developed for measuring reflectance of soils in a manner simulating the remote sensing geometry of illumination and viewing while maintaining a uniform moisture tension on the soils. Over 500 individual soil samples from 39 states and Brazil and Spain were measured and their spectral properties correlated to organize matter content, moisture content, particle size, iron oxide content, and cation exchange capacity.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

011080 Contextual Classification of Multispectral Image Data by P. H. Swain, S. B. Vardeman and J. C. Tilton.

Compound decision theory is invoked to develop a model for classifying image data using spatial context. Methods for characterizing contextual information in the image are proposed and tested. Experimental results demonstrate the effectiveness of the contextual classifier. Associated practical problems are discussed.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466 and NSF under Grant No. MCS78-04366.

SYSTEM SERVICES May 15, 1980

NEW NAMES COMMAND BY PETE JOBUSCH

A new NAMES command has been added to the system to replace the NAMES exec which many users have private copies of. The format of the NAMES command is:

NAMES

The NAMES command may be used to display the number of users logged onto the system, which line each user is logged on to, and the name entered at logon time (or in a 'SET NAME' command) by each user.

A typical response from the NAMES command is:

```
021 USERS, 000 DIALED
JSC290   - 06A - SESTAK !          CONVERT8 - 032 - LISENFE
JSC201   - 062 - REDNER            JSC1145  - 06D - LINDA K MOORE
TRITICUM - 041 - GETULIO           JSC202   - 06B - DCL
JSC212   - 060 - MCINTYRE          JSC404   - 061 - K. BAKER
VMONITOR - 031 - JOBUSCH           JSC      - DSC - GOODE
JSC780   - 06C - SUSANNE           BATMED   - DSC - NO-JOB ACTIVE
BATSHORT - DSC - NO-JOB ACTIVE     BATQUICK - DSC - NO-JOB ACTIVE
BATEOD   - DSC - NO-JOB ACTIVE     BATCH    - DSC - NONE
RSCS     - DSC - WILSON            OPERATOR - 001 -
TANG     - 035 - MON LI            REFORM16 - 030 - LANG 651
JOBSUCH  - 036 - PETE
```

The first line shows the number of users in the system (as from the QUERY USERS command). On succeeding lines, each user is listed showing his ID, the line connected on, and current NAME. Note that DSC is shown for disconnected machines, and that 'NO-JOB ACTIVE' in the name field of a BATCH machine indicates an idle machine to which work could be sent for immediate execution.

LARSYS NEWS BY JOAN BUIS

Now that Bill Shelley has left LARS, many of you are asking "who will take care of LARSYS?" KAY HUNT is now responsible for maintaining the system, but any questions concerning LARSYS or LARSYSDV may be referred to JOAN BUIS, SUE SCHWINGENDORF, or LOUIS LANG in addition to Kay.

FRIS SOFTWARE DOCUMENTATION EFFORTS

As part of the FRIS project, two new processors were added to LARSYSDV and two others were enhanced. The documentation of these plus seven other previously existing LARSYSDV processors is currently underway, and scheduled for completion in September, 1980. As documentation for each processor is completed, its availability will be reported in SCAN LINES. The first of these, CHANGEDETECTION, is discussed below.

CHANGEDETECTION PROCESSOR

The CHANGEDETECTION function compares two separate LARSYS Classification Results Files, pixel by pixel, and produces an output to disk or tape in LARSYS Classification Results File format. It can be used to detect changes in temporally overlayed data, or to compare classification results obtained via different channels of data, different training methods or using different classifiers. The classes on the output Classification Results File are defined by the user/analyst in a data deck, where the class changes between the two input results files which are of interest are enumerated. An example of a data deck is illustrated below.

Suppose the analyst has two input files with classes as follows:

Input Classification Results File 1	Input Classification Results File 2
Class	Class
1 - Pine 1	1 - Hardwood
2 - Hardwood 1	2 - Pine 1
3 - Pine 2	3 - Pine 2
4 - Hardwood 2	4 - Bare Soil
5 - Bare Soil	5 - Water
6 - Water	

The analyst wants to know how many samples stayed in the pine, hardwood, bare soil and water classes, and how many changed from forest (pine, hardwood) to bare soil, and from bare soil to forest. His data deck might look like this:

```
DATA
CLASS PINE                    This class will consist of points
BASE 1,3                      which are in a PINE class on either
COMP 2,3                      input file.
CLASS HARDWOOD
BASE 2,4
COMP 1
CLASS BARESOIL
BASE 5
COMP 4
CLASS WATER
BASE 6
COMP 5
CLASS FOR/BARE                This class will contain points in
BASE 1,2,3,4                  a forest class on 1st input tape
COMP 4                        (classes 1,2,3, or 4) and in the
CLASS BARE/FOR                bare soil class on the 2nd input
BASE 5                        tape (class 4)
COMP 1,2,3
END
```

User documentation for the CHANGEDETECTION function is available from SUSAN SCHWINGENDORF. The control card reference file follows on the next page.

LARSYS CONTROL CARDS

CHANGEDETECTION

KEY WORD(COL.1)	CONTROL PARAMETER	FUNCTION	DEFAULT
+ *CHANGEDETECT	(NONE)	SELECT CHANGE DETECTION FUNCTION	(NONE)
+ BASERESULTS		LOCATION OF RESULTS FROM FIRST DATE.	(NONE)
	TAPE(XXX)	LOCATED ON TAPE XXX.	(SEE CONTROL CARD)
	FILE(FF)	FILE FF.	(DICTIONARY)
	DISK	USE RESULTS PLACED ON DISK IN CURRENT TERMINAL SESSION.	
+ COMPARERESULTS		LOCATION OF RESULTS FROM SECOND DATE.	(NONE)
	TAPE(XXX)	LOCATED ON TAPE XXX.	
	FILE(FF)	FILE FF.	
	DISK	USE RESULTS PLACED ON DISK IN CURRENT TERMINAL SESSION.	
+ NEWRESULTS		LOCATION OF CHANGE (OUTPUT) RESULTS FILE.	(NONE)
	TAPE(XXX)	WRITE ON TAPE XXX.	
	FILE(FF)	FILE FF.	
	INIT	INITIALIZE TAPE AND WRITE RESULTS IN FILE 1	
	DISK	PLACE RESULTS ON DISK	
± BLOCK			
	RUN(XXXXXXXX)	RUN NUMBER IS XXXXXXXX	
	LINES(X,Y,Z)	DISPLAY LINES X TO Y WITH LINE INTERVAL Z	(NONE)
	COL(X,Y,Z)	DISPLAY COLUMNS X TO Y WITH COLUMN INTERVAL Z	
+ DATA	-----START OF DATA DECK-----		

```
I                                                                    I
I          DEFINE CHANGE CLASSES OF INTEREST BY NAMING THE CLASS     I
I            ON A 'CLASS' CARD, AND INDICATING WHICH CLASSES         I
I            FROM THE FIRST CLASSIFICATION (ON 'BASE' CARD) AND      I
I            WHICH CLASSES FROM THE SECOND CLASSIFICATION (ON        I
I            'COMP' CARD) ARE PERMITTED FOR A POINT TO BELONG        I
I            TO THIS CLASS.                                          I
I                                                                    I
I  CLASS NAME1                                                       I
I  BASE N1, N2, N3, ....                                             I
I  COMP M1, M2, M3, ...                                              I
I  CLASS NAME2                                                       I
I            .                                                       I
I            .                                                       I
I            .                                                       I
I          ETC        (WHERE M1,M2,... AND N1,N2,... ARE CLASS OR    I
I                      (POOL NUMBERS FROM CLASSIFYPOINTS.            I
I                                                                    I
```

+ END	(NONE)	END OF FUNCTION.	(NONE)

BLDPAT

LOUIS LANG and STEVE SOMMERS have created an ability which allows users to build gray patterns containing up to 60 symbols, drastically exceeding the previous limit of 16 symbols per pattern. These patterns can then be used by GDATA or GRESULTS. Following is a description of the routine which allows the user to build patterns (BLDPAT), and an example run. If you have any further questions, please contact Louis or Steve.

BLDPAT will put together a grayscale pattern for use with GDATA and GRESULTS using symbols from existing patterns. BLDPAT will prompt for all symbols to be used in the pattern, let you check the symbol list and make any changes or corrections, and then build the pattern. Note that there is no output produced by BLDPAT until you are satisfied with your pattern specification.

When a pattern and symbol are entered for use in your pattern, several tests are made. The selected pattern is first checked to see if it exists. If it exists then the dimension of the selected pattern and that of the new pattern are compared. Finally, the pattern is checked to make certain that the selected symbol is actually in the pattern.

BLDPAT will prompt for a name to be given your output pattern. The pattern name can be any combination of up to nine alphanumeric characters. Your new pattern will be in file 'pattern' .PAT , where 'pattern' is the name you have given your output pattern.

BLDPAT will also prompt for the height and width of your pattern. This is, of course, the height and width of each symbol in the pattern. Enter the height and width separated with a comma as 'height', 'width'. For example, for a pattern symbol 25 high and 20 wide, enter '25,20'.

You will also be asked if you wish to define any default input patterns. There are two reasons for wanting to define default inputs. One, the user can enter a number for an input pattern selection rather than having to type out the input pattern name each time it is needed. Two, the program only has to check a pattern file for validity once when entered and then use that information later for input pattern checks. On the other hand, the program must check the validity of each non-default input pattern as it is entered. Using default patterns will therefore make BLDPAT slightly more responsive, especially when the system is slow. BLDPAT allows up to 5 default input patterns. During input of selections for your new pattern, typing a question mark will make BLDPAT type a list of your defaults to the terminal.

To select a pattern, type the pattern name followed by a comma, and the number of the desired symbol in response to the 'Symbol number' prompt. For example, to select symbol number 3 from the JASPER pattern, type jasper,3 in response to the input prompt.

To select a default pattern, type ;'pattern #','symbol #'. For example, to select symbol number 5 from default pattern number 2, type ;2,5 in response to the input prompt.

Presently, to run BLDPAT, type:

run dbl:[107,107]bldpat

New symbols that you wish to have added to the pattern library are welcome. Simply contact someone on the local terminal staff. Also, any questions or problems should be directed to the local terminal staff.

Once you have built your pattern, you will want to either have it punched as cards, or sent to your IBM virtual machine's reader. To do this, you will want to use the LITER command file commands PUNCH and XFER, respectively. See documentation for LITER for more information. An example follows.

```
run dbl:[107,107]bldpat
Do you want instructions? (Y/N) n
Enter the name to be given your output pattern. (9A1) : test2
How many symbols will your pattern have? (2 to 60) 10
Enter height and width of your pattern. (H,W) 25,20
Do you want to specify any default patterns? (Y/N) y

Enter default pattern names. Type  CTRL/Z  when through entering def'alts.

Default pattern number 1 : Jasper
Default pattern number 2 : h25w20gr
Default pattern number 3 : Jasper3
Default pattern number 4 : ^Z

Symbol number  1  : ?

    Default pattern specifications

        #1  =  Jasper
        #2  =  h25w20gr
        #3  =  Jasper3

Symbol number  1  : #2,6
Symbol number  2  : landuse,16
Symbol number  3  : #3,5
Symbol number  4  : #1,1
Symbol number  5  : 25x20,10
Symbol number  6  : #1,11
Symbol number  7  : #1,12
Symbol number  8  : #2,15
Symbol number  9  : landuse,14
Symbol number 10  : #3,7

Pattern                    Pattern                    Pattern
Number                     Number                     Number

  1)  h25w20gr   6           2)  landuse   16           3)  Jasper3    5
  4)  Jasper     1           5)  25x20     10           6)  Jasper    11
  7)  Jasper    12           8)  h25w20gr  15           9)  landuse   14
 10)  Jasper3    7

Do you wish to make any changes to your pattern? (Y/N) y

Enter the number of the symbol to be changed. Type CTRL/Z in response to
the prompt when you are through with your changes.

Pattern to be changed. (1-10) 5
Symbol number  5  : 25x20,9
Pattern to be changed. (1-10) ^Z


Pattern                    Pattern                    Pattern
Number                     Number                     Number

  1)  h25w20gr   6           2)  landuse   16           3)  Jasper3    5
  4)  Jasper     1           5)  25x20      9           6)  Jasper    11
  7)  Jasper    12           8)  h25w20gr  15           9)  landuse   14
 10)  Jasper3    7

Do you wish to make any changes to your pattern? (Y/N) n

Your new pattern is in file  test2    .Pat .
```

REMOTE TERMINAL NEWS BY MICKEY TRICHEL

John Lyon, leader of the Systems Design and Implementation Group in the Systems and Facilities Branch (SF6) at the NASA Johnson Space Center, has resigned to accept a position as Chief of the Interpretive Techniques Branch (Code 932.0) of the Information Extraction Division at the Goddard Space Flight Center. John has been the Manager of the Earth Observations Division's efforts to procure a new IBM-compatible computer system and to develop the major software systems for it. He will be replaced by Bill Weimer, formerly on his staff and, like John, a product of the Ground Data Systems Division at JSC.

SYSTEM CONFIGURATION UPDATE

Current diagrams of the LARS/Purdue IBM 3031 system can be found on the next two pages.

HEAVY COMPUTER USAGE PREDICTED

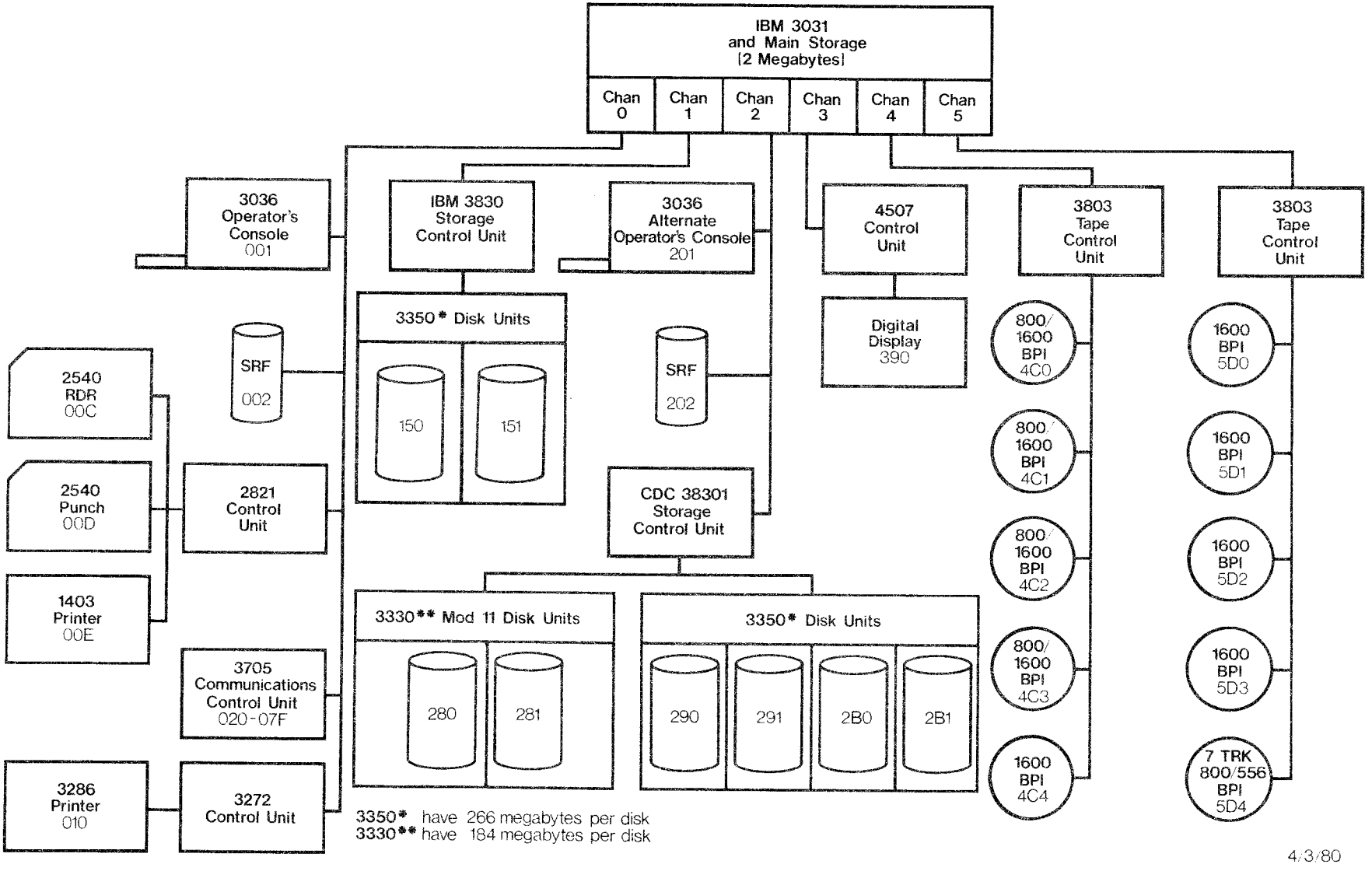
Hands-on instruction during the special short course offered June 9-13, will cause some extra heavy system usage during 7:00 - 10:00 pm Tuesday, June 10 through Thursday, June 12. This heavy usage may continue Friday, June 13, afternoon and evening, and Saturday, June 14, morning.

NEW DISK UNIT INSTALLED BY ROSS GARMOE

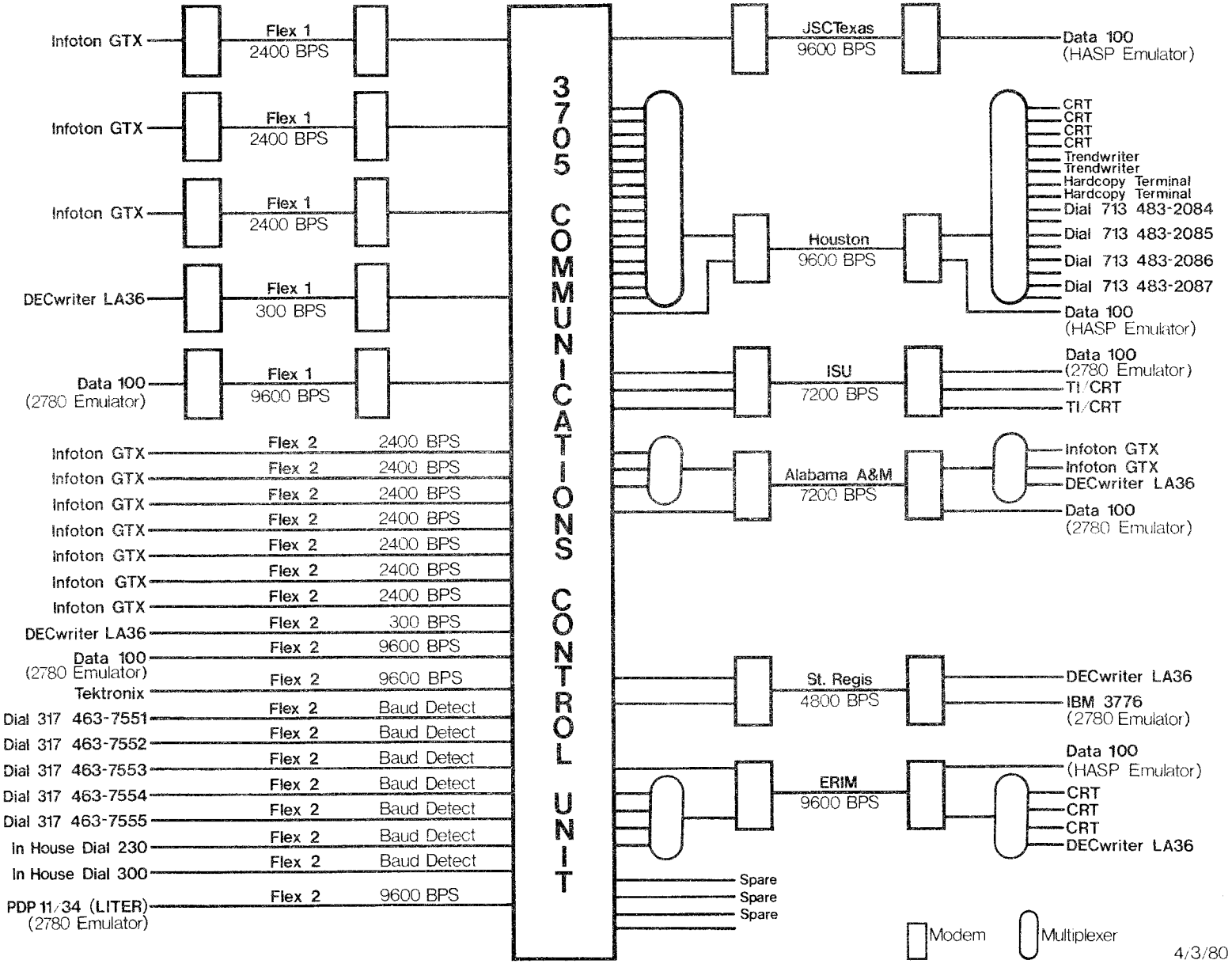
A CDC 33502 disk unit has recently been installed which will provide the equivalent of 4 IBM 3350 disks or about 1 billion bytes of additional storage.

Some computer IDs have been moved to the new disks, and requests for additional storage space are being filled as time permits. Due to the number of disk requests, there is currently a slight backlog. To request additional disk space, contact MIKE COLLINS.

3031 Hardware Configuration



4/3/80


Infoton GTX
Flex 1
2400 BPS
Infoton GTX
Flex 1
2400 BPS
Infoton GTX
Flex 1
2400 BPS
DECwriter LA36
Flex 1
300 BPS
Data 100
(2780 Emulator)
Flex 1
9600 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
Infoton GTX
Flex 2
2400 BPS
DECwriter LA36
Flex 2
300 BPS
Data 100
(2780 Emulator)
Flex 2
9600 BPS
Tektronix
Flex 2
Baud Detect
Dial 317 463-7551
Flex 2
Baud Detect
Dial 317 463-7552
Flex 2
Baud Detect
Dial 317 463-7553
Flex 2
Baud Detect
Dial 317 463-7554
Flex 2
Baud Detect
Dial 317 463-7555
Flex 2
Baud Detect
In House Dial 230
Flex 2
Baud Detect
In House Dial 300
Flex 2
9600 BPS
PDP 11/34 (LITER)
(2780 Emulator)
3705 COMMUNICATIONS CONTROL UNIT
JSCTexas
9600 BPS
Data 100
(HASP Emulator)
Houston
9600 BPS
CRT
CRT
CRT
CRT
Trendwriter
Trendwriter
Hardcopy Terminal
Hardcopy Terminal
Dial 713 483-2084
Dial 713 483-2085
Dial 713 483-2086
Dial 713 483-2087
Data 100
(HASP Emulator)
ISU
7200 BPS
Data 100
(2780 Emulator)
TI/CRT
TI/CRT
Alabama A&M
7200 BPS
Infoton GTX
Infoton GTX
DECwriter LA36
Data 100
(2780 Emulator)
St. Regis
4800 BPS
DECwriter LA36
IBM 3776
(2780 Emulator)
ERIM
9600 BPS
Data 100
(HASP Emulator)
CRT
CRT
CRT
DECwriter LA36
Spare
Spare
Spare
Modem
Multiplexer
4/3/80

SAS UPDATE BY CAROL JOBUSCH

LARS has received and installed Release 79.3 of SAS (Statistical Analysis System). The new release is available now by using the SAS793 command. Note that the options that control output file destination have changed.

SAS793	filename [(options]
	options: [LD LP LT PD PP PT] [SAS options]

Options used by the CMS/SAS interface to control output files are:

LD specifies that the SAS log file is to be written on disk (default)

LP specifies that the SAS log file is to be printed on the virtual printer

LT specifies that the SAS log file is to be displayed on the terminal

PD specifies that the output from SAS procedures is to be written on disk (default)

PP specifies that the output from SAS procedures is to be printed on the virtual printer

PT specifies that the output from SAS procedures is to be displayed on the terminal.

Any combination of these 6 options may be chosen. For example,

SAS myprog (LT LD PD

will write a SAS log file and procedures output on disk and will also display the SAS log messages on the terminal.

For further information on the use of CMS/SAS, see the April 9, 1980 issue of SCAN LINES.

On Sunday, June 1, 1980 the new release will replace the old one. After that date the SAS command will invoke Release 79.3 instead of Release 79.2 We encourage SAS users to try 79.3 now and report any problems to CAROL JOBUSCH as LARS. The command

SAS793 NEWS

will display on your terminal information about any known problems with 79.3

With Release 79.3 it is now possible to write your own SAS procedures in FORTRAN, taking advantage of the SAS supervisor for data input, manipulation and output formating. For further information see CAROL JOBUSCH at LARS or Cecil Hallum at JSC.

NEW GRAPHICS FEATURE TO BE ADDED TO SAS BY CAROL JOBUSCH

SAS Institute has announced an interactive computer graphics system for producing color plots, bar charts, and graphs on screens and plotters. The graphics system is an extension of the Statistical Analysis System. All SAS retrieval, data management, analysis, and other capabilities may be used with the new SAS graphics procedures.

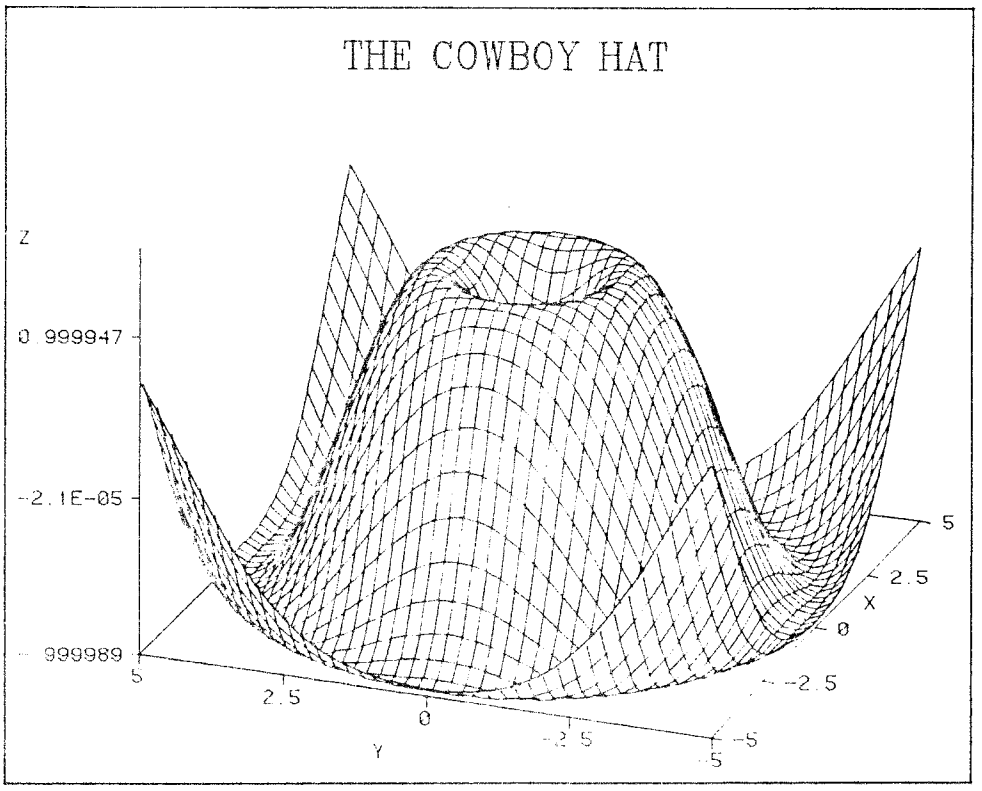
Graphics devices that may currently be used with SAS/GRAPH include a variety of Tektronix and Hewlett-Packard screen terminals and pen plotters, and the Calcomp 1012. Capabilities for other devices will be added in future releases of SAS.

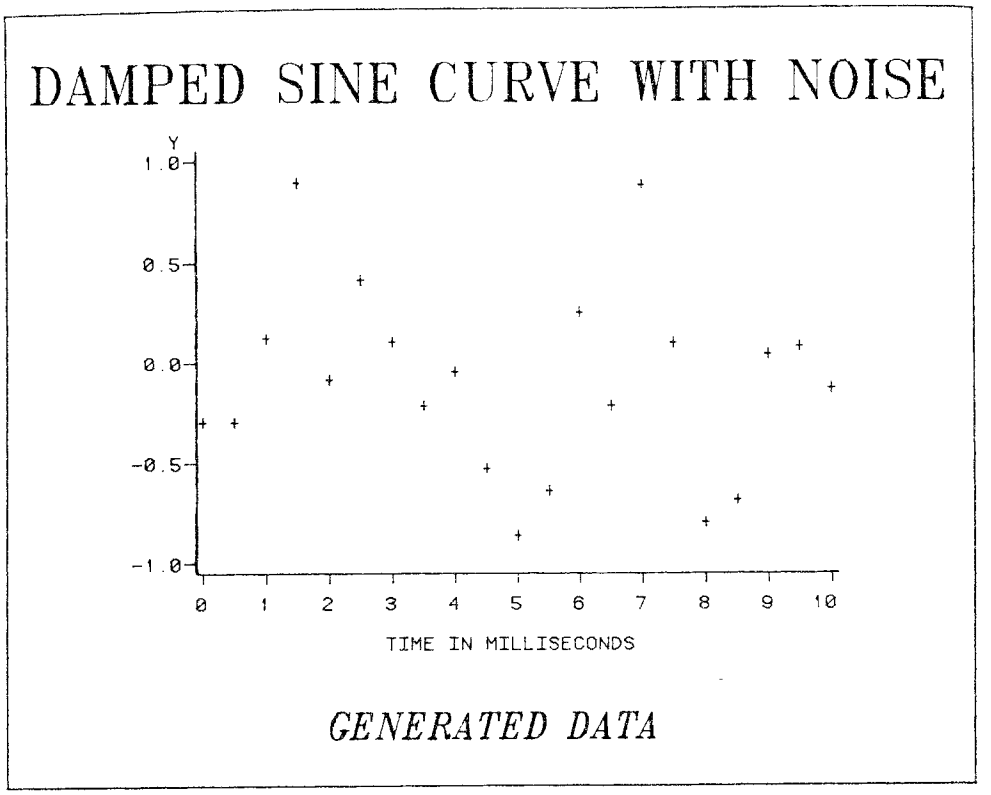
You need a working knowledge of SAS to use its graphics procedures. You do not need to know FORTRAN or any other computer language. The entire SAS program to create the cowboy hat plot is

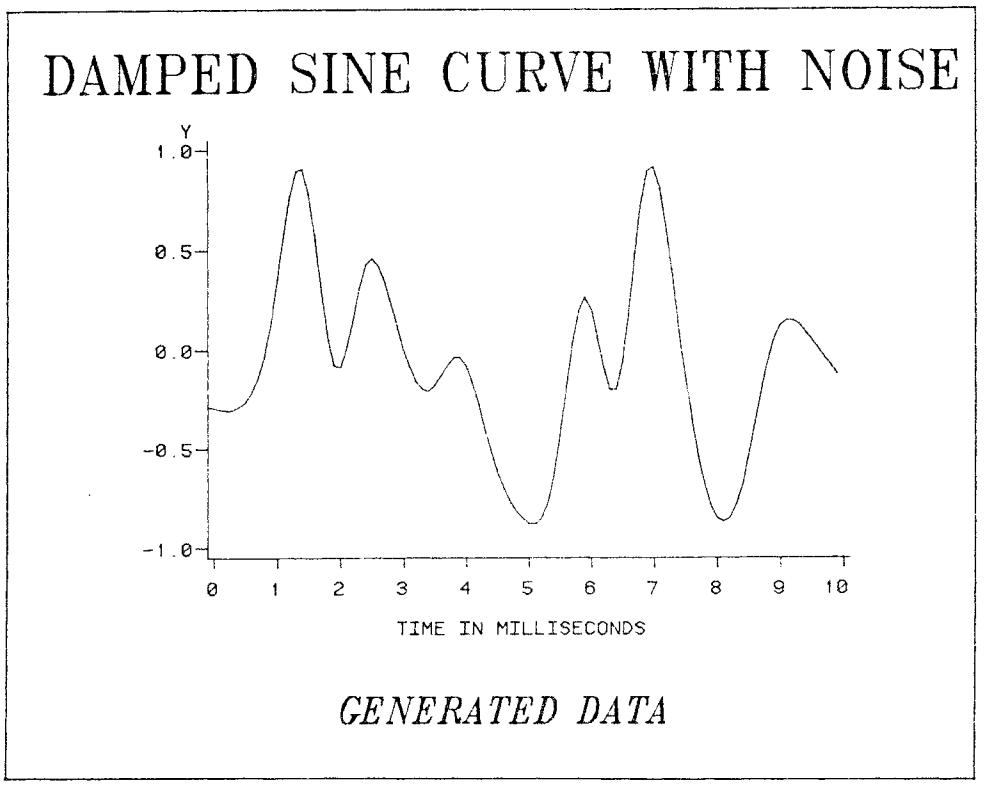
```
DATA:
  DO X = -5 TO 5 BY .25;
  DO Y = -5 TO 5 BY .25;
  Z=SIN(SQRT(X*X + Y*Y));
  OUTPUT; END; END;
TITLE THE COWBOY HAT:
PROC G3D;
  PLOT Y*X = Z;
```

The first 5 lines of the program create the data, the last 3 lines produce the plot.

LARS plans to acquire SAS/GRAPH on a trial basis as soon as the CMS version is available (late May or June). It will be available initially on LARS new Tektronix 4054. We hope that other graphics devices will be added later.




DAMPED SINE CURVE WITH NOISE
Y
1.0
0.5
0.0
-0.5
-1.0
0
1
2
3
4
5
6
7
8
9
10
TIME IN MILLISECONDS
GENERATED DATA


DAMPED SINE CURVE WITH NOISE
Y
1.0
0.5
0.0
-0.5
-1.0
0
1
2
3
4
5
6
7
8
9
10
TIME IN MILLISECONDS
GENERATED DATA

LARSPEC BY JERRY MAJKOWSKI

On April 30, LARSPEC was updated to include the DECwriter as a valid graphics device for the GSPEC processor. This capability can be employed simply by using an "OUTPUT DECWRITER" control card within a GSPEC deck. At the beginning of each job (both interactive and non-interactive) the user will be requested to manually set the top of the page on the terminal. Subsequent graphs within the same job will automatically skip to the next page but each new job will require the resetting of the top of page by the user. Currently only two DECwriters have the special graphics capability; one in the Flexlab 1 terminal area and one at ERIM.

By May 15, the expanded punch capabilities for the IDLIST and DSEL processors should be on line. The 'PUNCH' control card will replace the current 'CASES' control card and along with the present punch output capabilities there will be three new ID information sets, an 'ALL' option to punch all ID parameters and an option for the user to select specific ID parameters to be punched. The three new sets will include ID parameter formation for meteorological, experiment parameter and soils type data. The user will also have the ability to specify a format other than the default formats for punching the ID information. More detailed information will be made available when the update is complete.

Upcoming projects which will hopefully begin within the next two months and continue through the summer are the capability to plot differing wavelength resolution data on the same graph and the addition of the new Tektronix terminal as a high resolution graphics output device.

GCS BY JERRY MAJKOWSKI

The 2D-GCS (Graphics Compatability System) system at LARS has been interfaced to the DECwriter II terminal. Currently there are two DEC-writer terminals available to users of the LARS computer which have the graphics capability. One is located in the Flexlab 1 terminal area, the other is at ERIM.

For those unfamiliar with GCS, it is a system of Fortran callable subroutines providing various levels of graphics capability. Manuals are available in both the Flex1 and Flex2 terminal areas as well as the JSC and ERIM terminal areas. These manuals should contain a primer, a user's manual, a set of notes and memos and a document describing the LARS GCS system.

Use of the DECwriter with GCS is similar to that of using any of the other available devices. The user must first access the GCS libraries by typing:

GETDISK PLTDSK

The PLTDSK disk will be accessed as a 10B Z disk. This disk contains an EXEC routine which accesses and loads everything necessary to use the GCS system. The user must also have on a A disk a FORTRAN file which will serve as the controlling program and make all the appropriate calls to GCS routines as described in the manuals. Then the user initiates the execution of the GCS EXEC routine to run the controlling program by typing:

```
GCS DEC 'filename'
```

where: DEC specifies the DECwriter as the output device.
'filename' is the user created controlling program.

The user will then be requested to manually position the paper at the top of the next page in order to set the top of form. This must only be done for the first job submitted or anytime after the paper position is manually changed and can be by-passed by using the 'GO' option as follows:

```
GCS DEC 'filename' GO
```

This will cause the EXEC routine to proceed immediately to execution of the controlling program rather than requesting that the top of form be set.

Further details and updates to the GCS manuals will be made available soon.

SUMMARY OF 3031 COMPUTER USAGE FOR APRIL 1980

Overall Usage	Basic Rate CPU Time Used	4.50
	Priority Rate CPU Time Used	133.04
	Total CPU Time Used	137.54
	Terminal Sessions	4803
	Batch Jobs	562

Usage by Time of Day - Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	13.34	8
Mon-Fri 8AM-4PM	75.72	44
Mon-Fri 4PM-midnite	33.84	19
Weekend	13.61	10

Batch Job Usage — Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	224	0.14	0.05
BATSHORT	41	1.59	0.12
BATMED	81	14.41	1.69
BATONITE	30	9.18	0.70
BATLONG	5	11.57	3.51
TAPTRAN	3	4.75	0.21
BATEOD	128	14.36	3.04
BATJSC	46	22.31	3.71

Keyboard Terminals - Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	INFOTON GTX	127	138.34	1.09
Flexlab2	31	INFOTON GTX	264	170.66	0.65
Flexlab2	32	INFOTON GTX	261	196.78	0.75
Flexlab2	33	INFOTON GTX	238	146.63	0.62
Flexlab2	34	INFOTON GTX	280	192.24	0.69
Flexlab2	35	INFOTON GTX	259	189.91	0.73
Flexlab2	36	INFOTON GTX	250	148.17	0.59
Comp. Room	37	DECwriter	176	80.95	0.46
Flexlab1	40	INFOTON GTX	120	81.10	0.68
Flexlab1	41	INFOTON GTX	179	142.04	0.79
Flexlab1	42	INFOTON GTX	243	127.18	0.52
Flexlab1	43	DECwriter	120	106.09	0.88
Dial-up	50	1st in Use	114	67.90	0.60
Dial-up	51	2nd in Use	25	6.06	0.24
Dial-up	52	3rd in Use	1	0.96	0.96
Dial-up	53	4th in Use			
Dial-up	54	5th in Use			
Dial-up	5E	In-House 1st	15	19.23	1.28
Dial-up	5F	In-House 2nd	33	26.83	0.81
Houston	60	Hazeltine 2000	253	172.98	0.68
Houston	61	Hazeltine 2000	261	191.20	0.73
Houston	62	Trendwriter	281	155.99	0.56
Houston	63	Trendwriter	237	131.47	0.55
Alabama	64	DECwriter	15	13.91	0.93
Alabama	65	INFOTON GTX	6	4.38	0.73
ISU	66	(various)	11	1.54	0.14
ISU	67	(various)	26	8.26	0.32
Houston	6A	Dial-1st in Use	234	240.89	1.03
Houston	6B	Dial-2nd in Use	167	188.82	1.13
Houston	6C	Dial-3rd in Use	149	157.05	1.05
Houston	6D	Dial-4th in Use	129	129.80	1.01
St. Regis	4A	DECwriter	7	4.93	0.70

INTRALAB NOTES

PERSONNEL CHANGES

MIKE FLEMING has accepted a position as systems analyst with Color Technique, Inc., a subcontractor to EROS Data Center. He will be working at the new branch office EROS has opened in Anchorage, Alaska.

Fleming leaves LARS after seven years as a graduate student during which time he was responsible for effective research in the development of training statistics. Many of these results are contained in his master thesis (LARS Technical Report 112277) "Computer-aided Analysis Techniques for an Operational System to Map Forest Lands Utilizing Landsat MSS Data."

More recently he has been involved in the Landsat/Topographic Spectral Overlay project. Fleming will also continue to work toward his Ph.D. in Forestry under ROGER HOFFER.

LARS will also say good-bye to several of the student computer operators including DEBBIE ANDREWS, MALISSA HADDOCK, DAVE KEMPF, TAB HARGRAVES, RUTH COX and MIKE LUTTRELL

JON RANSON is a new graduate student in the Crop Inventory program area. He will be working under MARVIN BAUER on field research projects and in the Agronomy Department on his Ph.D. Three other new students are working in crops, PAMELA WEEDA and MARIA DOWNTON are working under MARILYN HIXSON; CHARLES RHYKERD will be under CRAIG DAUGHTRY.

RECENT JOURNALS FROM THE LIBRARY

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI February 1980 *Number 2*

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI March 1980 *Number 3*

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI April 1980 Number 4

REMOTE SENSING OF ENVIRONMENT

An Interdisciplinary Journal

Volume 7, Number 4, 1978

Contents

ITC Journal 1979-3

Contents

IBM Systems Journal

Volume Eighteen | Number Four | 1979

SCAN LINES

LARS·Purdue University·Vol. 6·No. 6·June 30, 1980

SYMPOSIUM COORDINATORS THANKED BY DAVID LANDGREBE

The 1980 Symposium on Machine Processing of Remotely Sensed Data is now history. There were 230 registered participants from 30 nations. Many indicated that the communicative atmosphere and hard work of the LARS staff made the symposium a rewarding and successful meeting.

In addition to the regular machine processing technical sessions, several special sessions on remote sensing of soils resulted in the participation of many soil scientists from around the world. LARS received many compliments about how this exciting technology has developed and is now making a valuable contribution as a tool for inventory and monitoring of the resources of the earth.

Special thanks goes to MARION BAUMGARDNER, overall Symposium chairman and chairman of the Finance and Sponsor committee, LUIS BARTOLUCCI, co-chairman of the Symposium, MARVIN BAUER, chairman of the Field Trip committee, DICK WEISMILLER, chairman of the Evening at Fort Ouiatenon and Transportation, and all members of the Technical Program and Paper Review committee.

The efforts of DOUGLAS MORRISON, PAM BURROFF, and SUSAN FERRINGER were especially appreciated. DOUG MORRISON was responsible for general coordination of the entire symposium and chairman of the Exhibits, Publicity, and Proceedings committees. SUE FERRINGER was responsible for the LARS Open House. Both Morrison and Ferringer received invaluable assistance from PAM BURROFF, secretary to Technology Transfer.

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).

LARS also wishes to thank the many cosponsors and financial supporters of this year's symposium.

Cosponsors:

American Society of Agronomy
Crop Science Society of America
Institute of Electrical and Electronics Engineers, Inc.
-Computer Society
-Geoscience and Remote Sensing Society
International Society of Soil Science
-Working Group on Remote Sensing and Soil Survey
-Working Group on Soil Information Systems
Society of American Foresters
-Working Group on Remote Sensing
Soil Conservation Society of America
Soil Science Society of America

In Cooperation with:

National Aeronautics and Space Administration
U.S. Department of Agriculture
American Society of Photogrammetry

SPECIAL JOURNAL FEATURES SYMPOSIUM PAPERS

A special issue of Geoscience and Remote Sensing, composed of 9 selected papers from the 1979 Symposium on Machine Processing of Remotely Sensed Data, is now available. DAVID LANDGREBE and Tom Lynch, NASA/Goddard Space Flight Center, were special editors of this issue.

Copies are available in the LARS Library, Technology Transfer area, and from IEEE Single Copy Sales
455 Hoes Lane
Piscataway, NJ 08854
Price is $5 to IEEE members for the first copy only, and $10 per copy to non-members.

LARS PRESENTS PAPER AT INTERNATIONAL MEETING

ROGER HOFFER travelled to Budapest, Hungary, on June 9-12 to participate in the 23rd COSPAR Meeting, which included 7 symposia, 2 workshops, and numerous interdisciplinary scientific commissions.

COSPAR, the Committee on Space Research, is an international committee whose members represent a large number of natural and physical science organizations around the world.

Dr. Hoffer presented an invited paper coauthored with MARVIN BAUER on "Spectral Inter-relationships between Vegetation and Soil Background." The paper was presented at the Space Studies of Earth Surface, Meteorology and Climate interdisciplinary commission which was organized by Dr. I.S.

Rasool, Chief Scientist for the Earth Resources Program of NASA/HG.

Hoffer also chaired one of the technical sessions of this interdisciplinary commission and was the reporter for a panel discussion on Spectral Band Requirements and Satellite Projects.

Dr. Hoffer felt that this meeting offered an interesting and open exchange of scientific information between countries all over the world.

VISITORS

Dr. Donald Moore, Associate Director of the Remote Sensing Institute of South Dakota State University, visited LARS on June 19-20. He presented a special seminar on "HCMM Thermal Inertia and Thermal Data for Soil Moisture and Shallow Water Tables," and conferred with members of the LARS staff.

Ron Boyd returned from Goddard June 9-13 to help with special short course on Numerical Analysis of Remote Sensing Data Applied to Soils. He taught the Hands-On computer option and also presented a special seminar to LARS staff.

Demetre Argiolas, a Ph.D. student in Civil Engineering at Ohio State University, is at Purdue/LARS for the summer under the auspices of the Big Ten Traveling Scholar program. Demetre has registered at Purdue for a program of directed reading under the supervision of PHIL SWAIN. He is interested in advanced pattern recognition and image processing methods applicable to remote sensing data analysis.

WORKSHOP ON BASIC RESEARCH IN FIELD MEASUREMENTS

A workshop on optical and geometric field measurements in support of fundamental research in the area of scene characterization and analysis was held on June 16-18 at Purdue University. Twenty-eight participants from universities, NASA, USDA and industry were present for discussions of the measurements required to model and empirically characterize crops, soils, rangeland, and forests.

The workshop was hosted and coordinated by MARVIN BAUER, BARRETT ROBINSON, and VERN VANDERBILT and included a field trip to the Purdue Agronomy Farm to view the field research experiments and instrumentation being used by Purdue/LARS.

The workshop was one of four which have been held in the area of Scene Radiation Characterization and Atmospheric Effects as part of the planning of a basic research program.

SPECIAL SHORT COURSE SUCCESSFUL

Twenty-one participants attended the Numerical Analysis of Remote Sensing Data Applied to Soils short course held June 9-13.

JOAN BUIS and MARION BAUMGARDNER would like to thank the Purdue staff who helped make the course so extremely successful. LUIS BARTOLUCCI, DAVE LANDGREBE, PHIL SWAIN, and several staff from the Agronomy gave presentations; STEVE KRISTOF and LANNY LUND gave workshops.

The participants expressed appreciation for the smooth interaction between Technology Transfer and Soils staff members in producing an excellent short course.

Ten participants were able to take the Hands-On computer option taught by LUIS BARTOLUCCI, NANCY FUHS, SHIRLEY DAVIS, JOAN BUIS and Ron Boyd, from Computer Sciences Corporation.

HOUSTON VISITING CONSULTANT TRIP

PETER JOBUSCH, LUKE KRAEMER, and TOM WILSON travelled to NASA/JSC during the week of June 16 to consult with EOD Personnel. A portion of the trip was spent in presenting some sections of the LARS CMS short course. Along with general computer user consultation, Jobusch made ERSYS implementation recommendations to IBM, Kraemer presented the Dot Ground Inventory System, and Wilson briefed users on the new batch system design.

LARS TRAVEL LOG

Dr. JOHN PETERSON travelled to Huntsville, Alabama, on May 12-15, to participate in a review of Alabama A&M University's Department of Natural Resources and Environmental Studies; specifically their remote sensing program. The review was sponsored by Cooperative Research, U.S. Department of Agriculture.

BARRETT ROBINSON and VERN VANDERBILT attended a Microwave Workshop at the University of Kansas, Lawrence, Kansas, on May 13-16.

H.J. SIEGEL participated in the international workshop on New Computer Architectures and Image Processing, held June 2-5, 1980, in Ischia, Italy. He presented a paper on "PASM: A Multimicroprocessor System for Image Processing."

WADE RUDYANSKI travelled to Fort Dodge, Iowa, twice recently to collect agronomic data at the Webster County field research test site. He was gone June 10-13, and June 29-July 3.

MARILYN HIXSON, PHIL SWAIN, and SHIRLEY DAVIS participated in a technical exchange on Advanced Methods for Remote Sensing Data Analysis held at EROS Data Center, Sioux Falls, S. Dakota, on June 26. They will also do some analysis work on the IDIMS System to become familiar with its capabilities.

MARVIN BAUER will be at Fort Collins, Colorado, from June 27-July 2 to attend the NASA Basic Research program planning committee.

DICK MROCZYNSKI will be in Jacksonville, Mississippi, to attend the FRIS project steering committee meeting, July 7-8.

Dr. DAVID LANDGREBE will be at Snowmass Village, Colorado, July 13-18, to attend the National Academy of Science committee on data management and computation.

PAUL ANUTA plans to attend the International Society of Photogrammetry Congress, held in Hamburg, Germany, on July 13-28. He will present an invited paper on "Geometric Representation Methods for Multitype Self-Defining Remote Sensing Data Sets."

PHIL SWAIN will also present an invited paper at the Congress on "Pattern Recognition for Remote Sensing: Progress and Prospects."

TEKTRONIX EQUIPMENT ON LOAN TO LARS

LARS personnel were able to experiment with the capabilities available on hardware Tektronix Corporation loaned to LARS during June 13-30.

The Tektronix 4027, a high-resolution color graphics terminal, was connected for one week each at Flexlab 1 and 2. SASGRAPH software routines were demonstrated and experimental 35mm color slides were taken by CAROL JOBUSCH.

In addition to the color graphics terminal, a video imaging copier was also at Flexlab 2 for one week. This black & white hardcopy device has the capability of interface between either the COMTAL Vision One/20 or the Tektronix 4027, and produces a medium-resolution output product with up to 12 measured levels of gray on high performance dry silver paper.

SPECIAL STAFF APPOINTMENTS

Effective January 1, 1980, LEROY SILVA was named Technical Editor of the Geoscience and Remote Sensing Society of Visual and Infrared Techniques.

MARION BAUMGARDNER has been appointed to a committee for the Remote Sensing for Resource Management Conference to be held in Kansas City, Missouri, on October 28-30.

NEW PROJECTS FUNDED

Title: Goddard Institute for Space Studies Field Research Request
Sponsor: Goddard
Principal Investigator: LARRY BIEHL
Duration: May 15-December 31, 1980

Title: Digital Information System for Oruro Department, Bolivia
Sponsor: Program ERTS/Bolivia
Principal Investigator: LUIS BARTOLUCCI
Duration: April 15, 1980-October 15, 1981

NEW LARS TECHNICAL REPORT

022580 Pixel Labeling by Supervised Probabilistic Relaxation by J. A. Richards, D. A. Landgrebe and P. H. Swain.

A simple modification to existing probabilistic relaxation procedures is suggested which allows the information contained in initial labels to exert an influence on the direction of relaxation throughout the process. Thus the initial labels assume more importance than with conventional algorithms and are used in combination with the outcome of relaxation at each iteration to produce a cooperative estimate of the correct label for a particular object. Pixel labeling examples are presented which show the performance that can be obtained with the modified algorithm. The procedure is readily generalized to allow other data to influence the process.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

030180 On the Accuracy of Pixel Relaxation Labeling by J. A. Richards, D. A. Landgrebe and P. H. Swain.

An analysis of pixel labeling by probabilistic relaxation techniques demonstrates that these labeling procedures degenerate to weighted averages in the vicinity of fixed points. A consequence is that undesired label conversions can occur, leading to a deterioration of labeling accuracy at a stage after an improvement has already been achieved. Means for overcoming the accuracy deterioration are suggested and are used as the basis for a possible design strategy for using probabilistic relaxation procedures. Results are illustrated using simple data sets in which labeling on individual pixels can be examined and also using Landsat imagery to show application to data typical of that encountered in remote sensing applications.

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

060280 Application of Multispectral Reflectance Studies of Soils: Pre-Landsat by S. J. Kristof, M. F. Baumgardner, R. A. Weismiller and S. M. Davis.

Short history of spectral soil studies at LARS since 1966 to 1972 (Pre-Landsat). The results obtained through this early research illustrate the relationship between the reflected and emitted energy from soils and the physical chemical properties of those soils.

NEW LARS PUBLICATION

042480 Remote Sensing Decoded: Meeting the Challenges of Multidisciplinary and International Remote Sensing by P. H. Swain, S. M. Davis, and P. M. Adrien.

Technology transfer is always a complex communications task. When the technology is as diversified as remote sensing and the arena is multidisciplinary and international, performing this task effectively becomes all the more difficult. Despite the difficulties, however, it is the thesis of this paper that the fundamental concepts and a practical working knowledge of remote sensing technology can be readily transmitted if the communicator recognizes the realities of the situation and adopts appropriate strategies. A number of effective strategies are outlined and illustrated using examples from the remote sensing technology.

SYSTEM SERVICES

HOLIDAY SHUTDOWN BY MIKE COLLINS

The computer will be shutdown over the upcoming July 4th holiday. The complete schedule is listed below.

Thursday, July 3	shutdown at 2400 hrs.
Friday, July 4	down all day
Saturday, July 5	down all day
Sunday, July 6	system will be up at 1500 hrs. and continue with regular schedule

CMS SHORT COURSE COMMENTS BY SUSAN SCHWINGENDORF

On June 10, 12, 17, 19 a number of units on CMS were presented at LARS by KAY HUNT, SUSAN SCHWINGENDORF, CAROL JOBUSCH, and TOM WILSON. We would appreciate your comments or criticisms about contents of the units, individual presentations, other information you would like to see included, whether you would like this course offered in the fall, etc. Please complete and return the attached questionnaire.

Also, additional copies of the units have been obtained, so phone or send a note to SUSAN SCHWINGENDORF to receive a copy.

TO: SUSAN SCHWINGENDORF

CMS Short Course Comments and Criticisms

= units I attended
+ = units I would like to attend in the future

_____ 1. Introduction to VM370

_____ 2. CMS I

_____ 3. Virtual Machine Concepts

_____ 4. CMS II

_____ 5. EDIT I

_____ 6. EXEC I

_____ 7. Programming I

_____ 8. IMSL

_____ 9. BATCH

_____10. Programming II

_____11. CMS III

_____12. CP

_____13. EXEC II

_____14. EDIT II

Comments (General or about specific units):

REMOTE TERMINAL NEWS BY JOAN BUIS

JOAN BUIS went to visit the remote terminal site at Alabama A&M on May 27, 28. In addition to working with Dr. Oscar Montgomery and his students on advanced CMS commands, she worked with John Herschelman and Doug Domenech. Hershelman and Domenech are with the Timber Harvesting Management Program at A&M, and are using the remote terminal to run the TVA Forest Inventory Programs and the VPI Harvesting Simulator System.

We're sorry to see LANNY LUND leaving LARS, but excited about the prospects of a new remote terminal site at his home base - the University of California at Riverside. Some of the hardware has already been ordered for Lanny to have direct contact with LARS through a dial-up terminal at the university. It will be a pleasure to have Riverside as part of our Remote Sensing Research and Analysis Network.

The ISU remote terminal contract has been extended for another year. Dr. Paul Mausel brought a group of short course participants to LARS on June 18. They were able to tour the lab, see a demonstration of selected facilities and meet with NANCY FUHS, DICK MROCZYNSKI and LUIS BARTOLUCCI.

On April 22, 1980 the Goddard remote terminal account was terminated. Goddard was involved in the original LARS remote terminal experiment, and now have various systems of their own available.

LARSYS NEWS BY JOAN BUIS

The LARSYS group is in the process of recompiling all of the LARSYS and LARSYSDV programs with the H compiler. We'll keep you posted on this progress. Thanks to FRIS, there is a major documentation effort taking place. We hope to have many of the LARSYSDV processors documented and updates ready for the LARSYS System and Users manuals by October.

TWO ATTEND COMTAL TRAINING COURSE BY JOAN BUIS

JOAN BUIS and CATHY KOZLOWSKI attended the COMTAL Vision One/20 training course in Pasadena, California June 2-6. The course included a demonstration showing the flexibility of the Vision One/20, an introduction to the theory of operation at the architectural and board levels, a tour of the plant, a discussion on hardware/software interfacing, one hour of hands-on time, and a discussion about what COMTAL hopes to produce in the future.

LARSPEC BY JERRY MAJKOWSKI

On June 9 LARSPEC was updated to expand the ID record punching capabilities in the IDLIST and DSEL processors. A new supervisor control card PUNCH will replace the CASES control card which will no longer be supported. The format for the PUNCH card is described below.

Note that all the control parameters, except 'XXXX,' described below begin with either a '$' or '*.' Those which begin with '$' pertain to identification record information; those which begin with '*' pertain to band means information. The 'XXXX' parameter also pertains to identification r-cord information.

Key Word: PUNCH

Control Parameters:

$GEOMETRIC, $NOGEOM, $AGRONOMIC, $NOAGRON
$METEOROLOGICAL, $NOMET, $EXPERIMENTER, $NOEXP,
$SOILS, $NO SOILS, $ALL, XXXX, *FFORMAT, *BINARY,
*BANDS, $FORMAT (....)

Function:

Controls the punching of data values and leader parameters.

Card default:

None; no data is punched if PUNCH card is omitted.

A detailed description of the ID parameter output for the control parameter sets $GEOMETRIC, $AGRONOMIC, $METEOROLOGICAL, $EXPERIMENT, $SOILS can be obtained from LARRY BIEHL, NANCY FUHS or JERRY MAJKOWSKI and will be included in the next "LARSPEC User's Manual" update. Placing "NO" in front of any of these parameters turns that set off. $ALL punches all the ID parameter data and XXXX punches selected parameters using the four letter mnemonic codes given in section 5 of the "LARSPEC User's Manual." FFORMAT and *BINARY are identical to the similar parameters from the CASES card and *BAND is equivalent to the CASES PUNCH. The $FORMAT (....) parameter is a new addition and allows the user to define a format for the XXXX parameters which normally default to binary. If the user defines the format the first specification must be 'T17,' to allow for the printing of date collected, observation number and serial number on the first card. The rest of the format must follow normal FORTRAN specifications.

The punch output (sample shown below) will contain a title, the date and time, a description of the bands punched and the name of the first class. This will be followed by a description of each ID set selected giving the parameters and formats contained in that set. Each set has an identifier consisting of a letter describing the set (ex. 'A' for $AGRONOMIC) and a digit for the card number with the exception of the $ALL and 'XXXX' parameters which contain two letters (AC=$ALL from crops, AS=$ALL for soils, US=user defined XXXX parameter). Then the ID record and band means data will be punched. The data will be grouped first by classes and then by runs. Each data card punched will contain the card number for that run in columns 1-2, the class number in 3-4, the date the data were collected in 5-10, the observation number in 11-14 and the serial number in 15-16. For the $ALL and XXX

parameter sets columns 1-16 will be as described above for only the first card in the set; subsequent cards will have card number and class number in 1-4, then 10 parameter data in the remaining columns. Every time the record type changes (i.e. from crops to soils, or vice versa) the ID set description will be reprinted since the parameters and identifiers vary between types. The class name will also be printed before each new class.

```
FILE: PUNCH    FILE     0   PURDUE / LARS 3031

MODULE DATA DECK FOR LARSPEC          BCD JUNE 19,1980 04 25 45 PM
BANDS    0.400 -  0.500,  0.500 -  0.600,   0.600 -  0.70,   0.700 -  0.800
BANDS    0.800 -  0.900,  0.900 -  1.000
CLASS CROPS          BAND MEANS
A1    CLAS,DACO,OBNU,SENU,JUDA,TIDA,SCTY,PLNU,RENU,SPEC,VARI,
A2    DACO,OBNU,SENU,LOF1,LOF2,LOF3,LOF4,LOF5,LOF6,LOF7,LOF8,ROWI,PLDA,DAPL,MATU,
      NMAT,HEIG,PEGR,LEAR,
A3    DACO,OBNU,SENU,LEPL,PLCO,FRCO,GRLE,YELE,BRLE,PLMO,PMOW,RATE,TATE,DBFR,TSWT,
      GMOS,
A4    DACO,OBNU,SENU,DBGL,DBYL,DBBL,DBST,DBFR,DBWE,DBTO,FRBI
   ('A1',,I2,I6,I4,I2,I3,I6,4A4,I4,' ',I2,4A4,4A4/
    'A2',,I2,I6,I4,9I2,F5.2,I6,I3,4A4,2F5.2,I3,F5.2/
    'A3',,I2,I6,I4,I2,F4.1,2F7.1,3I3,I2,F8.2,F4.1,F5.2,F8.1,F6.2,F4.1/
    'A4',,I2,I6,I4,I2,8F8.2)
B1    DACO,OBNU,SENU,SFNA,TEXT,MUCO,HORI,DRCL,MOLA,
B2    DACO,OBNU,SENU,PESA,PESI,PECL,MOFI,SUCO
   ('B1',,I2,I6,I4,I2,3(4A4),2A4,I2,F6.2/
    'B2',,I2,I6,I4,I2,3F4.1,4A4,4A4)
US    DACO,OBNU,SENU,DQF1,DQF2,DQF3,DQF4,DQF5,DQF6,DQF7
   ('US',,I2,I6,I4,I2,16A4,/('US',,14X,16A4))
 1 1770511   17 6131212800PLOT 12 CHAL          -9 -9
 2 1770511   17 6-9-9-9-9-9-9-9-9-9-9.00      -9 -9                    -9.00-9.00 -9-9.00
 3 1770511   17 6 0.0    -9.0    -9.0 -9 -9 -9-9    0.25-9.0-9.00     -9.0  0.25-9.0
 4 1770511   17 6   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00
 5 1770511   17 6                                                  ....    -9 -9.00
 6 1770511   17 6-9.0-9.0-9.0
 7 1770511   17 6 ...W.....:.....:.....A...A...
 8 1770511   17 6   5.30   6.12   7.46   9.54  12.22  14.83
 1 1770511   18 6131212900PLOT 10 CHAL          -9 -9
 2 1770511   18 6-9-9-9-9-9-9-9-9-9-9.00      -9 -9                    -9.00-9.00 -9-9.00
 3 1770511   18 6 0.0    -9.0    -9.0 -9 -9 -9-9    0.25-9.0-9.00     -9.0  0.25-9.0
 4 1770511   18 6   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00   -9.00
 5 1770511   18 6                                                  ....    -9 -9.00
 6 1770511   18 6-9.0-9.0-9.0
 7 1770511   18 6 ...W.....:.....:.....A...A...
 8 1770511   18 6   4.85   5.67   7.02   9.24  12.24  15.08
 1 1770511   19 6131213100PLOT 8 CHAL           -9 -9
```

Upcoming expansions for LARSPEC include interface to the TEKTRONIX 4054 terminal for high resolution graphics and multi-wavelength data graphing capabilities.

SUMMARY OF 3031 COMPUTER USAGE FOR MAY 1980

Overall Usage

Basic Rate CPU Time Used	34.97 hrs.
Priority Rate CPU Time Used	124.71 hrs.
Total CPU Time Used	159.68 hrs.
Terminal Sessions	5303
Batch Jobs	796

Usage by Time of Day

Time Period	Hours of CPU Used	Average Percent CPU Utilization
Mon-Fri midnite-8AM	26.25	16
Mon-Fri 8AM-4PM	88.18	53
Mon-Fri 4PM-midnite	35.53	21
Weekend	9.72	8

Batch Job Usage

Batch Machine	Jobs Run	Avg. Clock Time	Avg. CPU Time
BATQUICK	218	0.36	0.07
BATSHORT	120	2.61	0.19
BATMED	45	18.43	3.26
BATONITE	105	18.03	1.12
BATLONG	40	7.04	1.51
TAPTRAN	19	8.83	0.55
BATEOD	155	18.07	4.15
BATJSC	82	54.90	22.90

Keyboard Terminals

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	164	143.32	0.87
	31	GTX	237	159.61	0.67
	32	GTX	267	172.07	0.64
	33	GTX	299	185.99	0.62
	34	GTX	328	181.58	0.55
	35	GTX	275	180.21	0.66
	36	GTX	274	154.41	0.56
	37	DECwriter	208	81.06	0.39
	38	Tektronix	86	63.39	0.74
	39	CRT	Installed in June 1980		
	3A	GTX	Installed in June 1980		
Flexlab 1	40	GTX	214	122.41	0.57
	41	GTX	197	141.81	0.72
	42	GTX	214	141.81	0.66
	43	DECwriter	145	73.94	0.51
Dial-up	50	1st in Use	102	81.57	0.80
	51	2nd in Use	42	22.90	0.55
	52	3rd in Use	9	5.17	0.57
	53	4th in Use	8	2.50	0.31
	54	5th in Use	0	0.00	0.00
	55	In-House-1	24	28.30	1.18
	56	In-House-2	30	33.22	1.11
St. Regis	4A	DECwriter	0	0.00	0.00
Alabama	4B	DECwriter	8	3.81	0.48
	4C	GTX	58	56.09	0.97
	4D	HTX	26	33.19	1.28
ISU	4E	(various)	5	0.87	0.17
	4F	(various)	58	75.12	1.30
Houston	60	CRT	250	128.63	0.51
	61	CRT	255	153.47	0.60
	62	Trenddata	264	129.65	0.49
	63	Trenddata	232	114.14	0.49
	64	CRT	127	96.12	0.76
	65	CRT	118	64.96	0.55
	66	CRT	105	54.39	0.52
	67	CRT	140	94.84	0.68
	68	CRT	125	110.34	0.88
	69	CRT	88	95.42	1.08
	6A	Dial-up	109	107.02	0.98
	6B	Dial-up	102	102.42	1.00
	6C	Dial-up	42	42.26	1.01
	6D	Dial-up	58	40.15	0.69
	6E	Dial-up	27	27.11	1.00
	6F	Dial-up	6F	22.40	0.90

INTERLAB NOTES

PERSONNEL CHANGES

VERLE HUGHES, a familiar presence around both Flexlab 1 and 2, will retire from Purdue University on June 30. He has worked for the Purdue Research Foundation for the past 11½ years as custodian, general handyman and friend to all, and will continue to take care of the grounds on a part-time basis as needed.

Hughes was born on a farm near Brookston, Indiana, has worked all over the county area, and lived in the same house in West Lafayette for almost 40 years.

This past month has seen numerous students join the LARS staff for the summer. By Program Area they are:

Field Measurements	System Services	Crop Inventory
SELMA AL-ABBAS	DAVID CHUNG	JON RANSON
TOM BONSETT	DAWN DUNCAN	DIANA BRADDICK
RICHARD NOLLER	RAVI KADIYALA	MARIA DOWNTON
TODD PLANTENGA	JOEL KESSLER	DONNA PARKER
JAMES YORK	MARC MEANS	E.B. RAWLES
	MARK PENNINGROTH	WADE RUDYANSKI
	FATI SANII	CAROL MCFADYEN
	SHERYL SKIFSTAD	CHUCK RHYKERD

CARLOS MACHADO joined the staff on 5/19 as a Graduate Student in the Reformatting Group.

STACY ELDRIDGE was hired on 5/27 to replace Jo Albert who left on 5/30. Stacy is secretary in Crop Inventory working primarily for MARV BAUER.

Dr. Roy Chung, Visiting Research Associate, began his 10 week program at LARS on 5/27/80. Professor Chung will be working on the Digital Display, data banks, and taking advantage of training opportunities such as the Symposium, short course, and visiting scientist program. Professor Chung is a graduate of University of Wisconsin and is associate professor of demography at University of Norther Iowa. His son David is also working at LARS, in the System Services area, this summer.

MON LI TANG is leaving LARS June 30, to accompany her husband Alex to Pennsylvania, where he will accept a job in materials engineering.

RECENT ACQUISITIONS IN THE LARS LIBRARY

IBM Systems Journal

Volume Nineteen Number One | 1980

IBM Systems Journal

Volume Nineteen | Number Two | 1980

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI May 1980 Number 5

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI June 1980 Number 6

ITC Journal 1979-4

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 7 · August 7, 1980

NEW ASSOCIATE DIRECTOR ANNOUNCED

Professor MARION BAUMGARDNER has been named Associate Director of Purdue's Laboratory for Applications of Remote Sensing (LARS). The appointment, which was announced by Professor DAVID LANDGREBE, Director of LARS, comes after a nation-wide search conducted by a committee of LARS and the Department of Agronomy staff chaired by Dr. Marvin Phillips, Agronomy Department Head.

Dr. Baumgardner will be assuming the position now held by Dr. JOHN PETERSON. Dr. Peterson, who served for 23 years as Head of Purdue's Agronomy Department, has been Associate Director of LARS since July 1971. Though he will shortly relinquish his administrative duties at LARS, Dr. Peterson is expected to remain active in the field of agronomy and remote sensing.

Dr. Baumgardner, a Professor of Agronomy at Purdue, has been a LARS staff member since its organization in 1966, and has most recently served as the Program Leader for Earth Science Programs. He has an Honorary D. Sc., DePauw University, B.S., Texas Tech University; M.S., Ph.D., Purdue University. The author of numerous scientific papers, Professor Baumgardner serves frequently as a consultant to several international development agencies with assignments in Africa, Asia, Latin America, and Europe. He is a Danforth Associate and a Fellow of the American Society of Agronomy, the Soil Science Society of America and Indiana Academy of Sciences.

Having traveled and lectured in more than 50 countries, Professor Baumgardner is active in a dozen national and international scientific societies. As a participant in the 1974 Summer Study of the National Academy of Engineering's Space Applications Board, he helped to define applications of space technology for the 1980's and 1990's. He served on the National Academy of Sciences' Committee on Remote Sensing for International Development, is currently Chairman of the Agricultural Research Institute's National Study Panel

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).

on Remote Sensing and Soil Survey of the International Soil Science Society; is vice chairman of the Working Group in Ecological Botany, International Union of Biological Sciences.

Dr. Baumgardner will continue to teach on an occassional basis in the Department of Agronomy while pursuing his new duties.

Dr. RICHARD WEISMILLER has been appointed the new Program Leader for Earth Sciences Programs, filling the vacancy created by Dr. Baumgardner's appointment as Associate Director of LARS.

Dr. Weismiller is exceptionally well qualified for this position having come to LARS in 1973 as a Research Agronomist after serving four years as a research scientist in the U.S. Air Force. He holds a B.S. in Agronomy with Highest Distinction, a M.S. in soil mineralogy from Purdue University, and a Ph.D. in soil chemistry and clay mineralogy from Michigan State University. His first responsibility at LARS was the management of the Great Lakes Watershed Land Cover Mapping project. Later as Associate Program Leader he was involved with a number of tasks. Most recently he has served as a co-principal investigator of the highly successful NASA Office of University Affairs (PY) Grant to assist the State of Indiana in beginning to use remote sensing technology.

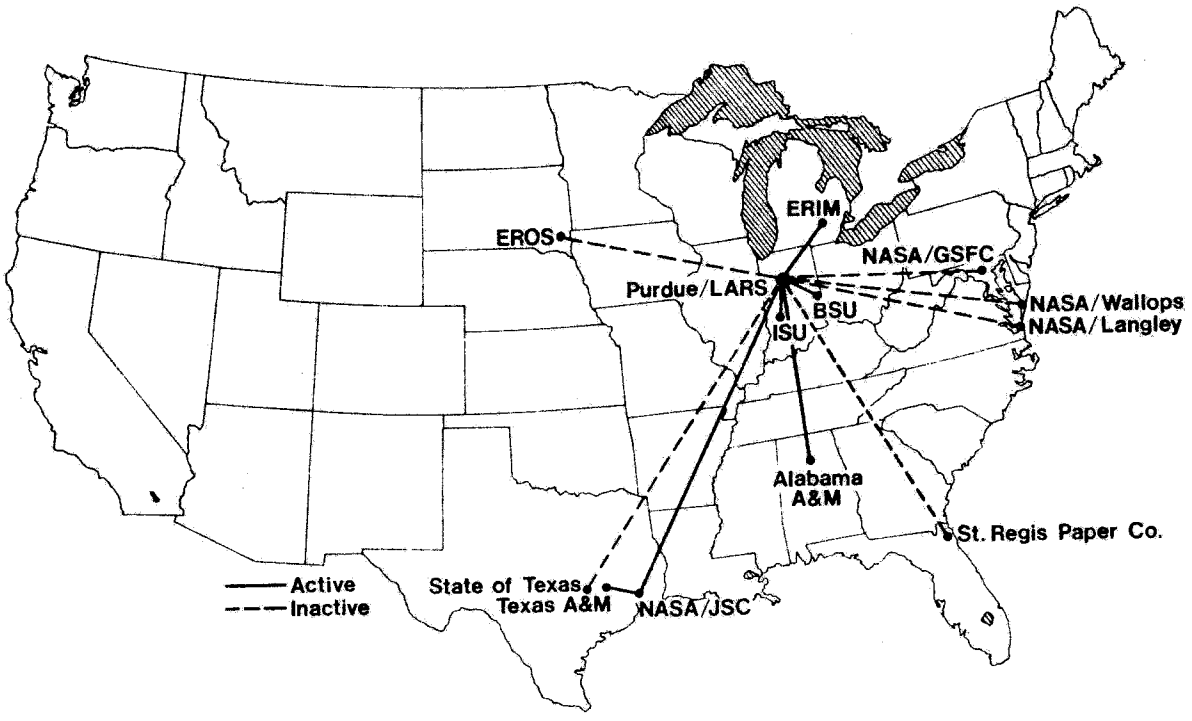
REMOTE TERMINAL REVIEW

Since July 1972, the Landsat satellite sensor systems have been collecting multispectral scanner data on a world wide basis and thus providing a vast amount of data upon which earth resource management decisions can be made. To make effective use of this remotely sensed data, one must have access to the data and to processing capabilities, and should possess a understanding of how to apply the available processing tools.

The high initial cost of procuring a dedicated remote sensing processing system, coupled with the personnel cost of supporting and maintaining such a system, has proven to be prohibitive for certain potential users. A solution to this problem is to provide potential users with powerful analysis capabilities at greatly reduced fixed costs through a dial-up computer network.

Over the past nine years Purdue/LARS has supported such a remote sensing research and analysis network. This remote terminal network permits immediate access to the existing technology and is an appropriate mechanism for organizations to learn, evaluate, and rapidly apply the technology to meet specific needs, and utilize it for reserach and education. This concept of technology transfer has been implemented through various hardware configurations, training materials, and training procedures.

Since 1972, remote terminals have been installed at twelve different remote sites, as shown on the map on page 3. In the past year new terminals were established at the Environment Research Institute of Michigan (ERIM) and Ball State University (BSU). Two other sites, NASA/Goddard Space Flight Center and St. Regis Paper Company, implemented their own processing capabilities.



For furthur information on the Purdue/LARS remote sensing research and analysis network, contact JOAN BUIS, (317) 749-2052.

LARS WELL REPRESENTED AT INTERNATIONAL CONGRESS

A well-varied program on all aspects of photogrammetry - including a strong component of remote sensing - was featured at the 14th International Congress of the International Society of Photogrammetry. PHIL SWAIN, PAUL ANUTA, MARVIN BAUER, ROGER HOFFER, VERN VANDERBILT and ED MIKHAIL all participated in the Congress, held July 13-25 in Hamburg, Federal Republic of Germany.

The LARS staff members presented the following papers:

"Spectral Properties of Agricultural Crops and Soils Measured from Space, Aerial, Field and Laboratory Sensors" by MARVIN BAUER, VERN VANDERBILT, BARRETT ROBINSON and CRAIG DAUGHTRY.

"A Multiband Radiometer and Data Acquisition System for Remote Sensing Field Research" by BARRETT ROBINSON, MARVIN BAUER, DAVE DEWITT, LEROY SILVA, and VERN VANDERBILT.

"Simulated Response of a Multispectral Line Scanner over wheat as a function of Wavelength and View/Illumination Directions" by VERN VANDERBILT, BARRETT ROBINSON, LARRY BIEHL, MARVIN BAUER and A.S. Vanderbilt.

"Pattern Recognition for Remote Sensing: Progress and Prospects" by PHIL SWAIN

"Geometric Representation Methods for Multi-type self-defining Remote Sensing Data Sets" by PAUL ANUTA

"Computer Processing of Satellite Data for Assessing Agricultural, Forest and Rangeland Resources" by ROGER HOFFER and PHIL SWAIN

In addition, Mikhail chaired a technical session on Rectification, Correlation and Change Detection and Bauer co-chaired a technical session on Spectral Signatures of Objects. Swain participated in a panel discussion on "Image Processing Pattern Recognition -- Should Photogrammetrists Worry?"

Swain commented on some of the Congress highlights. They included a change in the name of the society to International Society of Photogrammetry and Remote Sensing. Also of interest were presentations on the outlook for remote sensing applications and remote sensing instrumentation from the point-of-view of the international community, including ambitious plans that France and Japan have to orbit satellites with multispectral sensors during 1980-90's.

BOOK REVIEW

IEEE Spectrum recently included the following review by Dr. V. Klemas, Director of the Center for Remote Sensing, College of Marine Studies, University of Delaware, of Remote Sensing: The Quantitative Approach (Philip H. Swain and Shirley M. Davis, editors, McGraw-Hill Book Company, New York, 1978, 396 pages, $39.50) This textbook is authored by DAVID LANDGREBE, TERRY PHILLIPS, PHIL SWAIN, SHIRLEY DAVIS, ROGER HOFFER, JOHN LINDENLAUB, and LEROY SILVA.

> "The unmistakable message of this book is that remote sensing, if properly applied, can produce quantitative results to meet rigorous scientific standards.
>
> The authors set the stage by presenting the concept of the quantitative approach at a level that even a novice can understand. There follow several chapters describing instrumentation and data analysis techniques. By emphasizing important instruments and techniques, yet not neglecting to mention briefly less popular systems, the authors present a complete view.
>
> The chapters on pattern recognition and data-processing systems are particularly thorough, including detailed discussions of training procedures, error estimation, statistical separability, feature extraction, and cluster analysis. Good illustrations and concise, clear writing ease the reader through difficult information. The spectral, temporal, and spatial characteristics of vegetation, soils, water, and other Earth surface features are reviewed. There is a good chapter on applications and advice to users.
>
> Most specialists and nonspecialists in remote sensing will probably agree that this book is the first successful attempt to present remote sensing data acquisition and analysis from a quantitative point of

view. This is particularly important at this time because in the early years after the launching of such satellites as Landsat, remote sensing proponents were accused of producing nothing but "pretty pictures." In part, this evaluation was a result of the eagerness of many investigators to publish preliminary satellite results before they could be quantified and correlated with "ground truth." We have come a long way since that early post-launch period. Satellite data is now being used almost routinely to map quantitative changes in land cover, ocean surface temperature, as well as various other properties of land, sea, and the atmosphere.

This volume is highly recommended for use both by the specialist as a reference book and by the instructor as a textbook."

VISITORS

Brigadier General Miguel Sanchez Peña, President of Comision Nacional de Investigaciones Espaciales (CNIE), Argentina, and Lic. Eduardo Banus, Argentine representative at the United Nations, Outer Space Affairs Division, visited LARS on July 2. They were briefed by DAVID LANDGREBE, MARION BAUMGARDNER, and LUIS BARTOLUCCI on various LARS programs.

MARION BAUMGARDNER hosted several visitors at LARS during July. Dr. Richard Morris, Cropping Systems Agronomist, IRRI, Manila, the Philippines, discussed various educational programs on July 7. On July 11, Dr. Bernard Naert, Office of Soil Survey, National Institute of Agricultural Research, Montpellier, France, talked with Ray Sinclair and Dr. Baumgardner about current research programs at Purdue University in remote sensing and soils.

Drs. Baumgardner and DICK WEISMILLER presented various soils research programs of LARS to Dr. Jalaludin Jipelos, Head of the Soil Science Branch, MARDI, Serdang, Malaysia, on July 16.

Eighteen international participants from Indonesia, Malaysia, Bangladesh, Kenya, and Bolivia, toured LARS on July 18, as part of the Integrated Pest Management short course held at Purdue. They received a briefing on remote sensing technology and agricultural applications.

LARS TRAVEL LOG

GARY BRAMMER, LUIS BARTOLUCCI and JOAN BUIS were at Indiana State University on July 1 to discuss remote terminal hardware configuration upgrades with ISU staff.

DAVID LANDGREBE was in Chicago, Illinois, on July 12, to receive a briefing for IEEE Section Treasurers. Dr. Landgrebe will assume the position of treasurer of the Central Indiana Section of IEEE shortly.

PHIL SWAIN presented a seminar at the IBM Scientific Center, Paris, France, on July 18, on "Pixel Classification by Relaxation Methods: Some Interesting Results." Approximately 30 people from IBM and the local image processing/pattern recognition community attended.

TERRY PHILLIPS and LUIS BARTOLUCCI travelled to La Paz, Bolivia, to discuss digital information systems for application in Bolivia as part of their ongoing project with LARS. They were in South America from July 20 to August 4.

MIKE STABENFELDT and BARRETT ROBINSON, travelled to Stamford, Connecticut, and Gaithersburg, Maryland, on July 21-24, to discuss the multiband radiometer and data logger with manufacturers.

NEW LARS TECHNICAL REPORTS

062479 Predictability of Change in Soil Reflectance on Wetting by J.B. Peterson, B.F. Robinson and R.H. Beck.

The loss of reflectance from the oven-dry state to field capacity for 15 surface soils from Central Indiana, representative of the Mollisol and Alfisol great soil groups, was found to be definitely related to the oven-dry reflectances of the soils. A regression analysis of the relationship of the darkening effect of wetting on the reflectance of the soils when dry resulted in regression curves with R^2 values ranging from .9914 to .9291 over the five wavelength bands used, .52 - .58 μm, .71 μm, .76 - .90 μm, .90 - 1.22 μm and 1.50 - 1.73 μm.

080979 Correlation of Spectral Classes Derived from Landsat MSS Data to Soil Series and Soil Conditions for Jasper County, Indiana by E. J. Hinzel, R. A. Weismiller and D. P. Franzmeier.

Recent work utilizing computer-aided analysis of Landsat MSS data resulted in a spectral soils map of Jasper County, Indiana, which displayed 52 spectral classes representing the soils found within six distinct parent material areas. A correlation of these spectral classes with the soils and soil conditions was achieved by inventorying soils on twenty-eight 160-acre randomly chosen sites. Percentages derived from manually overlaying soils and spectral data and making a dot grid count were used to develop a description legend identifying the dominant soils represented by the spectral class as well as soils with significant inclusions. The contributing influence of other factors (soil-vegetation complexes, crusting, surface moisture, organic matter content, texture, etc.) to the analysis and interpretation of remotely sensed data for soil survey was identified. These results may conceivably aid in auger placement and soil boundary delineations, hence reducing the time and expense of the soil survey.

The research described in this report was sponsored by NASA under Grant No. NGL-15-005-186.

101679 Multiclass Bayes Error Estimation by a Feature Space Sampling Technique by B. G. Mobasseri and C. D. McGillem. IEEE Transactions on Systems, Man, and Cybernetics, Vol. SNC-9, No. 10, October 1979.

A general Gaussian M-class N-feature classification problem is defined. An algorithm is developed that requires the class statistics as its only input and computes the minimum probability of error through the use of a combined analytical and numerical integration over a sequence simplifying transformations of the feature space. The results are compared with those obtained by conventional techniques applied to a 2-class 4-feature discrimination problem with results previously reported and 4-class 4-feature multispectral scanner Landsat data classified by training and testing of the available data.

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

041080 Analytical Design of Multispectral Sensors by D. J. Wiersma and D. A. Landgrebe. IEEE Transactions for Geoscience, Remote Sensing, Vol. GE-18, No. 2, April 1980.

An analytical procedure for the design of the spectral channels for multispectral remote sensor systems is defined. An optimal design based on the criterion of minimum mean-square representation error using the Karhunen-Loeve expansion was developed to represent the spectral response functions from a stratum based upon a stochastic process scene model. From the overall pattern recognition system perspective, the effect of the representation accuracy on a typical performance criterion, the probability of correct classification, is investigated. The optimum sensor design provides a standard against which practical (suboptimum) operational sensors can be compared. An example design is provided and its performance is illustrated.

The research described in this paper was supported by NASA under Contract Nos. NAS9-14970 and NAS9-15466.

041580 A Parametric Model for Multispectral Scanners by B. G. Mobasseri, P. E. Anuta, and C. D. McGillem. IEEE Transactions for Geoscience, Remote Sensing, Vol. GE-18, No. 2, April 1980.

Efficient acquisition and utilization of remotely sensed data require an extensive a priori evaluation of the performance of the multispectral scanner. The objective of the research described in this paper is the development of a parametric model to analytically evaluate the response of a multispectral scanner in any operational environment and to provide the necessary information in selecting a set of optimum parameters.

The research described in this paper was sponsored by NASA under Contract No. NAS9-15466.

042380 Contextual Classification of Multispectral Remote Sensing Data Using a Multiprocessor System by P. H. Swain, H. J. Siegel and B. W. Smith. IEEE Transactions for Geoscience, Remote Sensing, Vol. GE-18, No. 2, April 1980.

A statistical model of spatial context is described and procedures for classifying remote sensing data using a context classifier are outlined. Experimental results are presented. Because the computational requirements of the context classifier are very large, its implementation on multiprocessor systems is investigated. Some of the special considerations necessary for such implementations are described, with particular reference to implementation on an array of Control Data Corporation Flexible Processors.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

072180 The Development of a Spectral-Spatial Classifier for Earth Observational Data by D. A. Landgrebe. Pattern Recognition, Vol 12, No 3, July 1980.

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 on its performance are summarized. This results show it to have improved accuracy, with greater computation efficiency, and only slightly increased operator complexity.

The work described in this paper was sponsored by NASA under Grant NGL 15-005-112 and Contracts NAS9-14016 and NAS9-14970.

SYSTEM SERVICES August 7, 1980

LARSPEC BY LARRY BIEHL

LARSPEC was updated on June 23, June 29 and July 7 to correct bugs that existed in the new PUNCH control parameters for the IDLIST and DSEL processors. Also the June 30 update was made to reflect a change in the CMS system. The new PUNCH control parameters are listed here for reference. Both DSEL and IDLIST processors:

$GEOMETRIC,	punch 9 geometric ID parameters
$AGRONOMIC,	punch 45 agronomic parameters
$METEOROLOGICAL	punch 9 meteorological parameters
&EXPERIMENTER	punch 10 experimenter parameters (Ag ID records) punch 13 experimenter parameters (Soils ID records)
$SOIL	punch 11 soils parameters (Ag ID record) punch 82 soils parameters (Soils ID record)
$ALL	punch all ID record parameters in binary format
XXXX, YYYY, ...	punch selected ID parameter(s) with mnemonic code(s) of XXXX, YYYY, ...
$FORMAT(....)	specified format for user selected ID parameters. No data should be punched in first 16 columns of any card. Use T17 to tab to column 17 of each card. Example $FORMAT(717,F7.2,1X,I6,1,T17,I6,10I2)

DSEL processor only:

*BANDS	punch band means
*BINARY	punch band means in binary format
*FFORMAT	punch band means in F6.2 format

See JERRY MAJKOWSKI, NANCY FUHS, or LARRY BIEHL for a more detailed list of the ID parameters mentioned above.

LARSPEC has been converted to FORTRAN H. The FORTRAN H version will replace the FORTRAN G version on August 15. The LARSPEC user should see no change in the system. Anyone who is using routines on the LARSPEC disk compiled with FORTRAN G should contact JERRY MAJKOWSKI to determine if the change will cause a problem.

There will be an added capability in the GSPEC processor of LARSPEC on August 15. The user may request thicker lines for the Varian plots. The line thickness can be set by the UPSET BRIGHTNESS(n) control card where n is a value between 1 and 25 indicating the number of raster units for the line width. One raster unit is approximately .006 inches wide. n can also be a negative number to produce a 'negative' plot (i.e., black-grey background with white lines of thickness n). n of 2 or 3 makes nice bold lines.

GCL AND IGL PLOTTING SOFTWARE UPDATES BY JERRY MAJKOWSKI

Both 2D GCS (Graphics Compatability System) and IGL (Interactive Graphics Library for the Tektronix 4054) have been successfully converted to FORTRAN H. Although the FORTRAN G versions will continue to remain as the default libraries on PLTDSK until August 15, the H versions can be accessed by those desiring to use the advantages of the H compiler. Both plotting packages are on a disk which can be accessed by typing:

```
LINK LARSPEC 10B 10B
ACCESS 10B Z
```

Note the default PLTDSK address is also 10B so that both disks cannot be accessed concurrently thus avoiding possible load problems. The use of both packages are identical to the G version except for the names of the controlling EXEC routines. To run a GCS or IGL program in FORTRAN H type:

```
GCSH device filename options
```

or

```
IGLH filename
```

This version of 2D GCS will also contain an update to allow for varying line thicknesses on the Varian plotter. To use this option use

```
CALL UPSET ('BRIGHTNESS', THICK)
```

where THICK is a real number from 1.0 to 25.0 indicating the thickness of the graphics lines in raster units. THICK can also be a negative number to produce a "negative" plot (i.e., black-grey background with white lines of thickness THICK).

Contact JERRY MAJKOWSKI if the August 15 date for changing the plotting software on PLTDSK from FORTRAN G to FORTRAN H causes problems.

The problem with the Tektronix 4054 graphics input feature in the IGL software (LOCATE and WHERE) on the IBM has been solved. One needs to be certain that the special terminal characters that need to be set off are: LINEND, LINEDEL, CHARDEL, ESCAPE, and INPUT.

Upcoming expansions for IGL and GCS include implementation of 2D and 3D GCS on the Tektronix 4054.

GRAPHIC HARD COPY BY GARY BRAMMER

The Tektronix Hard Copy Unit purchased in 1975 for use with the Princeton Graphic Display System has been adapted for use with the Tektronix 4054 Graphics Terminal. A copy of anything displayed on the terminal can be obtained by pressing the MAKE COPY button on the terminal or the COPY button on the hard copy unit. Higher quality copies will be obtained when the five year old paper currently being used is replaced by the fresh paper that has been ordered. If any problems arise, or paper is needed, contact GARY BRAMMER at ext. 297.

LARSYS NEWS BY KAY HUNT

Problems with LARSYS continue to be minimal with the exception of DUPLICATERUN which still is being investigated. Users who have problems with LARSYS should report their difficulties (complete with printer output) to KAY HUNT or use the system TROUBLE report.

There will be a change made to LARSYSDV on August 1 concerning the CHANGEDETECTION function. As of that date, CHANGEDETECTION will be called COMPARERESULTS. Only one change need be made to any control card files and that is:

*CHA -> *COM
BASE RESULTS -> FIRSTRESULTS
COMPARERESULTS -> SECONDRESULTS
BASE -> FIRST
COM -> SECOND

After August 1 "*CHA" will no longer be recognized as a valid control card requesting the change detection function.

The LARSYSDV version of DUPLICATERUN will have a name change to CHANNELTRANSFORMATION on August 15. This change more adequately reflects the functions available in the processor. Only one change need be made to any control card files and that is:

*DUP -> *CHA

After August 15, "*CHA" will be recognized as a valid control card requesting the channel transformation function and "*DUP" will no longer be valid on LARSYSDV.

RT&E DATA BASE UPDATE BY LUKE KRAEMER

The final version of the 1978 Ground Truth has been received at LARS and entered into the tape library. This new data set has also been entered into the RT&E data base. A directory of this new set can be obtained by executing the following commands in CMS:

```
GETDISK JSCDISK 19A B
PRINT GROUND TRUTH B (CC
```

A listing of the new segments will be printed on the line printer. This data is a replacement for the current 1978 Ground Truth stored on tapes 5043-5047. The old tapes will be removed from the library on August 4.

CMS SHORT COURSE CASSETTES BY SUSAN SCHWINGENDORF

The following tape/slide units on the use of CMS on the Purdue/LARS computer are now available to computer users at LARS and JSC:

Introduction to VM370
CMS I
Virtual Machine Concepts
CMS II
Edit I
Exec I
Programming I
IMSL

The units vary in length from 30 to 60 minutes and are intended for individuals or small groups of people who need to use the Purdue/LARS computer before the next major training course is organized. The material presented on each cassette was taken from the CMS courses given at JSC, ERIM and LARS during the past year. Contact Ken Baker at JSC or JOAN BUIS at LARS to make arrangements for using any of these units.

CMS SHORT COURSE NOTES BY SUSAN SCHWINGENDORF

Copies of the notes from the Purdue/LARS CMS Short Course are now available from KAY HUNT at LARS. These notes should be particularly useful for new employees or others learning CMS for the first time, and can be used in conjunction with the tape/slide units

SYSTEM SERVICES RATES BY JIM KAST

Table 1 lists the System Services Products and Rates for Fiscal Year 1981 (July 1, 1980 - June 30, 1981). Inflation has driven up the cost of doing business for System Services just as it has for most other economic entities. Consequently, several of our rates have increased. However, we expect many products to enjoy an increase in usage over the previous year which allows us to hold such rates as Computer and Priority Service at their FY80 levels even though the total cost of providing these products has increased 15% to 20%. Products whose rates have increased include Local Terminal, Computer Tapes, LARSYS, 7-Track Tape Drive, and all products which charge for staff time (e.g. Professional Assistant Staff). An expected increase in usage has allowed us to decrease the rates for Statistical Services and Disk Storage. The rest of the rates for System Services products have remained at the FY80 level.

Table 1
PURDUE UNIVERSITY/LARS
System Services Products and Rates
July 1, 1980 - June 30, 1981

ITEM	UNIT	RATE/UNIT
Computer Service	1 hour	$ 275.00
Priority Service	1 hour	200.00
Disk Storage Space	1 meg.mo.	7.50
Computer Tapes	1 tape	15.50
Polaroid Film B&W	1 pack	4.20
Polaroid Film Color	1 pack	6.60
Polaroid Film P-N	1 pack	5.20
7 Track Tape	1 hour	50.00
Local Terminal	1 hour	10.00
Statistical Services	1 hour	375.00
LARSYS	1 hour	375.00
LARSPEC	1 minute	10.00
Landsat Reformatting	1 job	135.00
Geometric Correction:		
Fixed Cost	1 run	270.00
Variable Cost	1 mil.pts.	80.00
Image Registration:		
Fixed Cost	1 run	1300.00
Variable Cost	1 mil.pts.	500.00
Precision Registration:		
Fixed Cost	1 run	1540.00
Variable Cost	1 map	320.00
Boundary Definition	1 def.	920.00
LARSYS Reformatting	1 run	90.00
Landsat Frame Connection	1 frame conn.	230.00
Table Digitizer	1 hour	20.00
A/D Converter	1 hour	90.00
EXOTECH Reformatting	1 run	15.00
Color Classification Map	1 run	500.00
Varian Plotter Output	1 foot	.75
LARSYS Version 3.1 Documentation	1 copy	1000.00
LARSYS Educational Package	1 pakcage	1250.00
Student & Instructor Notes	1 set	760.00
LARSYS Users Manual	1 manual	70.00
Student Notes	1 set	30.00
Transparencies	1 page	.85
Slides	1 slide	2.50
Printed Material	1 page	.08
Professional Staff	1 hour	49.15
Professional Assistant	1 hour	24.65
Technical Assistant	1 hour	17.00
Service Staff	1 hour	11.75
Clerical Staff	1 hour	12.60
Student Staff	1 hour	8.60

TERMINAL SIGN-UP BY MIKE COLLINS

Due to the popularity of the new Textronix 4054 and Comtal Vision One/20 and the high usage of the regular terminals, sign up sheets have been established. Besides the Textronix and Comtal, 5 terminals in Flexlab 2 and 2 terminals in Flexlab 1 have been designated for sign-up, as follows:

Flexlab 1	Flexlab 2
42 - GTX	31, 34, 35, 36 - GTX's
43 - DECWRITER	37 - DECWRITER
	- COMTAL
	- TEXTRONIX

With the exception of the Comtal a couple of rules have been established when signing up:

A. Limit your sign-up periods to 2 hours each.
B. If a sign-up terminal is in use, give the user a minimum notice of 1 hour when signing up.
C. If the user hasn't logged in to the terminal within 15 minutes after sign-up time, they lose their session.

If any one of the sign-up terminals are not reserved for a specific time period they may be used on a first-come, first-serve basis.

SUMMARY OF 3031 COMPUTER USAGE FOR JUNE 1980

OVERALL USAGE

Basic Rate CPU Time Used	47.04
Priority Rate CPU Time Used	149.84
Total CPU Time Used	196.88
Terminal Sessions	6373
Batch Jobs	620

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	39.83	24
Mon-Fri 8AM-4PM	90.13	54
Mon-Fri 4PM-midnite	48.88	29
Weekend	18.02	15

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	144	0.25	0.07
BATSHORT	32	7.20	0.30
BATMED	37	3.98	0.13
BATONITE	39	11.78	0.59
BATLONG	72	5.68	1.17
TAPTRAN	20	6.92	0.61
BATEOD	123	8.88	0.77
BATJSC	151	40.73	17.89

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	226	175.11	0.77
	31	GTX	264	157.09	0.60
	32	GTX	274	199.84	0.73
	33	GTX	265	178.09	0.67
	34	GTX	311	205.93	0.66
	35	GTX	286	210.05	0.73
	36	GTX	324	174.47	0.54
	37	DECwriter	263	146.16	0.56
	38	Tektronix	138	85.05	0.62
	39	CRT	206	157.57	0.76
	3A	GTX	68	57.81	0.85
Flexlab1	40	GTX	246	188.46	0.77
	41	GTX	275	201.71	0.73
	42	GTX	266	163.30	0.61
	43	DECwriter	204	142.81	0.70
Dial-Up	50	1st in Use	113	87.66	0.78
	51	2nd in Use	49	35.02	0.71
	52	3rd in Use	8	4.69	0.59
	53	4th in Use	5	4.33	0.87
	54	5th in Use			
	55	In-House-1	58	70.76	1.22
	56	In-House-2	47	50.76	1.08
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	8	3.44	0.43
	4C	GTX	45	70.23	1.56
	4D	GTX	34	53.33	1.57
ISU	4E	(various)	13	2.75	0.21
	4F	(various)	48	19.88	0.41
Houston	60	CRT	263	176.53	0.67
	61	CRT	265	169.79	0.64
	62	Trenddata	247	156.58	0.63
	63	Trenddata	209	132.77	0.64
	64	CRT	256	131.37	0.51
	65	CRT	238	121.36	0.51
	66	CRT	221	124.53	0.56
	67	CRT	271	152.23	0.56
	68	CRT	190	142.17	0.75
	69	CRT	126	102.11	0.81
	6A	Dial-up	90	110.15	1.22
	6B	Dial-up	87	56.76	0.65
	6C	Dial-up	118	76.36	0.65
	6D	Dial-up	74	34.15	0.46
	6E	Dial-up	35	16.77	0.48
	6F	Dial-up	20	8.98	0.45

INTRALAB NOTES

PERSONNEL CHANGES

CHUCK SMITH, Systems Engineer with the Data Reformatting Group, resigned from LARS on July 18 to take a position with Technicolor Services, a facility of the Bureau of Land Management, in Denver, Colorado. Any questions on reformatting services can be directed to CATHY KOZLOWSKI, ext. 222.

SUSAN SCHWINGENDORF, Systems Analyst and Remote Terminal Specialist, has accepted an appointment as Assistant Professor in the Computer Technology Department of Purdue. Her last day at LARS will be July 31.

MARY ELLEN PIERSON, Shift Supervisor for the Computer Operations Group will be leaving LARS on July 31. Mary Ellen and husband Bill (a recent Purdue graduate) will be moving to Blacksburg, Virginia, where Bill will attend Virginia Polytech Institute and State University.

CAROL MCKIEL, the full-time computer operator on the midnight to 8am shift was promoted on July 14. She will be filling the vacancy left by Mary Ellen Pierson's departure, starting as soon as a new midnight to 8am operator is hired.

JIM COCHRAN recently joined the LARS staff as an Applications Programmer I. He received a BS in Management from Purdue in 1978 and has since been working at PUCC while taking Computer Sciences courses. Initially, Jim will be working primarily on the 3A Project. Jim is originally from New Jersey but don't hold that against him. He enjoys bike riding, basketball and fishing. He will be sharing an office with JERRY MAJKOWSKI at extension 259.

LORRAINE LOW and DEBBI BENTLE have been helping with overload secretarial work in Flexlab 1 and Flexlab 2 respectively. Both plan to return to school in the fall to pursue masters degrees.

Corrections: JON RANSON is a new graduate student in Crop Inventory. He was incorrectly listed with the temporary summer students. PAM WEEDA was omitted from that same list.

LARS extends a warm welcome to Jeffrey Welch, System Engineer in the Reformatting Group. Jeff received his B.S. in Computer Science from Purdue this May. He is located at Flex 2, extension 222.

THANKS TO THE PICNIC COMMITTEE

The LARS Annual Picnic was held on July 12, at Fort Quiatenon. About 90 people were on hand to enjoy barbecued chicken, provided by Bob Hogue, Animal Sciences, a scrumptious array of food, and a sizzling game of volleyball (from the competition and from the heat of the day!!!) A special thanks to this year's committee: MARLENE HODGE, chairman, Dave Hodge, JOAN BUIS, GAY BENSON, LUKE KRAEMER and SUE ROTH.

FORE!

Last April a call-out of "hackers" was announced on the LARS bulletin boards under the above caption. Those responding in alphabetical order were: PAUL ANUTA, DAVE FREEMAN, LUKE KRAEMER, JERRY MAJKOWSKI and DOUG MORRISON. To field a 4-man team each of the 11 weeks in the Purdue Summer Staff Golf League another member was needed to off-set absences due to work and vacations so Prof. H.L. (Ben) Banton of M.E.T. rounded out the team and became an honorary LARSIAN. The final position matches of the season were played the week of July 21 with the results that the LARSERS CHARGERS, like the Boilermakers' football and basketball teams of the past two years, made post-season play-offs (also for the 2nd year in a row). The quarter finals will be played on Monday, July 28. Survivors from these matches will play in the semi-finals on August 4 against winners from the Thursday portion of league. The winners from the 4th matches will contest for the Championship on August 7th.

LARS TENNIS LADDER

A new outlet has been formed for LARS people by way of a tennis ladder. Play should start Monday, July 28. Registration forms have already been sent out but people may sign up any time. Additional registration forms will be posted on bulletin boards. Return these and all other forms associated with the tennis ladder to the mailbox of MARC MEANS.

CHANGES IN TRAVEL REGULATIONS

Effective July 1, 1980 the State Budget Agency has authorized changes for fiscal year 1980-81 in Purdue University's travel regulations under authority of the 1979-81 Appropriation Act. These new rates are posted on the bulletin boards at both Flexlab 1 and Flexlab 2.

PROPOSALS SENT OUT

Title: Development of a Low-Cost Earth Resources Processing Capability for the University of California at Riverside
Sponsor: University of California
Principal Investigator: LUIS BARTOLUCCI
Duration: 10/1/80 to 9/30/81

Title: Preparation of a Color Brochure (An Addendum to St. Regis)
Sponsor: NASA
Principal Investigator: RICHARD MROCZYNSKI
Duration: 8/1/80 to 10/31/80

Title: Research in Remote Sensing of Agriculture, Earth Resources, and the Environment
Sponsor: NASA
Principal Investigator: MARVIN BAUER and JAMES KAST
Duration: 8/1/80 to 11/30/80

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 8 · September 17, 1980

NEW DIRECTOR NAMED FOR AGRICULTURAL EXPERIMENT STATION

It has been announced that Billy Baumgardt will take over as director of the Indiana Agricultural Experiment Station on Nov. 1. Baumgardt fills a void created when former director Bernard Liska assumed the role of Dean of Agriculture on Aug. 1.

Baumgardt is currently associate dean for research and associate director of the Agricultural Experiment Station at Penn State University. His appointment at Purdue is contingent on final approval by the Board of Trustees.

The 47-year-old Baumgardt will be responsible for administration and fiscal management of more than 300 research programs in agriculture, consumer and family sciences, and veterinary medicine at Purdue. These include several research projects at LARS.

Baumgardt earned bachelor's and master's degrees from Purdue in agriculture and dairy sciences, and a Ph.D. in agricultural biochemistry and nutrition from Rutgers University in 1959.

He has taught animal nutrition, feeds and feeding, physiology and dairy science at Rutgers, the University of Wisconsin, and at Penn State.

A member of the American Dairy Science Association (ASDA) and the American Society of Animal Science, Baumgardt has written 56 articles in several scientific journals and authored or co-authored 51 papers delivered at national or international meetings.

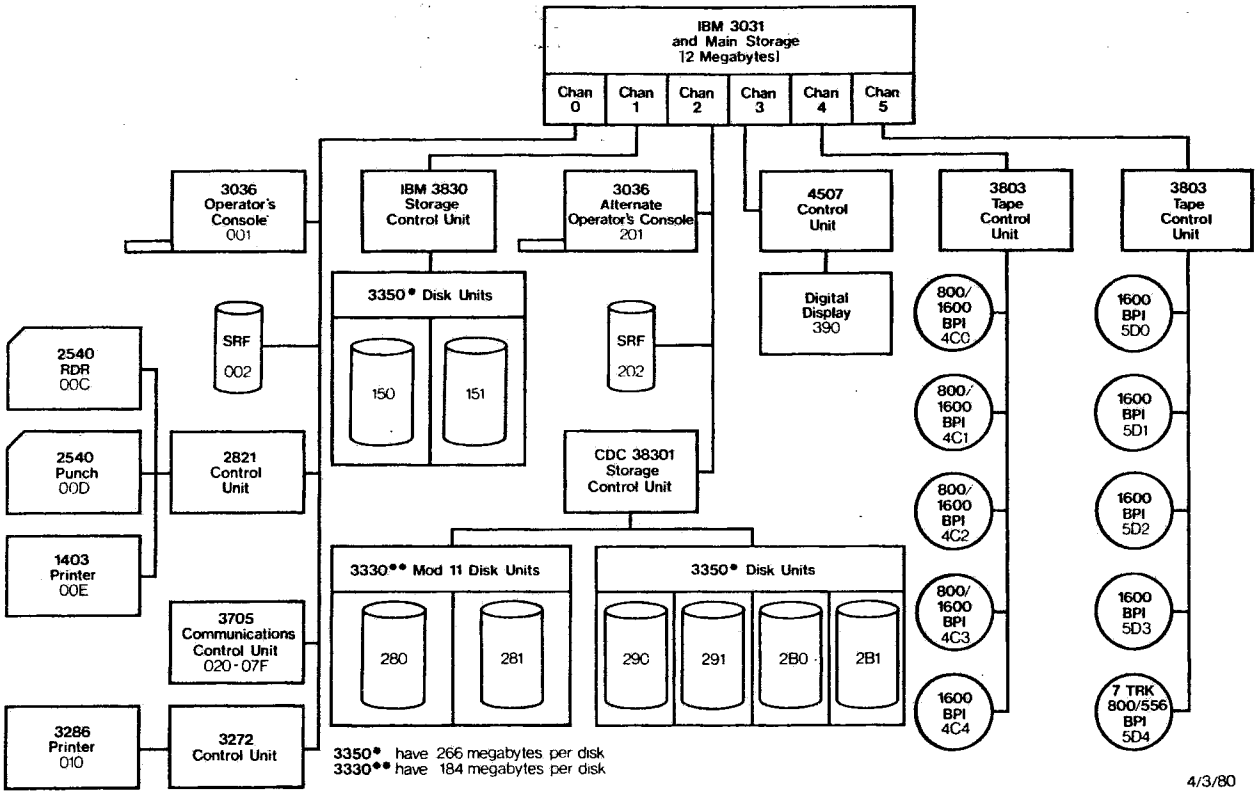
"We are fortunate to attract a person of Dr. Baumgardt's expertise and experience as director of the Agricultural Experiment Station," Liksa said of the pending appointment. (Journal and Courier, Lafayette, IN, 9/29/80)

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).

DEVELOPMENT OF RESEARCH CAPABILITIES BY JIM KAST

BACKGROUND

The primary thrust of System Services has been to provide an excellent research computation facility to meet the needs of Purdue's remote sensing research community. The research data processing environment at Purdue/LARS attracted three additional remote terminal sites during FY80. Several Purdue research scientists in areas other than remote sensing have displayed interest in LARS because of its research-computing orientation and because of a desire to use one of the large number of commercially available software packages which may only be implemented on IBM operating systems.

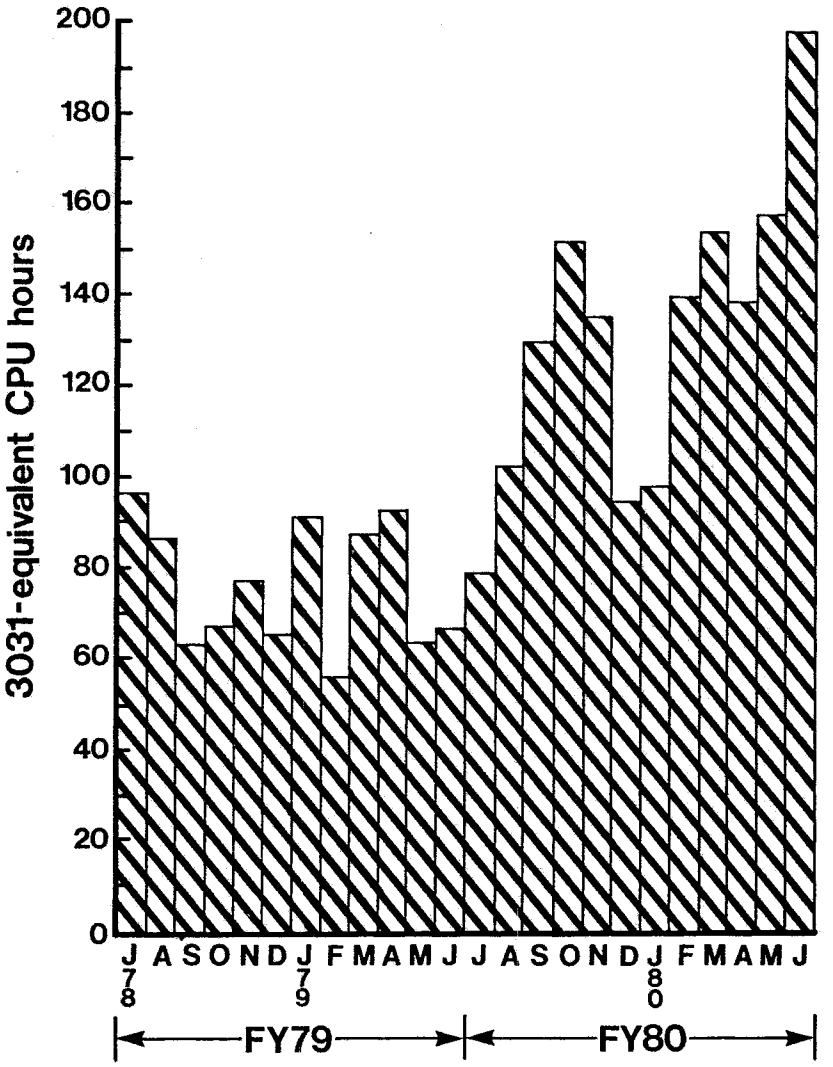


Hardware configuration of IBM 3031 which LARS installed during FY80. The 3031 is roughly three times as powerful as the computer it replaced.

NEW HARDWARE

Chief among the FY80 System Services' accomplishments was a change in the computer system. In September 1979, the IBM System 370, Model 148 was replaced by an IBM 3031. The 3031 provides roughly three times the computational capacity but increased total costs only ten percent. The installation of the 3031 made possible and necessary by heavy, sustained use of the LARS computer facility to researchers at the Earth Observations Division of Johnson Space Center (JSC), LARS and other remote sites. Sharing a computation environment with JSC has improved communication between LARS and its chief sponsor and provided many opportunities for cost savings and software exchange.

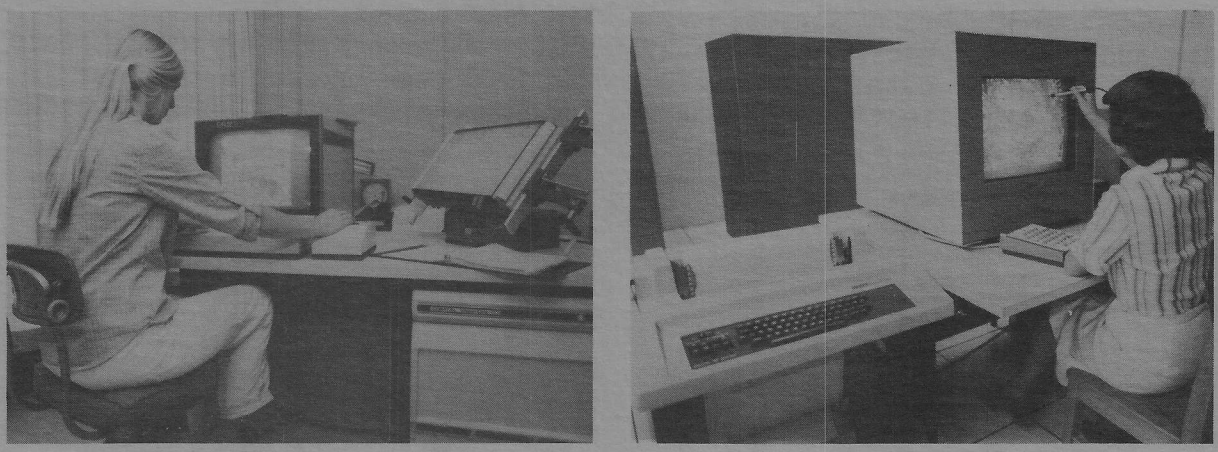
The additional capacity provided by the 3031 made possible an 80% increase in the amount of computation performed in FY80 over FY79. In spite of inflation, the effective rate charged for computer usage at LARS was reduced by one-third during FY80.



Effective computer usage in FY80 was nearly double FY79 usage.

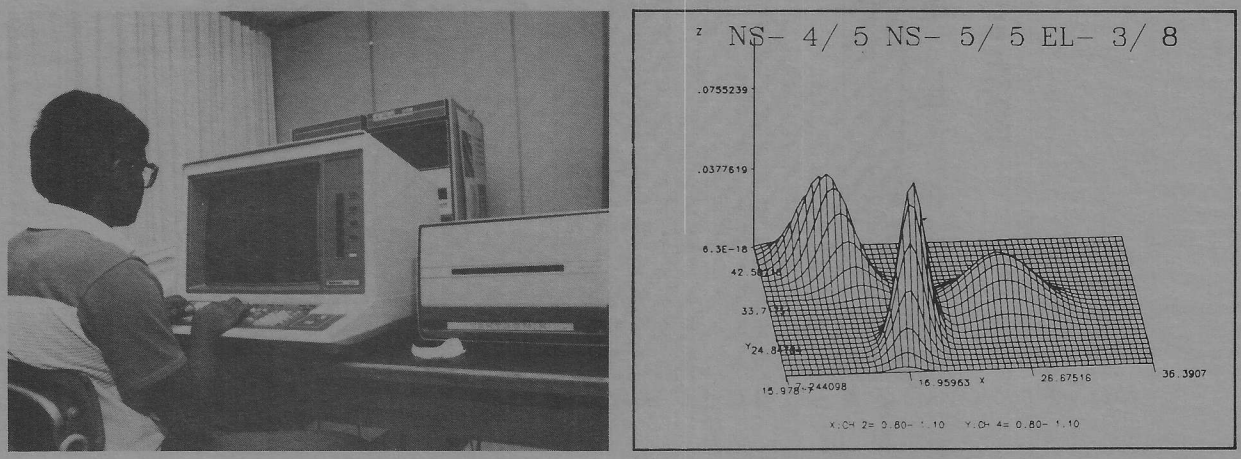
A second major hardware acquisition during FY80 was the Comtal Vision One/20 color display system. In 1972 LARS installed the first digital display device built. This one-of-a-kind piece of equipment could display up to 16 gray levels of a single multispectral scanner wavelength band. The purpose of the digital display was to pictorially display multispectral scanner data in a form that was easy for a human to interact with.

The Comtal uses color to increase the dimensionality of the data which can be displayed and puts a programmable micro computer under analyst control, making it possible to enhance greatly the efficiency, speed, flexibility and power of the image processing functions through distributed processing.



During FY80 LARS replaced its historic Black-and-White Display (right) with a new Comtal Microprocessing Color Display Unit (left).

A high resolution Tektronix 4054 graphics terminal was also acquired during FY80. The Tektronix already interfaces with some of the graphics packages at LARS and will be utilized by the LARS Multispectral Data Analysis System (LARSYS) and the LARS Spectroradiometer Analysis System (LARSPEC).



(Left) With only a few commands, SAS/GRAPH allows users to display data in a wide variety of formats. (Right) High resolution graphics output to help train the computer to recognize ground cover types.

NEW SOFTWARE TOOLS

Several new software tools were installed on the LARS system to enhance the data processing and display capabilities of LARS users. The Statistical Analysis System (SAS) and a special graphics package designed for the display of data sets and results associated with SAS (SAS/GRAPH) were installed during FY80. The Interactive Graphics Language (IGL), which interfaces with the Tektronix 4054 has been installed on both the IBM 3031 and the PDP 11/34. The previously acquired Graphics Control System (GCS) has been modified to work with an electrostatic printer for high resolution graphs and with a modified DECwriter to allow users at remote locations to acquire graphics output with a very small investment in specialized hardware.

NON-LARS USAGE

An increasing number of researchers at Purdue and at several major remote sensing research centers across the country are benefiting from access to the LARS system:

*During FY80 the Environmental Research Institute of Michigan (ERIM), Alabama A&M University and Ball State University joined the LARS remote terminal network.

*LARS has provided the primary research computing environment for the Earth Observations Division of Johnson Space Center (JSC), Indiana State University, and Alabama A&M University as well as Purdue during FY80.

*Twenty-four Purdue departments have established accounts in order to make use of one or more of the LARS System Services.

Sue Schwingendorf accesses the LARS machine through a dial-up terminal.

TRAINING

In order for new users from within Purdue University and at the remote terminal sites to become familiar more quickly with the LARS computing environment, a 14 module, tape/slide Introduction to the LARS Computer and Its Operating System has been developed.

PANAMA SHORT COURSE

LUIS BARTOLUCCI and JOAN BUIS will be in Panama September 26 to October 8, to present the LARS short course on Numerical Analysis of Remote Sensing Data and hand-on computer option to 25 participants from Latin America.

The course is sponsored by the Defense Mapping Agency - Inter American Geodetic Survey (DMS-IAGS) Cartographic School and is coordinated by Larry Goldstein. A dial-up remote terminal link between Panama and LARS will be used during the hands-on portion of the course.

Joan will also discuss options for implementing LARSYS with DMA-IAGS personnel.

REMOTE SENSING OF SOILS PRESENTED IN YUGOSLAVIJA

STEVE KRISTOF will be travelling in Yugoslavija during September and early October, and will give several invited presentations on remote sensing.

In Ljublijana, Yugoslavija, he will lecture at the Landuse Institute, September 10-13, on the "Application of MSS Data from Landsat 1 and 2 in Landuse Studies." ON September 14-16, he will talk on "Engineering Soils Mapping from Multispectral Remote Sensing Data using Computer-Assisted Analysis" at the School of Civil Engineering at the University of Split.

The Council for Remote Sensing and Photointerpretation of the Yougoslav Academy of Sciencis and Arts, Zabreb, SR. Croatia, invited Dr. Kristof to be one of the first foreign experts to deliver a lecture about the development of remote sensing technology and its application to the field of pedology. He will give this presentation on September 17-18. At a similar invitation from Sarajevo University, SR. Bosna and Hercegovina, he will talk on "Application of Digital Analysis of Landsat Data to Soil Survey in Ford County, Illinois, USA," on September 19.

On September 22-23, he will visit the Institute for Soil Science and the School of Agriculture at Novi Sad, Vojvodina, to discuss the use of Landsat images for delineating parent material boundaries and different approaches to spectral analysis for use in soil mapping.

At Novi Sad, he will also have a reunion with his high school classmates to celebrate 45 years of graduation.

AGRICULTURAL RESEARCH ADMINISTRATION PRESENTED

JOHN PETERSON was discussion leader and coordinator at a recent workshop, August 11-16, presented by EMBRAPA (Brazilian Agricultural Research Organization). Twenty-five Brazilian scientists, selected from 100 doing graduate work in the United States, participated in discussions about administration of agricultural research. Guest speakers from all over the United States made presentation, and a high degree of interaction was achieved with the future Brazilian administrators.

NEW LARS TECHNICAL REPORTS

123079 Relationship of Skin Reflectance and Serum Bilirubin: Full-Term Caucasian Infants by R. L. Schreiner, R. E. Hannemann, D. P. DeWitt and H. C. Moorehead. Published in Human Biology, February 1979, Vol. 51, No. 1, pp. 31-40.

This study was designed to obtain basic information concerning the reflectance of the newborn skin and its relationship to serum bilirubin level. Measurements of blanched skin were taken on the back of 30 white full-term infants. The results show that there is a strong relationship between spectral reflectance of the white full-term newborn skin and the serum bilirubin concentration.

The research described was supported by grants from the Biomedical Engineering Center, Purdue University, and the National Institutes of Arthritis, Metabolism and Digestive Diseases NIH Grant No. ROl AM18871.

040480 Building Locally Adapted Remote Sensing Programs in Developing Nations by L. A. Bartolucci, T. L. Phillips and S. M. Davis. Proceedings Fourteenth International Symposium on Remote Sensing of the Environment, San Jose, Costa Rica, April 23-30, 1980.

Development of the human resources of a country is essential to harnessing the full potential of modern technology. Only well-trained, local professionals will be in a position to insure that the new technologies are properly adapted to the specialized needs of a particular country. A strategy for building locally adapted remote sensing programs in developing countries is discussed in depth in this paper. This strategy is based primarily on the development of human resources and on the creation and strengthening of remote sensing institutions through which local specialists may guide the evolution of an integrated natural resources information system. This paper identifies four phases in the development of local understanding and adoption of the technology. This gradual, long-term development process is essential for the successful adaptation of remote sensing technology.

042980 Mapping Land Cover in Latin American Countries by Computer-Aided Analysis of Satellite Scanner Data by R. M. Hoffer and L. A. Bartolucci. Proc. Fourteenth International Symposium on Remote Sensing of the Environment, San Jose, Costa Rica, April 23-30, 1980.

This paper evaluates the results of several projects in Latin American countries involving the use of computer-aided analysis techniques for mapping land cover. The results of these and other recently completed research projects indicate a number of key points which should be considered in applying such analysis techniques. This paper also addresses the importance of and the need for effective training programs for data analysts, and the need for spectral field research on Latin American cover types.

051580 Effects of Management Practices on Reflectance of Spring Wheat Canopies by C.S.T. Daughtry, M.E. Bauer, D.W. Crecelius and M.M. Hixson.

Analyses of multispectral measurements from satellites offer the potential to monitor and inventory crop production. The crop canopy is a dynamic entity influenced by many cultural and environmental factors. To quantify and understand several of the potential sources of variation in spectral measuresments of crops, an experiment was conducted at Williston, North Dakota, Agricultural Experiment Station in 1977. The effects of available soil moisture, planting date, nitrogen fertilization, and cultivar on reflectance of spring wheat (Triticum aestivum L.) canopies were investigated. Spectral measurements were acquired on eight dates throughout the growing season, along with measurements of crop maturity stage, leaf area index, biomass, plant height, percent soil cover, and soil moisture. Planting date and available soil moisture were the primary agronomic factors which affected reflectance of spring wheat canopies from tillering to maturity. Comparisons of treatments indicated that during the seedling and tillering stages, planting date was associated with 36 and 85% of variation in red and near-infrared reflectances, respectively. As the wheat headed and matured, less of the variation in reflectance was associated with planting date and more with available soil moisture. By mid-July, soil moisture accounted for 73 and 69% of the variation in reflectance in red and near-infrared bands, respectively. Differences in spectral reflectance among treatments were attributed to changes in leaf index (LAI), biomass and percent soil cover. Cultivar and N fertilization rate were associated with very little of the variation in the reflectance of these canopies.

The research described in this report was sponsored by NASA under Contract No. NAS9-15466.

060380 Parallel Processing Implementations of a Contextual Classifier for Multispectral Remote Sensing Data by H. J. Siegel, P. H. Swain, and B. W. Smith. Proceedings of the Symposium on Machine Processing of Remotely Sensed Data, Purdue University, June 3-6, 1980, pp. 19-28.

Contextual classifiers are being developed as a method to exploit the spatial/spectral context of a pixel to achieve accurate classification. Classification algorithms such as the contextual classifier typically require large amounts of computation time. One way to reduce the execution time of these tasks is through the use of parallelism. The applicability of the CDC Flexible Processor system and of a proposed multimicroprocessor system (PASM) for implementing contextual classifiers is examined.

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

060480 An Assessment of Landsat Data Acquisition History on Identification and Area Estimation of Corn and Soybeans by M. M. Hixson, M. E. Bauer and D. K. Scholz. Proc. of the Sixth International Symposium on Machine Processing of Remotely Sensed Data, Purdue University, June 3-6, 1980, pp. 72-77.

During the past decade, numerous studies have demonstrated the potential of satellite remote sensing for providing accurate and timely crop area information. This study assessed the impact of Landsat data acquisition history on classification and area estimation accuracy of corn and soybeans. Multitemporally registered Landsat MSS data from four acquisitions during the 1978 growing season were used in classification of eight sample segments in the U.S. Corn Belt. The results illustrate the importance of selecting Landsat acquisition based on spectral differences in crops at certain growth stages.

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

060580 A Model of Plant Canopy Polarization Response by V. C. Vanderbilt. Proc. of the Sixth International Symposium on Machine Processing of Remotely Sensed Data, Purdue University, June 3-6, 1980, pp. 98-108.

This paper discusses a model for the amount of linearly polarized light reflected by the shiny leaves of such crops as wheat, corn and sorghum. The theory demonstrates that, potentially, measurements of the linearly polarized light from a crop canopy may be used as an additional feature to discriminate between crops. Examination of the model suggests that, potentially, satellite polarization measurements may be used to monitor crop development stage, leaf water content, leaf area index, hail damage, and certain plant diseases.

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

070180 A Multiprocessor Implementation of a Contextual Image Processing Algorithm by B. W. Smith, H. J. Siegel and P. H. Swain.

Classification algorithms such as the contextual classifier typically require large amounts of computation time. One way to reduce the execution time of these tasks is through the use of parallelism. Results show a dramatic increase in throughput can be obtained using the CDC Flexible Processor array.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

070980 A Multispectral Data Simulation Technique by M. J. Muasher and P. H. Swain.

In remote sensing data analysis, several assumptions are made that are not always precisely met (normality of data, representative data, purity of pixels). A method is presented that simulates data with class-conditional multivariate normal distributions, retaining the natural spatial information occurring in the scene. It is useful in research circumstances where it is desirable to distinguish between effects due to imperfect fit of assumptions and effects due to new algorithms or techniques themselves.

The work described was supported by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES September 17, 1980

SAS/GRAPH BY CAROL JOBUSCH

SAS/GRAPH is an interactive computer graphics system for producing high-resolution plots, charts, and graphs. SAS/GRAPH was installed on LARS' IBM 3031 computer on June 6 and has been much used this summer.

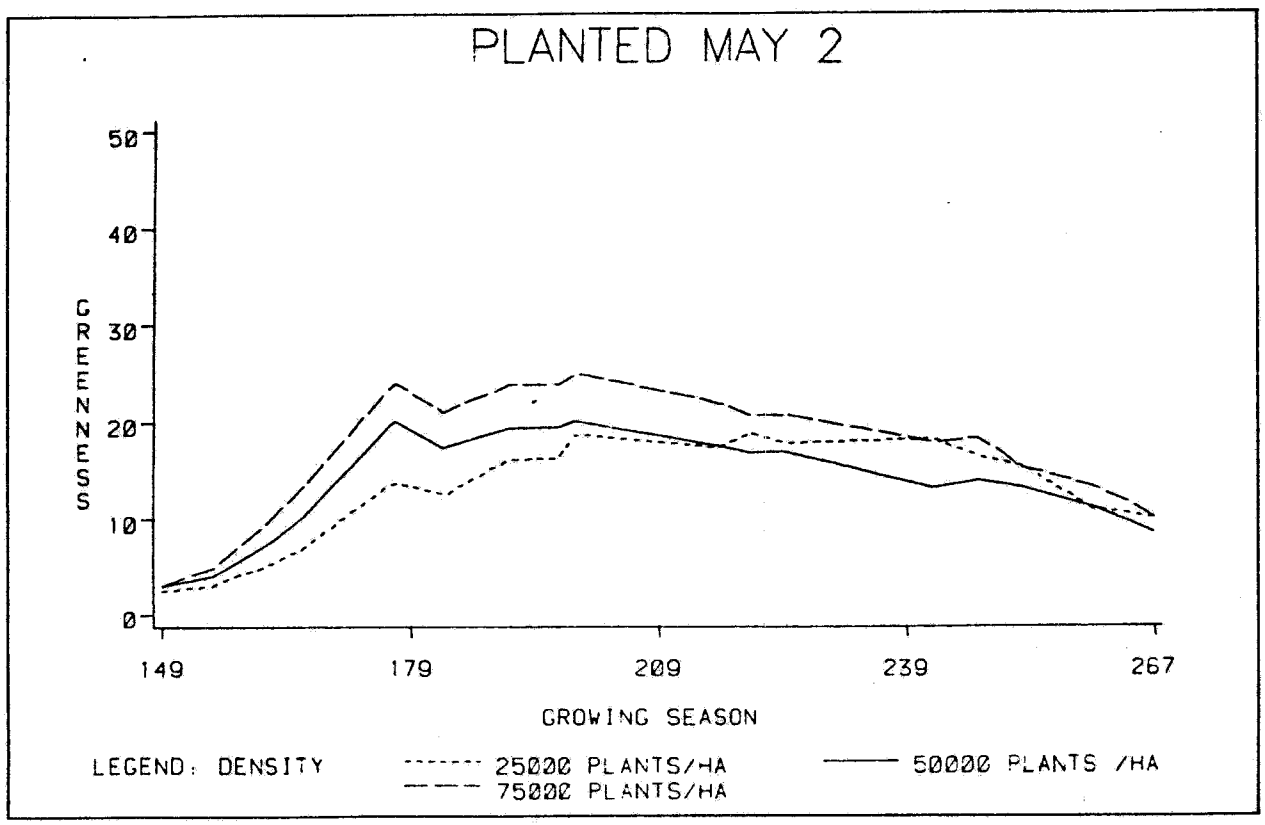
To use SAS/GRAPH, create a SAS data set and then call one or more of the SAS graphics procedures:

PROC GCHART - draws bar charts, pie charts, block charts

PROC GPLOT - graphs one variable against another

PROC G3D - plots three-dimensional response surfaces

PROC GSLIDE - displays lines of text in any of 20 fonts - useful for making overhead transparencies



The SAS program that produced this plot is shown on the next page.

```
OPTIONS TSO;
SYMBOL1  L=2  I=JOIN;
SYMBOL2  L=1  I=JOIN;
SYMBOL3  L=4  I=JOIN;
PROC FORMAT;
   VALUE ZCODE
         1=25000 PLANTS/HA
         2=50000 PLANTS/HA
         3=75000 PLANTS/HA;
TITLE .F=SIMPLEX  PLANTED MAY 2;
PROC GPLOT DATA=SASFILE.BYDATE1;
   LABEL JUDA=GROWING SEASON   GREEN=GREENNESS;
   FORMAT DENSITY ZCODE. ;
   PLOT GREEN*JUDA=DENSITY/VAXIS=0 TO 50 BY 10
                           HAXIS=149 TO 267 BY 30;
```

For an explanation of each of these statements, see the SAS User's Guide, 1979 Edition and the SAS/GRAPH User's Guide, 1980 Edition.

To execute SAS/GRAPH programs, you must log on to a supported graphics terminal. The only terminal currently available at LARS is the Tektronix 4054 large screen terminal (with attached hard copy unit) in the Flex 2 terminal area.

SAS (and SAS/GRAPH) programs are run by using the SAS command from within CMS. You can use SAS in noninteractive mode by issuing the command

SAS filename

where filename identifies a CMS disk file containing SAS statements. If you use this mode for SAS/GRAPH procedures, you must include

OPTIONS TSO;

as the first statement in your SAS program.

You can also use SAS in interactive mode:

1. Type 'SAS' to link and access the SAS disk. Put your terminal in 'TTY MODE' (i.e., all letters should be typed in upper case unless you are entering title text which you want in lower case).
2. Type 'SAS' again to enter SAS interactive mode. You can then enter your SAS statements line by line, or you can type

   CMS GETSAS filename;

   to enter a previously written program of filetype SAS. It is usually easiest to write the program with the CMS editor before entering the SAS environment and then use the GETSAS command within SAS. To edit your program while you are in SAS, type

   CMS EDIT filename filetype;

   then use the usual CMS EDIT commands. The edit command FILE returns you to the SAS environment.

   When all desired lines have been entered, either directly or through the GETSAS command, type

   RUN;

3. To exit SAS (and return to CMS) type /*

COMTAL NEWS BY DAVE FREEMAN AND SHIRLEY DAVIS

COMTAL usage has picked up markedly during this summer. In particular the COMTAL has been put to work in selecting training fields, establishing data quality, and photointerpretating aircraft data. To keep all users aware of developments and discoveries, SCANLINES will be regularly used as a vehicle for reporting upgrades in hardware and software and for sharing users' experiences with the COMTAL. In addition, watch for memos to users and Technical Memoranda which will contain more detailed discussions of special interest to COMTAL users.

Work on COMTAL development continues in several areas:

* recommendations for film speed and camera settings to record color images off the COMTAL monitor are being developed by MIKE COLLINS, with the help of CATHY KOZLOWSKI, DOUG KNOWLTON and DICK MROCZYNSKI. Their results with 35mm photography have been excellent and will be documented soon in a memo to users.

* hardware installation for Phase I is complete. Phase II improvements are under consideration now, with a prime candidate being the acquisition of a HASP box interface that would enhance the data link between the IBM and the PDP. Acquisition of the HASP would allow data to flow more quickly between the two computers and greatly improve the user's ability to do interactive computation. It should be noted that operations of the PDP minicomputer have been enhanced over the year by the addition of 64K words of main memory, bringing it to full capacity. GARY BRAMMER installed and checked out the new memory.

* User software is progressing in parallel with our understanding of the role the COMTAL can fill in data analysis. JOAN BUIS and CATHY KOZLOWSKI attended the COMTAL short course in early June, 1980, to gain more understanding of the operations and potential use of the COMTAL and to begin envision its role in analysis at LARS. Also in June, PHIL SWAIN and SHIRLEY DAVIS had 12-hours of first-hand experience using the IDIMS system at EROS Data Center, another interactive, image-oriented display and analysis system, and in July, Phil had an online demonstration of ERMAN2 at the IBM Scientific Center in Paris. Phil is developing a long-term analysis scenario using the COMTAL and is helping now in recommending priorities for the development of user software. Professor ROY CHUNG, a recent visiting scientist, has contributed some important observations about uses of the equipment from a cartographic viewpoint and CARLOS MACHADO is focusing his time on the very extensive task of developing a file manager that will span the IBM, PDP, COMTAL, Tektronix, Varian, table digitizer, and disk and tape storage. In addition, JEFF WELCH is developing a method for recording a COMTAL image or graphic using the Varian matrix printer.

One thing needed now is more users, especially ones who will share their experiences with other users and with system development staff. Notes to aid new users in getting on the system are in the 3-ring notebook on top

of the unit, and both CATHY KOZLOWSKI and SHIRLEY DAVIS can provide some personal assistance. A short hands-on excercise for getting started will be ready by the end of September, but anyone who would like to begin sooner than that can learn the ropes from the "Example COMTAL User's Session" by CATHY KOZLOWSKI, included in the COMTAL notebook. System documentation provided by COMTAL is also in the notebook but unfortunately, is not adequately user-oriented; we are beginning now to develop a user's manual for the LARS installation, but until that's done, expect to have to work your way through the existing material. See Cathy or Carlos for an ID.

Some people have done just that, and have found creative ways to use the COMTAL:

* RICK LATTY and ELLEN DEAN are using the COMTAL to overlay a grid on aircraft data in order to select and identify points to be used in a supervised classification scheme. The ability to overlay a grid on image data is an important contribution the COMTAL makes to analysis.

* NANCY FUHS and LARRY BIEHL used the COMTAL recently to review aircraft scanner data, specifically to assess data quality and to do some limited visual interpretation. In this project they displayed thermal scanner data, as well as visible and near infrared, and found that the "true color" images (i.e., three channels overlaid) were an effective way to review the data. By using every-other line and every-other column of the data and merging the 512x512 images into a "pseudoimage" they were able to extend the dimensions of the displayed area.

DAVE FREEMAN and SHIRLEY DAVIS would appreciate hearing about ways the COMTAL is being used and will try to keep all users abreast of developments and new techniques.

GCS AND IGL PLOTTING BY JERRY MAJKOWSKI

On August 15 the Fortran H versions of the plotting software available on the PLTDSK became the default. This includes 2D and 3D GCS as well as the Tektronix IGL. Users should now compile all GCS and IGL programs using the FORTHX compiler and run them by typing

```
GCSH device filename options
IGLH filename
```

The PLTDSK can be accessed by typing 'GETDISK PLTDSK' (default address and mode is 10B Z). Anyone still needing the Fortran G versions should contact JERRY MAJKOWSKI.

This version of 2D GCS will also implement an option already contained in 3D GCS to allow for varying the Varion plotter line thickness by calling UPSET as follows:

```
CALL UPSET ('BRIGHTNESS', n)
```

where n is a real number from 1.0 to 25.0 indicating the line thickness in raster units which are approximately .006 inches wide. If n is negative a 'negative' plot (i.e., black-grey background with while lines of thickness n) will be produced.

On September 5 the 2D GCS was interfaced to the TEKTRONIX 4054 graphics terminal. Users can take advantage of the 4054 high resolution graphics by typing:

GCSH T54 filename option

A sign-up sheet for using the 4054 is available in the Flex 2 terminal area.

This interface has also been tested on the JSC TEK 4002A terminal with limited success. It appears that most graphics and software character output will be done correctly but that most hardware character output will not.

Users should refer to the GCS Manual 'LARS Usage Notes' section for details on using the 4054 with GCS.

Also the new versions of both 2D and 3D GCS contain a correction for the default of the string terminator character. Due to previous charges in the IBM character translate table the default terminator character has been the up-arrow (↑); to be consistent with GCS documentation it has been changed back to the backslash (\).

LARSPEC BY JERRY MAJKOWSKI

On August 13 the Fortran H version of LARSPEC was updated to correct a bug which occurred when reading data from tapes containing both radiometer and spectrometer data. Then on August 15 the Fortran H version became the default version of LARSPEC. It is expected that the H version will be more efficient and will not require any changes on the part of LARSPEC users. Anyone who may still have need of the Fortran G version should contact JERRY MAJKOWSKI.

Included in this new version of LARSPEC is an option to request thicker lines on Varion plotter output. This can be done by using the USET BRIGHTNESS(n) control card is GSPEC, where n is a value from 1 to 25 indicating the line thickness is raster units. One raster unit is approximately .006 inches wide. If n is negative a 'negative' plot (i.e., black-grey background with white lines of thickness n) will be produced. Setting n to 2 or 3 gives nice bold lines.

The next planned expansion for LARSPEC software is an interface to the TEKTRONIX 4054 Graphics terminal.

IMSL UPGRADE BY JIM COCHRAN

The latest versions (Edition 8) of IMSL Routines have been received, and should be installed by September 5, 1980. For testing purposes, Edition 8 will temporarily be put on JSCDISK 29E. Beginning September 15, 1980, Edition 8 will replace Edition 7.1 on JSCDISK 19E. Edition 7.1 will be moved to JSCDISK 29E. To access Edition 8 (after September 15) type

GETDISK JSCDISK 19E

If you have any questions, please contact JIM COCHRAN (LARS) or Bob Goode (JSC) for information and documentation.

REMOTE TERMINAL NEWS BY JOAN BUIS

CMS EDUCATIONAL UNITS

The CMS Tape/Slide presentations are now available in Flex 1 and Flex 2, see Mary Rice or Pam Burroff to check out these units. If you have any problems or questions, contact KAY HUNT, ext. 298.

CAPABILITY UPGRADE

We are proud to be assisting the Indiana State University Remote Sensing Laboratory (ISURSL) staff in upgrading their capabilities. GARY BRAMMER, JOAN BUIS, LUIS BARTOLUCCI and several other LARS staff met with Paul Mausel, and six ISURSL personnel on September 4 to discuss the upgrading options and to demonstrate some of the available capabilities that LARS presently has.

NEW VERSION OF SCRIPT TO BE INSTALLED BY PETER JOBUSCH

On September 19 the latest version of the SCRIPT text processing software from the University of Waterloo will be installed.

Available with this new SCRIPT are two powerful sets of SCRIPT macro-instructions (called SYSPUB and SYSPAPER) to facilitate the preparation of documents. Users guides for SCRIPT, SYSPUB, and SYSPAPER are available from BARBARA PRATT at LARS.

The unsupported 1976 version currently accessible will continue to be available as "ϕSCRIPT".

VARIAN PLOTTING/PDP SCHEDULE FOR FALL 1980 BY CATHY KOZLOWSKI

When there is Varian plotting to be done, the PDP 11/34 may be unavailable for general use at the following times:

Monday	3:00 - 7:00 pm	Thursday	noon - 3:00 pm
Tuesday	noon - 3:00 pm	Friday	10:30 am - 1:30 pm
Wednesday	3:00 - 7:00 pm	Saturday	9:00 am - noon

When plotting is done for the day, the PDP will be available. Every effort will be made to have plots run off within 24 hours after entering the LITER queue. If any special instructions should accompany a plot, contact CATHY KOZLOWSKI or DAVE GODDARD.

If these schedules cause anyone difficulty, contact CATHY KOZLOWSKI.

COUNTY BOUNDARY MAPPING AVAILABLE BY JIM COCHRAN

The DVSYS disk now has a program available to draw county boundaries on the Tektronix 4054 graphics terminal. The Fortran H program, with IGL, uses Alber's projection to map a single state of the continental United States, or any combination of states, and the corresponding county boundaries. To access the program type:

```
GETDISK DVSYS
COUNTY
```

If there are any questions or problems, please contact JIM COCHRAN at ext. 259.

LARSYS NEWS BY KAY HUNT

LARSYSDV was successfully modified on August 1st and August 15th. These modifications included two major name changes: CHANGEDETECTION → COMPARERESULTS and DUPLICATERUN → CHANNELTRANSFORMATION. If you encounter problems with either of these two processors, please notify KAY HUNT.

The programs currently residing on the LARSYS and LARSYSDV disks are being converted to FORTRAN H. We expect to complete this changeover in the next few months. To date, all of the programs on the LARSYS disk have been changed and are in the process of being tested. The new FORTRAN H versions may be accessed by linking to the VMGEN 400 disk. Further information regarding the conversion may be obtained from KAY HUNT.

NEW SOFTWARE TO BE BROUGHT TO YOU BY THE LETTER "Y" AND THE NUMBER '19E' BY PETER JOBUSCH

On October 3, the CMS system disk will be split onto two mini disks. The 'S' disk at address 190 will be joined by a 'Y' disks at address 19E. This will increase available disk space as the current 190/s disk is almost full.

LARSYS and LARSYSP1 will be accessed as 'N' disks after the change is made. LARSYSDV will be accessed as an 'M' disk.

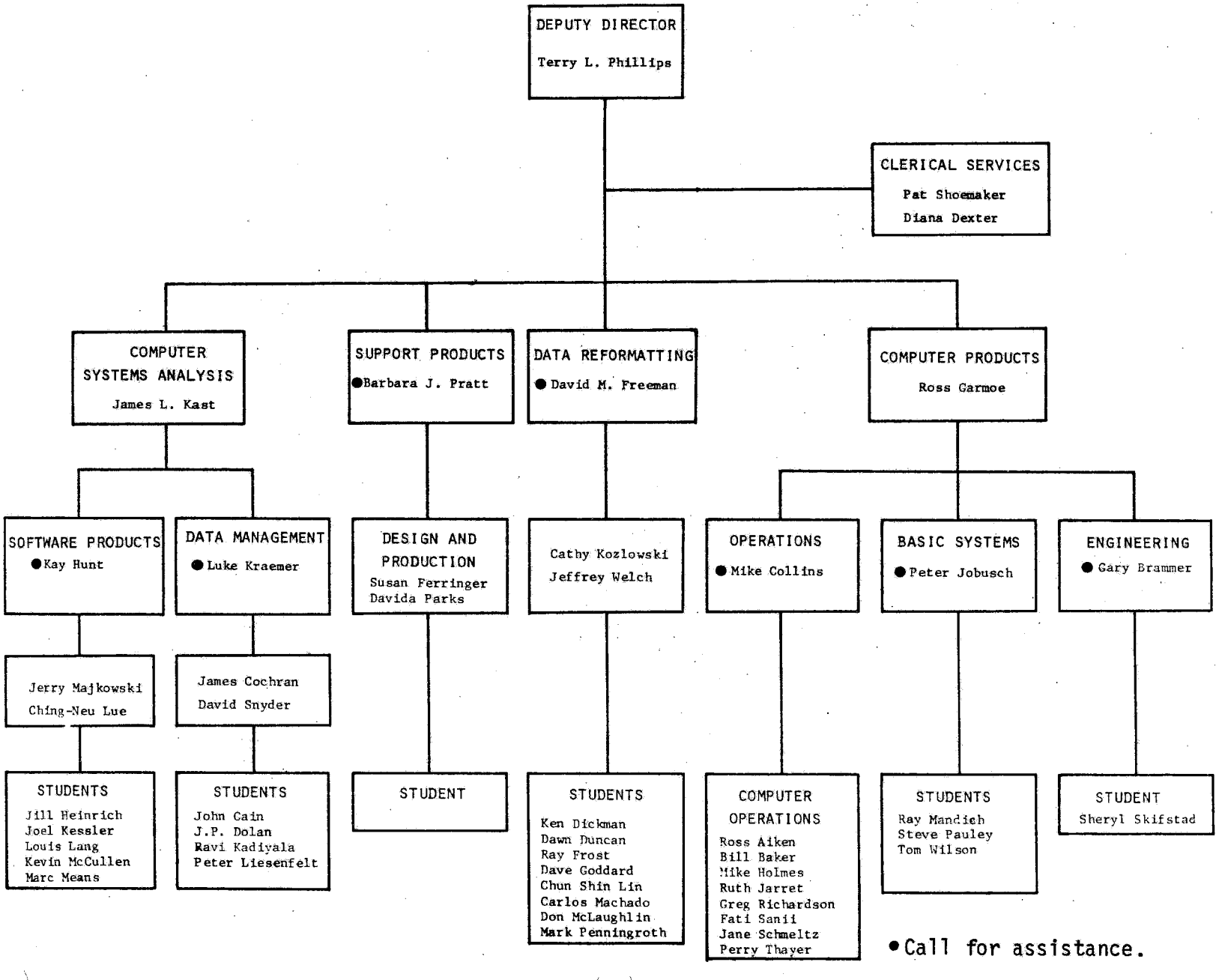
In addition to eliminating current use of the 'Y' disk mode, users should also avoid the address 19F and mode 'X' as plans are being made to expand the CMS system to a third disk.

Users needing assistance in converting their programs and execs to avoid the new system disks should contact PETE JOBUSCH at LARS.

SYSTEM SERVICES ORGANIZATION BY BARBARA PRATT

There have been many changes recently in the Computer Facility staff. The chart on the following page details the Systems Services organization and also lists each group manager, who is available to help with any problems users might encounter.

SYSTEM SERVICES ORGANIZATION



● Call for assistance.

SUMMARY OF 3031 COMPUTER USAGE FOR JULY 1980

OVERALL USAGE

Basic Rate CPU Time Used	28.39 hours
Priority Rate CPU Time Used	191.65 hours
Total CPU Time Used	220.04 hours
Terminal Sessions	7316
Batch Jobs	536

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	36.34	20
Mon-Fri 8AM-4PM	110.80	60
Mon-Fri 4PM-midnite	54.52	30
Weekend	18.37	16

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	106	0.36	0.06
BATSHORT	75	15.04	0.58
BATMED	87	44.12	6.04
BATONITE	43	29.05	2.39
BATLONG	8	7.51	1.29
TAPTRAN	5	29.98	2.10
BATEOD	110	28.49	5.53
BATJSC	94	31.95	16.03

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	340	196.26	0.58
	31	GTX	306	169.99	0.56
	32	GTX	300	192.09	0.64
	33	GTX	336	180.18	0.54
	34	GTX	302	196.40	0.65
	35	GTX	350	197.17	0.56
	36	GTX	393	185.04	0.47
	37	DECwriter	244	104.65	0.43
	38	Tektronix	263	163.80	0.62
	39	CRT	137	61.96	0.45
	3A	GTX	110	71.03	0.65
Flexlab1	40	GTX	188	250.97	1.33
	41	GTX	216	236.05	1.09
	42	GTX	189	247.83	1.31
	43	DECwriter	214	150.94	0.71
Dial-Up	50	1st in Use	126	149.13	1.18
	51	2nd in Use	35	40.61	1.16
	52	3rd in Use	10	7.87	0.79
	53	4th in Use	3	2.51	0.84
	54	5th in Use	24	14.22	0.59
	55	In-House-1	55	47.88	0.87
	56	In-House-2	49	52.25	1.07
St. Regis	4A	DECwriter			
Alabama	4B	DECwriter	13	9.69	0.75
	4C	GTX	72	99.13	1.38
	4D	GTX	58	71.29	1.23
ISU	4E	(various)	24	8.36	0.34
	4F	(various)	42	26.62	0.63
Houston	60	CRT	233	198.38	0.85
	61	CRT	282	162.50	0.58
	62	Trenddata	324	156.50	0.48
	63	Trenddata	279	127.86	0.46
	64	CRT	282	135.05	0.48
	65	CRT	238	142.45	0.60
	66	CRT	264	122.80	0.47
	67	CRT	277	160.30	0.58
	68	CRT	227	146.90	0.65
	69	CRT	135	100.50	0.74
	6A	Dial-up	90	69.65	0.77
	6B	Dial-up	55	43.13	0.78
	6C	Dial-up	162	108.58	0.67
	6D	Dial-up	79	51.77	0.66
	6E	Dial-up	26	20.51	0.79
	6F	Dial-up	19	9.78	0.51

INTRALAB NOTES

PERSONNEL CHANGES

CHING-NEU LUE recently joined the LARS staff as a Systems Analyst II. She received her BA in Economics at Fu-Jen University, Taiwan; MS in Computer Science at Kansas State University; MS in Applied Mathematics and Statistics at SUNY, Stony Brook, N.Y. Ching has an impressive employment background having worked at such places as SUNY at Stony Brook, Citicorp Credit Service, and most recently at National Economic Research Associates. Initially Ching will be working on Software Products and LAIS. Ching enjoys reading, listening to music, and playing ping pong. She is temporarily in Sue Schwingendorf's office at ext. 296.

DEBORAH LANG was hired September 2, in the position of full-time Computer Operator on the midnight-8 am shift. Deborah will be training on days for several weeks before going to work on the midnight shift. CHARLES LEEPER was hired September 2, in a temporary Computer Operator Trainee position. This position is for a 4 month period. We welcome back from the summer break, RUTH COX and DAVE KEMPF who are student computer operators.

Three new Agronomy graduate students have begun work in the Crop Inventory program area this fall. CHRIS BROOK is working on field research under MARVIN BAUER. LOIS GRANT and JUDITH WARD are working on the development of spectral approaches to estimating crop development stage and other variables relate to yield under CRAIG DAUGHTRY.

CARLOS POMALAZA has recently begun research on SR&T Task 2A: Misregistration Effect for PAUL ANUTA. He received his Ph.D. in Electrical Engineering from Purdue University this August and is currently working under a post-doctoral appointment at LARS.

CARLOS VALENZUELA has recently joined the Technology Transfer staff at LARS to work on the Bolivian geographic information system project. He is originally from Chochabamba, Bolivia, and worked for ERTS/GEOBOL from 1977 until present. Carlos will also be working toward a Ph.D. in Agronomy in soils under major professors MARION BAUMGARDNER and DICK WEISMILLER. He holds a B.S. from the Agricultural State College, Deventer, Holland and an M.S. from ITC, Enschede, The Netherlands.

Effective 7/1/80, Dr. Robert A. Greenkorn was appointed Vice President for Programs of the Purdue Research Foundation. Dr. Greenkorn was appointed to the position of Vice President and Associate Provost of Purdue University earlier this year.

TRAVEL REMINDER

Purdue travel request information (form 17) should be turned in at least 2 weeks prior to departure, or, a reason should be given why the form is being submitted late.

CONFERENCE CALL CAPABILITY

Purdue now has access to a telephone conferencing system for up to 20 participants using IHETS (Indiana Higher Education Telecommunication System) and SUVON. Conference calls using this system must be scheduled at least 4 days in advance to be sure the equipment is available. Additional information is available from the Purdue Chief Operator at 2800.

PROPOSALS SENT OUT

Title: St. Regis/NASA FRIS Symposium
Sponsor: NASA
P.I.: R. MROCZYNSKI
Duration: 10/1/80-6/30/81

Title: Evaluation of Change Detection Techniques
Sponsor: Defense Mapping Agency/DOD
P.I.: P. ANUTA
Duration: 9/1/89-10/31/80

Title: Remote Sensing Training Course of Mineral Specialists, Part II
Sponsor: Bureau of Land Management
P.I.: S. DAVIS
Duration: 9/15/80-1/31/81

Do Not Put This Copy Out On Table

SCAN LINES

LARS · Purdue University · Vol. 6 · No. 9 · November 4, 1980

PANAMA SHORT COURSE

An international communications link was the key to a unique hands-on experience offered to 14 Latin American students in Panama from September 29 to October 3. LUIS BARTOLUCCI and JOAN BUIS presented a short course on Numerical Analysis of Remote Sensing to students from Central and South America at DMA/IAGS (Defense Mapping Agency/Inter American Geodetic Survey) Cartographic School in Fort Clayton, Canal Zone, Panama.

A Decwriter terminal and modem were transported from LARS to Panama for the course. The Government's Autovon Network provided the means for linking communication between the LARS team in the Canal Zone and the LARS computer system at Purdue. Fort Benjamin Harrison in Indianapolis, Indiana, was contacted through the Autovon Network, and personnel at the Fort patched the calls to a LARS dial-up line.

Although they were cut off twice by calls with higher government priority, JOAN BUIS reported no problems with noise distraction on the lines. Autovon Headquarters was extremely helpful in this operation, and allowed LARS the use of data quality lines.

The students were excited by the opportunity to use the LARS facilities, and commented that the experience "opened new horizons", and "motivated them to work in the field of remote sensing." The Cartographic School was also excited by the ability to use the LARS facilities, and are considering entering into a remote terminal contract.

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).

NEW DIRECTOR NAMED FOR ENGINEERING EXPERIMENT STATION

Dr. John Hancock was pleased to announce the appointment of R. Eugene Goodson as Associate Dean for Research and Director of the Engineering Experiment Station on September 2, 1980. Dr. Goodson is responsible for all research activities within the Schools of Engineering at Purdue University. He is also a member of the LARS management committee.

He has been on the faculty of Purdue University since 1963 as a professor of Mechanical Engineering, prior to assuming his new duties he was director of the Institute for Interdisciplinary Engineering Studies.

LARS WELCOMES NEW VISITING SCIENTIST

Mr. MINORU AKIYAMA joined the LARS staff as a member of the Visiting Scientist Program on October 1, 1980.

He received his Bachelor of Science degree in Physics from Tokyo Institute of Technology in 1974. He was employed by Japan's Geographical Survey Institute for six years, gaining knowledge and experience in many areas of topography, including some research in photomapping and the computerization of photogrammetry.

In regard to remote sensing, Mr. Akiyama has performed research in the areas of analogue/digital analysis, geometric correction for LANDSAT and airborne MSS data, and application for environmental monitoring systems.

While at LARS, he will be investigating pattern recognition theories, advanced computer processing techniques and their application methods for land cover map making. His studies here are being sponsored by Japan International Cooperation Agency.

Mr. Akiyama and his bride of one month, Shigeko, will be living at Warren House during their two-year stay here in West Lafayette.

COMTAL CONFERENCE BY DAVE FREEMAN AND SHIRLEY DAVIS

The first COMTAL/3M Image Processing Conference took place at St. Paul and Wonewok, Minnesota, October 6 to 10, 1980. The conference served three purposes for COMTAL and its users and potential users. First it provided a meeting place for COMTAL/3M and its current and potential customers, an important meeting since COMTAL has recently become a subsidiary of 3M. Second, it gave COMTAL/3M the opportunity to show future development plans to potential customers. Third, it provided an environment for the formation of a COMTAL exchange group and for considerable communication of ideas and concerns among institutions using COMTAL equipment. DAVE FREEMAN and PHIL SWAIN were LARS representatives.

COMTAL/3M was certain to make an impression on customers through their hospitality both in St. Paul and at the wilderness conference center at Wonewok. They made serious efforts to let customers know that COMTAL will be thoroughly supported by 3M through staff increases, through providing centralized service and additional trained service personnel for COMTAL equipment and

integrating COMTAL equipment into future activities at 3M's Central Research Laboratories.

At Wonewok a relaxed atmosphere (and Indian summer) allowed participants to fulfill their physical exercise requirements and slim their minds for thought-provoking informal discussions about present and future applications digital display equipment. A COMTAL VISION ONE/20 was available to conferees at the conference site 24 hours a day. Without an obvious attempt to impress the participants with the solid construction of COMTAL equipment, personnel unpacked the demonstration VISION/ONE 20 and brought it up within an hour.

"Johnny" Carson from EG&G, Los Alamos, New Mexico, was confirmed chairman of VISEX, the COMTAL Vision One Exchange group. DAVE FREEMAN from LARS will assist him. Others present were from NSTL at Bay St. Louis, Missouri, Hughes Aircraft at Los Angeles, RR. Donnelly at Chicago, IBM at Endicott, New York, as well as several potential COMTAL customers who own remote related equipment. One participant came all the way from Kiel, West Germany. Application areas included remote sensing classical image processing, printing industry page make-up, military image processing, general research and development. Discussions with folks representing these applications were interesting, informative and often relevent to activities at LARS.

Special note must be made of two items "discovered" at the conference. First, IBM under the wisdom and perseverence of Blair Martin has exploited the COMTAL capabilities to a great extent and now owns one of the largest VISION ONE/20's produced. Mr. Martin has produced documentations of the COMTAL operating system commands in a tremendously informative volume of 258 pages. This is a real blessing for all users who have struggled at LARS. Six copies are being made for use here. Read it. I know you will enjoy it!

Second, EG&G has written a number of FORTRAN callable subroutines to do image processing in support of the COMTAL with a PDP11/34 host. COMTAL 3M is producing copies and distributing them for a modist charge. LARS copy is already in the mail.

As if this wasn't enough, the next COMTAL VISEX meeting at Wonewok is tentatively scheduled for September 28 to October 2, 1981. LARS will be there!

LARS SEVENTH INTERNATIONAL SYMPOSIUM CALL FOR PAPERS

A Symposium on MACHINE PROCESSING OF REMOTELY SENSED DATA, with special emphasis on: Forest, Range, and Wetland Assessment is being sponsored by Purdue University, Laboratory for Applications of Remote Sensing, on June 23-26, 1981

This symposium will be concerned with digital processing of remotely sensed data. Papers are solicited on but not restricted to:

Data Correction and Enhancement

Digital Classification Techniques

Evaluation of Classification Results

Forest Resources Inventory

Rangeland Assessment

Wetlands and Water Resources

Land Use and Geographic Applications

Crop Inventory

Soil Survey

Geology Applications

Geo-referenced Information Systems

Technology Transfer

Dates:

Summaries due.....15 February 1981
(500-1000 words in quadruplicate).

Author Notification
of selection.....16 March 1981

Camera-ready copy
of manuscript.....26 June 1981

Send summaries to:

Douglas B. Morrison
Purdue University/LARS
1220 Potter Drive
West Lafayette, Indiana 47906 USA

(317) 749-2052

LARS TRAVEL LOG

SHIRLEY DAVIS and DON LEVANDOWSKI met with Donna Scholz of EROS, and BLM's contract monitor Jean Juilland in Denver, Colorado, on October 1-3, to plan a new short course. The course, entitled "Remote Sensing for Mineral Specialists -- Part II, Digital Techniques" will be offered there by LARS in December. The planning visit included working on the Bureau of Land Management's IDIMS System to develop hands-on exercises to be used during the course.

LUIS BARTOLUCCI was in Jacksonville, Florida on October 7-8, to visit the St. Regis/FRIS Remote Sensing Laboratory and discuss their digitizing capacity with Bud Goodrick and Bill Shelley.

MARVIN BAUER was at NASA/JSC on October 7-9, where he participated in the AgRISTARS Supporting Research Project Review and Technical discussions

of the field research and crop inventory tasks.

DAVE LANDGREBE was with General Electric in Philadelphia, Pennsylvania on October 9, to present a seminar entitled, "Some Observations on the Information Content of Multispectral Data." He also received a briefing on the status of G.E.'s Landsat programs.

PETER and CAROL JOBUSCH will be attending a short course on "Writing SAS Procedures", conducted by the SAS Institute in Raleigh, North Carolina, on October 22-24.

MARION BAUMGARDNER will travel to Mexico October 29-31, to attend the Annual meeting of the Soil Science Society of Mexico in Toluca, Mexico. He will present an invited plenary paper on "Remote Sensing as an Aid in Soil Survey." Dr. Baumgardner also plans to visit the National Cartographic Center in Mexico City. He initially visited the center in 1973 and will learn about their progress since then in combining computer analysis with cartographics.

Three LARS staff members will attend a conference on Remote Sensing for Resource Management sponsored by the Soil Conservation Society of America to be held in Kansas City, Missouri, on October 28-30. MARION BAUMGARDNER will present an invited plenary paper on "Remote Sensing for Resource Management: Today and Tomorrow." ROGER HOFFER will give a poster paper on "Mapping Forest Cover Types Using Landsat and Topographic Data." DICK MROCZYNSKI will present a poster paper on "Aerial Photography: A Tool for Strip Mine Reclamation" and on "Aerial Surveys for Pheasant Habitat."

ROGER HOFFER will attend a FAO sponsored Short Course for Brazilian foresters on November 24-28, in Brasilia, Brazil. He will give a series of presentations on remote sensing for forestry applications in North America, on spectral reflectance of vegetation, and on computer processing of remote sensing data for forestry. Other teaching staff for the course will include Robert Baltaxe, FAO, Rome, Gerd Hildenbrandt, University of Freiburg, Germany, and presentation made by two Brazilians on their programs.

This teaching staff plans to continue on to the Brazilian Space Research Institute (IMPE), San Jose Dos Campos, during the first week in December to visit their facilities and discuss remote sensing programs. Dr. Hoffer will also visit the forestry staff of the University of Vicosa.

UPCOMING ASP MEETING SCHEDULED

ROGER HOFFER will attend the Annual meeting of the Western Great Lakes Region of the American Society of Photogrammetry on November 21, in Elk Grove, Illinois.

Ray Allison, Remote sensing coordinator for the U.S. Forest Service will give a keynote address on "Forest Service Application of Advanced Camera Systems." This presentation will emphasize the optical bar panoramic camera and large format camera. Anyone interested in this meeting should contact ROGER HOFFER

Bill French, executive director of ASP will be present to install new officers at the meeting. His trip will include a visit to LARS on November 20, for a general introduction to LARS programs.

VISITORS

Professor Hercio Ladeira, head of the Department of Forestry, University of Vicosa, Brazil, Dr. James Collum, International Programs, Purdue and Dr. Doug Knudson, Forestry Department, Purdue Visted LARS on September 17, to review remote sensing activities with ROGER HOFFER.

Dr. Norman Caplan, director for Automatic, Bioengineering and Sensing Systems at the National Science Foundation, was here on September 23. He met with DAVE LANDGREBE and PAUL ANUTA to review the NSF project on pre-processing of geophysical data.

Ted Herman, vice president for Technology at Sun Oil Company visited LARS on September 24. He met with DAVE LANDGREBE to learn about remote sensing programs which might be useful to his company.

On October 6, 30 "prospective Purdue students" from high schools throughout the United States toured the LARS facility as a part of the Women in Engineering -- Day on Campus activities. These students received an introduction to Remote Sensing and were hosted by DOUG MORRISON and LEROY SILVA.

About 40 field representatives from the Indiana Farm Bureau Coop visited MARION BAUMGARDNER on October 8, to receive a briefing on LARS programs and a tour of the computer facility. Agricultural applications were emphasized. Dr. Baumgardner also hosted Johann Erasmus, agricultural meteorologist, Republic of South Africa while he toured LARS computer facilities on October 3.

Bob Goode and Manny Lopez with NASA-EOD Systems and Facilities and Doc Corbin and Mike Gamble from IBM Federal System Division were at LARS on October 13-17, to attend a training course hosted by JIM KAST, ROSS GARMOE and PETER JOBUSCH. They received instruction on systems software installation and maintenance procedures for VM/CMS systems, and applied it by installing a standard CMS system.

NEW PROJECTS FUNDED

Title: The Application of Photo-Interpretation Techniques to Assess Episodic Storm Damage
Sponsor: U.S. Army Corps of Engineers
Principal Investigator: RICHARD MROCZYNSKI
Duration: 9/29/80 - 4/13/81

Title: Development of a Low Cost Earth Resources Processing Capability for University of California at Riverside
Sponsor: University of California
Principal Investigator: LUIS BARTOLUCCI
Duration: 10/1/80 - 9/30/81

Title: St. Regis/NASA FRIS Symposium
Sponsor: NASA
Principal Investigator: RICHARD MROCZYNSKI
Duration: 10/1/80 - 6/30/81

Title: Remote Sensing Training Course for Mineral Specialist, Part II
Sponsor: Bureau of Land Management
Principal Investigator: SHIRLEY DAVIS
Duration: 9/15/80 - 1/13/81

Title: Preparation of a Color Brochure (An addendum to St. Regis)
Sponsor: NASA
Principal Investigator: RICHARD MROCZYNSKI
Duration: 10/1/80 - 6/30/81

Title: Research in Remote Sensing of Agriculture, Earth Resources and the Environment
Sponsor: NASA
Principal Investigator: MARVIN BAUER and JAMES KAST
Duration: 10/1/80 - 11/30/80

NEW LARS TECHNICAL REPORT

122079 Digital Processing of Remotely Sensed Data for Mapping Wetland Communities by C.L. Ernst and R.M. HOFFER.

A layered classification algorithm was used to classify small wetland areas using Landsat multispectral scanner data and soils information. Results showed that the combined spectral/soils data set improved classification and enabled the analyst to identify additional wetland types which previously had been spectrally inseparable from upland cover types.

The research described in this report was sponsored by NASA under Grant No. NGL-15-005-186.

081280 Analytic Signal Representation in the Synthetic Seismogram of Bright Spots by K.Y. HUANG, C.D. McGILLEM and P.E. ANUTA.

The problem addressed in this report is the digital processing of seismic signals to determine geologic structure and information on oil and gas deposits. Transformation of the seismic signal into an analytic signal representation (Hilbert transform) is useful in geophysical interpretation. The report discusses a new method for preprocessing seismic signals for improved generations of the analytic representation.

The research described in this report was sponsored by the National Science Foundation under Grant No. ENG7820466.

081580 Contextual Classification of Multispectral Image Data: Approximate Algorithm by J.C. TILTON.

Earlier reports have introduced a classification algorithm incorporating spatial context information in a general, statistical manner. Here an approximation to that algorithm is presented which is computationally less intensive, yet produces classifications that are nearly as accurate.

The work described in this report was sponsored by NASA under Contract No. NAS9-15466.

SYSTEM SERVICES November 4, 1980

NEW REFORMATTING PRODUCTS BY CATHY KOZLOWSKI

There have been two changes in Reformatting.

1. As of October 1, 1980, a new product has been established for all Reformatting work, Reformatting Data and Software Products (Departmental Reference Number 02100). This product will replace most of the previous Reformatting Products such as Landsat Reformatting (02103) as well as custom work. The product will be charged based on IBM 3032 CPU time at $20.00 per minute. Work such as Landsat Reformatting or Geometric Correction should cost roughly the same as before while image registration and boundary definition may cost more. All charges will be based on the amount of IBM CPU time needed to complete the task. The new product does not cover A/D Converter time (02122) or Table Digitizer time (02135). Also, if the IBM computer is not used to complete a Reformatting task, personnel time (02182 and 02186) will be charged separately. We hope the new Reformatting product will simplify Reformatting charges. For your convenience a complete list of System Service products and rates is included on the next page.

2. All requests for Reformatting services should be directed to CATHY KOZLOWSKI.

LARSYS NEWS BY KAY HUNT

On October 17, 1980, the following disk mode assignments were made:

LARSYS	N
DVSYS	M
RUNTABLE	O

These are the modes assigned when ipl'ing LARSYS or DVSYS or when using GETDISK or CONFIGUR.

No problems have been reported concerning LARSYS or DVSYS. If you have problems or questions, please contact KAY HUNT.

LARSFRIS NEWS BY KAY HUNT

The documentation effort for the LARSFRIS system being used at St. Regis Paper Company is expected to be completed by the end of October. This documentation includes a User's Manual, System Manual, and Program Abstracts. It contains descriptions and updates for the previously documented 18 LARSYS functions as well as the following additional functions: SECHO, MERGESTATISTICS, RATIOMEANS, BIPLOT, COMPARERESULTS, and SMOOTHRESULTS.

Updated
10/09/80

PURDUE UNIVERSITY/LARS
System Services Products and Rates
July 1, 1980 - June 30, 1981

DEPT. REF.	ITEM	UNIT	RATE/UNIT
02016	Computer Tapes	1 tape	$ 15.50
02018	Polaroid Film B&W	1 pack	4.20
02019	Polaroid Film Color	1 pack	6.60
02020	Polaroid Film P-N	1 pack	5.20
02031	Local Terminal	1 hour	10.00
02040	Varian Plotter Output	1 foot	.75
02801	Computer Service	1 hour	275.00
02806	Priority Service	1 hour	200.00
02811	Disk Storage	1 meg. mo.	7.50
02816	7-Track Tape Drive	1 hour	50.00
02881	Professional Staff	1 hour	49.15
02882	Professional Assistant Staff	1 hour	24.65
02883	Technical Assistant Staff	1 hour	17.00
02884	Service Staff	1 hour	11.75
02885	Clerical Staff	1 hour	12.60
02886	Student Staff	1 hour	8.60
02100	Reform Data Software	1 min.	20.00
02122	A/D Converter	1 hour	90.00
02135	Table Digitizer	1 hour	20.00
02182	Professional Assistant Staff	1 hour	24.65
02186	Student Staff	1 hour	8.60
02203	LARSYS Version 3.1 Documentation	1 copy	1000.00
02204	LARSYS Educational Package	1 package	1250.00
02206	Student & Instructor Notes	1 set	760.00
02208	LARSYS Users Manual	1 manual	70.00
02210	Student Notes	1 set	30.00
02212	Transparencies	1 page	.85
02214	Slides	1 slide	2.50
02215	Printed Material	1 page	.08
02282	Professional Assistant Staff	1 hour	24.65
02283	Technical Assistant Staff	1 hour	17.00
02286	Student Staff	1 hour	8.60
02303	Statistical Services	1 hour	375.00
02307	LARSYS	1 hour	375.00
02311	LARSPEC	1 minute	10.00
02382	Professional Assistant Staff	1 hour	24.65
02386	Student Staff	1 hour	8.60

WORD PROCESSING NEWS BY KAY HUNT

Word processing classes continue to be held for the secretarial staff on a once-a-week basis. To date the following have been covered: Introduction to VM/370, Edit, CMS, and three sessions on SCRIPT commands. The basic word processing functions have been learned and much proficiency has been attained by all of the staff in a very short period of time. More advanced techniques will be presented in the coming weeks.

COMTAL NEWS BY DAVE FREEMAN AND SHIRLEY DAVIS

The First LARS Comtal Users Meeting will be held Wednesday, November 12, 3:30-5:00 p.m. in Flex 2 (as the technical discussion for the week.) All are invited to attend, especially those who have used the COMTAL VISION ONE/20 or would like to.

The purpose of the meeting is to maximize progress toward effective use of the Comtal at LARS. There will be a chance to share what we've learned about using the Comtal, discussions to determine and prioritize needs for system development, and a tutorial presentation on one or more of the more complex operations. But now are looking for volunteers who will demonstrate useful capabilities and techniques they have discovered to other users at LARS. Please contact SHIRLEY DAVIS or PHIL SWAIN by Octover 31, if you had any experiences at all using the Comtal...and don't feel limited to telling only about the "successful" uses. We can all benefit from hearing about the frustrations, too---perhaps someone therewill have just the solution you need. Watch for more details soon.

SLIDES FROM THE COMTAL BY DAVE FREEMAN AND SHIRLEY DAVIS

MIKE COLLINS and CATHY KOZLOWSKI have been working out the details for making slides from the Comtal screen. They have produced excellent slides (in black-and-white and color) using the Canon Camera with an F-Stop of 5.6 and a shutter speed of ¼ second. So far they have tested only 64ASA film but plan to test 200 and 400ASA soon.

Contact MIKE COLLINS or CATHY KOZLOWSKI 24 hours in advance, please, for assistance in setting up the camera and tripod, loading film, and taking the first few slides.

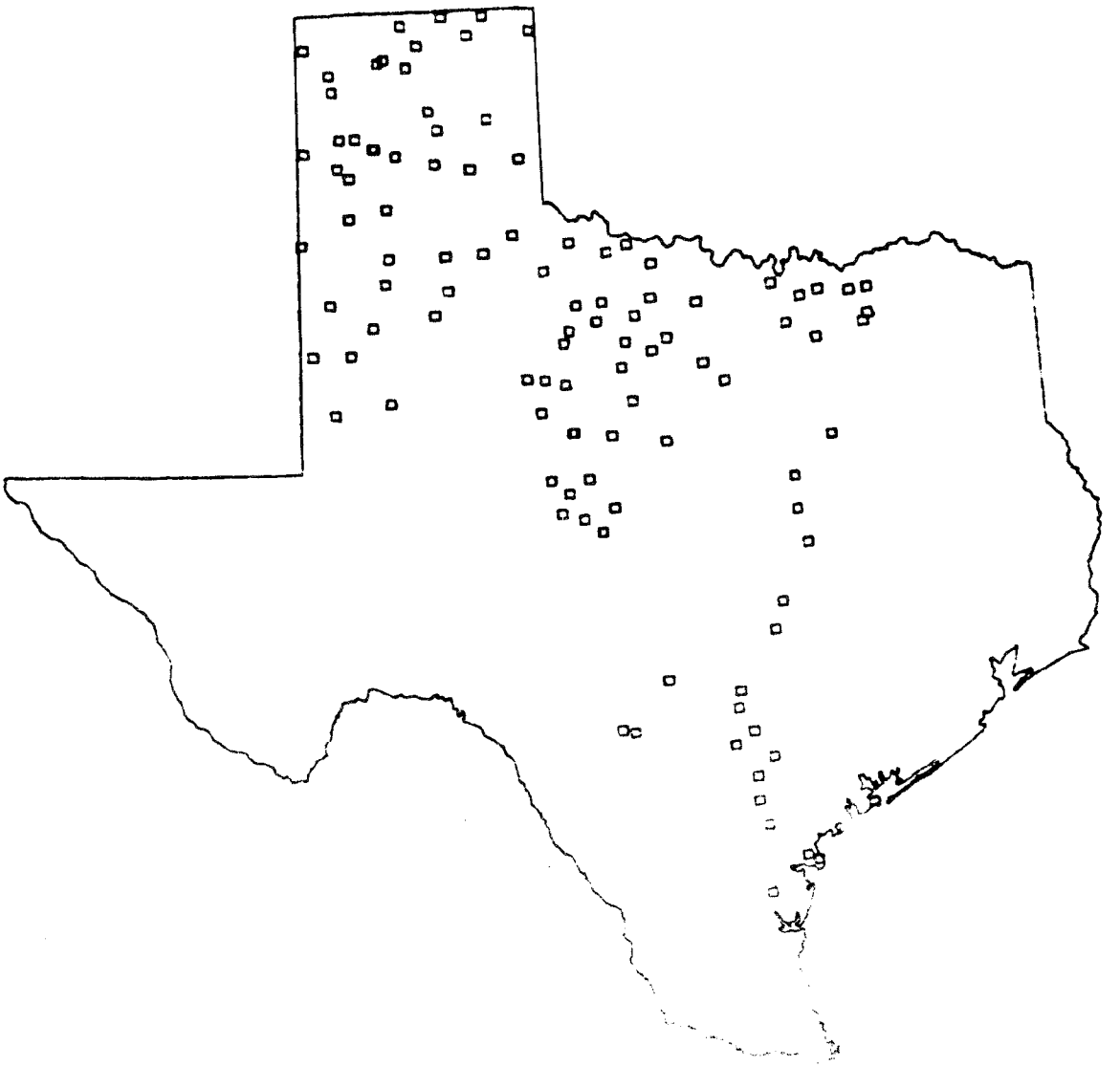
Once the testing at LARS is complete, a final document will describe the entire procedure. Mike has a set of sample slides available now for anyone to see that show both Landsat and Aircraft Data in color and black-and-white.

RT&E DATA BASE LANDSAT SITE MAPPING AVAILABILITY BY JIM COCHRAN

There is now a program available to display on the Tektronics all RT&E data base Landsat sites within a given state's political boundaries. An example of Texas is shown below. The FORTRAN-H program, with IGL, utilizes the RT&E data base subroutine subset. Subset usage and information is available in LARS Abstract 2022 and the RT&E data base section of the CMS SHORT COURSE, with an update in article 00605REJ of SRTNEWS. To access the program type:

```
GETDISK JSCDISK 19A
STATESET
```

If there are any problems, contact JIM COCHRAN (LARS) at ext. 259.



GCS BY JERRY MAJKOWSKI

On October 3, the 2D version of GCS was updated to correct some problems with TEKTRONIX 4054 and Varian Plotter graphics output. This included a correction to the dashed line drawing capabilities on the 4054. Both hardware and software lines can now be used.

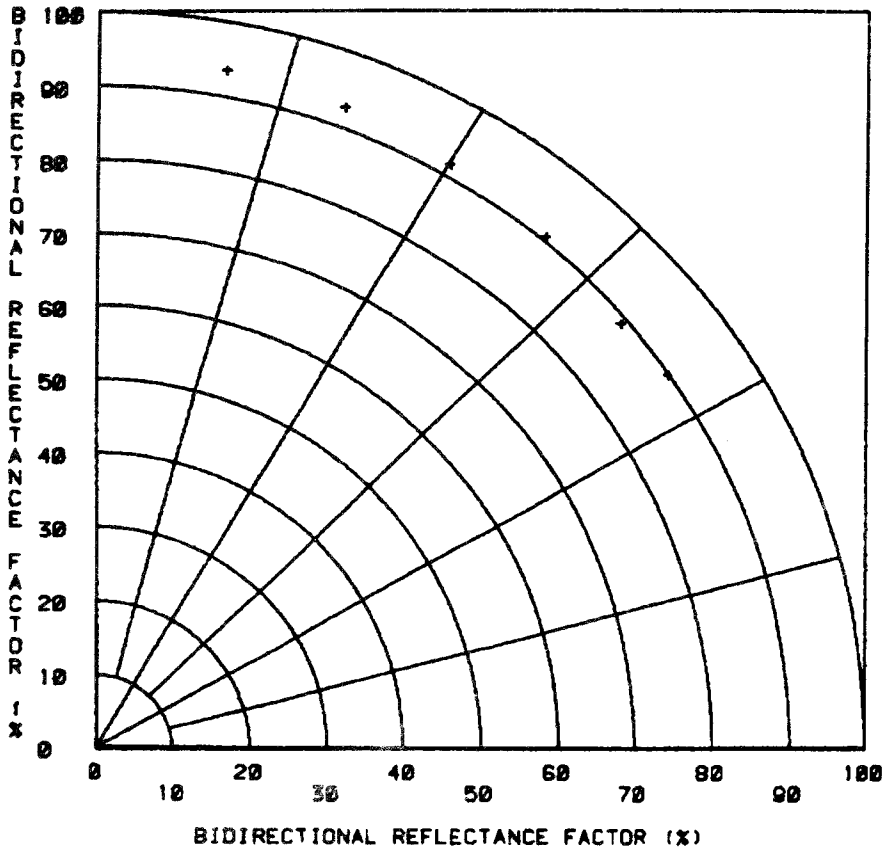
The next planned expansion for GCS is an interface of the 30 system to the 4054.

LARSPEC BY JERRY MAJKOWSKI

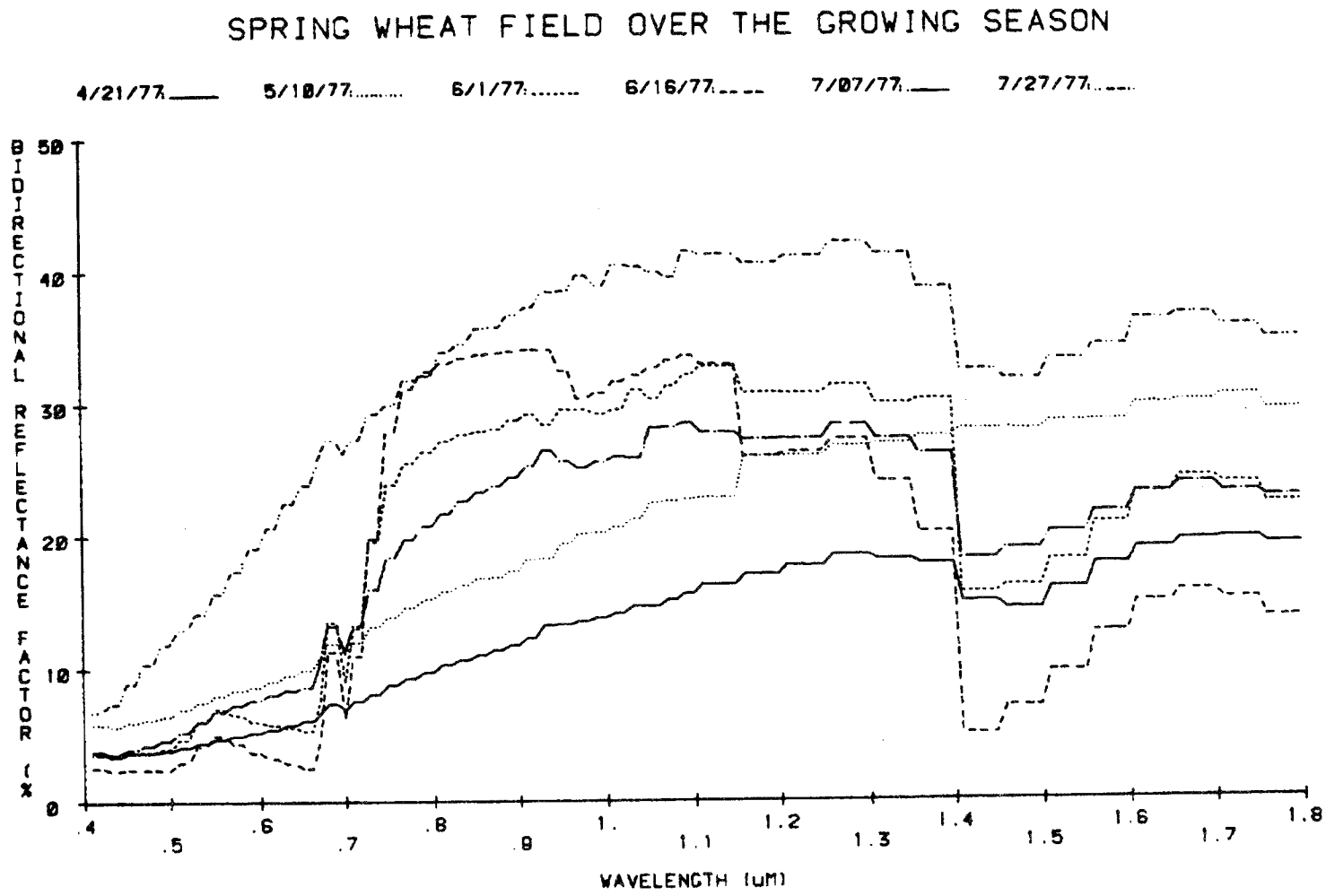
The TEKTRONIX 4054 graphics terminal became a valid output device for the GSPEC processor on October 5. User's can now take advantage of high resolution, quick turn-around time graphs by inserting an "OUTPUT TK54' card in a GSPEC control card deck. Sample plots illustrating the LARSPEC graphics capabilities on the 4054 are shown below. A sign up sheet for using the 4054 terminal is available in the Flex 2 terminal area.

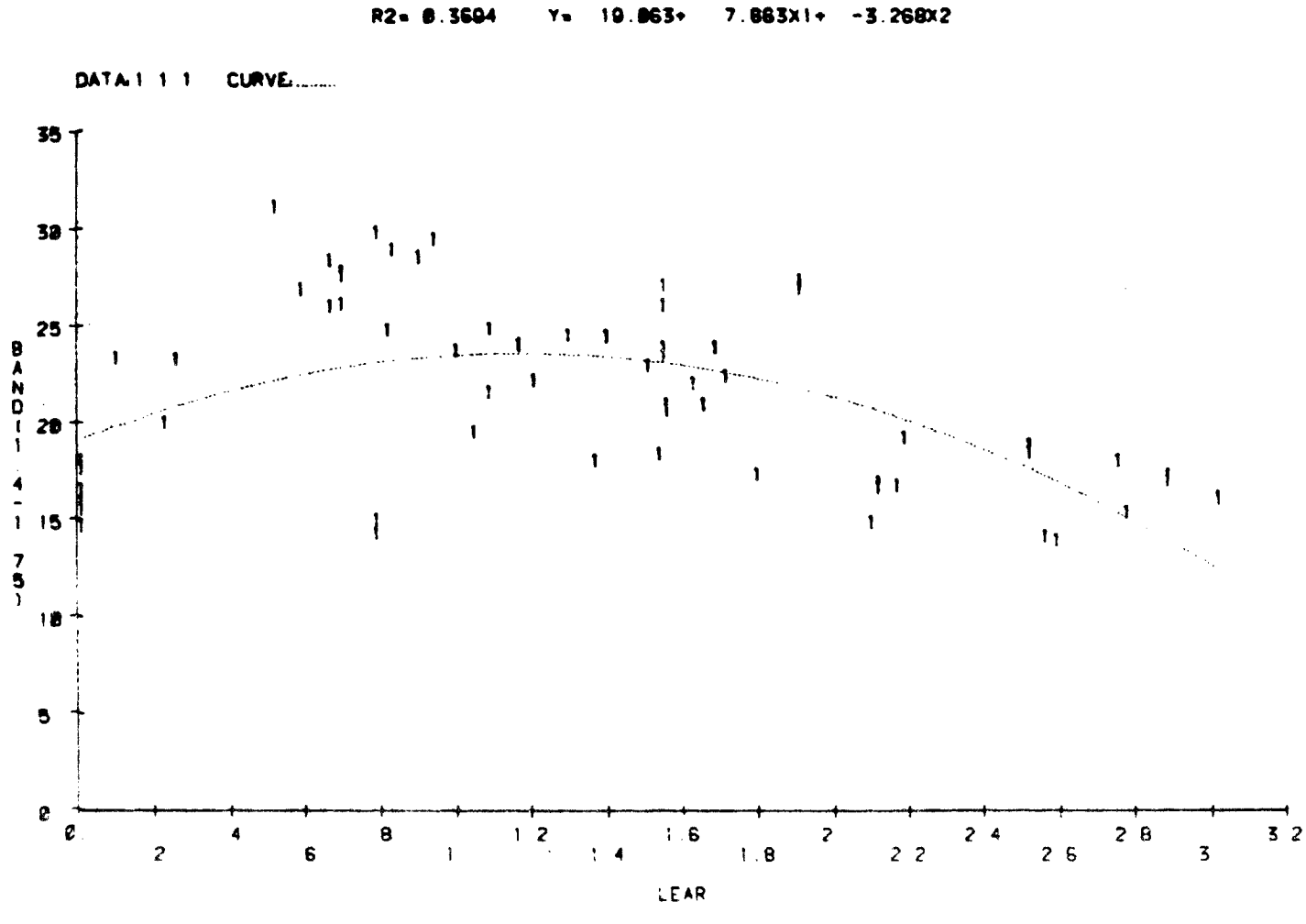
LARSPEC was also updated on October 17, to accomodate for system changes to default disk mode letters. The default letter for the LARSPEC disk will now be N whenever a user types 'IPL LARSPEC' or 'GETDISK LARSPEC'. This does not effect the default device address which will remain as 19C.

PAINTED BARIUM SULFATE ANGLE STUDY



Graphs continue on pages 16-17.


SPRING WHEAT FIELD OVER THE GROWING SEASON
4/21/77
5/10/77
6/1/77
6/16/77
7/07/77
7/27/77
BIDIRECTIONAL REFLECTANCE FACTOR (%)
0
10
20
30
40
50
.4
.5
.6
.7
.8
.9
1.
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
WAVELENGTH (uM)


R2= 0.3694 Y= 10.863+ 7.883X1+ -3.268X2
DATA: 1 1 1 CURVE.....
BAND(4 - 1 75)
35
30
25
20
15
10
5
0
0
2
4
6
8
1
1 2
1 4
1 6
1.8
2
2 2
2 4
2 6
2 8
3
3 2
LEAR

SUMMARY OF 3031 COMPUTER USAGE FOR SEPTEMBER 1980

OVERALL USAGE

Basic Rate CPU Time Used	14.18	hours
Priority Rate CPU Time Used	132.21	hours
Total CPU Time Used	146.39	hours
Terminal Sessions	6980	
Batch Jobs	666	

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	21.27	13
Mon-Fri 8AM-4PM	82.35	49
Mon-Fri 4PM-midnite	33.31	20
Weekend	9.45	9

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	290	0.16	0.03
BATSHORT	101	8.52	0.80
BATMED	46	30.04	3.56
BATONITE	57	33.13	2.68
BATLONG	30	20.57	9.38
TAPTRAN	8	4.14	0.20
BATEOD	39	50.63	2.33
BATJSC	69	35.80	5.34

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	252	125.57	0.50
	31	GTX	296	132.79	0.45
	32	GTX	248	127.03	0.51
	33	GTX	240	153.83	0.64
	34	GTX	326	150.98	0.46
	35	GTX	324	144.39	0.45
	36	GTX	329	147.56	0.45
	37	DECwriter	95	71.84	0.76
	38	Tektronix	181	115.61	0.64
	39	CRT	103	42.47	0.41
	3A	GTX	19	5.63	0.30
Flexlab1	40	GTX	209	120.60	0.58
	41	GTX	204	208.53	1.02
	42	GTX	222	139.02	0.63
	43	DECwriter	160	85.31	0.53
Dial-Up	50	1st in Use	205	135.93	0.66
	51	2nd in Use	39	19.46	0.50
	52	3rd in Use	2	1.93	0.96
	53	4th in Use	1	0.49	0.49
	54	5th in Use			
	55	In-House-1	48	41.89	0.87
	56	In-House-2	54	54.85	1.02
St. Regis	4A	DECwriter	4	0.22	0.05
Alabama	4B	DECwriter	21	10.38	0.49
	4C	GTX	15	23.77	1.58
	4D	GTX	40	24.58	0.61
ISU	4E	(various)	19	7.26	0.38
	4F	(various)	71	35.96	0.51
Houston	60	CRT	244	183.06	0.75
	61	CRT	246	166.66	0.68
	62	Trenddata	285	128.76	0.45
	63	Trenddata	228	116.27	0.51
	64	CRT	73	36.45	0.50
	65	CRT	78	42.21	0.54
	66	CRT	164	78.31	0.48
	67	CRT	131	97.41	0.74
	68	Dial-up	221	200.51	0.91
	69	Dial-up	208	129.27	0.62
	6A	Dial-up	138	120.90	0.88
	6B	Dial-up	112	95.43	0.85
	6C	Dial-up	163	80.53	0.49
	6D	Dial-up	148	85.22	0.58
	6E	Dial-up	131	54.89	0.42
	6F	Dial-up			

INTRALAB NOTES

INFLUENZA IMMUNIZATION INJECTIONS AVAILABLE

The Student Hospital will be administering influenza immunization injections to interested staff members from 8:30-11:30 a.m. and from 1:00-4:00 p.m., Monday through Friday at the Student Hospital Cold Clinic. The price per injections is $3.00. For more information please refer to President's Office Memo posted on bulletin board in Flexlab I and II.

SUVON CALLING

General Telephone has requested that we try a different procedure for placing Suvon calls. The new procedure is as follows: Access Suvon by dialing 8, and wait for the dialtone. Then, dial all the remaining numbers without waiting for additional dial tones. Call GLORIA PETERSON if you have any questions about this procedure.

NEW SMALL PACKAGE SHIPPING SERVICE

Imperial Enterprises is offering bus service shipping from Lafayette to Indianapolis Airport, making 5 round trips per day, Monday through Friday, and 3 trips on Sunday. They are planning a pickup service in the Lafayette and West Lafayette area, and should have a schedule designed soon.

The rate will be $12.00 for one piece up to 50 lbs. and $2.00 for each additional package per pickup.

PERSONNEL CHANGES

SYLVIA JOHNSTON was hired on September 10, to replace RUTH JARRETT, who left on August 22, to attend school. Sylvia is secretary to TERRY PHILLIPS and supervisor of the Flex II secretarial staff.

BONNIE PHIBBS joined the staff on September 15, as secretary in the Computer Facilities area.

DAVID SNYDER has recently joined LARS as an Applications Programmer I. David is currently working part time while he is finishing up his B.S. in Computer Science this semester. He enjoys music and all sports. David will be sharing an office with JERRY MAJKOWSKI and JIM COCHRAN at ext. 259. His supervisor is LUKE KRAEMER.

MINI-LARSIANS

Congratulation and best wishes are extended to Carole and CHRIS SEUBERT who recently became parents of a son. Christofer was born on October 17, 1980 and weighed 7 lb. 2 oz.

PROPOSALS SENT OUT

Title: "Alabama A&M University Earth Resources Data Processing Remote Terminal Support Personnel".
Sponsor: Alabama A&M University
Principal Investigator: LUIS BARTOLUCCI
Duration: 10/1/80 - 9/30/81

Title: "Offering Training Courses in Remote Sensing & Image Processing".
Sponsor: Corps of Engineers
Principal Investigator: LUIS BARTOLUCCI
Duration: 11/1/80 - 1/31/82

Title: "A Proposal to Conduct a Conference on Remote Sensing Education (CORSE).
Sponsor: NASA/Goddard
Principal Investigator: SHIRLEY DAVIS
Duration: 10/15/80 - 7/31/81

Title: "Research in Remote Sensing in Agriculture".
Sponsor: NASA
Principal Investigator: MARVIN BAUER
Duration: 12/1/80 - 11/30/81

REMOTE SENSING JOB OPPORTUNITIES

SR. PRODUCTION PROGRAMMER ANALYST

This position requires four years of experience in program analysis and the development of Raster Image Processing and/or Display Systems. Knowledge of Fortran and Assembler language is essential. Preference will be given to candidates with direct experience in the development of landsat and/or seismic processing and display systems, including peripheral equipment, interfaces, and drivers.

Contact: Roy D. Wood, Remote Sensing Projects Coordinator
SEISCOM DELTA INC.
P.O. Box 36928
Houston, Texas 77036 Telephone: (713) 789-6020

COMPUTER PROGRAMMER/ANALYST

This position requires a B.S., M.S., or Ph.D. in Computer Science, Mathematics, Management or related area. Knowledge of PASCAL, FORTRAN, and CDC Job Control language is necessary, and experience in handling large files is desirable. The person who fills this position will be assisting the Ag. Business Office in preparing the University budget, developing several salary analyses and providing other Ag. finanacial management reports.

This will be a temporary, half-time assignment and would be ideal for either a graduate student or any individual looking for employment on at least a one-year basis.

Contact: John Beelke
Agriculture Business Office
Agriculture Administration Building
West Lafayette, IN 47906 Telephone: (317) 494-8753

PROFESSIONAL POSITION: REMOTE SENSING USER ASSISTANCE APPLICATIONS EXPERT

This position is located in Nairobi, Kenya, and involves teaching East and Southern Africans to utilize remote sensing data, preparing demonstration projects, conducting training courses and providing assistance to users of the Regional Remote Sensing Facility's laboratories.

A Ph.D. (or the equivalent) in a discipline requiring the applications of Remote Sensing is required, as well as previous academic teaching experience including lecture presentations and field work. Experience in one or more of the following fields is desired: Vegetation Mapping, Rangeland Management, Soils, Hydrology, and Geomorphology.

Contact: Dr. Edward Yost, Director
Spectral Data Corporation
112 Parkway Drive South
Hauppauge, New York 11787 Telephone: (516) 543-4441

Positions are also available for Applications Scientists, and a Data Analyst with Technicolor Graphic Services Inc.

Contact: Mr. Joseph N. Pfliger, Vice President and General Manager
Technicolor Graphic Services, Inc.
EROS Data Center
Sioux Falls, South Dakota 57198

There is also an opening for a Graduate Instructor-Program Specialist with the Supervisory Development Institute at Purdue.

Contact: Mark A. Goodwin
Graduate House East 101
Purdue University
West Lafayette, Indiana 47907 Telephone: (317) 494-8176

RECENT NASA PUBLICATIONS AVAILABLE IN THE LARS LIBRARY

NASA TECHNICAL PAPERS

Discrimination of Rock Classes and Alteration Products in Southwestern Saudi Arabia with computer-enhanced Landsat data.

H.W. Blodget, F.J. Gunther, and M.H. Podwysocki October, 1978 1327

Coordinated Aircraft and Ship Surveys for Determining Impact of River Inputs on Great Lakes Waters-Remote Sensing Results

C.A. Raquet, J.A. Salzman, ET.AL. July, 1980 1694

The Time-Space Relationships of the Data Points (Pixels) of the Thematic Mapper and Multispectral Scanner or "the Myth of Simultaneity"

F. Gordon, Jr. July, 1980 1715

NASA CONFERENCE PUBLICATIONS

Conference of Remote Sensing Educators (CORSE-78). A workshop held at Stanford University by NASA Ames Research Center, Moffett Field, California June 26-30, 1978. 2102

Remote Sensing and Problems of the Hydrosphere. Proceedings of a workshop held at Warner Springs, California January 29-31, 1979. 2109

NASA TECHNICAL MEMORANDUMS

Analysis of the Dynamics of Shifting Cultivation in the Tropical Forests of Northern Thailand using Landscape Modeling and Classification of Landsat Imagery.

L.D. Miller, K. Nualchawee and C. Tom. May 1978 79545

Spatial Land-Use Inventory, Modeling and Projection/Denver Metropolition Area, with Inputs from Existing Maps, Airphotos, and Landsat Imagery.

C. Tom, L.D. Miller and J.W. Christenson August 1978 79710

SCAN LINES

LARS • Purdue University • Vol. 6 • No. 10 • December 31, 1980

PURDUE HOSTS EDUCATORS' CONFERENCE

CORSE-81, Conference on Remote Sensing Education, will be held May 19-21, 1981, at Purdue University. Co-sponsored by NASA and NOAA, the conference is being organized and conducted by the Laboratory for Applications of Remote Sensing (LARS).

The goal of the conference, according to co-chairmen SHIRLEY DAVIS and JOHN LINDENLAUB, is to bring together remote sensing educators from across the country to exchange information on establishing and improving remote sensing curricula in institutions of higher education. National Planning Committee members include ROGER HOFFER and MARION BAUMGARDNER and six other university and NASA Staff concerned with Remote Sensing Education.

A panel presentation during the opening session will seek to identify the kinds of skills and knowledge that will be needed by those involved in remote sensing in the years ahead. The remainder of the conference will explore ways for education to meet this challenge.

An honest look at resources needed for effective teaching of remote sensing and also at strategies for teaching in various disciplines will lead into concurrent, discipline-oriented sessions where educators can tackle specific problems in small groups. Several presentations and discussions will also address critical questions about obtaining and using digital image-processing capabilities for education.

Since the federal government has long been a supporter of developments in remote sensing, educators attending the conference will hear from and be asked to respond to NASA and NOAA representatives who will discuss the current and future relationship of these governmental agencies to remote

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).

sensing education.

Several tutorial workshops will be held in conjunction with the conference. These workshops, on the days preceeding and following the conference, will serve to acquaint relative newcomers with the basics of remote sensing and will be a means for others to keep abreast of new technological developments. Whenever possible, educational materials used in these workshops will be distributed so that those attending may adapt them for use in their own classes.

Some spaces are still open in the program for presentations that focus on activities in specific disciplines and for poster papers that address any topic related to remote sensing education. Anyone interested in making a presentation should submit a title and a brief description by February 1, 1981, to SHIRLEY DAVIS, Laboratory for Applications of Remote Sensing, Purdue University, 1220 Potter Drive, West Lafayette, Indiana 47906.

Attendance at CORSE-81 is limited to approximately 200 educators, with room and meals provided for many who attend. Registration information will be available in early February. For additional information contact SHIRLEY DAVIS.

MINERAL SPECIALISTS SHORT COURSE

The Bureau of Land Management (BLM) sponsored a short course in Denver, Colorado on "Remote Sensing for Mineral Specialists -- Part II, Digital Techniques", December 15-19. Course coordinator was SHIRLEY DAVIS; other instructors were LUIS BARTOLUCCI, PAUL ANUTA, DON LEVANDOWSKI, and DAVE L'HEUREUX from LARS, and Donna Scholz from Technicolor Graphics, Inc. at EROS Data Center. The course dealt with digital analysis, data enhancement, data integration, and models for G-E-M resources, and included hands-on work with the IDIMS.

TRAVEL

STEVE KRISTOF presented a paper entitled, "Reflectance Characteristics of Soil-Vegetation Complexes" at the annual meeting of the Indiana Academy of Science and the Indiana Junior Academy of Science, at Saint Joseph's College, Rensselaer, Indiana, November 6-8.

LUIS BARTOLUCCI was in Quito, Ecuador to chair the plenary session of the first meeting of Latin American Remote Sensing Specialists on November 24-27. The purpose of the meeting was to create the Association of Latin American Remote Sensing Specialists.

DAVE LANDGREBE attended the 5th International Pattern Recognition Conference in Miami Beach, Florida on November 30-December 4.

TRAVEL (CONT.)

Several members of the LARS staff were in Detroit, Michigan on November 30 - December 5 to attend the 72nd Annual Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. The following papers were presented:

"Spectral Reflectance for Determination of Nitrogen F Fertilization Level and Foliar Disease in Winter Wheat"; L.D. HINZMAN, M.E. BAUER, and C.S.T. DAUGHTRY.

"Variability of Reflectance Measurements due to Interaction of Row Azimuth and Solar Illumination Angles"; J.C. KOLLENKARK, V.C. VANDERBILT, and C.S.T. DAUGHTRY.

"Spectral Information for Discriminating Nitrogen Treatment Levels in Maize Canopies"; G. Walburg, M.E. BAUER, and C.S.T. DAUGHTRY.

"Variability of Reflectance Measurements with Sensor Altitude and Canopy Type"; V.J. POLLARA, C.S.T. DAUGHTRY, V.C. VANCERBILT, and B.F. ROBINSON.

"Effects of Cultural Practices on Spectral Reflectance of Maize Canopies"; L.M. NASH, M.E. BAUER, and C.S.T DAUGHTRY.

"Interpretations of Landsat Data to Determine Soil Characteristics and Variations in Ground Cover"; S.J. KRISTOF, R.A. WEISMILLER, L.J. Lund, D. Fehrenbacher, and L.M. Kiefer.

"Utilization of Landsat Data in Mapping Soils of the Big Desert Area, Idaho"; L.J. Lund, W.D. Harrison, M.E. Johnson, R.A. WEISMILLER, and S.J. KRISTOF.

DAVE LANDGREBE was in Washington, D.C., December 11-12 to attend a CODMAC meeting (Committee on Data Management and Computation).

SPECIAL PRESENTATIONS

Mr. William Brooner, Director of Land Resources Division, EARTHSAT Co., presented a seminar at LARS on SPOT and Earthsat Images Processing facilities, on November 3.

Dr. Thomas Peuker, Dept. of Geography, Simon Fraser University, Canada, presented a seminar on Remote Sensing and Computer Cartography at LARS on November 5.

VISITORS

The House Agriculture Committe (U.S. Congress) visited LARS on November 12 for a briefing on the agricultural applications of Remote Sensing. DAVE LANDGREBE gave a presentation entitled: "Satellite Based Land Observation Technology for Agriculture."

Mr. Yoshitaka Hosoi, from the Metal Mining Agency of Japan, attended the November Short Course at LARS and spent one week as a visiting scientist to investigate the use of numerical analysis in exploration.

Professor Don Luman and 10 students from his advanced course in Remote Sensing at Illinois State University, visited the LARS facility on December 5 for an introduction to the history, mission, and operation of LARS by DOUG MORRISON.

Dr. E. Trindl, head of DIBIAS (Digital Image Processing Institute for Communication Technology) from the German Aerospace Research Establishment, was here on December 9 for a tour of the LARS facilities, and was interested in learning about the COMTAL capabilities.

Dr. Robert A. Feldman, Assistant Curator of Field Museum, Chicago, Illinois, Visited the LARS facility on December 10. He discussed exploring the possibilities of using remote sensing for archeological research, with LUIS BARTOLUCCI.

LUIS BARTOLUCCI and other LARS staff members discussed LARS' Bolivia technology transfer activities with Mr. Tom Canby from National Geographic Magizine on December 11-12.

NEW PROJECTS FUNDED

Title: "Research in Remote Sensing in Agriculture"
Sponsor" NASA
P.I.: M.E. Bauer
Duration: 12/1/80 - 11/30/81

Title: "Alabama A&M University Earth Resources Data Processing Remote Terminal Support Personnel"
Sponsor" Alabama A&M University
P.I. L. Bartolucci
Duration" 10/1/80 - 9/30/80

Title " A Proposal to Conduct a Conference on Remote Sensing Education
Sponsor: NASA/Goddard
P.I.: S. Davis
Duration: 10/15/80 - 7/31/81

NEW LARS TECHNICAL REPORT

072580 Computer Processing of Satellite Data for Assessing Agricultural, Forest, and Rangeland Resources by R. M. Hoffer and P. H. Swain.

This paper first discusses three basic aspects of computer processing of MSS (multispectral scanner) data, including preprocessing, enhancement, and classification. Recent developments in classification techniques are then discussed. Consideration is given to the use of ancillary data as part of the classification process. The ECHO algorithm and the layered classification technique, which appear to be particularly important for effective analysis of earth resource features, are described. The paper concludes with a look to the future of remote sensing data collection systems and analysis techniques.

SYSTEM SERVICES December 31, 1980

RSCS NETWORKING

One of the major functions of the LARS system is to allow users to transmit print reader and punch files between the remote site and the central system. To perform this operation LARS uses a component of the VM/370 system called RSCS (Remote Spooling Communication System). On January 5, 1981, the RSCS supplied as a part of VM/370 was replaced by an IBM program product called RSCS Networking 2.0. The functional characteristics of the two systems are similar and the major difference is that RSCS Networking sends messages to the user whenever a file is transmitted. These messages are a bother to most users now but will become necessary as some of the advanced features of RSCS Networking are used.

RSCS Networking allows the connection of two or more computers into a network. Files can be transmitted from the spool file system of one machine to the spool file system of another system. This feature becomes important after JSC installs their computer and users wish to transmit files between the two systems. The JSC system should be installed by February and RSCS Networking is essential networking without providing our users with the normal warning and test times. We hope we did not severely affect anybody's project.

The RSCS driver that transmitted data between the IBM and the PDP systems was developed by LARS and could not be fit into Networking in the time we had available. For this reason we are making a special virtual machine available for transmitting files to the PDP. To transmit files to the PDP replace all

REMOTE dev TO LITER

with the following commands.

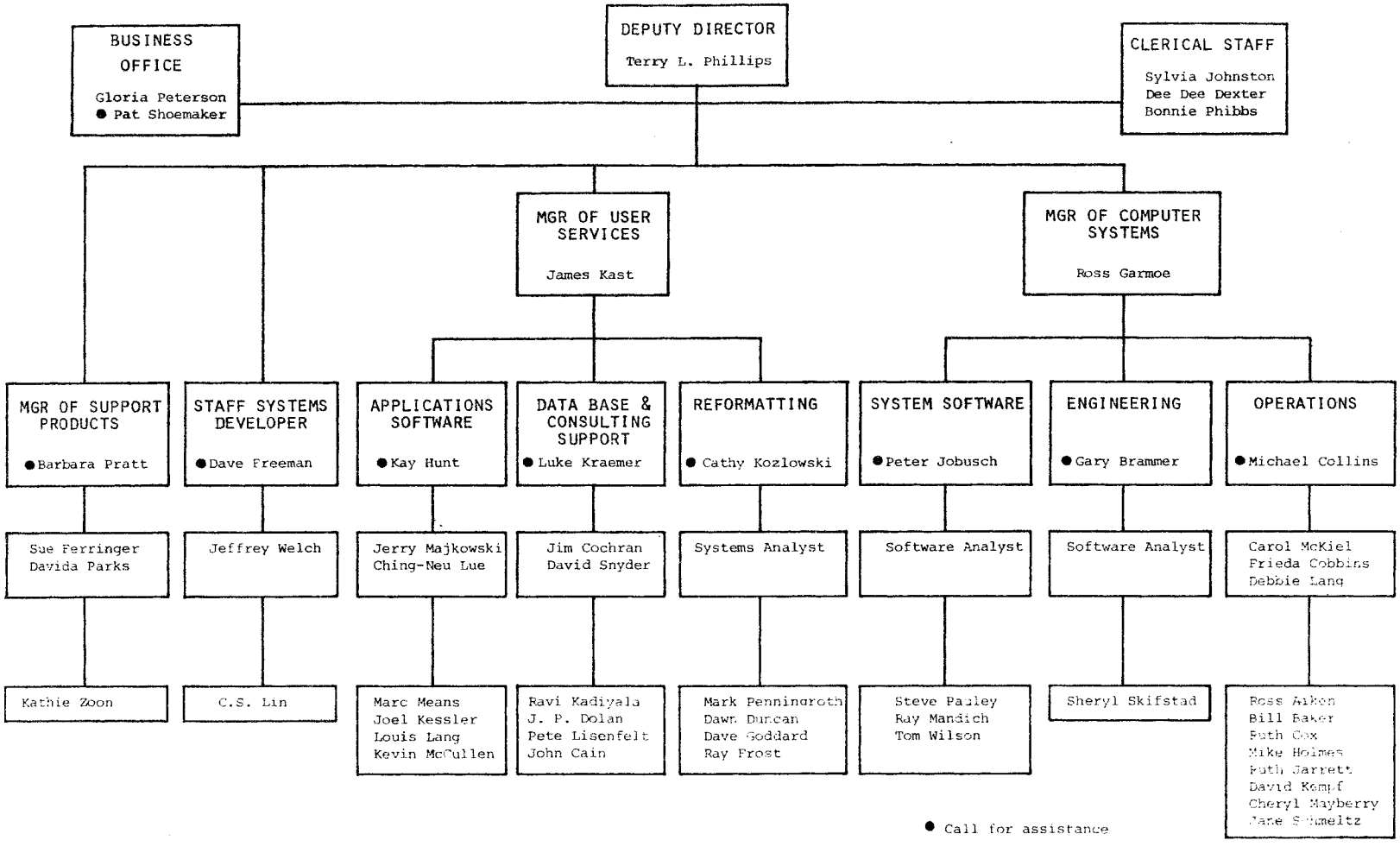
SPOOL dev TO PDP
TAG DEV dev LITER

For more information on the SPOOL and TAG commands refer to the CP REference for General Users.

We are working on transmitting files to the PDP using RSCS Networking and will notify all users when the work is complete.

SYSTEM SERVICES ORGANIZATION

There have been many changes recently in the Computer Facility Staff. The chart on the following page details the System Services Organization and also lists each group manager, who is available to help with any problems users might encounter.


DEPUTY DIRECTOR
Terry L. Phillips
BUSINESS OFFICE
Gloria Peterson
● Pat Shoemaker
CLERICAL STAFF
Sylvia Johnston
Dee Dee Dexter
Bonnie Phibbs
MGR OF USER SERVICES
James Kast
MGR OF COMPUTER SYSTEMS
Ross Garmoe
MGR OF SUPPORT PRODUCTS
● Barbara Pratt
STAFF SYSTEMS DEVELOPER
● Dave Freeman
APPLICATIONS SOFTWARE
● Kay Hunt
DATA BASE & CONSULTING SUPPORT
● Luke Kraemer
REFORMATTING
● Cathy Kozlowski
SYSTEM SOFTWARE
● Peter Jobusch
ENGINEERING
● Gary Brammer
OPERATIONS
● Michael Collins
Sue Ferringer
Davida Parks
Jeffrey Welch
Jerry Majkowski
Ching-Neu Lue
Jim Cochran
David Snyder
Systems Analyst
Software Analyst
Software Analyst
Carol McKiel
Frieda Cobbins
Debbie Lang
Kathie Zoon
C.S. Lin
Marc Means
Joel Kessler
Louis Lang
Kevin McCullen
Ravi Kadiyala
J. P. Dolan
Pete Lisenfelt
John Cain
Mark Penningroth
Dawn Duncan
Dave Goddard
Ray Frost
Steve Pauley
Ray Mandich
Tom Wilson
Sheryl Skifstad
Ross Aiken
Bill Baker
Ruth Cox
Mike Holmes
Ruth Jarrett
David Kempf
Cheryl Mayberry
Jane Schmeltz
● Call for assistance

FORTRAN-H EXTENDED

We wish to remind all of our users that the FORTRAN-G compiler and text library will no longer be available after July 1, 1981. We are making the FORTRAN-H (EXTENDED) compiler and the FORTRAN MODII library the standard system compiler. Call CAROL McKIEL at ext. 221 to obtain copies of the manuals for FORTRAN-H (EXTENDED). The compiler is called by issuing the CMS command

FORTHX fn (parameters

The text library name is FORTMOD2. To obtain a listing of the valid compiler options and their meanings, enter the CMS command

PRINT FORTHX MEMO S

We recommend that all new programs be written using the new compiler and that all existing programs be converted as soon as possible. If you have any questions or need assistance, please call PETER JOBUSCH.

LARSYS NEWS BY KAY HUNT

No major problems have occurred with LARSYS. Length of processing time used in the PRINTRESULTS function is being investigated. Minor problems resulting from changes in the disk modes were encountered and immediately fixed. Users experiencing problems with LARSYS or LARSYSDV should contact KAY HUNT or CHING LUE.

LARSFRIS DOCUMENTATION BY KAY HUNT

The LARSFRIS documentation has been completed. Updates to existing LARSYS function descriptions have been made as well as the addition of documentation for the following processors: BIPLOT, CHANNELTRANSFORM, SECHO, RATIOMEANS, COMPARERESULTS, SMOOTHRESULTS, MERGESTATISTICS. Copies of the documentation will be available in January, 1981 on a reference basis in both Flex I and Flex II. For further information, please contact KAY HUNT.

CMS TAPE SLIDE MODULES BY KAY HUNT

A new CMS tape/slide unit will be ready for distribution in January, 1981. It is an introductory unit on SAS which is being developed and produced by CAROL JOBUSCH. Users who wish to have this unit added to their existing CMS package should contact KAY HUNT at LARS for further details.

COMTAL NEWS BY DAVE FREEMAN AND SHIRLEY DAVIS

On the following page in Scan Lines you'll find reproduced a one-sheet condensation of the Comtal Commands that are in operation on the LARS system. On the front are listed all possible combinations of operations and on the back is additional information de-coding some of the abbreviations and listing some of the options. We hope you will find it useful.

MIKE COLLINS and CATHY KOZLOWSKI have finalized their recommendations on camera settings for taking slides of the Comtal screen with the Canon camera: F-stop of 5.6 and Shutter speed of 1/4 seconds. (These same settings were recommended in a previous issue of Scan Lines before the testing was complete).

Users wishing to take slides should contact Mike or Cathy 24-hours in advance for assistance in setting up the camera and tripod, and in loading and unloading the film. (After February 1, 1981, the full-time computer operators on all three shifts will be trained to provide this help in Cathy's place).

The evening hours are best for taking slides because of lower congestion in the user's area and the possibility of closing the curtains to keep glare off the screen, and so Mike urges that all photography be done then.

Contact Mike if you have questions about using the camera or about costs.

The L12 processor, implemented on the PDP and Comtal, can now be used to create files of LARS-12 cards, the cards that identify training/test fields and check points for future processing. To indicate the single check points or the pair of points that define the upper left and lower right of a rectangular field, the user positions the target on the screen by moving the track ball, and then enters an appropriate command, e.g., carriage return, at the PDP. Users of L12 are given several options for entering additional information, comments, etc. that they would like to have included on the final cards. When selection of fields and/or check points is complete, the file of LARS-12 cards can be transmitted to a designated ID on the IBM.

User documentation of this procedure is now being prepared; for those who want to use L12 now, some preliminary documentation is available.

Contact JEFF WELCH for further information.

COMTAL

Condensed Command Language (alphabetical by Command Name)

```
ADD/SUBTRACT

      ANNOTATION CHARACTERS
      BARS
      BOTTOM LINE
      DOTS
      FUNCTION MEMORY N (,RGB)
      GRAPHIC N
      GRAY SCALE N
      IMAGE N IF GRAPHIC M (NO
        SUBTRACT)
      PSEUDOCOLOR MEMORY RGBA
      TARGET
      TRANSPARENCY OF GRAPHIC
        /TARGET

ASSIGN

      IMAGE N W1 K W2 L
        W3 M W4 O
      TRUECOLOR N RED K
        GREEN L BLUE M

CLEAR

      FLAG GRAPHIC/IMAGE N
      FUNCTION MEMORY N (,RGB)
      GRAPHIC N
      IMAGE N
      PSEUDOCOLOR MEMORY RGBA
      TABLE N

COLOR

      ANNOTATION CHARACTERS NN
      BARS NN
      GRAPHIC N CNAME
      TARGET CNAME1

CREATE

      MACRO A

DEFINE

      CORNERS GRAPHIC/IMAGE N
        X1 K X2 M Y1 O Y2 P
      IMAGE N X KKKK Y MMMM
      TRUECOLOR N X KKKK Y MMMM
      TARGET X KK Y MM

DISPLAY

      BLACK SCREEN
      FUNCTION MEMORY N (,RGB)
      GRAPHIC N
      IMAGE N (,RGB)
      PSEUDOCOLOR MEMORY RGBA
      ZOOM IMAGE BY FACTOR NZ

DUMP

      CODE MMMMMM BYTE/WORD
      IMAGE
      INTEGER FUNCTION N
      MEMORY MMMMMM BYTE/WORD
      REAL FUNCTION N

EQUALIZE

      FUNCTION MEMORY N (,RGB)

EXECUTE

      CODE
      MACRO A

FILL

      GRAPHIC N

FUNCTION MEMORY N (,RGB)=

      HISTOGRAM OF IMAGE
      FUNCTION MEMORY N/M (,RGB)
      INTEGER (UASF)
      LOG (UASF)
      PSEUDOCOLOR MEMORY RGB
      REAL (UASF)
      SQRT (UASF)
      TABLE M
      X (*/A) (+-B)

GRAPHIC N

      FUNCTION MEMORY N (,RGB)
      GRAPHIC M
      IMAGE M LEVEL K
      LABEL BY FACTOR M
      PROFILE OF IMAGE M
      PSEUDOCOLOR MEMORY RGB
      TABLE M

IMAGE N =

      COMBINE (IMAGE N + -
        IMAGE N)
      CONSTANT M
      DISPLAYED IMAGE RGB
      FREEZE RGBA
      IMAGE M (,RGB)
      INTEGER (UASF)
      LOG (UASF)
      REAL (UASF)
      SQRT (UASF)
      SUPERIMPOSE IMAGE M IF
        GRAPHIC K SET/CLEAR
      ZOOM IMAGE M BY FACTOR O

INTEGER FUNCTION N =

      INTEGER (IASF)

INITIALIZE

      FUNCTION MEMORY N (RGB)
      PSEUDOCOLOR MEMORY RGBA
      TABLE N

MODE N

MODIFY

      CODE MMMMMM BYTE/WORD
      MEMORY MMMMMM BYTE/WORD

PAUSE N

PSEUDOCOLOR MEMORY RGB=

      FUNCTION MEMORY N (,RGB)
      INTEGER (USAF)
      LOG (USAF)
      PSEUDOCOLOR MEMORY RGB
      REAL (UASF)
      SQRT (UASF)
      TABLE N
      X (*/A) (+-B)

REAL FUNCTION N=

      REAL (RASF)

RELEASE

      CODE
      GRAPHIC N
      IMAGE N
      INTEGER FUNCTION N
      MACRO
      REAL FUNCTION N
      TABLE N

ROAM

      IMAGE

ROLL

      FUNCTION MEMORY N (,RGB)
      PSEUDOCOLOR MEMORY RGBA

SET

      CODE SIZE NNN
      CORNERS  IMAGE
      DISPLAY COORDINATES
        X KKKK Y MMMM
      FLAG GRAPHIC/IMAGE N
      GRAPHIC N X KKKK Y MMMM
      IMAGE N X KKKK Y MMMM
      INTEGER FUNCTION N
      MACRO
      REAL FUNCTION N
      TABLE N
      TARGET COORDINATES
        X KKKK Y MMMM

SHIFT

      FUNCTION MEMORY N (,RGB)
      PSEUDOCOLOR MEMORY RGBA

SMOOTH

      IMAGE

SPIN

      FUNCTION MEMORY N (,RGB)
      IMAGE BY FACTOR KKKK
      PSEUDOCOLOR MEMORY RGBA

TABLE N =

      FUNCTION MEMORY M (,RGB)
      INTEGER (UASF)
      LOG (UASF)
      PSEUDOCOLOR MEMORY RGB
      REAL (UASF)
      SQRT (UASF)
      TABLE M
      X (*/A) (+-B)

TRACE

      FUNCTION MEMORY N (,RGB)
      GRAPHIC N
      IMAGE N
      PSEUDOCOLOR MEMORY RGBA

UNASSIGN

      IMAGE N

WAIT
```

Default Functions of 15-key Alpha Pad

A — DISPLAY IMAGE 1
B — DISPLAY IMAGE 2
C — DISPLAY IMAGE 3
D — (A) + ADD PSEUDOCOLOR MEMORY 1
E — (B) + ADD P.M. 2
F — (C) + ADD P.M. 3
G — (A) + ADD FUNCTION MEMORY 1
H — (B) + ADD F.M. 2
I — (C) + ADD F.M. 3
J — DISPLAY FUNCTION MEMORY 1
K — DISPLAY F.M. 2
L — DISPLAY F.M. 3
M — DISPLAY IMAGE 8
N — (M) + ADD F.M. 8
O — DISPLAY PSEUDOCOLOR MEMORY

Annotation/Graphics/ Target Colors

nn	CNAME	CNAME 1	color
00	BLA	BLA	BLACK
01	RED	RED	RED
02	DGR		DARK GREEN
03	LOR		LIGHT ORANGE
04	FGR		FOREST GREEN
05	ORN		ORANGE
06	GRN	GRN	GREEN
07	YEL	YEL	YELLOW
10	BLU	BLU	BLUE
11	MAG	MAG	MAGENTA
12	DTU		DARK TURQUOISE
13	PNK		PINK
14	TUR		TURQUOISE
15	LPI		LIGHT PINK
16	CYN	CYN	CYAN
17	WHT	WHT	WHITE

Key to Condensed Command Language

1. **A** - Alpha symbol A through O, for 15-key Alpha pad letter
2. **CNAME** - Color Name, three letter abbreviation, from Table 1 for Graphics Colors
3. **CNAME1** - Color Name, three letter abbreviation, from Table 1 for Target Colors
4. **IASF** - Integer Arithmetic Statement Function. User defined function composed of X, Y and integer constants. See detailed description for example in 4.5.34.
5. **KK,MM** - Target size in X and Y, for programmable target
6. **KKKK** - Integer size in X direction
7. **[L]** - Tape unit Number, for multi-tape system option.
8. **MMMM** - Integer size in Y direction
9. **MMMMMM** - Code/Memory address, octal, word or byte depending on selection of **W** and **B** after **MMMMMM** entry
10. **NN** - 1 or 2 octal digits for color number. See description of command
11. **NZ** - Discrete Zoom factor, one of 1, 2, or 4
12. **RASF** - Real Arithmetic Statement Function. User-defined function composed of X, Y and real constants. See detailed description for example in 4.5.34.
13. **RGB** - **R**ED, **G**REEN, or **B**LUE
14. **RGBA** - **R**ED, **G**REEN, **B**LUE or blank (space) for **ALL**
15. **SMA** - SMALL AREA (option)
16. **[/U]** - Optional User Number, for multi-user system
17. **UASF** - User Arithmetic Statement Function. For INTEGER, composed of user-defined Integer Function's (using SET and INTEGER FUNCTION N =) and integer constants. For **LOG**, **REAL**, **SQRT**, composed of user-defined REAL FUNCTION's and real constants. See examples in Detailed Command Note 15, section 4.5.34.
18. **XXXXXX** - ASCII filename known to host processor
19. **COP** - Combine Operation, one of +, -, *, or /.

Function Switches 1-5

FS1 is the function switch labeled "1" on the left edge of the COMTAL keyboard. This switch, when set, activates the target so that the current target position is relayed to the current interactive command. The interactivity is disabled when the switch is reset (depressed again). A trackball used as an interactive device will be enabled when FS1 is set after a command is typed (e.g. **R**OAM IMAGE, then FS1, then roll the trackball in the desired direction.) Users with data tablets should depress the stylus to achieve the same effect as FS1. On some commands FS1 is reset immediately after it is set and one coordinate pair is sent to the command (e.g. on **F**ILL **G**RAPHIC **n**, the switch is reset immediately and must be set for each new area to be filled.)

FS2 is the function switch labeled "2" on the left edge of the COMTAL keyboard. This switch serves a number of purposes, depending on the command being executed. Two of the more prevalent functions are: a) when reset, **T**RACE function writes white (1's for graphics, 255 for image), when set, **T**RACE writes black (0's or erase for graphic, 0 for image); b) for **P**ROFILE, when set, profile of targeted X line is done, when reset profile of X line is not done.

FS3 is the function swich used for two primary purposes: a) when executing some interactive commands, the **R**OAM command can be momentarily entered by setting FS3. The image can then be Roamed to the desired location, the Roam mode exited by using one (ESC), and the normal command resumed; b) when creating a **P**ROFILE, a profile of the Y line is done when FS3 is set, and is not done if FS3 is reset.

FS4 is a function switch used for two primary purposes: a) When tracing into a function memory, graphic or image, FS4 is set when interpolation between endpoints is desired, the interpolating being done by the LSI; and FS4 is reset if no interpolation is desired. b) FS4 is set to indicate upper left corner on **S**ET **C**ORNERS, and reset to indicate lower right corner.

FS5 is the function switch used to "reset to original state." In tracing function or pseudocolor memories, FS5 will restore the memory to its original contents before the trace, if FS5 is set before the trace command is terminated. In Roam, FS5 resets the image so that coordinate (0,0) is at the upper left corner of the display. In convolving, FS5 resets the target to screen center, and the convolution matrix coefficients to their initial values.

INTERACTIVE GRAPHICS LANGUAGE (IGL) BY JERRY MAJKOWSKI

The TEKTRONIX Interactive Graphics Library (IGL) was updated on November 25, to implement the host file input/output capabilities at LARS. This enables the user to read from and write to disk files in various modes directly from IGL routines. All the associated routines begin with the letters 'HF', such as 'HFREAD' and are documented in the 'IGL User's Manual' located in Flexlab 2. Note that when calling HFOPEN each file name should be uniquely defined by a single channel number and vice versa. That is, a file name should not have two channel numbers and a channel number should not have two file names. HFOPEN uses 'DEFINE' to open files and assigns the unit numbers 51 to 58 for channels 1 to 8 consecutively. The host file communications capability also enables users to employ the error processing routines IERRNM and REPORT.

LARSPEC BY JERRY MAJKOWSKI

The GSPEC and DEC processors were updated on October 23 and January 3. The DSEC processor is now able to recognize a situation when none of the requested bands are found in any of the selected observations. Whereas this situation would previously cause the job to abort and throw the user out of the LARSPEC environment, now the following message will be printed and the program will come to a normal stop:

E0065 NO SPECTRAL DATA FOUND FOR REQUESTED BANDS AND OBSERVATIONS
(DATA1)

Note that this situation is most likely to occur when using radiometer data and the specified band limits do not match the radiometer bands exactly.

WORD PROCESSING BY KAY HUNT

Formal word processing classes for the secretarial staff have been completed. All participants completed the course with a high degree of proficiency. There has been some interest in a short course on SCRIPT for the professional staff. If anyone is interested in such a session, please contact KAY HUNT.

The set up of the DIABLO for word processing has been restricted somewhat, Users must request the computer operator to change ribbons and/or print wheels as needed. The standard font on the DIABLO is 12 pitch elite. Other fonts (pica, spokesman, symbol, etc.) and carbon ribbons may be requested from the operators.

RT&E DATA BASE UPDATE BY LUKE KRAEMER

The Crop Year 1979 Image data has been added to the RT&E Data Base thus bringing the total number of acquisitions in the LARS RT&E data library to 58,273. There is a one-to-one correspondence between the JSC tape numbers and the LARS tape numbers starting with 79001 in slot 7561 and ending with tape 79101 in slot 7661. Please request these tapes by their LARS tape slot number.

Contact LUKE KRAEMER (LARS) if you have any further questions or encounter any problems.

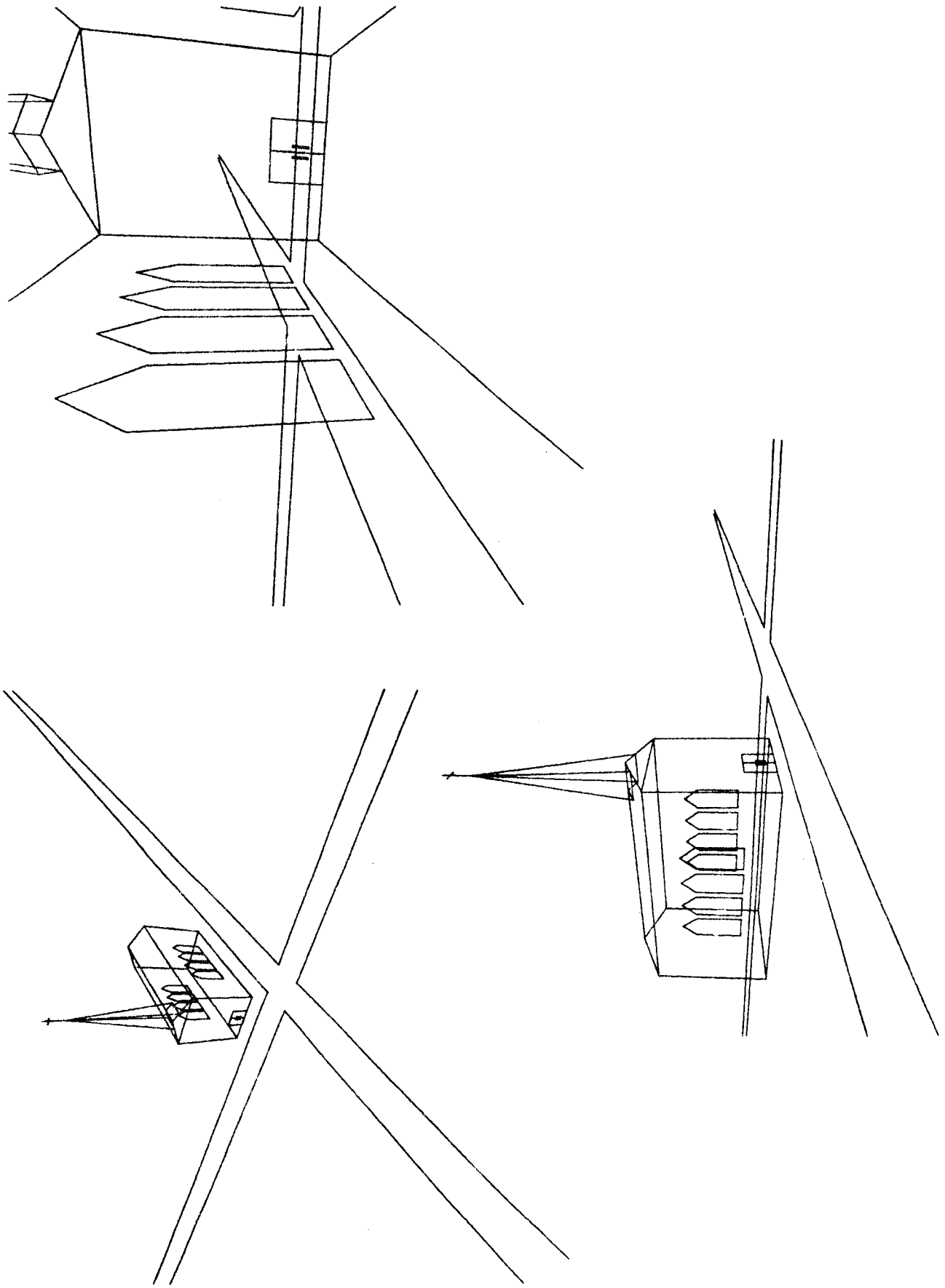
GRAPHICS SOFTWARE BY JERRY MAJKOWSKI

GRAPHICS COMPATIBILITY SYSTEM (GCS)

On December 15, the 3D version of LARS Graphics Compatability System (GCS) was implemented on the TEKTRONIX 4054 graphics terminal. This gives users the advantage of high resolution, quick turn-around, three dimensional graphs at a FORTRAN programming level. Two other strong points of 3D GCS on the 4054 are the graphics input capabilities using thumbwheel controlled cross-hairs and the ability of GCS to compute proper perspective when supplied viewing position and site (see page 15). The 3D capabilities are fully described in the GCS manuals located in the terminal areas. After accessing the PLTDSK disk by typing GETDISK PLTDSK the user can run a GCS program called 'filename' on the 4054 by typing:

```
GCS T54 'filename' 3D
```

Future GCS expansions will include the implemention of both the 2D and 3D systems on the TEKTRONIX 4002A for JSC users.



BATCH MACHINE INFORMATION

BATCH MACHINE	TIME LIMIT (CPU MINS)	TIME MACHINE OPERATES	CORE	PRIORTY CHARGES **
BATQUICK ***	1	24 hours	832 K	YES
BATSHORT	15	24 hours	832 K	YES
BATMED	45	24 hours	832 K	YES
BATEOD	60	24 hours	2 MEG	YES
BATONITE	30	MIDNIGHT-8am *	2 MEG	NO
BATJSC	240	MIDNIGHT-8am *	2 MEG	NO
BATHOUST ****	240	MIDNIGHT-8am *	8 MEG	NO
BATLONG	500	MIDNIGHT-8am *	2 MEG	NO
BTREF	600	MIDNIGHT-8am *	12 MEG	NO

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

** CPU RATE = $275.00 per hour
PRIORITY SERVICE RATE = $200.00 per hour

*** No tape mounts allowed

**** Will only be brought up on special request

SUMMARY OF 3031 COMPUTER USAGE FOR OCTOBER 1980

OVERALL USAGE

Basic Rate CPU Time Used	38.02
Priority Rate CPU Time Used	130.21
Total CPU Time Used	168.23
Terminal Sessions	8373
Batch Jobs	593

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	30.97	17
Mon-Fri 8AM-4PM	81.64	45
Mon-Fri 4PM-midnite	37.63	20
Weekend	17.99	16

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	165	0.33	0.05
BATSHORT	145	7.08	0.42
BATMED	32	10.25	0.92
BATONITE	67	31.13	1.89
BATLONG	33	60.11	40.09
TAPTRAN	24	8.83	0.26
BATEOD	45	25.31	4.03
BATJSC	39	80.95	14.35

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	279	181.27	0.65
	31	GTX	344	145.35	0.42
	32	GTX	354	157.93	0.45
	33	GTX	336	153.17	0.46
	34	GTX	320	165.23	0.52
	35	GTX	352	187.38	0.53
	36	GTX	420	195.39	0.47
	37	DECwriter	120	54.73	0.46
	38	Tektronix	223	150.64	0.68
	39	CRT	181	60.38	0.33
	3A	GTX			
Flexlab1	40	GTX	236	133.82	0.57
	41	GTX	216	207.52	0.96
	42	GTX	254	141.31	0.56
	43	DECwriter	165	135.83	0.82
Dial-Up	50	1st in Use	101	77.80	0.77
	51	2nd in Use	15	26.14	1.74
	52	3rd in Use	1	0.17	0.17
	53	4th in Use	1	1.82	1.82
	54	5th in Use			
	55	In-House-1	66	43.40	0.66
	56	In-House-2	57	52.85	0.93
St. Regis	4A	DECwriter	63	11.91	0.19
Alabama	4B	DECwriter	15	4.64	0.31
	4C	GTX	45	53.20	1.18
	4D	GTX	32	25.94	0.81
ISU	4E	(various)	104	37.42	0.36
	4F	(various)	171	116.31	0.68
Houston	60	CRT	318	147.72	0.46
	61	CRT	311	157.82	0.51
	62	Trenddata	232	148.78	0.64
	63	Trenddata	258	170.12	0.66
	64	CRT	116	47.93	0.41
	65	CRT	148	135.07	0.91
	66	CRT	215	125.38	0.58
	67	CRT	208	156.61	0.75
	68	CRT	233	216.13	0.93
	69	CRT	227	170.47	0.75
	6A	Dial-up	178	116.14	0.65
	6B	Dial-up	177	118.75	0.67
	6C	Dial-up	217	112.80	0.52
	6D	Dial-up	161	95.39	0.59
	6E	Dial-up	158	101.59	0.64
	6F	Dial-up	119	84.40	0.71

SUMMARY OF 3031 COMPUTER USAGE FOR NOVEMBER 1980

OVERALL USAGE

Basic Rate CPU Time Used	15.41
Priority Rate CPU Time Used	133.07
Total CPU Time Used	148.48
Terminal Sessions	7811
Batch Jobs	497

USAGE BY TIME OF DAY

Time Period	Hours of CPU Used	Avg. % CPU Utilization
Mon-Fri midnite-8AM	20.62	14
Mon-Fri 8AM-4PM	65.36	43
Mon-Fri 4PM-midnite	44.07	29
Weekend	17.19	15

BATCH JOB USAGE

Batch Machine	Jobs Run	Average Clock Time	Average CPU Time
BATQUICK	139	0.67	0.05
BATSHORT	65	12.17	0.46
BATMED	102	14.83	2.00
BATONITE	69	44.36	2.80
BATLONG	14	36.43	3.46
TAPTRAN	18	8.39	0.49
BATEOD	41	19.92	3.55
BATJSC	32	60.25	18.12

KEYBOARD TERMINALS

Location	Port	Terminal Type	Logins	Total Time in Use	Avg. Time Per Session
Flexlab2	30	GTX	223	109.94	0.49
	31	GTX	225	141.51	0.63
	32	GTX	251	111.51	0.44
	33	GTX	217	137.48	0.63
	34	GTX	237	152.19	0.64
	35	GTX	287	180.29	0.63
	36	GTX	317	156.17	0.49
	37	DECwriter	142	77.08	0.54
	38	Tektronix	159	155.11	0.98
	39	CRT	203	70.47	0.35
	3A	GTX			
Flexlab1	40	GTX	270	138.04	0.51
	41	GTX	270	212.50	0.79
	42	GTX	294	190.19	0.65
	43	DECwriter	211	99.23	0.47
Dial-Up	50	1st in Use	118	122.37	1.04
	51	2nd in Use	51	49.68	0.97
	52	3rd in Use	7	7.58	1.08
	53	4th in Use	3	2.79	0.93
	54	5th in Use			
	55	In-House-1	56	43.74	0.78
	56	In-House-2	79	65.61	0.83
St. Regis	4A	DECwriter	16	7.53	0.47
Alabama	4B	DECwriter	4	0.30	0.08
	4C	GTX	32	18.55	0.58
	4D	GTX	14	18.48	1.32
ISU	4E	(various)	86	37.85	0.44
	4F	(various)	128	88.46	0.69
Houston	60	CRT	235	135.30	0.58
	61	CRT	271	142.39	0.53
	62	Trenddata	252	173.87	0.69
	63	Trenddata	205	134.62	0.66
	64	CRT	119	47.23	0.40
	65	CRT	208	128.77	0.62
	66	CRT	330	161.38	0.49
	67	CRT	209	83.21	0.40
	68	CRT	248	208.66	0.84
	69	CRT	212	138.03	0.65
	6A	Dial-up	156	113.97	0.73
	6B	Dial-up	142	85.18	0.60
	6C	Dial-up	182	101.68	0.56
	6D	Dial-up	181	100.42	0.55
	6E	Dial-up	114	90.76	0.80
	6F	Dial-up	111	64.51	0.58

INTRALAB NOTES

EFFECTS OF METAL DETECTOR DEVICES ON MAGNETIC TAPES

A recent article in the COMPUTING CENTER NEWSLETTER from the University of Michigan cited the findings of a test of the effects of metal detectors devices and x-ray on magnetic media.

After moving recorded computer tapes through many different locations within airport detectors, and then testing them for a loss of data, it was concluded that there was no observed instance of erasure or data loss. In this study, a signal loss of less than 50% was not considered to result in a loss of data because the data could be recovered during the normal operations of dp systems through the various reproducing processes.

Magnetic media were also subjected to extremely high (lethal) x-ray dosage, and to normal airport x-ray inspection, with no resultant loss of data.

("Erasing Myths About Magnetic Media", COMPUTING CENTER NEWSLETTER, University of Michigan, Vol. 10, No. 15, September 17, 1980 pg. 1)

ADDITIONAL SPACE IN FLEXLAB 2

The addition of unit E in Flex 2 for LARS use has been approved by Vice President Greenkorn. A corridor will be created to connect the new unit to the space we now occupy.

PERSONNEL CHANGES

JEFF KOLLENKARK recently completed his Ph.D. degree in agronomy. Jeff's thesis research was on the canopy reflectance properties of soybeans. He will be continuing this area of research as a research associate at LARS.

PERSONNEL CHANGES (CONT.)

The following System Services staff members have accepted offers to promoted positions, effective January 1, 1980.

	NEW POSITION
JIM KAST	Manager of User Services
S. KAY HUNT	Systems Analyst III
CATHY KOZLOWSKI	Systems Analyst III
LUKE KRAEMER	Systems Analyst III
JERRY MAJKOWSKI	Systems Analyst II
JIM COCHRAN	Systems Analyst I
GARY BRAMMER	Senior Computer Analyst

DAVID SNYDER has accepted a full-time position with LARS as an Applications Programmer I, following his graduation from Purdue in December.

TOM WILSON has accepted a Software Analyst position, 4/5ths time, with LARS.

MINI-LARSIANS

Congratulation and best wishes are extended to Audrey and RAY FROST who recently became parents of a daughter. Atlanta was born on November 16, 1980 and weighed 7 lb. 10 oz.

Greg and STEPHANIE STILES also became parents recently of a son, Travis; congratulations Greg and Stephanie.

PROPOSALS SENT OUT

Title: "Develop an Instructional Module on Interactive Image Processing"
Sponsor: Comtal/3M
P.I.: D. FREEMAN & S. DAVIS
Duration: 1/1/81 - 4/30/81

Title: "A Workshop on Key Issues in the Machine Analysis of Remote Sensing Data"
Sponsor: NASA
P.I.: P. SWAIN & S. DAVIS
Duration: 1/1/81 - 7/31/81

RECENT NASA PUBLICATIONS AVAILABLE IN THE LARS LIBRARY

NASA TECHNICAL PAPERS

NASA Technical Paper #1553 "Demonstration of Wetland Vegetation Mapping in Florida From Computer-Processed Satellite and Aircraft Multispectral Scanner Data" by M. Kristine Butera

NASA Technical Paper #1575 "Determination of Noise Equivalent Reflectance for a Multispectral Scanner - A Scanner Sensitivity Study" by D.E. GIBBONS and R.R. Richard

NASA CONTRACTOR REPORTS

NASA Contractor Report #2932 "Digital Computer Processing of LANDSAT Data for North Alabama" by A.D. Bond, R.J. Atkinson, M. Lybanon, and H.K. Ramapriyan

NASA Contractor Report #159092 "Evaluation of the Spatial and Temporal Measurement Requirements of Remote Sensors for Monitoring Regional Air Pollution Episodes" by H.K. Burke, C.J. Bowley, and J.C. Barnes

NASA Contractor Report #159107 "Evaluation of the Capabilities of Satellite Imagery for Monitoring Regional Air Pollution Episodes" by J.C. Barnes, C.J. Bowley, H.K. Burke

NASA REFERENCE PUBLICATIONS

NASA Reference Publication #1016 "The Use of Landsat Digital Data and Computer-Implemented Techniques for an Agricultural Application" by A.T. Joyce and R.H. Griffin II

NASA Reference Publication #1048 "Procedure for Extraction of Disparate Data From Maps Into Computerized Data Bases" by B.G. Junkin

NASA TECHNICAL MEMORANDUMS

NASA Technical Memorandum #79546 "Korean Coastal Water Depth/Sediment and Land Cover Mapping (1:25,000) by Computer Analysis of Landsat Imagery" by K.Y. Park and Lee D. Miller

NASA Technical Memorandum #80101 "A Regression Technique for Evaluation and Quantification for Water Quality Parameters from Remote Sensing Data" by C.H. Whitlock and C.Y. Kuo

NASA Technical Memorandum #80310 "Passive Microwave Applications to Snowpack Monitoring Using Satellite Date" by D.K. Hall, J.L. Foster, A.T.C. Chang and A. Rango

RECENT JOURNALS IN THE LARS LIBRARY

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI October 1980 *Number 10*

COVER PHOTO — This color-IR oblique of the NASA Kennedy Space Center was made in the fall of 1979. The 525-foot high Vertical Assembly Building (VAB) is in the photo center. On the left is the 15,000-foot Orbiter Landing Facility. In the upper right is Launch Complex No. 39, the origin of the Apollo, Skylab, and ASTP flights. The wide double lanes running between VAB and No. 39 is not a divided highway, but the right and left tracks for the Mobile Launching Structures. Two Crawler Transports, a Mobile unit, and a Launching Structure may be seen north of the VAB. Taken on Aerochrome IR 2443 film, f5.6 at 1/300th second, with a Zeiss RMK 15/23 camera at 5,500 feet. Submitted by Jon S. Beazley of the Florida Department of Transportation, Tallahassee.

TECHNICAL ARTICLES

PHOTOGRAMMETRIC ENGINEERING and REMOTE SENSING

Volume XLVI September 1980 *Number 9*

COVER PHOTO — Niagara Falls, site of the ACSM-ASP Fall Technical Meeting, being held October 7-10 1980. This aerial infrared view was taken looking south with the American Falls on the left and the Horseshoe, or Canadian, Falls in the center background. The photo was provided by Eastman Kodak Co.

TECHNICAL ARTICLES

ITC Journal Contents