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# The California Surveyor

No. 82

The Voice of the Land Surveyors of California

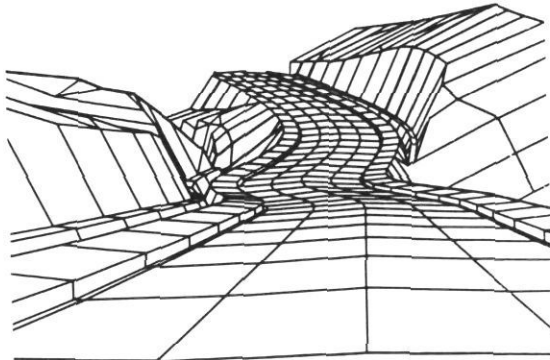
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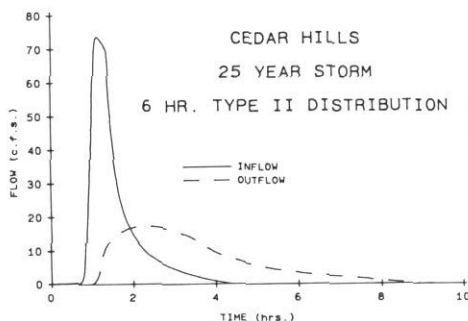
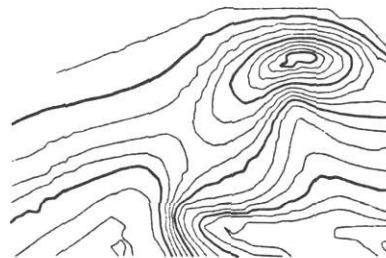
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# The California Surveyor

is the quarterly publication of The California Land Surveyors Association and is published as a service to the land surveying profession of California. It is mailed to all Licensed Land Surveyors and Land Surveyors in Training in the state of California as well as to all members of California Land Surveyors Association. *The California Surveyor* is an open forum for all surveyors, with an editorial policy predicated on the preamble to the constitution of the California Land Surveyors Association and its stated aims and objectives, which read:

"Recognizing that the true merit of a profession is determined by the value of its services to society, the 'California Land Surveyors Association' does hereby dedicate itself to the promotion and protection of the profession of Land Surveying as a social and economic influence vital to the welfare of society, community and state."

"The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession of Land Surveying, to promote and maintain the highest possible standards of professional ethics and practices, to promote professional uniformity, to promote public faith and dependence in the Land Surveyors and their work."

## PERSONNEL

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Membership in the California Land Surveyors Association as a sustaining member is open to any individual, company or corporation who, by their interest in the Land Surveying profession, is desirous of supporting the purposes and objectives of this association. For information regarding sustaining membership, contact the Editor of *The California Surveyor*.

## EDITORIAL MATERIAL

All articles, reports, letters and contributions are accepted and will be considered for publication regardless of the author's affiliation with the California Land Surveyors Association. Material should be sent to *The California Surveyor*.

Unless indicated, all articles in this publication are prepared by the editor.

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COVER PHOTO by *Hal Taylor*. Handsculptured porcelain, limited edition, previously issued by Kontinental Spirits Kompanie, 1978; Pioneer Series - *Land Surveyor*

## DEADLINE DATES FOR THE CALIFORNIA SURVEYOR

Fall . . . . . July 7, 1986  
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Articles, Reports, Letters, etc., received after the above mentioned date will be placed in the next edition.

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# President's Message

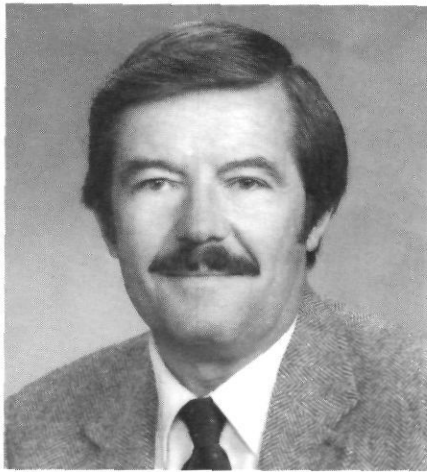
With the beginning of summer we look back to review what has happened the first quarter of the year. Work is plentiful and most firms have been wondering how they will get their work load completed per schedule. The government agencies that are checking maps and plans are having the same problem. The developers and contractors are pushing to get the projects underway and completed before the money market changes.

Good production and providing the services desired depends on the people working for a firm and their level of training. Today the firms that are overloaded with work could resolve their work load by hiring additional qualified employees, if they could find them. This situation of not finding enough well trained employees brings us to look at our education levels and goals for our profession.

Besides the education classes the schools have, we need to look at what we in the profession can do. The Old World method of apprenticeship was a means of education that was replaced by the formal classroom. The formal classroom provides a fast and efficient means to communicate information to students. It provides a very good way of practicing example problems and giving time to repetition of working problems.

When these students start in the career field, do we spend the time we should working with them? I feel we need to look at the young people coming into the surveying profession and spend more time on the job as a tutor and share our knowledge. The more education time we can share with these people, the sooner we will have the trained employees we need. In my years of teaching in the past, I have found my education has also continued.

In the last two years a very small percentage of the persons taking the Land Survey examination passed the test. This is in part due to modifying the method used to determine the passing score and also what should be a minimum level of knowledge to practice surveying to the public. With surveying technology changing and laws being modified, we begin to believe continuing education is only around the corner. We will have to provide more college classes for the new per-



Richard P. Siegmund

sons of the profession and also classes for those that have been in the profession and need to be kept up to date. Education improves performance and interest in our work.

Our Education Committee has been working hard this year to provide workshops. The CLSA/BLM workshops of May 10 and June 7 had a good attendance response. An Alta/Vertical Subdivision workshop is in the plans for September.

Legislation this year focuses on two main bills. S.B. 1680 deals with the North American Datum of 1983 and State Plane Coordinates. Many people and hours have been involved in perfecting this legislation for our profession. A.B. 3073 also has seen several revisions and many hours by California Council of Civil Engineers and Land Surveyors together with California Land Surveyors Association. One of the main subjects of this bill deals with persons who have let their license lapse. To insure in the future that those licensed will be signing a map or plat with a valid license, starting January of 1987, the date of expiration of the license will be required. Other items in the bill deal with testing items in the L.S. Exam and the use of "certify" or "certification." After the bill has become law, we will publish a copy in the C.L.S.A. NEWS.

Legislation in the past years has begun to affect all of us more everyday. I urge everyone to get to know your legislators at all levels of government. Work with these people to create laws that will benefit both the consumer and our profession. Support your Political Action Committee. □

## A BEARING TREE by Willis G. Corbitt Portland, Oregon

ISSUE No. 78 of *The California Surveyor* pictured a sculpture entitled "The Old Bearing Tree." Mr. Kenneth J. Omsberg presented the photo to us for printing and has now found an appropriate poem to accompany the picture.



### "A BEARING TREE"

In the year one-eight-seven-nine,  
The surveyor ran a second line.  
And at the end, he marked a tree,  
That stood for years as a B.T.  
To the section corner planted there,  
After a mile was chained with care.

From this Fir tree, he peeled the bark,  
And then with scribe he made a mark  
Within the solid growing wood,  
To show the place the corner stood  
In township, range and section, too,  
As the law required that he must do.

Years passed by, and new wood grew,  
Over marks once made by such a crew.  
Then came a day when other men,  
Would find the tree and set again  
The corner post, where once it stood  
In California's densest wood.

By careful search, a Fir was found  
That had a trunk both large and  
round.

There on the surface of the bark,  
One could perceive an ancient mark,  
Showing that in a single place,  
New growth had covered up a face.

Through bark and wood an axe-man  
chopped,  
'Til from the tree, there finally popped  
A section oft termed over-lay,  
That hid the marks from light of day.  
Then from the scar was cleaned with  
care

The resin that had gathered there,  
To cover letters that were good  
And well-preserved in solid wood.

Thus did Dame Nature in her way,  
Assist the man of present day,  
Who must produce in his profession  
A good survey for restoration  
Of section corners long forgotten,  
Because the post, once used,  
was rotten. □

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# Developing Efficient Survey Techniques

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California State University, Fresno,  
Fresno, CA 93740

(Continued from Spring Issue)

## The Real Property Connection

Perhaps the most significant driving force behind the burgeoning number of computerized land information systems is the lure of avoiding duplication and waste by having one department or agency, rather than several, create and maintain the maps and related land records information. Efforts to keep costs down in such new systems often lead to development of quick-fix, spatially imprecise systems that satisfy only some of the system requirements. More precise spatial requirements for future large scale mapping, land ownership records, or engineering design requirements are often not attainable in this scenario. Thus, a system that cannot avoid redesign may not have avoided duplication.

The term "spatial imprecision," as used here, is a measure of the distance between the location of a point as recorded in the computer and the location of that point on the ground. Unfortunately, most computerized land records information systems disregard spatial precision in their mapping applications by using one or more of the following techniques:

1. "Rubber sheeting" to stretch and/or distort map data;
2. Arbitrary elimination of apparent overlaps and gaps that are fully documented as existent in written legal records;
3. Digitizing maps of unknown reliability to create computer map data having an even greater lack of spatial precision.

Typical land records information systems create digitized boundary files from USGS 7½ minute topographic map sheets and existing assessors' maps. The positional uncertainty of any USGS map point is typically about 40', while the typical assessor's map contains about 10' of spatial im-

precision at every map point. Public decisions about private property rights should not be made when the spatial uncertainty of the system may be larger than some owners' properties. A sample survey conducted in Spring 1985 by surveying students at California State University, Fresno, found that property owners were tolerant of no more than a one-half foot error in the location of their boundary lines.

The following list summarizes several important facts associated with the increasingly popular computerization of land records information systems:

1. Modern computerized land records information systems are necessary so that society can correctly and quickly answer fundamental questions about public and private rights and responsibilities to land.
2. The common thread linking all types of environmental, resource, and ownership aspects of land is the geographical location of these items on the ground. Those who deal with ground coordinates on a daily basis are the individuals who must provide guidance for the development of spatially reliable computerized land records information systems.
3. Modernized land records information systems must be designed from the ground up with positional data of known quality used to create each new overlay of information.
4. The spatial reliability of all data sets must be known at all times so that land ownership rights and responsibilities are not incorrectly determined because of imprecise information.

Fundamentally, then, the cadastral overlay portion of multipurpose land information systems must be designed to include the spatial and written components of the entire collection of deed, abstract, and land survey records relative to each parcel of land. To do less would run counter to long-established common law

(Continued on page 8)

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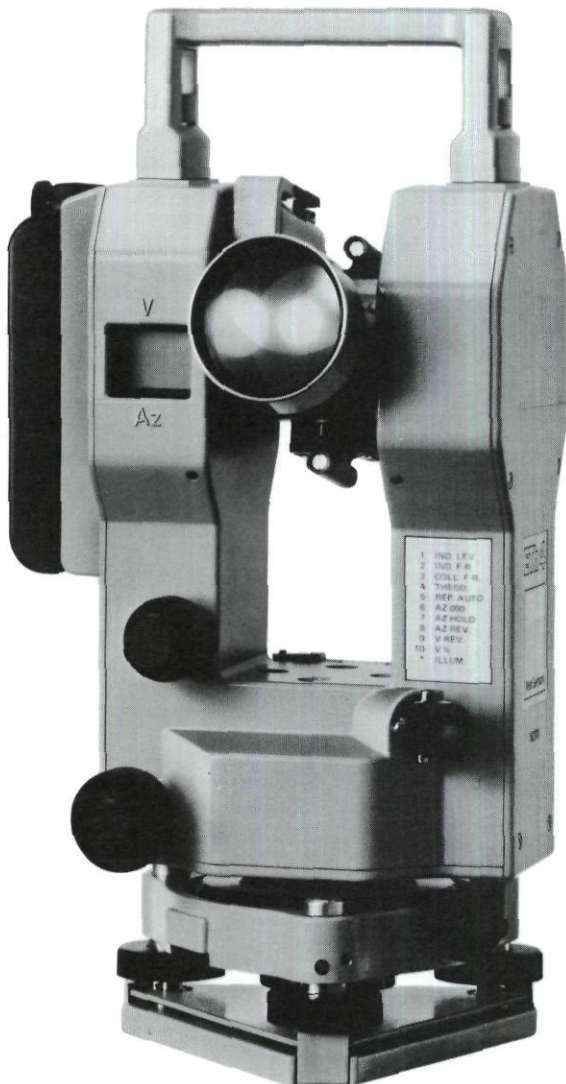
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## DEVELOPING EFFICIENT SURVEY TECHNIQUES

(Continued from page 6)

tradition. Efforts must be encouraged in this area to provide the most comprehensive system design possible. Efficient surveying technology can have a favorable impact on the evolution and efficiency of the system if the system effectively incorporates and merges the positional and legal boundary components of real property.

### The Cost Factor

One of the largest component costs associated with multipurpose land information system development are typically considered to be surveying and mapping positioning costs. Surveying and mapping technology costs tend to drop with the passage of time. New technology breakthroughs occur frequently, and knowledge of the reduced costs offered by these new technologies should be made clear to system users as quickly as possible, lest applicable equipment and methods be neither considered nor used in a given system.

Chapter 4 of the NRC report entitled "Modernization of the Public Land Survey System" discusses the economic and technical considerations for placing coordinates on PLSS corners. This chapter does not provide specific guidance to those who must make difficult decisions in specific localities. The cost per point conclusions listed in the NRC report are misleading because they tend to ignore the fact that the economics of PLSS corner positioning are very dynamic and very dependent on the specific situation in which they are being evaluated. Any given positioning technology may be superior to any other for a specific application when cost is the basic criterion. A very wide range of per corner costs is possible for any given method because very different input data are always possible for each situation investigated. Thus, the NRC report on the PLSS does not help the manager of an evolving multipurpose system make decisions about horizontal geodetic framework implementation methodology and cost.

Only a specific cost estimation methodology can answer two fundamental questions concerning any given application to multipurpose cadastres. These are: which application is cheapest? and how much will

it cost? Fortunately, some researchers have been working in this area. Epstein's cost-benefit study of the economic value of the geodetic framework is one example. Crossfield's horizontal geodetic control surveying cost model is another. When supplied with the proper input data, the latter model is a valuable planning tool for evaluating the probable cost of and the appropriate technology for implementing the horizontal geodetic framework for evolving multipurpose cadastres in specific remonumented Public Land Survey System areas. When correctly applied to a specific situation at a specific time, the cost model provides useful PLSS corner positioning technology cost and applicability information.

The results of the horizontal geodetic control survey densification investigations suggest that intermediate densification is not always justified. Due to the rapid improvements in positioning technology, it is clear that at least for some regions of the country the NRC recommendation for a 3-5 mile or less spacing of horizontal geodetic control is already out of date.

The value of existing densification was found to be negligible from a strictly PLSS corner positioning cost point of view. This suggests that incremental densification may not be a reasonable alternative to localized township by township incremental PLSS positioning. Unfortunately, the additional cost of incremental PLSS corner positioning was shown to be substantial. This conclusion ignores many other potential densification uses such as photo control for use in a large scale topographic mapping effort.

Another conclusion that can be made in the area of monumentation was predicated upon the knowledge that in many jurisdictions PLSS corners are being lost faster than they are being remonumented. Jurisdictions that have completed remonumentation and horizontal positioning of all PLSS corners and that have access to modern efficient positioning technology may ignore PLSS corner maintenance.

This is appropriate because, once established, the corner locations will always be known and may therefore be relocated on the ground if necessary. They may never require relocation if GPS-type technology

and a few good NGS stations are locally available. Direct use of an inexpensive and timely positioning technology on property boundary corner points will enable the surveyor to directly and easily correlate property boundary point coordinates to the known coordinates of the PLS system.

Application of surveying technology, regardless of its efficiency, must occur within an economically viable multipurpose land records information system. Thus, within this context, the fate of the technology is tied to the fate of the system.

### Recommendations

1. The Horizontal Geodetic Control Survey Cost Model and other generally applicable surveying technology cost model research can and should be expanded, refined and updated.
2. Research should be initiated immediately to create the various cost models that can be used to predict the costs associated with the establishment of the spatially-based legal property component of multipurpose land records information systems.
3. Research should be immediately initiated to create several precise miniature prototype land records information systems that can serve as design laboratories for the development of standardized data collection, storage and retrieval activities.
4. Research leading to the development of real time positioning technology, like the field positioning unit, should be funded immediately.
5. Digital image correlation and related automated photogrammetric research should be continued and expanded.
6. Conventional surveying equipment should not be ruled out from having a substantial role to play in the collection of significant amounts of data vital to the development of multipurpose land records information systems.

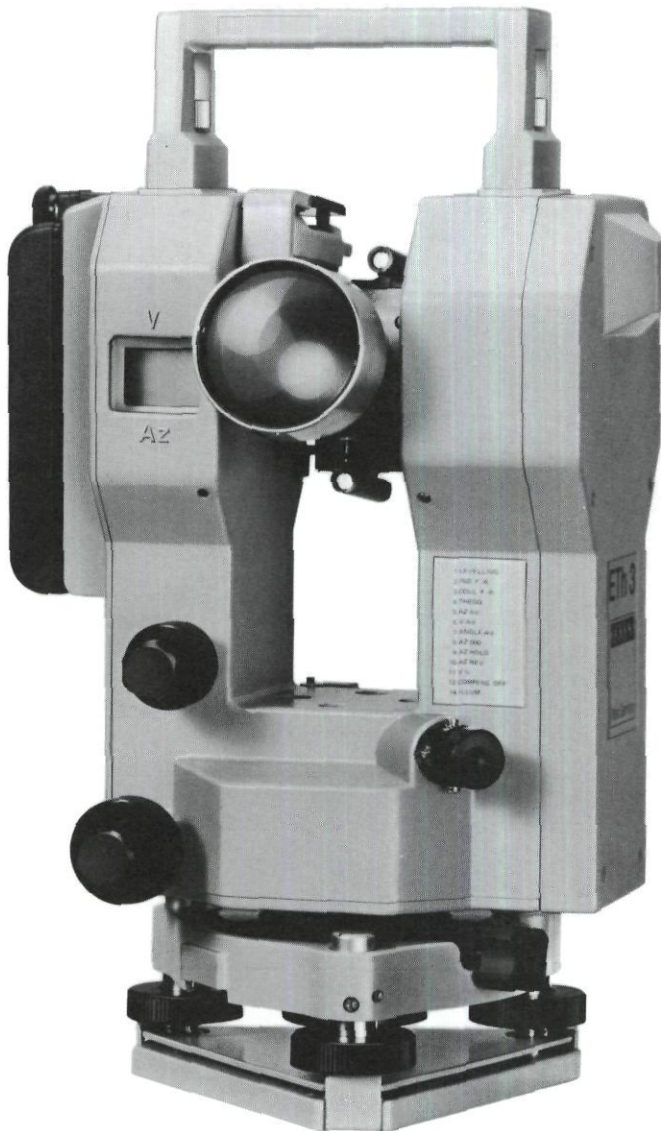
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2. Martin, Robert H., "A Study of Automation in Surveying," Unpublished Paper, presented at the Fall meeting of ACSM, Indianapolis, September, 1985.
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4. National Research Council, *Modernization of the Public Land Survey System*, National Academy Press, Washington, D.C., 1982.
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# Legal Corner

The following article, continued from the spring 1986 issue, is an outline of the efforts to correct problems caused by the various "state line surveys". The boundary between California and Nevada consists of two straight-line segments. The north-south segment from Oregon to the 39th parallel. The oblique segment from the 39th parallel southeast to the Colorado River.

## "ELEVEN THOUSAND ACRES OF CLOUDED TITLE"

by John Briscoe

continued from spring issue

Some latter-day sleuthing by F.D. Uzes, the chief surveyor for the California State Lands Commission, brought to light and focused public attention on the inaccuracies in both the Von Schmidt north-south line and the C. & G.S. oblique segment. Some sabre-rattling between the two states — not altogether good natured — culminated with California filing an action in the United States Supreme Court in 1977 to have the boundary finally determined by that court. Basically, California sought a declaration that the currently recognized line dividing the two states was in fact the lawful boundary. The matter was referred by the Court to a Special Master, who, acting as a trial judge, received the evidence and testimony, and reported back to the court with a recommendation in the fall of 1979. Following oral argument, the Supreme Court held on June 10, 1980, that, notwithstanding astronomical or other errors, the two segments of line (the Von Schmidt meridian and the C. & G.S. oblique) had been so long acquiesced in by the states that, according to a principle akin to adverse possession in property law, it had become in law the true boundary.

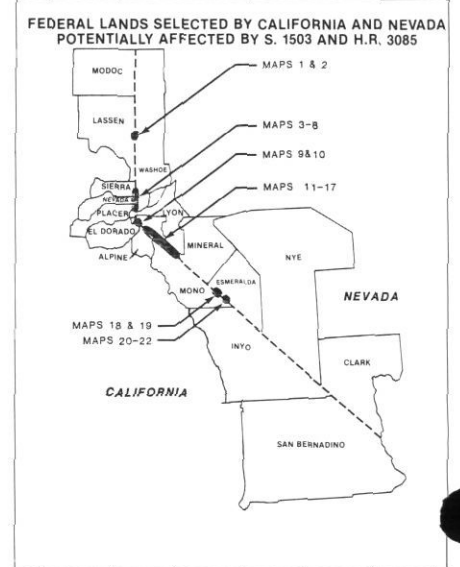
In a sense, however, the real problems had only begun to be addressed. Prior to the final adjudication of the boundary dispute between California and Nevada in 1980, numerous boundary surveys had been made resulting in much uncertainty as to where the line between the states actually lay. Since 1850, the United States Government had granted thousands of acres of lands

from the public domain to California and Nevada for purposes such as schools, universities, and internal improvements. In turn, much of this land was conveyed to third parties, and many of these lands have been bought and sold numerous times, improvements made, and taxes paid. Now that it is known where the true boundary between California and Nevada lies, it has been ascertained that approximately 12,000 acres of land, now in supposed private ownership, were originally selected and patented by the wrong state. Approximately 9,400 acres of land, for example, now known to be in California and thought to be privately owned, were originally selected by Nevada before being granted into private ownership. California, on the other hand has selected more than 1,600 acres of land which lie in Nevada; it has ostensibly conveyed into private ownership all but approximately 680 acres of these. The rub in this state of affairs is that a century-old decision of the United States Supreme Court, *Coffee v. Groover* (1887), 123 U.S. 1, held that such a selection, made by a state of lands beyond its borders, is wholly invalid. Thus, absent piecemeal or mass litigation, or action by Congress to correct these title defects, the title to these 11,000 acres of putative private lands really resides in the federal government.

**"...12,000 acres...  
originally selected and  
patented by the  
wrong state."**

Congressman Richard H. Lehman of California, working with other members of the California delegation and with those of the Nevada delegation, introduced legislation into the United States House of Representatives on July 25, 1985, to end these uncertainties. As Congressman Lehman stated before the full House on July 25, "The history of California and Nevada is replete with examples of disputes and disagreements. I am extremely pleased to note that in this final round of the border controversy, the

entire congressional delegation from both states stands together in support of legislation to validate thousands of acres of land transferred made many, many years ago." The legislation has exceedingly broad support, and should hopefully attain passage during the second session of the 99th Congress. It is supported by both parties of both congressional delegations, the attorneys general of both states, and their state land commissions and land title associations.



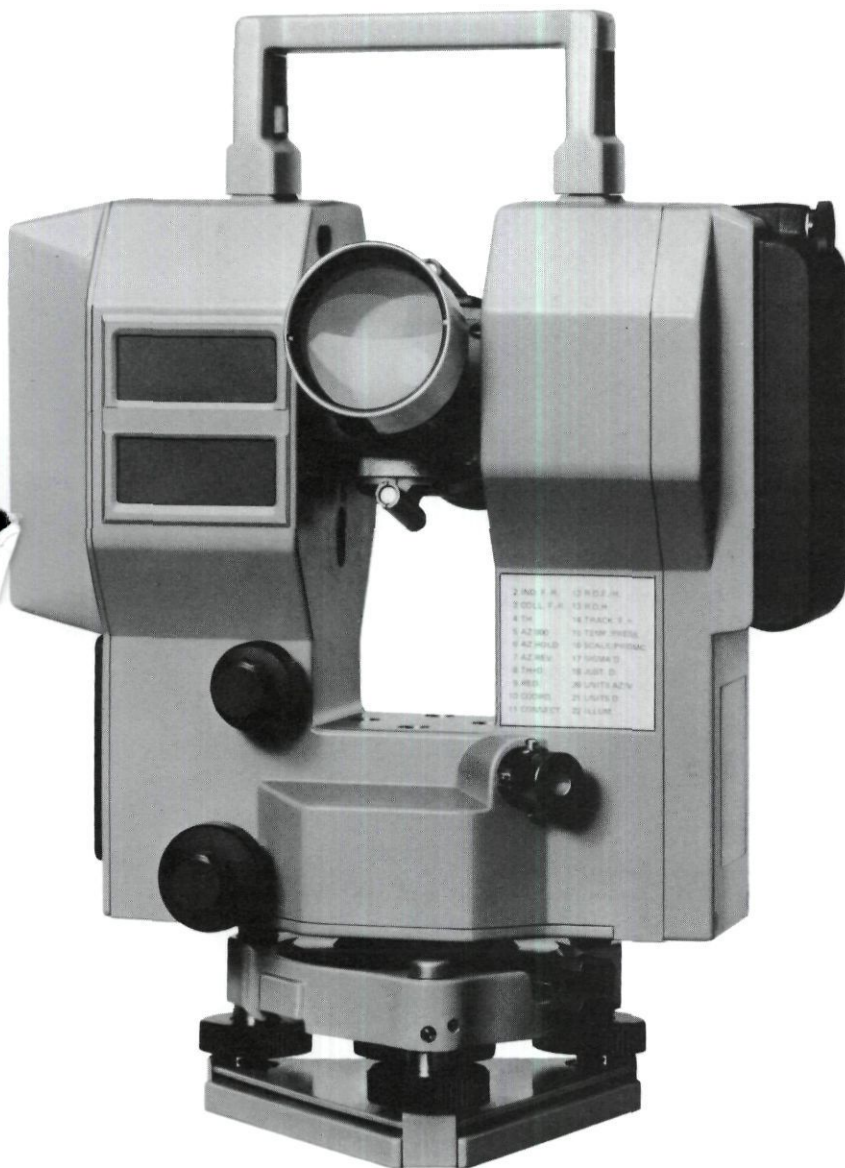
The total length of the boundary between California and Nevada is 620 miles. The counties in California with lands affected by the proposed legislation are Modoc, Lassen, Plumas, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, Inyo, and San Bernardino. Nevada counties having lands affected by the proposed legislation are Douglas, Lyon, Mineral, Washoe, Nye and Esmeralda. While approximately 12,000 acres of lands would be affected by the curative legislation, most of which lies in California, it is not known how many individual property owners would have their titles cleared. □

*Mr. Briscoe, the author of the recently published *Surveying the Courtroom* (Landmark Enterprises, 1984), is a member of the San Francisco-based law firm of Washburn & Kemp, which specializes in real property, land title and boundaries, and land-use law. He expresses his appreciation to Sean E. McCarthy of his Sacramento office, who has testified before Congress on the California-Nevada boundary problems, for much of the information contained in this article.*

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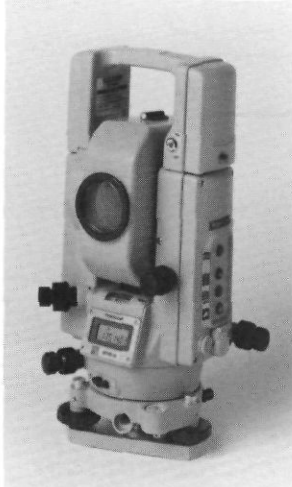
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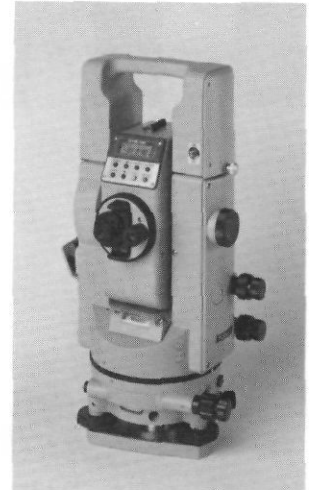


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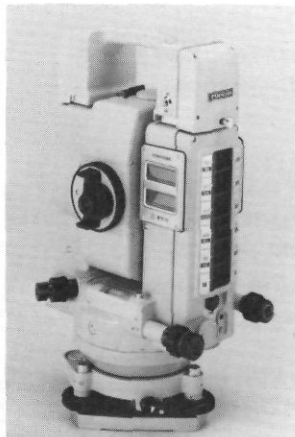


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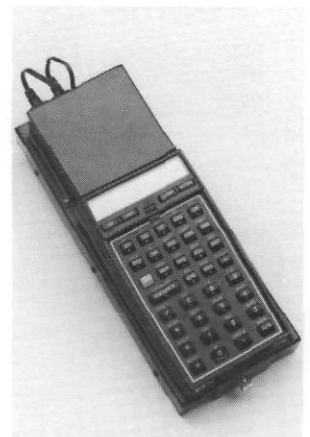
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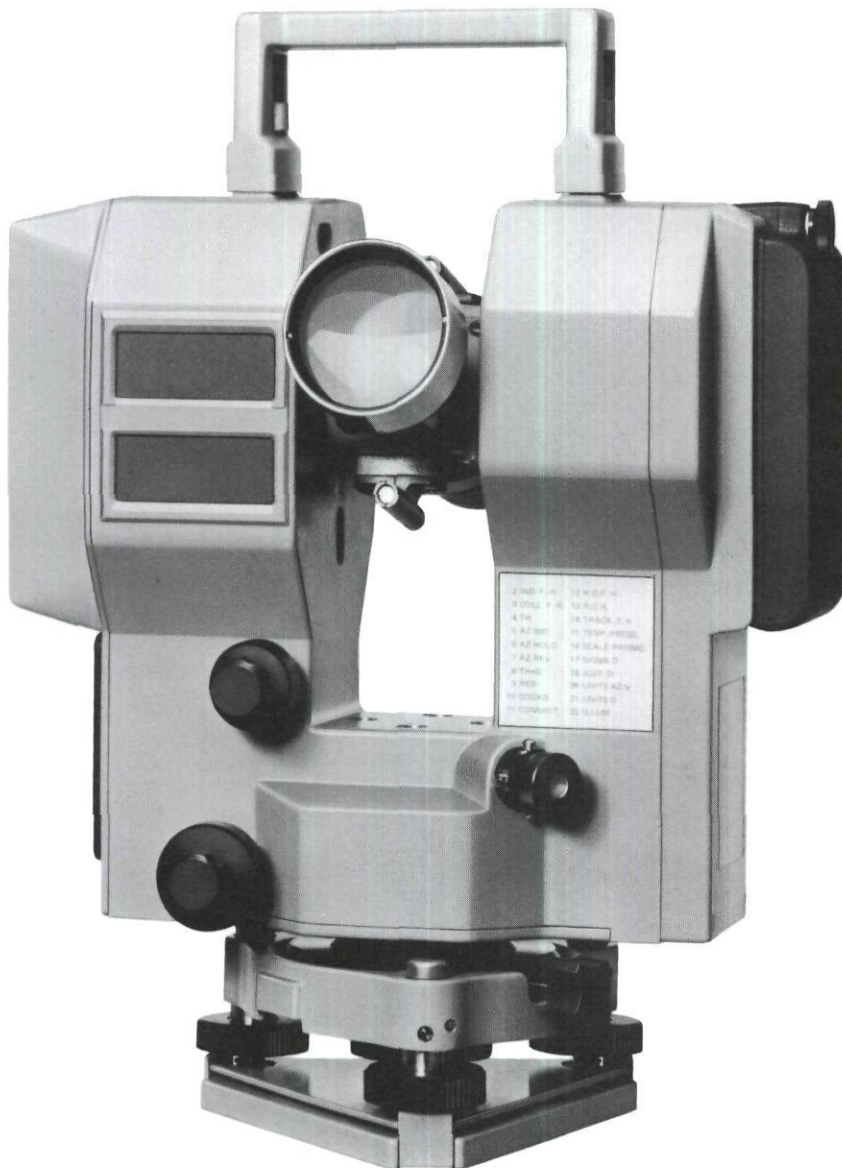
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# 1986 C.L.S.A. Conference

*Report by Michael J. Pallamary  
with special assistance by D.K.  
Nasland, LS and Kent Whittaker,  
LS*

In 1966 the California Land Surveyors Association was formed. The preamble to our constitution states: "The purpose of this organization is to promote the common good and welfare of its members in their activities in the profession of land surveying, to promote and maintain the highest possible standards of professional ethics and practices, to promote professional uniformity, to promote public faith and dependance in the Land Surveyors and their work." Dedicated to the promotion of the Professional Land Surveyor, C.L.S.A. has led the way in many key issues affecting Land Surveyors nationwide. On February 11-14, 1986, the association celebrated the twentieth anniversary of the inception of this organization. The Red Lion Motor Inn, in the capital city of Sacramento, welcomed the many conference attendees, guests, and participants to this event.

President Richard P. Siegmund, LS, officially opened the conference. His remarks were instrumental in establishing a sense of unity for those attending the conference. Mr. Siegmund took note of the fact that it was fitting for Sacramento to be the sight of the conference, as it has been the center for many of C.L.S.A.'s legislative activities. President Siegmund's closing comments focused on the introduction of guests and visiting dignitaries.

One of the most important issues affecting the Land Surveyor today involves education. With rapidly changing technology and the surveyor's scope of practice constantly expanding, education is an issue of concern to us all. Appropriately, one of the greatest advocates of this principle, Paul Cuomo, LS, presented the keynote address. Mr. Cuomo is a proponent of continuing education and recognizes the need to educate present and future Land Surveyors. In order for the land surveying community to be accepted without

reservation by others in the various professional occupations and organizations, it is becoming increasingly clear that rigid educational requirements must be supported by the words and actions of C.L.S.A. and its members.

At eleven o'clock in the morning, the exhibit area was officially opened. The host of exhibitors did a fine job of displaying the latest in state-of-the-art surveying equipment. As always, the display of equipment and technology was fascinating and informative. To many, it represents the most comprehensive display of equipment in one location. This important facet of the conference cannot be overemphasized. During the conference there were many opportunities to view the exhibits. In the evening of the opening day, the Exhibitors hosted a cocktail party for the attendees and guests. It was a great opportunity for socializing and allowed many the chance to discuss other matters in an informal atmosphere.

**"With rapidly changing  
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surveyor's scope of  
practice constantly  
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an issue of concern  
to us all."**

The Wednesday afternoon program began with John Briscoe, a San Francisco attorney and writer, who lectured on "The Trial — Preparing For It and Being Effective." A substantial portion of Mr. Briscoe's legal career has been devoted to cases of land and natural resources disputes. He has tried such cases in federal and state courts and has argued them before the United States and California Supreme Courts. Mr. Briscoe, now with the San Francisco law firm of Washburn & Kemp, stressed two points well worth remembering. The first and foremost was preparation which, as is true with a sound

survey of land, so too, is this true in the arena of the courtroom. It is essential that both attorney and Land Surveyor be properly prepared for the ordeal of testimony and deposition. Mr. Briscoe commented on the proper use of a deposition and the need to be cautious if one is required to provide one. He suggested that one limit his/her testimony and authority to their area of practice and expertise. To represent oneself as other than they are is surely bound to diminish one's credibility.

Following Mr. Briscoe's program an open forum on the new leadership of the Board of Registration for Professional Engineers and Land Surveyors featured:

1. Recently appointed Executive Director, G. Harrison Hilt, P.E., proceeded to inform the attendees of the goals and new programs to be adopted by the State Board. Mr. Hilt has indicated that he will attempt to adopt several new policies of enforcement and organization to the recently tumultuous Board.

2. James Dorsey, LS, discussed the relationship between the surveyor and the State Board. Mr. Dorsey was C.L.S.A.'s 1984 President and is now serving as a Board Member.

3. Ira H. Alexander, PE, LS and board TAC Member, joined Mr. Hilt and Mr. Dorsey in fielding questions from the audience on procedures, new Board policies, and other related matters.

The closing speaker for the conference opening day was Admiral J.C. Bossler, Director of the National Geodetic Survey. He discussed a topic of extreme importance to the professional Land Surveyor in light of Senate Bill No. 1680. This bill would establish the California Coordinate System of 1983 based upon the North American Datum of 1983 (NAD 83) as established by the NGS and would divide the state into 6 zones to accommodate the system. In addition, the bill would authorize a local agency to require, by ordinance, that State Plane Coordinates be used on maps recorded in accordance with the Subdivision

*(Continued on page 16)*

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## 1986 C.L.S.A. CONFERENCE

(Continued from page 14)

Map Act and the Land Surveyor's Act. The bill would also require, after January 1, 1995, that when *State Plane Coordinates* are used on new surveys and new mapping projects, their use be limited to NAD 83, thereby imposing a state mandated local program. In light of the fact that this legislation is pending, input from the profession is important. It is essential that the land surveying community become familiar with NAD 83, and its adoption and use, both by the public and the private sector.

The Thursday morning session of the conference began with a most fascinating discourse on "Dendrochronology," the use of tree rings to date past events, presented by C.W. "Wes" Ferguson, Ph.D. Dr. Ferguson, (now deceased) past Professor of Dendrochronology at the University of Arizona, explained how to use the study of tree rings to date a diverse range of elements from the study of sunspots to the dating of archeological ruins. Tree ring studies have also been applied to climatic reconstruction, fire

history, hydrological studies, insect infestations, etc.

Professor Ferguson explained how dendrochronology has played a role in legal cases involving plant theft, illegal cutting, riparian boundary legislation, and the authentication of tree blazes.

Edward Zimmerman, LS and James K. Crossfield, Ph.D. presented a joint program entitled "Surveying Technology — the key to a well rounded technician" and "The Graduate — An investment for the future," respectively. This program was centered around the skills and education of today's survey students. Both gentlemen are proficient instructors and take a great deal of pride in the quality of education being provided by their respective institutions. It is increasingly important that as education continues to play a more prominent role in the changing profile of today's professional Land Surveyor, a high standard of education be both promoted and supported by all. Only in this fashion can we expect properly educated and skilled technicians and surveyors to supplement manpower resources.

Liability, incompetency, and education were noted as some of "The Dangers of Surveying," a discussion presented by John S. Parrish, LS, a surveyor from Carson City, Nevada. Mr. Parrish outlined many of the problems associated with land surveying. Perhaps the most important of these is the concept of professionalism. It is incumbent upon the profession to take these matters in our own hands and to clean our own house.

A program by Tom Donahue, RCE, ran concurrently with Mr. Parrish's presentation. Mr. Donahue has an extensive background in computers. He spoke regarding the oftentimes confusing computer technology and the experience of choosing the system to meet your needs. Mr. Donahue, who also founded Automated Engineering and Office Systems, logically outlined a step-by-step process for purchasing a system and software. Generally this included needs defined, software located, a preliminary and secondary evaluation, and the final selection. Mr. Donahue noted that the computer was another tool, similar to any others used in an office. Finally, he suggested one seek

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Dr. Ferguson returned during the luncheon session to present a most fascinating discourse entitled, "Carbon Dating with the Bristle Cone Pine." Studies of the Bristlecone Pine in the White Mountains of east central California have resulted in the establishment of a continuous tree-ring sequence back to 6700 B.C., a total of 8686 years. So precise is this standard of measurement that it has been used to calibrate the radiocarbon time scale for the past seven millenia, a development of far reaching consequences in the fields of archeology and geology. In light of the potential applications of this aspect of dendrochronology, it can be readily seen how, in examining vegetation structures and bearing trees, one can possibly determine the history of any given plant or product.

Following the luncheon was a concurrent program featuring the aforementioned "Computer Technology" presented by Tom Donahue and "Business Applications on the Microcomputer" presented by Robert Mix. Mr. Mix is the owner of Computerize, a turnkey computer

system supplier to small business. He has been a microcomputer business consultant for six years and is a hardware and software troubleshooter. Mr. Mix is experienced in mainframes, minicomputers, and microcomputers. He has constructed and owned microcomputers since 1975.

A concurrent session opened Friday, the final day of the conference. "Dendrochronology" was presented by Dr. Ferguson and "No-Fault Negotiations" was presented by Julie Rochelle-Stephens, a consultant who has been active in organizational development for the past ten years as a trainer, consultant, and facilitator. Ms. Rochelle-Stephens presented a logical approach to "No-Fault Negotiations" as she is a specialist in negotiations, conflict resolutions, time management, and team motivation. Her upbeat presentation provided some valuable considerations for entering into any negotiating scenario.

The second session on the Friday program was presented by Fred Weatherill, Contracting Officer with the U.S. Forest Service. He has been involved with contracting for 15 of his 19 years with the U.S. Forest

Service. Owing to his lengthy career, Mr. Weatherill was well qualified to represent the contracting effort by the Forest Service utilizing the private sector to assist in defining National Forest System Land Boundaries. Under the current administration, much emphasis is being placed on contracting with private surveyors rather than employing in-house personnel.

The above mentioned "No-Fault Negotiations" presented by Ms. Rochelle-Stephens ran concurrently with Neil Cummins, LS, CE, and Attorney, presenting a discourse entitled "The Surveyor and the Law." Mr. Cummins is a regular contributor of articles to various professional journals and has the good fortune of being able to blend his diverse background into a meaningful perspective of the many issues affecting a given area of the law. His insight is invaluable and is of great importance in interpreting the law as it affects the Land Surveyor.

Friday's luncheon program was presented by the Honorable Senator Leroy Greene. Senator Greene has carried C.L.S.A. sponsored legislation for many years and his efforts



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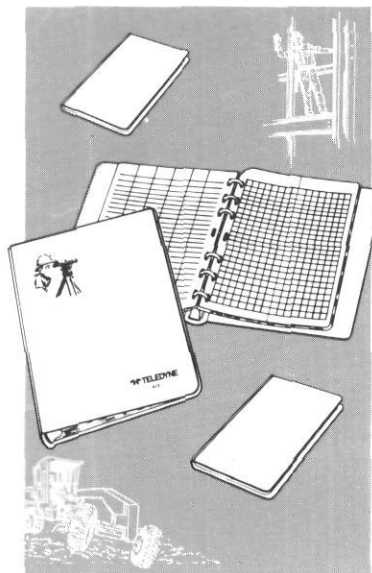
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(Continued from page 17)

and diligence are much appreciated. Senator Greene reported on the activities of the legislature and the success of our organization. If there is one effort for C.L.S.A. to undertake, it is to be persistent and consistent in monitoring legislation affecting the profession. Each and every one of us must take the time to become involved with the issues and legislation affecting the Land Surveyor. Only in this fashion can we protect our rights as established by sound, proper acts of our legislatures.

Appropriately, following Senator Greene, Dennis Flatt with Winner/Wagner & Associates, Inc., presented an update on the legislative activities of C.L.S.A. Mr. Flatt, as our legislative advocate, is responsible for monitoring C.L.S.A. sponsored bills as well as those affecting the profession. Winner/Wagner has done a splendid job in this regard. Once again, this aspect of our occupation should not be treated lightly.

The final session of the conference featured Larry L. Reeves, CLU, CHFC. Mr. Reeves' 20 years experience in assisting privately held businesses on a variety of financial subjects provided a sound platform from which to base his presentation. Mr. Reeves is also the vice president of the financial services division of Gregg-Miller & Assoc., Inc.

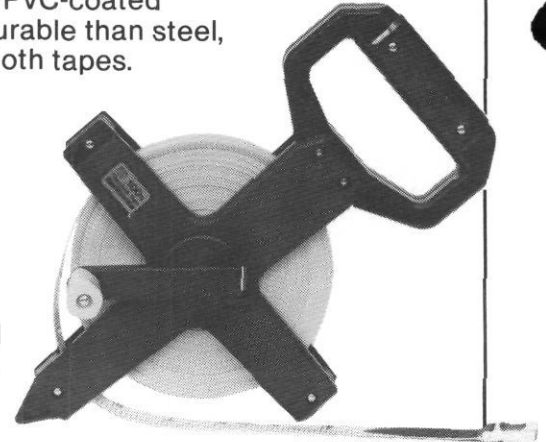
The conference activities came to a conclusion with the closing remarks by President Richard P. Siegmund, LS. As host, Mr. Siegmund's hospitality and involvement added to the success of the conference. The conference committee also made great contributions to the program's success. Their efforts are acknowledged and greatly appreciated. Please remember their unselfish contributions the next time you are asked to give of your time and professional abilities. As the preamble to our constitution states:

"Recognizing that the true merit of a profession is determined by the value of its services to society, the California Land Surveyors Association does hereby dedicate itself to the promotion and protection of the profession of land surveying as a social and economic influence vital to the welfare of society, community, and state". □

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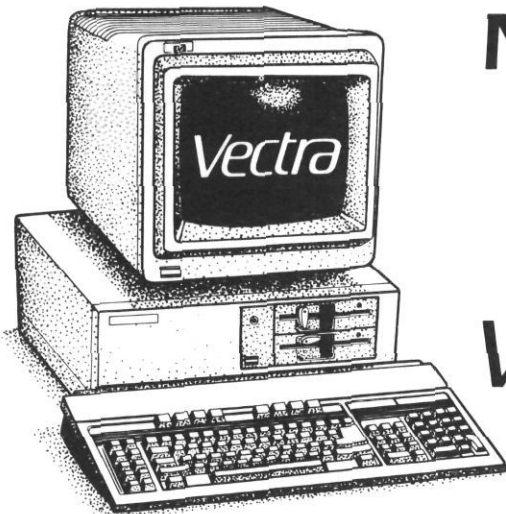
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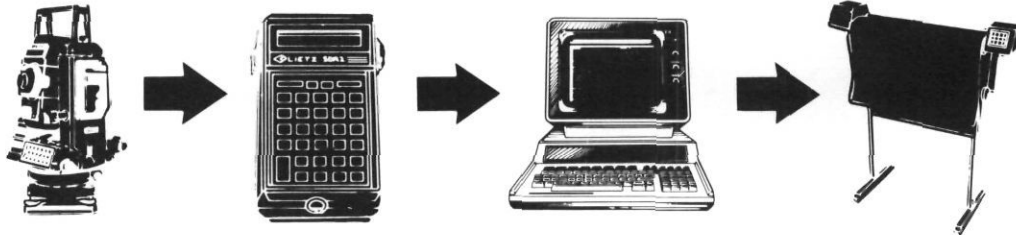
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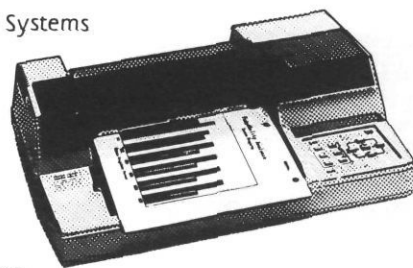
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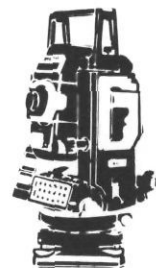
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- increased range (4300 Ft. to a Single • 8300 Ft. to a Triple under average conditions).



#### \*SET-3A electronic total station

- Identical to the SET-3, but now with automatic compensator

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### TOTAL STATIONS

Lietz SET-3 or SET-10 electronic total station	75.00	45.00	30.00
SDM3ER semi-total station w/vert. sensor	55.00	33.00	22.00
SDM3E semi-total station (one mile range)	45.00	27.00	18.00
Nikon DTM-1 electronic total station	85.00	51.00	34.00
NTD-4 semi-total station (6 second)	45.00	27.00	18.00
NTD-2 semi-total station (20 second)	40.00	24.00	16.00

### TOP MOUNT E.D.M.

Lietz RED-2L E.D.M. w/slope reduction (4 mile range)	30.00	18.00	12.00
RED-2 or RED-2A E.D.M. w/slope reduction	25.00	15.00	10.00
Nikon ND-21 E.D.M. w/slope reduction (1 mile range)	25.00	15.00	10.00
Kern DM-503 distance meter w/5 km. range	45.00	27.00	18.00
AGA Geodimeter 120 or 122 distance meter w/vertical sensor	50.00	30.00	20.00

### LONG RANGE E.D.M.

Hewlett-Packard 3808A E.D.M. (6 mile range)	50.00	30.00	20.00
Tellumat CMW-20 microwave system (16 mile range)	100.00	60.00	40.00

### DATA RECORDERS

Lietz SDR-2 (32K)	25.00	15.00	10.00
Nikon DR-1 (32K)	20.00	12.00	8.00
Kern Alphacord-64 (64K)	30.00	18.00	12.00

### GYRO

Lietz GP-1 / TM1A north seeking gyroscopic "one second theodolite"	125.00	85.00	55.00
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### THEODOLITES

Kern DKM-2AT one second theodolite	35.00	21.00	14.00
K1-MT six second theodolite	25.00	15.00	10.00
K1-ST thirty second theodolite	25.00	15.00	10.00
Lietz DT20E electronic theodolite (20 second)	20.00	12.00	8.00
TM-6 six second theodolite	25.00	15.00	10.00
TM-10E ten second theodolite	22.00	13.20	8.80
TM-20H or TM-20C twenty second theodolite	20.00	12.00	8.00
TS-6 or T-60D one minute theodolite	20.00	12.00	8.00
Nikon NT-4D six second theodolite	25.00	15.00	10.00
NT-2D twenty second theodolite	20.00	12.00	8.00
NT-2S one minute theodolite	20.00	12.00	8.00

### TRANSITS

Lietz BT-20 twenty second transit	10.00	6.00	4.00
Nikon TT-400 one minute utility transit	7.00	4.20	2.80
BD-7F five minute utility transit	6.00	3.60	2.40
David White 8300 construction level-transit	5.00	3.00	2.00

### LEVELS

Zeiss Ni-2 engineers 32X, 2nd order automatic level	12.00	7.20	4.80
Nikon AS or Lietz B-1 32X, 2nd order automatic level	10.00	6.00	4.00
Nikon AE-5 or Lietz B-2A 30X, engineers automatic level	7.00	4.20	2.80
Nikon AP-5 or C-3A 26X automatic level	6.00	3.60	2.40
Nikon AZ-1 or AZ-1S 22X construction automatic level	5.00	3.00	2.00
David White 8114 construction 12" dumpy level	3.00	1.80	1.20

### FATHOMETER

Raytheon DE-719B recording fathometer	25.00	15.00	10.00
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### CONSTRUCTION LASERS

Spectra-Physics EL-1 electronic level	30.00	18.00	12.00
942 laser level, vertical/horizontal	40.00	24.00	16.00
611 align. laser w/20 sec. transit	15.00	9.00	6.00
LT-3 alignment laser	20.00	12.00	8.00

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# Varied Forces Affect Surveying on the Surface

Reprint from *Texas Surveyor*  
Nov./Dec. 1985  
by David Moore, RPS 2040

*NOTE: The following is not written as a treatise on geodetic science but to familiarize surveyors with the forces, concepts and relationships that exist in the physical and mathematical conditions that affect surveying results.*

The surveyor, his surveying, and his resulting data, are directly affected by certain forces and conditions that in most cases are not physically evident and may be changed by varying the conditions mathematically. Each of these forces and conditions may be visualized as a surface and then expressed in numerical terms.

The obvious surface is that of the earth or some part thereof, upon, or near, where we actually make our measurements. This topographic surface controls location of the survey lines and the slope of the lines of sight, but in and of itself, and other than in slope, has little physical affect on the measurements.

The surface with the greatest physical affect on the measurements is that of gravity. Although we seldom consider gravity as having a surface, such a concept allows us to visualize a surface in which the force of gravity is the same at all points on that surface — an equipotential surface. The equipotential surface which has been adopted for the earth is called the geoid.

Of course we can adopt various potentials and each will be of a different size, but they will have the same shape. Because of the mixed density of the earth, the geoid is not uniform in shape. The surface undulates, and one might look at it as a potato.

Another visualization would be to cut friction-free channels across the land masses and fill them with water, so as not to diminish the volume in the oceans. Then, having eliminated the effects of wind, air pressure, and luni-solar tides, the resulting water surface would be the

surface of the geoid.

At each point there is a line perpendicular to the geoidal surface, called the vertical or the direction of the force of gravity; and it is the vertical to which the axis of a survey instrument is oriented.

Because the geoid is non-uniform in shape and its surface has no uniformly variable distance from

some fixed point, it offers a very undesirable surface upon which to compute.

Another surface, one that is mathematically expressible, therefore, is substituted. This surface is usually an oblate ellipsoid revolved on its minor axis to provide a solid form.

*(Continued on page 25)*

**The surface with the greatest physical affect on the measurements is that of gravity.**

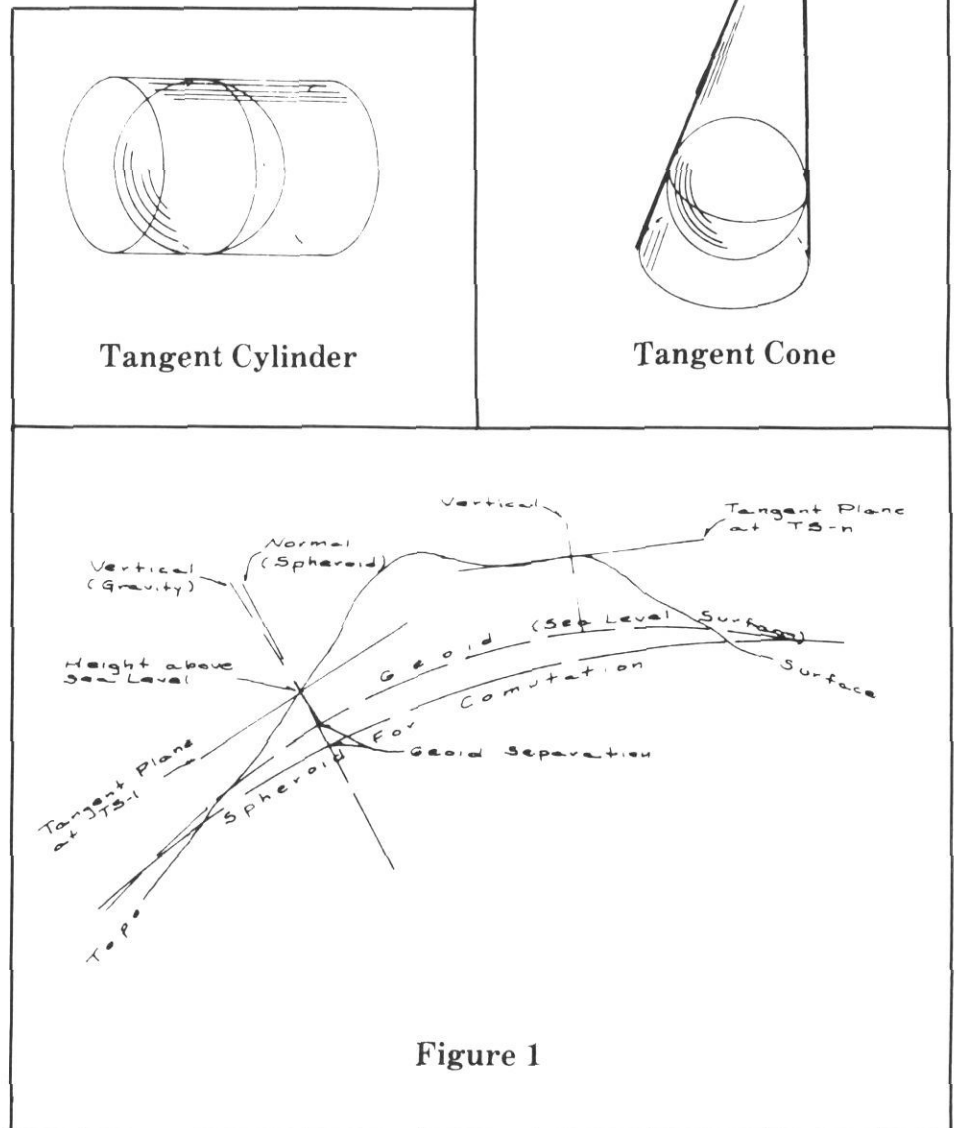


Figure 1



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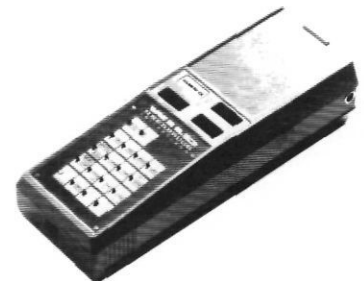
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## VARIED FORCES

(Continued from page 23)

It may be viewed to some extent much as an egg.

The idea is to select an ellipsoid that nearly approximates the size and shape of the geoid. A line perpendicular to the surface of the ellipsoid is called a normal.

Obviously a perfect geoid-ellipsoid fit would have all points at equal elevation and the perpendicular lines at a point would coincide.

The physical reality of the geoid makes this an impossibility.

The elevation difference is termed geoid separation while the directional difference is the deflection of the vertical.

The surface of an ellipsoid of revolution, which is usually referred to as a spheroid, may be defined precisely, and the relative location of points upon its surface are easily computed.

In earlier days, computation was done by hand with logarithms or natural trig functions with intermediate steps tabulated on printed forms. With electronic computers such calculations are virtually instantaneous.

Because the multi-curved surface

of the spheroid is not easily correctable into a plane surface for production of maps, an auxiliary surface with a surface curved in only one direction, e.g., a cylinder or a cone, is often introduced. Such a surface may then be flattened without excessive distortion along the axis and is easily computed on by non-geodetic methods in terms of plane coordinates.

The land surveyor generally performs plane surveying, in most cases, assuming a plane touching the topographic surface, but oriented by the force of gravity. He uses a large number of planes, with a new plane at each instrument station, and each considered tangent at the station. In a small area, the assumption of a single plane is reasonably valid, especially when the observational errors are much greater than the errors in the assumption. However, when working within a larger area and using today's information, errors of the assumption can become evident as failure of control to close upon itself.

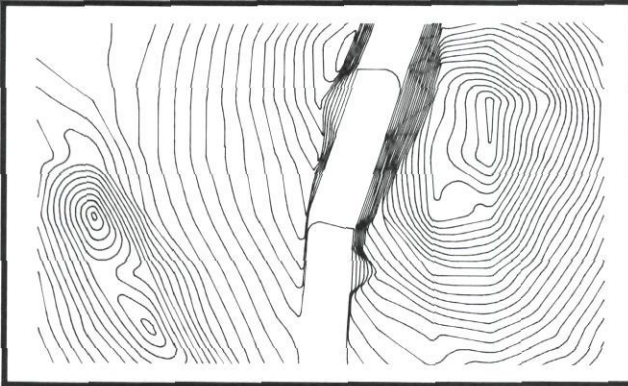
Consider a 10 mile square to be traversed, three corners having an average elevation of 400 feet and the northwest corner quickly rising to about 1,100 feet, with traverse

line lengths of about one mile. Lone lengths reduced to horizontal will have an average elevation of about 400 feet except for the last mile on west side and the first mile north side. These will have an average elevation of about 770 feet. Failure to consider the difference in sea level reduction on just two lines can cause an error of about 0.20 feet, a not immeasurable difference with today's equipment.

Similarly, the plane of the traverse station at one of the corners will be about 170 feet below the plane at the diametrically opposed station and the vertical will be out of parallel about 14 minutes of arc. Failure to consider the earth's curvature and convergence of meridians can account for probably another 0.2 feet of failure to close. Obviously when working on a larger systems of local orientation, problems get progressively worse. But now consider typing two systems together.

Our assumptions of the local system and plane surveying has its merits under some circumstances, but, because of the physical reality, there may well be times we will want to consider other alternatives. □

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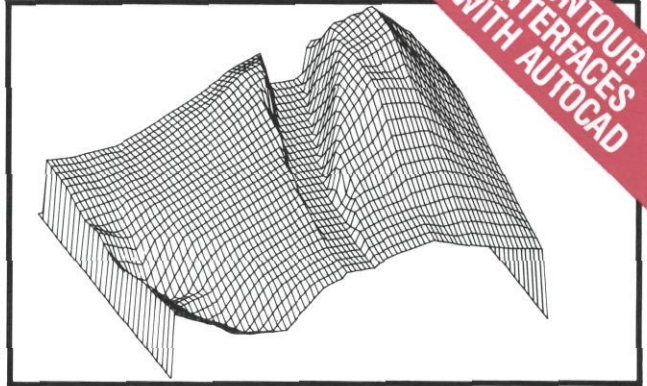
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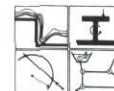
Of course, data can still be entered from the keyboard, the *only* option many other programs give you. CONTOUR can also produce the standard CONTOUR map in AutoCAD format.

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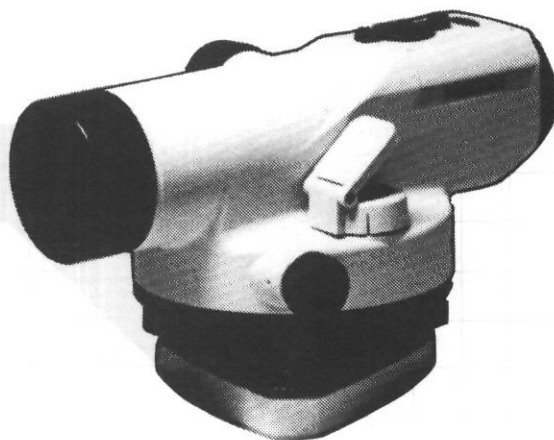
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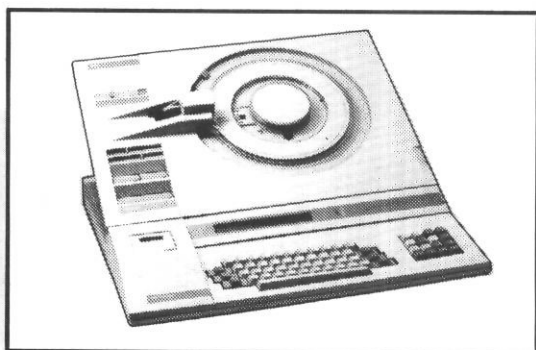
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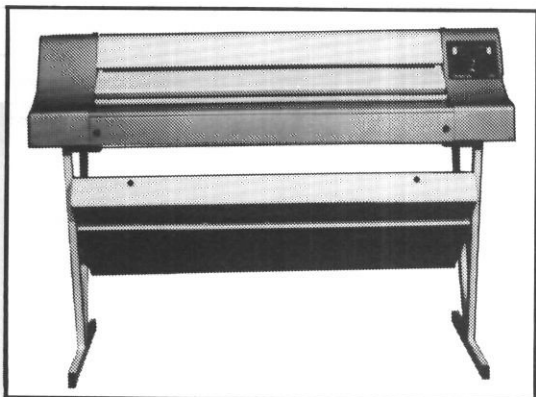
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**CALIFORNIA LAND  
SURVEYORS ASSOCIATION  
CENTRAL OFFICE**

Sprinkled throughout *The California Surveyor* you may have seen references to the "Central Office." Perhaps you've noticed that many of the reply cards, information requests, and registration forms are sent to Post Office Box 9098, Santa Rosa, California — the mailing address of California Land Surveyors Association (C.L.S.A.) Central Office. Have you ever wondered what the Central Office is all about?

Maybe you have known about the Central Office for some time now. Perhaps you talk with the staff over the phone from time to time and have wondered about the faces and backgrounds of the persons attached to those voices.

If you would like to become acquainted with the staff of the CLSA Central Office and find out about the various services which they provide for the Association, then read on.

---

**REBECCA BOEHM, SALES/  
PRODUCTION MANAGER**

---

Rebecca Boehm has been the Sales/Production Manager for *The California Surveyor* magazine since September of 1985. Working in this capacity, Rebecca sells the advertising for *The California Surveyor* and, once the advertising is sold, she then formats the magazine. Her responsibilities include: working with a graphics company to have the editorials, reports, letters and other contributions typeset; doing the paste-up of the magazine; and arranging with the graphics company to do the printing.

In advertising, Rebecca rarely meets the advertisers, but does all

business with them over the phone and by letter. She acquired many good sales techniques from her previous experience in telemarketing. She can hear a "no" and turn it into a "maybe"; hear a "maybe" and turn it into a "yes." She also learned to deal with the rejection which is part of any sales position, realizing that when someone says "no," they're saying "no" to the offer, not to the person.

Rebecca has a strong interest in the mechanical production process and finds it very exciting to take an idea, work with it, and have a project come together as planned. She gained experience in this process through personal seminars from MK Marketing in Rohnert Park.



*Photo by Hal Taylor*

**Rebecca T. Boehm**

Through those seminars Rebecca learned the mechanics of paste-up and developed the skills needed for various graphic techniques. The paste-up work was previously being done by a graphics company, and now Rebecca performs this process "in-house" while still maintaining the quality of the publication. Rebecca feels that it is important to produce a publication which is a good reflection on the California Land Surveyors Association.

In addition to her involvement with *The California Surveyor*, Rebecca is responsible for producing the Association's newsletter. Although she receives guidance from Dorothy Calegari, editor of the newsletter, Rebecca formats the articles and performs the paste-up.

Rebecca is the mother of five children. Her interests involve working creatively with her hands, such as playing the piano, craft work, and sewing. She has many interests which deal with magazine publishing and feels it is exciting to have those interests coincide with her job.



*Photo by Hal Taylor*

**Cheryle Belli**

---

**CHERYLE BELLI,  
MEMBERSHIP SERVICES**

---

Cheryle Belli is a recent graduate of Heald Business College, where she majored in Legal Secretarial studies. Her areas of special training at Heald include accounting, secretarial courses, shorthand, and legal courses. Like Rebecca, Cheryle has also been a member of the Central Office staff since September of 1985.

At the CLSA Central Office, Cheryle is in charge of all membership services. The largest part of Cheryle's responsibilities is the maintenance of membership records, although she performs other vital functions such as filling member requests for Central Office services. Cheryle utilizes a computer data base to process new members and update information about current members. She also uses the data base to create mailing labels for the various types of mailings which are processed at the Central Office. In order to effectively use the features of the data base program on

the Central Office computer, Cheryle has attended special training classes. She is able to query the member data base in order to select a certain set of members based on given criteria, as well as produce reports for various Association purposes. Other data base applications include processing registrants for conferences, seminars, and workshops, as well as keeping detailed information on speakers.

Cheryle uses a word processor to accomplish such tasks as typing agendas to be sent out to members, typing and formatting articles to appear in the *CLSA News*, merge printing (using a data base file) to create personalized correspondence, and other necessary word processing such as updating changes in the Bylaws and the Land Surveyors Act.

In her leisure hours, Cheryle enjoys camping, playing tennis, and is a member of a co-ed softball team.



Photo by Hal Taylor

Karen A. Rogers

---

### KAREN ROGERS, BUSINESS MICROCOMPUTER SPECIALIST

---

The most recent addition to the Central Office staff is Karen Rogers. It is Karen's job to make sure that all computer operations performed on the Central Office computer system are implemented using the full potential of the software. She also protects data integrity by examining the contents of the fixed disk and is developing an easy-to-use fixed disk backup procedure, an essential part of microcomputer operations.

Karen specializes in data base management applications and computerized accounting. She has designed and developed the CLSA

member data base, a data base of speakers, as well as various registration data bases. She is currently in the process of designing a customized accounting system for the CLSA. The system will keep track of account balances, budget amounts, previous year balances, as well as print checks, financial statements, and other accounting reports.

Karen's previous experience includes work with Local Area Network systems, including implementation and supervision of such systems. A Local Area Network consists of two or more microcomputers and/or terminals connected as an integrated system in order to share programs, data files, disk storage space, printers, and other microcomputer resources. Her previous experience also includes development of data base applications, both as a part of a team of programmers and as an individual consultant. She is familiar with several different data base programs.

In addition to data base and accounting programs, Karen is also knowledgeable in the use of word processing, mail merge, spreadsheet, and computer utility programs. She has also become familiar with several programming languages during her four years of experience with microcomputers.

Karen feels it is important to balance the indoor activities on a computer with outdoor activities. So in addition to computing, she also enjoys hiking, fishing, gardening, and writing.

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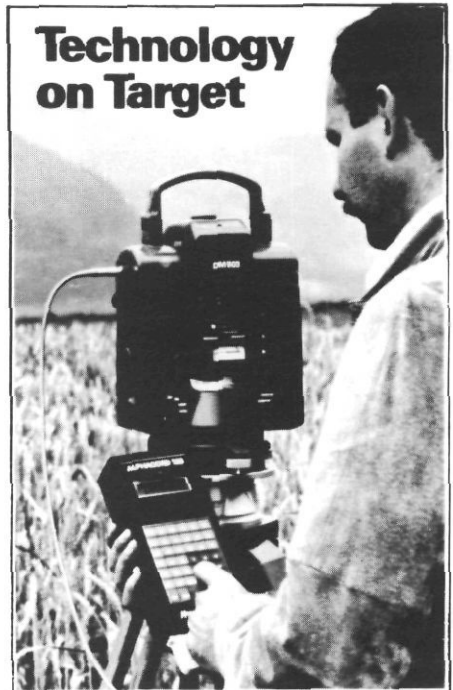
### THE CENTRAL OFFICE — WORKING TOGETHER FOR THE ASSOCIATION

---

The CLSA Central Office staff realize that it is important for the California Surveyors to have a professional image; they are professionals and should be represented as such. *The California Surveyor* is one way of showing professionalism, through the articles, format, and total content of the publication.

Future plans include producing a newsletter every other month, informing members on a timely basis of activities of the State Associations concerning current legislation. These newsletters will also contain notices about upcoming seminars and workshops, as well as provide information on the resources available at the Central Office. □

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# Board of Directors Meeting

## MINUTES OF THE FIRST QUARTER BOARD OF DIRECTORS MEETING JANUARY 25, 1988

Prepared by Susan A. Jensen, L.S.,  
Secretary.

Condensed for publication.

The first quarter meeting of the Board of Directors of the California Land Surveyors Association was held at the Amfac Hotel, Burlingame, CA on January 25, 1986.

The meeting was called to order by President Michael R. McGee at 9:40 A.M. An omission from the minutes of the October 12, 1985 meeting was requested to be included in this record, as follows:

Frank Fitzpatrick moved that the Board of Directors rescind the action of the July C.L.S.A. Board of Directors meeting approving the joint policy statement by A.C.S.M. stating: The profession of surveying is within the broad spectrum of engineering. The original motion was seconded by Gene Rutledge and was passed by the Board.

The minutes of the October 12, 1985 Board of Directors meeting were approved, as corrected.

### UNFINISHED BUSINESS:

Certificates of Appreciation were presented to the retiring members of the State Board of Registration L.S. Technical Advisory Committee members, as follows: Vincent Sincek, Fred Seiji, Timothy Wong, Frederick Kett, Roger McIntosh, and Jim Crabtree.

Neal Campbell, chairman of the Teller's Committee announced the 1986 officers as follows: President, Richard P. Siegmund; Vice President, Louis E. Rutledge; Secretary, Susan A. Jensen; Treasurer, Paul A. Cuomo. The chairman also reported that all By-Law changes had been approved by the membership.

The gavel was passed to the new president, Richard Siegmund.

Resolution 86-01, conferring Life Membership upon Michael McGee was presented by President Richard Siegmund. The resolution was moved by Neal Campbell, seconded by Lee Hennes and passed unanimously by the Board.

Resolution 86-02, retaining Dorothy Calegari as Executive

Director of the association was presented by President Richard Siegmund. The resolution was moved by Lee Hennes, seconded by Howard Brunner and passed unanimously by the Board.

Legislative Committee's Report; Gary Shelton moved that C.L.S.A. co-sponsor the Cal Council bill to reword the L.S. Act and that the President appoint three L.S. members from C.L.S.A. to work on this committee. The motion was seconded by D. K. Nasland. Following discussion, the President assured the Board that any committee work would be carried out under the guidance of the Legislative Committee in order to maintain continuity with our present legislative efforts. The motion was passed unanimously.

A request for input from the California Attorney Generals office concerning A.G. Opinion No. 86-101 was discussed. Michael McGee moved that C.L.S.A. support the interpretation of Government Code section 66451.301 and 66451.302 pursuant to the proposed Attorney Generals Opinion No. 86-101 that would require a Notice of Merger be recorded prior to January 1, 1988. This interpretation is consistent with present state law regarding merger of non-resource lands and imparts constructive notice putting the public on notice and thereby completing the merger process. The motion was seconded by Howard Brunner. The motion passed by voice vote with one no. Michael McGee was directed by the Board to write a letter to this affect to the Attorney Generals office.

A request was made in writing by General F. Oldenburg to print two letters, commonly known as "Big Brother" and the "Harrison/Blake Letter" in the California Surveyor and for C.L.S.A. to state their support of the "Harrison/Blake Letter" as they pertain to SB 1837. Susan Jensen moved that C.L.S.A. write a letter of support concerning SB 1837 and the "Harrison/Blake Letter" and publish both letters in the next issue of the California Surveyor. The motion was seconded by Lou Hall. After discussion, the

motion was amended to exclude our written support of the "Harrison/Blake Letter". The amending motion failed, 8 yes, 13 no. The main motion was then voted upon and was passed unanimously.

### NEW BUSINESS:

Claude Tomlinson, on behalf of the Riverside/San Bernardino Chapter, moved that the quarterly meetings of the Board of Directors be alternately held in the northern area of California in or around the San Francisco area; and, in the southern area of California in or around the Greater Los Angeles area in order to accomodate all the chapters. The motion was seconded by D. K. Nasland.

The motion failed, 8 yes, 12 no.

Claude Tomlinson, on behalf of the Riverside/San Bernardino Chapter moved that the By-Laws Committee be instructed to develop for implementation, the necessary modifications to the By-Laws, which will permit the use of a proxy for voting purposes. The language should be such that a single Chapter Representative, with properly executed proxies from designated Chapter Representatives will have the ability to vote on any or all issues brought before the Board of Directors, as though all entitled representatives were in attendance at that meeting. The motion was seconded by Bruce Hall.

After discussion, the motion was passed, 17 yes, 7 no. The By-Laws Committee was so directed.

Resolution 86-03, authorizing the President and/or Vice President, Secretary and Executive Director to executive contracts and agreements on behalf of the association, was presented by Richard Siegmund. Bruce Hall moved adoption of the resolution, seconded by Lee Hennes, and passed unanimously.

Resolution 86-4, authorizing the Treasurer and Executive Director to sign checks on behalf of the association, was presented by President Richard Siegmund. Lee Hennes moved adoption of the resolution, seconded by Bruce Hall, passed unanimously.

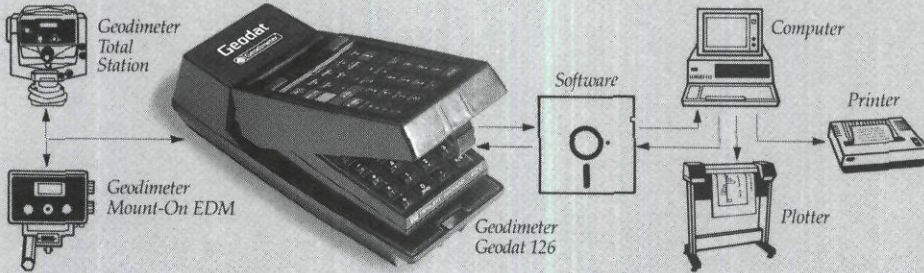
The meeting was adjourned at 4:14 P.M. □

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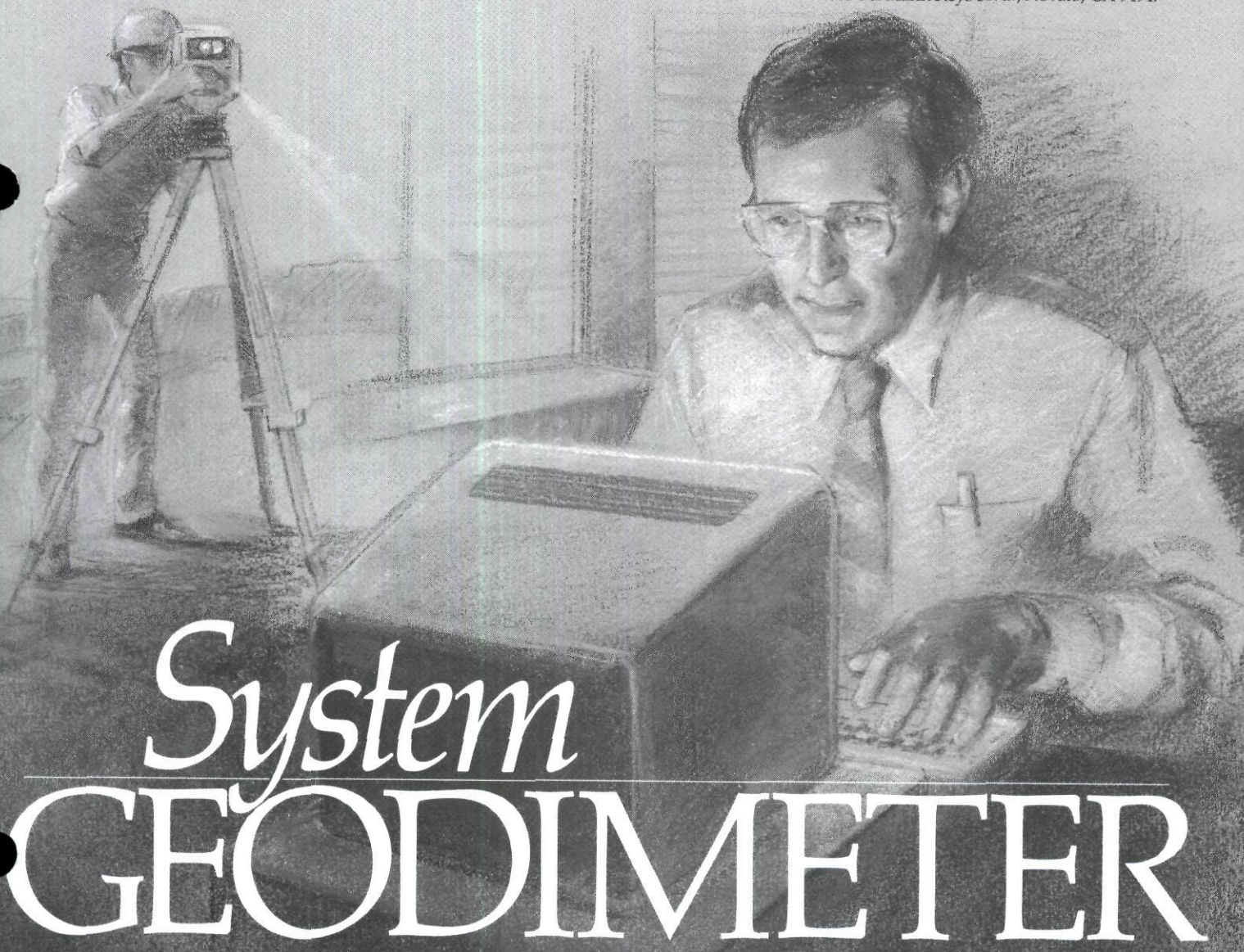
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# System GEODIMETER

# THE COMP-YOU-TER CORNER

Surveying, Photogrammetry and . . . Computers

by John N. Hatzopoulos, PhD  
Reprinted from *Fore Sight*, Vol. 3,  
No. 2, Fall 1985

The computer market is another important consideration to be studied before making a final decision in purchasing computer equipment. There is a great variety of computers and peripherals such as mass storage devices, printers, plotters, etc. The prices also vary considerably and there is a strong competition in the computer market. Some of the microcomputers which make a large amount of sales every year such as the personal computer (PC) have some very interesting features which have not yet been exploited enough by surveying engineers. Such features are: (a) large random access memory (RAM), (b) high speed in computations such as least squares adjustment, (c) ability to communicate and interface with other computers and peripherals such as plotters, (d) excellent color or monochrome graphics on the screen and full-screen editing features. The most important feature, however, is the very low price which starts with less than \$1,000, averages about \$3,000, and reaches to about \$5,000. Most of the present use of personal computers is for office automation, such as word processing, accounting, and data management. The use of the personal computer in surveying can

be further expanded in computing, graphics and plotting. Another consideration from the computer market is the variety and low price of portable and pocket computers which are suitable for collecting data in the field and making calculations. Pocket computers sometimes are explicitly offered for surveyors and there is a great variety of software associated with them. Perhaps there has been given too much attention to the portables by the surveyors and that has left the personal computers behind.

The software available for surveying engineering applications is another important factor to be discussed. The software available in the market for surveying is not enough to cover the current needs. Quality packages, however, exist and come with a relatively high price because of the limited amount of sales. Software for simple computations and simple adjustments such as COGO packages is abundant in the market. There is an effort to develop software for land information systems which is still in the development stage. The area which needs more software development is the digital mapping based on digital terrain modeling. This area has made progress in medium and small scale mapping and the development primarily came from government agencies such as USGS and the Defense Mapping Agency.

Digital terrain data and digital mapping is not a problem if the acquisition system is based on photogrammetry or orthophotography, but there is much to be done in terms of software development for data acquired by traditional surveying. The idea of digital mapping has been exploited quite well by those that are marketing graphics work stations. People in surveying, enthusiastic about the advantages of digital mapping, have acquired some of these stations only later to discover that they have to develop the software, often at great expense of time and money. By the time the software is operational, the work station equipment is outdated and in need of replacement in order to be productive. This is a typical problem when there is not enough consideration given before acquiring hardware or software components.

## Selection of

### Computer Equipment

The first step in the selection process is to define completely the current needs and make a reasonable estimate of the future needs. Complete definition of the needs is obtained by assessing the amount of computations performed, the digital mapping requirements, and information management. Then, a projection of the current needs into the future is necessary to anticipate ex-

(Continued on page 34)

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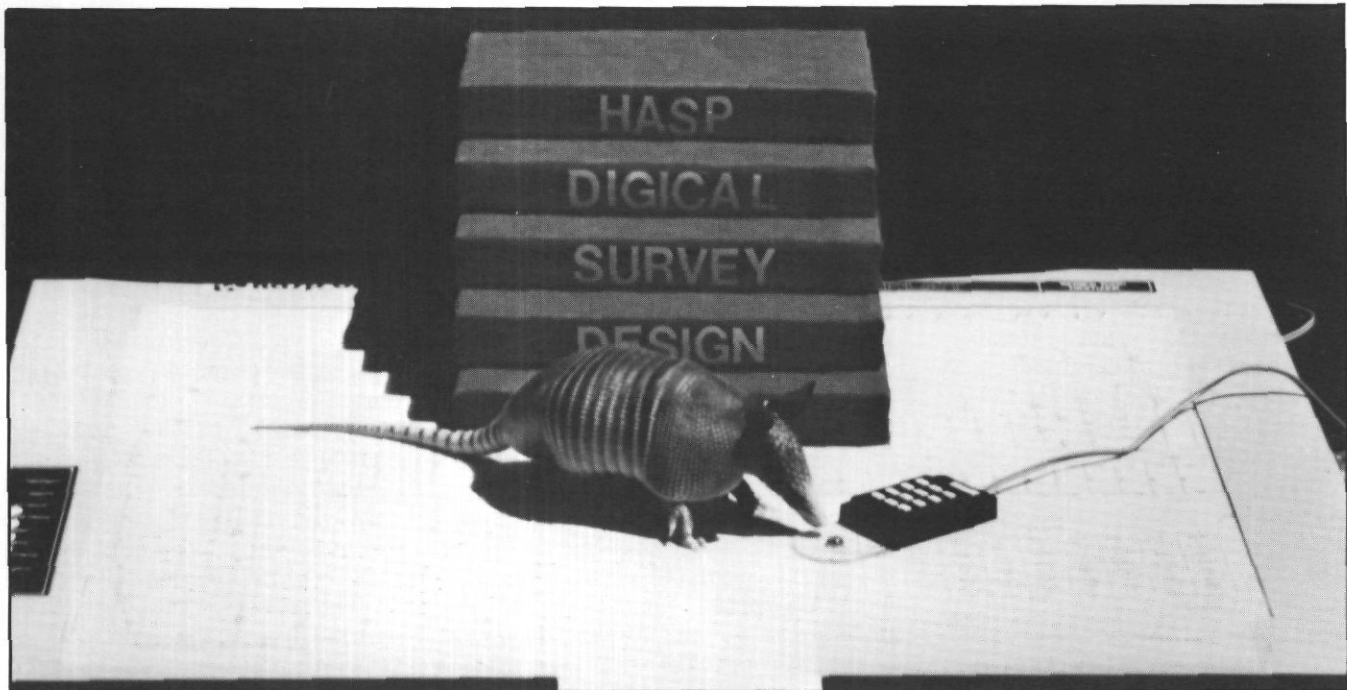
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## THE COMP-YOU-TER CORNER

(Continued from page 32)

pandability and compatibility of the initial system with the system to be developed in the future. An example of such a development is given below; start with a pocket computer, it may be enough to handle current problems. Later, as the computing demand increases, a personal computer is acquired. The pocket computer then is used in the field for data collection, preliminary checks, preliminary adjustment and simple computations. The personal computer is used for final adjustment using least squares, data management, plotting and office automation. As the computing demand increases, more personal computers are acquired, some of them are used for office automation, some for computations and some for plotting. Having more computing needs demands a mini or main frame computer be acquired, and the personal computers are used as terminals for the main frame. The pocket computer is still used in the field and, in this way, nothing is wasted. Hardware components with computer units attached to them, such as analytical plotters, may be selected

to fit the existing system. Peripherals such as mass storage unit must be selected based on the current and future needs, and taking into consideration the compatibility and expandability factors. Plotting peripherals may need more attention, especially in the early stages of development because of the constant improvement of this type of equipment and because of the relative high cost of both the hardware and the software. Sometimes, software developed to operate with one type plotter is not suitable to a different type plotter.

The software is another difficult problem in the equipment selection process. The expandability and compatibility criteria must also be used for selecting the proper software. Since there is a great need in software development, the selected software must provide the ability to make modifications and additions into certain areas such as the I/O modules. Some of the features which characterize a good software package are the ability to accomplish a task correctly, the user-friendly operation through interactive menu-driven steps and through screen graphics, and the documentation. Part of the success in soft-

ware modification and development in the surveying industry depends on the ability of the personnel to do such development and modification.

An easy way to make sure that the hardware and software to be purchased are suitable for the type of work to be done is to make a field trip and visit a place where the same computer facilities are used for identical operations. This will give the opportunity to ask questions about their performance and make some tests to get a personal feeling. Another suggestion is to make a complete test of any ordered computer facilities before accepting the order.

### Conclusions

The selection of proper hardware and software, as well as the organization of the computer and surveying facilities into an efficient integrated system is the most significant part of the interrelationship between surveying engineering and computers.

The personal computer which is a very capable machine and is successfully used in business and office automation seems to be behind in engineering applications and particularly in surveying engineering applications. □



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## FEBRUARY CENTRAL COAST CHAPTER ACTIVITIES

The Central Coast Chapter of C.L.S.A. donated a lot survey and map to our local Public Radio Station (KCBX) in conjunction with their annual pledge week. Besides offering high quality non-commercial programming, the station also broadcasts the weekly San Luis Obispo County Board of Super-

visors meetings. The pledge raised \$800 for KCBX and provided our association with valuable public exposure.

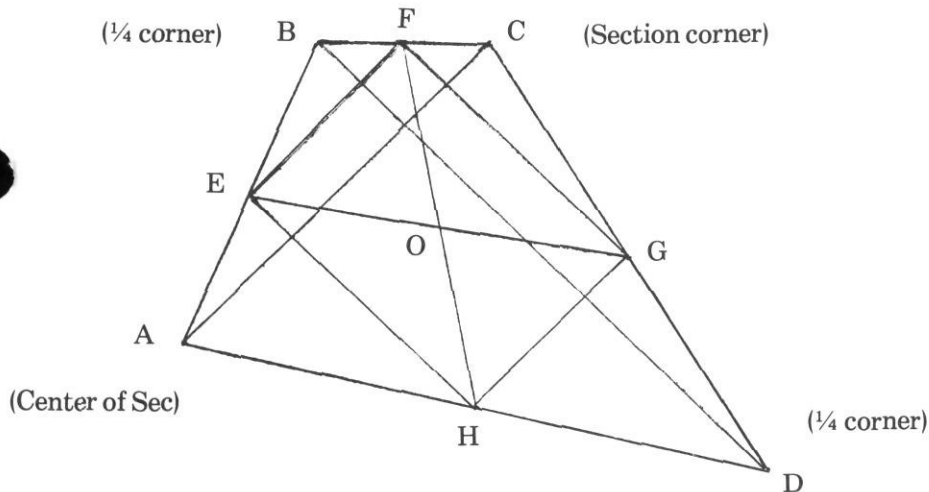
In addition, our chapter invited students in the Survey program at California State University at Fresno to attend our meeting. The students gave a very professional slide presentation illustrating their program and were very interested in our ideas for improving the program. Following the meeting the

students split up and stayed in various surveyors homes. The next day students went to work at a firm of their choice or helped with the pledged survey. It was a totally enjoyable learning experience for both the students and the chapter members. Eleven students participated but evidently many more wished to attend. If any other chapters are interested in this type of program, please contact C.S.U. Fresno. □

### FINDING A MIDPOINT

Submitted by John Hoffman, L.S. of Taft, CA

The question occasionally arises whether finding the midpoint of one "centerline" of a section or  $\frac{1}{4}$  section is equivalent to locating the center "by intersection." The following is offered as proof that it is, *wherever the  $\frac{1}{4}$  or  $\frac{1}{4}\frac{1}{4}$  corners are the midpoints of the respective sides.*



Sample  $\frac{1}{4}$  section; made extremely irregular for emphasis.

Object: to prove that  $\overline{FO} = \overline{OH}$  and that  $\overline{EO} = \overline{OG}$

Given: E lies on  $\overline{AB}$ , F on  $\overline{BC}$ , G on  $\overline{CD}$ , H on  $\overline{DA}$  & O on  $\overline{FH}$  and  $\overline{EG}$  (but not, in general, on BD or AC). Also,  $\overline{AE} = \overline{EB}$ ,  $\overline{BF} = \overline{FC}$ ,  $\overline{CG} = \overline{GD}$ ,  $\overline{DH} = \overline{HA}$ .

$$\overline{AE} / \overline{AB} = \overline{AH} / \overline{AD} = 1/2$$

$$\angle EAH = \angle BAD$$

$\triangle BAD$  is similar to  $\triangle EAH$

$\overline{EH}$  is parallel to  $\overline{BD}$

Similarly  $\overline{FG}$  is parallel to  $\overline{BD}$

$\overline{EH}$  is parallel to  $\overline{FG}$

Similarly  $\overline{EF}$  is parallel to  $\overline{HG}$

The figure E-F-G-H is a parallelogram, and the diagonals of a parallelogram bisect each other.

Hence  $\overline{OF} = \overline{OH}$  and  $\overline{OE} = \overline{OG}$  Q.E.D. □

### NIKON DONATES \$95 THOUSAND IN EQUIP— MENT TO SUPPORT DEGREE PROGRAMS IN SURVEYING

TORRANCE, CA, — Nikon has donated 30 NT-2S theodolites to six U.S. universities offering four-year degree programs in surveying. The donated instruments, allocated five per school, have a total market value of \$95,000.

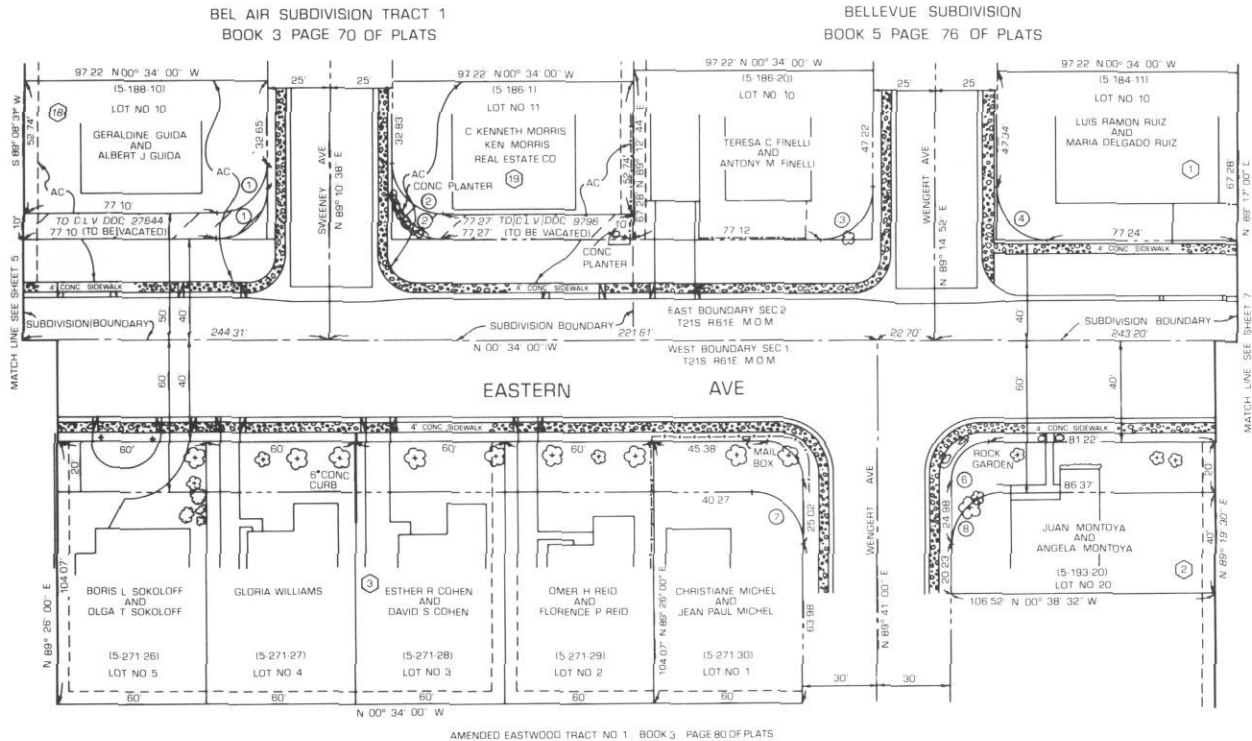
Recipients of the theodolites were California State University at Fresno; Ferris State College, Big Rapids, Mich.; the University of Florida, Gainesville; the University of Maine, Orono; Metropolitan State College, Denver; and Oregon Institute of Technology, Klamath Falls.

Roger Justice, national sales manager for Nikon surveying instruments, says the donations were made "to reinforce Nikon's support of degree programs in surveying." Twenty-two U.S. universities currently offer such programs (several as an emphasis within a civil engineering or engineering technology major), but only the six schools selected for the Nikon donations required surveying-degree candidates to earn 45 or more semester credits in surveying and mapping.

"These schools have shown a strong commitment to make surveying a degree-based profession," Justice said, "and we wanted to support them with quality equipment." The donations were made by Nikon regional representatives at the beginning of the 1985-86 school year. □

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# Letters to the Editor

Dear Editor:

Reference is made to the paper written by Dr. James K. Crossfield and published in the Fall 1985 issue of *The California Surveyor* and titled, "Multipurpose Disaster: The Result of Spatially Imprecise Land Records Information Systems."

We take no issue with the technical aspects of Dr. Crossfield's paper yet hold a somewhat different philosophy as set forth in the attached paper.

Thank you for your interest.

Very truly yours,

Richard J. Mitchell, P.E.

## ORGANIZATION-WIDE LAND INFORMATION SYSTEMS - THE NEW ERA

by Richard J. Mitchell, P.E.

### BIOGRAPHICAL SKETCH

Richard J. Mitchell, better known to many of us as "Dick", is a Licensed Land Surveyor and registered Civil Engineer in California. He is now "doing a bit of consulting" after some 42 years with the Los Angeles County Engineer's Survey Division. Dick is a Past President of AAGS/ACSM and is a member of the National Research Council's Committee on Geodesy. He holds a Bachelor's Degree in Civil Engineering from West Virginia University and an MS in CE from USC. He is now consulting engineer/surveyor for the U.S. GEOGRAPHICS CORPORATION (USGC) of Newport Beach, California. The firm builds organization-wide geographic information systems for cities, counties, and utilities.

### INTRODUCTION

While there are a number of derogatory articles in press that ridicule the Multipurpose Cadastre (MPC) there remains an increasing crescendo of rhetoric about the development of County-wide geographic information systems. It is the opinion of the author that most of the negative comments are based on initial system costs and accuracy, and a lack of understanding of the ability of currently available computer hardware and program management methods to resolve the apparent conflicts between poten-

tial users and beneficiaries of a *complete* system. The following pages will address these problems. The ACSM and the Committee on Geodesy as well as a number of cabinet departments have produced a number of reports on the subject. The reader is referred especially to three reports published by the National Research Council and titled, "The Use and Value of a Geodetic Reference System," "Need for a Multipurpose Cadastre," and "Procedures and Standards for a Multipurpose Cadastre."

County-wide Land Management Systems (or Multipurpose Cadastres) are critically necessary to improve the operations of urban governments.

Much of the dialogue relates to accuracy. The surveyor often sees the system as an "end" for surveying accuracy and surveying information. However, although land parcel information is an end for 5% of the users of land information (surveyors and engineers) it is a "means" to the badly needed organization-wide County information system which will serve all users in the County with geographic-oriented information requirements. This is because the geographic address of the land parcels is the only common denominator which permits an integrated expert file to be developed which will interrelate all County data bases into a pure data base environment.

The degree of accuracy of the plotted parcel data for the 95% of the users is of minor importance. In addition, to get the data to the accuracy of the 5% costs many times more than it does for the 95%. Historically it has been very difficult to obtain these funds. The lack of the accuracy to fulfill the requirements of the 5% has been an unnecessarily severe impediment to the development of organization-wide geographic information systems.

While the data management element of the total system is somewhat outside the expertise of the writer, it is nonetheless a critical element. Suffice it to say that at least one system has been demonstrated to the writer's satisfaction that is independent of

the hardware available or the format of existing machine-readable files, yet is capable of addressing these files by existing addresses, manipulating them as needed, and producing the desired output in the form desired by the user whether from a public utility in alpha format or from a surveyor's file in graphic format. The files can be made "secure" as to either input or output of both.

## THE COUNTY-WIDE GEOGRAPHIC INFORMATION SYSTEM

In the writer's opinion, the first requirement is a graphic (map), almost any graphic, that shows each individual parcel in its approximate location relative to each other parcel. Streets, railways, navigable waters, and such are considered parcels as the term is used here. The graphic must exist in electronic storage and must be on line to each potential user of the system. As soon as this condition is met, then each potential user can begin to enter his specific data into the system. The tax assessor will probably be one of the first to begin using the system. However, he isn't going to give up his present system until he has a *complete* map of his entire area available.

This first graphic will show street names and recorder's parcel designators (lot, block and tract, public land survey parcel numbers, recorder's book and page numbers, etc.) and will, as soon as possible, have house numbers or other such popular designators which are common in the mapped area. Chances are good that at this point, the Assessor's maps will have been used extensively and that a lot of "shoehorning" will have been done. Yet it will be a map of sufficient accuracy to meet the needs of the fire and police agencies, the public utility people, the political people (census tracts and political boundaries) and many of the interests of the regulatory agencies such as planning and beverage control.

The fact that an oil well site is plotted several hundred feet from its true (whatever that means) loca-

(Continued on page 38)

## LETTERS TO THE EDITOR

(Continued from page 37)

tion with respect to some arbitrarily assigned grid (say, NAD '83 — since we still don't have it) will not bar the Assessor from estimating its value. Neither will the inaccuracy hinder the Fire Department from finding it or the pollution control people from testing its emissions. It's plotted position with respect to nearby identifiable lines or features will be sufficient for these purposes.

Needless to say, the map will have been scaled and oriented as well as possible but perhaps no better than reference to existing 1:20,000 or 1:24,000 quad sheets or other similar maps will permit. Here we might note that we suggest that the final *graphic* need be no better than needed to meet National Map Accuracy Standards at a scale of 1:600 (1"=50 ft.). In saying this we are referring only to the *graphic*, *not to the data in the file from which the graphic is created*. (Differences in file structure and data manipulation methods will be, at least, alluded to if not discussed in later paragraphs).

Now one more stipulation must be added to the above. This is that each element of data entered into the file must have an indicator of that element's validity and the date of that validity. (And dates are especially important as NAD '83 data begins to stare us in the face.) Perhaps our first *graphic* is simply a combination of USGS quad sheets for scale and orientation and Assessor maps for record dimensions and parcel shape data. Here, a qualified technician could probably provide the weighting and dating elements to our file; however, if the data available includes items of various weights it is even at this point that the professional ("professional" = *licensed* and *graduate* and *experienced*) surveyor must become a working member of the mapping team. At this point it may be appropriate to note that surveying is both an art and a science. Numerical methods and measurements processes constitute elements of the science. Deed interpretations are elements of the art. Only the fully qualified professional is competent to handle both.

When we used the word "validity" above, we were thinking

especially of data elements that would be entered into the system analytically. For example, we might create a list like this:

1. First order Coordinates of a found U.S.P.L.S. corner.
2. \_\_\_\_\_
3. Bearing and Distance from a post 1940 Record of Survey.
4. Bearing and Distance from a pre 1940 Tract Map.
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. Digitized from a USGS 1:24,000 quad sheet.
9. Digitized from the Assessor's map sheet.
10. Digitized from a map of unknown origin.

The list of weights would be tailored to the community for which a specific system was being designed and to the data types that might immediately and/or become available. These validity statements (or weights) will later be incorporated into any adjustment programs that are to be incorporated into the system (more in the following paragraphs).

It is at this point in the development of the total system that the professional land surveyor *must* become a part of the *system* team (and we emphasize the words "must" and "system".) He must create the above weighting scheme. This could be accomplished by simply assigning a weight of zero to the entire file created to this time. But, in any event, it is at this point that he can begin the creation of the true cadastral element of the complete Land Information System, i.e. his 5% of the system. The machine and its programmer mathematician custodians can do the requisite drafting and mass adjustments. The Land Surveyor can begin to enter record bearings and distances and see if they fit between identified primary control stations. A first inclination might be to try for an overall improvement in the total scale and orientation of the map; however, a survey problem of special interest to a client or client's client at the time of the surveyor's first involvement with a new system might dictate the use of the system for the detailed study of a

single block or P.L.S. Section. The rubber sheet geometry (limited in any application to the area of interest) may be appropriate, or perhaps a traverse analysis would be needed (single or network) or even an analysis by a rigorous first-order adjustment would be necessary. The judgement of the professional will dictate the method and its limit. As each phase (or problem) is completed the coordinate values will be put back in the system with their appropriate upgraded weights and date.

It is necessary to remain cognizant that within our philosophy of the development of a Land Information System, many activities may now be taking place at the same time. Still in the early development stage the Assessor will be adding (if it was not an element of the original plot) assessment parcel numbers which are already the key to his alpha type files. The Fire Department will be adding hydrant locations (that can be keyed to alpha type hydrant attributes files); the gas, phone and electric utility people will be adding pole, manhole and valve locations that will also be keyed to alpha type attribute files of pipe sizes, head available transformer types and will be relating the graphics to their assessment/valuation files, etc., the Street and Highway Engineering Departments will want to add a topographic overlay as soon as possible, and so on.

We must note that, as each parcel is plotted, the machine (plotter) will be assigning a parcel identifier to that parcel. It was, however, the writer's somewhat lighthearted stipulation to his client, when he (as a surveyor and engineer) agreed to provide consulting services in the development of a complete Land Information System, that he should never be made aware of this machine identifier. (The one that will be used in a project now under development is proprietary to USGC). But it was also stipulated that the system should be capable of changing the identifier as needed in the full development of the system. The surveyor/engineer, already has a number of identifiers - deedbook and page, grantee name, Assessor's book, page and parcel number and

street address to name a few - he doesn't need any more. Yet as more reliable scale, orientation and location data become available it will become necessary for the machine to move parcels around on the graphic. Programming *must* be such that the system will be able to modify its identifier and apply the modified identifier to each of the other files being developed (fire, assessment, etc.) without the possibility of confusion or redundancy. Here, rubber sheeting will have the outstanding attribute of moving the fire hydrants (etc.) along with the land lines and keep all of these related files consistent with the graphic and its constantly developing coordinate control.

Now let us look at an aspect of the system that many have discussed - the aspect of accuracy. How many times has the practicing surveyor, whether public or private, picked up the phone and heard the complaint that "My next door neighbor is putting in a new driveway (or fence, or tree, or building or . . .) two inches (or two feet or . . .) onto my property. What can you do to stop him/her? - too many times to count, you may be assured. Looking now at our Land Information System, it is going to be many years before almost any system is developed that will permit a system-only response to such a question, i.e., when the full cadastral potential of the system has been developed. Surely, some day in the future, the system will be developed to the point that a practicing private land surveyor will be able to ask it, from his field location, for the coordinates of the end points (and intermediate points as needed) of the line in question. Then he would take his G.P.S. or inertial system to the spot and mark and monument the line in question within a couple of millimeters of its true location. He would not then have to refer to any street centerline or other property line (he will also transmit back into the system the location and nature of the monuments set).

This is the ultimate objective of the cadastral element of the Land Information System. But, even with the inaccuracies and uncertainties of the present system at its most basic level, the surveyor will be able

to use the system to go from street address to lot and tract, or to recorder's book and page and to related survey records (R.S.'S. the County Engineering field books and pages etc.) even if the initial plot is in error by a hundred feet or more. It must always be remembered that a map is merely a representation of a place on the face of the earth.

The philosophy being proposed will be utilitarian as soon as the map is made machine-readable. However, the Fire Department and other potential users of the system can't, or won't, begin to use the system until the entire area of its jurisdiction is available as a single graphic file - the Fire Department can't afford even the few seconds it would take to determine that the address given by a caller is not in the automated system. However, a 100 foot misplot with respect to some point, several miles away, would not affect their response. The need to go to another data source would.

At this point, we could go into many other aspects of our ultimate system such as intrasystem communications, security, handling "record" information, cross indexing technology and many, many more. However, let's now go to perhaps the *most basic* element:

Ultimately, the Fire Department, the Assessor, etc., are going to be the users of the information system and are going to be the people who will pay a major element of the cost of the system. (Or will justify the system if they are not in fact the direct payors). The cost base for paying for the surveying effort needed to make the system as accurate as is desired is now much broader and the ability to fund Land Information System related survey projects will be significantly increased.

The above is not intended to minimize the importance of careful and accurate work or to limit the applications of a complete Land Information System. It is intended rather to suggest an economically justifiable and orderly development of such a system. □



## ANNOUNCEMENT

Cal State Chico has over 70 students in their second semester Surveying course. The University is in need of some equipment and has requested some transits.

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Professor Thomas Ferrara  
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For a Tax Deductible receipt, send a letter to the California Foundation for Land Surveying Education, P.O. Box 1573, San Juan Capistrano, California 92693-1573.

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## Announcement

"Instrument Adjustment" Workshop July 12, 1986, at USGS Menlo Park. Sponsored by Santa Clara/San Mateo Chapter and Haselbach Inc.

\$20—lunch and refreshments included. Contact: Peri Cosseboom, 604 Mission St. 5th Floor, San Francisco, CA 94105, (415) 543-4500.

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# 25th Annual Surveying and Photogrammetry Conference California State University, Fresno

*Report by John Pettley  
President of Surveying and Photogrammetry Student Association,  
California State University, Fresno.*

The 25th Annual Surveying and Photogrammetry Conference at California State University Fresno (CSUF) was a great success. The conference was held January 13 to January 18 in conjunction with the Sacramento office of the U.S. Bureau of Land Management, Region 5 of the U.S. Forest Service, and the California Foundation for Surveying Education. One of the highlights of this silver anniversary celebration was a visit and presentation by Edward Kuhlan, who founded the surveying engineering program at CSUF. It was his hard work and determination that laid the foundation for the outstanding program we enjoy today.

There were a number of excellent speakers including Ira Alexander, Don Bender, Harold B. Davis, Art Trinkle, and many others. The speakers covered a variety of topics such as monitoring tectonic motion in Los Angeles, implementing an analytical photogrammetric capability, and accuracy issues in land records systems. Two students gave presentations during the lunch sessions. Ken Meme spoke on close range photogrammetric systems, and John Pettley spoke on surveying the Alaska Railroad.

There were numerous workshops offered including multipurpose land records systems, analytical photogrammetry, beginning and advanced HP41 calculator programming, and advanced programming for the HP71B calculator.

At the awards banquet Friday evening, Dave Goodman gave a fascinating slide show called

"Surveying in Egypt." The presentation was about a program to survey the pyramids and also gave an indepth look into the culture and peoples of the Nile. The dinner was well attended, and numerous scholarships were awarded. The Surveying Faculty Award went to Tracie Mesloh, who was conference chairperson. The Niel Nelson Award was given to Mark Lewis. Ken Meme won the California Foundation for Surveying Education scholarship. The Orange County CLSA chapter scholarship was awarded to Bob Davies, and the Central Coast CLSA chapter scholarship went to Joan Honda. Mark Shadburn and Richard Shepard each won the CLSA sponsored Ed Griffin Awards. Don Liddle was given the Max Laird Award. Other Conference scholarship recipients were Joe Cordoza, Tom Gandy, Brian Howard, Kieth Nofield, Doug Howard, and John Pettley. Ken Meme and Doug Howard had the dubious distinction of winning the "broken tape award", for disturbing a tripod leg during a crucial astronomic observation. Recipients of a new award, The Newsletter Award, were Bob Davies and John Pettley. The California Land Surveyors Association was presented with the Ed Kuhlan Award for their outstanding support of the surveying engineering program at CSUF.

Cassettes and video tapes of the speakers featured at the conference are now available, and can be obtained by writing to Dr. James Crossfield, Department of Civil and Surveying Engineering, California State University Fresno, Fresno, California 93740-009, or by calling (209) 294-2965 extension 2889.

The students and faculty would like to express our gratitude to all those who attended the conference for making it such a success. Perhaps our feelings are best expressed by the words of our founder, Ed Kuhlan who said: "I could not have done anything without the profession backing me." □

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# Education Outlook

## SURVEYING ENGINEERING

at California State University,  
Fresno

The four-year degree program in Surveying Engineering at California State University Fresno provides each student with a comprehensive understanding of the many aspects of surveying and photogrammetry. This program, accredited by the Accreditation Board for Engineering and Technology (ABET), prepares students with the job skills necessary to compete in a fast-paced world of rapid technological change.

The modern surveyor performs a critical function in our society by coordinating the application of areawide imaging and point-specific positioning technologies to development, construction, resource monitoring and land records management activities.

Surveying Engineering involves the science, art and technology of

making measurements to determine the relative positions of points on or near the earth's surface. Making measurements on the ground (surveying) and/or on photographs (photogrammetry) are the key components of surveying engineering.

### Photogrammetry

Besides map making, the photogrammetrist's skills may be used for a wide variety of unusual measurements: in topology of the human body, in nondestructive testing of engineering materials, in monitoring structural deformations and in architectural applications.

### Surveying

The surveyor applies his or her knowledge in locating land and water property boundaries, collecting terrain data for engineering planning, making measurements for guiding construction operations, accurately establishing horizontal and vertical control points for scientific and engineering projects, and coordinating land records information systems.

### Career Opportunities

Opportunities for specialists in surveying and photogrammetry continue to grow with rapid advancements in analytical photogrammetry, electronic surveying, and inertial and satellite positioning methods. Graduates of the CSU, Fresno program find readily available job opportunities with federal and state government agencies, oil and gas companies, and private consulting firms.

### The Curriculum

The Surveying Engineering curriculum at California State University, Fresno provides the student with a unique blend of practical and theoretical knowledge. The practical field and office skills gained at CSU, Fresno mean that the graduate is immediately valuable as an employee, ready to contribute to job-related activities. The theoretical skills learned at the university mean that the graduate is equipped to adapt to technological advances as they occur throughout the future.

The program requires 130 units or semester hours of study for graduation. Required engineering courses currently comprise 69 of those units. Mathematics and physical science requirements total 34 units.

A balanced selection of humanities, social science and history courses is also required; and communication skills are addressed and sharpened through writing and speech courses. Computer programming is introduced early in the curriculum and used as a problem solving tool in almost every Surveying Engineering course offered.

### Equipment and Facilities

A wide selection of modern surveying and photogrammetry equipment is available to students at CSU, Fresno. The spacious photogrammetric laboratories are among the most complete of any education facility in the country, while the surveying equipment includes most varieties likely to be found on jobs anywhere. In addition, a field surveying laboratory encompasses the university's extensive agricultural fields adjacent to the campus.

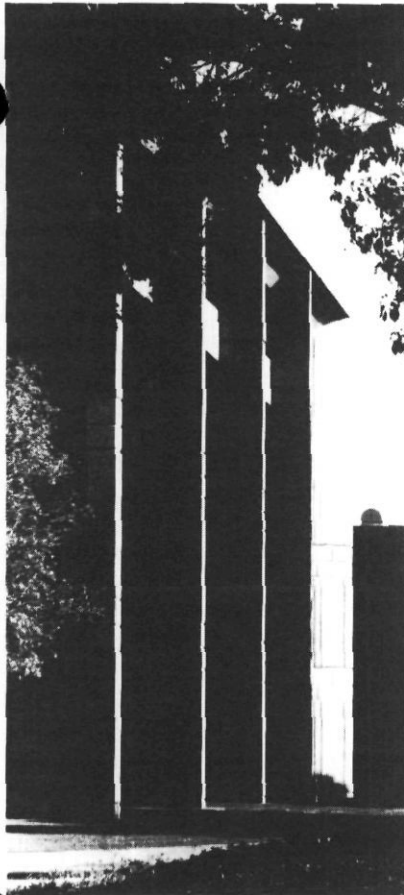
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- Photogrammetry
- Survey Computations
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- Technology and Society
- Geodetic Surveying
- Geodesy
- Surveying Astronomy
- Photogrammetric Instrumentation
- Advanced Photogrammetry
- Map Design and Reproduction
- Advanced Survey Computations
- Earth Resources Surveying
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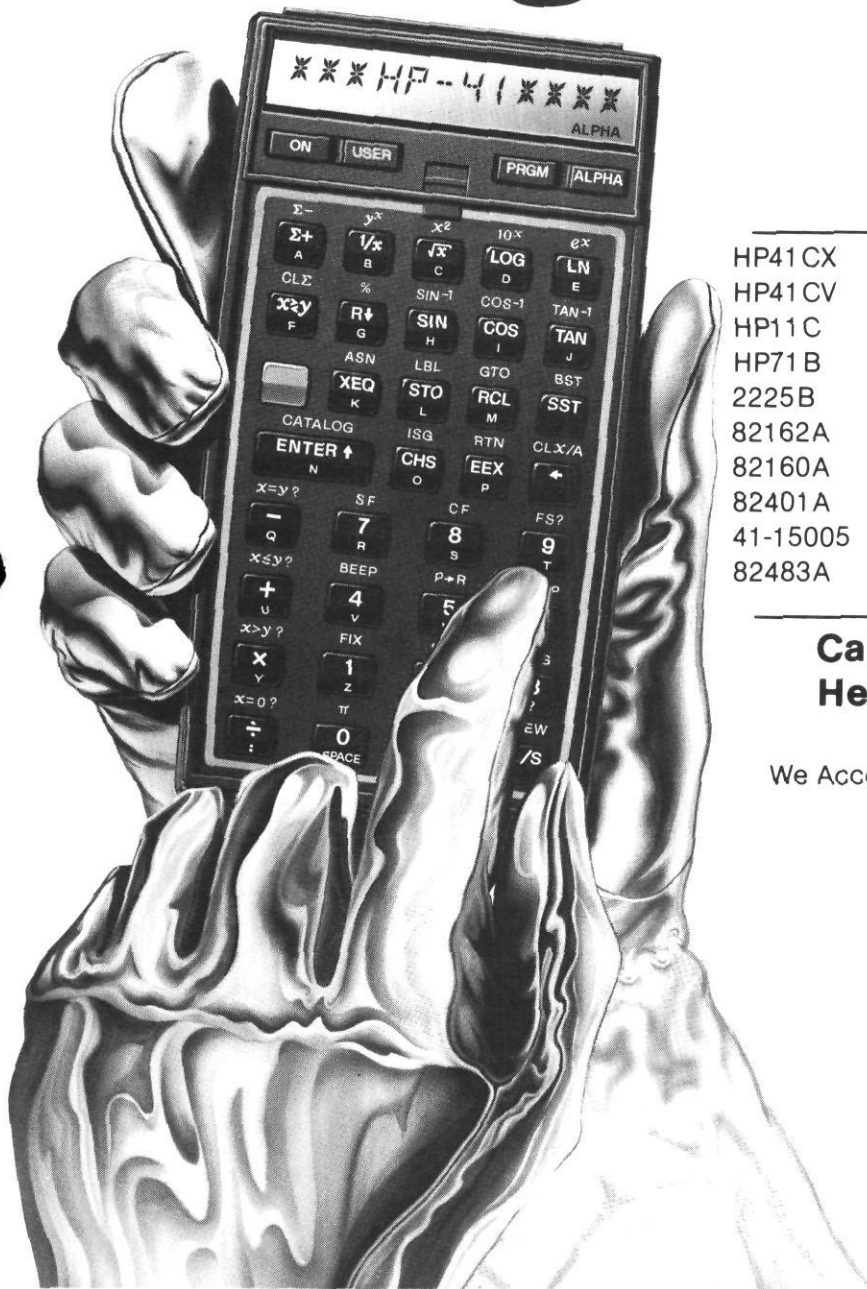
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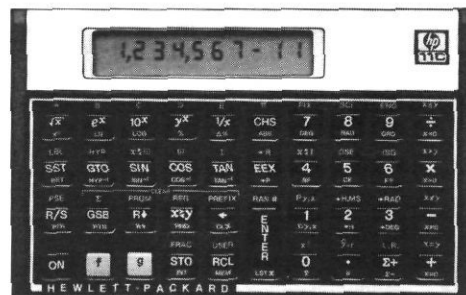
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# Orange County C.C.C.E.L.S.

*Submitted by Paul Cuomo with the permission of Kevin McHugh*

## PURPOSE:

The Professional Liaison Committee was formulated as the result of a suggestion from a group of concerned individuals and businessmen in the civil engineering and land surveying professions as members of two Orange County professional associations, the CCELS and the CLSA.

The overall objective was stated as, "an interest in obtaining a meeting of the minds between private practice and public agency on improving the development process in Orange County."

## PROGRESS:

With the cooperation of Carl Nelson, Director of Public Works, the concept was established and the first meeting was held on August 20, 1981, where Bob Bein was appointed Chairman, a statement of

objectives and procedures was developed, and the nature of items in the development process requiring committee consideration was established. It was determined that the Committee was not established as a "gripping session" for private practice, but rather an opportunity for both private practice and governmental agencies to review the development process and concentrate on methods to streamline and improve the procedures of the system.

An energetic proposal of agenda items was slated for initial discussion, as follows:

1. Current items being considered by Standard Plans Committee, Jim Williams, Orange County.
2. Status of Subdivision Manual - Floyd McLellan, Orange County.
3. County Policy on Monumentation - Gary Shelton, Orange County.
4. A/E Contracts - Anti-recruitment policy.

5. GSA Proposal - Professional liability insurance.

6. Status of development processing center ("one-stop-shop").

7. Processing items, work slowdown, map check fees, amount of map checking required.

8. Processing landscape plans.

9. Grading certification - 3 man survey crew: post occupancy problems, relationship between geologist and landscape architect.

From August 1981 to October 1984, the above-mentioned items, and many others, were brought to the PLC, and sub-committees composed of both private practice and governmental agency personnel, were appointed to review the details of the matter and report back to the Committee with recommendations for procedures and/or policies. Both private practice and governmental agency committees brought their arguments to the Committee and cooperated fully with each other in

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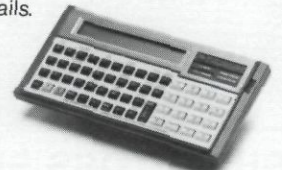
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discussing the merits of their respective points of view. General consensus on the part of private practice members is that much progress was made in the discussions in achieving the stated objective of "improving the development process," not only with the many achievements of the Committee but also in establishing a true professional working relationship between the private sector and the County. The private sector believes this may be the most significant accomplishment of all and that the relationship seems to strengthen and grow as each new issue is discussed.

Additional items discussed by the Committee were:

1. Grading Manual Review
2. Hydrology Manual Review
3. Remedial Legislation for Senate Bill 2
4. Participation in High Level County Engineering Appointments and Replacement or retiring EMA Employees
5. Effect of County Rotation Program
6. Erosion Control Compliance
7. Grading Permit Requirements

8. Lot Line Adjustment Procedures
9. County Contracts
10. Generating Funds for Monument Presentation
11. Plan Check Policies
12. Additional Conditions on Tentative Map Extensions - SB 1721
13. Organizational structure of EMA
14. County Recorder's Office Map Recordation Policies

**PROJECTIONS:**

The private sector members of the Committee see a very positive effect of the opportunity to discuss topics, such as those outlined above, with public agency officials, and provide input from industry in the effort to streamline and improve the development process. Many subjects are planned for discussion in future meetings and private sector members look forward to the opportunity to continue the dialogue in the interest of achieving the stated objectives. New members have been, and will continue to be recruited, in order to develop and maintain a better agency in the development process. □

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Lotus 1-2-3 Workshop	8	Childs	Jul 12	\$125
Astronomy for Azimuth Workshop (Las Vegas)	12	Nader/Cross	Jul 11-12	\$150
Computer Programming for Engineers and Scientists (Basic, Fortran) Workshop	16	McCallister	Aug 1-2	\$150
Basic Photogrammetry Shortcourse (Reno)	16	Hatzopoulos	Aug 15-16	\$175
Satellite Surveying Shortcourse	32	Crossfield	Aug 18-22	\$495
Astronomy for Azimuth Workshop	12	Nader/Cross	Aug 29-30	\$125
Small Business Financial Management Workshop	12	Childs	Aug 29-30	\$145
Analytical Photogrammetry Shortcourse	16	Munjy	Sep 5-6	\$200
Geodesy for Surveyors Shortcourse	16	Crossfield	Sep 12-13	\$150
Monitoring Wells and Groundwater Hydrology Shortcourse	16	Schmidt	Sep 12-13	\$195
HP41 Programming Workshop	8	Lewis	Sep 14	\$ 50
Legal Principles of Land Surveying Shortcourse	16	Knowles	Sep 19-20	\$195
Groundwater Sampling Methodology Shortcourse	32	Staff	Sep 19-20 & 26-27	\$395
Basic Photogrammetry Shortcourse	16	Hatzopoulos	Sep 26-27	\$150
Professional Engineer Exam Review for Civil Engineers	32	Staff	Sep 26-27 & Oct 3-4	\$300
Professional Engineer Exam Review for Electrical Engineers	32	Staff	Sep 26-27 & Oct 3-4	\$300
E.I.T. Comprehensive Review	24	Staff	Sep 27, Oct 4, 11	\$150
Land Surveyor Exam Review	30	Staff	Oct 3-5	\$225
L.S.I.T. Exam Review	26	Staff	Oct 3-5	\$175
Least Squares Adjustments Shortcourse	16	Hatzopoulos	Oct 10-11	\$150
Optimization Techniques Shortcourse	16	Frair	Oct 17-18	\$150
Quality Assurance for Groundwater Sampling Shortcourse	16	Longley	Oct 24-25	\$195
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Multipurpose Land Records Information System Shortcourse	16	Crossfield	Nov 14-15	\$150
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HP41 Programming Workshop	8	Lewis	Jan 15	\$ 50
HP 41 Advanced Programming Workshop	4	Garner	Jan 15	\$ 30
HP 71 Advanced Programming Workshop	4	Bell	Jan 15	\$30

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HP	3820A 3 mile/1 sec	\$100	\$67	\$50
	3810A 1 mile/10 sec.	50	33	25
	3810B 5 mile/10 sec.	50	33	25
	3851A collector	20	13	10
Lietz	SET 3 1 mile/5 sec	75	50	38
	SDM3ER 1 mile/10 sec	53	35	27
	SDR2 collector	20	13	10
	SDM3E 1 mile/3 sec	45	30	22
Topcon	ET1 1 mile/1 sec	75	50	38
	FC1 collector	20	13	10
	GTS3 1 mile/5 sec	53	35	27
	GTS2 1 mile/6 sec	45	30	22

### DISTANCE METERS

HP	3808A 6 mile/1 ppm	\$45	\$30	\$23
	3805A 1 mile/5 ppm	35	23	18
	3800A 2 mile/5 ppm	25	17	13
Lietz	RED2L 3 mile/5 ppm	35	24	18
Topcon	DMS3 2 mile/5 ppm	35	24	18

### THEODOLITES & LEVELS

Lietz	TM1A 1 second	\$30	\$20	\$15
	TM6 6 second	20	14	10.50
	DT20E 10 sec/elect.	15	10	8
	B1 level 32X	11	8	6
	B2C level 32X	11	7	5
Topcon	DT20 20 sec/elect.	15	10	8
	TL10DE 10 sec.	20	14	10.50
	ATF1 level 32X	11	8	6
	ATF3 level 30X	11	7	5
Ziess	Ni-2 level 32X	11	8	6

### HEWLETT-PACKARD COMPUTERS

HP-11C programmable scientific	\$50
HP-12C programmable business	
HP-15C programmable scientific w/matrices	83
HP-41CV programmable calculator	145
HP-41CX programmable calculator w/extended functions	202

## HEWLETT-PACKARD

### ANNUAL SERVICE AGREEMENTS

3820A edm	\$1440
3810B edm	785
3810A edm	878
3808A edm	562
3805A edm	524

### SERVICE

Model #	CAL	PM
3820A	\$515	\$240
3810A/B	455	240
3808A	360	95
3805A	300	95
3800A	300	95
3801A	110	60

Calibration and preventive maintenance includes minor repairs, adjustments and cleaning. Major repairs will be quoted as time and material. 90 day limited warranty.

### ACCESSORIES

11441A rebuilt pod	120
11441A battery (new)	180
11421A rebuilt pod	105
11421A battery (new)	130

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	REG.	SALE
HP 11410D single prism	\$185	\$150
11411D triple prism	480	400
SECO 510 range pole	160	125
TOPCON tripod	210	170
LIETZ tripod	199	160
AERVOE paint (case)	39	35
LUFKIN W312D 12' tape	14.60	11.32
W325D 25' tape	18.85	14.64
1066D wood rule	13.65	10.92
		275
PRICES SUBJECT TO AVAILABILITY		25

PRICES SUBJECT TO AVAILABILITY

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# Duties of a Good Party Chief

Reprinted from the Tennessee Surveyor

1. Make every effort to be at work every day and arrive at work soon enough to get your materials and people ready to leave the office for field work by work time.
2. Remember that you are a supervisor and director of your group. Your value is measured by the success you achieve in motivating, training, teaching your assistants and developing smooth, efficient and accurate team effort. Accuracy and completeness of any task are essential.
3. See that you have the materials needed to do the job and use these materials efficiently.
4. Utilize the talents of your workers so that you get the most productive work accomplished.
5. Be able to plan your work ahead so that you know what the next move will be. Don't wait until one part of the job is done before deciding what to do next — think ahead.
6. Teach each person in your crew how to do the assigned job. Don't pretend that he already knows.

7. Teach each person in your crew to take pride in their work and to wear the proper clothing and maintain a neat appearance.
8. Keep a good set of notes. They should be easily read and not scrunched together. There should always be a neat sketch on the righthand side of the field book showing your work.
9. Always be a little suspicious of using control set by others. Always check them out. Always have a way to check your work to make sure it is correct.
10. Try to put yourself in the person's place who is going to use your notes. Can your notes be plotted? Is the sketch properly oriented? Have you obtained enough information, such as, names of roads, houses, poles, trees?
11. Always remember that the company you work for must make a profit to survive. For you to survive, the company has to make a profit. The type and amount of services you perform determine your status with the company.
12. Do everything you can to improve yourself. Take the attitude

- that someone is just about to pass you on the road to success.
13. Do not take for granted that others have gotten permission for you to survey on private property. In each case, assume that it has not been obtained.
  14. Be extremely careful about cutting line on the owner's land. It will be more noticeable in the summer than in the winter.
  15. Do not be afraid to tackle a job that is tough or that requires more experience than you have. If you are not sure how to do the job or what is wanted, ask questions. Remember that others have been in the same position you are in and they got the job done by getting a few pointers along the way.
16. If you will, take the attitude of always giving 100% on every job. There is a great demand for dependable, aggressive and hard workers. This type of person will always have a job and will have very little difficulty finding one if the need arises.
- QUESTION: Can you add anything to this list or do you disagree with any item? Return your comments to the editor.*

## SURVEYORS G.P.S. SURVEY

## Questionnaire on GPS Receiver

"This survey will help the instrument manufacturers such as Rockwell International in the research and development of a GPS receiver for land and geodetic survey applications. In addition this survey will provide the amount of interest for a GPS receiver in the surveying community. Thus your input will help the future development of GPS receivers."

Sincerely yours,  
K. Jeyapalan  
Professor of Civil Engineering  
Iowa State University

### Type of work you are involved

1.  Control Surveys     Land Survey     Engineering Survey  
 Geodetic Survey

### Type of GPS instrument you would like to use

2.  1 cm accuracy     10 cm accuracy     1 m accuracy  
 10 m accuracy     25 m accuracy     100 m accuracy

### Reasonable Price

3.  \$5,000 - 10,000     1 cm     10 cm     1mm     10 m  
 \$10,000 - 25,000     1 cm     10 cm     1mm     10 m  
 \$25,000 - 50,000     1 cm     10 cm     1mm     10 m  
 \$50,000 - 100,000     1 cm     10 cm     1mm     10 m  
 \$100,000 - 200,000     1 cm     10 cm     1mm     10 m

Please remove or photocopy your response and mail to C.L.S.A. Central Office. This information will be reported in the next California Surveyor. Your questionnaires will be forwarded to Iowa State University.

Staff



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# “The Liability Crisis: A Primer for Surveyors and Mapping Scientists”

*This special report was prepared by the ACSM-ASPRS Joint Government Affairs Program, John M. Palatiello, Director, March, 1986.*

Imagine a young man on a motorcycle comes racing through a subdivision. He is drunk and unable to control his vehicle, particularly at the high speed at which he is driving. He approaches a bend in the road and hits a curb. He is thrown from his motorcycle and dies from his injuries. His family sues the surveyor who designed and drafted the location of the subdivision street. Despite the fact that the motorcycle driver was drunk and clearly liable and responsible for his own actions, a court finds the surveyor liable and awards the victim's estate \$200,000 in damages.

Although this scenario may sound far fetched, it can happen. In fact, it has. It is based on an actual case. Courts have applied the doctrine of strict, joint and several liability — that is liability not based on fault, but who has the “deep pocket” of money — in cases touching every business and profession in the American economy.

Legal experts believe the explosion of liability awards to victims is based on aspects of the American judicial system which have gone astray. Attorney General Edwin Meese, III told a White House conference there needs to be “a balancing act in our legal system” whereby “victims are made whole” through compensation, but not “to provide a windfall.”

A number of civil justice system reforms are frequently mentioned as possible solutions. The most popular, but long term remedy is a statute of limitations. All fifty states have some legal limit on the time in which a claim can be made against a design professional, but several have been held unconstitu-

tional. According to a recent inquiry of the NSPS Board of Governors, 11 states are known to have such a law applying to surveyors.

The U.S. Supreme Court recently upheld the legality of a California law limiting punitive damages in medical malpractice cases to \$250,000. There are other legal limits on monetary liability, such as nuclear power plants, airline crashes and oil spills.

Some have also suggested limiting trial lawyers' contingent fees or replacing them with a sliding scale. It is often noted that the United States is the only major nation in the world which permits lawyers to peg their fee as a percent-

tage of their clients' awards.

It has also been suggested that the “collateral sources rule,” information on the injured party's awards from insurance, workers' compensation and other sources is not known by juries when they rule on the amount of a liability award to be taken from the guilty party.

An approach suggested to ease the burden when jury awards are made is a structured settlement system, whereby incremental, rather than lump sum payments are made to injured parties.

While other occupations and professions have numerous horror stories to tell about the inavailability of insurance, skyrocketing

## ACSM Joins Tort Reform Group

FALLS CHURCH, VA - The American Congress on Surveying and Mapping has joined more than 100 organizations in the formation of the American Tort Reform Association (ATRA). This broad based coalition of associations, businesses, professional and public interests seeks resolution of the liability crisis, civil justice reform and promotion of the availability of affordable insurance.

At the Federal level, ACSM will work through ATRA to promote resolution of the liability crisis by the White House and Congress.

More importantly, ACSM's participation in ATRA will provide surveyors and mapping scientists at the state level the ability to join forces with other businesses and professions in the formation of broad based local coalitions on the liability crisis by supporting model state laws and developing training sessions to establish public

awareness of the need for tort reform.

As one of its first efforts, ATRA organized a February 19 White House Conference on Tort Reform. ACSM Assistant Executive Director for Public Affairs John M. Palatiello attended on behalf of ACSM.

At the briefing, Attorney General Edwin Meese, III told representatives of ACSM and more than 125 other organizations that the Reagan Administration is committed to reforming the Nation's tort law system.

Merlin Breaux, Special Assistant to the President for Public Liaison, opened the conference by noting ATRA has “the support of the White House,” noting that liability reform is a “top White House issue.”

Meese recently appointed a working group on civil justice reform headed by Assistant Attorney

premiums, increased deductibles and limits and exclusions of coverage, surveyors are fortunate, the crisis has not yet had a catastrophic impact.

Policies written for ACSM members through the endorsed CNA program of the Victor O. Schinnerer & Co. (VOSCO), have not experienced a premium increase for more than six years. In fact, when ACSM last renegotiated its agreement with VOSCO in 1981, premiums were reduced. Some firms experience increases at renewal time due to significant increases in revenues.

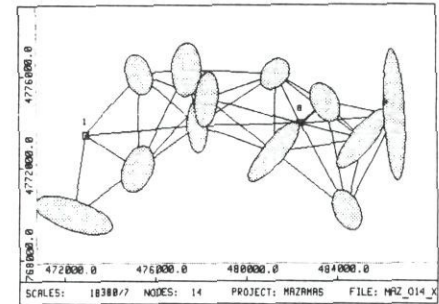
Exclusions are currently standard for any survey work related to the production or location of oil or gas. VOSCO policy holders are also being advised that policies will now carry an exclusion from coverage for a wide range of pollution related work.

Currently, surveyors insured by VOSCO are not experiencing the crisis and in comparison to other professions, surveyors pay less for liability insurance. Surveyors currently pay about 1.5 to 2 percent of gross income for liability coverage, where civil engineers average 8 percent, due to the lower claim and loss

record among surveyors relative to engineers. VOSCO places firms whose receipts are primarily derived from surveying services in the lowest cost, reduced risk surveyors' insurance program. Firms which derive more than 20 percent of their income from engineering services are those particularly hard hit, as the engineering insurance program face increased premiums, higher deductibles, and limits and exclusions from coverage.

Despite the fact that the picture for surveyors is not as clouded as other businesses and professions, ACSM is working on several fronts to minimize future problems. The Superfund hazardous waste cleanup bill currently before Congress contains a number of protections advanced by ACSM and other design and construction groups. As a member of American Tort Reform Association, ACSM will provide information to its members in state organizations on efforts in state legislatures on the aforementioned solutions.

All surveying and mapping professionals should dedicate time to these efforts as their short term insulation from the crisis could become their own long term liability. □



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1. Wild 410 Citation EDM, City of San Jose Unit "C", City of San Jose #054479, Wild Serial #21809

2. Lietz 10-C Optical Transit with mounts for the 410 EDM, City of San Jose #036835, Lietz Serial #135521

Stolen from the City of San Jose. Both items were still in the cases when stolen.

If anyone has any knowledge of these items, please contact: Larry Cloney, Dept. of Public Works, Room 300 - City Hall, 801 N. 1st Street, San Jose, CA 95110 (408) 277-4607

General Richard K. Willard, who also directs the Justice Department's civil division. He said the Administration is seeking broad based rather than special interest remedies.

The working group has task forces investigating problems related to state and local government employees, Federal employees, government contractors, insurance availability and professional liability. It will report findings and recommendations to the Cabinet Domestic Policy Council by the end of March.

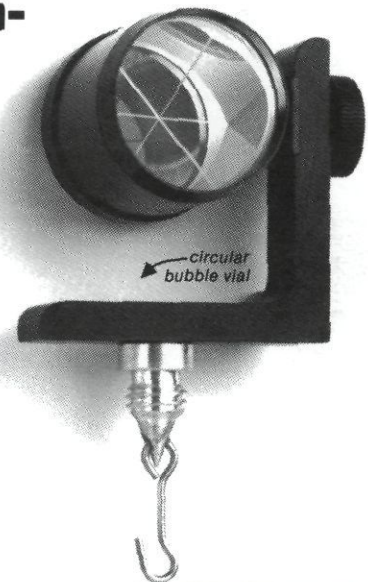
"Liability pollution is hurting the users of surveying and mapping services as much as it is hurting surveying and mapping practitioners. ATRA is an organization that will help correct the causes of the runaway liability crisis that's facing our country and the profession," said Palatiello.

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