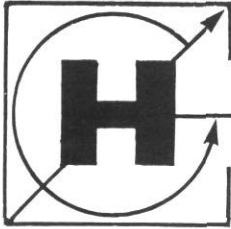


The California Surveyor



Scenes from
CLSA-NALS 1987
Joint Conference
See Conference Report
on page 6



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The California Surveyor

is the quarterly publication of The California Land Surveyors Association, Inc. 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, Inc. *The California Surveyor* is an open forum for all surveyors, with an editorial policy predicated on the preamble to the Articles of Incorporation of the California Land Surveyors Association, Inc. 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."

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Sustaining Membership

Membership in the California Land Surveyors Association, Inc. 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, Inc. Contributions submitted on floppy diskette medium is encouraged. For compatibility, the following requirements should be met: 5 1/4-inch floppy diskette, PCDOS or MSDOS format, ASCII text files, and no formatting codes in the text. Material should be sent to *The California Surveyor*.

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President's Message

The California Land Surveyors Association is an organization that is dedicated to the best representation possible for the Professional Land Surveyor in California. This cannot be done by one person, elected by the membership, and charged with the responsibility of seeing to the affairs of the association. It includes all of the elected officers and many volunteers working together as a team. If one member of the team should happen to falter, others will step in and take up the slack. Through these combined efforts we are able to give you the best; that is our pledge to you; that is what you deserve! And we are not here to serve a part of our membership while paying lip service to another part. We are here to serve all of the membership equally. We have but one master, if you will, the Professional Land Surveyor of this state.

Why, you may say, would the president of this association start his message by telling us something of which we are already aware. You might also be thinking, that had I expected less I would not have cast my lot with the association in the first place.

Therein lies the reason I have chosen such a start. Most of us need to be reminded from time to time of things that we all take for granted. This is especially true in my case.

In early January of this year, things were looking bright for me. I had just been elected president of one of the most prestigious associations in the state.

Prior to my first meeting as president, I made numerous contacts throughout the state, seeking volunteers to fill the various committee chairmanships. And much to my surprise, I had no problem finding willing candidates. All of my appointments were approved by the Board of Directors. I felt that I was in tune with the board, we had a good program outlined and approved, and good people willing to do their part to see that all went smoothly.

For the first time the California Land Surveyors Association had a President Elect, who had a full year to visit the membership and determine the direction to be taken in 1988. Also, for the first time, the association would not have a Vice-President. We had convinced ourselves that we really didn't need that position, a decision that I am

not too sure was a wise one.

One week after the first board meeting of 1987 your president was admitted to the hospital for triple by-pass surgery, an event that came as a complete surprise. For this reason, I say that I am not too sure our decision to eliminate the position of Vice-President was a wise one. CLSA came very close to having it's first nonelective president, as well as, the first president to serve two terms without benefit of election.

Your President Elect took the reigns of the presidency and continued with the programs as outlined and approved. However, had my recovery been delayed there would have been no time, nor would there have been the opportunity, to adequately plan for 1988, while conducting the business of 1987. If you believe as I do that the office of Vice-President should be reinstated, I request that you discuss it at the chapter level and instruct your representative to the Board of Directors to make your wishes known.

I report to you now that the Califor-

nia Land Surveyors Association, as well as your president, is alive and well. Together we are moving forward. I have never felt better, and CLSA seems to be enjoying a very good year. We have just received our final report on the most successful conference yet, and are in the middle of planning what could be an even better conference next year.

In closing I would like to congratulate the Board of Registration for Professional Engineers and Land Surveyors for electing Mr. Jim Dorsey as their President. Congratulations are also in order for the Governor of the state of California, George Deukmejian, for recognizing the fine qualities that Jim possesses, and appointing him to another four years on the Board. And congratulations to you, too, Jim for having the good sense to accept both the presidency of the Board and the appointment.

Louis E. Rutledge, LS
President

□

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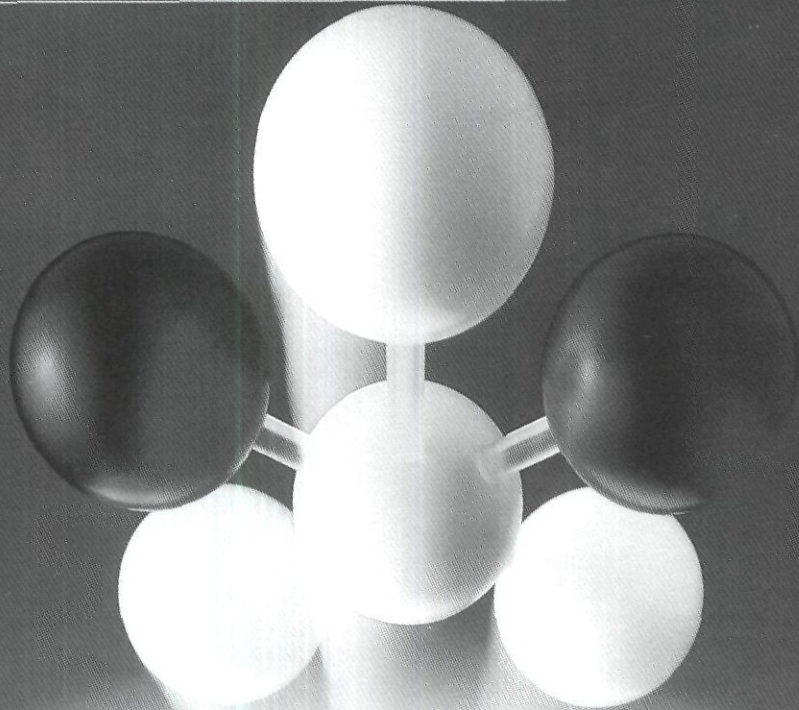
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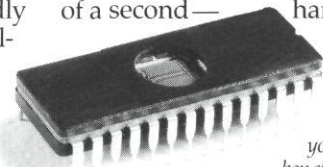
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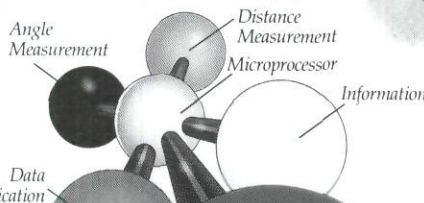
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1987 Joint Conference Report

A report on the 1987 Joint Conference between the CLSA and NALS held in Las Vegas Nevada, March 4 - 7, 1987, Bally's Hotel, formerly the MGM Grand Hotel.

Report by Michael J. Pallamary, LS, San Diego Chapter, CLSA, prepared at the request and direction of CLSA Board of Directors.

As if indicative of the prosperous times currently enjoyed by the land surveying and real estate related professions, the 1987 conference of the California Land Surveyors Association was held in Las Vegas, Nevada. The incredibly successful conference was held in conjunction, and in a cooperative effort with the Nevada Association of Land Surveyors. As joint sponsors of the conference, CLSA and NALS hosted an extravaganza long to be remembered by the 417 attendees and their guests.

On Wednesday, March 4, many of the conferees and participants arrived at Bally's palatial hotel. Located across the street from Caesar's Palace, Bally's offered a host of accommodations as well as being located very close to downtown Las Vegas.

The majority of the attendees stayed at Bally's, a virtually self-sufficient establishment. There was ample room in the suites and superb restaurants and shops to be found throughout the hotel complex.

By Wednesday evening, the hotel was bustling with guests and visitors, providing a colorful backdrop for the conference which was held on the 26th floor of the hotel. The rooms offered a sweeping panoramic view of Las Vegas and the beautiful Nevada desert which lay just on the outskirts of this desert community. During the early registration, the hospitality suite was open and concurrently, the conference committee met to finalize last minute arrangements. Like a precisely tuned instrument, the conference neared the opening on Thursday, being the result of countless hours of preparation by the committee. By Wednesday evening, the program for the next three days was successfully put into operation.

The central lobby of the 26th floor was the scene for the formal registration of the many attendees and guests. The hallway was filled with the sound of greetings and chatter as old acquaintances were renewed and many a new one were made. As is typical of

a successful conference, familiar faces were to be found in every corner.

At precisely 9:00 on Thursday morning, the joint conference of CLSA and NALS was officially opened. Paul A. Cuomo, LS and the Secretary of the California Land Surveyors Association proceeded to take the podium and formally commence the opening of the 1987 conference.

Paul is a highly regarded speaker and combined with his spontaneous sense of humor, served to set the tone and pace for the three day conference. Without much ado Paul introduced the current Presidents of CLSA and NALS, Louis E. "Gene" Rutledge, LS and Phillip M. Mott, LS.

Both gentlemen were pleased and honored to begin the proceedings for this the 1987 conference. As well as welcoming the attendees and distinguished guests, both gentlemen were delighted to acknowledge the efforts of the conference committee, without whose help, the conference would not have been possible.

CLSA's Executive Officer, Dorothy Calegari, served as co-chairperson of the conference along with Ron Monson from NALS. They were aided in their efforts by four representatives from CLSA and an equal amount from NALS. John Pavlik, Paul Cuomo, Susan Jensen, and Kenny Fargen all did a splendid job on behalf of CLSA. They well represented our organization and enough cannot be said of their efforts. Equally impressive was the NALS contingent which included Barry Hickerson, Rita Lumos, Kenneth Brown, and Eslyn "Babe" Brenner.

Clearly an indication of the great success enjoyed by this years' conference was the large number of guests and dignitaries in attendance, representing a majority of the western states as well as national surveying organizations.

These dignitaries included James Dorsey and William Rupp, both representing the State Board of Registration. Harry "Bud" Campbell, chairman of WFPLS, Don Bender, President ACSM, John Stock, President NSPS, Paul Lamoreaux, Area 9 Director NSPS and Pres. No. Cal. Section ACSM. In addition, neighboring western states were represented by their respective presidents. These included George Sanders and Tommie Anderson, President and President-

Elect of the Texas Surveyors Association, Gale Dahlman from Idaho, and Homer Gilson from Colorado. Finally other California organizations were represented by Alan Myer the President of the Southern Cal Section of ACSM and William Steen, the President-Elect of the California Council of Civil Engineers and Land Surveyors. Tom Gribbin, President of the Consulting Engineers Council was also welcomed and in attendance.

The key note speaker for the conference was John M. Palatiello, the distinguished Assistant Executive Director for Public Affairs for ACSM as well as the director of ACSM's Joint Government Affairs program with the American Society for Photogrammetry on Federal Procurement of Architectural/Engineering Services (COFPAES), and in addition, John serves as Treasurer of the ACSM/NSPS PAC.

John, in his capacity, has possibly done more to promote the national image of the surveyor than any single individual. Combined with his valuable background as a congressional legislative assistant, John has been able to successfully apply his diversified expertise to the betterment of the land surveying profession.

Being in the mainstream of issues at a national level, John's presentation addressed an issue of extreme importance to the surveyor at every level of government and practice. That key issue was education.

'Educate-Legislate-Communicate' was the theme of John's speech. *It is an area of vital interest to the land surveying community, one so timely, that its importance cannot be over-emphasized.*

John commenced by explaining and discussing the great disadvantage the Land Surveyor is at with regards to the professional peer community. Recognition at the federal level is difficult because of the surveyor's general lack of formal education, a fact which constantly hampers identification by the legislature. With so many high powered interests being lobbied before congress and the senate, those that are better educated are those that are recognized. The days of the plumb bob and stadia board are gone forever. They have been replaced by complex computer technology, satellites, and a host of other devices created in response to a burgeoning technical

society.

Additionally, land values have escalated causing the related laws affecting real property to be revised creating a bevy of regulations demanding only the highest skilled and better educated individuals in the land surveying community.

The role and interests of the Land Surveyor must be conveyed to the appropriate branch of the legislature. The surveyor must project his concerns in order to bring about change. This does not only apply to the national level, but also to the state and local level.

Finally, John stressed the importance of communication. Communication between each other and those that need to be aware of the concerns and issues affecting the land surveying community. Silent voices make no sound. In the roar of the crowd, our voices must be heard. It is a responsibility we hold to each other. One we must constantly strive to maintain.

Appropriately, following John's inspirational presentation, the audience was shown the west coast premiere of the recently completed NSPS film "A Matter of Degrees."

Tracing the early history of surveying, the viewer was taken through

history to see the development of modern survey practice. Partially filmed in the Smithsonian Institution, the importance and integral relationship between the surveyor and society was emphasized.

Following a magical trip through history, we were brought to the office of a modern surveying firm to watch a project take birth. We saw the surveyor in his various roles as he aided and directed the project to it's eventual construction and completion. By and large, the 28 minute film was well received, with many individuals seeking to obtain their own copies which are offered in a variety of film mediums.

At 10:15, Denny DeMeyer, the President of the Northwest Chapter of the Land Surveyors Association of Washington, presented a remarkable and well received lecture and slide show entitled "Retracing the Willamette Meridian."

Some time ago, this story was published as a feature article in *POB* and proved to be a most enjoyable story. Denny's appearance and firsthand stories were delightful as well as extremely educational. One did not have to be a surveyor to enjoy and appreciate this fascinating project. Den-

ny's splendid use of slides and humor coordinated with his presentation revealed a well planned and high quality production.

The story involved a group of surveyors from Denny's area retracing the Willamette Meridian and recreating the clothing and steps of the original surveyors. This task involved backpacking in with horses and camping at the same locations as did the original crew when first performing the work over one hundred years ago.

The survey crew utilized vintage chains and the Burt's solar compass. Some of the more humorous anecdotes involved the aid of contemporary equipment at select times. These included a chainsaw and an HP 41-C which occasionally appeared in the "recreated" historical photos.

From beginning to end, the audience was transported in time to Puget Sound and the rainy northwestern region. The slides, being so well produced, added immensely to the lecture and revealed a strikingly clear image of surveying one hundred years ago. Today, the notes and plats and an occasional monument are all that is left of

continued on page 8

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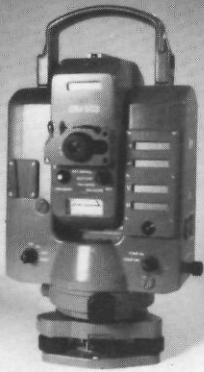
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Report

continued from page 7

these great pioneers. Thanks to people like Denny DeMeyer and his assistants, there are many more memories of these early surveyors for those who attended the '87 conference.

At noon, the exhibit room was formally opened. As has become a standard for CLSA conferences, there was an impressive array of equipment on display as well as knowledgeable representatives from each major supplier and distributor. The exhibits, as usual, required a considerable amount of time and were a conference unto themselves.

The exhibitors room was also the site of the many raffles that were held throughout the conference. Each of the attending chapters and many of the distributors generously provided a wide range of prizes and gifts. The exhibitors room was a very lively scene during the raffles and also afforded attendees a chance to view the latest in survey technology and equipment.

The Pot Roast luncheon was highlighted by a lecture by former CLSA President, and current member of the Board of Registration, James Dorsey, LS. Entitled "The Surveyor - Where he has been, is now, and where is he going", the lecture was an informative perspective of the surveyor as he is envisioned at the state level. Jim began his speech by noting that the consumer's view of the Land Surveyor is rather low and is one that must be improved.

Citing the historical significance of the surveyor, Jim traced the evolution and possible decline of the profession in recent years. In order to restore or establish credibility for the profession, Jim maintained that the standards imposed upon the surveyor and the education and licensing necessary to practice surveying must be raised.

The recent results of the Land Surveyor exam in the state of California has been the source of great criticism by disgruntled applicants who were unsuccessful in obtaining their licenses. Under great pressure, the State Board has maintained that the examination is a sound and proper test of an applicant's ability and that the recent crop of applicants were simply unqualified to sit for the exam. The results of the recent exam, which were conducted identical to the preceding years, proved Mr. Dorsey to be correct. A high success rate occurred without altering the exam. The applicants got the message and simply studied for the

exam as they should have earlier.

Jim closed his comments by stressing the importance of education, a common thread of the many speakers and dignitaries who spoke over the three day conference.

Following the relaxing and well prepared lunch, conference attendees had the choice of attending one of two optional sessions. "Research Material at the State Lands Commission", was presented by Ed Zimmerman, a Boundary Officer with the California State Lands Commission, in one room while Bob Zickwolf, Regional Surveyor with The U.S. Forest Service, Pacific Southwest Region aided by Carl Tompkins, LS also with the Forest Service, presented a program entitled "Forest Service Contracting Program."

Ed began his lecture by noting that the opinions and commentary offered by him were his own and not reflective of official policy, as he gave us valuable insight into the official workings of this important branch of government.

The State Lands Commission is presently composed of three members, Leo McCarthy, Grey Davis and Jess Huff. Meeting monthly, the commission is responsible for overseeing the 7 million acres of land under their jurisdiction.

Relating the early history of state lands, Mr. Zimmerman went on to provide a most informative overview of the records and availability of maps stored in their extensive archives. Presently, his office maintains an inventory of sixty-thousand maps, one third of which are of federal lands. In an attempt to update the library, the commission has recently adopted a new program to collect maps for use by both the commission and the general public.

The majority of the maps are generally topographic with a great many dealing with hydrographic information. Mr. Zimmerman noted the importance of these documents in matters related to coastal activity, a primary concern for the lands commission. Since 1971, Mr. Zimmerman noted, the commission began an accelerated program of obtaining high quality maps for use and reproduction.

Additional documents are regularly being collected and inventoried by the commission, including quad sheets, GLO maps, and maps of the public lands. Also included in the inventory are Mexican land grant maps, tideland maps, as well as modern assessor's maps and aerial photos.

Mr. Zimmerman stressed the willingness of his agency to assist anyone

in need of any of their multitude of records. In the event that anyone is ever in need of, or must research any historical maps of anywhere within the state, would be encouraged to contact Ed and his agency. They would unhesitatingly assist any interested party needing their services.

The Forest Service presentation provided a comprehensive overview of the programs and procedures employed in the procurement of contracts with their agency. In conjunction with a nationwide program, the Forest Service is identifying federal lands and performing surveys of areas sensitive to modern development.

In an attempt to perform the work, the Forest is seeking to contract with the private sector. This program is encouraged and presently available to many regions throughout the state. The Forest can be contacted for those who desire to be placed on their availability list.

By three o'clock, everyone was ready for a cup of coffee and a chance to win one of the many prizes being raffled in the exhibitors room. As there were so many fine prizes, few went away empty handed.

Robert Stephenson, A Registered Engineer and a Land Surveyor as well as member of the New Mexico Bar Association, presented a timely presentation entitled "Choosing A Computer System."

Bob, as the founder of Stephenson Software, has been involved with providing computers and software to the surveying community. He also holds a degree in engineering and a doctorate in law, which combined with his knowledge of computers offered a diverse and valuable insight into the decisions that must be made before one purchases a system. Considerations such as applications and budgetary constraints were all issues that need to be considered before a major purchase such as a computer system was contemplated. In light of the well represented systems and software on display two rooms away, Bob's program was one much appreciated.

The final sessions of the afternoon were held concurrently in rooms atop Bally's majestic Grand Hotel. While the Forest Service presented their program once again, Karen Wilson, MBA, a management consultant, made a presentation entitled, "Communicate - I've Been Asked To Speak!!"

With twelve years experience in training and helping businessmen manage their businesses more effi-

ciently, Ms. Wilson was familiar with many of the day to day problems facing the executive and businessman.

With a specialization in communication skills, Ms. Wilson discussed the problems many surveyors face on a regular basis when required to give a presentation before a group, large or small. She noted that nervousness was alright and that used properly, could work to one's advantage.

It is important to identify the needs of the audience before preparing or making a presentation of any sort, was just one of the valuable tips offered by Ms. Wilson. Make sure that the audience, whether it be one or a hundred, understand what you have said and that you attempt to clearly and concisely convey to them your concerns, which would be the basis for your presentation. Organization, she stressed, was a major factor and could not be overlooked nor overemphasized.

Ms. Wilson, in completing her presentation, stressed the importance and value of proper body language. All too often, a good speaker tends to distract and detract from his presentation by poor or confusing body movement and posture tending to confuse or turn off the listener(s). All in all, Ms. Wilson's

presentation was of extreme importance as evidenced by the many attendees who voraciously took notes of many of her comments.

While many attendees retired to their respective rooms to freshen up, a good many proceeded to the lobby to play a little blackjack or try their luck with the one-armed bandits residing in the lobby of the hotel. Nearly as large as a football field, the casinos were abuzz with many CLSA members and guests. In the adjacent entertainment lounge, Dean Martin and the Goldiggers kicked off their extravagant show.

At 6:30, again returning to the twenty-sixth floor of the hotel, the exhibitors-sponsored cocktail party got underway to a great crowd of surveyors along with their spouses and friends. From the seating area, the spacious room offered an impressive and panoramic view of downtown Las Vegas, where before the evening was over, many would travel to try their luck at the casinos downtown.

For over two hours, the exhibitors entertained everyone with fine food and drink. There was ample food and fare and as usual, the party was the

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Report

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highlight for many. In addition to having the chance to meet with the exhibitors, the cocktail function afforded many the opportunity to meet with others and discuss a wide range of topics. By nine o'clock, with the party winding down, everyone went their separate ways to take in one of Las Vegas' world famous shows or to visit one of the many casinos. The "Jubilee Show" held in the hotel was one of the many shows well attended by the group. The non-stop extravaganza earlier in the day, had been the source of a tour conducted for the women as a social event.

They had the chance to see the show girls prepare for the show as well as having a chance to see the behind-the-scenes look at the stage hands and equipment required to stage such a spectacular production. Everyone who attended was amazed at the work involved in putting on the show.

Friday morning the exhibitors area slowly filled up, as the second day of the conference got underway. Fred Henstridge, LS and Vice-President with Psomas and Associates started off the days' activities by presenting a program entitled "Managing A Survey Business." As the officer of a firm that employs 150 individuals, Fred was well qualified to speak on the topic of his presentation. The processes employed in order to run and maintain a business are diversified and are perhaps the most important facet of operating any business, it was noted by Fred. As one of the fundamental procedures, Fred noted, it was necessary to understand the needs of the various individuals it takes to effectively run a business.

Once this essential matter is taken under consideration and many of the personality problems are worked out, *there are other day to day issues that must be identified and pursued.* These include such important aspects as marketing, business development, sales, and other fundamentals of business practice. The importance of segregating *one's expertise and market are important items that are all too often overlooked by many a new or small business.* Only by identifying this area can one expect success from his business. In effect, the overall coordination of *these many items are of importance* if one expects to build or run a successful business. (Obviously a goal and desire of the many that attend Fred's lecture and presentation.)

"Office Automation - How To Sell It

To Your Boss" was presented after a morning coffee break by Scott Lazenby, Director of Management and Budget with the City of Glendale, Arizona. With seven years experience as a Systems Analyst and Management Analyst, Scott was well versed in his subject.

Citing the increased productivity of modern office machines and the computerization of many rote tasks, Mr. Lazenby stressed the importance of utilizing modern technology in the office. As the business world becomes more competitive, those at the forefront of computerization and technology will be those that will adapt and create the new business environment and standards of practice.

The final session of the morning was presented by Jon Blake, LS. Jon is a Licensed Mineral Surveyor as well as a licensed surveyor in several states. His subject, "Mineral Surveys - What They Are And What To Do With Them", was a well attended program and provided a fascinating look at a branch of surveying that many practitioners are unfamiliar with.

Dating back to 1872, the history and practice of mining and mineral surveying has its roots in the early settlement of California and Nevada. By appointment, there are only 130 mineral sur-

veyors in the United States. With such a small supply of practitioners, Jon noted there are many problems in obtaining literature and information on the practice of mineral surveying. Jon went on to explain the various types of surveys that are performed, which, for the most part, are a function of the type and location of the claim.

Some of the more salient points of Jon's presentation included the fact that the mineral surveys must be tied into sectionalized land corners and/or anchored to a definite geographic feature. The claim must also be actively pursued and a certain amount of improvements must be performed to maintain the validity of the claim.

Jon advised any interested individuals to review the government manual to acquaint themselves with mineral surveying, as well as to obtain as much literature as possible to familiarize oneself with the requirements and procedures to perform a mineral survey. The practice of mineral surveying is very unique in that there are no published rules nor procedures to follow while performing a mineral survey.

Jon concluded his presentation by discussing an actual survey he per-

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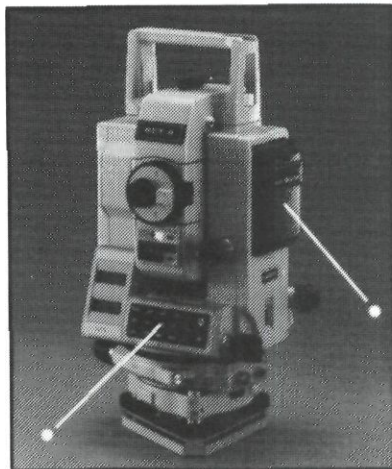
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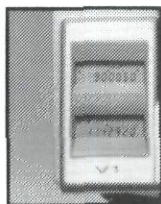


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Report

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formed. In addition, he related the procedures he employed and the results of that survey. Jon's example was quite typical he explained, and revealed an important facet of land surveying unfamiliar to many practitioners.

As was typical of earlier comments and presentations by other notable speakers, the issue of education was a common concern. At every level, the importance of this issue could not be emphasized more. It was therefore appropriate and timely for the speaker at the Friday luncheon to be Mr. Kevin D. McHugh. In addition to being a Licensed Land Surveyor, Mr. McHugh has served CLSA in numerous capacities and has given unselfishly of himself in every instance. His current activities and devotion are no different. His speech, entitled "Surveying Education - Yesterday, Today, and Tomorrow", was an inspirational dissertation for all those in attendance. Words alone cannot thank Kevin for his efforts. It is people like him that have bettered the association and profession of land surveying in so many ways.

Recently, in 1985, Kevin was honored by the professional associations of the California Council of Civil Engineers and Land Surveyors and the California Land Surveyor's Association

in receiving a "Professional Achievement Award" for outstanding contributions to his profession.

As was somewhat typical of many of the speakers, Kevin commenced his presentation by retracing the history of surveying. In the process, he noted how the concept of education was somewhat sporadic, but nonetheless, was a factor leading up to the modern practice of land surveying.

Citing the traditional methods one used to obtain his education and license to practice, which was based upon the apprenticeship method, Kevin noted that in more recent years, this procedure was going through a metamorphosis. The practice of land surveying was requiring much more of an individual. It was becoming increasingly obvious that education was becoming a key factor in proper training as a Land Surveyor.

Not to discredit the existing surveyors in practice, Kevin acknowledged those who "have come from the very hard, circuitous route of the so-called school of hard knocks." He noted that because of the general lack of availability of structured baccalaureate survey programs, most surveyors have been forced to obtain their educations in whatever way or avenue was available to them.

Traditionally, Kevin noted, the ex-

isting universities have tended to treat survey education as a stepchild of civil education and have not accorded it with the respect due the profession. Fortunately, things are changing. Across the nation, major universities are reinstating surveying programs.

Aware of the arguments regarding conflicts between engineering and surveying, Kevin believes that in order to standardize the method of becoming a Professional Land Surveyor, a four-year degree must be mandatory. Hopefully, he noted, this could be accomplished through the actions of the profession and concerned associations, as opposed to through legislation, which is a procedure not to be overlooked.

Kevin made note of the fact that the California Foundation for Land Surveying Education was formed several years ago, with the purpose of revitalizing survey education in California's schools and universities. Recognizing the growing demand and importance of education for Land Surveyors, it is hoped that the efforts of the Foundation will serve to provide the basis for education, so direly needed by the profession.

There are other areas of expertise a solid education could provide for the surveyor. Communication skills, technical proficiency, legislation and a host of other aspects of modern practice can only be enhanced and augmented by a proper and well-rounded education, presently lacking for the land surveying community.

In conclusion, Kevin stated that in his opinion, future surveyors would have to get their education first, prior to their licensure, as opposed to the present process, which in many cases is the contrary.

As the afternoon moderator, Bob Ozibko entertained the audience with some colorful humor to complement his introduction of the mid-afternoon speaker, Steve Parrish, LS. Steve has been employed in the land surveying profession since 1963 and is presently registered as a Land Surveyor in six western states. His presentation involved his current assignment as the project leader of the Tahoe Carson Front Project headquartered in Carson City, Nevada under the employment of the Bureau of Land Management.

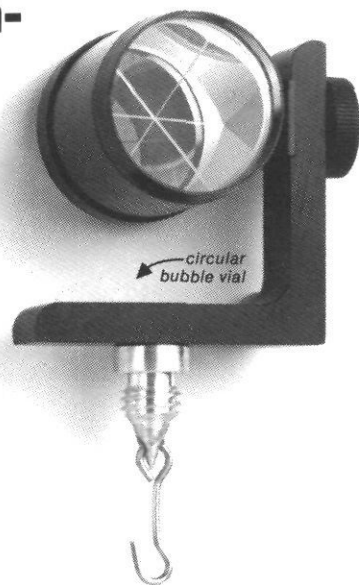
Steve's lecture and related slide presentation were nothing short of incredible and enlightening. Prefacing his presentation with a comment acknowledging that there are mistakes found in our business, Steve noted that

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this has a lot to do with the pleasures and rewards found in the surveying profession.

The Tahoe Basin, as the focus of Steve's work would prove to be a valuable insight into the workings of the original surveyors who ran the all important section, range and township lines through the area.

The project was based upon found and accepted corners originally set by one of the more notable pioneers of the great northwest, Deputy Surveyor Butler Ives. From here, Steve and his associates set out on an incredible journey through the mountains and rich surveying history of the area. His work took him many places including areas once run by the infamous John Benson of the famed "Benson Syndicate."

The area over the course of time was becoming recognized as being wrought with discrepancy and confusion. Roads and fences were out of line for no apparent reason. Disputes were becoming commonplace.

After an exhaustive investigation and retracement and countless hours of field work, the source of much of the confusion became readily apparent. Much to the surprise of Steve and those who attended his presentation, it was determined that many of the original

lines, reportedly run along the section lines were in most cases anything but that. As it turned out, because of the adverse and hostile terrain, convenient routes were selected. Once enough evidence was gathered, including relocated bearing trees and line trees, the routes were soon reestablished.

Running along ridges and through convenient valleys, it appeared obvious that the many twists and turns in the traverse lines were used to carry the latitude and departure calculations necessary to randomly traverse to the lines and corners in question. Needless to say, if the lines were not actually run out, the topographic calls and ties were either estimated or fabricated.

Numerous and periodic observations of bearing and line trees substantiated these findings. Combined with excellent photographs and slides depicting their work, Steve's project was extremely well presented and produced. Similar in context and significance to the earlier presentation by Denny DeMeyer, both programs provided a valuable insight into the work of the predecessors of the modern professional surveyor.

Don Bender, an active representative of ACSM, made a brief presentation on behalf of this fine organization.

Citing major advancements made on behalf of this organization, Don provided much inspiration to convince an individual to join this national organization. He noted that in 1968 ACSM addressed Congress and since that time has been recognized for their leadership and concern with the role of the surveyor.

Some of the important benefits of membership with ACSM, Don noted, included receiving various publications, national representation as well as access to workshops and seminars. Many of the major battles such as procurement and Brooks bill recognition are just a couple of the issues being pursued by ACSM.

Presently, NSPS, a branch of ACSM, has 7,000 members representing 70 percent of ACSM membership. Over 50 percent of these individuals are in private practice. All in all, ACSM has a great deal to offer today's professional surveyor.

Always a delight to hear and see, World Title Subdivision Engineer Jack Wilcox presented a discussion entitled "The Title Company and You." Presented as an overview of the workings of the title company, Jack explained the

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POINT	BEARING	DISTANCE
11	N 20 14 09.125 E	264.7740
12	S 64 54 57.536 E	152.7575
13	S 15 25 29.204 E	168.8521
14	S 25 11 57.845 W	171.5914
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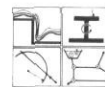
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Report

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structure of a typical title company as well as reviewing the various levels of management found in the company.

Basically divided into three divisions within the title department, Jack acquainted the audience with the workings and relationship of the commercial, industrial and subdivision departments. Jack noted that as could be expected, several areas of the title company are constantly busy as is real estate activity in general.

Jack noted many of the problems encountered by the title company as a result of demands being placed upon them from numerous individuals. All too often the title company is asked to perform calculations and make decisions outside their expertise and legal authority. As a practitioner dealing with the title company, one must be aware of the limitations and learn who is responsible for a certain aspect of a title company activity. Many times, the title officer is contacted by the client for reasons outside his expertise and responsibility.

Jack emphasized the need to communicate with the title company and those responsible to assure the successful completion of a project. Both the surveyor and the title company share equally in the liability and responsibility for a project. Only through teamwork can problems be avoided and the clients' best interests can be served.

By Friday evening, everyone was ready to kick up their heels and let down their hair. Departing by bus to Bonnie Springs, Old Nevada, over 150 of the conference attendees, guests and spouses headed out to a western barbecue.

A live country western band provided the entertainment. The evening was interspersed with a variety of exciting activities including an old western "shootout" and a hanging. All those who attended had a great time at the ranch and as could be expected, a great many new friendships were made. Everyone is looking forward to Tahoe to get together again.

The final day of the conference was devoted to one of the most important and rapidly advancing areas of technology - GPS Surveying.

Presented as a panel discussion by five well respected individuals involved with GPS, the day's presentation proved to be informative and very educational.

Presenting their dissertations were Charles Safford, LS and Dr. Albert

Chong, Ph.D. with Rick Engineering, Robert Nelson, Chief with CALTRANS, Charles Muncy, Div. Manager with Sunrise International and finally Roger Merrell, Director of Automated Surveys and Electronic Systems with the Texas Department of Highways.

The science of GPS requires the use and knowledge of a new array of terms and disciplines. Sophisticated concepts and procedures are all parts of this modern surveying method and the panel did a splendid job of explaining and discussing these many areas of understanding.

A common theme of each of the panel members involved the limitations and methods required to produce the results desired. In order to obtain a good and accurate reading, it may take up to one hour to collect the readings necessary for high order work. Once the readings were gathered, spectacular results could be obtained without too much difficulty, regardless of terrain or physical obstacles.

Also noted by the panel members were the costs associated with establishing and maintaining a GPS. In many cases the costs may make the application of GPS prohibitive. In time though, GPS will become the "tool of the future."

Another aspect of GPS involves the access to the government codes which are transmitted over select frequencies. There is a growing concern with the availability of these codes to individuals as a result of their use, making global positioning a possible concern from a position of national defense. This growing concern may make the use of GPS difficult depending upon how this matter is resolved.

An ephemeris coordinated with the receiver must also be understood and utilized properly. To accurately use the system, *accurate data must be used*. There are many methods of accessing this information and this data must be known and coordinated *prior* to acquiring the data to insure a sensible interpretation of the data collected.

In Texas and California, great advancements are being made with the applications of GPS. With permanent stations being established and mobile crews being dispatched, control networks can be rapidly and efficiently established throughout these states. Once these stations are established, conventional surveying practices can supplement the remaining control networks. An exciting application of GPS was also discussed. This involved the potential use of GPS in photogram-

metric applications. Because of the rapidity of the readings, it is possible to coordinate the location of a moving aircraft with geodetic positioning, opening up a myriad of possibilities.

Other important aspects of GPS were discussed such as efficiency, comparison with conventional survey practices and examples of successful applications on various projects.

It was obvious from the discussions and comments that this exciting and productive surveying innovation would soon become more commonplace and it would be incumbent upon all surveyors to become familiar and acquainted with this science of the future.

As is true with all good things, the 1987 conference had to come to a close. As is also true with all good and successful things, there is much hard work and many unsung heroes. Enough cannot be said about the student volunteers from Fresno State and Cal Poly Pomona who made a tremendous contribution to the conference. The staff of the CLSA central office also were invaluable in their contributions and efforts.

Plans are already underway for next years' conference which will be held at Lake Tahoe. For those of you who missed this years' conference, remember to calender in next years' engagement. It will undoubtedly be as successful and professionally rewarding as was this years' conference. □

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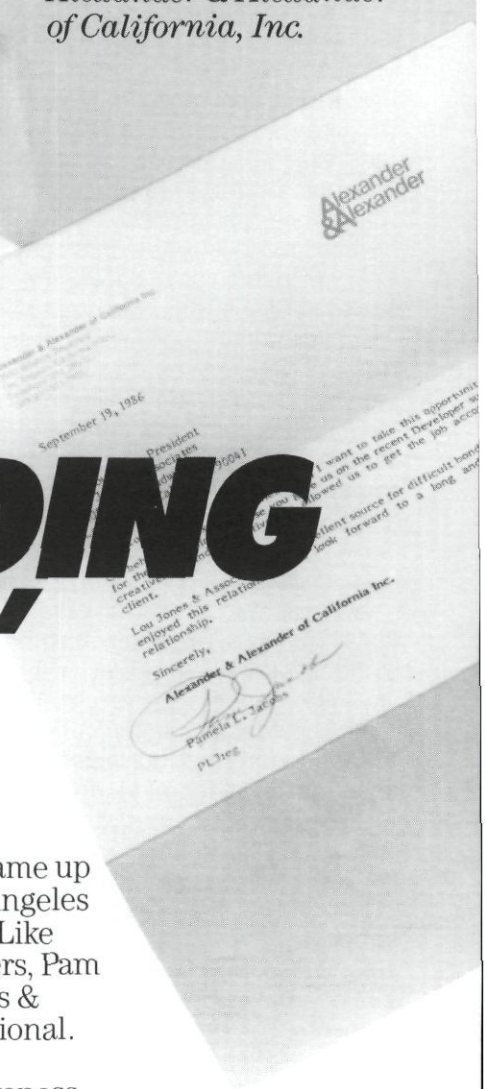
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It is recognized that members of the American Land Title Association (ALTA) have specific problems, peculiar to title insurance matters, which require particular information in detail and exactness for acceptance by title insurance companies when said companies are asked to insure title to land without exceptions as to the many matters which might be discoverable from survey and inspection and not be evidenced by the public records. In the general interest of the public, the surveying profession, title insurers and abstracters, the American Land Title Association and the American Congress on Surveying and Mapping (ACSM) jointly promulgate and set forth such details and criteria for exactness. It is understood that local variations may require local adjustments to suit local situations, and often must be applied. It is recognized equally that title insurance companies are entitled to, and should be able to, rely on the evidence furnished to them being of the appropriate professional quality, both as to completeness and as to accuracy; that it is equally recognized that for the performance of a survey, the surveyor will be provided with appropriate data which can be relied upon in the preparation of the survey.

For a survey of real property and the plat or map of the survey to be acceptable to a title insurance company for purposes of insuring title to said real property free and clear of survey questions (except those questions disclosed by the survey and indicated on the plat or map), certain specific and pertinent information shall be presented for the distinct and clear understanding between the client (insured), the title insurance company (insurer), and the surveyor (the person professionally responsible for the survey). These requirements are:

(1) The client, at the time of ordering a survey, shall notify the surveyor that an "ALTA/ACSM LAND TITLE SURVEY" is required, meeting the ac-

curacy requirements of a Class A, B, C, or D Survey as defined herein, and shall furnish to the surveyor the record description of the property and the record easements or servitudes and covenants affecting the property to which the "ALTA/ACSM LAND TITLE SURVEY" shall subsequently make reference. The names and deed data of all adjacent owners as available, and all pertinent information affecting the property being surveyed, shall be transmitted to the surveyor for notation on the plat or map of the survey. If the area of the parcel is required, the client shall so indicate to the surveyor. If the plat or map of survey is to include thereon a note as to zoning classification of the property, the client shall so clearly indicate to the surveyor. If applicable, the surveyor shall be informed by the client of any survey requirements of the Department of Housing and Urban Development, the Veterans Administration or any other government agency or entity.

(2) The plat or map of such survey shall bear the name, address, and signature of the professional Land Surveyor who made the survey, his or her official seal and registration number, the date of the survey, and the caption "ALTA/ACSM Land Title Survey" with the certification set forth in paragraph 8.

(3) An "ALTA/ACSM LAND TITLE SURVEY" shall be Class A, B, C, or D, in accordance with the "Classification and Specifications for Cadastral Surveys" as adopted by the American Congress on Surveying and Mapping on March 21, 1986, and attached hereto and incorporated herein. Should these above cited specifications be in conflict with state laws, rules or regulations, the more stringent requirements must be followed.

(4) On the plat or map of an "ALTA/ACSM LAND TITLE SURVEY," the survey boundary shall be drawn to

a convenient scale, with that scale clearly indicated. A graphic scale, shown in feet or meters or both, will be included. When practicable, the plat or map of survey shall be oriented so that North is at the top of the drawing. If required, supplementary or exaggerated diagrams shall be presented accurately on the plat or map. No plat or map drawing less than the minimum size of 8 1/2 by 11 inches will be acceptable.

(5) The plat or map of an "ALTA/ACSM LAND TITLE SURVEY" shall contain, in addition to the required items already specified above, the following applicable information:

(a) All data necessary to indicate the mathematical dimensions and relationships of the boundary represented, with angles given directly or by bearings, and with the length of each curve, together with its radius, chord, and chord bearing shown. A bearing base shall refer to some well-fixed bearing line, so that the bearings may be easily re-established. All bearings around the boundary shall read in a clockwise direction wherever possible. The North arrow shall be referenced to its bearing base and should that bearing base differ from record title, that difference shall be noted.

(b) When record bearings or angles or distances differ from measured bearings, angles or distances, both the record and measured bearings, angles, and distances shall be clearly indicated.

(c) Measured and record distances from corners of parcels surveyed to the nearest right-of-way lines of streets in urban or suburban areas, together with recovered lot corners and evidence of lot corners, shall be noted. The distances to the nearest intersecting street shall be indicated and verified. Names and widths of streets and highways and

widths of rights of way shall be given. Any use contrary to the above shall be noted.

(d) The identifying title of all record plats or filed maps which the survey represents, wholly or in part, shall be shown with their filing dates and map numbers, and the lot, block, and section numbers or letters of the surveyed premises. Names of adjoining owners and/or recorded lot or parcel numbers, recording information for last available conveyance, and similar information, where needed, shall be shown. The survey shall indicate set back or building restriction lines which have been platted and recorded in subdivision plats. Interior parcel lines shall clearly indicate contiguity, gores, and/or overlaps. Where only a part of a recorded lot or parcel is included in the survey, the balance of the lot or parcel shall be indicated.

(e) All evidence of monuments found or placed, shall be shown and noted to indicate which were found and which were placed. All evidence of monuments found beyond the surveyed premises, on which establishment of the corners of the surveyed premises are dependent, shall be indicated. The character of any and all evidence of possession shall be stated and the location of such evidence carefully given in relation to the surveyed boundary lines. An absence of notation on the survey shall be presumptive of no physical evidence of possession along the record line.

(f) The location of all buildings upon the plot or parcel shall be shown and their locations defined by measurements perpendicular to the boundaries. Proper street numbers shall be shown where available. Observable evidence of easements and/or servitudes of all kinds, such as those created by roads; rights-of-way; water courses; drains; telephone, telegraph, or electric lines; water, sewer, oil or gas pipelines on or across the surveyed property and on adjoining properties if they appear to affect the surveyed property, shall be located and noted. If the surveyor has knowledge of any such easements and/or servitudes, not observable at the time the present survey is made, such lack of observable evidence shall be noted.

Surface indications, if any, of underground easements and/or servitudes shall also be shown. If there are no buildings erected on the property being surveyed, the plat or map shall bear the statement, "No buildings."

(g) The character and location of all walls, buildings, or fences within two feet of either side of the boundary lines shall be noted. Physical evidence of all encroaching structural appurtenances and projections, such as fire escapes, bay windows, windows and doors that open out, flue pipes, stoops, eases, cornices, areaways, steps, trim, etc., by or on adjoining property or on abutting streets, shall be indicated with the extent of such encroachment or projection. If the client wishes to have additional information with regard to appurtenances such as whether or not such appurtenances are independent, division, or party walls and are plumb, the client will assume the responsibility of obtaining such permissions as are necessary for the surveyor to enter upon the properties to make such determinations.

(h) Driveways and alleys on or crossing the property must be shown. Where there is evidence of use by other than the occupants of the property, the surveyor must so indicate on his plan. Where driveways or alleys on adjoining properties encroach, in whole or in part, on the property being surveyed, the surveyor must so indicate on his plans with appropriate measurements.

(i) Cemeteries and burial grounds disclosed in the process of surveying or searching the title to the premises shall be shown by actual location if known. If the client wishes to have the survey reflect observable cemeteries and burial grounds, the surveyor shall be so advised.

(j) Ponds, lakes, springs, or rivers bordering on or running through the premises being surveyed shall be shown by actual location.

(k) Streets abutting the premises, which have been legally defined but not physically opened, shall be shown and so noted.

(6) As a minimum requirement, the surveyor shall furnish two sets of prints

of the plat or map of survey to the title insurance company or the client. The prints shall be on durable and dimensionally stable material of a quality standard acceptable to the title insurance company. At least two copies of legal boundary descriptions prepared from the survey shall be similarly furnished by the surveyor. Reference to date of the "ALTA/ACSM LAND TITLE SURVEY," surveyor's file number (if any), political subdivision, section, township and range, along with appropriate aliquot parts thereof, and similar information shown on the plat or map of survey shall be included with the boundary description and incorporated for documentation.

(7) Water boundaries are subject to change due to erosion or accretion by tidal action or the flow of rivers and streams. A realignment of water bodies may also occur due to the many reasons such as deliberate cutting and filling of bordering lands or by evulsion. Recorded surveys of natural water boundaries are not relied upon by title insurers for location of title.

When a property to be surveyed for title insurance purposes contains a natural water boundary, the surveyor shall measure the location of the boundary according to appropriate surveying methods and note on the plan the date of the measurement and the caveat that the boundary is subject to change due to natural causes and that it may or may not represent the actual location of the limit of title.

(8) When the surveyor has met all of the minimum standard detail requirements for an ALTA/ACSM Land Title Survey, he shall make the following certification on the plat:

To *(name or client)* and *(name of title insurance company, if known)*:

This is to certify that this map or plat and the survey on which it is based were made in accordance with "Minimum Standard Detail requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and ACSM in 1986; and meets the accuracy requirements of a Class Survey, as defined therein.

(signed) _____ (sealed)
Registration No.

Adopted by the Board of Direction,
American Congress on Surveying and
Mapping March 21, 1986.

Adopted by the American Land Title
Association September 27, 1986.

continued on page 18

Requirements

continued from page 17

American Congress On Surveying and Mapping

Classification and Specifications For Cadastral Surveys

INTRODUCTION

The degree of precision necessary for a particular cadastral survey should be based on the intended use of the land parcel, without regard to its present use, provided the surveyor has knowledge of the intended use.

Four general survey classes are defined using various state regulations and accepted practices. These general classes are listed and defined in table 1 below.

The combined precision of a survey can be statistically assured by dictating a combination of survey closure and specified procedures for a particular survey class. Table 2 lists the closures and specified procedures to follow in order to assure the combined precision of a particular survey class. The statistical base for these specifications is on file at the ACSM and available for inspection.

TABLE 1

SURVEY CLASSES BY LAND USE

CLASS A—URBAN SURVEYS

Surveys of land lying within or adjoining a City or Town. This would also include the surveys of Commercial and Industrial properties. Condominiums, Townhouses, Apartments and other multiunit developments, regardless of geographic location.

CLASS B—SUBURBAN SURVEYS

Surveys of land lying outside urban areas. This land is used almost exclusively for single family residential use or residential subdivisions.

CLASS C—RURAL SURVEYS

Surveys of land such as farms and other undeveloped land outside the suburban areas which may have a potential for future development.

CLASS D—MOUNTAIN and MARSHLAND SURVEYS

Surveys of lands which normally lie in remote areas with difficult terrain and usually have limited potential for development. □

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AMERICAN CONGRESS on SURVEYING and MAPPING

TABLE 2
MINIMUM ANGLE, DISTANCE and CLOSURE REQUIREMENTS FOR CLASSES OF SURVEYS
(1)

SURVEY CLASS	DIR. READING OF INSTRUMENT (2)	INSTRUMENT READING ESTIMATED (3)	NUMBER OF OBSERVATIONS PER STATION (4)	SPREAD FROM MEAN OF D&R NOT TO EXCEED (5)	ANGLE CLOSURE WHERE N = NO. OF STATIONS NOT TO EXCEED	LINEAR CLOSURE (6)	DISTANCE MEASUREMENT (7)	MINIMUM LENGTH OF MEASUREMENTS (8), (9), (10)
A	20' <1'> 10"	5' <0.1'> N.A.	2 D&R	5' <0.1'> 5"	10° √N	1:15,000	EDM or Doubletape with steel tape	(8) 81m, (9) 153m (10) 20m
B	20' <1'> 10"	10' <0.1'> N.A.	2 D&R	10' <0.2'> 10"	15° √N	1:10,000	EDM or steel tape	(8) 54m, (9) 102m (10) 14m
C	20' <1'> 20"	N.A.	1 D&R	20' <0.3'> 20"	20° √N	1:7,500	EDM or steel tape	(8) 40m, (9) 76m (10) 10m
D	1' <1'> 1'	N.A.	1 D&R	30' <0.5'> 30"	30° √N	1:5,000	EDM or steel tape	(8) 27m, (9) 51m (10) 7m

Note (1) All requirements of each class must be satisfied in order to qualify for that particular class of survey. The use of a more precise instrument does not change the other requirements, such as number of angles turned, etc.

Note (2) Instrument must have a direct reading of at least the amount specified (not an estimated reading), i.e.; 10" = Micrometer reading theodolite, <1'> = Scale reading theodolite, 10" = Electronic reading theodolite, 20" = Micrometer reading theodolite, or a vernier reading transit.

Note (3) Instrument must have the capability of allowing an estimated reading below the direct reading to the specified reading.

Note (4) D & R means the Direct and Reverse positions of the instrument telescope, i.e., Class A requires that two angles in the direct and two angles in the reverse position be measured and meaned.

Note (5) Any angle measured that exceeds the specified amount from the mean must be rejected and the set of angles re-measured.

Note (6) Ratio of closure after angles are balanced and closure calculated.

Note (7) All distance measurements must be made with a properly calibrated EDM or Steel tape, applying atmospheric, temperature, sag, tension, slope, scale factor and sea level corrections as necessary.

Note (8) EDM having an error of 5mm, independent of distance measured (Manufacturers specification)

Note (9) EDM having an error of 10mm, independent of distance measured (Manufacturers specifications)

Note (10) Calibrated steel tape.

What Does A Land Surveyor Do?

by George Butts

A surveyor is a person who measures the earth. The surveyor must be an expert measurer of long distances. A Land Surveyor is a person who surveys or locates the boundaries or real property.

The Land Surveyor measures property boundaries consisting of corners and lines. The measurements are a technical matter.

On the other hand, the determination of what to measure to is a professional matter and is the most important function a Land Surveyor does. In 1912, A.C. Mumford wrote:

"No attempt will be made to describe methods of measuring a line; the intention is to furnish suggestions for finding the line which is to be measured. For, after all, when it comes to a question of the stability of property and the peace of the community, it is far more important to have a somewhat faulty measurement of the spot where the line truly exists than it is to have an extremely accurate measurement of the place where the line does not exist at all."

To determine what constitute the boundaries to be measured or located, the surveyor must have knowledge, skills and abilities in many other professions than that of a measurer of the earth.

The Land Surveyor Is Not

A few, but not all, of the professional or occupational fields that the Land Surveyors must have knowledge, skill or ability in are:

The Land Surveyor is not an engineer, but must have a broad knowledge of such engineering works as highways, power lines, pipe lines and railroads, because these works often control property boundaries.

The Land Surveyor is not a cartographer, but must have a broad knowledge of maps and topography to prepare boundary maps and to define those boundaries dependent upon topographical features as ridges and streams.

The Land Surveyor is not an astronomer, but must be able to make observations on stars and planets to position his measurements and relate magnetic observations to the true meridian. (New technology is now being developed whereby man-made satellites can be observed and positions on the earth determined with great accuracy and reasonable cost.)

The Land Surveyor is not a hydrologist, but must have a knowledge of waters and water courses, for riparian rights such as spring rights, flowage or dam rights, and the problems caused when floods change stream channels; all enter into property boundary determination.

The Land Surveyor is not a geologist, but must have a general understanding of the land forms and an ability to identify the various types of stones used for monumentalizing of land corners.

The Land Surveyor is not a photogrammetrist, but must be able to make measurements on aerial photographs and to identify objects thereon.

The Land Surveyor is not an archeologist, but must be able to search for and recover objects placed to mark boundaries hundreds of years ago. He must be able to determine if three or four stones under a foot of decayed leaves were placed by the hand of man, or simply left by the melting glacier. He must be able to locate the foundation of the blacksmith shop, which in 1895 "burned 10 years ago."

The Land Surveyor is not a computer specialist, but must be able to operate computers that perform lengthy calculations required; that direct automatic map drafting machines and that do word processing.

The Land Surveyor is not a dendrologist (science of woody plants including trees) but must be able to identify a "sugar plum tree" called for in a 1935 deed, or identify a rotten yellow birch stump that has been moldering in the woods for 50 years.

The Land Surveyor is not a forester, but must be able to separate marks and objects placed by foresters in their management of timber stands, from marks and objects placed to control property boundaries.

The Land Surveyor is not a farmer, but must be able to recognize farming methods in use since the early settlement. Did the farmer erect that fence to mark his boundary or to keep the cattle out of a swamp? Where was the "north barway"? What was the "hop house"? Where is the 1888 boundary between the "mowing" and the "pasture"?

The Land Surveyor is not a logger, but must be able to separate the marks left by the cutting foreman from marks made to delineate a property

boundary.

The Land Surveyor is not a judge, but must be able to make decisions of law concerning the locations of property boundaries. Decisions that will withstand review by the courts.

A Land Surveyor is not a juror, but must be able to come to decisions of fact that will also withstand review by the courts.

A Land Surveyor is not a lawyer, but must be able to locate boundaries so that their positions will withstand attack by knowledgeable lawyers.

A Land Surveyor is not a writer, but must be able to describe in words the location of boundary lines and give directions for their location.

Directions that often will not be used until years in the future when all persons having knowledge of the time of the original survey are dead.

A Land Surveyor is not a historian, but must have a large, specialized knowledge of early history and the histories of the various towns in which he or she surveys.

The Land Surveyor is not a handwriting expert, but must be able to read the writing of the early town clerks. As the incumbent clerk grew older and older, the penmanship became progressively less readable, until, suddenly a new clerk's clear writing appears. In addition, such early English words as "staddle", "rood", "square perch" and other must be understood.

A Land Surveyor is not a detective, but solves problems in a similar matter by assembling piece after piece until the answer appears.

Other Requirements

In addition to being an expert measurer a Land Surveyor must be: An expert witness in court. Mere licensure will not qualify one as an expert witness. An expert witness must possess special knowledge, wisdom or information that was acquired by study, investigation, observation, practice or experience.

Able, after reaching the right decision, to present evidence and conclusions drawn from the evidence, in a manner that will enable others to reach the same decision. It is not enough to be right, you must be able to persuade others.

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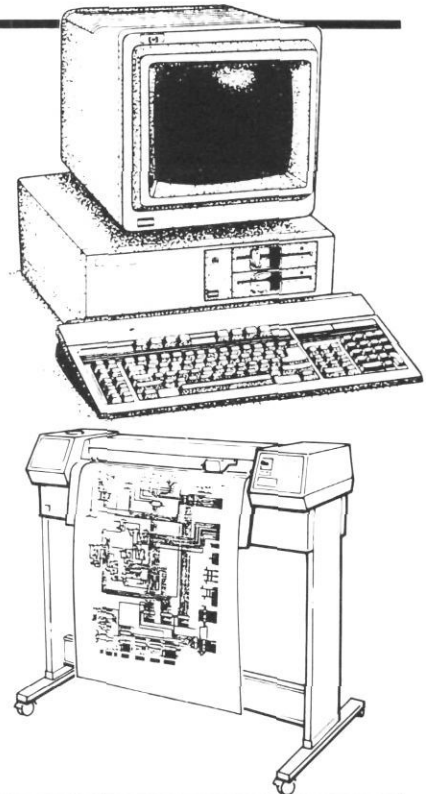
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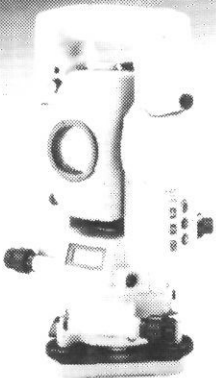
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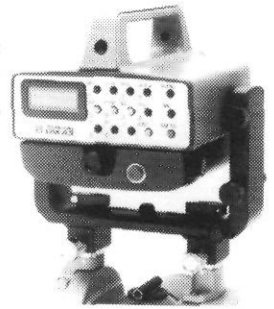
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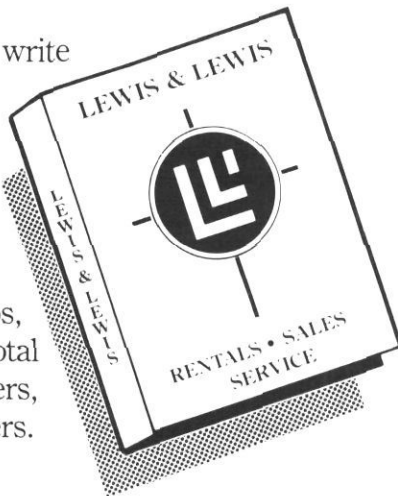
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September 1, 1987

"Surveying in the Year 2000"

by Martin C. Menke, Jr., P.E., L.S.

Surveying in the year 2000 is quite different from 1985. The changes were gradual but continuous and consistent with an overall plan for a land information system that was needed to provide data for the economic, social, scientific and industrial development in the world.

Today there are many specialists in what is sometimes called the surveying profession. The person recognized as a generalist in surveying in 1985 is now a rare commodity.

Most every phase of surveying is being done by and for government agencies. These agencies are the major role players in economic planning, in industrial development, in a world transportation system, in planning new life styles and in completing and maintaining a world cadastre.

The large surveying firms now in practice have survived the trauma of 1990 because of their ability to recognize the technical and educational advancements needed to meet the information requirements of government and the free enterprise system. Instantaneous mapping from satellites to computers is easily and quickly attainable. Small surveying firms still exist but

are few in number. Those remaining after the economic crunch of the 1990's provide a special areas of expertise not easily attainable from the public information systems.

Boundary surveying is one speciality which is not in demand to the degree that existed in 1985. The reason for this is that we now have a very sophisticated mapping recording system which provides answers to most questions raised by the public. However, when discrepancies occur they are very difficult to resolve.

There is a need for carefully monitoring the use of the natural resources of the newly emerged countries as well as devising some system for conserving or replacing with new materials the depleting resources of the overdeveloped countries. These countries are also devising new techniques to recycle or replace the worn out infrastructure.

The surveyor is a vital cog in this whole process. The demand for more precise information requires these professionals to have a broad based education in geology, advanced mathematics, mineralogy, geography, hydrology, law, communications and other special areas. Many acquired advanced degrees in order to become

highly proficient in some phase of the land information system which has created a world cadastre.

The surveyor who did not obtain the education to qualify for these new challenges is no longer in the forefront of this profession.

The variety of duties and areas of expertise required to provide information for science, industry and government has created confusion as to a proper title for a person practicing this profession.

Professional and trade organizations are working diligently to reduce or eliminate the confusion which has been created in what was once called the surveying profession. Since they have considerable more influence in the areas of public information and legislation than in 1985, their advice is welcomed by the agencies who examine and license the professions.

There are high hopes that new guidelines and definitions for this profession will be forthcoming from the ACSM annual convention to be held in March of 2001.

Reprint from Dis-Closures, Fall, 1985

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City of San Diego Challenges State Board of Registration

SAN DIEGO - On December 2, 1985, the State Board of Registration for Professional Engineers and Land Surveyors distributed a letter "To All County Surveyors and City Engineers", regarding compliance with the requirements of the Land Surveyors' Act. The letter addressed the responsibilities of the governmental agencies having local jurisdiction over monuments located in streets or highways and the obligation of the agency to protect the monuments whenever any construction occurs.

The notice also stated that "Resurfacing of streets and highways resulting in monuments being covered with paving material instead of being preserved will be considered a violation of the Land Surveyors' Act by the Board." The letter was sent to all agencies in the State of California.

In March of 1987, San Diego City street crews, under the direction of the City Engineer's office of San Diego went about the ambitious task of resurfacing a good many of the streets located in La Jolla, one of Southern California's most affluent neighborhoods. This area of San Diego is very old and is home to some of the most expensive properties in Southern California.

Originally laid out in the turn of the century, the majority of the streets were all constructed of concrete. After the roadways were constructed, City Surveyors and private surveyors went about monumenting and referencing the old subdivision markers in the concrete by setting lead plugs in the paving surface. In the course of time, these markers became the recognized controlling monuments for any activity in the area.

The new city resurfacing project was the first time asphalt was to be laid over the old concrete roadways. The plan called for an extensive overlay, in the process covering over and obliterating the already difficult to find lead plugs.

When the city project was underway, complaints were filed by the survey community regarding the covering and destruction of the lead plugs in addition to all of the secondary monuments that had been set in the intervening years by private surveyors either by their own volition or in

response to the City's rigid subdivision monumentation policy. The individuals subdividing their lands were required by the City to set reference markers to their projects as a condition of their subdivision. To do otherwise would mean the City would not allow the map to record.

As the basis for the complaints, the City was provided with a copy of the original Board letter originally sent to them on December 2, 1985. Additional complaints were also filed with the local city council representative.

In response, Ray L. Hall, the Deputy Director of the City of San Diego Engineering and Development Department, responded by stating that "It is our opinion that the City conforms to the law as stated for reconstructed or relocated streets and that the letter of December 2, 1985 signed by the Executive Officer of the Board of Registration for Professional Engineers and Land Surveyors does not conform with Section 8771 of the Land Surveyors Act." Furthermore, Mr. Hall stated that, "We would be pleased to meet with you, your attorney, ourselves and our attorney, to discuss this matter if you choose to pursue it further."

With regards to the problems that were being created, Mr. Hall responded by stating that "simple calculations are adequate to place the surveyor within a fraction of a foot of the record position for the point, which is then easily located using a disc-type metal locator. The only inconvenience is the few minutes required to scrape away the slurry seal or chip through the mat of resurfacing to expose the original point for its use as needed."

In response to his assessment of the situation, Mr. Hall was reminded that there are no commercially available metal detectors that respond to lead plugs and brass discs. In addition, Mr. Hall was reminded that it was difficult to use any "record" monument when they were all covered over with asphalt.

Upon receipt of this response, the matter was referred to the Board of Registration for action or rebuttal. The matter is presently under review by the Board. Meantime, the paving still continues.

Local practitioners are closely monitoring this situation to see what

type of response the Board takes in this matter. Earlier, in 1986, the City of Coronado, also located in San Diego County, was the subject of numerous complaints regarding their ambitious handicap ramp construction project. The problems arose when ramps built earlier had destroyed monuments set at block corners to reference legally recorded city subdivision maps, record of survey maps, and corner record surveys. The Board took a hard stand on the issue and in conjunction with the State Attorney General's office, threatened to file an injunction restricting any construction in the city until they were in compliance with the Land Surveyors Act. The City Engineer responded by personally assuring the Board of Registration that the City would make sure that the markers in question would be reset, in addition to making sure that future construction specifications would assure that survey markers would be protected by future construction. □

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Tips For Witness

1. **TELL THE TRUTH.** If you tell the truth and tell it accurately, nobody can cross you up.

2. **DON'T GUESS.** If you don't know, say you don't know.

3. **DON'T MEMORIZE** what you are going to say.

4. **UNDERSTAND THE QUESTION** before you attempt to give an answer. If you don't understand the question, ask the lawyer to repeat it.

5. **TAKE YOUR TIME.** Although you can't be rushed into answering, taking too much time on each question may lead the jury to think you are making up an answer.

6. **STICK TO FACTS.** No hearsay, nor your conclusions, nor opinions. You usually can't testify about what someone else told you.

7. **DON'T BE TOO FINAL.** Don't say "That's all of the conversation," or "That's all I remember happening." It may be that after more thought or another question you will remember and want to say something important.

8. **GIVE A POSITIVE ANSWER IF YOU CAN.** Avoid saying, "I think," "I believe," "in my opinion" and "I guess." If you are asked about details which you don't remember, just say that you don't remember them. But don't let the cross-examiner get you in the trap of answering question after question with "I don't know," or "I don't remember."

9. **DON'T VOLUNTEER.** Answer directly and simply only the question asked you, and then stop. Do not volunteer information not actually asked for.

10. **CORRECT MISTAKES.** If your answer was wrong, correct it immediately.

11. **BEWARE OF QUESTIONS INVOLVING DISTANCES AND TIME.** If you make an estimate make sure that everyone understands that you are estimating and make certain your estimates are reasonable.

12. **SPEAK UP.** Talk loud enough so that everybody can hear you. Speak clearly and distinctly. Keep your hands away from your mouth.

13. **YOU'RE ON YOUR OWN.** Don't look at the lawyer, or the judge, for help when you're on the stand.

14. **DON'T ARGUE.** Don't fence or argue with the lawyer on the other side. He has a right to question you, and if you give him smart talk or evasive answers you will make a bad impression.

15. **DON'T LOSE YOUR TEMPER** no matter how hard you are pressed.

16. **BE COURTEOUS.** This is one of the best ways to make a good impression on the court and the jury. Be sure to answer "Yes, ma'am" and "No, sir" and to address the judge as "Your Honor."

17. **DON'T DENY DISCUSSING CASE.** If asked if you have talked to the lawyer on your side, or to an investigator, admit it freely. Remember, you're sworn to tell the truth.

18. **DON'T BE AFRAID** to look the

jury members in the eyes while telling the story. Jurors are naturally sympathetic to witnesses and want to hear what they have to say. Eye contact helps to establish credibility.

19. **DRESS PROPERLY.** A court of law demands respect.

20. **WAIT UNTIL THE JUDGE HAS RULED** on any question about which an objection has been made. You may never have to answer the question if the judge sustains your attorney's objection.

Reprinted from WPI Journal

□

Official Surveys Accepted by BLM

This letter is to inform you of cadastral survey plats approved by the Chief, Cadastral Surveyor for California during the third quarter of FY 87, (April 1 - June 30, 1987).

These plats are now on file in the Survey Records Office, Bureau of Land Management, California State Office, 2800 Cottage Way, Room E-2841, Sacramento, California 95825.

Township	Approval Date	Type of Survey
Puukohola Heiau National Historical Site	4-07-87	Survey
T. 34 N., R. 10 E., MDM	4-07-87	Dependent Resurvey & Subdivision
T. 3 S., R. 6 E., SBM	4-17-87	Supplemental Plat
T. 23 N., R. 4 E., MDM	4-17-87	Supplemental Plat
T. 3 S., R. 29 E., MDM	4-21-87	Corrective Dependent Resurvey
T. 40 N., R. 3 W., MDM	4-21-87	Corrective Dependent Resurvey
T. 22 N., R. 13 E., MDM	5-01-87	Dependent Resurvey, Survey & Metes and Bounds Survey
Kaloko Hono Kahau Historical Park	5-05-87	Survey
T. 23 S., R. 43 E., MDM	5-12-87	Dependent Resurvey, Survey, & Metes and Bounds Survey
T. 1 S., R. 6 W., MDM	5-15-87	Administrative Boundary Survey
T. 1 N., R. 6 W., MDM	5-15-87	Dependent Resurvey and Survey
T. 11 N., R. 19 E., MDM	5-15-87	Dependent Resurvey & Subdivision
T. 23 N., R. 11 E., MDM	5-28-87	Dependent Resurvey & Subdivision
T. 24 N., R. 11 E., MDM	5-28-87	Dependent Resurvey & Subdivision
T. 39 N., R. 14 E., MDM	5-28-87	Dependent Resurvey & Informative Traverse
T. 15 N., R. 8 W., MDM	6-02-87	Dependent Resurvey & Subdivision
T. 7 N., R. 11 E., MDM	6-15-87	Corrective Dependent Resurvey
T. 19 N., R. 6 E., MDM	6-25-87	Dependent Resurvey & Subdivision

Sincerely,
Clifford A. Robinson, Chief
Branch of Cadastral Survey

The Surveying Profession in the United States

The following is a statement on the profession of surveying which ACSM President Donald E. Bender distributed at the August 12 NCEE meeting in St. Louis. The American Congress on Surveying and Mapping (ACSM) strongly supports state regulation of the surveying profession in order to safeguard life, health, and property, and to promote public welfare. ACSM believes that such regulation requires state licensing examination which tests the specialized knowledge obtained in an academic environment and a subsequent period of internship. ACSM also believes that a uniform definition of the scope of surveying services will be of benefit to the public.

ACSM believes that the profession of surveying, at a minimum, encompasses a broad scope of specialized services that includes:

cadastral surveys, cartography, design data surveys, hydrographic surveys, environmental surveys, geodetic or control surveys, remote sensing, photogrammetry, the management of land information systems, topographic

mapping, as-built surveys, subdivision mapping and design, and the surveying of real property for the establishment of land boundaries, rights-of-way, and easements.

Outside the United States, additional activities are recognized as part of the surveying profession and should be considered by the state for inclusion within the scope of the surveying profession. These activities, at minimum, include:

assessing, survey-related law, land valuation, zoning, real estate transfers, land planning, land development, land preservation, and resource management.

Additionally, the International Federation of Surveyors (FIG), organized in 1878, defines the surveyor as follows:

The Surveyor is a professional person who identifies, determines the boundaries of, measures and values public or private land property, whether urban or rural, and whether on the surface of land or water or below, as well as works executed thereon; and who

arranges for the registration of the property; and settles questions of ownership connected therewith.

In summary, ACSM believes:

1. That the several states should regulate the surveying profession to safeguard property and to promote the public welfare;

2. That a broad scope of services should be provided by professional surveyors;

3. That licensure as a professional surveyor should require passing an examination based on the broad scope of surveying services;

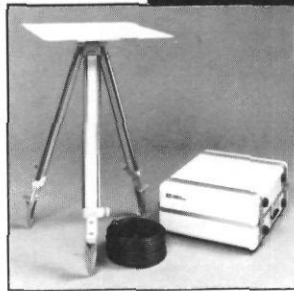
4. That a minimum of a four-year baccalaureate degree should be required to take the surveying licensure examination;

5. That the public will benefit from a requirement that professional surveyors have a minimum of a baccalaureate degree prior to licensure.

August 7, 1986

Note: This statement by ACSM is based on a summation of prior ACSM policies. The statement is subject to review by the ACSM Board of Direction.

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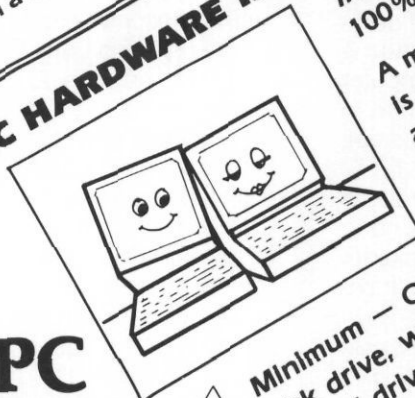
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The Computer in the Survey Office

by Gary Irwin, B.Sc., O.L.S.

A short time ago I was asked to prepare a paper on the uses of a computer in a land surveying office. While I am certainly no expert on computers, I have had the opportunity over the years to observe the impact they have made on small and medium sized survey companies. Consequently, this paper has been prepared with the smaller survey company in mind. For the purposes of this discussion the computers referred to, unless otherwise noted, are common microcomputers such as the Apple IIe or IBM PC.

At last count, only slightly more than half of the survey companies in Ontario had a computer in the office. I found this quite surprising; that more surveyors were not using proper tools to help them perform better, provide a better product and increase productivity – in this case, by using a computer. While computers are not an end unto themselves, they are very useful in performing some important functions, as we shall examine.

The most common use of a computer in a survey office is for performing coordinate geometry (CoGo) calculations. There probably isn't a survey office today that doesn't have a programmable hand held calculator or desktop calculator with CoGo software. While these machines have performed admirably they obviously cannot be compared to a modern computer with good CoGo software. A computer is faster, more versatile and can handle volumes more data than the old desktops ever could. When loaded with a modern CoGo program the computer is a powerful tool that will continue to be a survey company's most important reason for acquiring one.

Although the simple coordinate geometry program is the most important part of the calculation package, recently some other applications have demanded attention. A relative newcomer is the total station. (Strictly speaking, the total station can be used on its own without any automatic processing software, but in order to realize maximum benefits of this technology the data collector and processing software must be considered. Whether a total station system is a cost effective option for the average surveying company is open to debate, and beyond the scope of this paper, but for the purposes of this discussion, it is assumed that the

benefits are affirmed.) Automatic computer processing of data collector measurement data requires, generally two basic programs; the transmission program and the reduction/coordination program. The transmission program, if required, simply allows the computer to receive and store the transmitted data from the data collector. No interpretation of the data is performed at this phase. This program is often supplied with the data collector by the retailer and they are available for most common computers. The reduction/coordination program interprets and processes the measurement data. The usual result is an xyz coordinate base with point descriptors that can be assessed by calculation programs such as CoGo. Because of the close relationship between the reduction/coordination program and the CoGo program they are always purchased as a unit.

At the other end of the survey calculation spectrum is the world of Computer Aided Drafting (CAD) systems. Until recently, true CAD systems had only been available on mainframe or mini computers, but now several simpler packages have been written for microcomputers. These microcomputer-based CAD systems offer a cost effective solution for simple design and drafting but they cannot effectively handle the type of work required to produce survey plans. Expecting an efficient CAD program which runs on a DIGITAL VAX 11-780 to run effectively on an IBM PC is, to say the least, somewhat optimistic. In fact, producing survey plans on any CAD, regardless of power or price, is one of the most inefficient uses for a CAD, and it is almost impossible to turn a profit doing so. An example helps to illustrate this point. Say we want to place a block of text (lettering) on a "drawing" using a typical CAD program. Obviously the computer needs to know what the text is, so we type it in from the computer terminal. But before the computer can place the text on the drawing, it needs to know some other things as well: the location and orientation of the text block; the character font – whether the lettering is vertical or slanted, solid or dashed; the gap (distance) between the letters; the letter height, either in relative (scaled) dimensions or absolute dimensions; the text block justification of the lines within the block of text, either left, center or right; and the

logical "layer" upon which the text will be placed. All of these parameters must be defined before a single piece of text can be placed on a drawing. Of course, a good CAD program would set many of these parameters by default so it would not be necessary to redefine them every time you want to place a block of text. Unfortunately, survey plans are text-oriented and very little lettering on a plan of survey is of similar format. This means that it is frequently necessary to change parameters which is time consuming and inefficient for production CAD work. This is only one small example of the many difficulties encountered when attempting to use a CAD for surveying applications.

There are however, exceptions to this scenario. Subdivision and many engineering plans are based on a routine mathematical model which is better suited for CAD use. With these types of plans there is more emphasis on simple line work and text formats are more uniform. But even with these simpler drawings a microcomputer based CAD system has trouble performing in a production atmosphere. The basic problem is that the nature of computerized graphics systems is such that they are extremely CPU (central processing unit - the brain of the computer) intensive, and a CAD's processing requirement is far beyond most microcomputers capabilities. This coupled with the relative complexity of the average survey plan and the high cost of CAD systems prohibits most survey work from being produced on a CAD. There is no doubt in my mind, however, that eventually a "standard" survey calculation package will consist of a comprehensive data base shared by a powerful interactive CoGo program with a total station interface and a CAD system among other specialized programs. Such a system would probably run on the new generation of super microcomputers such as the IBM RT, Intergraph Interpro 32, or Apollo series computers. They are very powerful computers capable of multi-tasking, but they are also quite expensive. While it is true that this software technology is here today and available on some microcomputers, it is fragmented and incomplete. Some complex programs (CAD, least squares adjustment, contouring, terrain modeling etc.) will never run satisfactorily on

under powered microcomputers. In my opinion, a comprehensive, flexible and capable total calculation package that would work, is at least 5 to 10 years away – and it will not be inexpensive.

So, with regard to survey calculation software, where does this leave us today? A simple CoGo package is, without a doubt, a powerful tool, and they are relatively inexpensive. Total station packages and CAD systems can also be beneficial but they are expensive and their cost effectiveness must be given careful consideration.

The ability to perform survey calculations is only one important function of a computer in the land surveying office. The second most important use is for word processing. In fact, more microcomputers are sold for their word processing capability than for any other reason. The real power behind the word processor is the ability to recall old documents from disk storage, edit them and obtain a perfect hard copy whenever desired. A "standard" letter such as a letter of transmittal which goes with a plan to the Registry Office for checking can be stored on a disk and recalled when needed. Perhaps only the date and certain reference information needs to be changed and in a minute or so an entire new letter can be printed. The new letter can then be stored for future reference. More lengthy survey reports or proposals are easier to write simply because of the program's editing features; the ability to move words, interchange paragraphs and obtain a fresh hard copy at will. Most quality word processors include or can be expanded to include spelling checkers and some even have grammar checkers. Of course, your secretary could probably type a simple letter before you get the computer turned on and the program loaded. But what about that condominium proposal that has to be changed for the third time? And what if you don't even have a secretary or she is too busy? The capabilities of a word processor make it much easier to cope with these routine duties and possibly even postpone the need to hire extra staff. When purchasing a word processor, I have found it is best to buy the simplest program that will fill your requirements. Some packages may be powerful enough to allow you to recreate the complete works of William Shakespeare, but keep in mind the more capable the program, the more difficult it will be to use. Also remember that word processors won't help you write any better, they just make it easier.

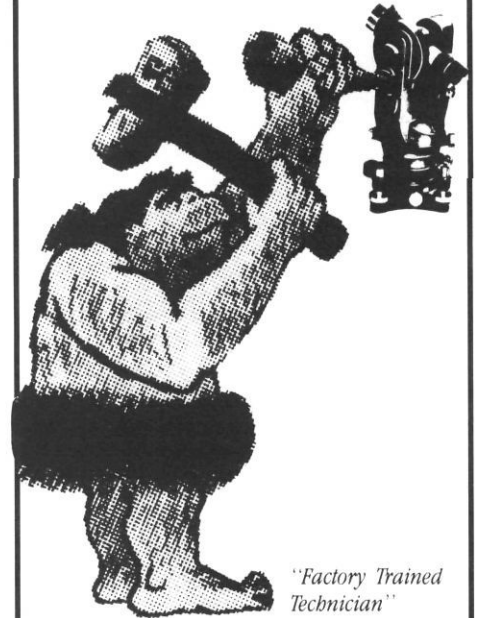
Business applications are the next most important use for a computer in a survey office. There are several major applications to choose from, and which ones to consider will depend primarily on the size of the company.

The first major type is the general ledger package. This program basically replaces your ledger books with disks and keeps track of net accounts receivable and accounts payable. Setting up and maintaining the program is no faster than setting up and maintaining the books by hand. The advantage of using a computer, however, is that the month end profit/loss statement can be obtained much more quickly as opposed to the manual method. Also the figures are more reliable; as long as the information is entered correctly you don't have to worry about the computer making an adding or subtracting mistake. Your accountant will appreciate this and the way the program formats the output. But don't assume your accounting fees will be cut substantially by computerizing. They may be reduced but your accountant still has to perform various functions such as ensuring data has been entered against the proper accounts, among other things.

Another popular program is an accounts receivable package. This program maintains a file of accounts for completed or ongoing jobs. When a job is ready to be billed, the particulars (such as the client's name, the work performed and amount of account) are entered into the computer and it prints a copy of the invoice with all relevant data (including the terms of payment) to be sent with the final return. When an account is paid it is deleted from the system after the month end report is generated. The benefit of computerizing this system is the ability to obtain a report of all monies in receivables very quickly. A standard report usually prints accounts in groups of current, 30, 60, and 90+ days overdue, and includes convenient information such as the client's name, address, value of account and home phone number. If your company operates on a bank loan you are probably accustomed to compiling similar reports as the banks like to see this information. If this is the case, the computer can save you a lot of time. The computer can also automatically apply an appropriate interest charge to overdue accounts and print reminder invoices which can be mailed monthly. The sight of rapidly accruing

continued on page 30

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Computer

continued from page 29

interest can work wonders on payment of overdue accounts!

Another program that can be useful is what I call a "timecard" program. This is a system which keeps track of job costs as the work is performed. In this system an employee file is set up containing the names of all your employees and their charge-out rates for various duties. A job file is also created which contains all the jobs which are currently being worked on. When a new job is taken in a job record is created on file. Employees fill in daily time cards indicating how much time was spent on each job and what disbursements were made. The timecard information is entered into the computer daily (*in order to ensure the data on file is as up to date as practical*) and is posted both against the job and employee's personal record. An hour summary from the employee's record can subsequently be used as a basis for payroll calculation. When a job is ready for billing the computer can provide a complete report on time and disbursements expended on it. The report could be brief, giving total costs only, or could be detailed including the date of the work, who performed the work and in what capacity. Many surveying companies are already using a paper system similar to this to keep track of job costs, but computerizing the system has its advantages. Firstly, it is much easier and faster for the computer to provide a more detailed report of job costs than would be practical manually. Secondly, it is a simple matter for the computer to provide a complete report of all monies tied up in work in progress (i.e. not in receivables yet). The output of this system would provide the basis of input for the accounts receivable program, but don't attempt to directly link the two programs. For whatever the reason may be, it seems survey work is rarely billed at card value.

Although a scheduling routine could easily be added to this system, (i.e. a routine that would examine and report on which jobs should be done first based on their due date) in practice it has proven not feasible to implement. In a very small survey office there is obviously no need to schedule the work. In a larger office it has been found that the rapid turnover of jobs and constant shuffling of priorities precludes any reasonable possibility of maintaining up to date job due dates that would be required by a schedul-

ing routine.

The general ledger and accounts receivable programs are common packages that can usually be purchased "off the shelf." A rudimentary timecard system can be set up from an off the shelf package such as Visicalc, but if you want some of the "bells and whistles" mentioned it will probably be necessary to have a program custom written to suit your business operation.

The programs suggested have all been successfully implemented on various computers, but not every system should be computerized. The scheduling routine in the timecard program already mentioned is one example. Another good example is a program that automatically looks up a company's survey records based on a geographic index system. Although setting up such a system is possible by using a data base program, in practice such implementations have had, at best, limited success. The problems start with the fact that all jobs must be coded under a standard homogeneous geographical system which may not be practical. To work effectively an entire company's job index would have to be coded and entered into the computer - usually a monumental task in itself for an existing company. Few microcomputers have the storage capacity and speed necessary to perform the searches such a system would require. In addition, once the files were coded and entered the system would have to be constantly maintained, otherwise it quickly would become useless. In most survey offices everyone at one time or another must search the job index for files, and this would require wide knowledge among the staff on how to operate the program and to some extent how to run the computer. Also, job searches are often required throughout the day and probably at a time when the computer is being used for something else. Compare this scenario to a manual card index system. Although it may not be ideal, it is much more easily understood by company staff, is easier to maintain, doesn't require a complete re-coding of jobs and is accessible 24 hours a day. Above all, it probably works.

Many of these arguments against computerizing can apply to other applications as well, including the systems already mentioned. Generally, if a system is too complex to work on paper, it probably won't work on a computer either. Conversely, and perhaps surprisingly, it's the simple applications that work best on a computer.

As to which software packages a survey company should consider using, beyond a coordinate geometry package and word processor, there are no simple answers. Although it is almost always possible to computerize a particular system, the question that must be answered is: Do the supposed benefits of computerizing outweigh the costs of implementing and maintaining the system? This question can only be answered after examining the operation of each individual company.

Computers definitely have their limitations but I believe their benefits far outweigh their costs, both in term of dollars and labor. A complete computer system with excellent software can be purchased today for less money, in real dollars, than a programable desktop calculator cost 15 years ago. If I may humbly offer one piece of advice to the first time computer buyer, it is this: If existing (computer) technology will help you perform more efficiently and make a profit - buy it. But don't make the mistake of purchasing technology that you can't presently use in the hopes of making it pay in the future. The future is usually further away than we first imagine and if and when it arrives, it is often not as we had envisioned. □

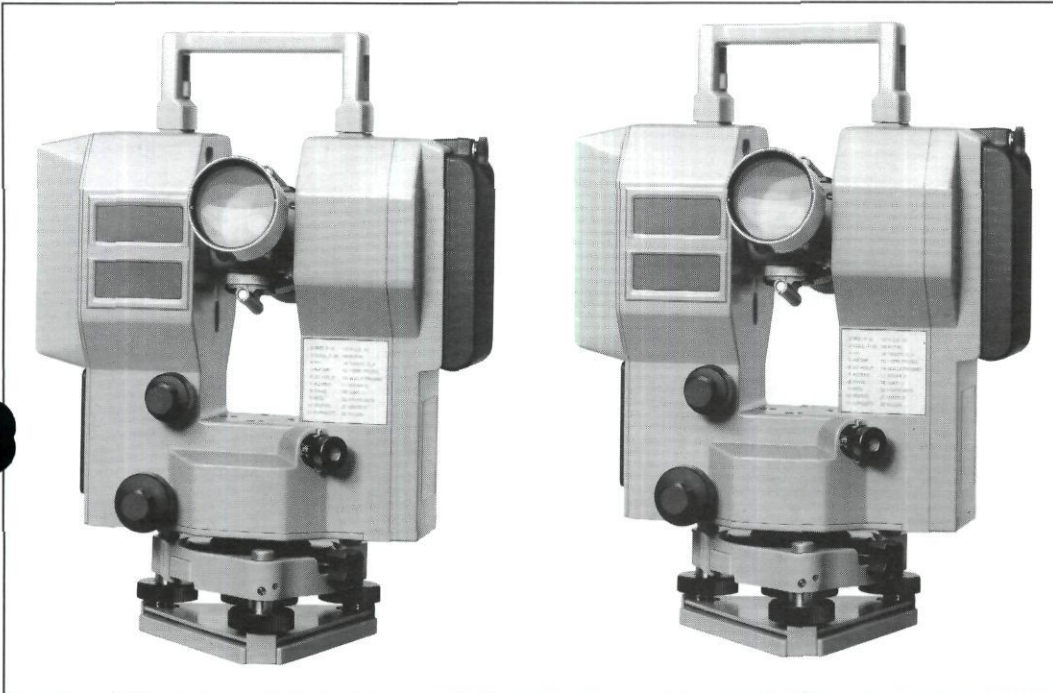
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