



Institutional Affiliate of American  
Congress on Surveying and  
Mapping

# The California Surveyor

THE VOICE OF THE LAND SURVEYORS OF CALIFORNIA

No. 32

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1974

## "THE LAW AND THE CALIFORNIA SURVEYOR"

California Surveyors, both those in public practice and especially those in private practice, come in almost daily contact with some facet of "the law" that affects decisions that they have to make. With this in mind, the technical sessions for the 1974 Convention were designed to cover some important aspects of these laws. Obviously, only a very few of these laws can be discussed in a two-day convention. The sessions vary, rather greatly, in subject matter: "Corner Recordation," "Title Insurance," "Condominium Statutes," "Administration and Enforcement of State Laws," etc., and will be presented by men that have a great deal of background and knowledge on their particular subject.

As in Convention '73 in San Jose, more innovations are being introduced and some things that were new in 1973 are being continued — one of the most important being the concept of early registration. It is extremely critical that as many as possible pre-register by March 15. This aids considerably in final planning for the Convention, especially in regard to meal functions. As in 1973, a drawing for special door-prizes will be held for those that do pre-register by March 15. Also, as last year, a discount is being given to early registrants (see registration form). *It is* beneficial, not only for the Convention Committee, but also for those attending, to register early.

Again the Commercial exhibitors play an important part in the Convention. As usual, they have the most modern equipment available and will be very eagerly demonstrating it.

San Diego has much to offer for all, especially the ladies. On Friday, a tour of the world famous zoo has been arranged and on Saturday a "not to be forgotten" shopping trip to the very exclusive town of La Jolla.

Two exciting evenings are planned: a moonlight cruise on Mission Bay with a following Polynesian dinner at the Catamaran Hotel for Friday night and a tour of Tijuana with dinner and seats for the Jai Alai games on Saturday night.

If interest is shown, then a golf tournament and/or a half-day deep-sea fishing excursion will be held.

Plans are being made to obtain group rates to fly to San Diego from Northern California and for those that are driving, open gasoline stations in San Diego will be noted. As the program shows, the technical sessions end at 2:00 p.m. on Saturday in order to allow those that are driving back to their homes on Saturday to be able to buy gas on the return trip before the stations close Saturday night.

As depicted, the Convention should be extremely worthwhile technically and professionally and certainly exciting with the social events that are planned. ▲

### "BEAT THE ENERGY CRISIS ... TRAVEL WITH A FRIEND"

If enough people are interested, group rates can be acquired from Air California Airlines to fly to San Diego. If more than 20 will fly, then about \$10 per person can be saved on a round trip flight, provided everyone will go down and come back together.

Several flights are available, but one flight has been tentatively chosen:

#### THURSDAY — April 4

Leave Oakland @ 3:30 p.m. — STOP @ San Jose

Leave San Jose @ 4:00 p.m.

Arrive San Diego @ 5:35 p.m.

#### SUNDAY — April 7

Leave San Diego @ 12:05 p.m.

Arrive San Jose @ 1:40 p.m. — continue on to Oakland

Arrive Oakland @ 2:05 p.m.

In order to funnel reservations, requests for other times and/or questions to one place for Northern California, please

Continued on page 22

C.L.S.A. CONVENTION APRIL 4-6, 1974 SAN DIEGO



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**BOARD OF DIRECTORS MEETING**

*by M.K. Welch, L.S.  
Secretary*

Board of Directors Meeting, Saturday, January 12, 1974 was called to order by President Eugene Lockton at 10:15 a.m. at the Airport Marina Hotel, 1380 Old Bayshore Highway, Burlingame, California, adjacent to the San Francisco International Airport.

**ATTENDANCE**

- President, Eugene Lockton ..... Present
- Vice-Pres. & Exec. Sec., James E. Adams ..... Present
- Secretary-Treasurer, Harold B. Davis ..... Present
- Immed. Past Pres., Charles A. Wooldridge ..... Present
- Director, Homer Banks, Jr. .... Present
- Director, Robert L. Carpenter ..... Present
- Director, Lawrence J. Cloney ..... Present
- Director, A.E. Griffin ..... Present
- Director, Paul W. Lamoreaux, Jr. .... Present

*Chapter Representatives*

- Bakersfield, Donald E. Ward ..... Present
- Central Coast, Robert Leger ..... Present
- East Bay, Donald Bunce ..... Present
- East Bay, Raymond J. Peters ..... Absent
- Eastern Sierra, Bob Baron ..... Absent
- Feather River, Jack Ashbaugh ..... Present
- Lake Mendocino, Joseph Scherf ..... Present
- Monterey Bay, James M. Prendergast ..... Present
- Marin, George Colson ..... Absent
- Mother Lode, Frederick W. Kett ..... Present
- Northern Counties, Dan Chatfield ..... Present
- Sacramento, Merwin Rose for  
Dan Radman ..... Present
- Sacramento, George W. Bridges ..... Absent
- San Diego, Bill Karn ..... Present
- San Fernando Valley, Leonard Lindenbaum ..... Present
- San Joaquin Valley, William O. Gentry ..... Present
- Santa Clara-San Mateo, Hank Young ..... Absent
- Santa Clara-San Mateo, George T. Stock ..... Absent
- Santa Clara-San Mateo, Charles Randall, Jr. .... Present
- Sonoma County, Ray Carlson ..... Present
- Tahoe, Bill Marum for  
Jerry W. Tippin ..... Present

*Non-voting members and guests:*

- Don Bender ..... Treasurer, elect
- Roy Watley, Jr. .... Editor, Director-at-Large, elect
- Ken Haskew ..... Present
- E.K. "Dave" Roberts ..... Present
- R. J. Stephan ..... Director-at-Large, elect
- M. K. Welch ..... Secretary, elect

President Eugene Lockton discussed the need for CLSA to upgrade the educational requirements to become a Land Surveyor. He said that we need to grow out of a "Trades" category and into a true profession.

Don Ward presented the Board with some background information on the Board of Registration's Ad Hoc Committee. A complaint to the Board was organized to

prevent the steady erosion of the Land Surveyor's functions such as the signing of grading plans. The Board then formed the Ad Hoc Committee. The discussions in the Committee centered around whether or not grading plans are "fixed works." The "fixed works" question was forwarded to the Attorney General for an opinion.

The Ad Hoc Committee is currently discussing the CC of CE & LS "Plan A" proposal. Mr. Ward indicated that he would like the CLSA to support that proposal.

This subject was discussed at length with a final decision that a Committee be formed to draft the pros and cons of several proposals that have been discussed over the years (including "Plan A") and submit this to the chapters to find out what positions CLSA should support.

Hal Davis presented the Secretary-Treasurer's report and Don Bender submitted a preliminary budget.

Jim Adams, Executive Secretary and Vice-President reported that our membership has been slowly gaining since the low of 1972.

Jim Adams was retained as Executive Secretary of CLSA for 1974.

Fred Kett reported on the activities of the Legislative Committee and handed out three bills that they prepared based on the Feather River Chapter's proposed revisions to the Land Surveyor's Act.

The Convention Committee reported that plans were well under way for the April Convention in San Diego, and they suggested that the participants consider public transportation or car pools as a hedge against the energy crisis.

Several chapters reported on the activities since the last meeting, including their new officers.

President Eugene Lockton presented the gavel to incoming President, Joe Scherf.

New President, Joe Scherf, commended Eugene Lockton for his year of service and suggested that the organization give him a vote of thanks.

A resolution was presented and carried to accept the resignation of Donald E. Bender as Secretary-Treasurer and appoint Michael K. Welch and Donald E. Bender as Secretary and Treasurer of CLSA for 1974.

The next meeting will be held in San Diego, in conjunction with the convention, and all members are welcome to attend. ▲

**CLASSIFIED ANNOUNCEMENTS**

Rates: \$2/line CLSA members; \$4/line non-members and business

**SURVEYOR—Management Trainee**

To plan and perform surveying and mapping work, gather and compile survey and mapping data, perform and coordinate production of maps and map overlays. Should have working knowledge of boundary and control computation, photogrammetry, computer programming and use, and drafting and reproduction techniques. Should be able to communicate well with others and to prepare clear and concise reports. Ability more important than specific training or experience. Equal opportunity employer. Send resume and salary requirement immediately to Gennis, Gray & Justice Engineers, 2612 "J" Street, Sacramento, CA 95816.



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## THE SURVEYOR AND O.S.H.A.

The last time this subject was brought up among some surveyors, a few nodded knowingly while the rest likely said, "The Surveyor and O'who?"

Well, we're not talking about some Irish gal, fellas. We're talking about the "Occupational Safety and Health Act of 1970." This far reaching and oft criticized law, went into effect on April 28, 1971 and is administered by the Department of Labor and a new federal agency, the Occupational Safety and Health Review Commission. "The law provides that each employer has the basic duty to furnish his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm."

To enforce this law, inspectors are allowed to enter your business to examine working conditions, equipment and job sites. He can enter on a general inspection or by way of a specific complaint. He will come unannounced! The law permits "any worker to write the Labor Department charging lax safety practices. An inspector is required to be dispatched if 'reasonable' grounds for a violation appear to exist." You cannot in any way discriminate against any employee who asks for an inspection. He cannot be fired. He cannot be disciplined. You have to let the inspector question any employee in private. If the inspection turns up violations of safety practices, you will be issued a citation describing the violation and prescribing a time in which it must be corrected. If the violation is serious enough, the inspector may forbid you to use that equipment. He can even close your business.

Provision is made for hearings and appeals. Penalties for violations can be very severe. Penalties for one violation can draw a fine of up to \$1,000. If it is willful, \$10,000. If you don't correct the violation in the allotted time, you can be fined \$1,000 per day for each day it continues. If an employee should die because of this violation, you may be fined up to \$10,000 or face six months in jail. In many cases, the employee will be fined for an unsafe practice, and the employer will be fined for letting the employee do it.

The law requires that you keep records. You should have been sent a booklet by the Department of Labor containing these requirements and advising you of the law and your responsibilities. (I even bet there's a darn good chance you threw it away, or at least put it in a drawer and forgot about it.) The forms and records you must keep are as follows:

1. OSHA No. 100, Log of Occupational Injuries and Illnesses. This must be kept current. Each injury occurred must be entered within two days of occurrence. This form must be kept available for examination by representatives of the Dept. of Labor, or the Dept. of Health, Education and Welfare.
2. OSHA No. 101, Supplementary Record of Occupational Injuries and Illnesses. This form must be maintained on each injury. The Workmen's Compensation First Report of Injury meets this standard and may be used. This also has to be kept available for inspection.
3. OSHA No. 102, Summary - Occupational Injuries and Illnesses. This form must be prepared at the end of the

calendar year and posted for inspection by employees by January 31st of the following year.

4. Employers must report to the Secretary of Labor within 48 hours each accident or health hazard that results in one or more fatalities or hospitalization of five or more employees. These reports may be made to area directors listed in the back of the federal booklet you received.
5. Work Days Lost. The actual number of days the employees *would* have worked but could not because of an occupational injury or illness must be reported. This doesn't include the day of injury or the day of return to full-time employment and also excludes the usual non-working days. If you don't have these forms, write the Office of the Assistant Secretary of Labor for Occupational Safety and Health, 14th Street and Constitution Ave., N.W., Washington, D.C. 20210.

Dis-closures staff has attempted to *try* and find what the specific regulations are that apply to Surveyors. We've found that the federal regulations are so many and so complex that it would be a mighty job to unravel them all. We've inquired from several private organizations on how to find specific regulations. The usual answer is "Good Luck."

In general though, these safety and health regulations are rules for avoiding hazards that have been proven by experience and research to be harmful to personal safety and health. These may take the form of new laws or old laws given teeth by OSHA. To attempt to dig through them all for regulations that affect us would take months and leave volumes of material too ominous to contemplate. From what little bit of research we could do however, it appears that these regulations will affect the surveyor mostly as he works upon the highways, when he is on a construction site, or when he is brushing a survey line. These are the scenes of most of our injuries and illnesses and we'll attempt to give you some general rules and safety measures. At this point, we must point out that our list is by no means complete, so don't rely upon us as the authority. This article must just be the beginning to make each surveyor aware of the law and of a few general safety practices. We should also point out that governmental agencies are exempt from the act, but most can fall under the jurisdiction of the State Industrial Commission or the like.

Some general rules that we have read or heard about are:

1. Approved first aid kits must be provided at work sites or on all vehicles.
2. A crew must have at least one person trained in first aid.
3. Seat belts must be provided and worn.
4. Gasoline, or other flammable liquids, must be stored in approved containers and fire extinguishers must be provided.
5. Shirts must be worn to prevent sunburn, proper shoes or boots worn to protect the feet and prevent sprains, etc.

When brushing survey lines, some of the lumber industry regulations that would apply are:

1. Safety shoes and hard hats must be worn by everyone on the job. This equipment must be made available for employees.
2. Anyone using wire rope (cable) must wear gloves.

Continued on page 22

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**Field Proven:** The Ranger electronic distance measuring system has a valid history of success with state highway departments, federal agencies, civil engineers and leading land surveyors.

**Accurate:** The Ranger III is accurate to within  $\pm 0.02$  ft. +2 ppm for the limits of its range. Or from 3 feet to more than 8 miles.

**Fully Automatic:** Operators simply aim the visible laser beam at a retro-reflector, set the return light level, dial-in atmospheric and instrument corrections, and touch a button. Digital readout is displayed instantly.



**Measurements in either Feet or Meters:** Conversion from one unit of measurement to the other is no problem. Simply change a switch position.

**Easy Operation:** Ranger III provides simple and quick operation. Users enjoy substantial savings; lower training costs; more measurements and greater accuracy in less time; fewer personnel for field and office data reduction.

**Lightweight, Rugged:** Total weight—36 lbs. Helium-neon laser light source, computer, and distance display unit are contained in single unit. Connects to a 12-volt storage battery by a single cable.

**Choice of Models:** The Ranger III is shown here, but for shorter distances, you can also choose the Ranger II (from 3 feet to 4 miles) or the Ranger I (from 1 meter to 4 kilometers).

**And Much, Much More:** Now that we've exposed you to some of the Ranger's qualifications, why not judge them all for yourself? For complete details, just write us at Keuffel & Esser Co.

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# RANGER



### YOU THINK YOU HAVE RED TAPE!!!

A New Orleans lawyer sought an RFC loan for a client. He was told that the loan would be granted if he could prove satisfactory title to property offered as collateral. The title dated back to 1803, and he had to spend three months running it down. After sending the information to RFC he got this reply: "We received your letter today enclosing application for loan for your client, supported by abstract of title. Let us compliment you on the able manner in which you prepared and presented the application. However, you have not cleared the title before the year 1802, and therefore, before final approval can be accorded the application, it will be necessary that the title be cleared back of that year."

Annoyed, the lawyer replied: "Your letter regarding titles in Case No. 189156 received. I note that you wish titles extended further back than I have presented them. I was unaware that any educated man in the world failed to know that Louisiana was purchased from France in 1803. The title to the land was acquired by France by right of conquest from Spain. The land came into possession of Spain by right of discovery made in 1492 by a sailor named Christopher Columbus, who had been granted the privilege of seeking a new route to India by the then reigning monarch, Isabella. The good queen, being a pious woman and careful about titles, almost, I might say, as the RFC, took the precaution of securing the blessing of the Pope upon the voyage before she

### PRESIDENT'S CORNER

by Joseph J. Scherf, L.S.

As I take over the reins of office of the presidency of CLSA for 1974, I find myself wondering "where are we going?" Do we still have the spirit and feeling we had when we first organized? Do we seem to be drifting with the tide — being content to accept what fate hands out? Have we become complacent with the small gains and recognition we've won? Is it enough that we have an organization with numerous committees, a convention, and a magazine? Are we content with only approximately 22% of the California licensed land surveyors in our organization? Are we satisfied with the status of land surveyors in California?

I firmly believe CLSA still has the same spirit and feeling we had when we first organized. Some of us have left, some of us have slowed down, but others have stepped in to continue with renewed vigor our goals and objectives. We are not drifting with the tide. Instead, we are making headway in numerous directions. We are not complacent with what we have accomplished — we have to fight like hell just to stay even! And there are still major battles to be fought and objectives to be won.

It is definitely not enough just to have an organization with numerous committees, a convention, and a magazine. Ours is a hard working organization, with active committees, a bangup convention that outdoes itself every year, and a magazine whose format, style, and content are excellent. We are striving continuously to increase our membership. (I would invite all of you reading this magazine who are not members to join — this is your Association.)

We are *NOT* satisfied with the status of land surveyors in California. We would like to have more surveying courses taught in the schools, a four year accredited curriculum in California leading to a B.S., the resolution of the civil engineer/land surveyor problem, the recognition of the professional land surveyor in the hiring practices of various state agencies, the halting of the erosion that is eating away at the land surveyors' traditional sphere of surveying practice, and a strengthening of the land surveying profession.

Our officers, directors, and committeemen are all dedicated men who are working constantly towards CLSA's goals. Even though we may differ in the paths we think we should take, or in the manner of doing it; one thing is certain: we are all striving for the same end result. We are all proud to be land surveyors — we wish to improve our status as individuals — and we want to continue to improve our profession. ▲

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sold her jewels to help Columbus. Now the Pope, as you know, is the emissary of Jesus Christ, the Son of God, and God, who it is commonly accepted, made the world. Therefore I believe it is safe to presume that He also made that part of U.S. called Louisiana, and I hope to hell you are satisfied." ▲

*An income tax collector is a man who can turn a nest egg into chicken feed.*  
—Gas House Gazette

# COMMENTS AND LETTERS, From In, Out, and Around

## SUB-PROFESSIONAL or PROFESSIONAL

by Frank Silver, L.L.S.  
*The West Virginia Surveyor*

Great confusion seems to surround the status of land surveying. Is it sub-professional technology, or is it a learned profession? If Tillotson is correct in his recent article in the May-June 1973 *West Virginia Surveyor*, even the American Society of Civil Engineers has become confused. Tillotson says that ASCE calls surveying a sub-professional branch of civil engineering.

Now it is probably true that construction, topographical, and engineering surveying is usually technology and should not be considered a learned profession.

It is probably equally true that legal or boundary surveying, especially retracement of very old lines, particularly where a dispute exists, is a learned profession, much like medicine or law in its difficulty and the demands it puts on a practitioner to turn out a satisfactory piece of work. Boundary surveying is recognized as a learned profession in the eyes of the law. (See "Clark: Surveying and Boundaries," 3rd ed. p. 11, "The law in most jurisdictions has recognized a qualified surveyor as being a professional man in the status of an architect, a lawyer, or a doctor . . . Although it might be difficult to convince a tired, muddy surveyor of the fact, the concept of surveying does not involve physical effort.")

It is probably not the mensuration or measurement part of the task that makes the legal branch of land surveying a learned profession. More likely it is the record and legal part of the task, the weighing the evidence, reconciling the conflicting claims of parties, the relocation of lost corners, the creating of a plat and description that will stand up in court, that makes boundary surveying a learned profession. Five years is hardly long enough to gain a good working knowledge of the record, as it is kept in most counties in the original colonies. This 5 years would be required of an intelligent, degreed, engineering professional, of high ethical standards, receiving close expert guidance and supervision. If any of these favorable elements are weakened, a much longer time will be required, or the neophyte may not live long enough to gain a good understanding of the structure of the record and the demands it places on him in difficult cases.

The same can be said of real estate and boundary law. This is not an easy branch of law, but one of the most difficult, if not the most difficult. Many attorneys have a poor understanding of this area of law. Some write whole books on the subject, floundering along through 300 pages of a myriad of details and miss the key points.

With difficult resurveying, it is hardly possible to use much division of labor and get an acceptable result. If assistance is used in record searching, the professional in charge must fully review every point. He needs to be so intimate with any field activity that often he decides to play the key field role. So also with drafting. In short, nearly every element of the problem must be in one man's mind. This need to be so closely involved

Continued on page 22

## LAND SURVEYING NOT SEMI-PROFESSION

Thanks to the joint effort of many professional organizations such as ACSM, ASCE and NCEE objecting to the recent listing of land surveying as a semi-professional occupation by the Federal Government, Llewellyn T. Schofield, Vice Chairman of the Surveying Committee of National Council of Engineering Examiners and Past President of EMAPELS, has received the following letter:

May 18, 1972

Dear Mr. Schofield:

This is in response to your letter of May 1, regarding the status of land surveyors. The Civil Service Commission recognized land surveyors in the Federal service as professionals. We are revising our occupational definition to clarify this point. The new definition will read as follows:

"This series includes positions that involve professional work in land surveying, which is concerned with establishing, investigating, and re-establishing land and property boundaries, and with preparing plats and legal descriptions for tracts of land. The work required application of professional knowledge of the concepts, principles, and techniques of surveying, including underlying mathematics and physical science, in combination with a practical knowledge of land ownership laws."

Sincerely yours,

Leon H. Blumenthal, Chief, Science & Engrg.  
Occupations Section, Standards Division  
United States Civil Service Commission

*EMAPELS Newsletter, August, 1972* ▲

## *In Memorium*

### JOSEPH F. SWITZER

Born  
San Diego, California  
September 4, 1931

Passed Away  
San Diego, California  
December 2, 1973

Services At  
Palisades United Presbyterian Church  
December 6, 1973 10:00 a.m.

Officiating  
Rev. Jay R. Paris

Music  
Betty Rikansrud

Final Resting Place  
El Cajon Cemetery



# THE SURVEYOR AND SURVEYING

or

## TECHNICIAN'S BUST OF THE TECHNOLOGICAL BOOM

by Robert L. Reilly, L.S.

An unsolicited review of surveying practices for the California State Board of Registration for Professional Engineers.

Editor's Note: This article is the final part of a three part series.

### The Theodolite

If in computing the surveyor claims intellectual abilities that qualify him to challenge the basic tenets of mathematics; as instrumentman he claims physical attainments of such superiority that only by recourse to the comic strip can one find his counterpart. For the surveyor will brook no argument that the axis of the telescope cannot be alined to absolute perfection and errors that appear can be assigned only to conditions extraneous to the operator's physical abilities. Although he may give verbal recognition to the operational definition of the theodolite that classify the repetition instrument as one which can be pointed more accurately than it can be read, and the direction instrument as one that can be read more accurately than it can be pointed, he will not accept a dual method of application. This is clearly demonstrated by the surveyor's implacable insistence that a station adjustment in the form of a horizon closure be applied regardless of the kind of theodolite used. To point out that with the direction instrument the second pointing on one station necessary to simulate a closing of horizon will reveal only the difference of the pointings at that particular station, but has no applicable relationship to the pointings at other stations, is contrary to his fundamental concepts and practices.

The surveyor is heir to the accumulated methods and practices derived since the telescope was first reduced to portable size and attached to graduated circles for the measurement of horizontal and vertical angles called the "theodolite". And immediately exceptions will be noted, for the term "theodolite" has come to be accepted as designating only instruments of high precision. But it is the categorical term for all instruments that, having both vertical and horizontal axes, simulate the elements of the sphere and is, in fact, an analog computer for the measurement of spherical angles. All longitudinal lines pass through the zenith, and the angle between two longitudinal lines is measured on the arc at the horizon regardless of the vertical position of the points on either line. Vertical arcs are measured along the longitudinal line of the point either plus or minus from horizon or continuously from zenith or nadir. All readings are static calibrations on a fixed graduated circle and the precision of the instrument is determined by the minuteness to which the calibrations can be read. But the theodolite is *not* a metering device. The motion or direction of motion of the telescope between positions on the graduated circle is without influence upon the readings at those positions. If such influence can be established, it would indicate mechanical or structural defects of a nature that would invalidate its usefulness.

The mechanical accuracy of the theodolite is determined by the closeness to which it conforms to the vertical and

Continued on page 10

# right on

### IT'S ABOUT TIME

by Roy Watley, Jr., L.S.

What is a woman's place? Some answers might include the home, kitchen, bedroom, washroom, or the baby's nursery. Some may be a little more liberal and say that a woman's place could also be outside the home, such as driving the kids to school and various other activities. In some circles the idea of a woman working is frowned on. In other circles women are allowed to work at such occupations as secretaries, receptionists, keypunch operators, telephone operators, waitresses, etc.

At present only about 7000 of the 760,000 engineers in the U.S. are women although aptitude tests given to high school students suggest the ratio should be nearer three to two than one hundred to one. In California the ratio is 1000 men licensed surveyors to *each* woman licensed surveyor.

According to *The Empire State Surveyor*, two women are working as land surveyors in the Ontario (Canada) area. One woman is a chainperson and the other is an instrumentperson. "They work well" reports Bill Londry, chief of the land surveying party. The branch manager of the company who hired the women stated "Generally, I think that even though it is unusual for girls to be working in land surveying, it is a good thing. I think the Victorian idea of girls as being fragile went out the window some time ago."

During World War II, women in the U.S. performed outstanding work in positions held previously by men only. It shouldn't take World War III to convince employers to give everyone (including women) an equal opportunity for employment.

The recent recruitment brochure, entitled "Consider the Possibility," aimed at high school and college women, issued last year by the Stanford Engineering School has a picture of a woman leveling a transit. Have you considered the possibility? ▲

### REPORTER?

Anyone wanting to be a reporter for "The California Surveyor" contact:

Reporter  
P.O. Box 3707  
Hayward, Calif. 94540

### DEAD LINE DATES FOR THE CALIFORNIA SURVEYOR

Summer Edition . . . . . May 18, 1974  
Fall Edition . . . . . August 17, 1974

Articles, Reports, Letters, etc., received after the above mentioned date will be placed in the next Edition.

— Editor

**SAN JOAQUIN VALLEY  
SURVEYORS' CONFERENCE  
APRIL 12 AND 13, 1974  
CALIFORNIA STATE UNIVERSITY, FRESNO**

For additional information, contact:

Larry W. Stone  
Conference Committee  
CLSA Student Chapter  
California State University, Fresno ▲

**TECHNOLOGICAL BOOM** (Continued from page 9)

horizontal axis of the sphere it stimulates, and the adjustments of the theodolite are made to bring the optical axis of the telescope in perfect coincidence with the vertical and horizontal axes of the instrument. All instrumental errors are, in themselves, systematic or accumulative errors. But since the telescope can be reversed or inverted, the error appears with the same magnitude but with opposite sign and the mean is a perfect compensation. When the vertical cross-hair is not in perfect coincidence with the vertical axis of the instrument it will illuminate about the true vertical axis with a radius equal to the error. When the telescope is transited from horizontal to zenith, the absolute arc distance of the error remains constant but its projected measurement on the horizontal circle coincides with the secant of the vertical angle which is one, the

Continued on page 21

**MOTION PICTURE FILM  
AVAILABLE FROM USGS**

Motion picture films covering various aspects of surveying, cartography and remote sensing are available from the U.S. Geological Survey on a free-loan, short-term basis to educational institutions, professional and scientific societies, civic and industrial groups and other organizations. Most are 16 mm. in color and with sound. Films of interest to the surveyor and cartographer include:

Precise Leveling for Topographic Mapping  
Transit Traverse for Topographic Mapping  
Triangulation for Topographic Mapping  
Supplemental Control for Topographic Mapping  
Negative Scribing for Map Reproduction  
Topographic Mapping by Photogrammetric Methods  
Preparation of Topographic Manuscripts for Reproduction  
Tellurometer  
Airborne Control (ABC) Survey System  
Introduction to Photo Interpretation  
Aerial Photo Interpretation of Geologic Resources  
Aerial Photo Interpretation of Forest Resources  
Aerial Photo Interpretation of Hydrological Resources  
Aerial Photo Interpretation of Soil Resources

Details on the content of films, loan procedures, etc., may be obtained by writing or calling: Chief Visual Services, U.S. Geological Survey, Washington, D.C. 20244, Tele. (202) 343-9391. ▲

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Wife's Name: \_\_\_\_\_

Address: \_\_\_\_\_

		<b>TOTALS</b>	_____
Registration Fee	\$20.00		_____
Student Registration Fee	2.00		_____

**FRIDAY, APRIL 5**

Men's Luncheon (Steak)	\$ 4.50	_____
------------------------	---------	-------

Zoo Trip	\$ 7.50 Adults	_____
	5.25 age 12-15	
	4.75 age 2-11	_____

Bay Cruise, Polynesian Banquet & Entertainment	\$12.00	_____
---	---------	-------

**SATURDAY, APRIL 6**

Men's Luncheon (Ham)	\$ 4.50	_____
----------------------	---------	-------

La Jolla Shopping Trip	\$ 2.00	_____
------------------------	---------	-------

Tijuana Tour, Jai Alai & Steak Dinner	\$15.00	_____
---------------------------------------	---------	-------

Tijuana Tour, Jai Alai & Mexican Dinner	\$11.00	_____
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**TOTAL:** \$ \_\_\_\_\_

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**ADJUSTED TOTAL:** \$ \_\_\_\_\_

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NAMES	AGES
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EQUIPMENT	1st 10 Days Per Day	After 10 Days Per Day	After 90 Days Per Day
<b>CUBIC DM-60 CUBITAPE DISTANCE METER</b> — Including power supply, altimeter, thermometer, two Kern tripods, one single prism assembly .....	\$ 25.00	\$ 15.00	\$ 10.00
<b>HEWLETT-PACKARD H.P. 3805 DISTANCE METER</b> — Including power supply, altimeter, thermometer, two Kern tripods, one single prism assembly .....	25.00	15.00	10.00
<b>HEWLETT-PACKARD 3800A DISTANCE METER</b> — Including power supply, altimeter, thermometer, two Kern tripods, one single prism assembly .....	25.00	15.00	10.00
<b>RETRO-RAY TRIPLE PRISM ASSEMBLY FOR H.P. 3800A OR DM-60 CUBITAPE</b> — Including Kern tripod with adaptor .....	3.75	2.25	1.50
<b>RETRO-RAY SINGLE PRISM ASSEMBLY FOR H.P. 3800 OR DM-60 CUBITAPE</b> — Including Kern tripod with adaptor .....	2.25	1.35	0.90
<b>CUBIC DM-40 AUTOTAPE</b> — Basic system including interrogator and two responders, tripods .....	300.00	150.00	100.00
<b>AUTOTAPE THERMOELECTRIC GENERATOR</b> — Propane power, 12 volts, 60 watts .....	20.00	9.00	6.00
<b>MOTOROLA RANGE POSITIONING SYSTEM (RPS)</b> — Basic system including two coded transponders ....	250.00	120.00	80.00
<b>MOTOROLA MINI-RANGER</b> — Basic system including two coded transponders .....	200.00	90.00	60.00
<b>ADDITIONAL RPS OR MINI-RANGER CODED TRANSPONDERS</b> .....	30.00	15.00	10.00
<b>AUTOTAPE, RPS OR MINI-RANGER PRINTER</b> — Automatically prints out ranges at three second intervals or upon command .....	15.00	6.00	4.00
<b>RPS OR MINI-RANGER THERMOELECTRIC GENERATORS</b> — Propane powered, 24 volt, 20 watts	10.00	4.50	3.00
<b>RAYTHEON DE-719 RECORDING FATHOMETER</b> — Portable, 12 VDC or 115 VAC, 410' depth range ....	25.00	15.00	10.00
<b>RAYTHEON DE-119D RECORDING FATHOMETER</b> — Portable, 12 VDC, 240' depth range .....	20.00	12.00	8.00
<b>CUBIC DM-20 ELECTROTAPES</b> — Two units including tripods, psychrometers and altimeters ....	40.00	24.00	16.00
<b>ELECTROTAPE TILTING HEADS</b> — Two units .....	2.50	1.50	1.00
<b>SPECTRA-PHYSICS LT-3 LASER TRANSIT-LITE</b> — Including fan beam attachment 12 VDC-115 VAC power supply and tripod .....	20.00	12.00	8.00
<b>ASKANIA A-2e 1" DIRECTIONAL THEODOLITE</b> — Including tripod .....	15.00	9.00	6.00
<b>ASKANIA A-1e 20" REPEATING THEODOLITE</b> — Including tripod .....	10.00	6.00	4.00
<b>AMERICAN PAULIN MODEL M-2 SURVEYING ALTIMETER</b> — 0 to 10,000 feet, 2 foot graduation ...	4.00	2.40	1.60
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<b>AUTOMATIC LEVEL</b> — Including tripod .....	3.50	2.10	1.40

Minimum rental charge: \$10.00 exclusive of shipping charges. Rental charges commence on the day the equipment leaves Ventura, California, and terminate on the day the equipment is returned or shipped for return from lessee's location. Lessee pays all round trip shipping charges on rented equipment. Rates for longer periods available on request. Rates subject to change without notice.



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# CALIFORNIA LAND SURVEYORS ASSO

APRIL 4 - 6, 1974

## "THE LAW AND THE C

### THURSDAY, APRIL 4

- 6:00 PM Early Registration  
8:00 PM Vendors Cocktail Party

### FRIDAY, APRIL 5

- 8:00 AM Registration and Exhibits open  
8:30 AM Opening ceremonies including:  
Joseph Scherf, L.S., President CLSA  
Moderator - Charles A Wooldridge, L.S. & P.E., Project Engineer and Associate, E.F. Cook & Associates, Ltd., San Diego; Past President of CLSA; Member Legislative Committee.  
"Legislative Activities of CLSA" and "Corner Recordation Law of 1974," A.E. Griffin, L.S., Chief, Branch Cadastral Surveys, U.S. Bureau of Land Management, California State Office, Sacramento; CLSA State Director-At-Large in charge of Legislative Division.  
10:15 AM Coffee with the Exhibitors  
10:45 AM Moderator - Michael J. Curren, L.S., President San Diego Chapter CLSA; Vice-President Nasland Engineers, San Diego, in charge of surveying activities.  
"Physical Monuments vs Title Insurance," Gordon H. Wattles, L.S., Consulting Title Engineer, Title Insurance and Trust Co., Santa Ana; also licensed as a Land Surveyor in Nevada.  
11:30 AM Pre-lunch break in the Exhibit area  
12:00 NOON Luncheon (Steak)  
Moderator - Jerry W. Tippin, L.S., Vice President Raymond Vail & Associates, Office Manager Tahoe City, California.  
Introduction of Exhibitors. Early registration includes the following, with more daily:  
Schonsted Instrument Company  
Kern Instruments Inc.  
Brunson Instrument Company  
Technical Advisors, Inc.  
Olivetti Corp. of America  
Monroe, The Calculator Co.  
Lewis & Lewis  
Surveyor's Service Co.  
Zena Company  
AGA Corporation  
The Lietz Company  
Keuffel & Esser Co.  
Cubic Industrial Corp.  
Wang Laboratories, Inc.  
Easi File Corporation  
Hewlett-Packard  
Los Angeles Scientific Instrument Co., Inc.  
Concap Computing Systems

# ATION EIGHTH ANNUAL CONVENTION

SAHIA HOTEL, SAN DIEGO

## CALIFORNIA SURVEYOR<sup>®</sup>

- Invitation to the 1975 California-Nevada Land Surveyors Convention, a joint meeting of CLSA and the Nevada Association of Land Surveyors, at Lake Tahoe, South Shore.
- 2:00 PM Moderator – Larry Cloney, L.S., Land Surveyor in charge of the Surveying Section at the City of San Jose; CLSA State Director-At-Large in charge of the Convention Division.
- “The Surveyor and Condominium Statutes,” Allan Perry, Esq., Attorney-at-Law in the firm Jenkins & Perry, San Diego; 25 years practice in Real Estate transactions; father was a Land Surveyor in Washington state.
- 3:15 PM Coffee with the Exhibitors
- 3:45 PM Moderator – Robert L. Carpenter, L.S., Chief of Surveys, Power Design and Construction Division, Dept. of Water and Power, City of Los Angeles; CLSA State Director-At-Large in charge of the Administration Division; Chairman of ACSM National Land Surveys Division Liason Committee.
- “California Surveyors and their Laws – Leaders or Followers?” Edward K. Elder, L.S. in New Mexico since 1951; Chairman of National ACSM Land Surveys Division; in private practice in Albuquerque, New Mexico.
- 5:00 PM Registration and Exhibits close
- 6:30 PM Bay Cruise, Banquet, and Entertainment at the Catamaran.

### SATURDAY, APRIL 6

- 8:00 AM Registration and Exhibits open
- 8:30 AM “Administration and Enforcement of State Laws Pertaining to Surveying,” a panel discussion.
- Moderator – Paul W. Lamoreaux, L.S., Real Estate Engineer at Bay Area Rapid Transit District, Oakland, involved in surveying and mapping BART’s right-of-way.
- Frank H. Fowles, Esq., District Attorney of Inyo County, California, with offices at Independence.
- Justice Stuart C. Wilson, Northern County Judicial District, San Diego County; former City Attorney of Carlsbad, and former Assistant District Attorney of Riverside and San Diego Counties.
- John P. Pedri, L.S., Tuolumne County Surveyor; Land Surveyor member of the Board of Registration.
- 10:30 AM Coffee with the Exhibitors
- 11:00 AM Luncheon (Ham)
- “Diverse Opinions,” a panel discussion
- Moderator – Eugene Lockton, L.S., Immediate Past President of CLSA; entering his second century of Land Surveying in private practice in San Rafael; is also registered as a M.E. and E.E. in California.
- Curtis M. Brown, L.S., Consulting Land Surveyor; retired from Daniels, Brown and Hall, San Diego; author of books on Surveying Law.
- William B. Wright, L.S., Consulting Land Surveyor, primarily with attorneys on property rights, Burlingame, California; retired after 28 years directing surveying and mapping operations for Wilsey and Ham; San Mateo.
- 2:00 PM Convention Adjournment
- 4:30 PM Tijuana Tour (see Information Sheet for details)

PRELIMINARY PROGRAM – LADIES' ACTIVITIES

THURSDAY, APRIL 4

- 6:00 PM Early Registration  
8:00 PM Vendors Cocktail Party

FRIDAY, APRIL 5

- 8:00 AM Hospitality Room open  
Say "hello" to old friends and meet new ones.  
Coffee and donuts provided.  
9:30 AM Zoo Trip (see Information Sheet for details)  
6:30 PM Banquet at the Catamaran.

SATURDAY, APRIL 6

- 8:00 AM Hospitality Room open  
Get-together with coffee and donuts provided.  
9:30 AM La Jolla Shopping Trip.  
4:30 PM Tijuana Tour.

NOTE: Babysitting will be provided if needed, and the Ladies Hospitality Room will be open daily.

---

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# Consumer Affairs

## GASOLINE SAFETY PRECAUTIONS

The Department of Consumer Affairs urges consumers to contemplate the possible hazards before attempting to store gasoline.

The Consumer Product Safety Commission reports that last year 13,500 gasoline-related injuries required hospital emergency room treatment. Treatment for swallowing gasoline was given to 5,100 persons – half of these were children under five years of age.

If you must keep a small amount of gasoline on hand, using the proper container and following a few safety rules can avert a tragedy.

Safety cans for storage outside automobiles should NOT be carried in a motor vehicle. These cans are designed to vent fumes to the outside – fumes which might easily ignite in a car. If you have to carry a small amount of gas, use only fire department-approved *vapor-tight* cans. When filling a can, allow enough space for the fuel to expand with temperature changes. Cans should be red and labeled “flammable” or “gasoline.”

- Never store gasoline or other fuel inside the house or in the basement.
- Never store gasoline near open flames, pilot lights, stoves, heaters, electric mowers or any other sources of ignition or sparks.
- Never use gasoline near an open flame. Never smoke near gasoline.
- Keep gasoline, kerosene, and other fuels and polishes out of the reach of children.
- Avoid repeated or prolonged skin contact with gasoline and avoid breathing fuel vapors.
- Avoid careless use of gasoline when cleaning clothing, paint brushes, exterminating insects, priming carburetors and starting or feeding fires.
- If a child or adult swallows gasoline (one of the dangers of siphoning) call a doctor or other medical help immediately. Do not try to get the person to vomit.

If in doubt about the safety of a container, or to find out regulations on storing gasoline, check with your local fire officials. ▲

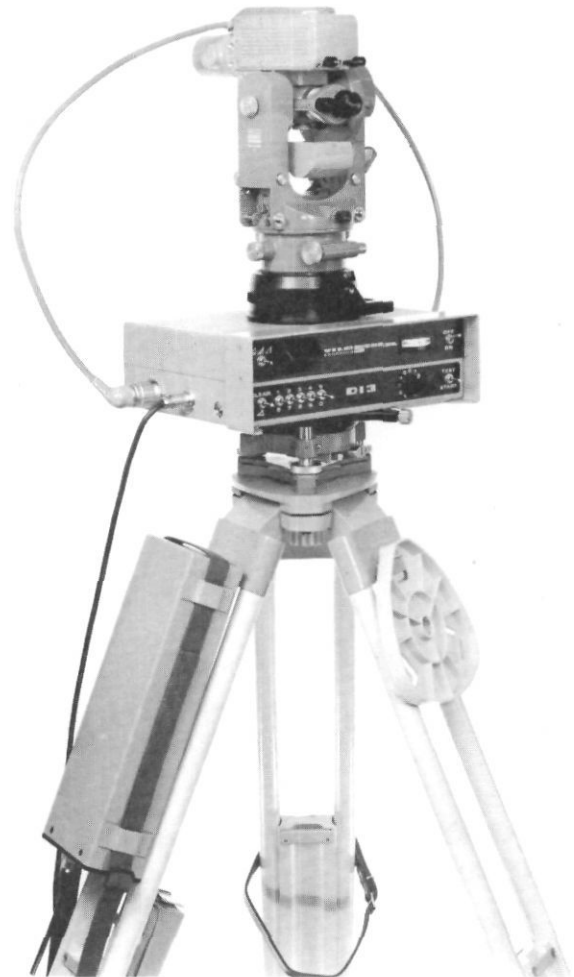
## MISSION BAY SAN DIEGO

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## NEW PRODUCTS

### NEW ELECTRONIC DISTANCE METER MEASURES WITH CONFIDENCE

*Built-in computer makes sure only correct readings are displayed. Accuracy is held regardless of momentary beam interruptions.*

A new, low-cost all-electronic distance meter introduced by Hewlett-Packard has automatic digital readout with a built-in computer to check distance accuracy. This new Hewlett-Packard Model 3805A Distance Meter averages a number of distance measurements, checks to make sure they are within a specification, and if they are, displays the result. Beam interruptions due to atmospheric conditions or physical objects have no effect on accuracy.

The rugged, all solid-state, 6-digit readout can be set to read feet or metres with the flick of a switch. Accuracy is  $\pm (0.02' + 0.01' \text{ per } 1000')$  or  $\pm (0.007\text{M} + 0.01\text{M} \text{ per } 1000\text{M})$  with a range of one mile (1600 metres).

Also built in is a single dial adjustment for environmental correction. Adjustment is made before the distance measurement, thus the direct reading is corrected for temperature and barometric pressure.

A self-test mode checks the battery and electronics of the Model 3805A. Field checks can be made quickly, assuring proper operation of the instrument and minimum down time.

Low in cost, the Model 3805A sells for \$3395. It weighs 19.2 lbs. (8.9 Kg) with optional Battery Pod. Two instrument cases, a shipping case and a back pack carrying case, are provided as standard equipment.

Power required is 12 volts dc. Rechargeable nickel-cadmium batteries in a pod that attaches to the instrument are optional. Operating time is 2 hours or about 100 measurements.

The 3805A Distance Meter is suited for applications such as boundary, utility or construction surveys. ▲

### DESCRIPTION OF LAND on file in a certain Connecticut County Seat for a parcel of land conveyed in 1812

One hundred and forty-seven acres, 3 rods and 19 rods after deducting whatever swamp, water, rock and road areas there may be included there in and all other lands of little or no value, the same being part of said deceased's 1,200-acre colony grant, and the portion hereby set off being known as near to and on the other side of Black Oak Ridge bounded and described more in particular as follows, to wit: Commencing at a heap of stone about a stone's throw from a certain small clump of alders, near a brook running down off from a rather high part of said ridge, thence by a straight line to a certain marked white birch tree about two or three times as far from a jog in the fence going around a ledge nearby, thence by another straight line in a different direction around said ledge and the Great Swamp so called, thence in line of said lot in part and in part by another piece of fence which joins onto said line, and be an extension of the general run of said fence to a heap of stone near a surface rock, thence as aforesaid to the Horn, so called, and passing around the same as aforesaid, as far as the Great Bend, so called, and from thence to a squarish sort of jog in another fence, and so on to a marked black oak tree with stones piled around it, thence by another straight line in about a contrary direction and somewhere about parallel with the line around by the ledge and the Great Swamp, to a stake and stone bounds not far off from the old Indian Trail, thence by another straight line on a course diagonally paralleled or nearly so with Fox Hollow run, so called, to a certain marked red cedar tree out on a sandy sort of plain, thence by another straight line in a different direction to a certain marked yellow oak tree on the off side of a knoll with a flat stone laid against it, thence after turning around in another direction and by a sloping straight line to a certain heap of stone which is by pacing just eighteen rods and about 1/2 rod more from the stump of the big hemlock tree where Philo Blake killed the bear, thence to the corner begun at by two straight lines of about equal length which are to be run in by some skilled and competent surveyor so as to include the area and acreage as hereinbefore set forth.

George D. Whitmore ▲

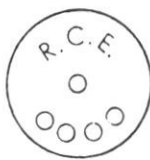
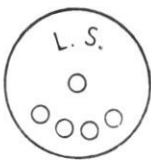
## Mission Bay, San Diego

### SURVEYORS AND ENGINEERS TAGS

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ALL TAGS 22 GAGE STOCK  
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#### BRASS TAGS

NUMBER OF TAGS	COST PER 1,000	TOTAL COST OF TAGS
500		13.00
1,000	20.00	20.00
2,000	19.00	38.00
3,000	18.00	54.00
4,000	17.00	68.00
5,000	16.00	80.00

#### ALUMINUM TAGS

NUMBER OF TAGS	COST PER 1,000	TOTAL COST OF TAGS
500		10.00
1,000	17.00	17.00
2,000	16.00	32.00
3,000	15.00	45.00
4,000	14.00	56.00
5,000	13.00	65.00

*California residents add 5% Sales Tax.*

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NUMBER OF TAGS WANTED \_\_\_\_\_

BRASS \_\_\_\_\_ ALUMINUM \_\_\_\_\_

*your check with order - we pay postage*



ART RICHARDSON

*On a moonlit night it does get a little crowded.*



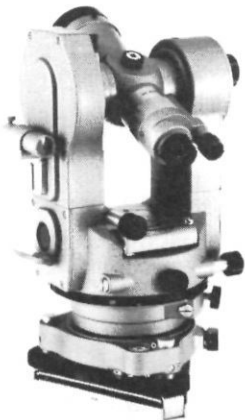
Art Richardson

*Sure glad this job wasn't scheduled for January.*

# Look into Lietz!

**Lietz has something nobody else has.  
Not Kern. Not Wild. Not Zeiss.**

With the TM 20C, Lietz has the *only* full-featured 20 second theodolite with a readout which projects opposite sides of the horizontal circle to eliminate any eccentricity error. Both circles are read through a microscope next to the eyepiece and are read directly to 20 seconds with estimation to 3 seconds. (The TM 10C is identical except that it reads directly to 10 seconds with estimation to 1 second.)



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# KNOW YOUR SUSTAINING MEMBERS

## SURVEYORS SERVICE

"The name is what they do!" may not be grammatical, but it pretty well describes the activities of Surveyors Service Company of Costa Mesa, one of CLSA's sustaining members.

Dedicated to the field needs of the land surveyors, and with skilled maintenance and repair of geodetic instruments the foundation of its efforts, SERVCO is now nearing a half-century of service to its wide-spread clientele.

As distributors for the world-renowned line of fine surveying equipment produced by Wild-Heerbrugg, Surveyors Service Company's staff takes pride in their record of assisting California licensed land surveyors in upgrading their professional competence and skill with modern equipment and instrumentation.

Whether it be plumb bobs or vertical collimators; precise leveling rods or folding rules; pocket tape-rules, chain tapes or electronic distance measuring systems; transits or theodolites, CLSA members will find SERVCO's representatives competent and courteous and ready to serve you. ▲

## AGA

AGA was founded in 1904, is headquartered in Lidings, Sweden, and has been engaged in the design and manufacture of electro-optical instruments since 1948. AGA's diverse product lines include industrial gases, welding products, batteries, radiators, electronics and medical equipment.

Represented by subsidiaries or agents in 50 countries, AGA is truly an international firm employing in excess of 14,000 people.

The name Geodimeter is a registered trademark of AGA and represents the ultimate in distance measuring instruments. The most recently introduced Geodimeters (R), using visible laser beams for target acquisition, are models 700 and 76.

Model 700 is a surveying system combining in one easy-to-use unit, an electronic theodolite, a direct readout measuring device, and a built-in computer. It displays with one sighting, slope measurements and horizontal distances to over a quarter of a mile, making 2-man surveying crews practical for the first time.

Model 76, manufactured in Secaucus, New Jersey, is a low-priced distance measuring system also with a built-in computer providing fully automatic operation and digital readout.

The Secaucus facility, headquarters of the U.S. subsidiary AGA Corporation, houses in addition to the manufacturing facility, sales offices, service and repair center and a large inventory of accessories and spare parts. The facility is located at 550 County Avenue, Secaucus, New Jersey 07094. Requests for additional information may be directed to: Manager Marketing Administration, Geodetic Instruments, located at the above address.

## LEWIS & LEWIS COMPANY

Lewis & Lewis Company was originally started by Mr. R. B. Lewis as a locally oriented Civil Engineer-Land Surveyor Company in Ventura, California. During 1953, a partnership was formed by Mr. R. B. Lewis and his son, Mr. R. T. Lewis. In 1953, Mr. Robert T. Lewis took over active management of the firm. During the next few years, "Bob" Lewis became one of the first to actively pursue the burgeoning offshore and navigational work. Using the most modern electronic equipment and survey techniques, the Company became world-wide in scope and operation, sending men and equipment to wherever the need arose.

In the natural course of events, another facet of the business was born. Because much of the precision equipment used by the firm was too costly for many individuals and companies to own, a rental division was started and has grown to include most types of survey equipment.

In conjunction with the Rental Division, the firm of Lewis & Lewis has recently begun sales of selected quality surveying equipment. One of the first items distributed on a national scale was the Retro-Ray line of retro-reflectors — originally used and tested in the operational side of the business. A rental/purchase plan for Distance Measuring Equipment and related survey equipment has also been created.

Future plans include a broadening of the marketing base of Lewis & Lewis. As more equipment is tested and added to the line, the Company will offer the options of Lease, Rental, Purchase — or a combination of these plus full service capability — anywhere there is a need.

## KEUFFEL & ESSER COMPANY

The Keuffel & Esser Company of Morristown, New Jersey, maintains a full line of quality geodetic instruments, field equipment and map-making materials. In addition to the standard line of transits and levels, K&E is the exclusive distributor in the United States for Zeiss (West Germany) geodetic and photogrammetric instruments. Among the items offered in the Zeiss line is the Th2 One-Second Theodolite, the Th43 Optical Scale Repeating Theodolite, the SM 11 and Reg Elta Electronic Recording Tacheometers and the famous Ni1 and Ni2 Self-Leveling Levels. Also available in the K&E line are other electronic distance-measuring instrumentation covering distances from 1 to 40 miles. K&E offers its line of STABILENE Films for map making in applications of precision cartography. This wide variety of proven products includes sensitized as well as unsensitized materials in peelable and scribable forms. For additional information contact Keuffel & Esser Company, 1327 South Olive St., Los Angeles, Calif. 90015 (telephone 213/747-7601) or Keuffel & Esser Company, 223 Lawrence Ave., South San Francisco, Calif. 94080 (telephone 415/873-6850).

Continued on page 22

absolute arc distance of the error at horizontal, to infinity at 90 deg., since the off-set vertical cross-hair will not pass through the true zenith.

If the telescope axis is not normal to the rotational axis of the instrument, its vertical axis will rotate in a conic pattern of two identical cones with a common vertex point on the horizontal plane and a vertical angle equal to twice the error. When the telescope is transited from horizontal to zenith the absolute arc distance of the error is zero at horizontal and increases to infinity at zenith. The absolute arc distance coincides with the tangent of the vertical angle. The absolute arc distance of the error with the rotational axis are equal with opposite signs for the same vertical angle when the telescope is reversed and, therefore, are compensating. The exception to this is that, if the rotational axis itself is not perfect due to structural defects in the instrument, the mean of the direct and inverted readings at the same vertical angle will not be the true vertical axis. This error can be determined only by the use of a striding level and computed by the tangent formula. Since the error is zero at horizontal and reaches one at 45 degrees, the error is only applied for steep vertical angles, usually celestial observations.

The accepted practice for the elimination of errors in the graduated circle and micrometer or vernier is by measuring the same arc over successive segments of the graduated circle and successive equal divisions of the micrometer.

The necessity of this detailed description of the theodolite is to illustrate that all instrumental errors are minimized or eliminated by methods of operation entirely, and only the pointing error is determined by the ability of the operator.

Although degrees of proficiency among instrumentmen can be established in the setting up, leveling and bringing the target into the field of vision, the actual alinement of the cross-hairs on the target varies so slightly among individuals that a limit of two seconds, plus or minus, for a single pointing or four seconds for the angle between two pointings has been accepted. Expressed in linear measurement the limit of this error for a single pointing is two feet at forty miles, one-hundredth of a foot at 1,000 feet or one-thousandth of a foot at one hundred feet. The smallness of this linear error for short distances and the fact it is well below the smallest division of the micrometer or vernier of the repetition instruments and, therefore, cannot be read directly, has led the surveyor to assume his pointings are perfect. But when the direction instrument is used, the error can be read directly and becomes immediately apparent. The method employed to minimize this error determines the real competence and reliability of the surveyor.

The pointing error is an accidental or random error which is defined as an error due to causes beyond the ability of the observer to control. Although this error cannot be entirely eliminated, it conforms to the law of probabilities; and when proper methods are employed, the most probable value can be determined. But the basic premise of the law of probabilities is that each pointing is an independent entity without influence of previous pointings or anticipated values. The Surveyor

demonstrates his disregard of this principle when, in turning multiple sets with a direction instrument using different indexing for each set, he will get different calibrations for each direction when the several sets are reduced to a common initial indexing. Certain that his pointings are perfect, he attributes these differences to the error of the graduated circle and micrometer. If he uses the same indexing for all sets, he would expect to get, and incredibly does record, identical calibrations for each pointing. And here there has developed a psychological impasse of a nature that excludes dispassionate discussion. For the surveyor has taken the position that the precise closures required in order accuracy surveys are not possible and the claims of the N.G.S., the advertised precision of theodolites, as well as the law of probabilities, are fraudulent.

When the surveyor is required to measure angles to an accuracy smaller than the finest division of the vernier or micrometer of the repetition instrument, he accepts the rule that states the final reading can be predicted within the limit of the number of pointings times the smallest division of the vernier or micrometer, plus or minus. This rule is applicable only to instruments in perfect adjustment as should be apparent from the above description of the theodolite. But the surveyor has accepted a dogmatic adherence to this rule regardless of the condition of the instrument used, although the perfectly adjusted theodolite is more of a rarity than the norm. Whatever methods the surveyor devises to conform with this rule that alter the exact readings of the instrument can only incur errors that might better be characterized as mistakes and result in the repeated failure to meet the standards of precision surveying. But the surveyor alibis these failures by arguments that vary from the denial that precise standards can be obtained to his curious defense of multiple bases of bearings.

The surveyor's concept of the theodolite as a metering device is not a stated claim but can be deduced only from the methods he employs. The above noted horizon closure he insists upon, when using the direction theodolite, can be explained only by the specious argument that the physical motion of the telescope, as it traverses the full 360 degrees, will accumulate a systematic error that can be determined by the difference of the second pointing on one station and can be eliminated by the prorating of this difference among the several stations observed. In traverse the same concept is noted where the turning of clockwise azimuth angles has been accepted to the total exclusion of the deflection angle on the grounds the deflection angle requires both clockwise and counter-clockwise motion and, therefore, cannot be accurate. That it is motion and not the negative value of counter-clockwise angles is evidenced by the implacable insistence of the use of the archaic compass bearing over azimuth, for the Bearing requires counter-clockwise measurements in two quadrants and is a constant source of needless mistakes and a deterrent to his computing development equal only to his denial of the Unique Solution.

But the surveyor, if he uses the striding level of the theodolite at all, will demonstrate his expertise by using it to level the theodolite. Q.E.D. ▲

## THE SURVEYOR AND O.S.H.A. (Continued from page 5)

3. Safety glasses or goggles must be worn where chips and sawdust or flying particles are present.
4. Dust masks must be used where extremely dusty conditions are found.
5. Workers subjected to high noise levels from chain saws must be provided with ear muffs or plugs suitable to reduce noise level. The alternative is to use improved mufflers on chain saws or to reduce the time the worker is subjected to the high level of noise.
6. "Widow Makers" must be watched for and carefully felled.

Construction staking by the surveyor is subject to regulations covering the construction industry. Before entering a construction site, a conference with the safety director, the general superintendent, or other responsible person is in order. Do as they direct, however, some of the general requirements are:

1. Hard hats or caps.
2. Safety shoes or other safety clothing.
3. When working on the edge of a building you must wear a safety belt attached to a safety wire.

For additional information write to the Bureau of Labor Standards, Safety & Health Regulations for Construction, Federal Register, Volume 36, #75 part 2, Government Printing Office, Washington, D.C. 20402.

A few more general items are:

1. Safety goggles must be worn when brushing or hand picking in frozen ground.
2. Safety vests worn at all appropriate locations.
3. When working on roads, all survey equipment must be removed as soon as possible.
4. Chains or tapes should be unreel on the ground clear of traffic, but in no event thrown out or dragged so that they may come in contact with electric wires or passing vehicles; or should a steel tape be thrown or left where traffic can pass over it.
5. All motor vehicles shall carry fire extinguishers which shall be so placed in the vehicle as to be readily accessible.

In summation, this article is by no means complete. In order to get all the information we would need to completely research this law, we would have to spend \$6,000.00. Then we would wind up with a stack of documents 17 feet high. There is the complexity of the problem. ▲

*Minnesota Land Surveyors  
Dis-Closures Staff*

## TRAVEL WITH A FRIEND (Continued from page 1)

contact:

Larry Cloney  
7129 Via Colina  
San Jose, CA 95139  
BUS: (408) 277-4000, Ext. 4607  
RES: (408) 629-9438

Contact should be made as soon as is possible in order to reserve space.

## SUSTAINING MEMBER (Continued from page 20)

### HEWLETT-PACKARD COMPANY

Hewlett-Packard — "Creators of Working Tools for People Who Measure and Compute" — is one of the world's leading designers and manufacturers of electronic measuring and test instruments and systems; electronic calculators, computer and computer systems; medical instruments and systems; instruments and systems for chemical analysis; and high-technology, solid-state components.

Founded in 1939, with headquarters in Palo Alto, California, the company is an international organization with some 25,000 employees. Hewlett-Packard produces more than 3,000 products at 20 domestic divisions in California, Colorado, Oregon, Idaho, Massachusetts, New Jersey and Pennsylvania and at six overseas plants located in the German Federal Republic, Scotland, France, Japan, Singapore, and Malaysia. These products are marketed throughout 100 countries abroad, primarily through the company's own network of sales and service offices.

A large share of Hewlett-Packard's resources are devoted to the design and manufacture of distance measuring systems, programmable desk-top calculators and peripherals, and powerful pocket-sized calculators for the surveyor.

The latest contribution from HP's Civil Engineering Division to the Series 3800 line of Distance Meters is the new low cost HP3805A Distance Meter that features a built-in computer that "thinks" to assure distance accuracy.

In the expanding calculator line, the latest contribution is the HP-65 Pocket Calculator, the first pocket-sized calculator to provide full programming capability in the field for the surveyor.

Complete information on Hewlett-Packard Surveying Products is available from local HP Sales and Service Offices in Sacramento, Palo Alto, Fullerton, North Hollywood, Los Angeles, San Diego, or from Hewlett-Packard Civil Engineering Division, P.O. Box 301, Loveland, Colorado 80537, (303) 667-5000.

## PROFESSIONAL (Continued from page 8)

in the field work often means old clothes, physical exercise, and dirt. We do not regard the surgeon as subprofessional because he gets blood on his uniform, handles urine and feces, and cuts and sews himself, instead of intrusting these delicate phases of the work to less highly trained assistants. The comparison is a close one.

The law and the record play little part in construction surveying or in topo's. Division of labor with field crews, calculators, draftsmen, etc., works rather well with this type of surveying. It can work rather well with laying out new lines. Bright youngsters with some native talent and some high school math can be taught most of these jobs fairly quickly. They can become rather proficient in a few months or years. The full professional will only have to coordinate and oversee the whole project and help out occasionally on a particularly tough problem. But woe betide the uncritical application of such an approach to difficult boundary re-survey problems. ▲

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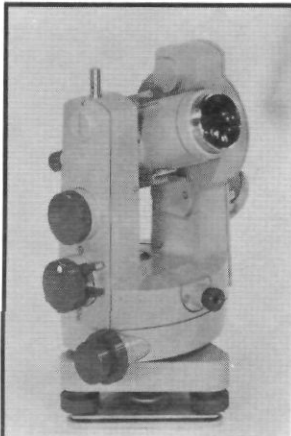
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**PROFESSIONAL CODE**

It shall be considered professional and consistent with honorable and dignified professional conduct for any member of the California Land Surveyors Association:

1. To devote effort and support programs to raise the professional, ethical and social status of Land Surveying.
2. To maintain a campaign for public recognition of professional contribution to the ethical, economical and social well-being of citizens of California and of the United States.
3. To accept and maintain standards of professional conduct of the highest order to win the respect and admiration of all citizens.
4. To protect the profession of Land Surveying and the public against the unqualified.
5. To promote an effective program of exchange, communication and cooperation amongst its professional members.
6. To maintain a constant effort of understanding between professionals in government service and private consulting, recognizing the common aims and philosophies and mutual respect of the professional society.
7. To promote and stimulate leadership in public service on a community, state and national level.
8. To promote and maintain an effective and continuous program of expanding our knowledge of social and technical advances.
9. To protect the professional reputation, prospects and practice of another professional with the same vigor and determination as he would his own.
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# TAPE AND ELECTRONIC DISTANCE MEASUREMENT CALIBRATION SITES IN SOUTHERN CALIFORNIA

*by Harvey T. Brandt and George J. Franceschini*

AREA	LOCATION	CONTACT	TYPE	LENGTHS	NOTE
Los Angeles	108 West Second St.	Los Angeles Co. Engr., Survey Division George Baily (213) 974-7309	Tape	100, 200 and 300 feet	Tape comparison
Los Angeles	855 No. Vermont Ave.	See above	Tape	100 feet	L.A. City College Campus
Los Angeles	461 N. Alameda St.	City of Los Angeles, Survey Division Leonard K. Hansen, (213) 485-3667	Tape	100 feet	Tape comparison N.B.S. Calibr. Tape
Los Angeles	111 No. Hope St.	Dept. of Water & Power, City of Los Angeles Lawrence Vadasz (213) 481-5977	Tape	100, 200 and 300 feet	Tape comparison
Mission Viejo	W/S Plano Trabuco Rd. S/O Trabuco Cyn. Rd.	Orange Co. Surveyors Office Jack De Groot (714) 834-3102 x 3460	EDM	Increments of 2402, 3009, 1540, 3134 and 4050 feet	Plano Base Line Obtain permission to enter at Rancho Mission Viejo, 2862 Ortega Hwy.
North Hollywood	Tujunga Wash N/O Saticoy St.	Los Angeles Co. Flood Control District W. A. McGreevy (213) 994-9931	EDM	1175 M @ 50 M intervals	
North Hollywood	Tujunga Wash N/O	City of Los Angeles, Survey Division	Tape	100 feet	Permanent pads. Temperature correction scale affixed.
Oxnard	Santa Clara River at U.S. Hwy. 101	Ventura Co., Dept. of Public Works Hulon Powel (805) 487-5511 x 4278	EDM	30, 60, 90, 500 and 1000 meters	Key at Field Survey Office, 682 El Rio Drive Oxnard, CA 93030
San Bernardino	Mt. View Ave. at Thompson Place	San Bernardino Co. Surveyors Office Wallace Raynor (714) 383-1011	EDM	1200 and 3100 feet	
Santa Ana	400 Civic Center Drive West	Orange Co. Surveyors Office Jack De Groot (714) 834-3102 x 3460	Tape	100 and 200 feet	Third Wednesday each month
South Gate	Los Angeles River	Los Angeles Co. Flood Control District G. W. Curavo (213) 773-1288	EDM	100, 250, 500, 1000, and 1950 M	
South Gate	11282 So. Garfield Ave.	Los Angeles Co. Road Department Donald Stipp (213) 225-1677 x 75017	Tape	100, 200 and 300 feet	Tape comparison twice yearly
Weschester	Ballona Creek W/O Centinela Ave.	Los Angeles Co. Flood Control District (213) 673-4929	EDM	800 M @ 100 M intervals	

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b. Address \_\_\_\_\_ Zip \_\_\_\_\_

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d. Employment: Private \_\_\_\_\_ (Principal \_\_\_\_\_ ) Retired \_\_\_\_\_ Public \_\_\_\_\_

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e. Signature and L.S., P.S. or C.E. No. \_\_\_\_\_

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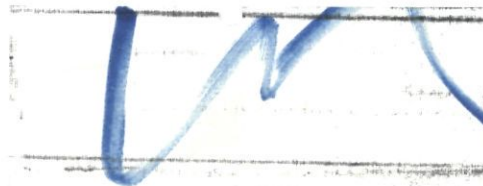
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