Institutional Affiliate of American Congress on Surveying and Mapping

# The California Surveyor

THE VOICE OF THE LAND SURVEYORS OF CALIFORNIA

No. 30 FALL EDITION 1973

## THE MEASUREMENT OR THE PULGAS BASE – WITH CARE AND PRECISION – A HISTORICAL MONUMENT

### "OF PASTIMES PAST . . . 1853

*by James H. Dowden, L.S.*

**Measurement of Pulgas base.* – The preliminary measurement of Pulgas base was executed during June, 1853, by Assistant R.D. Cutts. This base-line is situated about thirty miles southward of San Francisco, on the low lands bordering the bay, and presents every essential requisite for its purpose. Nearly twelve working days, between June 11th and June 27th, were expended in the actual measurement of 2,627 four-metre boxes, and the final corrected length was found to be 10,512.06 metres, or about six miles and a half. The extremities were marked by permanent monuments, the eastern end being 127.281 feet, and the western one 5.568 feet above high-water mark. Each of these monuments consists of an underground brick structure, enclosing a free-stone block, in which a copper bolt is sunk, and the extremity of the base is marked by cross-lines on the bolt-head, over which a stone cap is laid.

The measurement was executed with two iron rods of a half-inch diameter, each of which was four metres long. The ends were squared, and one side of each was plated and marked with the limiting line. Ten comparisons of each with the Hassler two-metre bars E and H were made before and after the measurement; the value of the micrometer divisions having been deduced from twenty-five measurements of the graduations on a $\frac{1}{10000}$ metre scale. Two inflexible oak-plank boxes and four trestles were employed for carrying and supporting the rods. Previous to each contact, the rod was levelled by a spirit-level with blocks and wedges. The alignment was made by a ten-inch Gambey theodolite, from one hundred and fifty to three hundred metres in advance. The contact was observed by means of the silk thread of a

Continued on page 6

## "RETRACEMENT OF ORIGINAL SURVEYS"

*by Larry Hyder*

### INTRODUCTION

I shall premise with the hypothesis that "retracement" is an important aspect of surveying. The *Manual of Surveying Instructions* provides the verifying words:

> "The engineer is not prepared to consider the restoration of a lost corner until he has exhausted every other means of identifying its original position, and at this stage of his work he should have determined upon an approximate position of the original monument based upon his findings resulting from retracements leading from known corners to the lost corner, from one, two, three, or four directions in accordance with the plan of the original survey (page 289, paragraph 361) . . . preliminary retracements furnish the only possible means of arriving at the descrepancies of the courses and distances of the original survey (page 289, paragraph 362) . . . the restoration of the lost corners can not proceed until the retracement of the original survey has been completed (page 290, paragraph 362)."

Chapter V, "Restoration of Lost Corners," refers specifically to retracement no less than 23 times. I have found the manual to be a strict taskmaster. It is, indeed, the "Bible" of Surveying and demands our constant reference. Most of what I offer will not be new to men with considerable experience. I only hope I might present a fresh approach for some and at least constructive review to all.

### SPAN OF RETRACEMENT

The full spectrum of necessity, involves all records, all local testimony, all physical accessories and field information. The importance of these is known by everyone and I do not wish to minimize, in any way, the significance of any category. For the purposes of this paper, however, I shall dwell more

Continued on page 8

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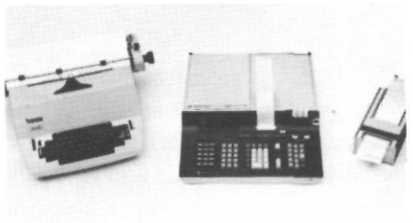

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## BOARD OF DIRECTORS MEETING

*by Harold B. Davis, L.S.*
*Secretary-Treasurer*

The Board of Directors of the California Land Surveyors Association met at the Rodeway Inn at the San Francisco Airport on July 21, 1973.

After the call to order at 10:15 AM, President Eugene Lockton presented a short dissertation on the progress of the Association. The Secretary-Treasurer reported on the financial status. The bank balances total $9075.15, and expenditures to date are $9525.28. The budget was amended to a new total of $17,934.00.

*ATTENDANCE*

| | |
|---|---|
| President, Eugene Lockton | Present |
| Vice-Pres. & Exec. Secretary, James E. Adams | Present |
| Secretary-Treasurer, Harold B. Davis | Present |
| Immed. Past President, 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, Roy Watley | Present |
| East Bay, Ray Thingaard for Roger Swink | Present |
| Eastern Sierra, Bob Baron | Present |
| Feather River, Jack Ashbaugh for Gary Lippincott | Present |
| Lake Mendocino, Joseph Scherf | Present |
| Monterey Bay, James M. Prendergast | Present |
| Marin, George Colson | Absent |
| Mother Lode, Frederick W. Kett | Present |
| Northern Counties, Kenneth G. Burton | Absent |
| Sacramento, Merwin Rose for Dan Radman | Present |
| Sacramento, George Bridges | Absent |
| San Fernando Valley, Leonard Lindenbaum | Present |
| San Joaquin Valley, William O. Gentry | Absent |
| Santa Clara-San Mateo, Hank Young | Absent |
| Santa Clara-San Mateo, George T. Stock | Absent |
| Santa Clara-San Mateo, Charles Randall, Jr. | Absent |
| Sonoma County, Rodney Pitts | Absent |
| Tahoe, Jerry W. Tippin | Present |

Frederick W. Kett, Chairman of the Legislative Committee, reported on a proposal prepared by this committee outlining long term goals for the legislative effort of the association. These goals include preparation and support of legislation in the following fields: I - REGISTRATION LAW: 1) Enforcement; 2) Revisions of the registration act; and assumption of a leading role by the association in the field of professional development; 3) Revisions to the platting laws. II - MAPPING AND SURVEYING: 1) Establishment of statewide standards for all record maps and provision for the State Board of Registration to establish and administer these standards; 2) Modifications to the Subdivision Map Act; Review of the Boundary Control Laws, III - LAND PLANNING AND DEVELOPMENT: Establish recognition of the Land Surveyors role in the fields of Mapping, E.I.R.s, Planning and Development. These goals are very definitive, but will fall short of fruition without an increase in numbers on the Committee. Any person interested in serving in an active role is requested to contact Fred Kett, P.O. Box 393, Murphys, California 95247. With an expanded committee the Association will be able to continue its role as the voice of the Land Surveyor in Sacramento.

Lawrence Cloney, Chairman of the Nominating Committee reported on the charge given this committee pursuant to the Constitution and By-Law revisions proposed by this committee. These proposals include extending the terms of the state officers to two years, staggering the terms of the directors-at-large, and separating the office of Secretary-Treasurer into two. These proposals were referred to the Constitution and By-Laws Committee, for study and recommendation back to the Board at the October meeting. Any comments from the membership on these proposals should be sent to the chairman of the committee, Doane E. Heryford, 666 Seventh Street, Santa Rosa, California 95404.

Ray Thinggaard reported on the July 11 meeting of the State Board of Registration. At that meeting the Board adopted proposed amendments to Rule 424, clarifying the requirements for application for license as a Land Surveyor. The State Board has appointed Don Ward as chairman of an Ad-Hoc committee to "identify and define the overlapping of work performed by Land Surveyors and Civil Engineers." Don has requested input from all members of the profession relative to operations which they once performed and are now prohibited from performing. Comments relative to this problem should be transmitted to Mr. Ward at 2901 H Street, Bakersfield, California 93301.

After reports on operations from the several committees and chapters, the meeting was adjourned at 2:50 PM.

The next meeting of the Board will be held on October 20, 1973, in South San Francisco. All members of the Association are invited to attend.

▲

### Department of Consumer Affairs

### CALIFORNIA BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS

| Examination Dates | *Final Filing Dates |
|---|---|
| **Land Surveyor** | |
| April 27, 1974 | January 21, 1974 |
| **Land Surveyor-in-Training** | |
| August 17, 1974 | June 17, 1974 |

*Applications filed after the final filing date specified will be considered for the following examination. Refile applications should be filed as early as possible to reserve an examination seat.

# TITLE TIPS

**Prepared by the Legal Staff of Title Insurance and Trust Company**

## COVENANT AGAINST AN ENCUMBRANCE

*by William F. Hunter*
*Senior Associate Counsel*

One of the covenants implied by the word "grant" in a California Grant Deed is "[t]hat such estate is at the time of the execution of such conveyance free from encumbrances done, made, or suffered by the grantor, or any person claiming under him." *C.C., Section 1113 sub. 2.* This statutory implied covenant is somewhat limited in that the grantor covenants only that he himself or those claiming under him have not encumbered the land. There is no implied covenant that the property was free of encumbrances at the time the grantor acquired title. The covenant is implied only when an estate of inheritance or fee simple is conveyed and not when the conveyance is in the nature of all right, title and interest (quitclaim). *Southern Pacific Company v. Dore,* 34 C.A. 521, 523 (1917). It does not apply when there is a devise or gift, apparently on the theory that there is no consideration for the covenant. *Estate of Porter,* 138 Cal. 618 (1903)

The California courts have held that the covenant against encumbrances, if untrue, is broken when made, since the encumbrance existed when the deed was executed. *Evans v. Faught,* 231 C.A. 2d 698 (1965)

'The term 'encumbrances' includes taxes, assessments and all liens upon real property," as defined by the *C.C., Section 1114.* In addition to the matters specified by C.C., Section 1114, the covenant against encumbrances also includes mortgages, deeds of trust, judgment liens, attachments, leases, water rights, easements, or in general any right in a third party that tends to diminish the value or restricts the use of the property (see *Evans v. Faught,* supra). However, it has been held that this implied covenant does not include visible easements or physical burdens on the land apparent on inspection to the grantee, even though of record. *Sisk v. Caswell,* 14 C.A. 377 (1910)

The statutory covenant is generally held to be a promise to indemnify the grantee against loss. Therefore, the grantee cannot seek recovery until he has sustained actual damage. *Wright v. Boggess,* 24 C.A. 533 (1914). The measure of damages for a breach of a covenant against encumbrances is defined specifically by *C.C., Section 3305.*

One encumbrance which is easy to overlook is a tax lien. Because of the various times when property tax liens attach and when current installments that may be due become delinquent, it is not unusual for a particular parcel to be subject to a tax lien. Consequently a seller should be careful to include in his grant deed a provision that the property is conveyed subject to current tax liens.

Because of the prevalence of title insurance in California, the covenant against encumbrances is usually relied on only when non-recorded encumbrances are involved. However, since notice may not destroy an action for breach of covenant, a buyer may want to take advantage of this implied convenant against encumbrances directly, even though the instrument may be recorded. *Evans v. Faught,* supra, at 711. [See generally *California Real Estate Sales Transactions,* C.E.B. 1967, Sections 16.7 and 16.14]. ▲

## COUNCIL OFFERING NEW LAND SURVEYING EXAM

NCEE has prepared and is for the first time making available to member boards the fundamentals portion of a Uniform Land Surveying Examination.

First use of the exam was held in April 1973. This initial exam was assembled by NCEE's Land Surveying Committee from questions and problems prepared by an ad hoc committee of 20 recognized land survey authorities from each of NCEE's four zones.

The exam is the result of two years of active work at the zone level and by the committee.

Eight hours in length, the first four hours of the fundamental exam is of the multiple choice variety and consists of 100 questions. There are 10 problems on the second four-hour portion of the exam and the candidate is to answer any five of these.

## EXAM UNIVERSAL

Scoring of both sessions of the uniform land survey exam is to be accomplished at NCEE's headquarters and the exam is applicable to all states, whether they are on the American System of survey used by the original 13 colonies or the Public Land Acts System which was initiated in the early 1800s.

The exam, naturally, is also applicable regardless of whether the land survey laws are administered by a joint engineering-land survey board, or a separate regulatory body.

It was in 1965 that NCEE first prepared the Uniform Professional Engineering Examination. Today 45 states and all five U.S. territories administer this exam.

The cost to the states for the new Land Surveyor's exam, including the scoring, will be $8.00 per applicant.

NCEE's committee proposes to offer the exam in April and November of each year.

## TEST SYLLABUS

In developing the exam, the committee, which was chaired by R.D. Reckert of Iowa, first prepared the syllabus which follows:

A. **Mathematics**
1. Trigonometry
2. Algebra
3. Geometry
4. Spherical Trigonometry
5. Analytic Geometry
6. Solid Geometry

B. **Physics**
1. Mechanics
2. Heat and light (optics)
3. Electricity and magnetism

C. **English**
1. Grammar
2. Spelling
3. Composition, report writing, specifications
4. Technical definitions

D. **Surveying**
1. Instrumentation
   a. Adjustments
   b. Care
   c. Use
   d. Limitations
2. Orientation
   a. Assumed
   b. Magnetic
   c. Astronomic, calculation
   d. State Grid, calculation
3. Horizontal Measurements
   a. Methods
   b. Errors
   c. Degrees of Precision
4. Vertical Measurements
   a. Methods
   b. Errors
   c. Degrees of Precision
5. Angular Measurements
   a. Methods
   b. Errors
   c. Degrees of Precision
6. Traverse
   a. Transit-tape, methods
      1) Direct and deflection angles
      2) Azimuths and bearings
   b. Theodolite and electronic distance measuring, methods
      1) Direct and deflection angles
      2) Azimuths and bearings
   c. Triangulation and trilateration
   d. Computations
      1) Latitudes and departures
      2) Closures and precision
      3) Methods of balancing
      4) Coordinates
      5) Positional tolerance
7. Topographic Mapping
   a. Methods
      1) Grid
      2) Transit stadia
      3) Plane table
      4) Profile and cross-section
      5) Photogrammetric principles
   b. Errors
   c. Degrees of Precision
   d. National Map Standards
8. Notekeeping, Records
   a. Requirements and importance
   b. Principal types of field notes
      1) Transit traverse
      2) Boundary survey
      3) Differential levels
      4) Topographic
      5) Profile and cross-section
      6) Slope staking
      7) Construction and utility
      8) As-built
      9) Location of improvements
      10) Astronomic observation
   c. Preparation of Records
      1) Indexing
      2) Filing

E. **Property Surveys and Descriptions**
1. Metes and Bounds
   a. Courses
   b. Areas
      1) DMD method
      2) Coordinate method
   c. Horizontal curves
      1) Intersections, line with curve and multiple curves
      2) Highway curves) circular
      3) Railroad curves) and spiral
2. Land Divisions and Subdivisions
   a. Strip conveyances
   b. Division line conveyance
   c. Conveyance by distance
   d. Conveyance by exception
   e. Conveyance by area
   f. Proportional conveyance
   g. Easements and rights-of-way
   h. Aliquot subdivision (Public Land Survey Section)
3. Plats
   a. Essential information to be shown
4. Descriptions
   a. Essential information
      1) General location
      2) Specific description
      3) Exceptions
      4) Additional rights
      5) Monuments found and set
      6) Basis of direction
      7) Area
      8) Author
5. Monumentation

F. **Vertical Curves**
1. Sight distances
2. Point of zero slope (low or high point)
3. Computation; design; symmetrical and unsymmetrical

G. **State plane coordinate calculations**

A copy of the information is furnished each state using the new exam. At the end of the syllabus, the committee suggests that the second day's examination which the state prepares, consist of further elaboration of items "E," "F" and "G," plus topics of surface stormwater drainage (culverts, ditch flow, soils and geology fundamentals, and siltation and erosion control), land planning (subdivisions, economics), and matters of judgment as well as knowledge of state and common laws. ▲

**PULGAS BASE** Continued from page 1

plumb-bob suspended in a bucket of water; and when this was correctly adjusted, the advanced rod was clamped and the rear box carried forward. The reading of an attached thermometer was recorded for each contact, and Hassler's proportional rate of expansion, 0.000006963535, was used in making the temperature reduction.

*Primary and secondary triangulation.* – The primary triangulation of the coast, and the secondary and tertiary connected with it, have, under the charge of Assistant R.D. Cutts, taken their regular form and made excellent progress. Proceeding from the Pulgas base, (Sketch J,) and bringing the San Jose base into the series, the triangulation covers San Francisco bay and its dependencies, extending north to Ballenas bay, and south to Monterey, a distance of about eighty-five miles.

The triangulation connects the astronomical stations of San Francisco, Santa Cruz, and Point Pinos, and determines the position of all the principal towns from Benicia to Monterey, and of the different light-houses on this part of the coast.

As primary points immediately along, or commanding a view of the coast, could not be had, a series of tertiary triangles were laid from Point Piedras to Santa Cruz. This series was commenced by Mr. C.M. Bache, under Mr. Cutts' direction.

From the line Red Hill – Contra Costa, (see Sketch J,) the triangulation extends northward and southward, with sides varying from fifteen and a half to forty-three and a half miles. Great elevations were selected for station points, in order to be above the fog; and experience has fully confirmed this course, for while the valleys are covered with fog, Mr. Cutts states that his primary observations have gone on without interruption, from January, when it was commenced, to late in September, the date of his report. The vapor-plane, or fog-plane, generally does not rise higher than about 1,800 feet above the level of the sea. Signal-poles were generally used, a heliotrope being required at but one station. The stations have been carefully marked with stones, intended to furnish permanent marks of reference.

The following are the statistics of the work for the year ending September 30, 1854:

| | |
|---|---|
| Primary stations occupied | 8 |
| Secondary stations occupied | 6 |
| Number of angles measured | 116 |
| Number of measurements | 5,880 |
| Number of signals erected | 33 |
| Heights determined by level | 1 |
| Heights determined trigonometically | 5 |
| Vertical angles measured | 70 |
| Area of triangulation in square miles | 1,612 |

The measured length of the San Jose base, (merely a preliminary base,) of nine hundred and forty one metres, (0.58 mile,) is stated to have differed from the computed length brought from the Pulgas base, through seventeen (17) triangles by 0.03 metre, or one inch and two-tenths.

Mr. Cutts observes: "Each angle belonging to the primary triangulation has been determined by one hundred to one hundred and twenty measurements, divided into eight or ten series of twelve repetitions each, six in the direct and six in the reversed positions of the telescope. These series were taken on different days, and under the usually varied condition of the atmosphere, and their arithmetical mean was adopted as the value of the angle. After deducting the spherical excess, the six primary triangles close with the following errors: (-2.05") (+0.44") (-1.99") (-1.77") (-1.69") (-1.77")

## . . . AND PRESENT." 1973

*PULGAS EAST BASE* –

(W.H.B., 1951) – The station was destroyed by a power grader.

(G.L.A., 1953) – This station was lost during grading operations for the construction of University Village housing and recreation area.

The old shaft of Benecia Freestone has been moved and is now mounted on a concrete base as a historical marker. It is located in the neutral ground between the end of Notre Dame Avenue and the N side of the University Village Recreation Area. University Village is located NE of Palo Alto, and S of the Dumbarton Bridge approach.

The old shaft is inscribed: "Alex, Dallas Bache, Superintendent," "United States Coast Survey," "Measured in July 1853," "East End of the Pulgas Base."

*PULGAS WEST BASE*

PULGAS WEST BASE (San Mateo County, Calif., R.D.C., 1853; J.D. Kelly, State Lands Commission, 1949)

Station has been destroyed. The hospital is being constructed and the shaft and pedestral were both found at the site. The shaft is on its side, partially crated, separated from the pedestal.

PULGAS WEST BASE (San Mateo County, Calif., R.D.C., 1853; G.L.A., 1953)

The original station reference marks were lost during grading for the new Sequoia Hospital.

The old shaft of Benecia Freestone has been moved and is now set upright, as a historical marker, on the W side of the semi-circular drive at the N end of the public parking area on the NE side of Sequoia Hospital, which is located at the intersection of Alameda De Las Pulgas and Whipple Avenue in Redwood City.

The monument is 22 in. square and 42 in. high, inscribed as follows: N side "United States Coast Survey," E side, "Measured in July & August 1853," S side, "Alex R. Dallas Bache, Superintendent," W side, "West end of the Pulgas Base."

*From: "Report of the Superintendent of the Coast Survey showing the progress of the survey during the year 1854" A.D. Bache, Superintendent. ▲

In this country, a political prisoner is an officeholder who can't stand his party's candidate but has to support him or lose his job. *The West Virginia Surveyor*

## SURVEYING INSTRUMENTATION AND COORDINATE COMPUTATIONS WORKSHOP

*by Roy Watley, Jr., L.S.*

A three-day workshop was held in Los Angeles, July 17-19, 1973. The purpose of the "Surveying Instrumentation and Coordinate Computation Workshop" was to enhance the knowledge of the practicing surveyor in regard to electronic distance-measuring equipment, modern theodolites, and coordinate computations.

The workshop registrants were divided into three equally sized groups (more or less). The workshop content was also divided into three parts. Each group participated in a different part each of the three days.

Part One (Computations) consisted of network design; national standards and specifications; the rectangular coordinate system; computation of a simple traverse; adjustment by compass rule, transit rule, and least squares; and computation of grid azimuths.

Part Two (Electronic Distance Measurement Instrumentation) included a brief history of EDM, principles of operation, instrument and reflector constants, and instrument accuracy. Each registrant was given an opportunity to operate (hands on) each of the seven different EDM instruments.

Part Three (Theodolites) was comprised of standards and specifications for local surveys of limited scope; the description of theodolites and the theory of observing; adjustments of errors; collimation and selection of targets; systematic and accidental erros, circle settings (Positions); observational procedures for measuring horizontal and vertical angles; and recording and reduction of observations. A demonstration of observing an astronomic azimuth using Polaris was held on the second evening of the workshop.

This excellent workshop was co-sponsored by the Southern California Section of ACSM, the Illinois Registered Land Surveyors Association, and the University of Illinois, Urbana-Champaign, Division of University Extension. The workshop was also presented by ACSM, NGS, NOS, and NOAA.

The instructors, who were outstanding, were Joseph D. Dracup, Carl F. Kelley, Goerge B. Lesley, Charles C. Glover, Leo A. Critchlow, Kenneth Barber, and Jay L. Gummow from the National Geodetic Survey.

The organizers and arrangers for the Los Angeles workshop were Bob Carpenter, Bruce Thompson, and Bob Klassen.

*Congratulations for a job well done!* ▲

## LAND SURVEYOR-IN-TRAINING EXAM

The State Board of Registration for Professional Engineers at its 642nd meeting on June 13, 1973, approved the usage of the NCEE Land Surveyor-in-Training (LSIT) examination for the examination scheduled November 3, 1973.

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*See "Test Syllabus" on page 4.*

## MODERN SURVEY CAMP FOR FRESNO STUDENT

*by Homer Banks, Jr., L.S.*

James (Jim) Willson, a senior at California State University, Fresno, is spending this summer accumulating data for his senior paper on Cadastral Survey Retracement. He is working and studying under the guidance of Larry Hyder of Camino, California, on various projects for Land Surveyors, Civil Engineers, and the U.S. Forest Service.

The project at this stage involves research of Bureau of Land Management notes and plats, the records of other local and Federal agencies, and the private records of surveyors and title companies. The important phase of research, the taking and recording of testimony of reputable local residents, has not been overlooked.

The types of original surveys being researched have varied from fairly recent mineral surveys through section and township line surveys of the 1850's. One project in the Forest Service-timber firm "checkerboard" areas of El Dorado and Placer Counties involves surveys executed by members of the infamous Benson syndicate.

The field work has consisted of

1. Compass line retracement
2. Identification of old and obliterated corners
3. Identification of corner accessories
4. Site growth patterns and fire history
5. Location of "area of probable corner location from terrain ties and compass lines"
6. How to detail an area of probability for evidence of the original survey.

The last week before registration at C.S.U., Fresno, a short field seminar of about one week will be held for the ten students who signed up last fall. This is to cover some of the more outstanding projects and work done by Jim Willson this summer. The program will be assisted by several local Land Surveyors.

▲

**RETRACEMENT** Continued from page 1

specifically on methods developed over a period of years for use in the field and the study of accessories. I do not feel it proper to dismiss even temporarily, any segment without acknowledgement and review of the guiding principles involved. I would refer to page 283, paragraph 350, *MSI,*

> "The rules for the restoration of lost corners are not to be applied until after the development of all evidence, both original and collateral, that may be found acceptable, . . . or where the point can be located by an acceptable supplemental survey record, some physical evidence, or testimony. Even though its physical evidence may have entirely disappeared, a corner will not be regarded as lost if its position can be recovered through the testimony of one or more witnesses who have a dependable knowledge of the original location."

## CARDINAL ALIGNMENT

I submit that compass retracement versus mathematical projection, is most likely to re-position one in the proverbial "footsteps" of the original surveyor.

> "The retracements, which are usually begun at known corners, and run in accord with the plan of the original survey, will ascertain the probable position, and will show what discrepancies are to be expected; (page 285, paragraph 354, MSI)."

The logic of these instructions is known by all surveyors. Original surveys till approximately 1890, were run by compass.

I often encounter surveyors and engineers using only mathematical projection and random search for retracement. The manual also states,

> "the question is not where a new or exact running of the lines would locate the corner, but where or in what particular position was the corner established in the beginning, in the approved official survey, (page 283, paragraph 387 MSI)."

I suggest a good compass will lead one through the calls and attractions in a like manner to the proper area of probability.

I must emphasize, a compass in good working order; preferably with a needle of four inches in length, self-contained leveling, open sight and staff mounted. At least one of the more recent authors on compass surveying de-emphasizes attractions from metal objects on your person. (10) I am sure he would agree, however, that it is best to develop habits eliminating the possibility. I find many local attractions, or anomalies, in the field not encountered in the field notes. Noting such an anomaly directs one to project two areas of probability, in case the original surveyor did not back sight or use sufficient solar observations, which many times they did not. It is rarely necessary to encumber ones technique with allowances for daily variation. It is obvious one can not retrace unless you have "plugged in." Care must be taken to start from an original corner or a known call.

If discrepancies develop it is often necessary to study many miles of a given surveyors work. Only then can idiosyncrasies, discrepancies and anomalies be analyzed. Some surveyors were inclined to "pencil whip" particularly East and West. This does not mean they failed to set any or all corners. It does mean to look for corners set by direction or method other than the original plan. The manual tells us to expect to retrace from two, three or four directions. I find this most pertinent. Only experience can teach one to make "expertise applied" and "expertise need" arrive at a point simultaneously. Economic feasability is a factor constantly before everyone.

I generally place primary emphasis on bearing. I pace and check calls with particular attention to call nearest corner. If calls fit reasonably well and I do not find corner on the first fast time through, I may then re-pace to last call and back. Many times chaining this last distance is helpful.

I have a theory that several shorter observations of a corner area are of more value than one long look. I might use the second viewing of a movie or your drive to town as examples. Recurrence seems to give new perspective. A certain retired forester in El Dorado County that we know as the "better of the best," stresses the running of corners from several directions, as does the manual. It reconfirms and generally narrows the area of probability. It also furnishes the new perspective. I was once told by a surveyor that I found certain evidence because I "did not know that it was not there." Perhaps one important deduction from this mans opinion could be that a negative attitude gives narrow perspective and is, in fact, a dangerous trap. I am not naive about fraudulent or "bar surveys," but I have managed to find enough so called "unset corners" to receive the mandate to go forth and find whatever evidence exists. The most precarious position involves deciding exactly how much work, the surveyor who skipped did actually perform. The deep river canyons have always provided the psychological format to enhance the decision that the canyon was not crossed.

## CORNER ACCESSORIES AND SITE STUDY

In examining corner accessories, we are reminded by the Bureau of Land Management that first thoughts should be toward preservation of original evidence. Bearing trees must not be opened unless necessary. Rock mounds should be examined with as little disturbance as possible.

Upon deciding that a tree needs further analysis, I first increment bore. The face of a blaze or an injury will show very clearly in the sample. The face is age-dated by counting the growth rings to see if it fits the field notes. If it does fit, this generally is sufficient in the presence of other evidence. The increment borer is available through your local supplier of surveying needs.

When the decision has been reached that it is necessary to open a potential bearing tree, maximum care should be taken. Conclusive information must be obtained with as little damage as possible. We all have our monuments to inefficiency. I have tried to develop techniques observing the law of maximum care.

From the field notes, I get the bearing tree diameter at the time of scribing. I diameter tape the tree and calculate how deep the face should be for increment boring. Bore and see if blaze shows in sample. Corraborate year of face with the date

of survey by annual rings. Measure depth of blaze face and mark on bar of chain saw with felt pin. I then divide the blaze and proceed to cut a rectangular block out of the top half. This leaves lower half of evidence untouched. After cutting the perimeter to depth needed, I take a small bar and pry or "pop off" the block from the face. This will expose the scribed face plus the superimposed face unscathed. At this point I should hasten to remind that, too often, the oaks will decay from the face inward, chopping with an axe may well reduce a beautiful superimposed face to chips and perhaps all that remains is an obliterated face and a decayed interior. I have also seen where an inexperienced person has chopped completely through a scribed face without identifying it. If possible, paint or tree – seal the injured parts.

At times, assistance will be needed to properly analyze a boring. A consultant forester or the Forest Products Laboratory, Madison, Wisconsin may prove helpful. Cores or wood samples, in important cases, may be mailed to Madison for age or species identification. When specie is needed, a resume of the site should be sent along. This would include elevation, aspect and species growing within a reasonable radius of sample. Also, there are many books to assist you. You will note in the bibliography a list of reference material selected to be most helpful to the surveyor working with Western trees.

More precise analysis of borings is becoming available through a study conducted by R.M. Echols of the Pacific Southwest Forest and Range Experiment Station. (11) It is titled *Moving – Slit Radiography of Wood Samples for Incremental Measurements.* The x-ray picture alone makes it quite easy to discern the individual growth rings. A graph of wood density variation is obtained from the x-ray negative by passing it through a densitometer, which in turn feeds an out put signal into a 10 inch chart recorder. There is an annual density variation in all trees. To obtain age from this chart it is a simple matter to count the high points of graph recordings.

By other methods, the remains of a potential bearing tree, however, small or charred the pieces, can usually be systematically identified as to specie. It is amazing how Mother Nature has granted us the preservation of cellular structure through charring. A person with keen interest can soon learn to make preliminary identification of wood structure. A prime example is the ability to separate pine from oak due to resin canals found only in the pine. This can often be done on the spot with a magnifying glass.(7) (9)

Due to certain slight differences of cellular structure in root and stem wood, there is currently a need for a study of the comparative anatomy of Western woods. This Association, through a letter from your president, has recommended to the Chief of Forest Service, that this study be conducted by the Pacific Southwest Experiment Station.

## EXAMINING ROCK MOUNDS AND DEPOSIT CORNERS

I have settled on a soil sampling probe to assist in examining such evidence. I have seen no other person using this device for this work and I am confident you will find it most helpful. It enables one to examine and retain for analysis a core of earth approximately one inch in diameter and as deep, as needed. It is difficult, at the least, if not nearly impossible to dig in a rock mound, for post or charcoal evidence, without defacing the "age, type and character" of the mound. Pieces of wood, for analysis, and bits of charcoal are easily spotted in the core. I always carry small plastic bags in my vest or pack to hold samples. If findings are conclusive at site, I re-deposit the core with no disturbance of the mound whatsoever. Incidentally, fairly sound post remains can be "sounded" underground with the probe. Availability of the soil probe is noted in the bibliography.

## ADDITIONAL MARKS AND COLLATERAL ACCESSORIES

It should be noted that line tree blazes, cruising blazes and other marks pertinent to section lines can also be dated by the use of an increment borer. In addition, I have recorded some thirty cruiser marks used in El Dorado County and subsequently identified approximately twenty one of these. Many of these people were also licensed surveyors. Once again, I am reminded of the Manual,

> "The expert testimony of surveyors who may have identified the original monument prior to its destruction and thereupon recorded new accessories or connections, etc., is by far the most reliable, . . . Full inquiry may often serve to bring to light various records relating to the original corners, and memoranda of private markings, etc., and the engineer should make use of all such sources of information. (Page 285, paragraph 355)."

I have discovered through research and consultations with now retired foresters that many of these people placed their cruiser marks only at known authentic corners. It is also worthy of note, that a number of these people worked all over the West.

## SUMMARY

I see many needs, as does everyone, and there is neither time, competency, ink or paper to allow complete assessment.

I have long felt and advocated there be a policy adopted that would send competent people in immediately after wildfires to examine corners and evidence while it was most recognizable. I am often assigned to retracement after re-growth of heavy brush and deteriation has taken its toll. The most efficient, expeditious, and inexpensive timing is immediately after the fire. I solicit your consideration and influence if deemed appropriate. In addition, I see the need for a standardized and concerted effort to mark the exterior of bearing trees. It seems a uniform method might be assumed by all and benefit in like manner.

I do not like the thought of implying the connotation that numbers denote proficiency. If, however, there be statistical merit, from my work that is due this report, it must reflect in "found" versus "searched." I have visited several thousand corners. I have been contracted or hired to research approximately thirteen hundred section corners, generally classified as "searched – no evidence found." I can report that I have been able to find either corner evidence, or conclusive

Continued on page 13

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

## THE SURVEYOR AND SURVEYING
## or
## THE TECHNICIAN'S BUST OF THE TECHNOLOGICAL BOOM

*by Robert L. Reilly, L.S.*

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

Over the past forty years the art of surveying in all its brances, geodetic, cadastral, topographic and construction has experienced revolutionary technological advancements. During the same period the National Geodetic Survey, formerly called U.S.C. & G.S., has extended its surveys to a point where basic control, vertical and horizontal, is immediately available. This would seem to indicate a golden age of surveying, but nothing could be farther from the truth; for the surveyor of today attains an accuracy scarcely better than the surveyor of 1910. From the steel tape to the electronic distance meter, the one-minute transit to the one-second theodolite, the adding machine to the electronic computer, the plane-table to photogrammetry, each in its turn, by improvised methods and pseudo mathematics, he maintains an accuracy and reliability so low that survey data can be accepted only by the legal definition as that of an indication of a condition, rather than the scientific as the specific of that condition.

In fact the surveyor of today will not accept surveying as an exact science and is distrustful and often contemptuous of those who make such claims. Predicating his reasoning on the judicial concept that no distance or angle can be measured perfectly and refusing to accept or understand the mathematical definitions of accuracy, he at once develops an alibi to defend his own work and a mental block that precludes any advancement.

In Land Surveying the effects of the surveyor's improvised methods are slow in being noticed and they have the cushion of laws which were largely derived to reconcile the abberations of the surveyor to reality. But in construction surveys these methods can be, and frequently are, disastrous.

The term "Surveyor" is here used in a composite meaning. I do not differentiate between the land and the construction surveyor. It is my experience he is too often the same individual in different hats. Nor do I exempt the engineer. Regardless of his educational background, he not only accepts parochial practices, but he also is intransigent in their defense. If this implies criticism of other engineering fields, it is not intended. But the engineer is the prime architect of surveying practices and the acting arbiter of their application. If he denies any or all of the following criticism or that none of the "shoes" fit, I remind him that the public archives are bulging with his footprints.

Plane surveying is generally taught and practiced on the expressed argument that for limited areas the mathematics of the plane are the only requirement and the difference between the plane and the sphere are not measurable quantities. Upon finding the State coordinate system expressed in plane co-ordinates, and completely bemused by the advertised excellence of today's technology with the certainty that possession is the only prerequisite for performance, the surveyor assumes that he has succeeded in bypassing the entire field of geodetic surveying and advance mathematics and is licensed to improvise his own methods and mathematics. The purpose of this criticism is to show that, while frequently giving lip service to proven theory, in application the theory is so garbled that the very antithesis is applied.

### Significant Figures and Number of Decimal Places

In a traverse with no distances exceeding 1,000 feet and bearings accurate to five seconds, plus or minus, five place functions are all that is required, and the use of more decimal places does not improve the computation. This, if not rejected out of hand, is dismissed as an innocuous criticism and the extra effort when the computation is performed manually is necessary since Recording Offices require it. No County or City Engineer's Office spells out the reason for this curious requirement, but the implied reason that multiple decimal places do improve the computation is the false premise upon which the surveyor bases his reasoning. Electronic Computer personnel entertain no such illusions and heave repeated the warning so often that it has been reduced to the acronym "GIGO," from "garbage in, garbage out." But acceptance of this and other fallacies so stultifies judgment that "garbage" cannot be identified. Valid computations are rejected "out of hand" when only four or five decimals are used, even in multiple equation adjustment, usually called "Least Squares," which does improve accuracy. And conversely, field work performed by whatever methods when computed by multiple places is not only accepted, but is the basic argument used to avoid the stringent requirements of precision surveying and a specious substitute for difficult adjustments. It is used as an argument to discredit earlier work computed when multiple place functions were not available and, incredibly, even computation by logarithms whose significant figures are constant to the number of places in the mantissa regardless of the characteristic has been discredited.

This has led to a fanatical acceptance of the electronic computer, not entirely on the grounds of its efficiency and mechanical accuracy, but on the specious argument that its presumed use of multiple decimal places results in the "best" solution. Individual computations are discouraged to the point where the trainee learns only the ritualisitic "input" for the

Continued on page 15

**DEADLINE DATES FOR THE CALIFORNIA SURVEYOR**

Winter Edition . . . . . November 10, 1973

Spring/Convention Edition . . . . February 16, 1974

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

Editor

## LETTER TO THE EDITOR

Dear Sir:

I have read with considerable interest the article entitled "Errors in S.P. No. 253" which appeared in the Summer 1973 edition of your publication. There are a number of points, some minor in nature, but others of considerable importance which require clarification and explanation.

First, a few minor issues, the transverse Mercator projection and not the "traverse Mercator" projection is utilized for several State plane coordinate systems. The geoid and not the "geod" is the mean sea level surface. Also, the third angles of triangles in triangulation surveys are generally observed and the sides are not limited to 25 miles. There may be other reasons for limiting the length of the sides such as station spacing requirements, intervisibility, etc., but lessening accuracy is not a consideration except perhaps in areas of extreme horizontal refraction. As a matter of fact, the longest line ever observed is between Mt. Shasta and Mt. Helena, a distance of more than 191 miles and the primary national network between Colorado and California contains numerous lines in excess of 100 miles. There are, in addition, a few other statements in the article, particularly those concerned with plane coordinate systems, which at best can be viewed as confusing, if not incorrect.

The statement made on page 11 that when using the constants given in SP No. 253 the plane coordinates as computed from geographic positions did not agree with published values is of a more serious nature. The numerical size of the differences were not reported. We are aware that in some instances, differences on the order of ±0.05 ft. can occur. This is due to the use of geographic positions containing more significant figures in the computation of the plane coordinates than published for the positions. Smaller differences (±0.02 ft. or less) are found in plane coordinates computed many years ago when logarithms were employed. If differences larger than those enumerated here were found, the National Geodetic Survey should have been immediately advised.

Finally, the contention that the constants given in SP No. 253 were referenced to a sphere rather than the spheroid is, of course, incorrect. The discussion concerning the use of the rectifying latitude in the Lambert projection as given on p. 43 of the enclosed publication "State Plane Coordinates by Automatic Data Processing" publication 62-4 should lay that assumption to rest.

Turning now to the matter of the differences in the zone constants as published in SP No. 253 and those derived using the basic equations on a computer. First, eliminate any thought that the published tables are seriously in error. The values for "ℓ", the quantities involved in many cases reduced to eight significant figures. Since all other constants are derived using "ℓ" in one sense or another, this accounts for the small differences between the published and computed constants for Zones 1, 3, 4, 5, and 6. Inasmuch as these differences will produce plane coordinates which will differ, for all intents and purposes, by constant values in X and Y, they are of no consequence. One must remember that the

Continued on page 13

# right on

## WHERE DO WE GO FROM HERE?

*by Roy Watley, Jr., L.S.*

I recently overheard a conversation, which went something like this:

L.S.: "What is your opinion of continuing education for professionals?"

S.I.: "Forget it! What more is there to learn?"

L.S.: "How would you like to have a medical doctor, who has never read a medical article, drug literature, or attended any medical conference since he completed medical school, operate on you?"

S.I.: "Well, he probably wouldn't take the shortest route to the problem; but as long as everything came out all right, I wouldn't mind. If everything didn't come out all right, it wouldn't make any difference anyway."

L.S.: "What is the disadvantage of continuing education?"

S.I.: "Continuing education would be a waste of time. I know everything necessary in order to complete the job."

L.S.: "How well can you write environmental impact reports?"

S.I.: "My English may not be perfect, but I get the message across. NO IMPACT!"

L.S.: "Are you familiar with analytical bridging?"

S.I.: "What is that?"

L.S.: "I assume that the answer is no."

S.I.: "I don't see what that has to do with land surveying anyway!"

L.S.: "Which of the various types of electronic distance measuring instruments would be better for city surveys?"

S.I.: "What are the different types?"

L.S.: "Never mind! Let us discuss continental drift instead."

S.I.: "Don't be ridiculous! What continental drift? Even if there was continental drift, the land is where it is."

L.S.: "Did you use the method of least squares adjustment on that long traverse which you completed last week?"

S.I.: "A least squares adjustment is too complicated."

L.S.: "Least squares adjustment is easily accomplished with a computer."

S.I.: "The original surveyor didn't use a computer, so why should I?"

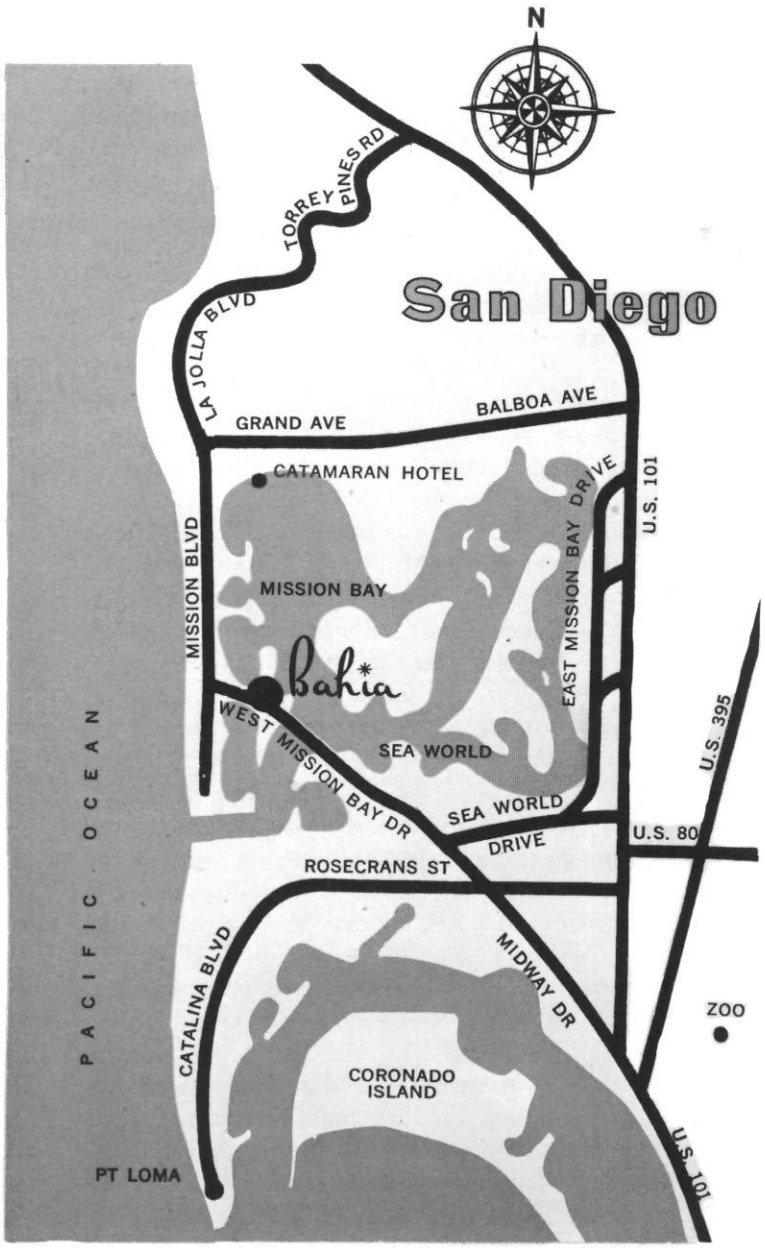
L.S.: "Surveyors can't possibly be involved in every phase of surveying in his daily work. You must have some suggestion as to how we can keep up. Where do we go from here?"

S.I.: "I don't know about you, but I am going home so that I can watch 'Gunsmoke' on the tele." ▲

*Another fault with being punctual is that everyone thinks you have nothing to do.* —*The Spotlight*

# Bahia
BY THE BAY

# APRIL 4 - 6
# 1974
# C L S A
# CONVENTION
# ON
# MISSION BAY
# SAN DIEGO




## "THE LAW AND THE CALIFORNIA SURVEYOR"

## SAN DIEGO ZOO WILD ANIMAL PARK

**RETRACEMENT** Continued from page 9

proof of occupation by the surveyor in approximately 85% of the cases. Most have been monumented or otherwise recognized as authentic. The remaining 15% is, no doubt, due in part, to my inexperience in earlier years.

If the field of retracement, itself, has boundary lines, they are divergent to infinity. One must search until return is no longer commensurate to need. It is not my perogative to stress economic feasability or practicability, but an accounting is inevitable.

As I recap my experience and strive to fill your needs, it seems most appropriate that I honor your predecessors, as I honor you. With the basic premise that their work was done in the field, not "from the bar." I recognize and accept the exceptions, but I will not allow it to narrow my prospective, or reflect unfavorably upon the preponderance of work performed in a manner and under circumstances so as to command my utmost respect.

In conclusion, I am led to ask the indulgence of all interested parties; private and governmental, Forest Service and B.L.M, student and assistant, to consider review of practices in treatment of our original survey evidence. To further this cause, I humbly and sincerely present this paper in whatever context it be judged, professional or lay.

## REFERENCE MATERIAL


1. MANUAL OF SURVEYING INSTRUCTIONS – (1947), U.S. Government Printing Office, Washington, D.C.
2. FOREST TREES OF THE PACIFIC SLOPE – George B. Sudworth, Dover Publications, New York, $4.00.
3. MANUAL OF THE FLOWERING PLANTS OF CALIFORNIA – Willis Linn Jepson, University of California, Berkeley, $10.00
4. TREES: YEARBOOK OF U.S. DEPARTMENT OF AGRICULTURE (1949) – Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
5. THE WOOD HANDBOOK – U.S. Department of Agriculture Handbook No. 72 (1955), Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, $2.00
6. FORESTRY HANDBOOK (1956) – The Ronald Press Co., New York, $15.00
7. TEXTBOOK OF WOOD TECHNOLOGY – Brown, Panshin & Forsaith, Vol. 1, McGraw Hill, New York, U.C. Book Store, Berkeley.
8. KNOWING YOUR TREES – Collingwood and Brush (1947), American Forestry Association, Washington, D.C.
9. INSIDE WOOD, MASTERPIECE OF NATURE – William M. Harlow (1971), American Forestry Association, Washington, D.C. $6.50.
10. COMPASS LAND SURVEYING – F. Henry Sipe, McClain Printing Company, Parsons, West Virginia 26287.
11. MOVING-SLIT RADIOGRAPHY OF WOOD SAMPLES FOR INCREMENTAL MEASUREMENTS – Research paper by R.M. Echols, 1970, Research Forester, Pacific Southwest, Forest and Range Experiment Station, Berkeley, California.
12. AVAILABILITY OF SOIL TUBE:
    (a) Conneys Screws
    Charlotte, Michigan 48813
    (b) Kemco Company
    5255 S. Clinton Trail
    Eaton Rapids, Michigan 98827
    (c) Oakfield Apparatus Company
    P.O. Box 65
    Oakfield, Wisconsin


▲

**LETTER TO THE EDITOR** Continued from page 11

computing means available when these constants and tables were originally prepared were very limited. Furthermore, no attempt was made to obtain absolute computing accuracy to hundredths of feet in the coordinates because the published geographic positions at that time were only given to 3 decimal places, which is equivalent to about ±0.1 ft. in X and Y.

In the case on Zone 2, the "ℓ" value was incorrectly computed. The mistake was on the order of about 50 in the tenth place of the logarithms. Again, this is no cause for concern. The tables and hence the plane coordinates computed from them are correct, within the tolerances previously stated, although it may appear when comparing the published and computed values for the constants that large errors exist. As noted earlier, the differences between the plane coordinates will be essentially the same. It may be of interest to you that values of "ℓ" could be adopted to three or four decimal places without materially creating any serious problem. The scale factors may change slightly in these cases however.

I seriously question the release of the computer program CLACPROC to anyone computing surveys on the California State plane coordinate system. It is not that I question the accuracy or completeness of this program, but since it does produce results which are not in agreement with published coordinates, difficulties are almost certain to arise. If one wishes to use this program for some special problem and clearly distinguishes between the coordinates produced by this program and State plane coordinates no great harm may be done.

In order to obtain results consistent with the published data, anyone transforming geographic positions to State plane coordinates or vice versa on a computer should prepare the programs using the formulas and constants given in the publication mentioned earlier ("State Plane Coordinates by Automatic Data Processing" publication 62-4).

Finally, there is one question I must ask. Why was this article published without prior consultation with the National Geodetic Survey? I would sincerely hope that should such a situation arise again or if any surveyor anywhere believes he has located any error, mistake or blunder in our surveys, publications or data that he contact me personally.

Sincerely,
Leonard S. Baker
Captain, NOAA
Director
National Geodetic Survey

▲

# RULE 424 AMENDED

424. Experience. (a) The several branches of professional engineering described in rule 404, herein, overlap and some activities are common to two or more branches of professional engineering. Experience in such overlapping activities may be used in securing registration in either branch but cannot be used more than once. The only exception to this is experience credit for education. Approved education entitles a candidate to experience credit in each branch and this experience credit can be used in any branch even though it has already been used in another branch.

(b) An applicant for registration as a professional engineer may be credited with four years experience toward the six years necessary for admission to the professional examination either by graduation from an approved engineering curriculum or by passing the engineer-in-training examination. They may not be combined. The additional two years of actual work experience shall have been gained after graduation from an approved engineering curriculum or after passing the engineer-in-training examination, whichever has first occurred.

(c) An application for license as a land surveyor must fulfill the following requirements under the immediate direction and supervision of a person qualified to practice land surveying:

(1) Have six years of land surveying, including both field and office experience, performing two or more activities defined in Section 8726 (a) through (f).

(2) Have not less than one year of the required six years experience in the field, planning, directing and analyzing the field work involved in one or more of the activities defined in Section 8726 (a) through (f).

(3) Have not less than one year of the required six years experience in the office, planning, researching and analyzing surveys; involved in one or more of the activities defined in Section 8726 (b), (c), (d) and (f).

(4) The remainder of the required experience shall be derived from field or office work involving one or more of the activities listed in Section 8726 (a) through (f).

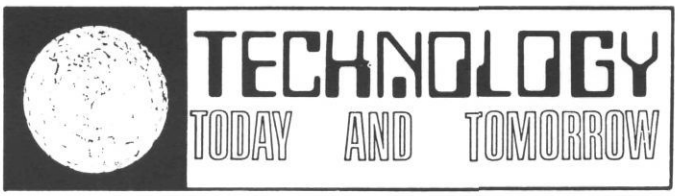
(5) Applicants who have passed the land surveyor-in-training examination may be credited with two years land surveying experience toward the six years necessary for licensure.

(6) An applicant may substitute educational qualifications for equivalent land surveying experience as outlined in Section 8742 (b) and (c).

(7) In any case where educational qualifications and land surveyor-in-training certificate credit has been allowed, the combination cannot exceed four years of the required land surveying experience. There must be a minumum of two years of actual experience as outlined in subsections (c) (2) and (c) (3) of this rule.

(d) Applicants for the second division of the land surveyor examination shall have passed the first division examination and received the land surveyor-in-training certificate. Applicants who hold a valid engineer-in-training certificate or hold a professional engineer registration certificate are exempt from taking the land surveyor-in-training examination. ▲

# 1973 ASP/ACSM




# FALL CONVENTION

## OCTOBER 2-5

Walt Disney World

LAKE BUENA VISTA, FLORIDA

### NSPE SUPPORTS BILL ON METRIC SYSTEM

In conjunction with Senate hearings on the U.S. conversion to the metric system, the National Society of Professional Engineers is supporting passage of a bill to direct the Secretary of Commerce to develop and implement a coordinated national plan of metric conversion within the next ten years.

NSPE noted there is a strong conviction in the engineering community that use of the metric system will make it easier for engineers to communicate with the scientific community, and with all counterparts internationally, "thus facilitating a greater exchange of ideas and a simplification in commerce."

The Senate Commerce Committee was told that most professional engineers support the metric conversion approach and that engineers look upon metrication as a well timed occasion to promote better engineering and consequent improved products through modernization of existing codes and standards.

In NSPE's official policy on the metric system adopted last year, the Society says "we are convinced that the benefits to all future generations of conversion to the metric system of measurement far outweigh the difficulties that will be encountered in the transition period." ▲

*West Virginia Surveyor*

*A deed description is a communication not a specification.*

*Eugene Lockton*

**THE SURVEYOR** Continued from page 10

computer, and the basic theories and their application remain a closed book. And, of course, the prejudices of the supervisor go unchallenged.

The computer computations most devastating effect is that it is the basic argument used to discredit mathematical theory. An example of this is the Inverse Position computation where the distance is determined by both the sine and the cosine of the bearing. If the positions lie near a cardinal direction, as do section lines, and natural functions are used, one or the other of the functions will be small and its significant figures reduced by the number of zeros immediately to the right of decimal point. When this number becomes less than the required number in the distance, the two distances will not agree. From this it is deducted that the formula check is not perfect and, therefore, cannot be relied upon as a check of the computation. Extending this, to include all proven formulae and freed of the restrictive rules of exact mathematics, has resulted in an almost total withdrawal of surveying computation as a science and the acceptance of personal judgment as the ultimate criterion.

*Read "The Unique Solution" in the next edition.*

## LAND SURVEYING 808

*by Roy Watley, Jr., L.S.*

"Land Surveying 808" will be offered this fall by University Extension, University of California.

The content of the course will include techniques of interpretation and preparation of land boundary descriptions, legal aspects of the practice of land surveying, original surveys, resurveys, subdivision surveys, mapping, the U.S. Survey of Public Lands, the California Subdivision Map Act, and the California Land Surveyors' Act.

Ray J. Peters, L.S., a member of CLSA, will be the instructor of the course. ▲

## LAND SURVEYORS ACT

The Board of Registration for Professional Engineers has available copies of the Land Surveyors Act, including 1972 changes in the law. ▲



## APPLICATION FOR MEMBERSHIP IN THE CALIFORNIA LAND SURVEYOR'S ASSOCIATION

- ☐ **MEMBER GRADE: Have a valid California Land Surveyor's or Photogrammetric Surveyor's License**
- ☐ **AFFILIATE MEMBER GRADE: R.C.E. or those who rely upon the principles of land surveying.**
- ☐ **ASSOCIATE MEMBER GRADE: Work in land surveying and be recommended by a member.**

a. **Name** _____ **County** _____

b. **Address** _____ **Zip** _____

c. **Mailing Address** _____ **Phone No.** _____

d. **Employment: Private** _____ **(Principal** _____**) Retired** _____ **Public** _____

**Name of Firm or Agency** _____

e. **Signature and L.S., P.S. or C.E. No.** _____

f. **Recommended by** (Associate & Affiliate Grade Only) _____

**Dues schedule: *Member $50.00 Affiliate $25.00 *Associate $10.00 (*Entrance Fee $15.00)**

**Mail application and check to: California Land Surveyor Association** • P.O. Box 1363, Santa Rosa, Ca. 95403

FIRST YEAR'S ANNUAL DUES ARE TO BE PRO RATED FROM DATE OF APPLICATION

# CALIFORNIA LAND SURVEYORS ASSOCIATION — 1973

OFFICIAL ADDRESS: P.O. BOX 1363, SANTA ROSA, CA. 95403

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*DIRECTORS AT LARGE*

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