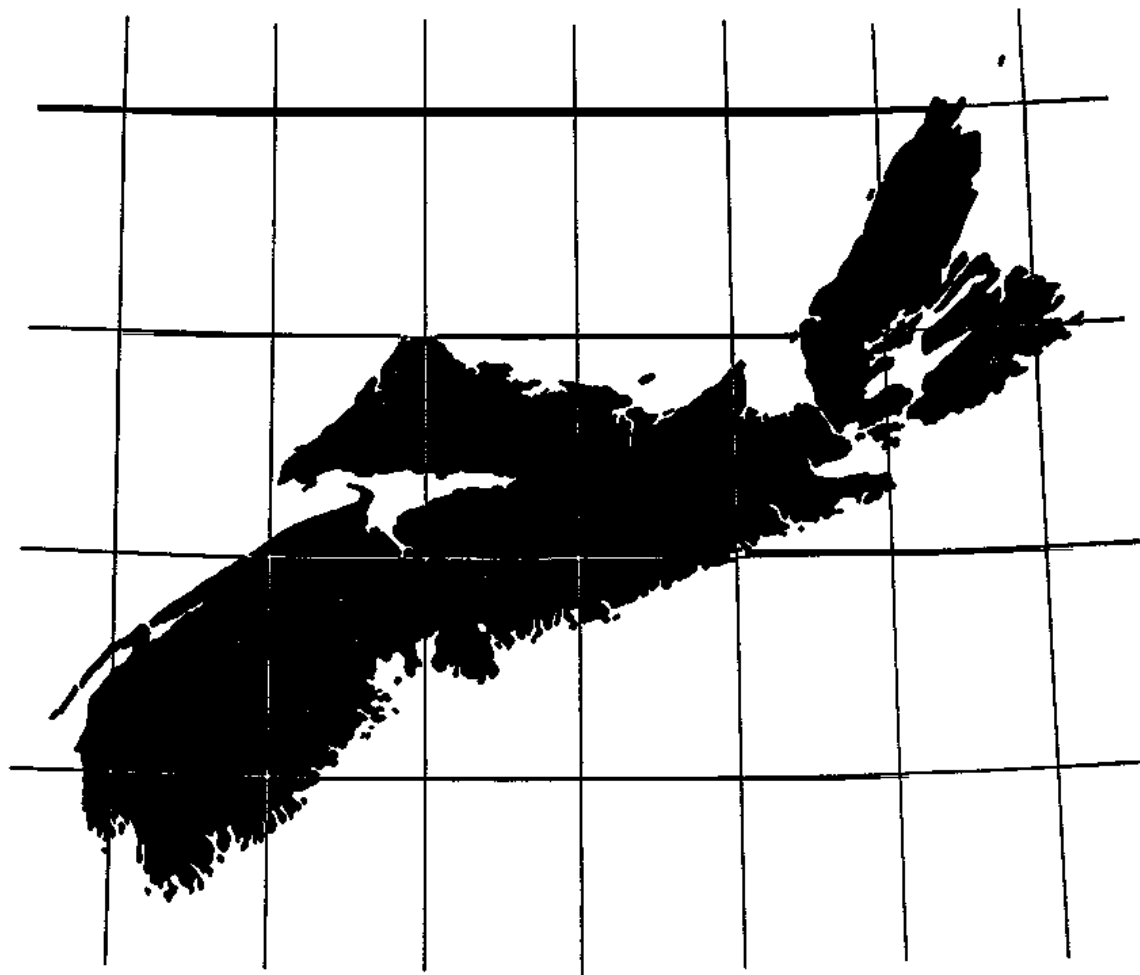


The NOVA SCOTIAN SURVEYOR



*Published by
The Association of Provincial Land Surveyors
of Nova Scotia*

Founded 1951
Volume 19

R. E. Millard, P.L.S.
June 1967

Incorporated 1955
Number 52

NOTICE

17th ANNUAL MEETING

**ASSOCIATION OF PROVINCIAL LAND SURVEYORS
OF NOVA SCOTIA**

WILL BE HELD, NO MATTER HOW HARD IT RAINS ON

Nov. 3rd - 4th 1967

P L A C E

**CITADEL INN MOTOR HOTEL
HALIFAX, NOVA SCOTIA**

**MAKE THIS YOUR PERSONAL CENTENNIAL PROJECT.
BRING YOUR SURVEYORETTE.
THIS MAY BE YOUR LAST FLING BEFORE WINTER SETS IN.**

Let's Make It The Best Yet

The NOVA SCOTIAN SURVEYOR

Published four times a year by

The Association of Provincial Land Surveyors of Nova Scotia Incorporated

GEORGE BATES
President

EDWARD P. RICE
Secretary-Treasurer

R. E. MILLARD
Editor

Volume 19

Number 52

Address all communications to P. O. Box 1541, Halifax, Nova Scotia

A Polaris Planisphere

G. G. BENNETT, M. SURV., FIS (Aust.)

Senior Lecturer in Surveying
The University of New South Wales, Australia

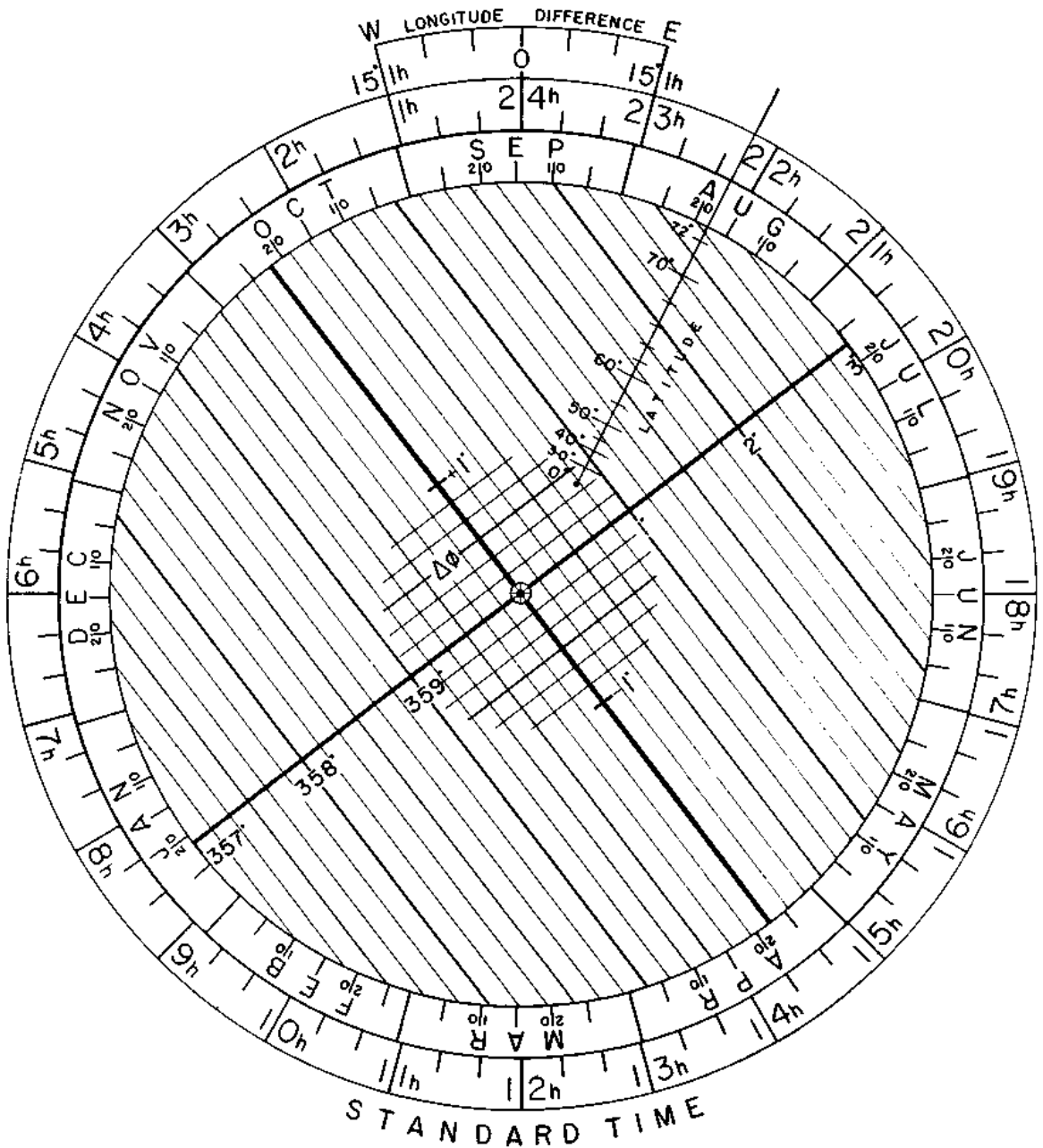
This article describes a graphical method of deriving the azimuth and altitude of Polaris without having to convert standard time to sidereal time.

Cet article décrit une méthode de détermination graphique de l'azimut et de la hauteur de Polaris sans la transformation du temps moyen normal au temps sidéral.

This planisphere satisfies the needs of the surveyor who is seeking an azimuth to a precision of a few minutes of arc or who needs to make instrumental settings to find Polaris in the daytime. The solution is performed entirely by graphical means and does not require auxiliary tables or a knowledge of sidereal time and its relationship with mean solar time.

Basically, there are two problems to solve in finding the azimuth and altitude of Polaris. First, the hour angle is found from the standard time of observation, the date, the observer's longitude and the right ascension. Secondly, the astronomical triangle is solved for the unknown elements of altitude and azimuth angle. A graphical solution of the second phase has been given already by this author [1963]; it is also the basis of the finding diagram of *Moppett and Blackie* [1963]. For the planisphere, the concentric circles of latitude on the finding diagram have been replaced by a transparent cursor. For the first phase, the finding diagram is rotated by approximately one degree a day to allow for the, changing phase of sidereal and mean solar time and to provide an index scale to allow for the longitude difference between the observer and the time zone meridian. This has been achieved by preparing a separate finding diagram which can be rotated with respect to the standard time scale.

AZIMUTH AND OF ALTITUDE POLARIS



USING CURSOR, SET DATE TO LONGITUDE DIFFERENCE (TIME ^{E. OR W. OF} ZONE MERIDIAN)

SET CURSOR TO STANDARD TIME

READ $\Delta\phi$ FROM 0 LATITUDE ON CURSOR ALTITUDE = LATITUDE + $\Delta\phi$

READ AZIMUTH FROM OBSERVER'S LATITUDE ON CURSOR

A Polaris Planisphere

A simple solution to the whole problem naturally involves some compromise and the azimuth found from the planisphere may be in error owing to the following assumptions made in the construction:

- (1) Taking $A = p \sin t \sec \phi$ instead of
 $\sin A = \sin p \sin t \sec \phi$.
- (2) Using a mean value of the apparent right ascension. For 1966, the variation from the mean value is ± 1.5 m
- (3) Using a mean value of the apparent declination. For 1966, the variation from the mean value is $+ 0.4'$

TABLE 1

Maximum values of the errors from the above causes

ϕ	(1)	(2)	(3)
40°	0.5'	0.5'	0.5'
60	1.2	0.6	0.7
70	3.1	1.0	1.1
80	13.6	2.0	2.3

For latitudes up to 60° , these errors are not serious but, at higher latitudes, they may become intolerably large.

There is also a small error involved in dividing the year into 365 equal parts. This error will propagate with latitude as in (2) but will never be greater than the above tabulated values except in leap year when the errors may reach twice these values. Apart from the assumptions made in construction, there will be errors introduced due to eccentricity in the mounting of the components.

The planisphere has been constructed for the year 1966, but, in a few years time, the right ascension and declination will have changed, thus introducing further errors to those previously examined. It is possible to construct a cursor to take these changes into account or, alternatively, to provide a table of corrections. However, to keep the solution as simple as possible, it is suggested that the cursor be replaced every few years.

References

- Bennett, G. G. Theodolite orientation and defining the meridian in field astronomy. *The Australian Surveyor*, March 1963.
- Moppett, G. S. and W. V. Blackie. A new Polaris card. *The Canadian Surveyor*, September 1963.

OBITUARY

MAJOR JAMES A. H. CHURCH, DSO, MC, PLS

James A. H. Church, DSO, MC, PLS, died at his home in Lawrencetown, Annapolis County, Nova Scotia, on Saturday, the 24th of June. Born in India of Scots parents, William and Marian Church, in 1884, educated in England, and articled as a Mining Engineer in Scotland, James Church came to British Columbia in 1907. He enlisted in August 1914 with the 19th Alberta Dragoons later transferring to the 21st Tunnelling Company, Royal Engineers. He returned to Canada in February 1919 with an enviable war record, the rank of Major, The Distinguished Service Order and The Military Cross. Mining engineer in Alberta, then farmer in Nova Scotia, he was called to active service in 1943 at Halifax and Camp Aldershot as Civilian Instructor in Topographical Surveying. After the war he was largely responsible for founding the Nova Scotia Land Survey Institute at Lawrencetown of which he was Principal until his retirement in 1963. He was held in high regard by all who knew him. He was an Honourary Member of the Canadian Institute of Surveying and the Association of Provincial Land Surveyors of Nova Scotia.

James Church is survived by his wife, the former Beatrice Maude Pym of Yorkshire, England, sons William Alexander of Dorval, Quebec and Dr. J. Peter Church of Temiskaming, Quebec and nine grandchildren.

The funeral was held at 2:00 o'clock Monday, 26th June, at St. Andrews Church, Lawrencetown, conducted by Reverend M. J. Findlay. Interment Fairview Cemetery.

The Association was represented at the funeral by President G. T. Bates. Also in attendance was a large number of the Major's former students.

Magnetic Clues Help Date the Past

By KENNETH F. WEAVER, Assistant Editor

And the touch'd Needle trembles to the Pole. . . .

ALEXANDER POPE, "THE TEMPLE OF FAME"

THE COMPASS NEEDLE, contrary to popular notion, does not point true north. Moreover, its aim today differs from that of a century ago, or of Columbus's day. And, if the compass had existed in the time of Christ, its direction would have been still different then.

In fact, what geologists call the "virtual," or apparent, geomagnetic north pole, toward which the navigator's compass points, wanders about the Arctic like a lost child. It may move as much as 700 miles in a century.

This curious and little-understood drifting offers an ingenious key to riddles of the past. Today's archeologist, when he uncovers the kilns, hearths, or fire pits of ancient man, may search for faint traces of magnetism. These traces serve as a "fossil compass." From them the scientist can determine the age of the remains, using a new dating technique called archeomagnetism. In the past several years it has dated Roman pottery kilns in Britain and France and ancient hearths in Japan.

NATIONAL GEOGRAPHIC SOCIETY

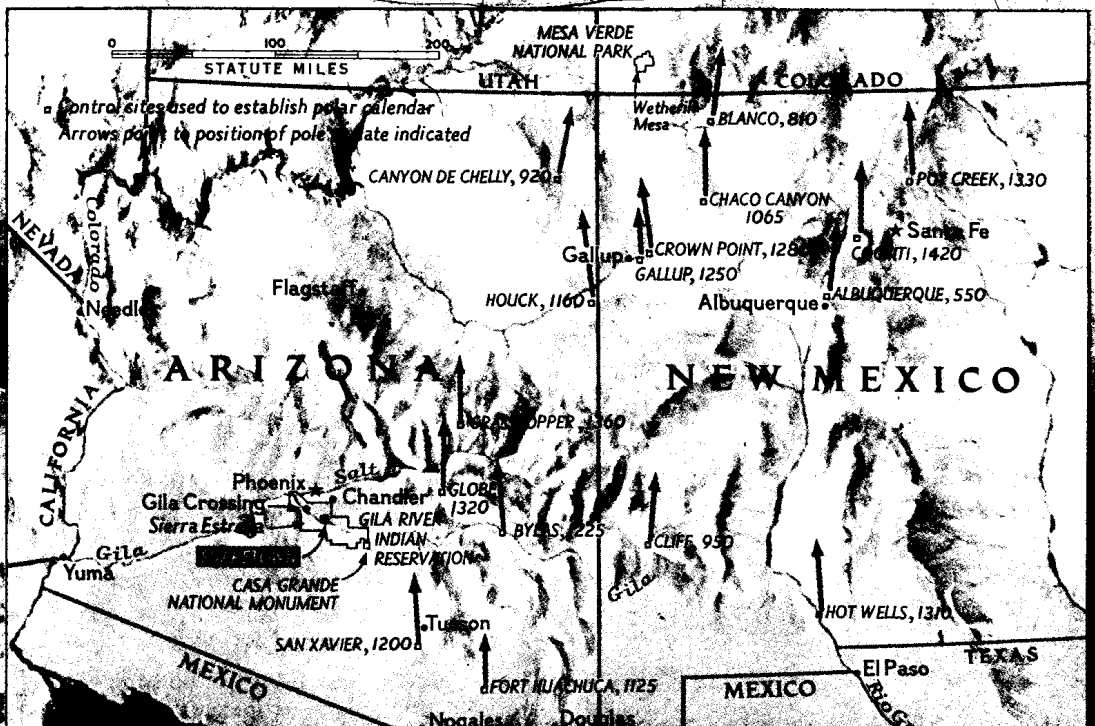
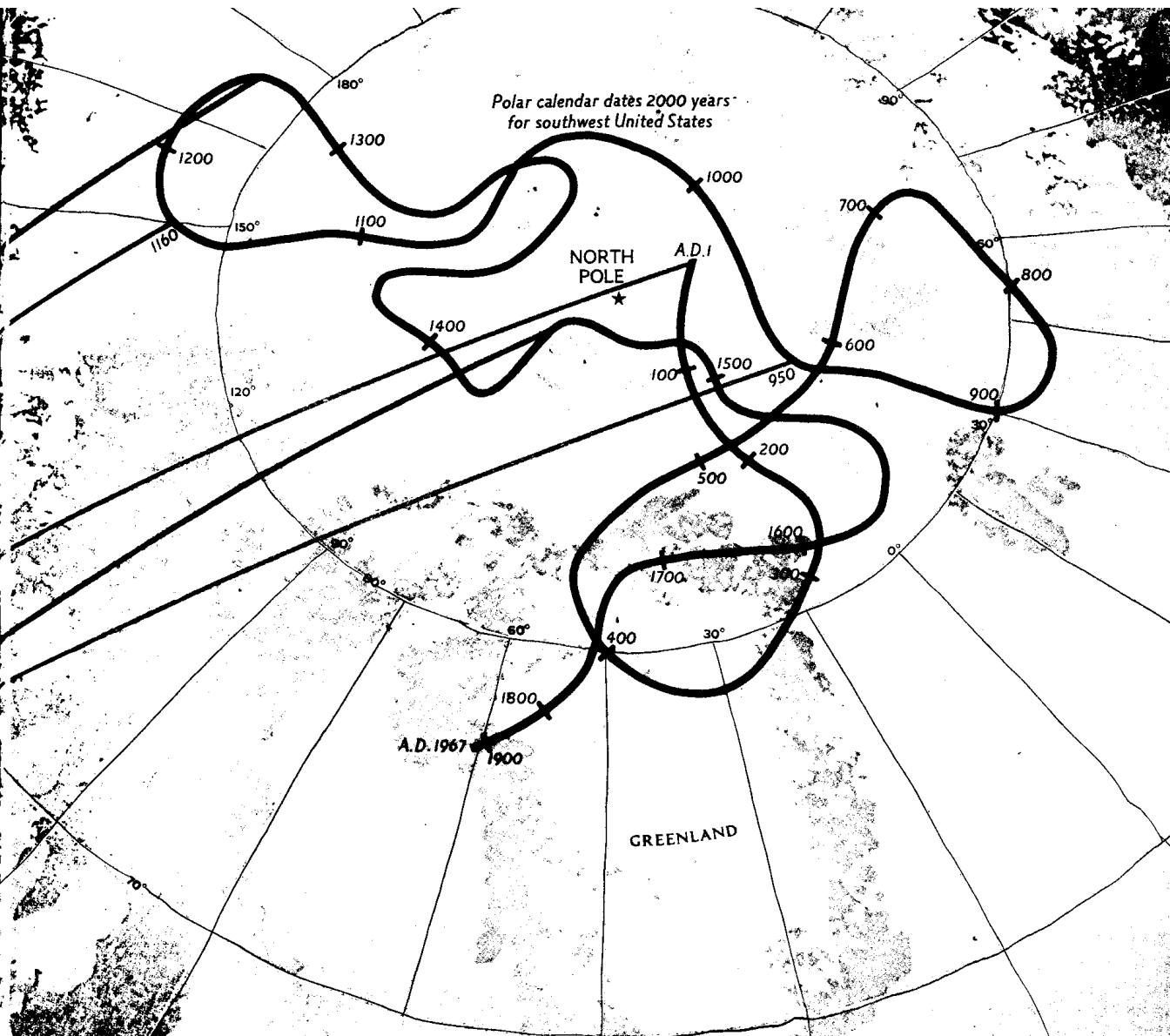
Vol. 131, No. 5 — May 1967

MAGNETISM DATES HISTORY

Like a player in blindman's buff, the virtual geomagnetic pole for the southwestern United States meanders hundreds of miles each century; this painting plots the 8,800 miles it has wandered since the time of Christ. To reconstruct its looping path as it would have been detected over the years by compasses, Dr. DuBois collected clay samples from fire pits in 16 pre-Columbian Indian villages. By determining the magnetic alignment of his samples, whose ages were already known from carbon-14 dating or tree-ring analysis of timbers found in the same ruins, Dr. DuBois worked out the polar "calendar" shown here. It provides a dramatic new tool, more accurate than carbon 14, for dating southwestern sites such as Snaketown, which lack suitable timbers for tree-ring dating.

Dr. DuBois must arrive at two readings for each of his samples: declination—north-south alignment as indicated by a standard compass—and inclination, or vertical dip. At any time, these two define a single point on the polar path. Declination lines alone, as shown on this map, may intersect the path at several points.

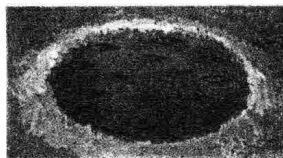
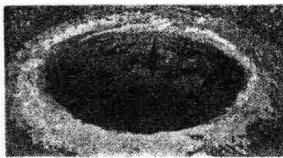






Ancient Hohokam fire pit yields its evidence to Dr. DuBois, one of the world's few specialists in archeomagnetism. He chisels into the fire-hardened clay to isolate a round core, then pours plaster around the sample to protect it, using a brass mold that has been leveled with a spirit level

(right) and oriented with a compass to the present magnetic north. Once the plaster has hardened, the cube can be cut free.



© N.G.S.

Archeomagnetic dating depends on the fact that the magnetism of minerals in clay, when heated to about 1,100° F., takes on

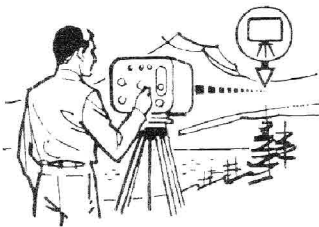
the direction of earth's magnetic field. Unless reheated, the particles hold that magnetic bearing through the centuries. As the upper diagram shows, magnetic direction in unfired clay is helter-skelter before heating. After firing, the magnetism lines up uniformly in all the particles.

the **NEW** **MRA3** MICRO-DISTANCER

an all new completely transistorized compact microwave system for precise distance measurement— with built-in battery and direct readout in centimetres



The new MRA3 Micro-Distancer is the latest development of Dr. T. L. Wadley, and the laboratories which created the original "Tellurometer". The MRA3 is complete in one package — no extra power supplies, batteries or other excess equipment to carry around. The MRA3 provides improved accuracy (within 2 centimetres at short distance), either phase resolver (digital) display or an improved cathode ray display to customer's choice; also readout either directly in centimetres or in millimicroseconds is available.



FEATURES:

- Accuracy 2 centimetres: 3 parts per million.
- Measures 100 metres or less to over 60 kilometres day or night.
- Weighs only 34 lbs. with built-in rechargeable nickle-cadmium battery.
- Only 3 main operating controls.
- Plug-in circuit cards and modular construction throughout.
- World-wide after sales service.

TELLUROMETER CANADA LTD.

1805 WOODWARD DRIVE, OTTAWA



SURVEY MARKER



A newly developed survey marker consisting of a corrosion resistant aluminum head threaded to a sharpened carbon steel rod and ribbed for better holding characteristics.

This marker has won approval from professional Land Surveyors in all the Maritime Provinces and is now in common use in this area.

Special heads, bearing the initials or registry number of the individual may be supplied, but time must be allowed for manufacture.

With "ENHEAT SURVEYORS' MARKERS" on the survey, it is no longer necessary to "begin at an old fence post" or such perishable reference point.

Another New Service From

ENHEAT STEEL DIVISION

Manufactured By

Enamel & Heating Products Limited

AMHERST. N. S.

BRUNING DIVISION

Addressograph

Multigraph

Company Limited

Drafting, Engineering Supplies

Cronoflex Printing a Specialty

Revolute — Copyflex

Electrostatic Machines

6100 Young Street, Halifax, N. S.

CARL ZEISS/JENA V.E.B.

THEO "010"

*for absolute accuracy
combined with economy...efficiency
and simplicity of manipulation...*



Important features of this new instrument include a one-second direct reading, an elongated mirror-lens telescope, internal focussing with a negative sliding lens, graduated glass circles with engraved divisions of extreme sharpness and great contrast. The arrangement of controls in the Theo 010 affords the operator real efficiency of the reading sequence and great certainty of results.

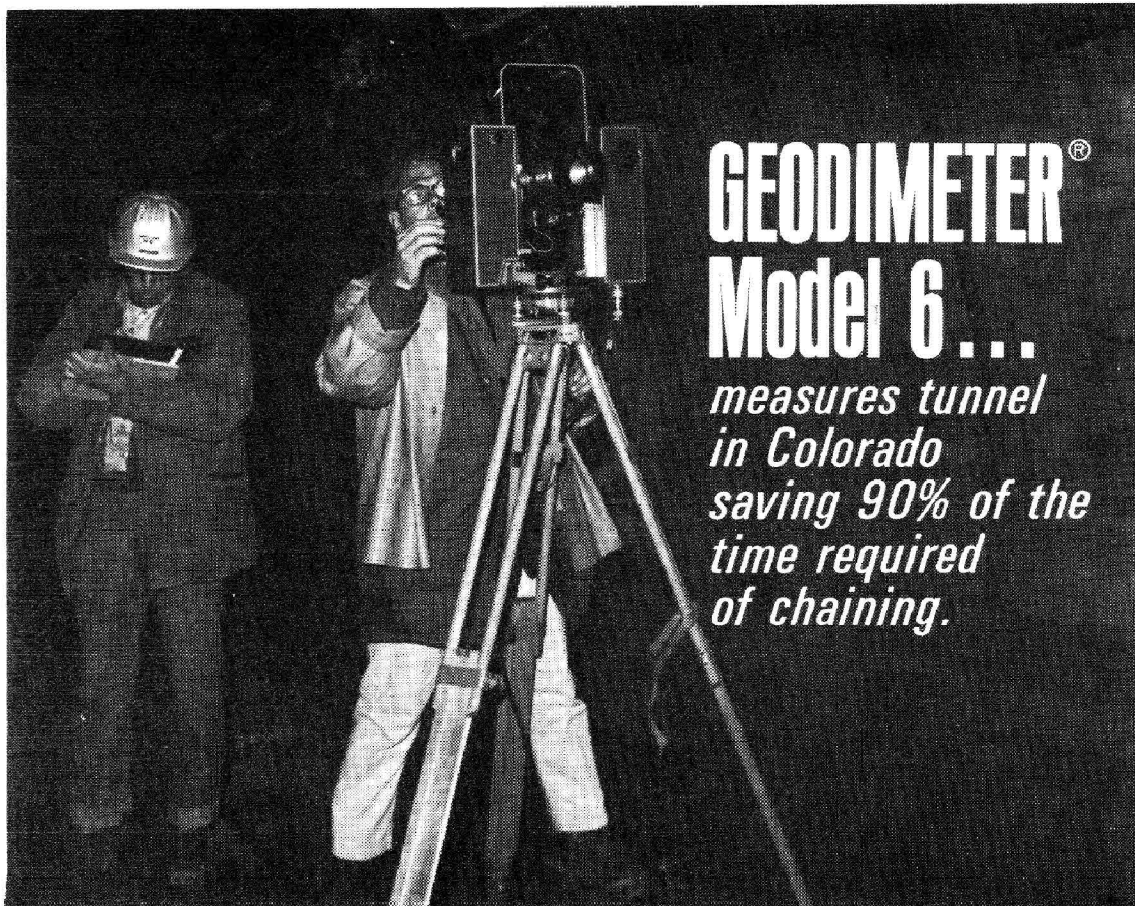


For complete data on the full line of
CARL ZEISS/JENA surveying and
photo-grammetry equipment, contact:

JENA SCIENTIFIC INSTRUMENTS LTD.

23 Rainside Rd.,
Don Mills, Ont.
Tel.: 447-4761

4040 Courtrai St.,
Montreal, P.Q.
Tel.: 342-0251



GEODIMETER® Model 6...

*measures tunnel
in Colorado
saving 90% of the
time required
of chaining.*

Photo by R. C. Hopper, Resident Engineer, Colorado Department of Highways.

Recently we asked an employee of the Colorado Department of Highways for his comments and the results of the Geodimeter Model 6 in measuring the "Straight Creek Tunnel" through the Continental Divide.

“ This measurement made for us was a great help and certainly was to an accuracy which would have been difficult if not impossible to do by the conventional methods of chaining. □ My estimate is that the measurements made in the tunnel were accomplished in 10% of the time that would be required in chaining. ”

Remember, underground, over water, in cities, in fact anywhere . . . the Geodimeter Model 6 does the job—*Faster* (10% of the time in this case), *Cheaper* (only one trained operator required and AGA's slave reflectors stationed anywhere) and *Better* (greatest accuracy available from any instrument - 0.03 ft. + 2 millionths of the distance) and it all can be yours . . . easily.

For further information call or write to:

AGAtronics, Ltd. 178A Queen St., E., Brampton, Ontario

U. S. SALES OFFICE: AGA Corporation of America, 151 New World Way, So. Plainfield, N. J.
Also represented in key cities in the United States.

"Geodimeter" is a registered trademark

NOTICE

I would call your attention to two new publications now available to Surveyors.

1. Surveyors of Canada — 1867 — 1967 by Courtenay C. J. Bond, D.L.S.
2. "Men and Meridians" by D. Thompson. — This is worth waiting for.

WRONG OR RIGHT? —The greatest amount of surveying was done in Canada between 1767 — 1867. 100 years before Confederation. Since then we have only worsened it, and have done a truly remarkable job, considering that we only half tried.

What would have happened if we really tried?

For Particulars write or call:

Norman Wade COMPANY LIMITED

Vancouver — Toronto — Montreal
Ottawa — Quebec City — Saint
John — 213 Hollis St., Halifax,
N. S.

Exclusive Maritime Distributors
**Wild Theodolites
and Levels**

For any requirements in:
**Reproduction, Drafting, Surveying
and Engineering Equipment and
Supplies**

Kelvin Hughes Division

5140 Prince Street, Halifax, N.S.

Phone 423-6139

**Engineering & Drafting Supplies
Instrument Rentals**

BETTER MEASURE WITH **LUFKIN**

**TAPES-RULES-PRECISION TOOLS
Send For Free Catalog**

THE LUFKIN RULE CO. OF CANADA, LTD.
BARRIE, ONT.

EASTWARD INDUSTRIES LTD.

exclusive representatives for the
Keuffel & Esser Company of
Canada

**K & E Transits, Levels, Rods,
etc., in stock.**

Desmond Ave, P. O. Box 220,
Armdale Post Office, N. S.

A. E. SIMPSON LTD.



Aerial Photography, for all pur-
poses. Photographic Mosaics for
detailed "surface" studies. Ac-
curate and economical plani-
metric or contoured maps or
plans, at all scales, to meet
your layout, planning, location
or other engineering needs.

1810 Laval Road

Montreal 9, Que.

The Hughes Owens COMPANY LIMITED

A complete line of Supplies for
the Engineer, Surveyor and
Draftsman

**Ozalid and Blueprinting
165-169 Hollis St., Halifax**

Nova Scotia Land Survey Institute

Operated by
Vocational

Education Division

Department of Education
Province of Nova Scotia

The Two Year Course
Prepares One To Sit For the
Provincial Land Surveyor's
Certificate

Full particulars from:

The Principal
Nova Scotia Land Survey
Institute

Lawrencetown, Nova Scotia

This is a Joint Federal and
Provincial Project.

Mailing Tubes — Open and Closed
Ends.

Storage Tubes — for prints and
tracings

Write —

**Sonoco Products Company of
Canada Limited**

8415 Mountain Heights Ave.,
Montreal 9, Quebec.

ATLANTIC AIR SURVEY (1963) LIMITED



Serving Surveyors and
Engineers in the Atlantic
Provinces with better ser-
vice at more economical
cost.

Phone 469-7901

P. O. Box 187
Dartmouth, N. S.