

The Case For Full Circle Bearings

BY JOHN R. HILEY, O.L.S., D.L.S.

*The expression "Full Circle Bearing" is used in the title in deference to the purists to whom the term "azimuth" quite correctly refers to the direction of a line from a given point on the earth's surface. However, in the remainder of this article "azimuth" will be used in its more popular sense as a synonym for "full circle bearing" as opposed to "quadrantal bearing".

Until about ten years ago most surveyors kept their minds alert and agile by performing miracles of data retrieval from trig. tables in order to perform their mysterious calculations. Most trig. tables available in the past yielded the functions of angles from 0° to 90° only, since any beyond this range were numerically repetitious. Some tables did indeed quadruple their extent by having the reader select the degrees from one of the four corners of the page, the minutes by going either up one side or down the other and the function from either top or bottom. This performance was not always guaranteed to yield the correct results even to the aforementioned alert, agile minds, much less those that were slightly fuzzy (from working too hard in the hot sun of course).

It is not difficult then to see why the quadrantal system of bearings was the logical system for survey calculations, and thus became entrenched in the regulations governing surveys in the Province of Ontario.

Since I have encountered very few laymen who understood bearings of any kind, it is assumed that concern for public understanding was not a guiding principle in giving statutory monopoly to the quadrantal system.

With the advent of electronic calculators, trig. tables have rapidly joined traverse tables and hand crankers as dust collectors in surveyors' basements. These calculators seem to have the heretical notion that a circle is made up of 360° , not four sections of 90° all going in different directions. However, with a few cracks of the whip and the addition to their program diet of numerous tests and branching instructions, the recalcitrant little beasts can be made to respond to external stimuli called "quadrant codes" and will obediently cough up data in the desired form. Mind you, the simplest hand held calculator when fed an azimuth of $320^\circ 10'$ will gracefully yield a positive northing and negative easting with scarcely more fuss than a few blinks of its red little eyes.

Comparison of the direction require-

ments on survey plans in the various survey jurisdictions across Canada, (for which I am indebted to the staff of the Legal Surveys Branch of the federal Department of Energy, Mines and Resources), is rather surprising:

Azimuths: are required in the co-ordinate survey areas of Nova Scotia, Prince Edward Island, New Brunswick, Quebec, and in all cases in Alberta, Yukon and North-West Territories.

Quadrantal Bearings are required in Ontario and British Columbia and on a reference line in Manitoba and Saskatchewan.

Angles: are required in Manitoba and Saskatchewan between all lines.

In the parts of Nova Scotia, Prince Edward Island, New Brunswick and Quebec which are not within a co-ordinate survey area, and in Newfoundland, no requirement is stated and directions are accepted in either quadrantal bearing or azimuth form.

From the above it appears that perhaps the survey profession is guided more by the heart than the head. Most of us in the past learned our surveying techniques as articulated students at the feet of the great god, O.L.S. (S.L.S., M.L.S., etc.) and traditions have been handed down in this manner from generation to generation. Obviously, each tribe across the country had its own customs to perpetuate.

However, change is possible even in our staid profession. Witness the changeover (with one notable exception)

NEW PRODUCTS

K. & E. VECTRON . . . Digital Surveying Instrument.

Keuffel and Esser Company have developed a surveying instrument that integrates precision optics and mechanics with electronic sensors and a micro-processor to perform standard surveying functions with greatly increased speed and versatility.

When interfaced with an Autoranger E.D.M. instrument and field computer, it provides a direct digital readout, on an eight-digit display panel, of the following operator-selected data:—

- Horizontal angle,
- Vertical angle,
- Slope distance,
- Horizontal distance,
- Departure,
- Latitude,
- Height difference.

from chains to feet, and the impending conversion to the metric system, which is already permissive.

I would suggest that the permissive or mandatory use of azimuths on survey plans be discussed at the fall meetings of each Regional Group and that their recommendations be forwarded to Council for the appropriate action.

For those of us who were brought up in the azimuth rather than the angle school of theodolite operation, the azimuth oriented electronic calculators are quite a boon. Field calculations particularly can now be made directly from the field data without converting azimuths to bearings with the ever-present threat of error introduced by these mental gymnastics.

Although some of you old-timers out there may remember vernier transits which had a quadrantal scale in addition to the regular 360° scale, I think it is safe to say that our direction measuring instruments have always had 360° graduations. Now our calculating equipment also operates in this mode. Is it not time, therefore, that our plans reflect the technology of the times rather than a once useful but now cumbersome calculating system which is understood by few outside the survey profession in any case?

Here is an opportunity to demonstrate, in a small but positive way, that the AOLS truly exists in the public interest. Let us urge our legislators to amend the rules so that we may operate in a more efficient manner, thus hopefully better serving the public.

