COMPASS & TAPE

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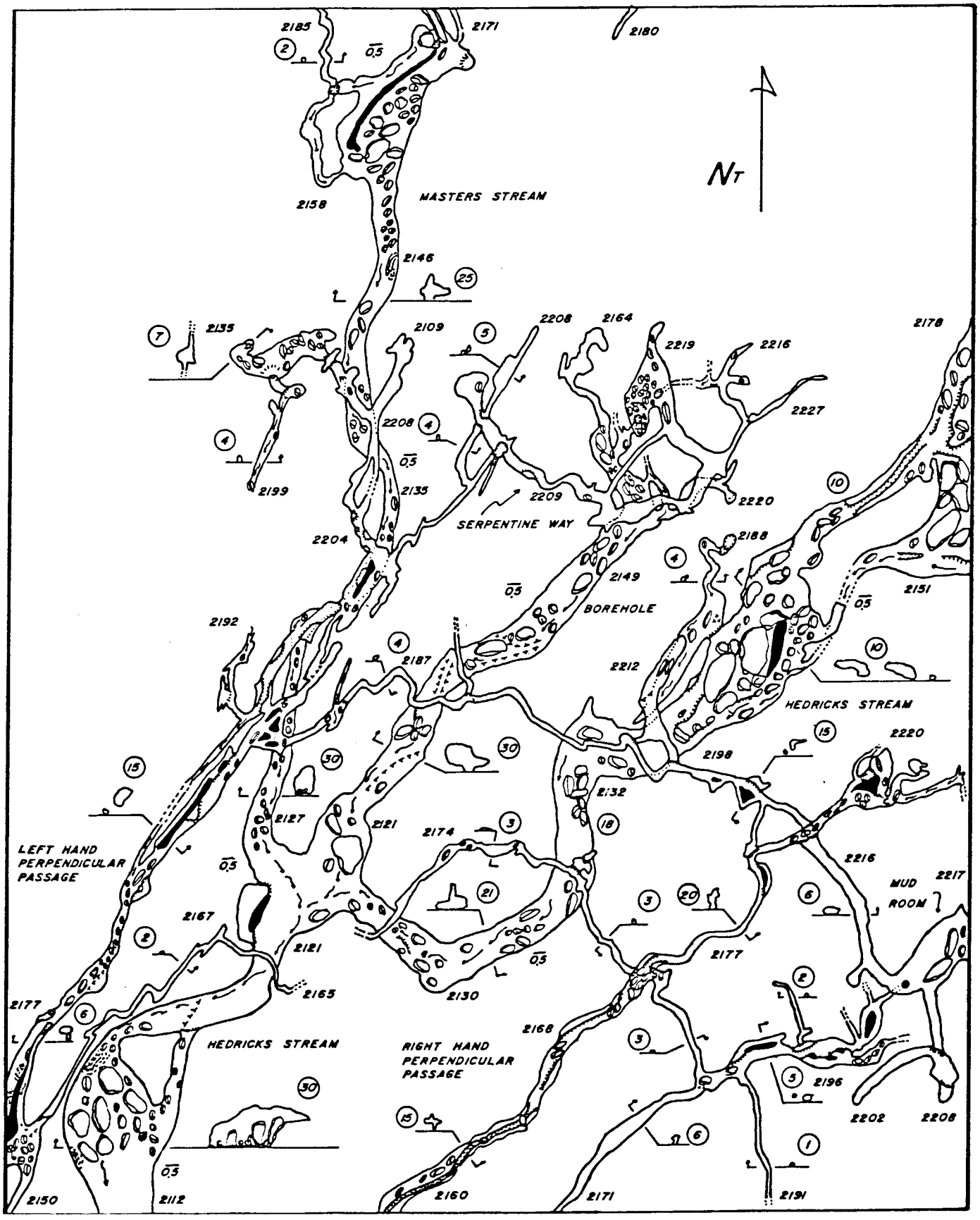

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COMPASS & TAPE

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Survey and Cartography Section - 1988/1989

Chair:	John Ganter	Rd. 6 Box 338 Bedford, PA 16802	814-356-3553
Vice Chair:	Doug Medville	11762 Indian Ridge Rd. Reston, VA 22091	703-860-0134
Treasurer:	Rich Breisch	4735 Mt. Ashmun Dr. San Diego, CA 92111	619-278-6280
Secretary:	George Dasher	109 Shawnee Dr. Buckhannon, WV 26201	304-472-6264
Editor:	Tom Kaye	2345 Rio Dr. #804 Falls Church, VA 22041	703-379-8794

Send Dues, Subscriptions, Address Changes to:
Rich Breisch

Send Articles, Photos, Letters, Comments, Tips, Maps to:
Tom Kaye

Cover: The cover is a portion of the map of Organ Cave (Greenbrier County, West Virginia) drawn by Paul Stevens. Organ Cave is more than 37 miles long and the map consists of 74 quads similar to the one shown. There are over 7,000 survey shots in the cave and Bob Thrun's CMAP program was used to do loop closure and to produce the stick map. The 74 stick map quads, each about 14 x 18 inches when plotted at 50 feet/inch, were then used as the basis for drafting the final map. The resulting quads were reduced to 1/2 size (100 feet/inch) for publication and the quad on the cover was further reduced to fit on the cover. The complete map is in the recently published book, The Caves of the Organ Cave Plateau, by Paul Stevens. (Bulletin Number 9 of the West Virginia Speleological Survey).

Contents:

One Judge's View

by George Dasher

This year, in Hot Springs, South Dakota, I was one of three judges at the Cartographic Salon at the NSS' annual convention. Twenty five people entered 38 maps in the Salon. These included 27 maps from the United States (12 different states were represented), 6 from Mexico, one from Canada, 2 from Jamaica, one from Honduras, and one from Australia. Almost without exception, all these maps were superb representations of each cave and the three judges; Keith Goggin, Bill Storage, and myself; wish we could have given more awards. In all, we gave five Honorable Mentions (green ribbons), one Merit Award (blue ribbon), and one Medal Award, which is the overall winner.

The winners were:

Green:		
Copperhead Cave	Westmoreland Co., Pa.	Walt Hamm
Cueva Inclinada	Oacxaca, Mexico	Carol Vesley
Rock Springs	Tooele County, Utah	Rodney Horrocks
Lechuguilla Cave	Carlbad Caverns Natnl. Park	Andy Lutsch
Cutlip Cave	Pocahontas Co. West Virginia	Doug Medville
Blue:		
Caves of Thanksgiving Island	Head Bay, Vancouver Island British Columbia	Stephen Grundy Olivia Whitwell
Medal:		
Dunco Spring Cave	Accompong Cockpit Country Jamaica, West Indies	Mike Futrell

This year the maps were judged not so much by minute cartographic detail, but by technical merit, useability, and clarity. This resulted in some unusual choices. For example, one map, which had no border, a few uneven letters, and no cartographer's name, received a green ribbon. However, the cave passages on this map were clear and there were plenty of ceiling heights and cave elevations. In short, it was very easy to understand this map.

Other choices were less agreeable. Two excellent maps had no ceiling heights or elevations. Another two entries made no mention of the linear units: was the cave surveyed in meters, feet, miles, or centimeters? Still worse, two maps, including and excellent representation of a large and complicated cave system in Oklahoma, had no elevations. Caves are three dimensional entities that are developed up and down, as well as along linear planes. It was very discouraging not to be able to award these maps ribbons. Still other maps were disqualified for confusing areas, improper use of cave map symbols, and incomplete profiles.

So what did we look for?

The important items were:

Barscales with linear units
A true North arrow
A date
Zero datum
A labeled entrance
Ceiling heights

The lack of any of these items resulted in the disqualification of the map.

Two points: The cross-sections should have been to scale; and a profile view of the cave could have been substituted for ceiling heights, pit depths, water depths, and elevations.

It was discouraging that very few of the maps used true north. Even worse, most of the cartographers used magnetic north without a date.

Then there were other items that were less important:

How much passage detail was there?
Did the shape of the walls appear natural or were they crudely drawn?
Did the cross-sections match the passage? Were ceiling changes shown on the plan view? Were there areas of the cave that were confusing?
Were there areas of the cave that was poorly represented?
How difficult was it to determine the relief and height of the passages? Was the general appearance of the map pleasing?
Was the title too small or too large?
Was the line consistency good or bad? (The walls should have been drawn thicker than the interior detail.)
Were the north arrow, barscale, and title well placed?
Were there any incomprehensible abbreviations?

Four maps form Tennessee displayed no county and state, but gave the state code and number, which is incomprehensible to anyone non knowing their system.

Finally there were the minor points:

What kind of survey was it? (Brunton and pace, Suuntos and tape, etc.)
What formation was the cave developed in?
Who went on the trips?
Who drew the maps?
Who compiled the data?
What was the length of the cave? What was the depth of the cave?
Was there a border?
Was there a precise cave location?

One thing: One person put an abbreviation in the title. If information is important enough to be placed in the title, it should not be abbreviated.

Second thing: I found it very disappointing that only two of the caves gave a location so that someone could find the cave. This trend had become so prevalent that the North Carolina cave law requires that no location be put on a cave map. I realize that many people are worried that their caves will be over use or vandalized if they put locations such as latitude and longitude, UTM coordinates, and elevations on their maps. However, a cave map is a record of the cave and I think it is very important that the user be able to locate the cave in the field. If the present trend continues, no one is going to be able to relocate these caves a decade or two down the road. Are we producing toilet paper for our children, or useable cave maps?

In conclusion, I would like to say that all cave map judging is very subjective and that the criteria by which I judged each map is different from everyone else. I hope that each and every contestant continues to enter their maps in the Salon and I would like to wish them all "Good Luck!". All the maps this year were excellent, and I wish we could have given everyone a ribbon, instead of 'nit-picking' the entries down to seven winners.

Keep up the good work!

Sketching

by George Dasher

Recently, I happened to go on a surveying trip where one or two of the people were somewhat less than experts on sketching. Contrary to my previous opinion, I could not sit in the entrance and give them a quick, competent lesson, not with three other caving parties waiting on me.

Sketching is very important. More cave passages have been resurveyed because of a bad sketch than because of any other reason. Therefore, the maximum effort should be made to draw the best possible sketch of the passage.

Once in the passage to be surveyed, the sketcher should have absolute control of the survey. The team leader of the cave guide might lead the cavers to the passage to be surveyed and the group may vote or throw rocks to decide which passage they wish to map, but once that decision has been made and the cavers are physically at the beginning of the survey, the sketcher should have absolute control over the placement of each shot, the number of shots in an area, splay shots, and the length of each shot. It is like a pilot, navigator,

and a bombardier; the pilot and the navigator get the plane to its target and then the bombardier flies it during the bombing run. Of course on a caving trip, the team leader, sketcher, and trusty cave guide might be the same person.

There are two ways to sketch

Method One: Draw to a precise scale. The sketcher determines which way is north and chooses a scale. If the first shot is 34 feet, 285, -5, then the sketcher determines which direction is 285 degrees (just a little north of due west); then he or she scales off the distance, subtracting a little for the 5 degrees inclination. If the station is on a four foot square breakdown rock, the sketcher scales out four feet twice and draws a square rock. Walls, other floor features, and this and that are all drawn to scale in their proper relationship to everything else. Then, in theory, once back at the office, the poor bloke drawing the map uses the same method to construct the working map. Some sketchers even take a protractor and scale into the cave to extract the ultimate from this technique.

Well, Method One is a bunch of bull! It is too tedious, too time-consuming, an energy drain, and is just a general pain in the ass, especially when you are tired or up to shoulders in a crawlway of wet, cold mud.

Method two: Draw to an approximate scale.
This method depends on two criteria. First, always record the dimensions to the left wall, right wall, floor, and ceiling. These measurements will be required to reconstruct the sketch back in the office.

Second, you need to know the approximate scale of the final map. If that scale is 50 feet to the inch, draw the sketch at 40 feet, 30 feet, 20 feet -- but do not draw it at 50 feet. Another trick that helps is to never take a survey tape into the cave that is longer than the linear distance that will equal one inch on the map. I draw big passage at about 20 or 25 feet to the inch -- I don't get a whole lot of each passage on a page (maybe only four station's worth), but I can sure squeeze a lot of detail onto that page. I draw crawlways and fissures at about 5 feet to the inch -- that leaves me a lot of room for error.

When sketching, draw the walls and floor detail first. Now, with the approximate sketching method, it is irrelevant that it is 25 feet to breakdown block x. What is important is that breakdown block x is one third the distance to the next station and that it takes up half the passage. The mud bank next to the station is one fourth the size of the passage.

What I am saying is: Draw relative sizes, don't worry about exact measurements and don't worry about which way is north. Since you are drawing at a scale much larger than the final map, your sketch will be a good rendition of the cave, once it is reduced.

Another thing: I dimension a lot of things in the cave, such as the size of breakdown, the distance between the breakdown and the wall, or the distance between the last survey station and the end of the passage.

Third thing: I don't just write four numbers for my right wall, left wall, floor, and ceiling. Sometimes, I write five, six, or even seven numbers, such as: 5/10, 8, 0/7, 20. Translated, this means it is 5 feet to the first right wall and 10 to the second; 8 feet to the left wall; 0 feet to the first floor (the station is on the floor), 7 feet to the bottom of the crack below it; and 20 feet to the ceiling. What I am doing is giving myself more data from which to reconstruct the sketch.

Back to walls and floors. Draw them first. Remember the walls are not straight, so look and see their little nooks and crannies and draw them. That four by four breakdown block is one third the size of the passage and nestled up against the right wall. Just divide the passage into thirds -- the right third is the block. Square off the block and move to the next item.

Since you only have to show the approximate location of each item on the sketch, your pace will be faster and, with the survey team not waiting for you, you will discover yourself looking for other things to add to your sketch. Notice how that wall sweeps into the change in the ceiling, the floor is covered with breakdown, the soda straws back in a cubbyhole, the single 'mite' on the ledge, and that the wall ledges are bedrock or clay. Since you are sketching at 25 feet to the inch, you will have plenty of room for all these extra items. Look and see what is in the passage, then draw it.

After drawing the walls and floor detail, add the ceiling changes and channels. Place the survey station and mark it well -- remember, it is not always on the same wall or in the center of the passage. Don't forget water depths and pit depths, but you wouldn't need passage heights, those will be recorded in the notes. Lastly, draw a cross section at each station.

There are tricks to surveying big passages. First, don't use the full length of the tape -- take short shots, from one prominent breakdown block to the next. Zig-zag down the passage, placing one station on one wall and the next on the other wall. Shoot plenty of splay shots; these are just single shots from the survey to the other side of the passage. Map around the circumference of a room, or down one side of the passage and back up the other side. The secret to constructing a good sketch of a big passage is that the sketcher should have absolute control of the survey. That way, the sketcher can design the survey through the areas he or she is having trouble with. Taking hundred foot shots (in a cave where the map will be 50 feet to the inch) over and through complex areas of the cave is a sure way to overload the sketcher. You might get finished earlier, but someone else will have to re-enter the cave and do the job right. Remember: More cave passages have been resurveyed because of a bad sketch than for any other reason.

Now, back at the office. How is the working map drawn? Well, first the coordinates are plotted, either by hand or by a computer. Then the draftsperson marks all the right and left walls. Usually, I estimate the short distances and measure the long distances. Then, he or she draws in the walls. Then they add floor detail. Do they actually measure every little item? No, they say, "Here is a square breakdown block, one third of the way between station 45 and 46 that is half the size of the passage." They draw it in as such and move on to the next feature. The reduction in scale from the sketch to the map corrects for any mistakes made by not precisely scaling the sketch. Ceiling changes are added next; ceiling heights, pit depths, water depths, and elevations follow; and cross sections are last.

So -- to conclude:

1.) Always record left wall, right wall, floor, ceiling
2.) Sketch at a larger scale than the final map
3.) Sketch to approximate scale, not to a precise scale
4.) Mark the station prominently
5.) Add pit and water depths
6.) Draw plenty of cross sections. Remember, Look for more detail in the cave passage, then draw it.

Tips:

1.) Never use a tape longer than the number of units that will equal on inch or centimeter on the work map
2.) Use plenty of splay shots
3.) Zig-zag in large linear passages
4.) Shorten the shots in complex passages
5.) The sketcher should have total control over station placement and the length of each shot.

On the Origin of the Topofil Surveying Device

by Claude Chabert
(Translated by Peter Bosted)

As far as I know, the invention of the topofil took place in France. It was apparently first made by the Chaix Company, who were well-known for their high-quality compasses Of all their compass types, the topofil was used by most caver surveyors before the Suunto compasses became available. This topofil was of conical form and used a 5 km spool of string, which made it too heavy to be really suited to underground use.

It was Bruno Dressler who around 1963-1964 came up with ways to modify the topofil to make it more suitable to cave use. He used a rectangular camping pot attached to the compass assembly itself in four places. The box was 10x10x8 cm and could hold either 500m or 1000m spools. This instrument was the predecessor to all those described in Compass and Tape 1988, (3), and was quickly adapted by French cavers. Robust, (mine had survived a 10m fall), light, easily repaired, it nonetheless had a major drawback which led to models made by Valcain and Marbach to become more popular. This drawbacks were that

the thread had not only to be threaded through a needle, but the needle itself had to be passed through the miniscule exit hole. These operations were difficult to perform in cold, wet or muddy caves.

It should be noted that the necessity for the needle could have been avoided if all thread spools had the end tied to the spool. In this case, when you ran out of thread, you could have simply tied the thread of the new spool onto the old thread. Unfortunately, only some thread-makers have the ends attached to the spool - most do not.

A disadvantage of all topofils (including the new ones) is that it is the thread which turns the distance counter. Therefore, the thread must be pulled smoothly and evenly - not always easy in a cave.

The principal advantage of topofils is the ease of surveying pits. One does not climb the rope carrying the thread - rather a small weight is attached to the end of the thread, which is lowered until it hits the bottom. The weight (such as an empty can of chicken) then also marks the station.

Dressler also had the idea of gluing a protractor onto his device to measure inclinations. A bubble was used to level the instrument (an idea copied in the Vulcain topofil). The advent of the Suunto inclinometer made the topofil protractor obsolete for it suffered several disadvantages:

could not measure angles between 0 and 7 degrees accurately,
could not measure over long distances due to sagging of the thread.

As an aside, I might mention that I have used the topofil on two occasions in the USA. The first was when two small caves near Midnight Cave (north of Del Rio, Texas) were surveyed in 1972. The second was when Red Watson, other CRF joint venturers, and I resurveyed Indian Cave in Salts Cave (Mammoth Cave System) in 1981.

My Dressler topofil continues to incite interest and admiration when I demonstrated it. It has never seriously failed during the 18 years of use in which about 50 km were mapped underground.

Although it has been much imitated, the brands available commercially today are not necessarily much better. Sadly, the Dressler model is no longer available and Bruno never made the improvements that could have made his design superior to the ones available today.

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Survey Grading

by

Robert Thrun

Every so often, someone advances the idea of cave survey grading. Sometimes the reason for using numerical grades is just a notion that is is more scientific. Donald McFarlane wanted to specify the accuracy of maps [1]. The keepers of state cave databases think that they should have some information about the quality of a map, so they add a numerical grade. The grading system employed is usually the one defined by the British Cave Research Association (BCRA) [2]. I have expressed my dissatisfaction with BCRA grades [3] in reply to McFarlane's letter. This article is to explain my reasons in more detail. I would prefer to continue to ignore survey grading and not write this article, but ignoring grading will not make it stop spreading.

In this article I will reprint the definitions of survey grades. I do so with some reluctance because I really don't want this to be a reference on survey grading. However, as a reader, I find nothing more confusing than a diatribe against the unspeakable when I have no idea what the unspeakable thing is. Because the definitions are long, they are placed in appendices.

History

The notion of survey grades was introduced in 1950 by A. L. Butcher [4] in a publication of the Cave Research Group of Great Britain (CRG). Most Americans got their first exposure to grades from the book British Caving [5]. These definitions are reprinted in Appendix A. Butcher's 1950 CRG grades included detail grades, but the detail grades were not mentioned in British Caving.

The CRG grades were revised in 1965 [6]. I will not reprint the 1965 definitions because of the space it would take and also because I do not know of any use of the 1965 grades by American cavers. The 1965 CRG grades included detail grades and were similar to the later BCRA grades.

The BCRA grades first appeared in a BCRA newsletter [7] in 1975 and then in the book Surveying Caves [2] in 1976. Appendix B contains a combination of the 1975 and 1976 wordings.

The Difficulties with BCRA Grades

The BCRA grades or any grading scheme is confusing to the uninitiated, which includes novice cavers and scientists in other fields. We might get cavers used to grades by insistent use of grades, but why? Does anyone expect non-cavers to know what a grade XD or 3B survey is?

The BCRA grades are backwards with respect to common terminology. The poorest BCRA grade is 1. In other contexts we have such terms as first class, Grade A, and first rate. A land surveyor's first order survey is the most accurate.
The BCRA grading discourages the use of grades 2 and 4. This was a compromise between different groups of British cave surveyors. One group claimed that there were only three grades of survey: "the rough sketch, the quick exploratory survey, and the proper survey" [8]. Other surveyors wanted their Grade 5 survey to remain a Grade 5 survey and not be given a lower number. Some consider there to be only two grades, "rough" and "accurate", since a rough sketch is not a true survey [2, p. 7].

The definitions of the BCRA grades are based on the accuracy of the survey measurements. However, in reading British caving newsletters, I have found no indication of any attempt to establish the accuracy of the survey. In actual practice, the grades are nothing more than a statement of the precision of the instruments used. If a survey is done with a handheld compass and clinometer marked off in degrees, the survey is a grade 5. The numeric grades give only the illusion that they reflect the accuracy of the survey. If the grades just reflect the instruments used, why not state, in plain English, what was used? There is room on a map for that.

Grade 2 is one of the discouraged grades. It corresponsd to compass and estimated distances. This is one of the more useful types of survey, since it can be done rapidly by one person and is adequate for route-finding purposes.

Grade 3 is obsolete except for underwater caves. I can not think of any compass that is graduated in 5 degree increments. It is just as fast and convenient to make measurements to the nearest 1 degree. Similarly, with the availability of fiberglass tapes, no one uses a cord with knots at 1-meter intervals. From what I have observed, the readings on a fast survey are made as accurately as those on a better survey, although there may be less checking for blunders. The differences between a fast survey and a definitive survey lie in the sketching, side shots, and lead checking. If, as I suspect, the fast survey is as accurate as the definitive survey, the supposed two accuracy grades are reduced to one and the whole accuracy grading system is unnecessary.

Grade 7 should have remained the designation for a very accurate theodolite survey. However, the situation was complicated by some cavers who cobbled together a bunch of surplus instrument dials with sights and called the device a theodolite [9].

Butcher and Railton [6] emphasized calibration of compasses in their 1966 definition of CRG grades. The requirement for calibration was retained in the BCRA grades. Calibration means establishing the difference between an instrument's reading and the true value. With the exception of a few organizations like the Cave Research Foundation, US cavers do not calibrate their instruments. A survey done to magnetic north, no matter how accurate, does not qualify for BCRA grade 5, although some maps carry a grade 5 label and only a magnetic north arrow. To properly calibrate a compass by BCRA requirements, it is necessary to sight between surface landmarks near the cave. The common practice of reading the magnetic declination from the notes on a topographic map is not sufficient to calibrate a compass.

The BCRA grades have poorly chosen boundaries. When I process survey data by computer, I compare closure adjustments with assumed errors based on the precision of measurements. Some of these comparisons were reported in a paper [10]. Most surveys that would be classed as grade 5 on the basis of the instruments used do not qualify on the basis of closure error. A very few would qualify as grade 6. The normal survey methods, all essentially the same, straddle the range of BCRA grades from 4 to 6. To my way of thinking, different grades should correspond to real differences in accuracy and technique. I can imagine quibbling about assumed precision of measurements, actual closure adjustments, and proper evaluation methods.

Only one BCRA grade is normally assigned to an entire survey. The grade does not reflect the fact that different closures have different accuracies. There is no way of reporting the variation in closure errors.

The emphasis on accuracy in the definitions of survey grades gives the impression that the accuracy of the baseline is the most important aspect of survey quality. This impression was particularly strong during the period when the only definitions readily available to Americans were those in British Caving, which did not mention detail grades.

The detail grade definitions do not take the scale of the map into account. The detail grades are based on what was recorded in the cave, not on what is presented on the map. On a small scale map, not much detail can be shown and it does not matter what was recorded.

Most persons, if asked to grade the detail on a map, would go by the amount of detail. The BCRA detail grades do not consider the amount of detail, instead the grade is based on whether or not the details were measured. All the detail between passage walls could be erased without changing the detail grade.

The detail grades, if interpreted literally, seem to require taping the passage dimensions and other detail. The wording of the detail grade definitions is taken from the report of the Mendip Cave Survey Colloquium [11], which provides the clarifying comment: "'Measurement' of detail includes estimation in the cave if distances are short." The use of measurements as the basis for detail grades has the advantage that one does not need to make a subjective (and arguable) judgement about the completness or accuracy of the details.

Better Survey Grades

A good grading system should reflect real differences in survey quality in an unambiguous manner. My idea of such a system is shown in the following table. Each grade is undebateable; horizontal angles, distances, or vertical angles are either measured or not measured. The three columns labeled A, B, and C are as follows:

A -- The numbering progresses in the same order as the BCRA grades.
B -- A rough sketch with no measurements is considered to be a grade zero survey.
C -- The best grade has the lowest number.

I am giving these grades three different sets of numbers just to confuse things and because I do not favor the use of grade numbers. Plain English is better.

Numbering System			
A	B	C	Type of survey
0			No survey or map made
1	0	5	Rough sketch, no measurements made
2	1	4	Compass and estimated distances
3	2	3	Compass and measured distances
4	3	2	Compass, clinometer, and measured distances
5	4	1	Theodolite or other high-accuracy method

Beyond Survey Grades

Donald McFarlane, in the letter that inspired this article, expressed a desire to state how accurate a survey is. Percentage error is often quoted, because it is simple and easily understood. There have been many articles pointing out that percentage error is not a satisfactory measure of survey accuracy because errors do not build up linearly. An additional problem with percentage error is that a single number does not apply to all parts of a cave survey.

With computer processing of survey data, we get information on actual closure errors. For the most part, this closure information is not reported. The closure information may be plotted in various ways or summarized with statistics. Those who have large amounts of computer-processed survey data are just beginning to present them. The best method of presentation is yet to be established. This will be the subject of another paper.

Any description of survey accuracy that is based on closure errors applies only to those parts of a survey that were involved in loops. The best we can do for other parts of a survey is describe the methods used.

Those who maintain cave lists want to include information about the maps. The information kept in cave files might include the following information about the map quality: Is the survey complete? What is the scale of the map? Is there a profile view? How accurate is the map? How much detail does the map have? Is the detail accurate?

The last two questions amount to asking for a detail grade and call for making a judgment about the quality of detail. I do not think we could get cavers to agree on a set of objective criteria for rating the detail level. I know that I have trouble coming up with ratings for a series of maps, and that does not involve getting others to agree with me. I would like to see someone try to make a set of criteria for judging the amount of detail on a map.

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11. anonymous, Mendip Cave Survey Colloquium, March 31, 1963

Appendix A: CRG Survey Grades from British Caving

CAVE RESEARCH GROUP GRADES OF SURVEY

Grade 1. Rough diagram from memory, not to scale.

Grade 2. Sketch-plan, roughly to scale; no instruments used; directions and distances estimated.

Grade 3. Rough plan-survey; small pocket compass graduated to ten degrees, lengths by marked cord or by stick of known length.

Grade 4. Prismatic compass graduated in single degrees (compass error not known); measuring tape or marked cord.

Grade 5. Calibrated prismatic compass; clinometer; metallic or steel tape; bearings to nearest degree.

Grade 6. Calibrated prismatic compass and clinometer on tripods, or miner's dial; chain or steel tape.

Grade 7. Theodolite for bearings and slopes; distances by steel tape or chain or by tacheometry; or by more accurate methods.

Appendix B: BCRA Survey Grades from Surveying Caves

BCRA SURVEY CENTRE LINE GRADINGS

Note: Caving organisations, and others are encouraged to reproduce [these tables] in their own publications; The permission of the British Cave Research Association to reproduce these three tables need not be obtained.

GRADE 1 A SKETCH OF LOW ACCURACY WHERE NO MEASUREMENTS HAVE BEEN MADE

(Grade 2) May be used, if necessary, to describe a sketch that is intermediate in accuracy between grade 1 and grade 3.

GRADE 3 A ROUGH MAGNETIC SURVEY. HORIZONTAL AND VERTICAL ANGLES MEASURED TO $\pm$ 2.5 DEGREES, DISTANCES MEASURED TO $\pm$ 50cm; STATION POSITION ERROR LESS THAN $\pm$ 50cm.

(Grade 4) May be used, if necessary, to describe a survey that fails to attain all the requirements of grade 5 but is more accurate than a grade 3 survey.

GRADE 5 A MAGNETIC SURVEY. HORIZONTAL AND VERTICAL ANGLES **ACCURATE** TO ± 1 degree; DISTANCES **ACCURATE** TO ± 10cm; STATION POSITION ERROR LESS THAN ± 10cm.

GRADE 6 A MAGNETIC SURVEY THAT IS MORE ACCURATE THAN GRADE 5.

GRADE X A SURVEY THAT IS BASED PRIMARILY ON THE USE OF A THEODOLITE INSTEAD OF A COMPASS.

NOTES:

1 The above table is a summary and is intended only as an aide memoire; the definitions of survey grades given above must be read in conjunction with the additional comments made in the B.C.R.A. book "Surveying Caves". The more important comments are summarised below.

2 In all cases it is necessary to follow the spirit of the definition and not just the letter.

3 The term accuracy, used in the definitions, means the nearness of a result to the true value; it must not be confused with precision which is the nearness of a number of repeat results to each other, irrespective of their accuracy.

4 To attain grade 3 it is necessary to use a clinometer in passages having an appreciable slope.

5 It is essential for instruments to be properly calibrated to attain grade 5 -- details of calibration are given in "Surveying Caves".

6 A grade 6 survey requires the compass be used at the limit of possible accuracy, i.e. accurate to ± 0.5 degree; clinometer readings must be to same accuracy. Distances and station positions must be accurate to at least ± 2.5 cm and will require the use of tripods or similar techniques.

7 A grade X survey must include on the drawing notes on the type of instruments and techniques used, together with an estimate of the probable accuracy compared with grade 3, 5 or 6 surveys.

8 Grades 2 and 4 are for use only when, at some stage of the survey, physical conditions have prevented the surveyor from attaining all of the requirements for the next higher grade and it is not practical to survey again.

9 The tabular summary above should not be published without these notes.

BCRA SURVEY DETAIL CLASSIFICATION

Class A All details based on memory.
Class B Passage details estimated and recorded in the cave.
Class C Measurements of detail made at survey stations only.
Class D Measurements of detail made at survey stations and whenever necessary between stations to show significant changes in passage shape, size, direction, etc.

Recommended grading/classification combinations

Grade 1A
Grade 3B or 3C
Grade 5C or 5D
Grade 6D
Grade XB, XC or XD

The earlier practice of adding 's' to the grading/classification to indicate that forward and back compass bearings have been taken, should no longer be used.

An additional suffix '/e' should be added to the survey grading/classification if electromagnetic location techniques have been used to fix the location of key points in the survey.

The Minutes of the 1988 Surveying and Cartography Section Meeting

by George Dasher

The annual meeting of the Cartography and Surveying Section of the National Speleological Society was held on June 29th, 1988 at the Hot Springs High School in Hot Springs, South Dakota.

Chairman John Ganter called the meeting to order at 12:28. After an introduction of officers, he reported that the Section's membership had stabilized at about 200 members. Doug Medville commented that this number was probably very close to maximum number of people interested in surveying and cartography within the Society.

John said that after editing twenty issues of the Compass and Tape, he wanted to resign. He also said he was receiving very few submissions. After a few minutes of discussion, Doug moved that the SACS temporarily suspend publication of the C&T. At this point, Tom Kaye stepped forward and volunteered to edit the C&T. More discussion followed.

Doug volunteered to bug people for articles for the C&T. Then, after withdrawing his previous motion, Doug moved that SACS appoint Tom Kaye as the new editor of the C&T. George Dasher seconded the motion and it passed by acclimation.

John Ganter then asked for a new treasurer and Richard Rice volunteered. George Dasher volunteered to continue as secretary and gave the Secretary's Report: The minutes of the 1987 SACS meeting were published in the C&T and no one has complained. John said that SACS has less than $100 in the treasury and plenty of back issued of the C&T.

Doug Medville gave a Vice-Chairman's report. The SACS session had concluded minutes before the SACS meeting. Eight papers had been given and everything had gone well. Doug thanked everyone who participated.

Those issues of the C&T that were out of print were discussed next. It was decided that when someone asked for back issues that were no longer in print, the Section would use a nickel and dime xerox to reproduce that issue.

George Huppert announced that the International Congress of Cartography was being held in Budapest, Hungary the same week as the International Congress of Speleology. He urged all members to try to attend both congresses.

John Ganter advised Rick Rice to put a note in the Convention Newsletter urging all Section members to renew their dues.

Bob Thrun said that he "had not done a thing" on cave map symbols in the past year. He asked for volunteers to head the committee. No one volunteered.

George Dasher made a motion that John Ganter continue as Chairman and Vice-Chairman, respectively. Barry Chute seconded the motion and it passed by acclimation.

George Veni announced that the regional publication for Bexar County, Texas was completed and could be purchased for $24.00.

Carol Vesley announced that she was hosting a seminar on Long Cave Projects in the Mueller Civic Center Auditorium at 2PM. She urged everyone to attend.

John Ganter asked everyone to pay their dues.

George Dasher made a motion to adjourn the meeting. There were no takers.

There was more discussion of the C&T. Barry Chute volunteered the PSC (Potomac Speleological Club) or the DCG (District of Columbia Grotto) bulk mailing permits.

John Ganter adjourned the meeting at 12:58.

Respectfully submitted by George Dasher, Secretary.

New Editor

by Tom Kaye

As foretold in the last issue of Compass & Tape, John Ganter has decided to get another editor. He is staying on as Chairman, and I am starting out as editor. My involvement is based on seeing no one else volunteering as editor at the 1988 NSS Convention. I don't consider myself a "real editor", but I am interested in this newsletter continuing to exist. Therefore, I will do the editing until someone else volunteers. I will give up editorship easily!

I am interested in obtaining both articles for the interior and nice maps for the cover. Sometimes, the cover can be the most frustrating item to get for an issue. So please send me covers. My feeling on them is that 1) they should not have appeared in another national caving publication (grotto newsletter material is OK), and 2) they should represent the level of quality that fits the concept of this publication.

As far as the articles are concerned, I am interested in publishing anything relating to cave surveying and cave mapping. With a specialized newsletter, one primary problem is that of obtaining articles. I hope to allay anyone's doubts as to the acceptability of many kinds of articles. I am interested in simple tips and surveying anecdotes as well as highly technical and mathematical articles.

Also, I am interested in reprinting certain articles, previously published in other (geographically limited circulation or foreign) newsletters, that I (and the person that sends the material to me) feel will be useful. Technical, mathematical, procedural, or esthetical arguments, trial balloons, or discussions are appropriate material for this publication, in my opinion. I am not interested in ordinary cave politics, however.

Material can be sent to Compass & Tape several ways. As with almost every newsletter editor, I am using a computer. I can read PC compatible disks. (If requested, I will return them after getting the data.) If you do send a disk, be sure to include a paper copy of what your article is to look like. Also, include a "flat, ascii" version of the file. I have programs to convert major word processors' stuff, but it is useful to have the ascii file just in case. As the editor of the Potomac Caver, I have gotten many articles via modem tranfer. Although this is a national publication, implying long distance calls, modem transfers may be used. I will make the computer call, if it gets an article. I also accept "camera ready" copy, provided the writing and printing is acceptable for publication. Handwritten or typewritten copy is also acceptable. My personal bias is toward a uniform lookng newsletter; those that are composed of obviously different typestyles and formatting styles tend to look like a scrapbook. I therefore tend to consider retyping stuff that is not given to me on disk or xmodem so that the appearance of the newsletter is more uniform. In doing such things, I make every effort to make the result look like the writer intended.

I must make apologies for the printing in advance. In the DC area, we will be using the DC Grotto and the Potomac Speleological Club's presses (colocated). They are old model 1250 offset presses, and the printing quality is variable. It is also more cheap. Maybe a dues decrease? Maybe we should contract for professional printing? Let me know.

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COMPASS & TAPE

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Survey and Cartography Section
of the National Speleological Society
c/o 1732 Byron Street
Alexandria, VA 22303

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