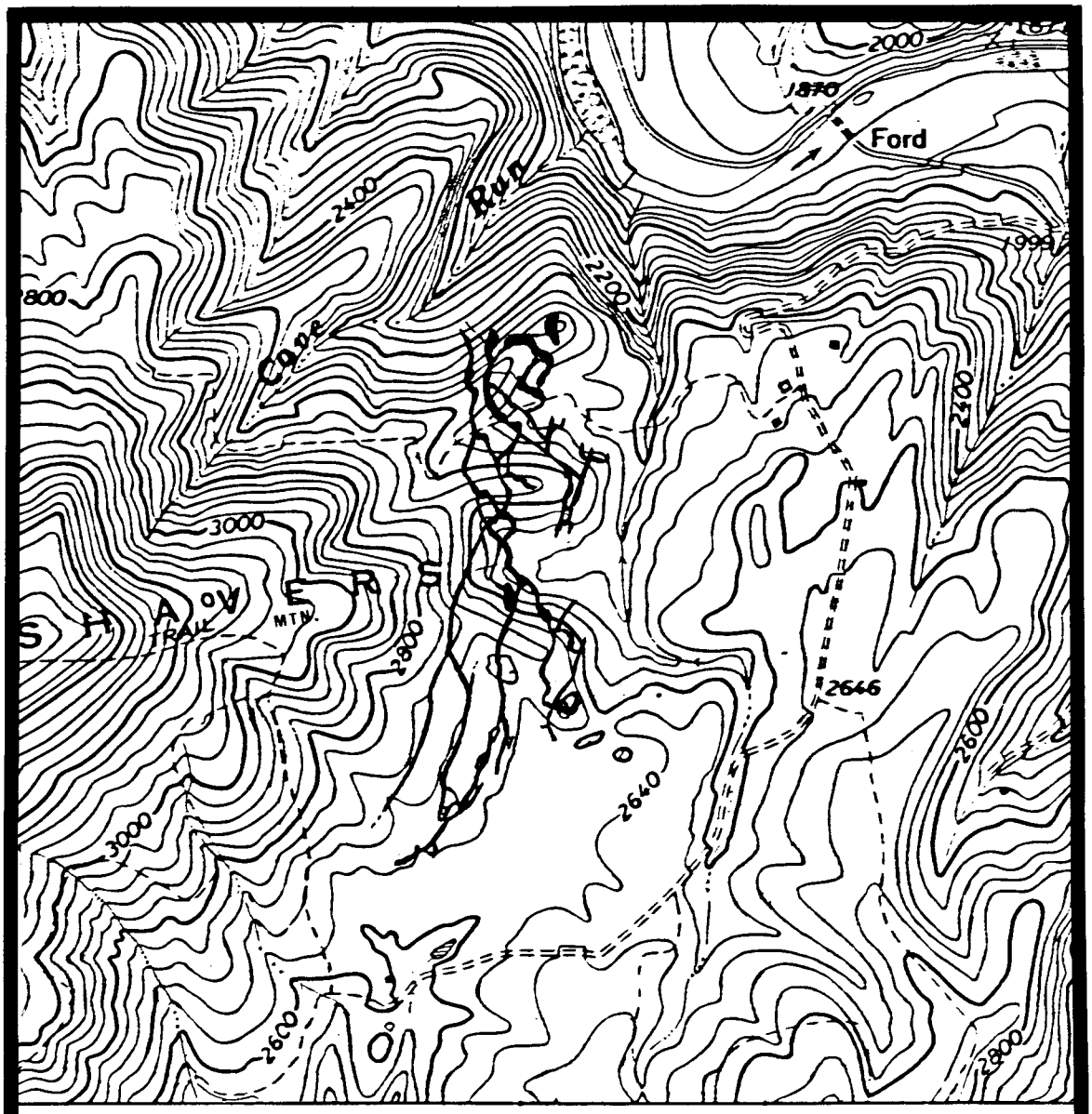
COMPASS & TAPE

Volume 1 Number 2 FALL 1983



TOPOGRAPHIC OVERLAY OF THE ARBOGAST-CAVE HOLLOW CAVE SYSTEM, TUCKER COUNTY, WEST VIRGINIA.

BASE MAP: USGS MOZARK MOUNTAIN, WV. 7.5 MINUTE QUAD (1968 EDITION)
OTHER SOURCES: Gulden, 1982; Davies, 1965.
DRAWN BY: J.H. GANTER, II-83.

UTM
Nm
5°

1000 0 1000 2000 FEET

0 500 METERS

CONTOUR INTERVAL 40 FEET

Quarterly Newsletter Of The N.S.S. Survey & Cartography Section

COMPASS & TAPE

Volume 1 Number 2 FALL 1983

Compass & Tape is the quarterly newsletter of the Survey and Cartography Section of the National Speleological Society. Dues are $4.00/year and include four issues. When paying dues, please give your NSS number and make checks payable to the NSS Survey & Cartography Section. Subscriptions for non-NSS members, Grottos, etc., are also $4.00 per year. The dues year begins at the annual NSS Convention. Those joining the section or subscribing after convention will receive all back issues for the year.

Submissions and General Communications:

Please send articles, maps, letters, artwork, advertisements, etc., to:

John Ganter
RD 3, Box 742
Bedford, PA 15522
(814) 356-3553

Memberships, subscriptions, address changes, etc., will also be handled by John Ganter for the time being.

Credits:

Cover: Topographic Overlay of the Arbogast-Cave Hollow System, Tucker Co., West Virginia. With over 5 miles of surveyed passage, this system is one of the longest in the state. It has recently been closed year-round to protect bat colonies.

Silva Compass: from the Silva instruction booklet.

All other illustrations: John Ganter

CONTENTS

From The Editor

An event which may be of interest to section members is the Association of American Geographers Karst Symposium, to be held 22-25 April 1984 in Washington, D.C. In addition to numerous presentations on karst topics, there will be a Cave and Karst Mapping Salon. If you are interested in entering the Salon, contact Ron Dilamarter, Dept. of Geography and Geology, Western Kentucky University, Bowling Green, KY 42101. For general information on the symposium, contact the AAG Central Office, 1710 Sixteenth Street, N.W., Washington, DC 20009.

Also, don't forget that there will be a Survey and Cartography Section Session at the 1984 NSS Convention in Sheridan, WY. Contact Paul Hill, SACS Session Chairman (607 South 11th Street, Salt Lake City, UT 84102), if you would like to present a paper.

George Veni wrote to offer some information on ballooning in caves (which I'm following up) and an evaluation of Duksbak Waterproof Books for cave surveying. This portion of his letter is excerpted herein: see Contents. The Duksbak book sound great and offers an alternative to the Poly Binder and Drafting Film combination, also reviewed in this issue.

Compass & Tape needs illustrations! Please send your drawings, maps, and black and white photographs to the editor; otherwise he'll be forced to use whatever is handy (i.e. maps of Pennsylvania "rat holes"). Photographs with a surveying theme to be used as covers or illustrations for article are particularly welcome; the Xerox 9500 being used to print C&T will reproduce them well. Even simple line drawings will be welcomed and accepted.

I'd like to thank Art Pettit and Keith Wheeland for their contributions to this issue.

John

The Pennsylvania Cave Survey

By Keith D. Wheeland - NSS 2878

In the Summer of 1981 we began to seriously consider using the computer at Penn State to help manage the survey data for the caves of Pennsylvania. Will White, Gordon Dayton, and I met a few times to discuss the direction this latest survey would take. Gordon and I then wrote kickoff articles which were published in the Nittany Grotto News (Ref 1). Then we rolled up our coveralls and waded in.

To help us decide which "holes" to collect data for, we needed a definition for a cave. We settled on Stone's definition (Ref 2). We don't store data from the compass and tape surveys; however, we do store some 50+ other data elements. The data are stored in a computer database and are accessible for display and update online.

We identify a cave by its name and the county in which it is located. And we provide for a maximum of 99 alternate names for a cave, any of which can be used to access the data for that cave. The terminal operator enters the preferred or alternate cave name to access the cave data. If there is more than one cave with the same name (Indian, for example), the terminal operator is presented with a list of counties where a cave with that name is located. The operator can view the data for each cave on the list to find the proper one.

Frequently we receive requests from cavers to provide them with a data sheet for each cave in a particular county. A selection screen is provided on which the terminal operator enters the county names to be printed. The data sheets are printed in alphabetical order by cave name within county. This print request is honored overnight.

The following is a typical scenario for displaying data and requesting a list of data sheets for a county.

1. Log on to the computer and the Cave System.
2. Receive the display - Figure 1.
3. Type in LOOK for the transaction (other options are CREATE, UPDATE, DELETE, LIST, and EXIT).
4. Type in BEAR for the requested cave name.
5. Receive a display - Figure 2.
6. Type in 2 after "enter your selection".
7. Receive a display - Figure 3.
8. To look at the second page, type in 2 after the word PAGE.
9. Receive a display - Figure 4.
   (The preferred cave name is displayed as the first alternate name, because you can also get to this display by using an

alternate name).

10. Type in LIST over top of LOOK for the transaction.
11. Receive a display - Figure 5. (Westmoreland will not be on the display).
12. Type in the county name/s after the numbers. In the example "westmoreland" was typed.
13. Figure 6 shows Bear cave as one of the 31 data sheets printed for Westmoreland county.

The data collection form (Figure 7) has been designed so that the caver can provide most of the data by circling a choice on the form. A manual provided with the data collection forms includes lists of codes for quadrangles and geologic formations. A map is also provided which shows the Physiographic Province and drainage basins for the area where the caver is collecting the data. We also have a program which determines the quadrangle code by using the latitude and longitude. This is available for Pennsylvania only and has not as yet been incorporated into the online update.

A unique feature of the system is the code-table concept. Much of the data (including the county) are stored in coded format. The terminal operator and the person reading the data sheets do not have to remember codes. Codes and their meanings are stored on a database external to the Cave System. It is possible to add additional codes to existing data elements or change a code's meaning without changing any of the computer programs which run in the system. When data are added or changed, the online program checks for valid code entries in the code-table before allowing the data to be stored in the cave database. Whenever a data sheet is printed, the code-table is checked in order to find and print the meaning of the code. On the data sheet we print the data element name, its value, and its code.

The system is running on an IBM 3081-D computer. It uses the ADABAS data base management system, the COM-PLETE teleprocessing monitor, and the NATURAL programming language, all from Software AG. The data are accessed through video terminals. We now have 700+ caves in the database. After we finish entering the data we expect to have 800+ caves. In the future we plan to provide downloading capabilities to microcomputers.

Our 48 page information manual contains definitions for each data element and instructions for completing the data collection forms. Copies are available from

Keith D. Wheeland
Penn State University
Rm 31 Shields Building
University Park, PA 16802

REFERENCES

1. Wheeland, K., Dayton, G. (1981) Pennsylvania Cave Data I., The Cave Data Base, Nittany Grotto News, V. XXVIII, No. 4, Summer 1981, P. 6-7

2. Stone,R. W. (1953) Description of Pennsylvania's Undeveloped Caves, National Speological Society Bulletin, V. 15, P. 51-137

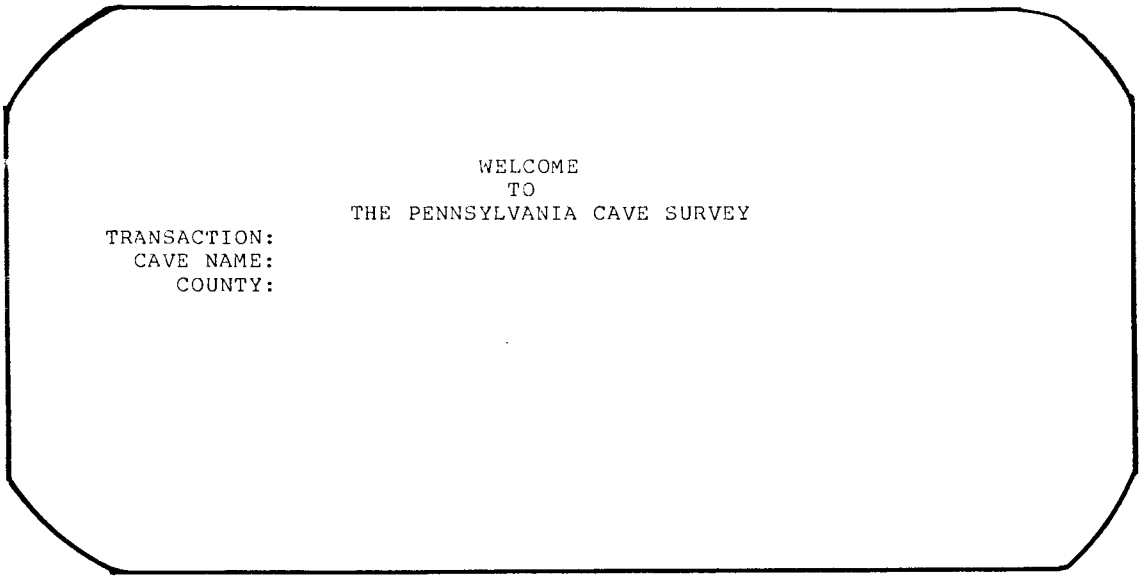


Figure 1 - Initial Display

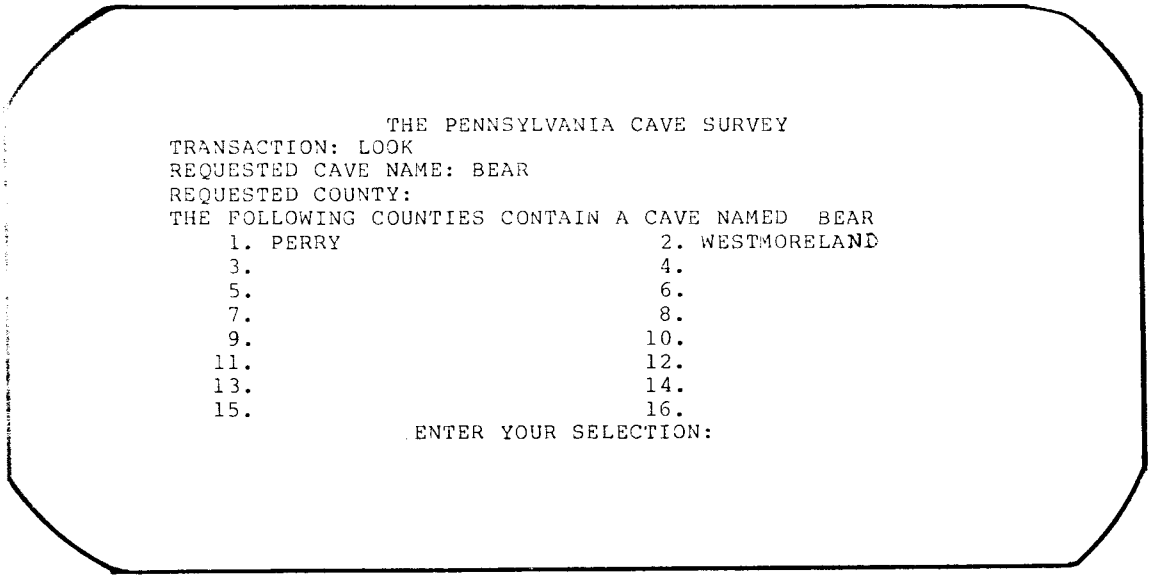


Figure 2 - Selection display - Multiple caves.

```
                    PENNSYLVANIA CAVE SURVEY
TRANSACTION: LOOK                                        PAGE 1 OF 2
REQUESTED CAVE NAME: BEAR
REQUESTED COUNTY: WESTMORELAND
CAVE ID 435     CAVE NAME BEAR                        COUNTY WESTMORELAND
OLD ID WE-01          QUAD 057C              FORM 3Q-13      PROVINCE 0852
FORMATION GROUP -     1         2         3         4       LITHOLOGY L
OPEN-CLOSED           CLASSIFIED              DRAIN 18D      INT RELIEF 0
STATUS N              ASPECT ORIENT N18E       RATIO 0.36                AD
MISCELLANY            LATITUDE 40 20 12        LONGITUDE 79 13 56
ELEVATION 1750        LOC BASE LEV 1750        STRIKE         DIP        SD
ENTR TYPE SB          ENTR SIZE C              LENGTH 3700    SOURCE S
ATTRIBUTE             HAZARDS -    1 S   2     3     4
ORIGIN S              SENSITIVE -  1     2     3     4        WATER F
EQUIPMENT NEEDS       1          2          3          4
RELEASE R             ENTRY ACCESS P              OWNER P     VERIFIED
ACCESS NAME CAL SMITH                  STREET
CITY HILLSIDE                                     STATE PA    ZIP 15627
OWNER NAME MR DONALD SMITH EST     STREET COLONIAL INN
CITY LIGONIER                                     STATE PA    ZIP 15658
CITATION CODE A       CITATION INFO CAVES W PA GGR 67         DATE 760101
```

Figure 3 - Display of cave data - Page 1

```
                    PENNSYLVANIA CAVE SURVEY
TRANSACTION: LOOK                                        PAGE 2 OF 2
REQUESTED CAVE NAME: BEAR
REQUESTED COUNTY: WESTMORELAND
REMARKS                                          LAST CHANGE DATE 83/7/15
PROFILE H                PASSAGE PATTERN 2MN     PASSAGE DENSITY T
MAP GRADE 5       CLASS D        QUALITY G       YEAR 60      STORAGE PGH
ALTERNATE NAMES:
     1. BEAR                                  2.
     3.                                       4.
     5.                                       6.
     7.                                       8.
     9.                                      10.
```

Figure 4 - Display of cave data - Page 2

➡ USGS map prices went up January 1, I984. I:24,000 (7.5 minute) Topo Quads are $2.25, 1:250,000 topo maps are $3.60. A $1.00 postage and handling fee applies to orders under $10.00 .

```
                              THE PENNSLYVANIA CAVE SURVEY
TRANSACTION: LIST
REQUESTED CAVE NAME:
REQUESTED COUNTY:
ENTER THE NAMES OF COUNTIES FOR WHICH A LIST OF CAVES IS DESIRED.
TYPE 'ALL' IN THE FIRST POSITION FOR ALL COUNTIES.
     1.  westmoreland                  2.
     3.                                4.
     5.                                6.
     7.                                8.
     9.                               10.
    11.                               12.
    13.                               14.
    15.                               16.
    17.                               18.
    19.                               20.
```

Figure 5 - Selection display - Print cave data sheets

```
                    PENNSYLVANIA CAVE SURVEY                          12/15/83

NAME AND ID                 BEAR                                        435

COUNTY                      WESTMORELAND                              42129
OLD-ID                                                                WE-01
QUADRANGLE                  WILPEN                                     0570
GEOLOGIC FORMATION          LOYALHANNA, LIMESTONE OR CALCAREOUS SANDSTO 30-13
  GROUP-1             GROUP-2             GROUP-3            GROUP-4
LITHOLOGY                   LIMESTONE                                   L
PHYSIOGRAPHIC PROVINCE      PITTSBURGH PLATEAUS SECTION                0BF2
OPEN/CLOSED STATUS          OPEN
CLASSIFICATION              NOT CLASSIFIED
DRAINAGE BASIN              MIDDLE CONEMAUGH R; TWOLICK, TUBMILL CK     180
INTERNAL RELIEF IN FEET       0
CAVE STATUS                 NATURAL - WILD                              N
ASPECT ORIENTATION          N18E     MAGNETIC
ASPECT RATIO                 0.36
CAVE MISCELLANY
LATITUDE                    40-20-12
LONGITUDE                   79-13-56
ELEVATION IN FEET           1750
LOCAL BASE LEVEL            1750
STRIKE
DIP
ENTRANCE TYPE               STREAM BANK                                 SB
RELATIVE ENTRANCE SIZE      CRAWL IN                                    C
LENGTH IN FEET               3700
SOURCE OF LENGTH            FROM SURVEY                                 S
LENGTH ATTRIBUTE
UNUSUAL HAZARDS
            1. S              2.            3.            4.
ORIGIN                      SOLUTION                                    S
SENSITIVITY    1.             2.            3.            4.
PRESENCE OF WATER           FLOWING STREAM                              F
EQUIPMENT      1.   -         2.   -        3.   -        4.   -
RELEASE-FORM REQUIREMENT    RELEASE FORM ONCE                           R
ENTRY ACCESS                PERMISSION REQUIRED EACH TIME               P
TYPE OF OWNER               PRIVATE, PARTNERS, OR FAMILY                P
ENTRY CONTROLLED BY         CAL SMITH

                            HILLSIDE PA 15627
OWNER                       MR DONALD SMITH EST
                            COLONIAL INN
                            LIGONIER PA 15658
CITATION PA. GEOLOGICAL SURVEY REPORTS   CAVES W PA GSR 67    760101    A
REMARKS
PROFILE                     HORIZONTAL                                  H
PASSAGE PATTERN             2-D NETWORK MAZE                            2MN
PASSAGE DENSITY             TIGHT - 50 FT OR LESS                       T
MAP GRADE                   COMPASS & TAPE - BETTER                     5
MAP QUALITY                 GOOD - SECTION VIEWS                        G
MAP STORAGE                 PITT GROTTO                                 PGH
MAP CLASS                   MEASURED WHEREVER NECESSARY                 D
MAP YEAR                     60
DATE OF LAST CHANGE: 83/07/15  VERIFIED: NOT VERIFIED
```

Figure 6 - Data sheet for a cave

PENNSYLVANIA CAVE SURVEY (Data collection form)

ID _____ NAME _____ COUNTY _____

OLD ID _____

QUADRANGLE _____

GEOLOGIC FORMATION _____

PROVINCE
- 03A Coastal plain
- 04A Piedmont upland section
- 04B Triassic lowland section
- 04C Conestoga valley section
- 05A Blue ridge
- 06B Appalacian mountain section
- 06D Great valley section
- 08C1 Glacial section (western)
- 08C2 Glaciated low plateaus section
- 08D Allegheny mountain section
- 08E1 Allegheny high plateaus section
- 08E2 Pittsburgh Plateaus section
- 08H Pocono plateaus section
- 09B New England
- 12A Eastern lake section

OPEN/CLOSED STATUS
- ø Open
- U Unknown
- I Closed intermittently
- N Closed naturally
- O Closed by owner or others
- Q Quarried away
- G Gated

CLASSIFICATION
- ø Not classified
- C Classified

DRAINAGE BASIN _____

INTERVAL RELIEF _____

CAVE STATUS
- N Natural (wild)
- C Commercial
- W Was commercial

- ASPECT -
ORIENTATION _____
RATIO __ __ · __ __ Which North?
G Geodesic M Magnetic

CAVE MISCELLANY

Flora/fauna, bones, etc. Check here and enter data in REMARKS below. ☐

LATITUDE _____

LONGITUDE _____

ELEVATION _____

LOCAL BASE LEVEL _____

STRIKE _____

DIP _____

Which North?
G Geodesic M Magnetic

ENTRANCE TYPE
- ø Unknown
- EQ Quarry
- ER Roadcut
- EM Mine
- EC Excavated for cave
- SR Resurgence (spring mouth)
- SS Sinking stream
- SB Stream bank
- SU Submerged
- DS Dry sinkhole
- DC Cliff face
- DP Pit or dome
- DE Eroded, i.e. hillside

RELATIVE ENTRANCE SIZE
- L Large 10' & up
- W Walk 5' - 10'
- C Crawl 2' - 4'
- S Squeeze 1' - 1.5'
- T Tight up to 1'

LENGTH _____

SOURCE
- M Map
- S Survey
- U Unknown

LENGTH ATTRIBUTE
- E Estimate
- A Additional passages not measured
- T Total of several small caves

HAZARD

(Circle all that apply)
- A Bad air
- B Breakdown unstable
- F Sudden floods
- H Hypothermia
- L Location near active mine or other danger
- P Pollution
- V Pits
- S Strained owner relations

ORIGIN
- S Solution
- R Talus
- E Erosion (outwash & slumping)
- T Tectonic (cracks)
- X Eolian (wind formed)
- I Ice
- L Lava
- W Sea
- O Other
- U Unknown

SENSITIVITY

(Circle all that apply)
- E Endangered species
- H Historic or archeological value
- F Formations delicate
- O Other

WATER
- D Dry
- M Muddy
- P Pools
- F Flowing stream
- S Sumps
- U Underwater (submerged)
- 1 Intermittent stream

Here are the citation codes to be used below to the left.

Blank Reference unknown
- A Pa. Geological Survey Reports
- B Pa. Dept. Internal Affairs
- C MAR Bulletins
- D NSS Bulletins
- E NSS News
- F Nittany Grotto News
- G York Grotto News
- H Greater Allentown Grotto News
- J Netherworld News (Pitt Grotto)
- K Philly Grotto Digest
- L Unpublished Reports
- M Other

EQUIPMENT CODES

Use codes at right and fill in per example. F = feet; M = meters

Example:
1. H60F 2. L20M

- H Hand line & length
- L Cable ladder & length
- R Standing rope & length
- W Wet suit
- D Diving gear

1. _____
2. _____
3. _____
4. _____

RELEASE FORM
- ø No release form
- R Release form once
- E Release form each time
- U Unknown

ENTRY ACCESS
- B Blanket permission
- P Permission definetly required each time
- N No caving
- U Unknown

OWNER TYPE
- P Private, partnership, or family
- C Company
- G Govt. - public
- U Unknown

ENTRY ACCESS CONTROLLED BY

Name _____

Street _____

City/State/Zip _____

OWNER

Name _____

Street _____

City/State/Zip _____

GENERAL INSTRUCTIONS:
- Where an entry is required, please print clearly.
- Unless otherwise indicated, circle only one entry per item.
- If in doubt, refer to the data description.

CITATION _____
Code Number Date

REMARKS _____

kdw 81236 MORE DATA ON REVERSE

PENNSYLVANIA CAVE SURVEY

PROFILE
- H Horizontal
- B Bi-level (two overlying, distinct, well developed levels)
- M Multi-level (overlying, well developed levels)
- S Sloping (passage gradient greater than normal stream gradient - dipping bedding control)
- T Tiered (sequence of several stepped levels)
- V Vertical (major vertical extent or significant pits over 30 feet along with horizontal levels)
- P Pit (no significant horizontal development)
- C Compound or complex (large cave with multiple profile types)
- I Insufficient information.

PASSAGE PATTERN

Linear Development
- 1DL Linear - straight
- 1DS Sinuous - gradual bends
- 1DA Angulate - sharp bends

Planar Development
- 2BS 2-D sinuous branchwork
- 2BA 2-D angulate branchwork
- 2MA 2-D anastomotic maze
- 2MN 2-D network maze

Three dimensional development
- 3MS 3-D spongework maze
- 3MA 3-D angulate maze

Other
- 4ND Indefinite passage development
- 4VC Unclassified because of unique passage development
- 4CD Compound: structure different but classic in some sections
- 4CX Complex: large cave, multiple structures, multiple dimensions

PASSAGE DENSITY
- ø Unknown
- S Single passage
- L Loose (features obvious on map only, repeat distance GT 500 ft.)
- I Intermediate (50-500 ft. repeat distances)
- T Tight (offsets or side passages obvious in cave with approximately 50 ft. or less repeat distances.

MAP GRADE
- 6 Theodolite or transit and tape survey
- 5 Compass & tape survey
- 4 → 3 Compass & pace survey
- 2 Controlled sketch (angles taken)
- 1 Sketch

MAP CLASS
- ø No map
- A Based on memory
- B Details estimated & recorded in cave
- C Measurement of detail made at survey station only
- D Measurement of detail made at survey station and wherever necessary to indicate changes within passages
- U Unknown

MAP QUALITY
- E Excellent - passage detail, passage setion views, and profile
- G Good - passage detail, may have some section views
- P Poor - line drawing, little or no detail
- N Little or no value, unreadable

MAP YEAR _____

MAP STORAGE
- ø No map
- ALN Allentown Grotto
- MAP Location shown on map
- NIT Nittany Grotto
- OWN With Owner
- PCS Pa. Cave Survey
- PGH Pitt Grotto
- PHL Philly Grotto
- YRK York Grotto
- NSS NSS
- WST Westminster
- UNK Unknown

Figure 7 DATA COLLECTION FORM

Keson Open-Reel Tape Modifications

. . . . . ART PETTIT

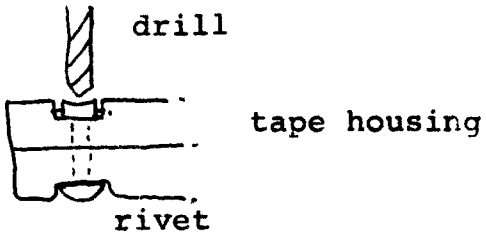
It is almost inevitable, at least in wet parts of the country, that during the course of cave surveying, equipment will become muddy. Much has been written on the care of various types of compasses under these conditions, but little, if any, attention has been paid to the lowly tape measure.

The most popular tape measure these days is the Keson open-reel tape. Although it is relatively easy to clean in its store-bought form, mud inevitably gets into cracks and works its way inside the plastic housing and into the crank mechanism; and some types of mud, especially prevalent in my home state of Pennsylvania, are difficult to remove even where they are accessible. What I have done is to remove the rivets which hold the case together and replace them with brass machine screws and nuts. This enables one to open the housing when necessary for a thorough cleaning. To perform this modification you will need:

5 1/8" x 1" brass machine screws and nuts
2 1/8" x 3/4" brass machine screws and nuts
hand drill or drill press
propane torch
pliers
drift punch (a nail will do)
light hammer
file or emery board

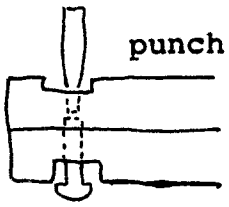
Step (1)

Drill out open end of rivets (the side with the washer).



Step (2)

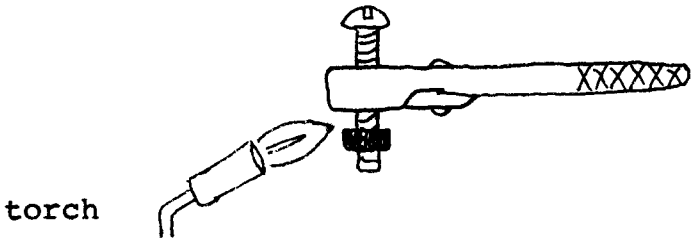
Remove washers and punch rivets out of case.



With the case now apart, it's a good time to give your tape a thorough cleaning. I also like to remove the pointed tip of the tape reel, since all it was ever good for was to punch holes in my cave pack.

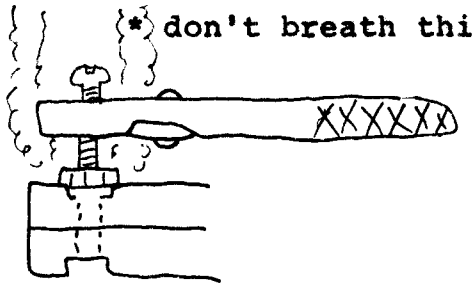
Step (3)

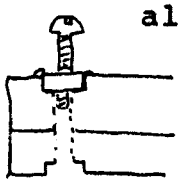
Screw one nut approximately 1/4" onto a machine screw. While holding screw with pliers, heat nut until very hot.



Step (4)

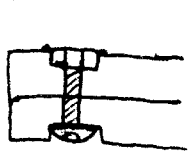
Press hot nut into case, making sure to align bottom of screw with hole in case. Repeat steps 3 and 4 with all screws. Be sure nut is flush with top of case.





Step (5)

Remove screw and file plastic so it is flush with case.



When all bolts are completed, the housing can be reassembled. The tape reel is now easily disassembled for cleaning and repairs, or other modifications. Since the nuts are melted into the case, they won't fall out and all you need for disassembly is a screwdriver or facsimile thereof. This is a relatively easy and inexpensive modification which will add to the durability and reliability of your Keson tape.

Cave Survey Notebooks

JOHN GANTER

Cave surveyors have traditionally used materials designed for surface surveying to record and transport the data and sketches they collect. These are generally cloth- or paper-bound books, filled with "rag" paper which is advertised to withstand "field conditions." However, we all know that caves, in general, are pretty nasty field conditions, and that these books don't hold up too well.

In the past few years, "Rite-in-the-Rain" paper bound in notebooks has become available, which is an enormous improvement over rag paper. However, the bindings of these books remain a weak point. Even plastic-laminated cardboard will go to pieces then it is wet and carried in a pack. In addition, the surveyor is forced to either destroy the book by cutting out pages or carrying the priceless data and sketches from other surveys around all the time. The following systems reduce some of these problems.

Polyethylene Binder and "Rite-in-the-Rain" Paper

Forestry Suppliers (205 W. Rankin St., Jackson, MS 39204) sells a small plastic binder which is nearly indestructible. (Well, not quite. Exposed to sufficient mud and silt--about one year's worth, probably--the binder freezes up and has to be opened with pliers. It still works fine, though.--RS) It has 6 rings, is fluorescent yellow, and measures about 5½" by 8". It can be twisted, bent, soaked in mud and water, and yet will spring back to its original shape. The paper for these binders is considerable heavier than the paper that Rite-in-the-Rain makes for the K&E, Leitz, and Dietzgen books; it can be washed (carefully) with no loss of readability. The paper costs about 6¢ per sheet, about the same as in the bound books. The binder allows easy removal and insertion of sheets, permitting one to reorganize the book in whatever way is desired and remove sheets for safekeeping.

Cost:	Poly Binder	$4.50	K&E Field Book	$11.70
	100 sheets paper	$6.15	(60 sheets in book)	
Total:		$10.65		$11.70

As can be seen, the plastic binder is cheaper than the disposable books. (Prices based on Forestry Suppliers' Catalog #32)

Polyethylene Binder and Drafting Film

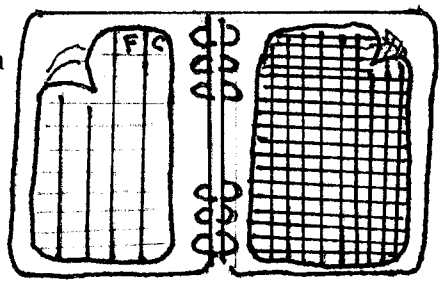
In nasty conditions where the notebook will get soaked, the Rite-in-the-Rain paper will become too soft to write on. Unfortunately, drafting film is not available with markings. This problem can be solved in the following manner.

1) Obtain a C-Thru Plastic Graph Sheet (Cat. No. GR161, The C-Thru Ruler Co., Bloomfield, CT 06002) in whatever scale you like to draw at, i.e. 10 x 10, 20 x 20, etc. Cost: about $1.50.

2) Cut the sheet to the preferred size and glue it to the binder with a thin film of clear silicone rubber cement. Press together under weights and allow to dry for 24 hours.

3) Punch sheets of drafting film (a heated nail works well) and place in the binder. The lines on the plastic graph will be visible through the film and will give a scale for sketching.

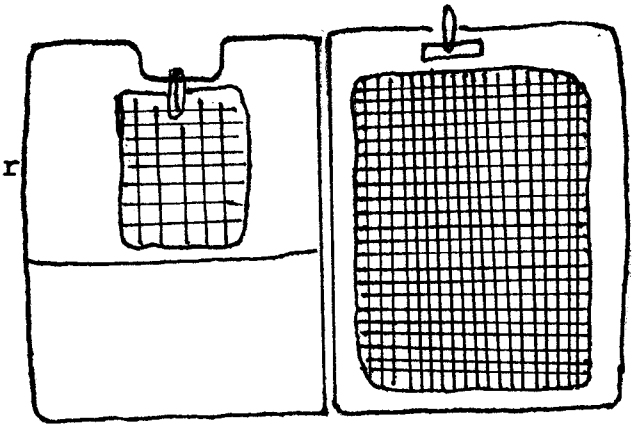
4) To record data, one can draw a series of lines on a sheet of film and glue it to the opposite inside cover of the binder Remember that any labels you want will have to be drawn backwards, since you want the inked side sandwiched and protected by the silicone. The sheets of film can be kept organized with paper clips. Also, a few drops of water under the film will cause it to cling tightly to the binder. Used spare film can be rolled and carried in plastic tubes, such as cigar tubes or PVC pipe.



The Big Board

In large passages and/or where extra accuracy is desired, surveyors often use a protractor and scale for sketching. A clipboard allows much more room than the small binder. A cardboard-sealed-in-vinyl model ($3 to $4) will work for a while, but an aluminum model (around $20) will last much longer. Forestry Suppliers carried an extensive line of these clipboards. As one might expect, drafting film is the only substance which will withstand the multiple erasures and sharp pencils used in this kind of exacting survey. I glue a full C-Thru Graph Sheet to the clipboard and then use the lines to orient my protractor. Data can be recorded on sheets attached to the opposite leaf, if your clipboard has a cover, or in any number of other ways.

The methods described may give you some ideas on how to set up a note-taking system which is right for you and for the conditions under which you survey. If you come up with any other variations of old ways, or with entirely new ideas, please let us know.



Things To Buy

. . . . . JOHN GANTER

Smithian Rubber Cement Pickup--Anyone who does any amount of work with rubber cement will want one of these. They are two inches by two inches by three-eighths inch thick blocks of hard rubber cement which grab those annoying little blobs and balls of soft rubber cement with amazing tenacity. They are also useful for erasing transfer lettering. Price: 40¢. Made by: A. & B. Smith Co., 636 Smithfield Street, Pittsburgh, PA, 15230. [Note: For the child at heart, good pickups can be made by spreading rubber cement over a six inch square on a piece of paper, waiting until it dries, and then rolling it together. Great fun, and a lovely excuse to play with glue.--Roberta]

Pickett General Purpose Junior Template (#1043I)--This small template (illustrated below) has just about all the symbols that are difficult to draw by hand. It includes circles for ceiling heights, squares for drop distances, and triangles for stations or datums. Pickett templates are currently the only ones available with built-in "ink risers"--little feet that keep the template off the drawing surface and prevent ink from being drawn under by capillary action. Picketts with the suffix "I" have this feature. Of course, a couple layers of tape work well too. Price: $1.75. Free catalog: Pickett Ind., One River Road, Leeds, MA, 01053.

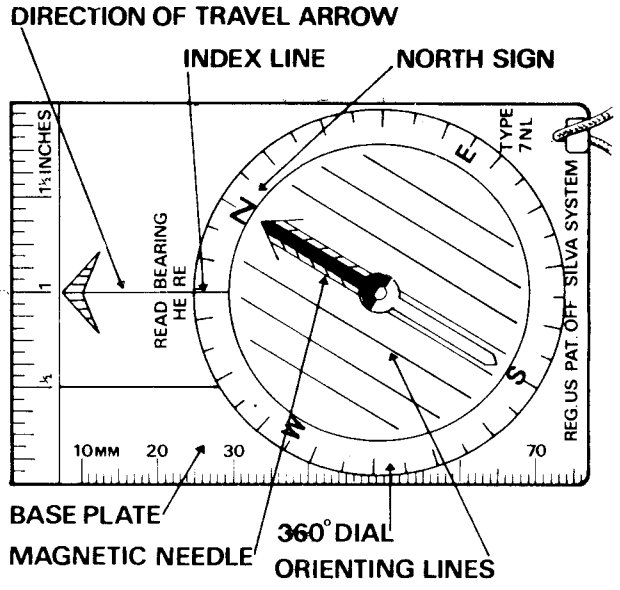
K & E Leroy Pens--In the future, I hope we will have some articles dealing with drafting pens, but I will make a suggestion or two now. Pens are made by a number of companies, and to hear their claims, you would think the things work like magic and never need maintenance. In sizes of 1 and larger, they all work pretty well. But if you find a 0000 that starts working immediately after drying out for two weeks, you know it's a good pen. I have compared Leroys to Alvins and found the Leroys far superior. You will probably save money if you buy the pens from Forestry Suppliers, as opposed to your local retailer. However, I don't think they carry the Jewel Point models, which are highly desirable if you draft on synthetic film (stainless steel tips wear out quickly on this stuff). If you really want to save some money, find a K & E distributor. They can usually be found in the Yellow Pages in fairly large cities. I recently (Summer '83) got a Leroy Jewel Point 1 and Jewel Point 0000 for $13.80 and $18.00 respectively in Baltimore, Maryland. I figure that I saved at least $10, and the pens weren't even on sale. These places also offer savings on templates, etc. It may be worthwhile to make a special trip if you are planning a large purchase. (Would anyone care to comment on other pens? Call my claims outrageous? Compare jewel and tungsten carbide points? Please feel free to drop me a line or an article.)

A Protractor For The Big Board ..... JOHN GANTER

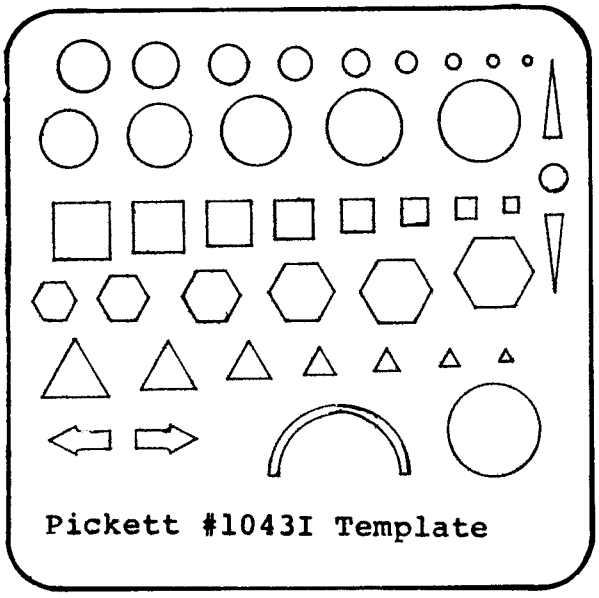
As mentioned previously, a large clipboard is usually used in conjunction with a protractor and scale to make an accurate sketch in large passages and rooms. The eye and mind are badly fooled under these conditions: lengths and angles appear very different from reality. The only way to really appreciate this is to try sketching to scale and angle: you'll be amazed at the difference between what you think you see and what's really there. Of course, these techniques must be used in moderation; otherwise your survey team will surely desert! Enough editorializing...

I find a small Silva Compass, like the Polaris 7 or Starter 1-2-3, ideal for this use because of the way in which it is set up for orienteering. To use the device as a protractor, you just turn the 360° dial until the azimuth of the survey shot you are drawing is at the index line. (See illustration.) Then you place one edge of the base plate on the last station, and rotate the whole compass until the orienting lines are parallel to your north reference line(s). You can also go a step further and rotate yourself until the north arrow points to north: now you have a miniature plane table and your sketch is oriented to the rest of the cave. (N.B. There will probably be ferrous metals somewhere on the sketching board.) The biggest advantage of the compass is that you only have to set the azimuth once for each shot. This means that if you drop it, or forget the azimuth, or fall down a pit, or otherwise get distracted, you don't have to find the proper markings again.

Once the protractor is oriented, you can use the edge of the base plate as the scale. I usually sketch at 25 feet to the inch. Since there are about 25 mm in an inch, and the side of the base plate is marked in millimeters, the scale is effectively in feet. If you prefer another scale, you can draw one on drafting film and glue it on with silicone. Another suggestion: attach the compass to your clipboard with a lanyard, The Polaris 7 and Starter 1-2-3 are $5.95 and $4.30 respectively (postpaid) from REI (18200 Segale Park Dr. "B", Tukwila, WA 98188). Forestry Suppliers also sells them.



Small orienteering compass



Clogged Pens

OR: JOHN GETS AN EARLY RESPONSE . . . ROBERTA SWICEGOOD

Dear John: Technical pens are not designed to sit without cleaning for two weeks, for heaven's sake. The prudent course is to use a minimal amount of ink (an eighth of an inch, e.g.) and to wash the pens when you're done (the advice of a reformed sinner). However, if you're dilatory about such things, or dawdle along working on your maps, there are a number of solutions to the clogged pen question. These are, in decreasing order of cost and trouble, the ultrasonic cleaner, K & E or other cleaning solution, the humidifying pen holder plus humectant, and tap water maintenance.

Ultrasonic cleaners cost about $100 to $130, and are best used in conjunction with pen cleaning solution. They work by shaking loose the dried ink particles that clog up the works, and they work very well. (Incidentally, some graphics stores provide ultrasonic cleaning as a customer service, free or for a small fee. Ask at your local store.) An ultrasonic cleaner is the Mercedes Benz of pen cleaning, but with a little patience, it isn't needed.

Cleaning solution is a solvent that liquefies dried ink and allows it to be rinsed away. An overnight soaking in a $1.75 two ounce container of solution does every bit as well as a five minute shaking in the $100+ ultrasonic. After soaking the tips, wash them off thoroughly in running water, dry them, and reassemble the pens. The only problems with solution are that 1), it takes a long soak, and 2) the solution is generally somewhat caustic and shouldn't be in contact with skin for long periods of time. (I recently cleaned some 0000 and 000 CKKC pens that were left standing for two years with ink in them using this method.) The solution in a two ounce bottle should last at least a year--it will turn black, but that doesn't matter.

Humidifying pen holders and humectant work by storing the pens tip down in a humectant solution. They are effective, which is more than can be said for the much-touted "humidifier caps" that come with reservoir pens. Depending on which type you choose, they range from $25 to $50 for the holder, humectant, etc. This is probably the best solution for the cartographer who works on maps intermittently. The humectant will keep pens going long enough to do a reasonably complex map.

Tap water maintenance is the best and easiest solution. Do your work, disassemble the pen, run warm tap water through the guts, shake, and repeat until the water is running clear. Dry and store.

Pen disassembly can be very frightening. At times, though, it is the only solution. DO NOT attempt it on pens smaller than 00 (.3 metric); you will bend the wire and ruin the point, without exception. Larger pens can be taken apart, though. Follow the instructions that come with the pen (every brand is a little different). When you remove the weight and its associated cleaning wire, be extremely careful not to damage the wire. NEVER force it back into the pen; if you meet resistance, stop, look, think, and try again (a bent wire means a new tip). Never disassemble a pen unless prolonged soaking or ultrasonic cleaning has failed to clear it.

More On Ferrous Materials

(or furiously ferreting out ferrous) . . . . JOHN GANTER

Not long ago I was inspecting my Joe Brown Super helmet when I noticed a heavy coating of rust on the chinstrap buckle. This led me to speculate that the buckle might be made of steel!! Subsequent experimentation showed that the little beast has been throwing my shots off by ½°. Not too significant, but still inexcusable. I quickly replaced the thing with a 3/4" Side-Release (plastic) Fastex buckle. (Available from Bob & Bob.) This buckle is quite strong and I think it will keep the helmet on my head in the event of a multiple impact fall. However, it can be quickly released with one hand, which greatly reduces the chances of my perishing from strangulation or a crushed trachea if I get hung up in a crevice.

To add insult to injury, a few days later I found that my "stainless steel" parabolic reflector is ferrous--very ferrous... Art Pettit suggests that it might be ferrous stainless steel--we're not sure. But I had bought it assuming it was meant for surveying. Luckily, I usually use a Wheat Lamp (held far away) while sighting, so I think this reflector only screwed up a couple of shots in a small cave. Moral: check everything that comes near your compass!!

Still More On Ferrous

(a little here & there) . . . . . ROBERTA SWICEGOOD

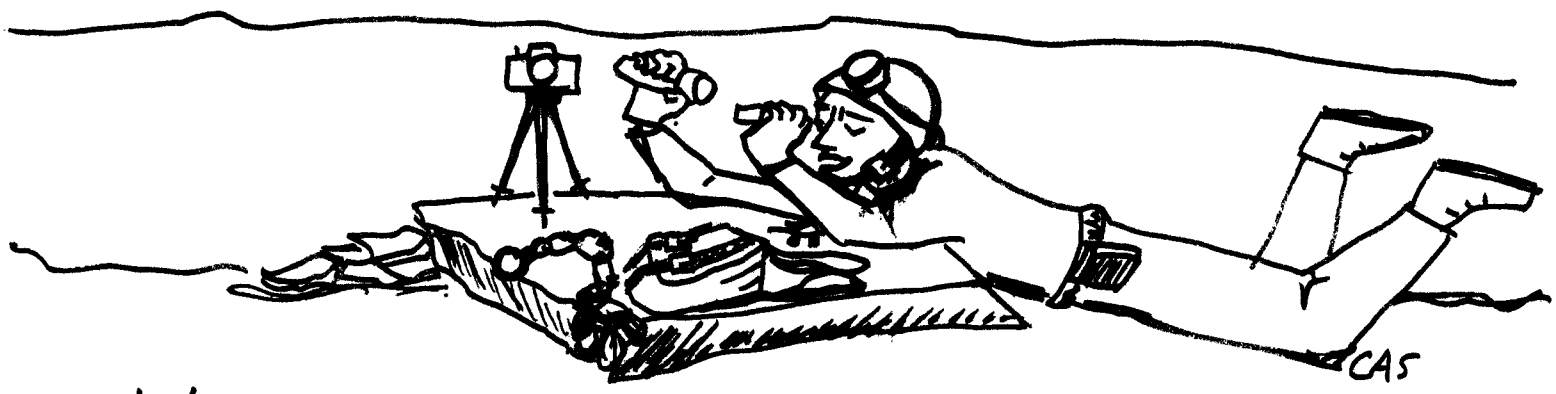
I have a few things to add to John's list of materials to be avoided by the conscientious compass reader. These include:

1. tip cleaners strung around the neck (often in association with can openers and other ironmongery) or attached to carbide lamps;

2. packs (generally contain enough metal that they should be left a few feet away from the survey station);

3. waterproof flashlights with magnetic induction switches (I once encountered someone reading compass with the aid of one of these--wow!).

Ferrous Wheel



I don't understand why you think we're nearing China—
I'm sure these compass sightings are accurate!!

The Duksbak Waterproof Book . . . . . George Veni

(This article is excerpted from a letter to John Ganter dated 5 Dec. 1983)

For wet caving, maintaining the book in some semblance of "usable condition" has always been a problem. Now there is a solution: the "Duksbak Waterproof Book"!! It is the standard size of most K&E-type field books, except thicker. It has 50 wire-bound pages between two sturdy plastic covers. When most books are melting in your hand, the covers of this one provide a rigid surface upon which to write. Best of all, the pages are also plastic, imprinted with the field-book format of rows and columns on pages opposite grids.

Honey Creek Water Cave in Texas has a 6km+-long trunk, much of which involves constant swimming. The easiest way to take notes, in many cases, is to hold the book underwater while sketching. The Duksbak performs magnificently. In cases where the book gets covered with mud, you simply wash it off and keep on sketching. A little care is needed though, not to rub the pages too hard when washing, or some of the writing will fade.

The book is made by: R.D. Penhall Ltd., 2685 Maple Street, Vancouver, British Columbia, Canada; telephone (604) 736-7271. Many survey shops are also beginning to carry them at prices from US$9-11. Although it may be considered a bit steep (the 32-page K&E runs about US$3), the K&E "Rite-in-the-Rain" runs US$7-8, and still isn't worth a damn in serious wet caving. Lastly, the Duksbak plastic pages can be erased and used over again. Even if you don't like erasing or transfering notes to a permanent ledger in order to erase the field copy, the price is still really cheap. Think how much time and money goes into each caving trip (food, gas, carbide, batteries, clean-up, etc.) and consider what a letdown it is to have a good survey ruined by a crummy book. Having a Duksbak survey book along even makes it easy for the sketcher to sketch faster since there is no worry about mud, water, or poking the pencil through soaked pages.