Compass Points

Issue 3 **March 1994**

BCRA

Info

Compass Points is published Quarterly in March, June, September & December and is edited by Wookey.

It is a sister publication to the Newsletter and Journal of the Cave Radio & Electronics Group (CREG), a special interest group of the British Cave Research Association (BCRA).

You can obtain a copy by joining the CREG. Send £2.50 (or £1.60 if you are a BCRA member), to David Gibson, 12 Well House Drive, LEEDS, LS8 4BX. Tel: 0532 481218. Airmail postage outside Europe is an additional £2.50.

Text, Microsoft Word 2 (and possibly postscript) copies are now obtainable by anonymous ftp from the Cavers Archive: gserv1.dl.ac.uk. Files are CPOINTnn.TXT or .DOC or .PS in the directory /pub/caving/cpoints, where nn is the issue number.

Submissions

The Editor is about to move (7th April 1994), so for the time being, send all correspondence and submissions to:-

The Editor, Compass Points,
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E-Mail: Wookey@aleph1.co.uk.

Articles can be on paper, but the preferred format is ASCII text files with paragraph breaks, although if they are particularly technical (i.e. contain lots of sums) then Microsoft Word documents (up to version 2.0) are probably best, WordPerfect documents are also OK.

Floppies can be 3.5" or 5.25" any DOS format, or 3.5" RISCOS floppies (or Mac, Atari or Amiga at a pinch) will also do. Even PCW 3" discs are feasible - but don't send them the day before the deadline! For these we can deal with text or Impression (Archimedes) or Microsoft Word (Mac) documents

Graphics should preferably be windows metafile or CGM vector formats, or just about any common bitmap format.

IN THIS ISSUE

FUTURE ARTICLES

Future articles (still!) in the pipeline:

Calibration data analysis - held over due to lack of space.

Network solution methods - the maths used in Steve Neads SURVEY software.

Treatment of errors in closed loops, including criteria for deciding on the presence of gross errors in a loop.

Details of a source of magnetic field data to allow you to orient your surveys with confidence.

A discussion of the complex subject of error treatment in survey software.

Survey Draughting using !Draw - The pros and cons of using standard vector graphics packages to produce the final printed version of a survey.

WELCOME

This issue is almost entirely written or compiled by me, as I still haven't heard much more than a squeak from the readership. If you don't find anything of sufficient interest to inspire you within these pages, then you can at least write and tell me that!

This publication should not be for me to voice my opinions to you. It should be a forum for discussion of all things surveying.

How about starting off by trying to get a directory of survey projects being undertaken in the UK. Please write in to tell

everyone what surveying is being done, and which caves are being surveyed or re-surveyed, and by whom.

SURVEYING TIPS

Andy Waddington

Don't discover muddy passages:

"TAPE?"
"Mud point mud mud"
And thus was the passage named.

QUESTIONS & ANSWERS

Answer to last time's question about Sisteco:

Sisteco instruments are made in Scandinavia, and they seem to have been bought by Silva recently. The compass/clino combo which was the Sisteco product that I was interested in is now sold by Silva.

SNIPPETS

BCRA Conference - Speleo Computing session

This Year's BCRA conference (17-18th September), at the Adams Agricultural College, in Newport, Shropshire will include a computing session for the first time. The idea is to cover all aspects of cave-related computing.

Obviously surveying will feature highly in this and we expect to have a large range of survey software on display for people to come and use. Talks on the use of Altimeters in surveying, and on the current state of surveying software already likely. There will also probably be demos of some packages.

If you feel able to talk about any cave-related computing that you have done, then please contact Wookey, the session co-ordinator.

Other possible subjects are computer modelling, karst databases, Geographical Information Systems, and data logging. Please step forward if you are involved in any of these, or anything else that may be relevant.

More details of this long overdue event will be in the next issue of CP.

Suunto price increases

Suunto were 'taken over by their bank' at the beginning of this year, and the bank have been mandated to increase prices until they show a profit. This means that as of the 20th Jan. prices were up about 30%, with further price rises to take effect on the 1st Feb.

This puts the US price (to cavers, from Cave Inc, Kentucky) of a Suunto block compass (KB-41) at $81 ($119 with light) before the February rise. The clino (PM5-360) was $103 ($128 with light). These are before tax and shipping, so add VAT and shipping ($30 air or $13 surface), and 5% if you pay by credit card.

Even with all this it is still cheaper to buy in the states, and if you have a friend who can make them dirty and bring them over for you it is loads cheaper. It's a bizarre world.

The UK price (for the clino) from Caving Supplies was £115 (£134 with light). These were only about 10% higher than the 1993 prices, so I don't think they include the recent rises.

The 'Twin' Suunto combo compass/clino reviewed in CP#2 was $125.

SURV93 now available

Martin Laverty has kindly sent me a copy of this program. It is a first generation survey program (ordered data, no loop closure) which has some interesting facilities to allow embellishments of the plotted survey. It has much of the functionality of a paint package and thus allows you to annotate text and drawings over the survey line plot, and to have several views on the same screen. It is available to anyone who is interested - see article on software for details.

More SURVEX releases

In the absence of any real news there have been yet more releases of SURVEX - versions 0.40 and 0.41. The former contained the improvements listed below, and the latter fixed a number of bugs which had crept into the release , especially in the printer drivers, so if you have version 0.40, get 0.41 'cos it works properly.

- You can now process more 'loopy' caves under DOS (beyond 127 simultaneous equations), provided you have enough conventional memory.
- The station position file is now sorted alphabetically by station name and prefix.
- Output is now split into 4 files - the 3d image data, the station co-ordinate list, error statistics on loops, and summary information. E.g. files "161.svx" (or "161.svc") will now produce "161.3d", "161.pos", "161.err" and "161.inf".
- Many errors are now non-fatal. SURVEX will ignore the line or command line option which caused the error and attempt to continue processing. This means that when you have typed in some new data, you can sort out any mistakes without having to rerun SURVEX for each one. A count of warnings and non-fatal errors is given at the end of the run (unless a fatal error occurs first).
- Warnings have been added for bad tape, compass and clino readings (e.g. negative tape), and for truncated station names (e.g. VeryLongSurvey.1 being read as VeryLong.1 by default).
- Makefile provided to automate compilation for Borland C or Microsoft C (for DOS), RISCOS, and UNIX.

Ordnance Survey digital data

Wookey

Now that the OS has been semi-privatised and is expected to make money it is possible to buy digital data from them. The service is designed for local authorities and utility companies, not for cavers, or even individuals. Thus it is generally pretty expensive, and much of the data cannot be bought outright, so you have to pay an annual fee for updates, maintenance, and, in some cases, use.

However, you may be able to justify buying yourself a small amount of data, for a specific project. Also it is apparently possible to negotiate special deals for academic and educational use, so if there is any interest amongst the readership of Compass Points it could well be worth seeing what sort of arrangements we could reach with OS.

There are all sorts of mappings available:

- **Land-Line**: Large-scale vectorized maps at 1:1250, 1:2500 and 1:10 000. There are two flavours - Land-Line.88 where features that cross tile edges don't join up, and Land-Line.93, where they do.
- **Address point**: Postcodes
- **OSCAR**: Roads
- **Boundary-Line**: Administrative & political boundaries
- **ED-line**: Census boundaries
- **Urban Areas**: From 1981 & 1991 census information
- **B&W raster** : Mono bit-image version of published 1:10 000 paper maps.
- **Colour raster**: Bit image of Landranger 1:50 000 series maps.
- **Gazetteer**: Place names as in Landranger 1:50 000 series
- **Land-Form PANORAMA**: Contours or Digital Terrain Model (DTM) from the Landranger series.
- **Scale height**: 1:10 000 contours or DTM
- **Strategi**: 1:250 000 vector maps
- **Basedata.GB**: 1:625 000 vector maps

The only ones of these that are likely to be useful to cave surveyors are the height data and possibly vector or raster standard map data.

The PANORAMA vector data consists of contours, form lines, breaklines, lakes & coastline, plus a selection of spot heights. Contours are at 10m elevation intervals.

The DTM data is the height values at each intersection of a 50m horizontal grid, interpolated from the contour data and rounded to the nearest metre. Mean High Water is given a value of 1m.

1:10 000 scale height data is currently only available on special order, but will become available as it is digitised from April 1994, with the whole of the UK completed by the middle of 1995.

The 1:10 000 Black & White Raster data is digitised at 400dpi which is about 1 pixel per 1.5m. It can be supplied in TIFF, SUN raster, RLC, PCX, PICT and CCITT group3 & 4 compression.

Product	Tile size	Tile cost	Tile data size	Format	Accuracy
PANORAMA Vector	20km sq.	Annual (M) £45(1st year),	1.5Mb - 8.5Mb	NTFv2.0 level 1	3.0m (RMS height error)
DTM		£9 thereafter	750kb	NTFv2.0 level 5	3.0m (better in hilly areas)
1:10 000 Scale Height Vector	5km sq.	Single POA	NTF 0.9Mb-1.2Mb DXF 2.0Mb-3.5Mb GENIO 0.8Mb-1.5Mb	NTFv2.0 level 2, DXF, GENIO	Height: 1.1-1.5m
Digital Terrain Model			NTF 7.5Mb DXF 16.4Mb GENIO 9.4Mb	NTFv2.0 level 5, DXF	< 2.5m
Land-Line Urban- 1:1250	500m sq.	Single(M) £130, Annual £35	NTF 310kb-1.5Mb DXF 820kb-3.3Mb	NTFv2.0 level 2, DXF	Surveying: 0.4m
Rural - 1:2500	1km sq.	Single(M) £130 Annual £17.50	NTF 150kb-2.05Mb DXF 600kb-3.1Mb		2.5m
Moor - 1:10 000	5km sq.	Single(M) £130 Annual £35	NTF 251kb-829kb DXF 795kb-2.75Mb		4.5m
1:10 000 raster (mono)	5km sq.	Single(M) £45	8Mb, 0.3-6Mb compressed	Various raster formats	(400dpi resolution)
1:50 000 raster (colour)	20km sq.	Single(M) £60	16Mb (256colours) 8Mb (16 colours) 0.8-3.5Mb (compressed)	Various raster formats	(254dpi resolution)

Principal communication features are matched at tile edges.

The 1:50 000 Colour Raster data is digitised at 254 dpi and is available in GIF, BMP, SUN Raster, PCX, TIFF and PICT formats.

Vector map data is only available as the very large scale Land-Line data (1:1250-urban, 1:2500-rural, 1:10 000-moorland), or the small scale Strategi (1:250 000). Thus Land-Line is most likely to be useful to cavers. Only the urban stuff has been completed, the other two scales will be complete by the end of 1995, and these are likely to be the ones we are interested in

Notes on the table:

Where two data sizes are given the first is the average tile size, the second is the maximum tile size.

Whenever hard copy is produced from raster data, separate royalty fees will become due.

Where Single & Annual prices are specified you can either buy the tile at the Single price, or you can take out a contract for a minimum of three years and pay the yearly rate, getting updates monthly whenever 'significant changes' have occurred - you choose whether you want a new one after 20, 30, 40 or 50 'units of change'. A 'unit of change' is one house, or equivalent length of road etc. Higher update rates can be had for very little extra money (1-4 quid per tile).

DXF translation charge for Land-Line is Single: £22.00, Annual: £2.20.

Note that there is also a minimum order of £50.

NTF stands for National Transfer Format, and is a standard agreed by the Association for Geographic Information (AGI) for transferring Geographical Data. I tried to find out the spec for this a couple of years ago, whilst considering cave survey data transfer standards, but came up against the fact that you couldn't even ask questions about it without paying money to join the AGI (£25). It also seemed from the people I talked to that it would not be very good for cave data. DXF is the format popularised by Auto cad.

So even if you buy some data you may well have problems converting it into a useful format, as none of the world's cave surveying software can read NTF. Even the DTM data comes in this format. Almost any GIS system should be able to read this format so if you have access to one of those it may help.

To the costs you need to add media charges, which are not trivial: from £11 per floppy disc (either size) up to £60 for a CD-ROM. And then you can add VAT to everything too! Note that you don't have to get very many tiles of DXF format 1:10 000 Scale Height DTM data before you need to buy a new hard drive as well!

In summary; if you want to put your favourite survey into an elevation model tomorrow, and it fits into one tile you can buy a set of data for £45+£9+£9 +£11 (for the media)+VAT= £86.95 (over three years). This should also be sufficient for local hydrological study. If you want to overlay typical map data, it will cost £60+£11+VAT= £83.43 for raster data, or £35*3+VAT = £123.75 (over three years) for vector data.

These are prices that a club or well-heeled individual might be prepared to stump up, however they are too much for most of us. I hope that deals can be negotiated for non-profit organisations such as ourselves, which will provide digital mapping data for sensible amounts of money.

Cave Survey Software - An overview

Wookey

There is now a great deal of software available to help you with survey data reduction and survey plotting. Much of it is very good. Here is a list of what is known to me to be available at the moment. There is a big variation in both functionality and price (not that there is any relationship between these two things). The list is arranged by the sort of computer it is designed to run on, although a couple of the packages will run on more than one system.

If you are looking for some software (or some better software) then you should narrow down the choice by first deciding what machine it is to run on, and how much money (if any) you are prepared to spend. Next think about whether you want a simple to use program, or if you want a powerful application, which may not be so easy to get to grips with. Also check if there are any specific features that you want. If you are changing from another program, then perhaps the most important thing is how easy it will be to transfer the data from the old to the new format.

Bracketed software has effectively been discontinued but is included for completeness.

Name:	System/OS	Author, Country	Cost
SURVEX v0.41	PC(DOS)/Arc/UNIX/any	Olly Betts, UK	Free
!SURVEY	Archimedes	Juan Corrin, UK	£15
(SU	Arc/BBC	Andy Waddington, UK	Free)
CML	PC/UNIX/Mac	Mel Park, USA	Free
Vectors	Mac/other	Mel Park, USA	Free
Toporobot	Macintosh	Martin Heller, Switzerland	Free (I think)
CaveSurveyStandard	UNIX	John Rowlan, USA	Free
CAPS v5.81	PC(DOS)	Hubert Crowell,USA	$35 (sharewarish)
CAVEMAP	PC(DOS)	John Beck, UK	£12
CMAP v16.1	PC(DOS)	Bob Thrun, USA	Free
COMPASS v1993	PC(DOS)	Larry Fish, USA	$35 (shareware)
KARST v20	PC(DOS)	Gary Petrie,USA	Free
SMAPS v5.2	PC(DOS)	Doug Dotson,USA	$99 to cavers
SMAPS Lite	PC(DOS)	Doug Dotson,USA	$15 (shareware)
(Surveyor88	PC(DOS)	Sean Kelly, UK	Free)
SURVEY v2.0	PC(DOS)	Steve Neads, UK	£15
SURV93	PC(DOS)	Martin Laverty,UK	Free
CaveView v4.0	PC(Windows)	John Fogarty, USA	Free
Pitter/Plotter v1.2	PC(Windows)	Bill McIntosh, USA	$25 (shareware)

Software can generally be obtained from an FTP archive site, Wookey, or the software's author. See the notes below and the summary of each program below for details.

I have copies of all of these (except !SURVEY, SU, CaveSurveyStandard, CAPS, SMAPS Lite, CaveView), but obviously can only distribute those which are free or shareware. For all the rest you will have to contact the author - addresses are given below where they are known. SURVEX, CML, Vectors, Toporobot, Compass, Karst, Pitter Plotter, and SURV93 can be obtained direct from Wookey at the address given at the front of the Newsletter. (send one formatted floppy per program and a stamped self addressed envelope).

The only programs I have really used properly are Surveyor 88 (discontinued), SURVEX & SMAPS5.1. My comments on the others are based on relatively perfunctory examinations of what is on offer. I hope to review all of these products properly in due course. If you are looking for some survey software tell me what you want to do with and what computers you have access to and I will be happy to advise. Or you can send me a load of floppies and I'll send you the lot (well, all the PD ones).

Programs are described as 1st generation or 2nd generation here. 2nd generation programs can read arbitrarily ordered data, and close loops.

CAPS can be obtained from Hubert C Crowell, Huco Systems, 3105 Mary Dr. NE, Marietta, GA 30066, USA, email: <NBHT47@prodigy.com>

CAVEMAP is fairly simple and menu based. It falls between the 1st & 2nd gen. stools: Loops are closed sequentially which makes it very quick. This is OK for straightforward caves where you survey a centre-line and then bend the rest of the survey around that line. No printing - screen must be grabbed and printed. Available from John Beck, Glebe Cottage, The Hillock, Eyam via Sheffield, Derbyshire, S30 1RB, UK. Tel: 0433 631732

CaveSurveyStandard can be obtained from John Rowlan, Building 203, Maths computer Science Division, Argonne National Laboratory, 9700 s.Cass avenue, Argonne, Il 60439, USA Phone(708) 252-7587, Fax: (708) 252-5986, Email: <rowlan@mcs.anl.gov>

CMAP is another command based system. very versatile data input format. less good plotting facilities. Available from Wookey or Bob Thrun, 8123 14th Avenue, Adelphi MD 20783, USA.

CML is also a command-based public domain multi-platform program, with a GUI-based version Vectors for Macs only. It is 2nd gen., and capable of very complex & large caves. Takes text files as input. available from the archives, Wookey or Mel Park, Email: <mpark@utmem1.utmem.edu>

Compass is pretty good 2nd gen. tool, although with rather irritating data-input scheme. Designed to be idiot-proof in use. John Fogarty <72614.1407@Compuserve.com>

Karst seems very good with the nicest (i.e. most intuitive) data-entry editor I have seen. It is 2nd gen. and has good graphics with extensive colouring of survey sections. Garry Petrie, 19880 NW Nestucca drive, Portland, Oregon 97229, USA. Email: <gp@scic.intel.com>

Pitter Plotter Windows based and thus very simple to use, although entering data is less than intuitive. Can draw walls. Data entry only in native format. It is available from the archive, Wookey or Bill McIntosh, Concentrics company, 1109 Caminito Alegre, Santa fe, New Mexico 87501, USA. Tel: (505) 988-4100

!SURVEY is only for the Archimedes. It draws the cave as you enter the data - making mistake spotting very easy. It is first generation, and can output !Draw files for further editing. Available from Juan Corrin, Tel: 0706 874669

SMAPS is the granddaddy of survey programs. Comprehensive and professional, conversant with the price, but rather cumbersome in use. Quite good data entry editor, very versatile data display abilities. Supports HTO data-interchange and text import and export. There is now a cut-down shareware version, SMAPS Lite, retaining much of the functionality of the full program. It is available from the archives. SMAPS can be obtained from Speleotechnologies, P.O. Box 293, Frostburg, Maryland 21532-0293, USA. Tel: (301)689-1904, Email: <dotson@clarknet.clark.net>

SURVEX is an all-platform 2nd generation survey production tool. It is currently available as PC or Archimedes applications, or as source for UNIX or anything else. A useful tool with fast processing, thorough error and warning reporting, a very fast cave viewer, and thorough printer support: HPGL, Postscript, Epson/Proprinter dot matrix & PCL (for inkjets & laser printers). Command based. Cave complexity only limited by computer memory. Input/output from/to text files, and HTO data-interchange standard supported. Very good for complex multi-system surveys. Available from the archive, Wookey or Olly Betts, 22 Fromint Rd, Milton, CAMBRIDGE, UK. Tel: 0223 862731 Email: <Olly@mantis.co.uk>

SU is really something of a relic. It was originally developed on a BBC micro, processing everything from disk, and was then (somewhat) ported to the Archimedes. Should you be unfortunate enough to need to reduce data on a BBC Micro, then you could contact Andy for a copy. Andy Waddington, Manor House, Boldron, Barnard Castle, Co. Durham, DL12 9RF, UK. Tel: 0833 690245, Email: <andy@pennine.demon.co.uk>

SURVEY is capable of extremely 'loopy' nets (e.g. mines) and is menu based and friendly, but can't read text file input, so data entry only in native format, although a converter from CMAP exists. Very good coloured output by loop accuracy. HPGL output with 3rd party utility for converting to other printers. There is a demo version available by FTP or the real thing from Steve Neads, Studio House, 23 Ash Lane, Wells, Somerset, BA5 2LR, UK Tel: 0749 676077

Surveyor88 is a menu-based 2nd gen. program, which is now no longer supported by its author. It takes text file input. Its graphics are fine but extremely slow.

SURV93 1st generation Survey program (no loops, only connected data can be input). Primary feature is included drawing facilities, which allow annotations to be made to the underlying line survey. Text files can be input & output. No printing - screens must be grabbed Available from Wookey or Martin Laverty, 23 Brunswick ST, Canton, Cardiff, CF5 1LH. Tel: 0222 372819

Toporobot is a very professional Mac-only system. It is designed with the general Mac philosophy of being very easy to use. It is 2nd gen., can do extended elevations with an interactive editor, and has point and click info from the cave plot. The English manual isn't finished yet so being able to read the French or German manual is useful, but the menus and errors etc. can be configured to English. Toporobot can be obtained by Anonymous FTP from `geosun.unizh.ch` in `pub/toporobot`. or from Wookey, who is the UK representative of the Toporobot users group.

If you have FTP access you can get the most up-to-date software directly from one of the two English language cavers archives. All the free/shareware software (except CAPS, CaveView & CaveSurveyStandard) are on these archives:

`vlsi.bu.edu` in `pub/cavers-archive`	US site
`gserv1.dl.ac.uk` in `pub/caving`	UK site

I have only examined the UK archive, and know that the following can be found there. I expect an almost identical file structure at the US site. The files and sizes are included to give people an idea of what to look for and how long it will take.

CML:	caveML/CaveML18.zip	288663	CML DOS executables
	CaveMLsrc18.tar.Z	229260	CML source
	Vectors.sea.hqx	408443	Mac application
Compass	compass/compass.dis	11181	?
	compass.exe	450814	DOS executables
	install.doc	8599	info
	whats.new	666	info
Karst	karst/karst.zip	311806	DOS execs, cave data, and Source (in Pascal)
	readme	409	info
	(pkunzip & zip are also in this directory)		
Pitter plotter	pitter/caveplot.txt	3401	info
	gal116.bsd	26826	Cave data
	pitter.exe	110496	Windows executable
SURVEX:	survex/readme.1st		
	src041.zip	134654	Source code (C)
	svx041.zip	500K	DOS executables and example data
	unzip.exe	30581	DOS PD unzipper executable