The BAS Low Power Magnetometer

BAS-TD001

Pre-deployment & General Manual

Xi eXtreme instrumentation

for scientific pioneers of the Polar regions

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This symbol identifies an electrical hazard.


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Warnings and Cautions

Warning **The equipment supplied by Extreme Instrumentation is designed for use in extreme environmental conditions which, if the appropriate safety procedures are not observed and / or enforced, may be hazardous. It is the customer's responsibility to comply with local, State or Federal Health and Safety regulations and ensure that all personnel are trained in the safe operation of equipment in extreme environmental conditions.**

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Low Power Magnetometer

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Introduction

This manual describes the tasks required to prepare a BAS Low Power Magnetometer (LPM) for field deployment. The actual deployment procedure is dealt with, in detail, in the companion manual “LPM Field Deployment Manual”.

This manual also contains general information about the LPM. this manual should be read in its entirety ar the start of the season and before preparing an LPM for deployment.

This manual assumes that the LPM is to be deployed at a snow site in the Antarctic.

General Points

The loggers are static sensitive - always take static precautions of opening the logger box.

All PCMCIA cards have been supplied prepared - do not plug these cards into a general PCMCI reader as this will almost certainly corrupt them. Currently it is recommended that these PCMCIA cards are only read using a DOS 6.22 machine.

The loggers have been supplied prepared, do not power up the loggers until they are at a site where you intend to record data as they will initialise and start recording data from power up.

The battery boxes are very heavyand should be lifted by two people.

Each deployment takes about two hours on the ground.

Before commencing the deployment make sure the deployment team are aware of the importance of :

Keeping the connectors free from snow

Covering unused connectors with dust caps of self amalgamating tape

Checking the sex of each connector as it is plugged in - all the connectors are unique and it is impossible to incorrectly plug the system together but you can damage the amphenol connectors by plugging in two males to each other.

NOT opening the logger boxes, they are filled with loose polystyrene balls.

Practice with the amphenol bayonet connectors (large 15 way power connectors to the logger and the 7 way maggy connector to the enclosure and the logger) with no power to the system. Practice plugging in a logger in an enclosure without any plug panel connections.

Consider practising with the amphenol screw-in connectors. To connect them properly they need to be fully screwed home. Only screw the connector with the end ring, beware of screwing the middle ring which will dismantle the connector (usually damaging the wires).

Deployment of a Test System

It is recommended that a system is deployed locally before heading into the field, ideally this deployment should use a spare logger. If a spare logger is not available then the logger should be unplugged immediateky after the self tests.

The main purpose of this test is to check the deployment procedure and the equipment procedure necessary for a succesful deployment. Take only the equipment and tools outlined in appendix 2 (which is identical to appendix 4 in the Field Deployment Manual). If any extra tools or equipment are required then these should be added to the list.

Pre-deployment Preparation

Deployment preparation tasks fall into one of four categories as follows :

Identifying all the materials for the LPM project

Preparing the battery boxes

Providing the loads for the local transport system, suitably packed and identified

Identifying the magnetic deviation at each intended location

Identifying the Materials

All electronic items have a serial number, cables, scaffolding etc. doesn't.

Preparing the battery boxes

This will probably be the most time consuming task in the preparation.

The batteries have been supplied separately, and must be fitted. Open the battery box by snapping off the top clips with the specialist tool provided for this purpose. Prise off the top and remove the top two layers of insulation so that the space inside the box is revealed.

Caution ***The following preparation charge procedure should take place ina well venilated area as a precaution against out-gassing. This is only a precaution as out-gassing should NOT accur)***

Ideally the batteries will receive a conditioning charge before fitting (although this is not essential if time is short).The conditioning charge consists of a charge of 15V at room temperature for 3 hours, and then a further 24 hours at 13.8V. The current should in all cases be limited to a maximum of 10A per battery.

Measure the open circuit voltage of each battery and put it in a set of four with its closest (in voltage) neighbours. It is recommended that you put a serial number on eaxch battery of the form BAT/XX/2007 and record the O/C voltage and which battery box it has gone into. The two battery boxes that contain each matched set of four should be used at one LPM site.

The batteries fit side by side, and it is advisable that the same polarity terminals of each battery are at the same end.

Inside the battery box identify the two wires with in-line fuses. These are the red wires coming from the regulator and the end after the fuse terminates in a ring crimp connector. Connect one crimp connector to each battery positive terminal.

Identify the short black lead (made up of three twisted wires terminated with a ring connector at each end and marked “jumper”). This wire should be connected between the two battery negative terminals.

Coonect all other green, black and white wires to the negative terminal of each battery.

When the batteries are in place, carefully replace the insulation and re-affix the lid down using the clips.

Making loads for local transport system

make sure that the materials for each site are identified.

All connectors should be protected during transport so there is no snow ingress into the connectors.

The solar panels need protecting against impavt damage during transportation.

The loggers should be transported in a snow tight box, and should be well packed in soft material to protect them against vibration and shock damage.

Identifying the magnetic deviation at each intended location

The magnetic deviation at each intended location needs to be known so that a magnetic bearing can be used to align the solar panel to TRUE North. The IGRF model is a convenient way of obtaining the deviation.

The TRUE bearing is the MAGNETIC (i.e. compass) bearing plus the deviation. Hence for a compass to point to TRUE North where the deviation is -24 degrees the compass will be pointing on a magnetic bearing of +24 degrees, likewise to point TRUE East, the compass will point on a magnetic bearing of 114 degrees.

Appendix I

LPM System

Enclosure
2 prepared battery boxes
Magnetometer sensor tube
2 x 2.5m scaffolding tubes
2 x keyklamp bases
2 x three way guy clamps
4 x short guying ropes
4 x long guy ropes
Dump box
4 x Snow anchors (useful to take some wood for cross pieces in bad snow conditions)
Short stake (dump box to enclosure connection lead)
Long snake (battery box to enclosure connection lead)
Short stubby (battery box to battery box connection lead)
Temperature probe pole
Logger box (plus spare logger box)

Extra materials are required if the system is to have a wind generator - refer to the Gorgen 500 Deployment Manual for detailed information.

Tools

Ice drill
2 x Shovels
2 x Key clamp Allen keys
2 x Metal enclosure box keys
1 x Battery box clip tool
2 x Medium adjustable spanners
Wire snips (for cutting cable ties)
Bolt cutters (for cutting rope)
Spirit level
Compass
Digital Volt meter
Long distance tape measure
Medium weight hammer
Digital camera
Pencil
Warm clothes and gloves (it WILL be cold)
GPS to record position
Spare length of rope

Sundries

Self amalgamating tape
20 x Large cable ties
20 x Medium cable ties
20 x Small cable ties
3 x Plastic bags (to protect connectors from snow)
Spare Keyclamp grub screws
Spare guy clamp

Appendix II

Preparing a PCMCIA Card

Caution ***The preparation of the MCMCIA data card should only take place on a native DOS 6.22 machine with a FAT 16 campatible PCMCIA driver software.***

For a new card :

FORMAT drive: /U	to build the FAT table
DATAFILH drive:	To build empty file
DIR drive:	to check that a zero length DATA.FIL exists

For a used card :

FORMAT drive: /U	to empty the FAT table
WIPEM drive: /W	to remove all the old data (takes some time) Directory cluster errors are not important
FORMAT drive: /U	to rebuild the FAT table No volume label
DATAFILH drive:	to build empty file
DIR drive:	to check that a zero length DATA.FIL exists

Appendix III

Document History

V2.0 Updated for Italian LPM shipment 2006

V1.0 Version for LPM's shipped to Japanese Antarctic program 2002

V0.9 BAS internal Pre-deployment Manual