

OPERATING MANUAL

Model G-836

UniMag™ PROTON MAGNETOMETER

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geoMetrics

WARRANTY

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EG&G geoMetrics guarantees that all equipment offered for sale is free from defects in materials and workmanship, carefully tested, and in first class operating condition. In the event of malfunction, geoMetrics, at its own expense, will repair or replace any materials, equipment, or parts which prove defective or deficient under normal operating conditions. Unless altered by contract, the warranty period shall extend for one calendar year beginning with the date of acceptance, but will not exceed fifteen (15) months from the date of shipment.

Every effort has been made to ruggedize and protect the Gamma Ray detectors for their intended use. Due to the fragile nature of the crystal detector assembly and difficult operating environments, geoMetrics' warranty does not include breakage of the crystal for whatever reason. geoMetrics does, however, warrant the detectors to be complete and fully operational to their published specifications at the time of delivery and to maintain the stated minimum resolution and performance for a period of one year.

EG&G geoMetrics reserves the right to perform warranty services FOB Sunnyvale or at the customer's installation site. EG&G geoMetrics is not responsible for delays or defects in the quality of results from misuse, mishandling, unauthorized modifications, installation, or other operation conditions outside its control.

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If any part of this instrument is returned to the factory for any reason, please include this completed form with the complete instrument or any individual part returned for repair. SHIP TO:

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Name _____

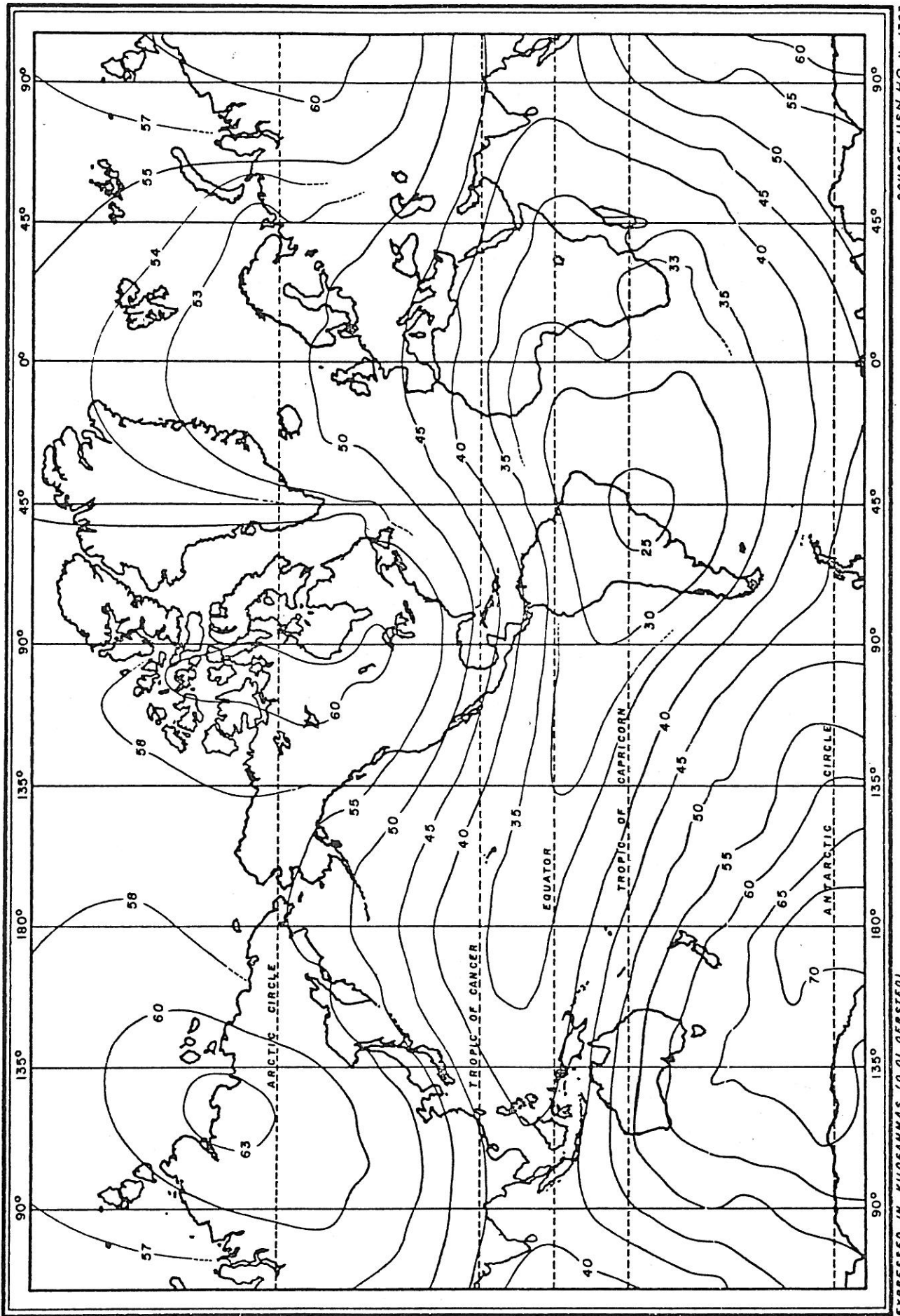
Company _____

Address _____

City, State, Zip, Country _____

Telephone _____

Please describe symptoms of trouble as completely as possible or detailed reason for return (use additional paper if required).



SOURCE: U.S.N. H.O. No. 1703

The Total Intensity of the Earth's Magnetic Field

EXPRESSED IN KILOGAUSS (10,01 GERSTED)

TABLE OF CONTENTS

Warranty	I
World Map	II
Table of Contents/List of Figures	III
Chapter 1.0 GENERAL INFORMATION	
1.1 Introduction	1
1.2 Magnetic Environment	1
1.3 Specifications	2
1.4 Inventory Inspection	3
Chapter 2.0 FIELD OPERATION	
2.1 Introduction	4
2.2 Console Operation	4
2.3 Sensor Orientation	6
2.4 Survey Operation	7
2.5 Data Display	7
2.6 Readout Test	7
2.7 Instrument Storage	8
Chapter 3.0 BATTERY MAINTENANCE AND CHARGING	
3.1 Introduction	9
3.2 Characteristics of Lead-Acid Batteries	9
3.3 Low Voltage Indicators	9
3.4 Battery Storage	10
3.5 Battery Installation and Replacement	12
3.6 Battery Charging	13

LIST OF FIGURES

Figure 2-1 Controls and Indicators	5
3-1 Battery Charger	11
3-2 Rate of Self-Discharge vs Temperature	10
3-3 Months in Storage Prior to Boost Charging	12

1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The UniMag™ Portable Proton Magnetometer, Model G-836, is a complete system designed for general field applications requiring simple operation and stable measurements of the total intensity of the earth's magnetic field. UniMag provides 10 gamma resolution over a range from 20,000 to 100,000 gammas. Since the instrument measures total field intensity, the accuracy of each measurement is independent of sensor leveling. Furthermore, each measurement is based upon an atomic constant* and is independent of temperature, humidity, and battery conditions. The unified simplicity of UniMag allows rapid, accurate measurements to be obtained from a single, compact field instrument without the need for external batteries, cables or a sensor and staff. UniMag is a precision instrument and reasonable care should be exercised to avoid damage from unnecessary field abuse.

I-M-P-O-R-T-A-N-T

Read Chapter 3.0 Before Using UniMag on a Survey

1.2 MAGNETIC ENVIRONMENT

During survey operation, it is important that the earth's magnetic field is not biased or disturbed by allowing unwanted magnetic objects to come close to the sensor. Such objects include jewelry, keys, watches, belt buckles, pocket knives, mechanical pencils, zippers, some hats, notebooks, other survey equipment, etc. In normal use, UniMag is suspended from the adjustable shoulder strap, and held in front of the operator. This places the sensor approximately 2 ft. (61 cm) away from the operator, and typically 3 ft. (91 cm) above the ground. Under such conditions, 10 gamma surveys can be quickly and accurately performed.

Prior to survey use, however, objects that are suspected to be magnetic may be checked in the following manner:

1. Go to a magnetically clean area away from buildings, roads, automobiles, AC power-lines, etc.
2. Place the suspected object far away from UniMag, and take several readings by depressing the black pushbutton - releasing - and waiting for a digital readout to appear.
3. Observe the displayed readings. Each reading should repeat to within 10 gammas, i. e., the least significant digit (extreme right-hand number) should NOT change by more than one count.

* Proton Gyromagnetic Ratio: $(2.67513 \pm 0.00002) \times 10^4$ Radians/Gauss second.

4. Now place the suspected object at the distance from the sensor expected during actual survey operation. Take several more readings and note the measurements.
5. If the measurements made in Step 4 above differ by more than ± 1 count (extreme right-hand number) from those measurements made in Step 3, then the object is magnetic.

IF THE ARTICLE IS HIGHLY MAGNETIC, OR IF UniMag IS OPERATED INSIDE OR NEAR A BUILDING OR VEHICLE, THE SIGNAL WILL BE LOST, GIVING COMPLETELY ERRATIC READINGS AND LOSS OF ± 1 COUNT REPEATABILITY.

UniMag should not be operated in areas that are known sources of radio frequency energy, power line noise (transformers), or operated in buildings. UniMag will NOT operate properly if it is placed directly on the ground.

1.3 SPECIFICATIONS

Resolution:	10 gamma throughout tuning range
Tuning Range:	20, 000 to 100, 000 gammas (world-wide)
Tuning Mechanism:	Multi-position switch with twenty-four overlapping steps.
Sampling Rate:	Manual pushbutton, new reading every 4 seconds.
Output:	4 digit, illuminated display directly in gammas.
Power Requirements:	12V DC, 500 ma average
Power Source:	Two internally mounted and rechargeable 6 volt, 1 amp/hr non-spill gelled electrolyte batteries. Charge state or replacement signified by flashing readout display.
AC Battery Charger:	Input: 115/220V, 50/60 Hz AC Output: 14V DC
Temperature Range:	-40 ^o to +60 ^o C Note: Battery capacity decreases with low temperature operation.
Accuracy (Total Field):	10 gamma through -20 ^o to +60 ^o C temperature range

Operating Manual
UniMag
Portable Proton Magnetometer

Sensor:	Noise cancelling, high signal. Internally mounted in console.
Console Size:	22½" l. × 3¼" w. × 5" h. (58 × 8.3 × 12.7 cm)
Console Weight:	7 lbs. (3.2 kg) Includes batteries, sensor and shoulder harness.

1.4 INVENTORY INSPECTION

When received from the manufacturer, the UniMag™ Proton Magnetometer should include the following items:

- | | |
|------------------------------------|---------|
| 1. UniMag Console including sensor | 1 ea |
| 2. AC battery charger | 1 ea |
| 3. Adjustable shoulder strap | 1 ea |
| 4. Battery Pack | 2 ea |
| 5. Operator's manual | 1 ea |
| 6. Applications Manual | 1 ea |
| 7. Attaché Case | 1 ea |
| 8. Teflon pipe tape | 1 strip |

2.0 FIELD OPERATION

2.1 INTRODUCTION

UniMag is completely self-contained, and is ready for field survey operation. A few simple procedures should be observed to obtain optimum results, and it is recommended that the operator follow each step as outlined in this chapter to initially become familiar with the operation of the instrument. Refer to Figure 2-1 for identification of UniMag's controls and indicators.

2.2 CONSOLE OPERATION

PRELIMINARY CONSIDERATIONS: BEFORE USING UniMag, CHECK FOR:

1. Presence of sensor fluid:

The sensor is located in the forward, cylindrical portion of the instrument as shown in Detail "A" of Figure 2-1. Shake the instrument GENTLY and listen for a "sloshing" sound. If fluid is not present, or cannot be heard, it is necessary to fill the sensor PRIOR to operation:

- a) Hold the UniMag console vertically with the sensor pointed up. Remove the slotted Fill Plug from the convex end of the sensor as shown in Detail "A" of Figure 2-1.
- b) Fill the sensor with STRAINED* kerosene or unleaded gasoline completely. Then REMOVE approximately 2 tablespoons of fluid.

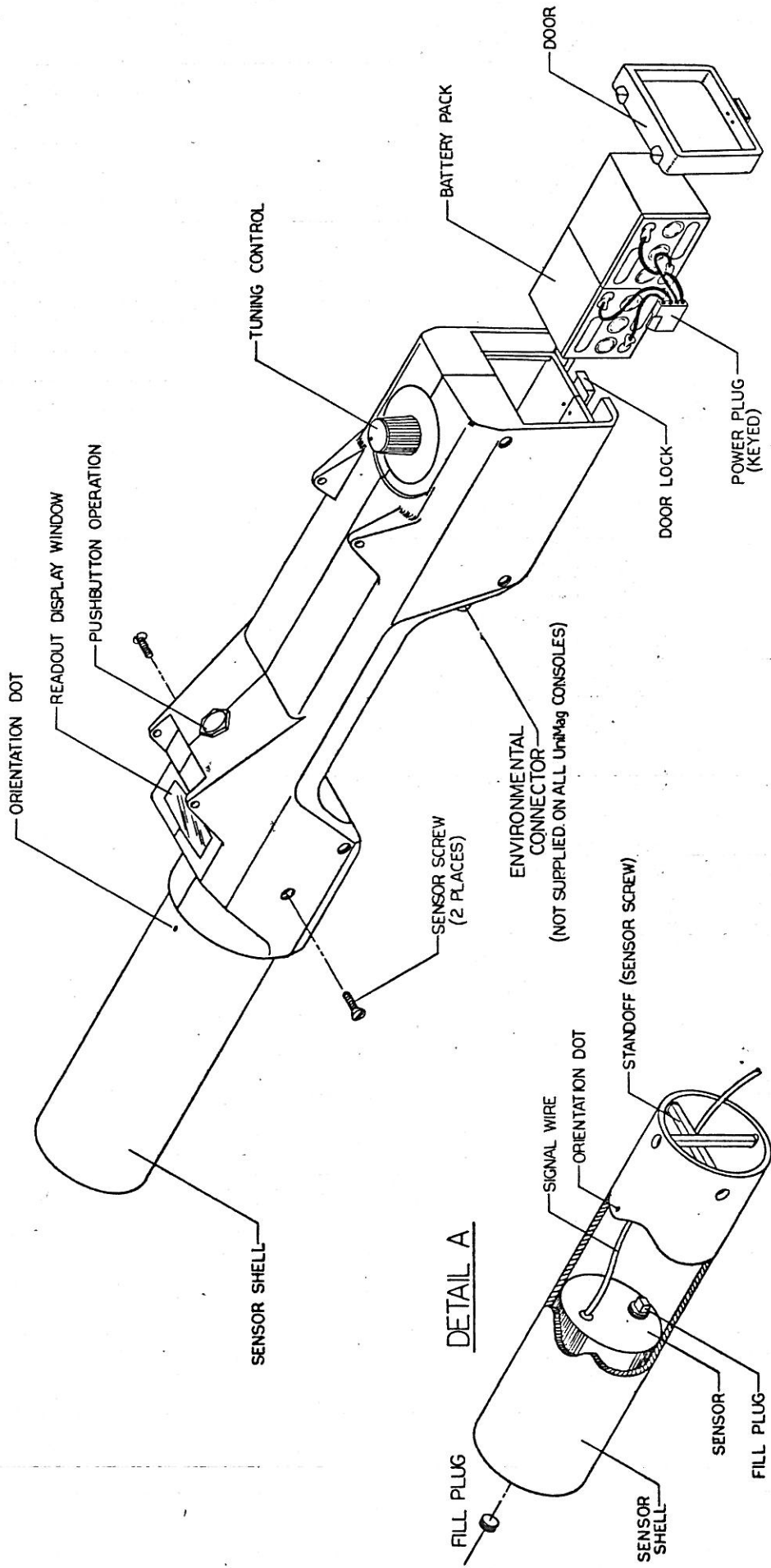
*Note: The fluid MUST be strained several times through paper filters, i.e., paper towels, coffee filters, etc. NEVER use kerosene or gasoline directly from a pump or storage can as it may be contaminated with metal particles.

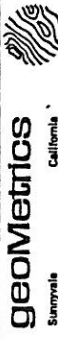
- c) Lightly wrap the Fill Plug with Teflon tape and replace in the sensor. Do NOT use excessive pressure to tighten the Fill Plug - a "snug" fit is sufficient.

2. Battery pack is fully charged:

To check the battery voltage, simply press the black pushbutton and observe the readout - if it "flashes" on/off during the display period, the battery pack is NOT fully charged. Refer to Chapter 3.0 for instructions of recharging the battery PRIOR to survey operation.

REVISIONS		DATE	APPD
LTR	EA. NO.		
DESCRIPTION			



DESCRIPTION		ITEM
 geomeetrics Sunnyvale, California		
CONTROLS & INDICATORS UNIMAG, MODEL G-836 FIGURE 2-1		
SIZE	CODE IDENT NO.	REV.
C	G-836	18013
SCALE	1/2	30° ISO.
	SHEET	OF
		Ø

REQ	PART NUMBER	SIGNATURE	DATE
		R. Brooks	9-2-75
UNLESS OTHERWISE NOTED		DFT	CHECK
2 PIG	3 PIG	±	±
±	±	±	±
REMOVE BURRS & SHARP EDGES		APPD	APPD
SURFACE FIN ✓		DO NOT SCALE THIS DRAWING	
NEXT ASSEMBLY	USED ON	FINISH	
APPLICATION			
MATERIAL			

SENSOR ASSEMBLY

ONLY THREE SIMPLE STEPS ARE NECESSARY TO CORRECTLY TUNE
AND OPERATE UniMag:

1. Lift the UniMag console out of the padded attaché case, and adjust the shoulder strap for a comfortable fit. Typically, the magnetometer is used on the operator's right or left side, with the shoulder strap suspended across the operator's chest from the OPPOSITE shoulder.
2. Adjust the TUNING-KILOGAMMAS knob to a position that correlates with the earth's known magnetic field. The earth's field, in any general location, can be estimated by using the world intensity map on Page II at the beginning of this manual.
3. Press the black pushbutton, and release; wait 2 seconds, and observe the 2 second illuminated display of the earth's total field directly in gammas.

NOTE: A true and repeatably correct reading can be made with the TUNING-KILOGAMMAS knob set in 3 or 4 tuning positions on either side of the "estimated" local magnetic field i.e., the tuning is quite broad and non-critical in most cases. Unless high field changes on the order of 4 or 5 thousand gammas occur during operation, it will not be necessary to retune the console.

2.3 SENSOR ORIENTATION

In low magnetic latitudes (where the field dips less than 40° , or below 40,000 gammas) such as near the magnetic equator where the field is horizontal, it may be necessary to rotate the black cylindrical sensor 90° as described below.

The small dot or line on the sensor is provided to allow proper orientation of the internal sensor axis, which must be placed perpendicular to the earth's field to produce optimum signal. The following procedure is recommended for easy rotation of the black sensor (Refer to Figure 2-1 for parts identification):

1. Remove the two slotted-head Sensor Screws completely.

2. Gently rotate the sensor 90° in either direction until the sensor holes are properly re-aligned to the corresponding holes in the UniMag console - secure with the two Sensor Screws. The orientation dot or line on the sensor should now be facing the SIDE of the UniMag console.

NOTE: The sensor should be rotated ONLY in survey areas where the local field intensity is less than 40,000 gammas.

2.4 SURVEY OPERATION

During survey operation and after UniMag has been tuned to the local field intensity (see Section 2.2), the operator need only depress the black push-button and note the reading in a log or field notebook. If a reading is in question, i.e., a sudden shift of several hundred gammas, several readings should be taken with the console held as still as possible.

UniMag SHOULD EXHIBIT ONE COUNT STABILITY, WHICH CAN BE VERIFIED BY REPEATING A MEASUREMENT WITH THE CONSOLE HELD IN THE SAME LOCATION. If one count stability is not possible, then an unwanted ferromagnetic article is present (buried pipe, etc.) or an extremely high magnetic gradient has been encountered.

2.5 DATA DISPLAY

UniMag provides an illuminated 4-digit display of the earth's magnetic field directly in gammas. Since the resolution of UniMag is 10 gammas, only the four most significant digits are displayed in the readout window. For example, given an earth's field intensity of 51,240 gammas, UniMag will display "5-1-2-4" with the least significant digit ("0") being omitted. It should be remembered, however, that the readout (5-1-2-4) actually represents a ten gamma measurement of the earth's field ranging from 51,235 gammas to 51,245 gammas.

2.6 READOUT TEST

Occasionally, it is advisable to check the numeric readout display to guard against an erroneous reading due to a non-illuminating segment of the display. Simply depress and HOLD DOWN the black pushbutton until four number 8's appear (8888) - check each number. If any segments are missing, notify GeoMetrics and return the magnetometer immediately.

2.7 INSTRUMENT STORAGE

When not in use, all of the components except the battery packs should be stored in the attaché case to prevent damage, loss, or possible contact with magnetic particles that could be embedded in the sensor. If extended storage (1 week or longer) is anticipated, the battery pack MUST be stored in a refrigerator (see Chapter 3.0) to prevent permanent damage to the internal charge plates of the battery. After any storage time, always re-charge the battery pack.

NOTE: Gelled electrolyte batteries provide an excellent power/weight ratio, but do require special handling considerations. TO PREVENT DAMAGE FROM EXCESSIVE BATTERY DISCHARGE, READ CHAPTER 3.0 COMPLETELY BEFORE USING THE UniMag MAGNETOMETER ON A SURVEY.

3.0 BATTERY MAINTENANCE AND CHARGING

3.1 INTRODUCTION

UniMag uses two Eagle-Picher "carefree" 6 volt, 1 amp/hr. gelled, lead-acid batteries fastened together and wired in series. A special keyed plug is used to connect this battery pack to the UniMag circuitry, or to the AC battery charger. On some UniMag models a special environmental connector is available on the console to allow charging without removing the battery pack.

NOTE: Lead-acid batteries REQUIRE careful attention to charging and storage procedures. To avoid unnecessary damage to the battery pack READ THIS CHAPTER COMPLETELY BEFORE USING THE UniMag MAGNETOMETER.

3.2 CHARACTERISTICS OF LEAD-ACID BATTERIES

The batteries selected for use in UniMag represent the best available combination of useable power vs. weight and cost. When the battery has been allowed to excessively discharge over an extended period of time, however, the internal electrolyte is reduced to water which is a very poor conductor of electricity. Such a discharged condition increases the internal resistance of the battery making recharging difficult at best, and impossible with the charger supplied with UniMag. IT IS NECESSARY TO REMOVE THE BATTERY PACK FROM UniMag WHEN IT IS NOT IN USE - ALWAYS STORE THE BATTERY PACK IN A COOL ENVIRONMENT.

3.3 LOW VOLTAGE INDICATORS

There are two methods of checking the available battery voltage:

1. Cycle the magnetometer by pressing the black pushbutton and observe the readout. If the readout "flashes" on and off (blinks) then the battery pack MUST be replaced with a fully-charged one. When the readout flashes, the battery pack has approximately 10 volts, which is not adequate for normal operation.
2. The second method of checking the battery pack involves the use of the charger supplied with the system. Remove the battery pack (see Section 3.5) and connect it to the charger using the keyed connector. On some models, an environmental connector

is supplied as part of the UniMag console (see Figure 2-1). Simply use the jumper cable supplied to connect the UniMag console to the BNC connector on the charger (this eliminates the need to remove the battery. It is also NOT necessary to plug the charger into an AC electrical outlet. Depress the TEST BUTTON and observe the TEST LAMP on the charger (see Figure 3-1); if it shows GREEN the battery pack can be used for a full day's survey activity. If the TEST LAMP shows RED, then the battery pack MUST NOT BE USED until it has been fully recharged. When testing the battery pack on models equipped with the environmental connector, hold the charger TEST BUTTON down and cycle the UniMag magnetometer. This places a load on the battery during the test. The TEST LAMP will be green when the battery voltage is 11 volts or greater, and red when the voltage is below 10.9 volts. Should the TEST LAMP show a yellow or orange color, consider it to be a RED indication as the available battery voltage is between 10.9 and 11.0 volts.

3.4 BATTERY STORAGE

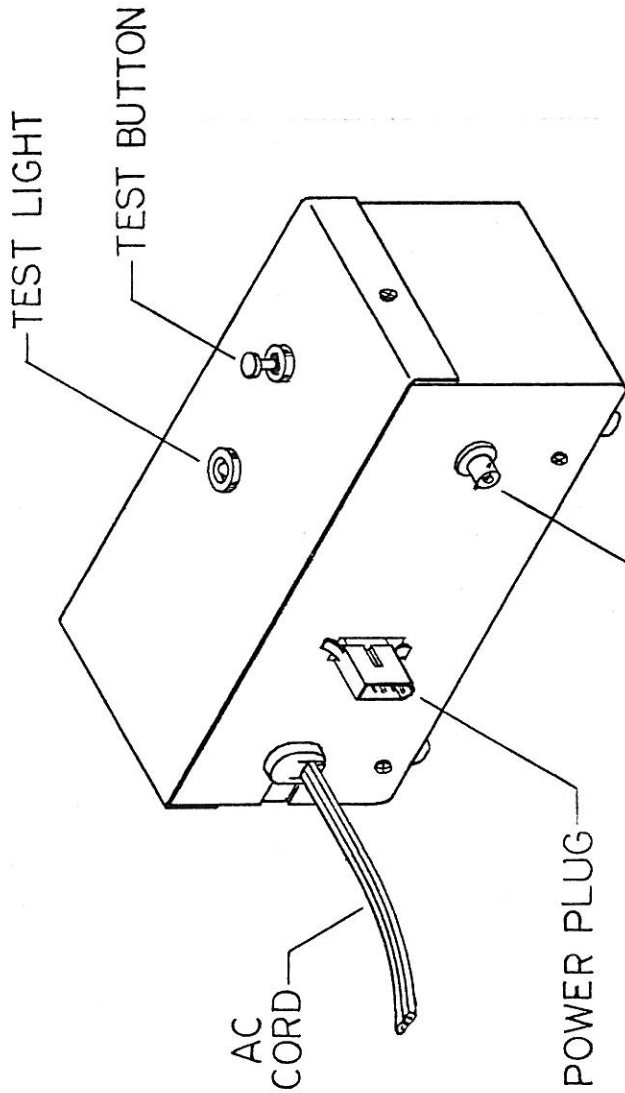
Batteries stored on a shelf will self-discharge as a function of temperature as shown in Figure 3-2 below:

Figure 3-2

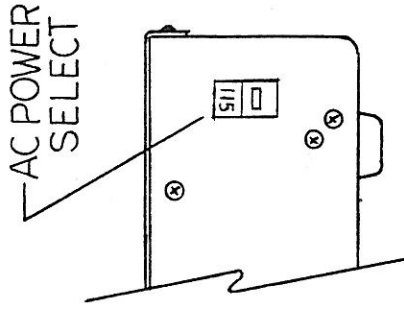
Rate of Self-Discharge vs. Temperature


<u>Storage Temperature</u> <u>°F/°C</u>	<u>Estimated % Loss</u> <u>per day</u>	<u>Percent Capacity</u> <u>Loss in 6 months</u>
0°/-18°	0.03%	5%
30°/-1°	0.07%	13%
60°/16°	0.13%	23%
80°/27°	0.25%	45%
100°/38°	0.50%	90%
120°/49°	1.10%	100% in 90 days
140°/60°	1.60%	100% in 62 days

It is important to remember that water is one of the resulting products of battery discharge. When batteries are stored at low temperatures, therefore, they must be in a fully-charged condition to prevent water freezing. After delivering its full-rated capacity, a battery pack will freeze at approximately -6°F (21°C). If long term storage is anticipated, it is best to leave the battery pack on the charger for at least forty-eight (48) hours to ensure full charge. It should also be noted that when shipping the G-836 system, the batteries included should be at full charge.



BNC PLUG
 USED ONLY WITH MODELS THAT
 HAVE AN ENVIRONMENTAL CONNECTOR



REQ		PART NUMBER		DESCRIPTION		ITEM
SIGNATURE		DATE		 Sunnyvale California		BATTERY CHARGER UNIMAG MODEL G-836 FIGURE 3-1
DFT	<i>R. Brown</i>	10-24-77				
CHECK				CODE IDENT NO.	DRAWING NUMBER	REV.
APP'D				A	G-836	18027
APP'D				SCALE	1/2	30° 150
DO NOT SCALE THIS DRAWING				SHEET		OF
FINISH:				SCALE		
UNLESS OTHERWISE NOTED		2 PLC		3 PLC		ANGLE
±		±		±		±
REMOVE BURRS & SHARP EDGES		USED ON		APPLICATION		
SURFACE FIN ✓		MATERIAL:				

Batteries in long term storage should be occasionally "boost" charged as a function of the storage temperature (see Figure 3-3 below) using the charger supplied with the UniMag. Allow 48 hours for boost charging.

Figure 3-3

Months in Storage Prior to Boost Charging

<u>Storage Temperatures</u>	<u>Months in Storage</u>
0° to 30°F (-18° to -1°C)	12
31° to 60°F (-.5° to 16°C) - - (Optimum) - - -	8
61° to 80°F (16.5° to 27°C) - - (Optimum) - - -	4
81° to 100°F (27.5° to 38°C)	2

NOTE: Do not store the battery pack above 100°F (38°C).
 Maximum operating temperature is 140°F (60°C).

3.5 BATTERY INSTALLATION AND REPLACEMENT

The following steps should be followed for the initial installation or replacement of the battery pack (refer to Figure 2-1 for identification of parts).

1. Unsnap the plastic door lock on the bottom rear portion of the UniMag console. Remove the rear door assembly.
2. Remove the battery pack. A protective foam covering has been applied to the battery pack and it may be necessary to GENTLY shake the battery loose from the console. Avoid letting the battery pack fall out of the console as this could damage the connected wires. For initial installation of a battery pack, ignore this step.
3. Connect a fully-charged battery pack using the white, keyed, POWER PLUG. Position the Power Plug between the battery terminals, or as convenient to allow the battery pack to slide completely into the UniMag console.
4. Install the battery pack with the terminals facing the left side of the UniMag console (same side as the door chain retainer nut). Slide the battery pack into the console, replace the rear door and lock it in place.

CAUTION

The battery pack contains Sulfuric Acid which can cause severe burns to skin and eyes and damage to fabrics. In the event the battery leaks and contact is made with the Sulfuric Acid, immediately flush skin or eyes with water for at least 15 minutes. For eyes, seek immediate medical attention. A good neutralizing solution for Sulfuric Acid is water and household baking soda.

3.6 BATTERY CHARGING

The small battery charger supplied with UniMag is compatible with a standard line voltage of either 115 or 220 volts, 60/50 Hz AC power. An AC POWER SELECT slide switch is provided on the charger (see Figure 3-1); use a small screw driver or pencil to select the correct input power. The charger is a constant voltage type designed for boost charging; it does not have the capacity to recharge a battery that has been deeply discharged as discussed earlier in this chapter.

To charge a battery pack, plug the charger into AC power and connect it to the battery pack using the keyed POWER PLUG. On those models equipped with the environmental connector, use the jumper cable to connect the console to the BNC connector on the charger. (The environmental connector on the UniMag console eliminates the need to remove the battery pack.) Observe the following rules to correctly charge the battery pack:

1. Daily use of the UniMag Magnetometer: At the end of each day's use of the magnetometer, it is recommended that the battery pack be recharged overnight, or for at least twelve (12) hours. If it is necessary to use UniMag for longer than one day between charges, the spare (fully charged) battery pack should be installed when the readout display flashes. The discharged battery should then be recharged for a minimum of twenty-four (24) hours or as long as forty-eight (48) hours to ensure full capacity charging.
2. Non-daily use of the UniMag Magnetometer: If it is anticipated that UniMag is not going to be used for several days or weeks, the battery pack should be removed and stored in a refrigerator (see Figure 3-2); this applies to all UniMag models. The UniMag console has no ON/OFF switch, therefore a small amount of current will always flow. The small current drain (approximately 50 μ amps), is insignificant to normal usage of the magnetometer, but if a partially discharged battery pack is left in the instrument for a long period of time, it is possible that this current drain could eventually cause a deep battery discharge. The charger supplied is not designed to overcome the internal resistance caused by a such deep discharge (refer to paragraph 3.2).

Careful attention to the above details regarding battery care and charging will allow years of service from the battery pack.

CAUTION: DO NOT ATTEMPT CHARGING BOTH RECHARGEABLE BATTERY PACKS
AT ONCE, OTHERWISE SERIOUS DAMAGE TO CHARGER WILL RESULT.

PRODUCT SERVICE BULLETIN

PRODUCT: G-836 Magnetometer

DATE: November 1, 1979

SUBJECT: Characteristics and Care of Lead Acid Batteries

DESCRIPTION: It should become apparent after reading this paper that the most important factors in taking care of the G-836 batteries are:

1. Maintaining full charge on the battery.
2. Storing the battery in a cool environment. The following paragraphs will discuss some of the technical details regarding the chemistry and proper care of the gelled, lead acid battery.

DISCUSSION: 1. Deeply discharged batteries. When a lead acid battery has been excessively discharged for an extended period of time the electrolyte is reduced to water. Water, being a poor conductor of electricity, will cause the internal resistance of the battery to increase which will make recharging very difficult. The constant voltage chargers supplied with the G-836 will not supply enough voltage to overcome the internal high resistance.

2. Batteries stored on the shelf will self discharge as a function of temperature. The following table gives an idea of what capacity loss versus temperature is.

Rate of self discharge vs temperature.

<u>Storage Temperature</u> <u>°F/°C</u>	<u>Estimated % Loss</u> <u>Per Day</u>	<u>Percent Capacity</u> <u>Loss in 6 Months</u>
0° / -18°	0.03%	5%
30° / - 1°	0.07%	13%
60° / -16°	0.13%	23%
80° / -27°	0.25%	45%
100° / 38°	0.50%	90%
120° / 49°	1.10%	100% in 90 days
140° / 60°	1.60%	100% in 62 days

It is important to remember that water is one of the products of discharge. When batteries are stored at low temperatures they must be in a fully charged condition to prevent water freezing. Prior to long term storage it is best to leave them on the charger for at least forty-eight (48) hours to insure full charge. It should also be noted that when shipping the G-836 system the batteries included should be at full charge. As a matter of interest, a battery after delivering its full rated capacity will freeze at approximately -6°F.

3. Batteries in storage should be occasionally boost charged. Boost charging should be performed as a function of storage temperature. The following table indicates how often the batteries should be boost charged.

Months in Storage Prior to Boost Charging

<u>Storage Temperatures</u>	<u>Months in Storage</u>
0° to 30° F	12
31° to 60° F	8
61° to 80° F	4
81° to 100° F	2

Batteries must not be stored above 100° F. Maximum recommended operating temperature is 140°F.

Periodic boost charging is conducted by charging the batteries for approximately forty-eight (48) hours at a constant potential. The charger supplied with the G-836 can be used for this purpose.

DAILY MAINTENANCE OF BATTERIES

1. At the end of each day's use, the battery in the G-836 Magnetometer must be recharged. Failure to recharge may result in deep discharge of the batteries, either by excessive use, or by self discharge. Once this condition occurs in the lead acid battery it cannot be recharged with the battery charger supplied with the G-836.
2. After a normal day's usage of the G-836 it is anticipated that an overnight recharge of approximately twelve (12) hours should bring the battery back to total capacity. However, if it is suspected that the battery usage was more than normal then the battery in the G-836 should be removed and a fully charged substitute battery put into the unit. The removed battery should then be charged for a minimum of twenty-four (24) hours and even as long as forty-eight (48) hours in order to insure full capacity recharging.

3. As noted above, the effects of temperature on the battery operation and storage are important. If it is anticipated that the G-836 is not going to be used for several days or weeks, the batteries should be removed from the instrument and stored in a refrigerator. Because the G-836 has no ON/OFF switch, the battery is required to constantly supply current to the circuitry (about 50 μ A). This size drain on a fully charged battery will have no adverse effect. However, on a partially discharged battery this drain could lead to deep discharge. If the battery is left in the instrument for a long period of time it is conceivable that it will become deep discharged. Once in the deep discharge mode the G-836 battery charger cannot recharge the battery.

INTERNAL BATTERY CHARGING PROCEDURE

It is possible to charge the battery in the G-836 console without removing it from the chassis.

1. Locate the 4 ft. interconnect cable with NBC connectors on it.
2. Insert the BNC's into their mating connectors located on the charger and on the G-836 chassis.
3. Charge as normal. After approximately sixteen (16) hours check the charge state by depressing the button on the charger. Simultaneously cycle the G-836 by depressing the read button. If the indicator lamp on the charger remains green the G-836 is ready for service. If the indicator lamp appears red or yellow additional charging time is necessary.
4. If additional charge time fails to bring the battery to full charge, the battery may have sulfated from being in a deep discharge state for an extended period of time. Send the battery with a note of explanation and the instrument serial number to geoMetrics' Sunnyvale facility and we will contact you regarding its repairability.