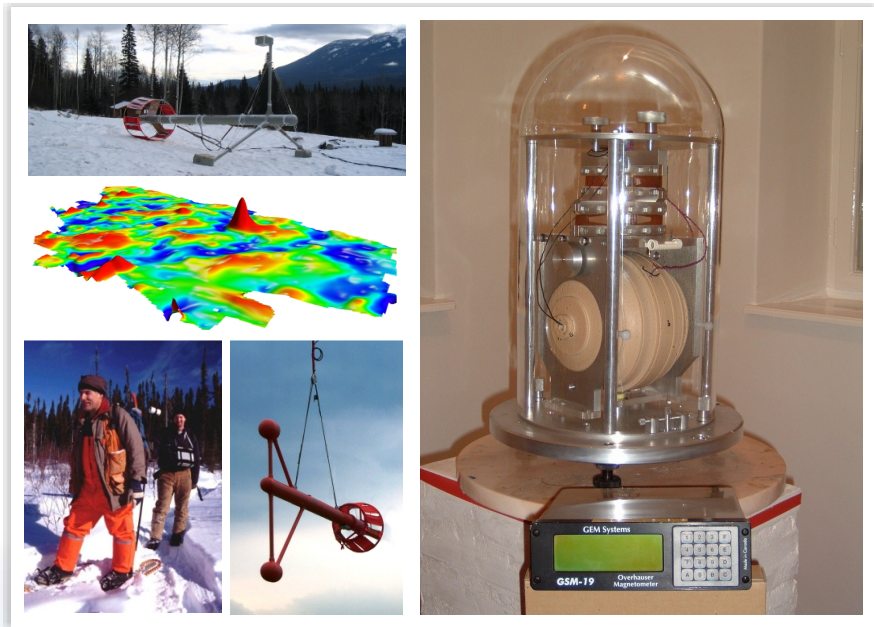


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dIdD v7.0

INSTRUCTION MANUAL



Our World is **Magnetic**

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TABLE OF CONTENTS

1. INTRODUCTION	4
1.1 SIMPLIFYING MAGNETIC MEASUREMENTS.....	4
1.2 SUSPENSION SYSTEM.....	5
1.3 SENSOR AND COILS.....	5
1.4 INSTALLATION INSTRUCTIONS	5
1.5 SUSPENDED dIDD MEASUREMENT	5
1.6 DATA ACQUISITION & DISPLAY SOFTWARE.....	6
2.0 SENSOR SETUP PRIOR TO OPERATION.....	7
2.1 INITIAL DIDD SENSOR OREINTATION	7
2.1 LEVELING THE DIDD HOUSING.....	7
2.3 REMOVING SHIPPING PLATES	8
2.4 SENSOR LEVELING ADJUSTMENTS.....	9
3.0 OPERATING THE GSM-19FD.....	11
3.1 MAIN MENU	11
3.2 SURVEY MODE	11
3.3 TIME	12
3.4 CYCLE RATE.....	13
3.5 AC FILTER	13
3.6 SETUP MENU	13
3.7 TUNING SETTINGS	14
3.8 BIAS SETTINGS	15
3.9 DEFAULT SETTINGS	15
3.10 TIME FORMAT	15
3.11 TEST OPTIONS.....	16
3.12 MEASUREMENTS	17
3.13 INFO MENU	17
3.13.1 Time Display	18
3.13.2 RS-232 Settings.....	18
3.13.3 Buzzer Options	19
3.13.4 Info.....	19
3.14 TEST MENU	19
3.14.1 Memory Test.....	20
3.14.2 Keypad Test.....	20
3.14.3 Display Test.....	20
3.14.4 ROM Checksum.....	21
3.14.5 RF Test.....	21
3.14.6 Buzzer Test.....	21
3.15 ALGINING THE GSM-19FD SENSOR.....	22
3.16 ADVANCED GSM-19FD SIGNAL OPTIMIZATION	22
4.0 OPERATING THE GSM-90FD.....	25
4.1 MAIN MENU	25

4.2	DEFAULTS.....	25
4.3	TESTS	25
	4.3.1 <i>Memory</i>	25
	4.3.2 <i>ROM</i>	25
	4.3.3 <i>Info</i>	25
4.4	SETTING TIME AND DATE.....	26
4.5	DATE	26
4.6	TIME	26
4.7	AC FILTER	26
4.8	RUN	26
4.9	CYCLE TIME.....	26
4.10	BIAS SETTINGS.....	27
4.11	TUNING SETTINGS.....	27
4.12	OUTPUT FORMAT.....	27
4.13	MEASUREMENTS	27
4.14	ALIGNING THE GSM-90FD SENSOR	28
4.15	ADVANCED GSM-90FD SIGNAL OPTIMIZATION	29
5.0	DIDD PC SOFTWARE.....	30
6.0	STORING THE MAGNETOMETER.....	31
	GSM-19FD	31
	GSM-90FD	31
7.0	CHARGING THE BATTERY	31
8.0	MAINTINING THE SYSTEM.....	32
9.0	WARRENTY	32
APPENDIX A	– MAGNETIC MAPS.....	33
	MAGNETIC FIELD INTENSITY	33
	MAGNETIC FIELD INCLINATION	34
APPENDIX B	– DIDD SPECIFICATIONS.....	35
	PERFORMANCE	35
	RATE OF READING	35
	RANGE OF MEASUREMENT.....	35
	OPERATING MODES	35
	DIMENSIONS	35
	WEIGHTS	35
APPENDIX C	– GPS OPTION	37
APPENDIX D	DETAILED SETUP TUTORIAL.....	41
	D1 CHOOSE A SITE.....	41
	D2 CONNECT ALL CABLES.....	41
	<i>D2.1 dIdD Sensor to Console Cables</i>	41
	<i>D2.2 Console to Battery and Computer Cable</i>	43
	D3 SET THE POSITION OF THE SENSOR (ROUGH)	43
	D4 SET THE TUNING.....	43
	D5 SET THE CORRECT VALUE OF THE FIELD.....	44
	D6 CUSTOMIZE THE BIASES (OPTIONAL).....	45

<i>D6.1 Changing the Order of Fields</i>	45
<i>D6.2 Turning the Bias Off</i>	46
D7 RUN THE MAG AND MAKE FINE ADJUSTMENT.....	46
D8 PERFORM EXACT ADJUSTMENT (OPTIONAL)	47
<i>D8.1 Changing the Delays</i>	47
<i>D8.2 Changing the Short Deflect</i>	47
D9 START YOUR SURVEY.....	48
D10 USING THE DIDD SOFTWARE.....	48
D11 COMMUNICATING OVER DISTANCES	51
<i>D11.1 Using a Local Computer</i>	51
<i>D11.2 Using Radio Modems</i>	51

1.0 INTRODUCTION

In the past, magnetic observatories relied on a combination of Overhauser, fluxgate and theodolite instruments for measurements of the total field and variability measurement. GEM then introduced the dIdD (delta Inclination / delta Declination) vector system for high precision results.

The dIdD has now been enhanced significantly with the development of the Suspended dIdD system. The Suspended dIdD comprises a revolutionary small diameter (250 mm), spherical Overhauser sensor with a bi-directional set of bias coils. Data is acquired directly to a GEM Overhauser magnetometer.



Figure 1: Suspended dIdD with view showing version with housing removed and advanced spherical sensor from GEM.

1.1 Simplifying Magnetic Measurements

The Suspended dIdD simplifies the set-up of magnetic observatory installations by eliminating the need for fluxgate magnetometers and thermally insulating structures. In addition, the new system minimizes ongoing system calibrations, which, in turn, frees personnel to concentrate on other more essential tasks.

The following important new benefits are achieved through system design:

- Low temperature coefficients reduce drift to less than 0.1 nT / °C (compared with 0.5 nT / °C for high-end fluxgate magnetometers)
- Physical suspension of the Overhauser sensor is shown experimentally to contribute to the reduction of drift
- Long term drifts are less than 2 nT / year - matching or exceeding the best component measurement at any observatory

Ultimately, the system also exceeds specifications set by Intermagnet, the global network of observatories monitoring the Earth's magnetic field (www.intermagnet.org).

1.2 Suspension System

The new dIdD magnetometer uses a set of two beryllium/bronze springs for suspension. These springs are perpendicular to each other for stability. Even if the base or suspending part is tilted, the two springs ensure that the coils keep the same orientation or altitude.

The benefit is that the axis between the coils and the planes of measured magnetic fields does not change, ensuring precision measurement.

1.3 Sensor and Coils

A key engineering design consideration was the development of Overhauser sensors that were optimally shaped to better interact with the magnetic fields surrounding the coil. Figure 1 shows an image of the novel spherical sensor that was implemented in the Suspended dIdD.

The external casing is impact resistant plastic. An upper support plate ensures that there is no movement of the sensor. The smaller sized sensor has advantages in terms of robustness (i.e. it is more durable than previous generations of larger, cylindrical sensors).

It is also easier to suspend and can be transported more readily using an immobilizing mechanism.

1.4 Installation Instructions

For information on installation, and especially sensor alignment, refer to Chapter 2.1, "Aligning the Sensor". Chapter 3, "Additional Setup Notes" provides general details on setting up the system.

1.5 Suspended dIdD Measurement

The Suspended dIdD is a vector magnetometer for continuous monitoring of the inclination, declination and total intensity of the Earth's magnetic field. This combination differentiates it from fluxgate instruments, which only provide inclination and declination.

GEM's dIdD employs a mutually orthogonal coil system that measures one unbiased and four biased values of the total magnetic field. The coils are oriented to be perpendicular to the Earth's magnetic field vector F . One (Declination) coil is in the horizontal plane and one (Inclination) coil is in the vertical geomagnetic meridian plane.

Equal and opposite bias currents are introduced sequentially in the Inclination (I) coil. The resultant deflected values of F in the geomagnetic meridian plane are called the I_p and I_m values. The Overhauser magnetometer records these values as well as the un-deflected value.

Then, equal and opposite currents are sequentially introduced into the Declination coil (D). The resultant deflected values of F in the geomagnetic East-West direction are called the D_p and D_m values. The Overhauser magnetometer also records these values.

A simple algorithm determines the subsequent instantaneous angular changes in the direction of the Earth's magnetic field vector, F . These angular changes are dI and dD .

Adding dI and dD to baseline values of Inclination and Declination gives instantaneous Inclination and Declination values for F (baseline values are determined from absolute measurement.)

1.6 Data Acquisition & Display Software

GEM's custom data acquisition and display software is a Windows 98/NT interactive interface. The software saves the calculated values to a disk file and displays the values in text and graph modes for easy monitoring of system functions.

The dIdD analog display charts the incoming data versus time. Separate charts show Total Field, East, North and Vertical components. Inclination and Declination charts are shown in graphical windows displayed below these values.

2.0 SENSOR SETUP PRIOR TO OPERATION

Before proceeding with initial measurements (also refer to the section on Aligning the Sensor) it is important to adjust the sensor. This includes leveling the sensor, removing the “shipping plates” and releasing designated sensor restraining bolts as described below:

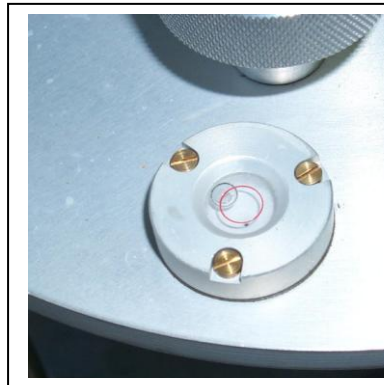
Note: These adjustments apply to both the GSM-19FD and GSM-90FD models

2.1 Initial dIdD Sensor Orientation

To start, the dIdD sensor should be placed on a clean flat surface away from ferro-magnetic objects. The sensor should be placed with the label N facing North.

2.2 Leveling the dIdD Housing

The suspended dIdD housing must be leveled using the supplied level located on the top plate as a reference. Using the adjustable tripod legs, the sensor should be leveled so that the bubble is within the defined area.

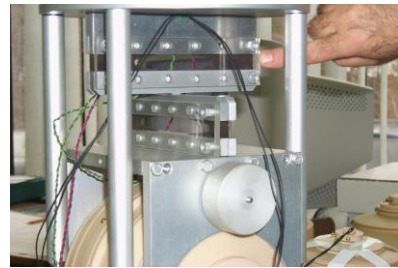


2.3 Removing the Shipping Plates

a. Remove the plastic dome. This can be replaced after all adjustments as long as it does not touch or interfere with the sensor or its cables. Unscrew and remove the four nuts on the plastic shipping plates. Remove the plastic plates and screw the nuts back into place. The location of these nuts is shown on the following diagrams.

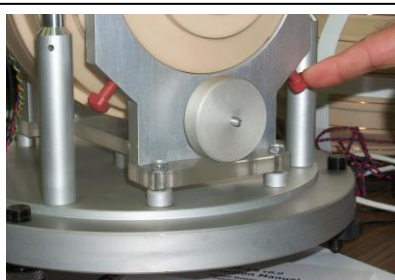


a. Lower Spring Shipping Plate and Nuts



a. Upper Spring Shipping Plate and Nuts

b. Unscrew the four sensor restraining bolts. It is not necessary to remove them; only to unscrew (i.e., release) them. This will enable you to position the sensor as required for measurement (i.e., will allow the coil system to rotate around its horizontal or X axis). They can be tightened once the fine adjustment is completed.



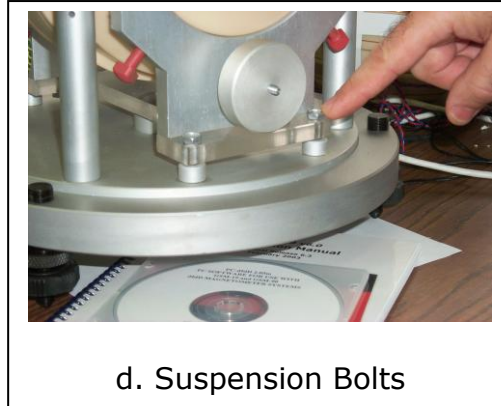
b. Sensor Restraining Bolts



c. Oil Container

c. Unscrew the oil container shown in the picture and fill up the wider part (please see inside) with silicon oil. Put it back in place

d. Unscrew and remove the four suspension bolts at the base of the unit. This enables the unit to suspend itself properly for measurement.



d. Suspension Bolts

2.4 Sensor Leveling Adjustments

Use the top adjust knobs to lift suspended sensor housing to the top plate. Ensure that both knobs are tight and secure.

By using the level on the sensor as a Reference, the sensor level can be adjusted precisely using the adjust knobs at sides of sensor.

These steps may need to be repeated since the sensor may need to be moved for bias adjustment. It is important that the sensor is level, not interfering with its housing or cables and is therefore allowed to hang freely.

The sensor can be adjusted by using a combination of the two knobs on the top plate, two upper and two lower sensors adjust knobs and the weight directly across from level (not shown).

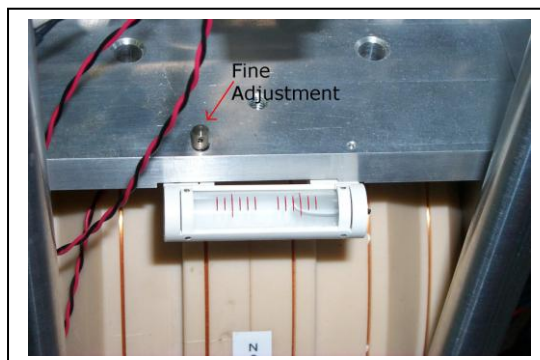


Important!

Do not touch the sensor coil interface adjustment. This has been factory calibrated to minimize interference between inner and outer coils. Failure will result in additional noise in readings and cross coupling between I and D measurements.



Do not touch the sensor fine level adjustment. This has been factory calibrated. The level should be in line with the sensor axis. In the remote case that it was moved it can be readjusted by turning the screw as required.



3.0 OPERATING THE GSM-19FD

Press **B**-power to turn on the console. The main menu will be displayed. To turn the console off press keys **0** and **F** simultaneously, hold and release.

3.1 Main Menu

The main menu will be displayed and can be reached at any time by pressing keys **1** and **C** simultaneously and then releasing.

SCREEN 1

```

A-survey
C-info   OF-off   D-test   15 II 2000
                                     TU
E-time-sync           00:12:55
                                     12.7V
  
```

3.2 Survey Menu

To access the dIdD survey mode press **A**-survey. The factory default has no previous survey performed so the survey selection option will be displayed. Press **D**-DIDD. If a previous survey has been performed then the DIDD survey menu will automatically be displayed.

SCREEN 2

```

D-DIDD
  
```

The dIdD survey menu will be displayed.

SCREEN 3

```

survey mode   time   cycling
AC filter
connect sensor now
DIDD
A-start           C-change ← BF →
  
```

Using keys **B** or **F** the operator can scroll backwards or forwards to change or set options as required.

3.3 Time

Press **B** or **F** to scroll and highlight time

SCREEN 4

```

survey mode      time  cycling
AC filter
15 II 2000 MO 15:05:04
this time has been set by keyboard
A-start          C-change ← BF →
  
```

The line that has “this time has been set by keyboard” can also have other values as follows:

has been set by GPS.

has been set by default.

has been set by cable synch.

To change the time, press **C-change** and the following screen is displayed:

SCREEN 5

```

wyyymmddhhmmss
c-clear
  
```

Now enter the date and time. In case of a typing error, press **C**.

w - weekday, 1 - Monday, 7 - Sunday

yy - year

mm - month

dd - day

hh - hours in 24h system

mm - minutes

ss - seconds

When all of the digits are entered the unit displays the following screen:

SCREEN 6

```

F-start-clock
  
```

Press **F** when you intend to start the time.

NOTE:

Units equipped with GPS overwrite this time with Universal Time Co-ordinate (UTC) when GPS is enabled.

3.4 Cycle Rate

Press **B** or **F** to scroll and highlight the cycling option.

SCREEN 7

survey mode	time	cycling
AC filter		
0001.0 sec cycle time		
A-start	C-D+ ←	BF →

Press **C** - to decrement the cycle time

Press **D** + to increment the cycle time

Available cycle times for dIdD are 1.0s, 0.5s, 0.4s and 0.2s.

3.5 AC Filter

Press **B** or **F** to scroll and highlight the AC filter option.

SCREEN 8

survey mode	time	cycling
AC filter		
50Hz		
A-start	C-change	← BF →

Press **C** to toggle between 50Hz, 60Hz and no filter to help reduce AC interference.

3.6 Setup Menu

Press **A**-start to enter the dIdD Setup Menu where survey options will be displayed.

SCREEN 9

1	-WE decl+	C+D-	48
2	-EW decl-	C-D+	48
3	-no bias		47
4	-NS incl+	A-B+	48
5	-SN incl-	A+B-	48
0-test A-start B-bias C-tuning			
D-default E-output-format			

NOTE:

The default tuning digits may be different on different software versions.

3.7 Tuning Settings

From screen 9 press C - change-tuning. The tuning settings screen will be displayed. This permits the operator to set the tuning for the un-biased total field. The first two digits of the expected magnetic field for all five entries can be entered.

SCREEN 10

48
tuning 19-131 microT
F-ok C-change number

dIdD tuning screen

Press **F-ok** to accept displayed value

OR

Press **C-Change** to edit the desired tuning

SCREEN 12

0
tuning 19-131 microT
E-enter C-clear

Enter the 2 digit tuning manually using the keypad. Select **E-enter** to accept or **C-clear** to clear. Select **F-ok** to accept

When the tuning has been modified or acknowledged the display returns to the dIdD Main Screen.

NOTE

The tuning settings may need re- adjusting after the sensor is aligned to the magnetic field.

3.8 Bias Settings

From screen 9 press **B** - bias. This displays the bias sequence for each of the five dIdD readings. Press F to return to survey menu.

SCREEN 13

A -WE decl+ C+D- B -EW decl- C-D+ C -no bias D -NS incl+ A-B+ E -SN incl- A+B-	F
--	---

3.9 Default Settings

From screen 9 press **D** – default to install the factory defaults. This will overwrite any changes entered by operator. It returns the unit to the default values of bias sequence and tuning of the console which are also the power-up default settings of the dIdD PC software.

The current defaults are:

1.Tuning:

47

2. Defect used for measurement.

15 units = 1.8us

3. Delays for falling edge of zero crossing to deflect.

Bias 1	4200 units
Bias2	4200 units
Bias3	4200 units
Bias4	4200 units
Bias5	4200 units

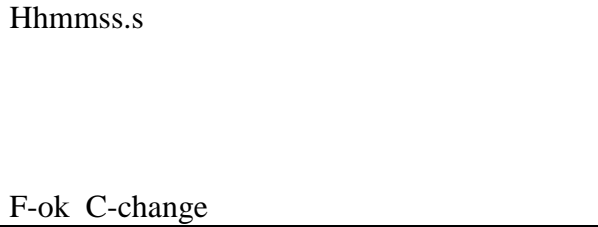
3.10 Time Format

From screen 9 press **E**–output-format to toggle the output format of the RS232 string containing the time/date stamp.

Note:

RS-232 baud rate parameters require configuration under C-info B-RS-232 settings from main menu.

SCREEN 14



Hhmmss.s

F-ok C-change

Press F-ok to accept or C-change to change the output format.

Note:

The interpreting software supplied with the GSM-19, both dIdD and GEMdIdD require the RS232 format hhmmss.s

If an improper time/date stamp format is selected, the software does not recognize the stream of data received on the RS232 port and it will not work.

Other interpreting software not provided by GEM Systems may require the format *yymmddhhmmss.s.

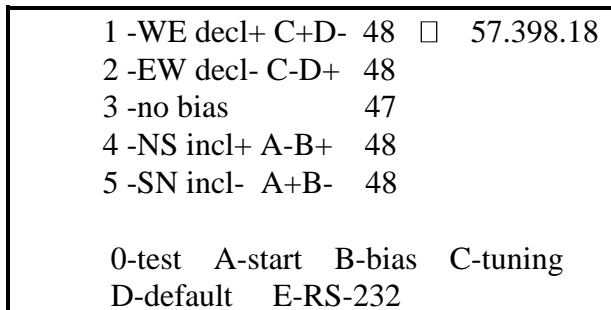
3.11 Test Options

From screen 9 each dIdD bias sequence can be tested independently by following combinations below. This should be used to align the sensor. Also See “Aligning the GSM-19FD or 90FD Sensor”

1 to 5 - These keys select which bias sequence is to be selected. For example, for the default bias sequence **1- WE decl+ C+D-**, the system selects WE bias. The biasing current is applied to the Declination coils (pins C and D of the 6 pin connector) with the polarity indicated. A black rectangle at the right of the tuning digits indicates the active bias.

0-test - Takes a single test reading using the coil-bias combination selected with the above keystrokes. The measured field in nT is shown at the right side of the black rectangle as shown in the following picture. These readings are used to align the sensor to the direction of the magnetic field.

SCREEN 15



1 -WE decl+ C+D-	48	□	57.398.18
2 -EW decl- C-D+	48		
3 -no bias	47		
4 -NS incl+ A-B+	48		
5 -SN incl- A+B-	48		
0-test A-start B-bias C-tuning			
D-default E-RS-232			

Therefore to test bias 1: First press the “1” key. A black box will appear beside the two digit tuning. Now bias 1 sequence is selected. Next press the “0” key to actually take a reading. The magnetic field will be displayed. This procedure should be repeated to test each bias.

3.12 Measurement

From screen 9 press **A** – start. The dIdD will start cycling. A black box will indicate which bias sequence is being measured.

SCREEN 16

47,195.04 nT	<input type="checkbox"/> 99
47,195.05 nT	99
46,195.06 nT	99
47,195.07 nT	99
47,195.08 nT	99

NOTE

The dIdD reading is composed of 5 readings (normally 4 biased and 1 unbiased). The rate of the calculated dIdD data (incl, decl, Δ incl, Δ decl, X, Y, Z) is five times the cycling rate set for the console.

Therefore,

1 second cycling rate correspond to a 5 seconds dIdD mode.

0.5 seconds cycling rate correspond to a 2.5 seconds dIdD mode.

0.2 second cycling rate which correspond to a 1 second dIdD mode.

3.13 Info Menu

Press **C**-info from to display the info menu. To return to the main menu press the **1** and **C** combination. When prompted press **F** to return to the test menu.

SCREEN 17

F-time B-RS-232	
2-buzzer	3-info

3.13.1 Time Display

Press **F**-time to display the time set in the console. Press and hold **F** to freeze the display. once released display will show updated time.

SCREEN 18

```

15 II 2000
  TU
  03:44:16
F

```

3.13.2 RS-232 Settings

Press B-RS-232 to display the Real Time Transmission (RTT) settings.

```

RS-232 115200 bps (RTT)

8 data bits
1 stop bit
no parity

F-ok C-change

```

Press F-ok to return to info menu. If C-change is selected available baud rates will be displayed

SCREEN 20

```

19200 28800 38400 9600 14400
57600 115200
A-select ← BF →

```

Press B or F to scroll through available options and press A-select and then F-ok.

3.13.3 Buzzer Options

Press 2-buzzer to display buzzer status.

SCREEN 21

buzzer disabled

F-ok C-change

Press F-ok to accept or C-change to toggle between buzzer disabled, on error messages, & keystrokes

3.13.4 Info

Press 3-info to display the console's information including model number, serial number, software version / date and GEM Systems contact information

SCREEN 22

Gem Systems GSM-19FD 6091211
52 West Beaver Creek Road #14
Richmond Hill, Ontario L4B 1L9
Canada
tel 905-764-8008 fax 764-2949
www.gemsys.ca
info@gemsys.ca
v7.030 V 2006 A e1didd.v7

3.14 Test Menu

Press D-test to display the test menu from main menu. The installed software date will be displayed on the last line. To return to the main menu at any time press 1 and C key combination. When prompted press F to return to the test menu.

SCREEN 23

A-memory B-keys

C-Display D-rom

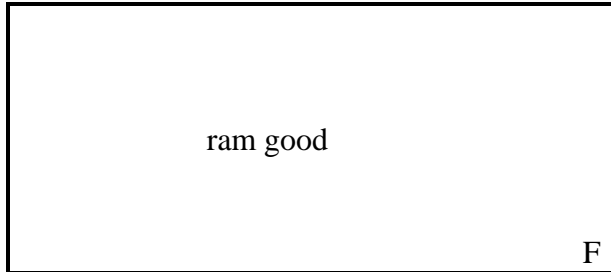
5-RF F-buzzer

v7.0 30 V 2006 A

3.14.1 Memory Test

Press A-memory to test the console ram. Message “testing ram” followed by “ram good” should be displayed.

SCREEN 24



3.14.2 Keypad Test

Press B-keys to test the keypads keys independently. As the key is pressed on the keypad it should be displayed on the screen. Once completed press 1 and C to return to the main menu.

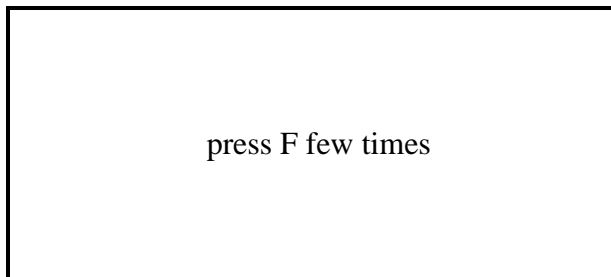
SCREEN 25



3.14.3 Display Test

Press C-Display to test the display. Press F to scroll through each display test. Once completed test menu will be displayed.

SCREEN 26



Press F 7 times to scroll through all tests and return to test menu

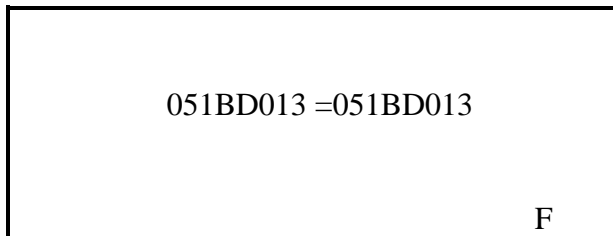
SCREEN 27
6 different display
Patterns



3.14.4 ROM Checksum

The software ROM checksum installed can be checked versus a calculated value. The value displayed should be equal on both sides.

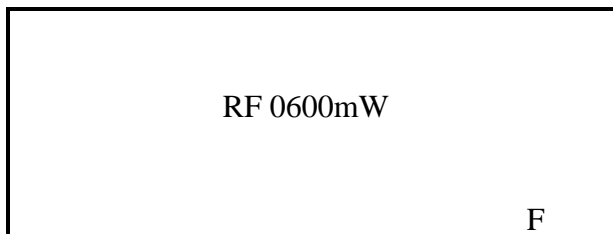
SCREEN 28



3.14.5 RF (Radio Frequency) Test

The RF used to polarizer the sensor can be checked. Press5-RF to test the RF. The value should be around 600mV. Note: Varies up to 1200mV for dIdD

SCREEN 29



3.14.6 Buzzer Test

The internal buzzer can be tested by pressing F-buzzer. The buzzer will sound on and off. If the buzzer is disabled the message “enable buzzer first” will be displayed. See 3.10.2.3 buzzer.

SCREEN 30



3.15 Aligning the GSM-19FD Sensor

NOTE:

The sensor must be placed on a solid, horizontal surface. This is the starting point of a proper alignment. Correct alignment of the sensor is crucial in order to obtain correct readings.

Proper alignment is accomplished by measuring EW (Declination) and NS (Inclination) biased magnetic fields using direct and reverse biasing. When the readings taken using direct bias equal the readings taken using reverse bias the sensor is correctly aligned.

EW alignment is determined by the Declination coil (pins C and D of the 4pin bias connector) which is the outer coil.

NS alignment is determined by the Inclination coil (pins A and B of the 4pin bias connector) which is the inner coil (not visible).

When properly aligned the EW /WE and NS / SN readings will be within +/-1nT respectively.

Start with the WE / EW alignment. For the default bias sequence of screen 9

Press **1**-WE(D+) and then press **0**- test : to read WE or direct bias on the D coil.

Press **2**-EW(D-) and then press **0**- test : to read EW or reverse bias on the D coil.

Rotate the sensor and repeat the above steps until both readings are as close as possible to each other (within +/- 1 nT).

Then proceed with NS / SN alignment.

Press **4**-NS(I+) and then press **0**- test : to read NS or direct bias on the I coil.

Press **5**-SN(I-) and then press **0**- test : to read SN or reverse bias on the I coil.

Adjust the dip angle of the sensor and repeat the above steps until both readings are as close as possible to each other (within +/- 1 nT).

The adjustment of one direction could affect the adjustment of the other. Repeat the above steps until the sensor is correctly aligned in both directions.

NOTE:

Alternatively the position of the sensor could be aligned with the unit cycling in the dIdD mode. While checking the readings on the screen, rotate the sensor and change the sensor's dip angle until the readings for reverse and forward bias are equal.

3.16 Advanced GSM-19FD Signal Optimization

Optionally the dIdD magnetometer signals can be monitored and adjusted for optimum performance. The duration of the deflect pulse and synchronization delay for each of the 5 sequences can be adjusted.

From screen 9 press keys **8** and **9** simultaneously. Starting values can be entered or displayed.

SCREEN 31

15
short defl 200 is 17.6us
F-ok C-change-number

The duration of the deflect can be entered. 10 units should be approx optimum. Press F-ok to accept. The following displayed screens will allow for the adjustment of delays and synchronization.

SCREEN 32

2700	1
DIDD	
F-ok C-change-number	

Press F-ok to accept or C-change-number to edit the selection. Each of the 5 bias selections will be displayed and each delay can be checked or changed. After the last bias sequence the software will return to the dIdD tuning and test menu screen 9.

The dIdD software also has the ability to allow the operator to change both the deflect pulse duration and the synchronization delay in real time while cycling within dIdD mode.

From screen 9 press A-start. The dIdD will begin to cycle. The signal output can be monitored using an oscilloscope or via the digital readout. The deflect or synchronization delay values will only be displayed as they are either decreased or increased on the keypad. The signal should be adjusted for maximum output while maintain constant amplitude.

SCREEN 33

47,195.04 nT	<input type="checkbox"/> 99
47,195.05 nT	99
46,195.06 nT	99
47,195.07 nT	99
47,195.08 nT	99

To change either the deflect duration or delay duration the operator must press and hold the desired key.

For Deflect changes: (Applies to all 5 sequences)

Press and hold 8 to increase short deflect length by 1 unit
 Press and hold 0 to decrease short deflect length by 1 unit

Note: As soon as either 8 or 0 is pressed a 3 digit number (eg. 015), deflect duration units, will be displayed on line 8 of display.

For Delay timing changes:

Press and hold 1 to decrease bias 1 sequence delay by 100 units
 Press and hold 2 to decrease bias 2 sequence delay by 100 units
 Press and hold 3 to decrease bias 3 sequence delay by 100 units
 Press and hold 4 to decrease bias 4 sequence delay by 100 units
 Press and hold 5 to decrease bias 5 sequence delay by 100 units

Press and hold A to increase bias 1 sequence delay by 100 units
 Press and hold B to increase bias 2 sequence delay by 100 units
 Press and hold C to increase bias 3 sequence delay by 100 units
 Press and hold D to increase bias 4 sequence delay by 100 units
 Press and hold E to increase bias 5 sequence delay by 100 units

Note: As soon as any of the above 10 keys are pressed then a 5 digit number is displayed on line 8 representing the delay in units (eg. 4200) followed by a 4 digit amplitude (eg 2000) measurement for the period which is adjusted

4.0 OPERATING GSM-90FD MAGNETOMETER

When power is turned on the dIdD main menu and the default power-up settings are displayed.

```
Gem Systems GSM-90F5D 5041529 v7.0 11 X 2006 M e90F5D.v7
?-menu &-defaults !-tests Cyymmddwhhmmss-set-time
d-date t-time 5-50Hz 6-60Hz 0-no-filter
R-run cycle-time D-down U-up B-bias T-tuning E-output-format
12.1V hmmmss.s 0.4s 50Hz AC filter
```

4.1 Main Menu

The main menu can be displayed by sending [?]. When cycling press [S] to stop. The battery voltage, output format, cycling rate and AC filter settings are displayed in the last line.

4.2 Defaults

Send [&] to restore factory defaults

4.3 Tests

Send [!] to display test menu. The current tuning and bias settings will be displayed. Press [S]-menu to return to the main menu.

```
M-memory R-rom i-info S-menu
a-WE decl+ C+D- 44.9
b-EW decl- C-D+ 44.9
c-no bias      44.2
d-NS incl+ A-B+ 44.9
e-SN incl- A+B- 44.9
```

4.3.1 Memory

Press [M] to test the internal memory. Message “ram good” displayed

4.3.2 R-rom

Press [R] to display software rom checksum.

4.3.3 I-info

Press [I] to display system information

4.4 Setting the Time and Date

Press [C] followed by 13 digits. For example C9905201201545 will set the internal time chip to year 99, month May, day 20, 1 is for Monday, 7 for Sunday and time 20:15.45 hhhmss which is in 24hr format. After the last digit is entered the unit will prompt you to press [S] to start the timer.

4.5 Time

Press [t] to display the time in hhhmss format

4.6 Date

Press [d] to display the date in yyyy-mm-dd format

4.7 AC filter

Press [6]-60Hz, [5]-50Hz or [0]-no to select and toggle between the appropriate AC filter.

4.8 Run

Press [R] to start and take readings. Press [S] to stop.

4.9 Cycle Time

Press [U] to increase cycle time to minimum 1s

Press [D] to decrease cycle time to maximum 0.2s

The power-up default cycling time is 0.2 seconds (5 readings/sec.). The possible cycling rates are:

1 second cycling rate. Since the dIdD reading is composed of 5 measuring periods (normally 4 biased and 1 unbiased) this cycling rate correspond to a 5 seconds dIdD mode.

0.5 seconds cycling rate which correspond to a 2.5 second dIdD mode.

0.4 seconds cycling rate which corresponds to a 2 second dIdD

0.2 second cycling rate which correspond to a 1-second dIdD mode.

4.10 Bias Settings

Bias is a DC current applied through the coils to generate magnetic fields around the Overhauser sensor. Press [B]-bias to display the default settings

1-WE[decl+]C+D-	(Dp)
2-EW[decl-]C-D+	(Dm)
3-no-bias	(Total Field)
4-NS[incl+]A-B+	(Ip)
5-SN[incl-]A+B-	(Im)

As an example, on WE[decl+]C+D- WE means a West-East field; [decl+] means positive bias of the declination coil; C+D- represent the pins and the polarity of the bias 4 pin connector. Later, (Dp) indicates the name of the column as it appears on the GEM dIdD PC software.

Press [?]-menu to display main menu

4.11 Tuning Settings

The unit must be tuned to the value of the expected total field

Press [T] followed by the 2-digits expected field in kilogamma for the total field

Example: Total Field 55,000nT

After pressing [T] and entering 55

tuning 19-131 microT 1 55

4.12 Output Format

Press [E] to toggle between the valid RS-232 output formats

```
yyyyymmddhhmss.s
hhmss.s
```

When using the dIdD PC software select the time only RS-232 output format

4.13 Measurement

When the sensor and console are properly set, use command [R] to run dIdD from the main menu. GEMlinkW or any standard RS232 communication program will the raw data transmitted from the mag (time stamp, biased and unbiased readings)

4.14 Aligning the GSM-90FD Sensor

Correct alignment of the sensor is crucial in order to obtain correct readings.

NOTE:

The sensor must be placed on a solid, horizontal surface and level provided. Sensor indicator should be facing north. This is the starting point of a proper alignment. The alignment procedure for GSM-19FD and GSM-90FD or identical other than the command set.

Alignment is accomplished by measuring NS (Inclination) and EW (Declination) biased magnetic fields using direct and reverse biasing. When the readings taken using direct bias equal the readings taken using reverse bias the sensor will be correctly aligned in the corresponding plane.

WE / EW alignment is determined by the Declination coil which is the outer coil.

NS / SN alignment is determined by the Inclination coil which is the inner coil (not visible).

It is possible to a single magnetic field reading for each coil bias tuning separately when in test menu and by pressing.

```
[a] -bias 1 Default WE
[b] -bias 2 Default EW
[c] -bias 3 No bias
[d] -bias 4 Default NS
[e] -bias 5 default SN
```

These commands can be used to align the sensor to the direction of the magnetic field

Press [a] WE[decl+]C+D- to read WE or direct bias on the D coil. ie 56,123.23 0378

Press [b] EW[decl-]C-D+ o read EW or reverse bias on the D coil. ie 56,123.32 0350

The first number represents the magnetic field and the second the amplitude of the signal

Rotate the sensor and repeat the above steps until both readings are as close as possible to each other (within +/- 1 nT). The signal amplitudes should also be as close as possible for all periods.

Then proceed with NS(I) alignment.

Press [d] NS[incl+]A-B+ to read NS or direct bias on the I coil.

Press [e] SN[incl-]A+B- to read SN or reverse bias on the I coil.

Adjust the dip angle of the sensor and repeat the above steps until both readings are as close as possible to each other (within +/- 1 nT).

Press [c] to read unbiased total magnetic field

4.15 Advanced GSM-90FD Signal Optimization

Optionally the dIdD magnetometer signals can be monitored with oscilloscope or by digital readout to optimize signal amplitude. The duration of the deflect pulse and delay used to generate and synchronize the signals can be adjusted.

From the test menu send [~]

1. Set 4 digit number from 0200 to 0420 for deflect. The default for 0.2s operation is 0200
2. Set 4 digit number from 2700 to 4200 for delay. The default for 0.2s operation is 2500

Press [S] to return to the main menu and [R] to start cycling. Monitoring the signal with an oscilloscope or using the digital readout the signal should be adjusted for maximum amplitude while maintaining proper synchronization.

This can be accomplished in real-time.

To adjust Deflect press and hold [a] to decrease or [b] to increase

To adjust Delay for bias 1 press and hold [1] to decrease or [A] to increase.

To adjust Delay for bias 2 press and hold [2] to decrease or [B] to increase.

To adjust Delay for bias 3 press and hold [3] to decrease or [C] to increase.

To adjust Delay for bias 4 press and hold [4] to decrease or [D] to increase.

To adjust Delay for bias 5 press and hold [5] to decrease or [E] to increase.

5.0 dIdD PC Software

The GSM-19FD and GSM-90FD do not store any data. A PC must be used to save the data. The provided GEMLinkW3.0 can be used to capture the raw data and setup the instrument. Optionally the provided PC dIdD software can be installed and used to capture and graph the data.

The values of ΔI , ΔD , and the three field components can be calculated by the PC dIdD software after a 2min Gaussian filter (Intermagnet Gaussian Filter) is applied.

Install the dIdD software from the GEMLink CD. Close GEMlinkW3.0 or any other communication applications before starting the dIdD acquisition program to avoid port conflicts.

Start the PC dIdD acquisition program,

If the magnetometer has been setup and started using GEMLinkW3.0 the data will be observed in realtime – no action is required. IF the system is to be setup using the PC dIdD software please refer to the instruction manual.

NOTES:

Changing the bias sequence of the console, affects the order in which the data is sent through the RS232 line, and therefore, the order in which the data is received by the terminal or computer.

The dIdD PC software must be changed accordingly so the ΔI and ΔD values are calculated from a correct set of data orderly received. For this purpose, use the submenu Bias sequence under the Options menu which allows changing the bias sequence. It is recommended to make all changes using this menu since it automatically matches the sequence of the magnetometer to the selected sequence on the PC software.

The dIdD console will accept any combination of biases and periods including all readings to be unbiased. The dIdD PC software however, will require all biases to be different to avoid incorrect calculations or mathematical errors.

Older versions of dIdD PC software do not include a magnetometer menu that provides full control of the unit without the need of GEMlinkW3.0s. By default the latest software available is on the GEMLink CD. Check with GEM Systems for further information regarding upgrades.

6.0 STORING THE MAGNETOMETER

GSM-19FD

The unit goes to **shelf-off mode automatically after 24 hours** of being turned off (**OF** command).

To minimize power consumption from the battery when the unit is not in service, the shelf-off function switches OFF the main power and also powers down the internal oscillator that normally maintains time. Date and Time *have to be programmed again* the next time you use the unit.

NOTE that date and time can only be maintained within 24 hours after the unit is switched off.

If the unit is stored for very long time in addition to the automatic shelf-off function, the internal battery should be periodically recharged (see below).

GSM-90FD

The GSM-90 does not have an internal battery. Settings such as time will be lost when external power is removed and will need to be set each time unit is powered.

7.0 CHARGING THE BATTERY (IMPORTANT!)

This applies only to GSM-19FD model

The internal battery is 12V lead acid 2.0 Ah battery. To maximize its lifespan, you **MUST** maintain it in the following manner:

- **Do not allow the battery to fully discharge** since this may cause internal leakage or shorts.
- Even if an external battery is used, charge the internal battery frequently.
- Always keep it charged (charger is automatic so overcharging is not possible). Additionally, the shelf-off function is triggered automatically after 24 hours of having the unit switched off by pressing **OF**.
- If the unit is used daily, always charge it overnight.

If the unit is left “on” for a long period of time and the battery voltage drops to 8.5V, it automatically switches off. 24 hours later the automatic shelf-off is triggered.

NOTE:

Batteries are NOT included in the normal warranty provided by GEM as their lifespan is determined by the way in which they are normally maintained.

8.0 MAINTAINING THE SYSTEM

Except for exchanging sensors or sensor cables, the instrument is generally not field-serviceable. Numerous self-test possibilities and warnings make the diagnostics reasonably easy though.

The sensor should be kept clean and free of ferro-magnetic particles, dust, etc.

The liquid of the Overhauser sensors is sealed in a pyrex bottle. Refilling is neither possible nor needed.

9.0 WARRANTY

ALL GEM Systems magnetometers **excluding batteries** are guaranteed for replacement of defective parts and correction of defective labor for two years from shipping date. Shipping costs are not covered.

IMPORTANT NOTE:

Any unauthorized opening of the sensor or console without written consent of GEM Systems, Inc. will void the warranty.

APPENDIX A: GLOBAL MAGNETIC MAPS

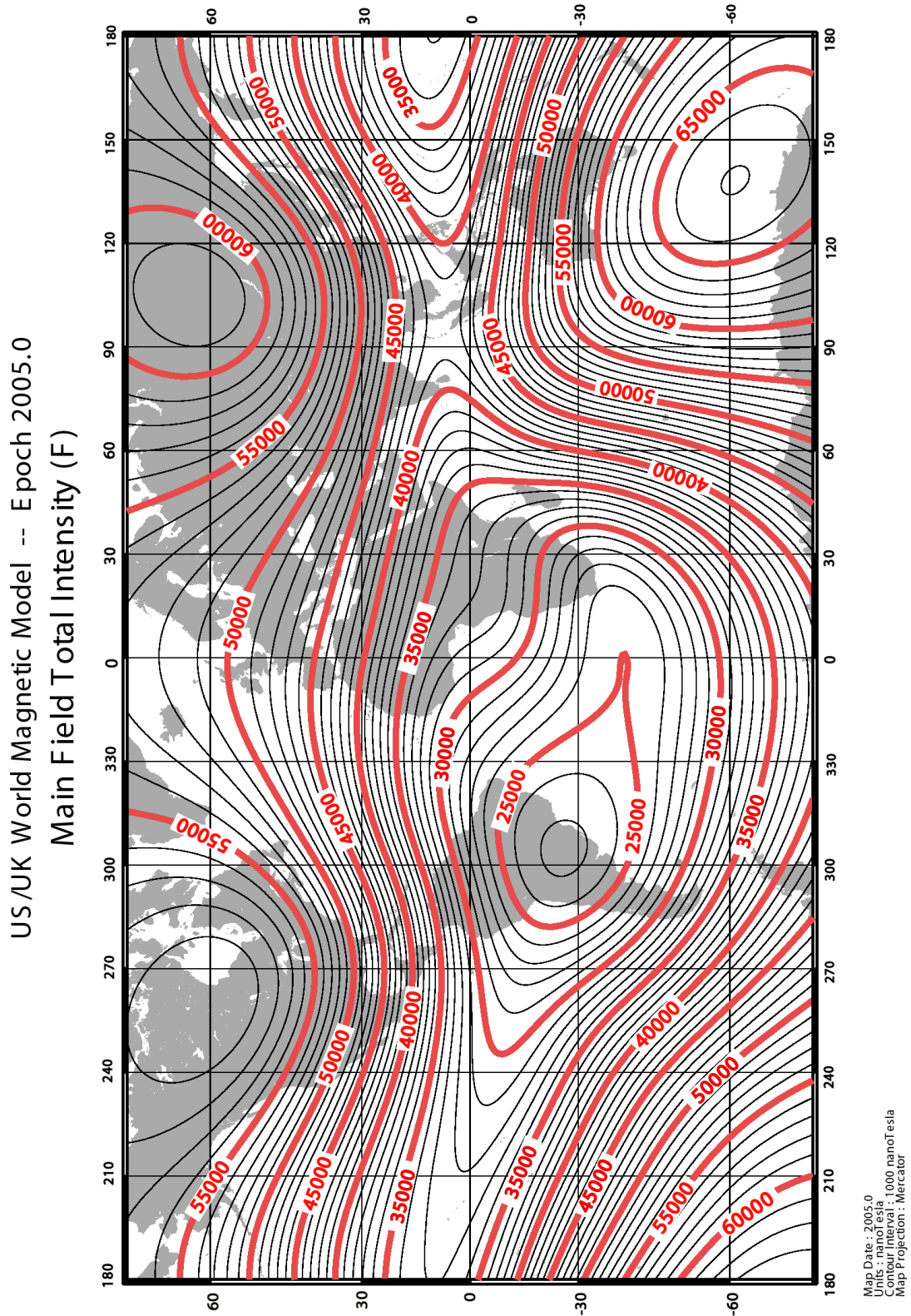


Figure A1: Magnetic Field Intensity

GEM Advanced Magnetometers
For more technical information, visit www.gemsys.ca

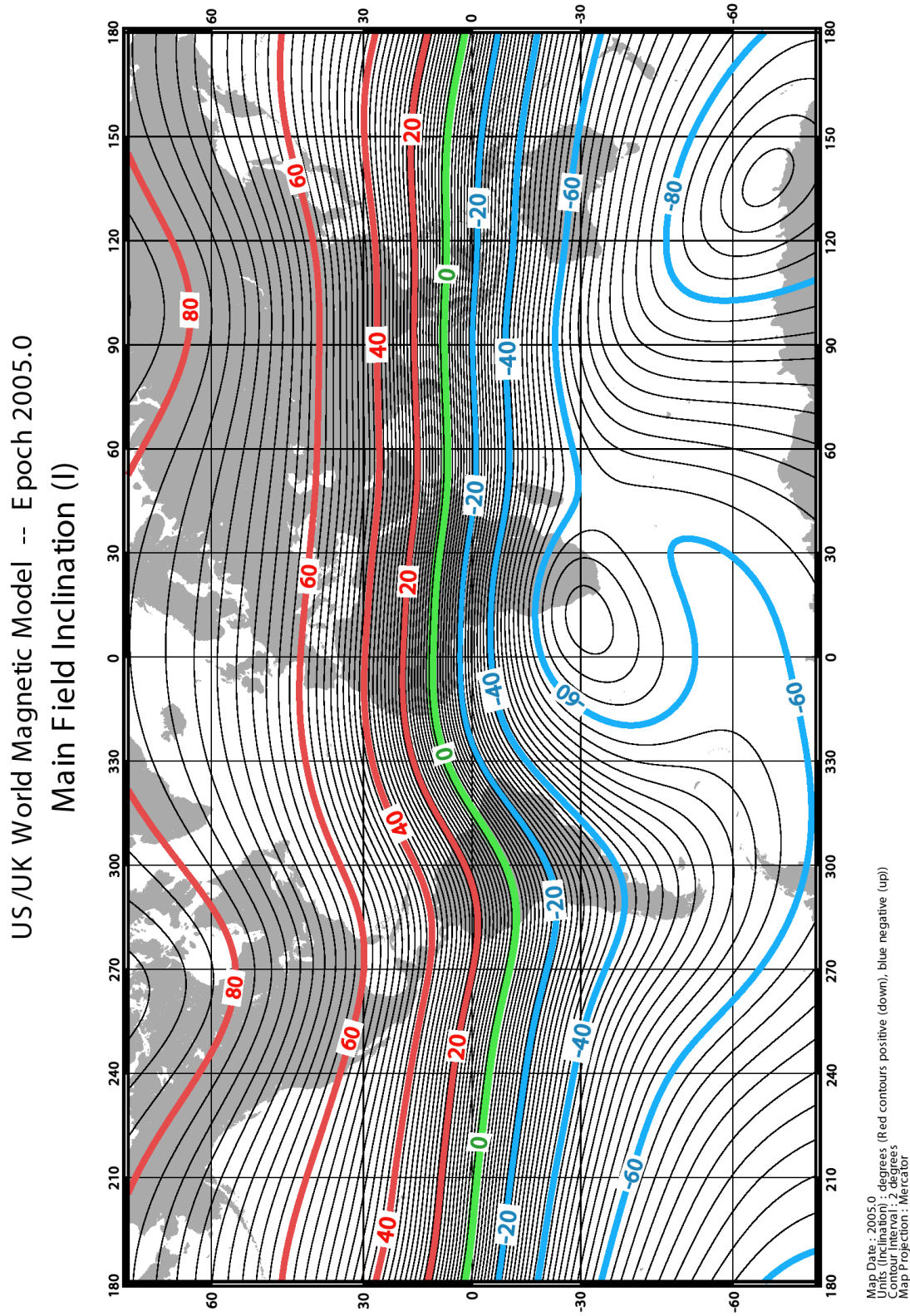


Figure A2: Magnetic Field Inclination

GEM Advanced Magnetometers
For more technical information, visit www.gemsys.ca

APPENDIX B – dIdD SPECIFICATIONS

PERFORMANCE

Sensitivity:	< 0.180 nT / Hz
Resolution:	0.01 nT
Absolute Accuracy:	0.2 nT
Dynamic Range:	20,000 to 120,000 nT
Gradient Tolerance:	over 5,000 nT/m
Operating Temperature:	-40C to +50C
Power Consumption:	1.5 W at 12V

RATE OF READING

1.0 sec per interval	5.0 sec full cycle
0.5 sec per interval	2.5 sec full cycle
0.4 sec per interval	2.0 sec full cycle
0.2 sec per interval	1.0 sec full cycle

2.5 or 5.0 sec full cycle recommended for reduced noise. 5 measurements acquired during each full cycle.

At 2.5 Sec Cycle:

dI uncertainty	less than / equal to 1 arcsec rms
dD uncertainty	less than / equal to 2 arcsec rms for I_0 less than / equal to 45°
dD	less than / equal to 4 arcsec for I_0 less than / equal to 70°

RANGE OF MEASUREMENT

I_0	less than or equal to $\pm 90^\circ$
D_0	less than or equal to $\pm 180^\circ$

OPERATING MODES

Automatic: X, Y, Z, dI and dD.

Remote Control: Optional remote control using RS-232 interface.

DIMENSIONS

Console:	223 x 69 x 240mm
Sensor:	250 mm diameter

WEIGHTS

Console:	1 kg
Sensor and Coil:	3.5 kg

APPENDIX C: GPS (GLOBAL POSITIONING SYSTEM) OPTION

GSM-19FD can optionally be equipped with a built-in GPS used as time reception only to synchronize the system. For GSM-90FD information contact GEM Systems.

IMPORTANT NOTES:

The GPS antenna must be connected to the BNC connector MARKED WITH YELLOW located on the RIGHT HAND SIDE of the console. Do NOT connect the GPS antenna into the BNC connector for the sensor RF on the left-hand side. The antenna will be damaged beyond repair.

The GPS antenna MUST be mounted a minimum of one full section staff (56cm) apart from the sensors to avoid magnetic interference.

C1. SETTING UP THE GPS

To access the **GPS menu**, press **F-GPS** from the **Main Menu**

SCREEN C1

A-survey	F-GPS
C-info OF-off D-test	no
E-time-synch	15 II 00
	TU
	00:56:56
	13.2V

Press **C-change** to toggle **GPS** on or off

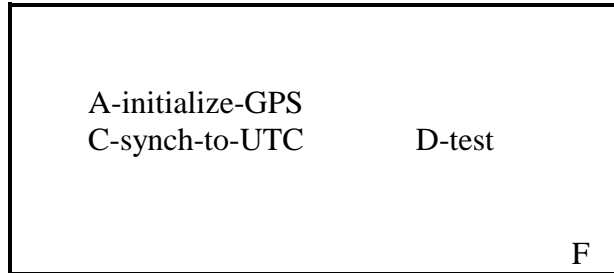
SCREEN C2

GPS yes
F-ok C-change

Press **F-ok** after making your choice.

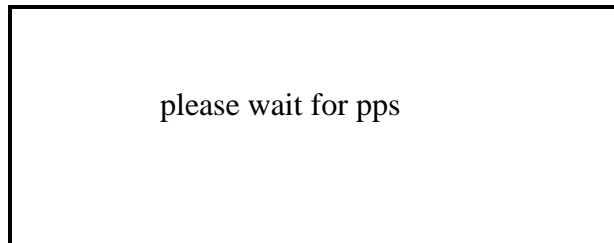
- If **GPS no** is selected, the software automatically returns to the **Main Menu**.
- If **GPS yes** is selected, the unit displays the **GPS menu**.

SCREEN C3
GPS menu



Select **A-initialize-GPS** to initialize the GPS module and start GPS lock.

SCREEN C4



The message “please wait for pps”, where pps represents **P**ulse **P**er **S**econd, is displayed until GPS lock occurs. Then the display returns to the GPS menu. Normally the initial feature is only required at first use or when moving between GPS zones.

NOTE:

The time to achieve GPS lock may vary due to sky visibility, weather conditions, and it is also affected by the satellite parameters stored in the GPS module during the previous surveys. Turning off the GPS in Canada and back on in Europe increases the time to lock since new satellites must be tracked. The PPS signal is generated when enough satellites are "in view" to produce a good GPS solution.

C2. SYNCHRONIZING GPS TIME

Select **C-synch-to-UTC** to manually synchronize the internal timer to UTC (Universal Time Coordinate) or GMT (Greenwich Meridian Time). After detecting PPS, the unit shows:

SCREEN C5

<p>Synchronizing to UTC</p> <p>Coordinated Universal Time</p>

Now the internal clock is synchronized to GPS UTC time

NOTE:

The synchronize to UTC command allows the unit to sync its internal clock to the GPS time. Multiple units can then be synchronized using time sync option in main menu. Before starting (or re-starting) a survey with the GPS enabled, the unit automatically synchronizes to UTC. The survey does not proceed until achieving lock condition and synchronizing the time.

With GPS enabled, the internal timer is always overwritten. It is not possible to run a GPS survey with other than UTC.

Normally, there is no need to manually synchronize the time, unless you need to transfer UTC to other units.

3. DISPLAYING CURRENT GPS INFORMATION

Select **D-test** to display current GPS information as described below

SCREEN C6

			094	00007
24	04	02	21:37:38	UTC 122
	0629231		4857210	0000174
00008		-00008		
00008		00000	0001	0002
0000031		0000152		
5	FFFFF5CA	F1FFFFFFE		0.00%
043.8566413		-0.793920040	08	

NOTE:

If post-processing was enabled in the GPS menu, the unit begins storing DGPS binary data when entering this test menu.

- Line 1 094 represents the length of the GPS data in bytes. It is obtained by comparing the PPS and internal TCXO. **A value of 7 is normal.**
- Line 2 Displays date and time in UTC
- Line 3 0629231 4857210 0000174 represent UTM Easting, Northing and altitude in meters
- Line 4 00008 -00008 are the position coordinates in the Local Grid.
- Line 5 00008 00000 are the position coordinates in the Rotated Grid.
- 0001 0002 are the current starting and ending waypoints
- Line 6 0000031 are intermediate calculation numbers and 0000152 is the distance (in meters) along the current line (wp1 - wp2 direction in this example) from current location to the ending waypoint (wp2 in this example)
- Line 7 displays the addresses of the memory locations used to store DGPS binary data and the percentage of memory used to that purpose.
- Line 8 043.8566413 -079.3920040 are Latitude and Longitude in decimal degrees. 08 is the number of satellites in view.

Press F to display the satellite information

SCREEN C7

s #	el	az	db	s#	el	az	db
028	t	65	315	40	011	t	60 098 40
008	t	58	204	41	027	v	34 182 0
017	u	33	250	39			
026	t	13	302	40			
138	t=	32	217	40			
122	t	10	251	40			F

where:

s# satellite number
v / t / u view / track / used
el elevation
az azimuth
dB strength in dB
= Differential correction (for SBAS DGPS)

APPENDIX D - DETAILED SETUP TUTORIAL

The purpose of this tutorial is to provide a detailed overview of how to set up and start running the dIdD system. There are a number of steps included in this procedure:

- Choose a site
- Connect all cables
- Set position of sensor (rough)
- Set the tuning
- Set the correct value of the field
- Customize the biases
- Run the magnetometer
- Check readings and adjust delays
- Start surveys
- Access data
- Communicating over distances

D1 CHOOSE A SITE

The dIdD system must be located in a magnetically quiet area. To ensure this condition is met, we encourage users to first perform a ground magnetic survey and use these results to locate the optimal location for the sensor. The location should be as free as possible from magnetic articles (ex. parking lots, power lines, etc.).

D2 CONNECT ALL CABLES

There are three main groups of cables for the system, including cables from the sensor to dIdD console; cables from the console to the battery and computer; and optionally a GPS cable connected to a GPS antenna. The diagrams on the next page show the basic configuration of all connectors and dIdD components.

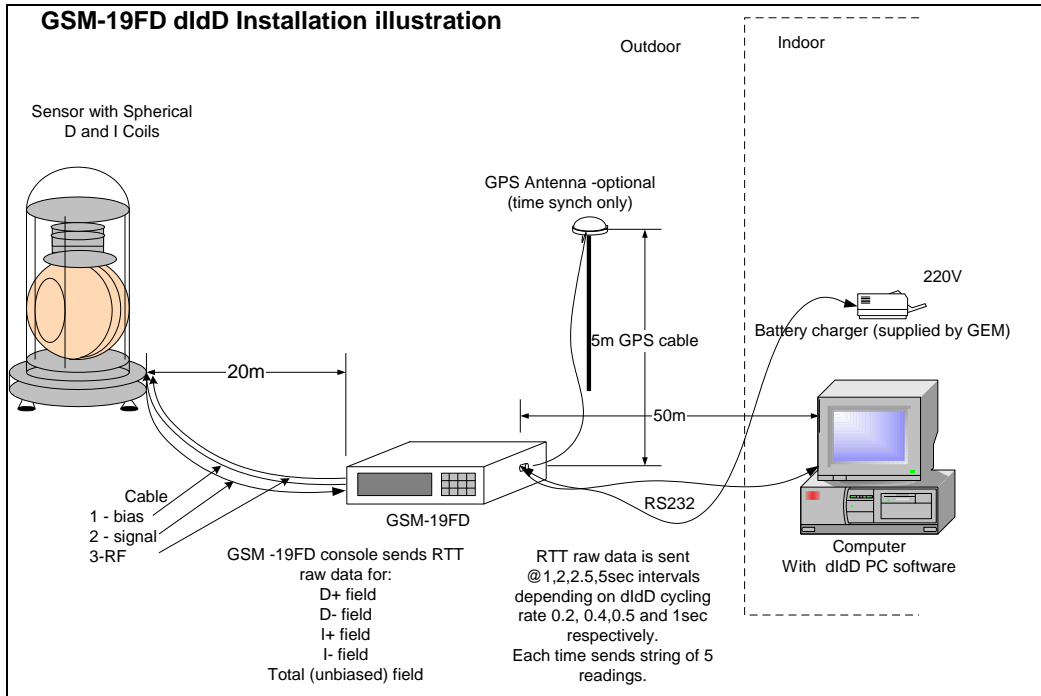
D2.1 dIdD Sensor to Console Cables

The three cables and their uses are as follows:

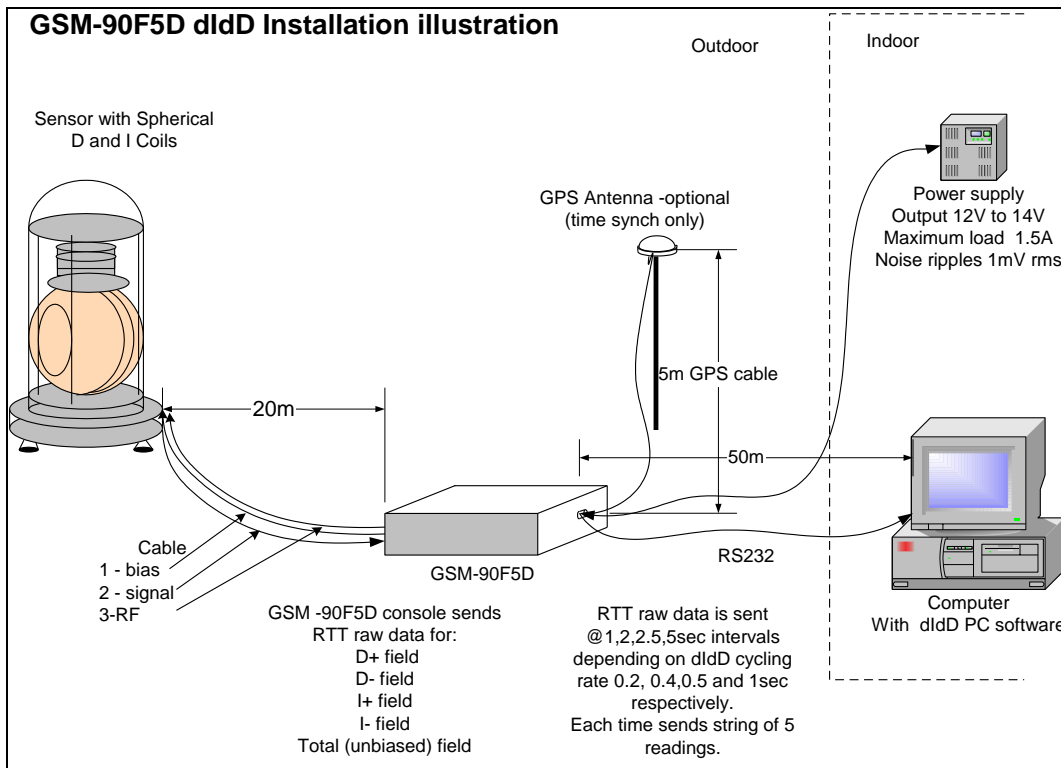
- Bias cable (4 pin female connector to the male connector on console)
- Radio Frequency – cable (BNC connector to the PLRZ connector on console)
- Signal Cable (4 pin male connector to the SNSR connector on console)

In addition, you may have an extension cable (ex. 10 m) for installations in which you want to place the sensor some distance from the console.

The following diagram shows the basic configuration for cables, etc.



Note: System works with 110 V and 220 V battery charger.



Note: System works with power supply or battery.

D2.2 Console to Battery and Computer Cable

The system comes with a spliced cable (i.e. one connector to the console with two connectors to the power supply and computer). Usage is as follows:

- 6 pin power cable connected to the power supply
- 6 pin data cable connected to RS-232. The RS-232 can be connected directly to a serial port or to a USB port (using the USB adapter supplied with the system).

D3 SET THE POSITION OF THE SENSOR (ROUGH)

There are several steps to positioning the sensor properly, starting with rough positioning. To set the rough positioning:

1. Use the bubble levels and the adjustment screws on the suspended coil system to level the system horizontally ... it **MUST** be on a smooth, level surface and leveling must be as exact as possible.
2. Identify the North directional mark on the suspended system.
3. Point the North mark to the North direction. You should know the North direction from a compass, theodolite, etc.

D4 SET THE TUNING

In this step, you will enter the approximate or known value for the local magnetic field. The factory defaults are set to 45,000 nT ... you will now customize this value to one that applies to your location.

1. Connect all cables except the Bias cable.
2. Use the Power key to turn on the dIdD system. The system displays the Main menu.
3. Select A-Survey. The first time you do this, you will see a screen that says D-DIDD.
4. Press D. The system displays the Survey menu.
5. Use the F key to advance to the cycling menu item.
6. Use the C- and D+ keys to change the cycling. In this case, we want to increase the cycling time, say to 0.4 seconds, so that our signal strength is as strong as possible for subsequent fine adjustment of the sensors.
7. Press A-start. The system displays a series of 5 values, including WE and EW biases, Field (no bias), and SN and NS biases.

8. Select C-tuning. The system displays the Tuning menu with the number 1 displayed to the top right of the screen. This value corresponds to the channel (i.e. WE).
9. Select C-change number. The system now shows that the channel has a tuning value of 0.
10. Type a value (for example, 55, representing 55,000 nT). When finished entering this two-digit number, press E-Enter. The system updates the value to the one you have entered.
11. Press F. The system displays the value for the next channel. Repeat steps 10 and 11 for this channel and all remaining channels. After the fifth channel, the system re-displays the Tuning menu.
12. Press A-start to run the dIdD magnetometer. The system runs and shows the total field on each channel. Field values will be all the same (ex. 55,000 nT).
13. Press the 1 and C keys together. The dIdD stops running and returns to the main menu.

D5 SET THE CORRECT VALUE OF THE FIELD

The system operates using a system of two coils perpendicular to each other. One of the coils (declination) provides a constant magnetic field of 1000 nT pointed in the WE and EW directions. The other coil (inclination) provides a constant magnetic field of 1000 nT pointed in the SN and NS directions.

To set the correct value of the magnetic field, the WE / EW and SN / NS values must be adjusted by 1000 nT. To make this adjustment:

1. Connect the bias cable.
2. Press A-Survey. The system displays the Survey menu.
3. If desired, change the cycling rate to the one you will use for your survey using the method described in section 4.4.
4. Press A-Start. The system displays the Tuning menu.
5. Use the Tuning menu to add 1000 nT to each of bias channels 1, 2, 4 and 5. You will do this by adding a 1 to the existing value shown in each bias channel (since each bias channel displays values in 1000s of nT). Do NOT apply this value to the third channel (no bias) as this is the actual total magnetic field.

Special Note on Tuning: The system electronics have an easier time tuning to fields that are below the bias than above it. For example, if the field is 56,693 nT, for instance, setting the bias to 56,000 will optimize the tracking of the signal and the dIdD performance. Therefore, we recommend that

you round up your bias values using the Tuning menu, and the system performance will be enhanced.

D6 CUSTOMIZE THE BIASES (OPTIONAL)

dIdD provides the user with the option of making changes to the biases. There are two possible reasons for this: Note: This option is no longer standard in v7 consoles.

- You want to change the order of the output channels to match the format expected by other software you are using.
- You want to turn off the biases. This is not recommended; turning off the biases will disable the dIdD functions and all recorded values will be simply the magnetic field.

D6.1 Changing the Order of Fields

The default order of the channels is as follows:

- WE
- EW
- No bias
- NS
- SN

It is possible to change the order so that you have (for example):

- NS
- SN
- WE
- EW
- No bias

To change the order of the fields:

1. Access the Tuning menu (see previous procedures for how to do this).
2. In the Tuning menu, select B-bias. The system displays the Bias menu. You will notice that there is a channel number displayed at the bottom right of the screen. This value indicates the channel that is currently selected.
3. For each channel, type a letter to assign the bias to a channel. For example, to assign the last channel to the first channel, type E. The system advances to the next channel.
4. Repeat the previous step until all channels are re-assigned. When finished, the system returns to the Tuning menu. You will notice that the channels are re-ordered as desired.

D6.2 Turning the Bias Off

This procedure is not recommended. The net effect of turning biases off is that all channels will read the total magnetic field (same approximate value).

To turn biases off:

1. Repeat the procedure described in section 4.6.1. Instead of pressing different letters, you will only press the letter C.
2. When finished and the system returns to the Tuning menu, you will see that all values show “no bias” – meaning that the biases have been turned off.

D7 RUN THE MAG AND MAKE FINE ADJUSTMENT

In this step, you will re-orient the coils so that they are nearly perfectly aligned. To run the mag and make the fine adjustment:

1. Press 1C. The system returns you to the Main menu.
2. Press A-survey. The system displays the Survey menu.
3. Press A-start. The system starts reading. It displays five values on the screen. Note that the values will be different for each WE / EW and SN / NS pair.
4. To adjust the WE / EW pair, rotate the coil system clockwise and re-take the reading. If the values are further apart than before, you must rotate the coil system anti-clockwise and re-take the reading. Repeat until readings on the WE / EW pair are as close as possible (i.e. a few nT).
5. Repeat Step 4 for the SN / NS pair with the exception that you will tilt the sensor up or down until the pair values are as close as possible (i.e. a few nT).

D8 Perform Exact Adjustment (Optional)

It is also possible to monitor the dIdD magnetometer signals and adjust them for optimum performance. Specifically, the operator can a) change the delay from falling edge of zero crossing (default is set to 4200) or b) the short deflect (see section 4.8.2 for definition).

D8.1 Changing the Delays

Note that there are five controls used to alter the delays:

1 – Decrease first channel delay	A – Increase first channel delay
2 – Decrease second channel delay	B – Increase second channel delay
3 – Decrease third channel delay	C – Increase third channel delay
4 – Decrease fourth channel delay	D – Increase fourth channel delay
5 – Decrease fifth channel delay	E – Increase fifth channel delay

To change the delays:

1. Run the dIdD and start reading (as described in previous steps).
2. For each channel, type the corresponding number or letter to decrease or increase delays. For example, hold the number 1 key down. You will see two numbers on the bottom left of the screen. The first is the delay value. As you hold the 1 key down, you will notice that the delay decreases. Alternately, try holding the A key down. You will notice that the delay increases.
3. Adjust each channel so that the two digit number to the right of the field value (Signal Quality) is maximized (i.e. equals 99). After completing this process, all channels should have field values that are very close (preferably equal) -- indicating that the system is set up for maximum signal and accuracy.

Note: When setting delays, do NOT set values to 0000 or 9999 as this will disable the system and you will be required to access the Default menu and restore original values to start again.

D8.2 Changing the Short Deflect

The deflect is a short pulse of current that deflects the vector of precession of protons ideally to 90 degrees from its ambient (non-polarized) position. We recommend that you change this value only as a last possible way of increasing your signal strength.

To change either the short deflect duration or delay duration the operator must press and hold the desired key.

For Short Deflect changes:

1. Run the dIdD and start reading (as described in previous steps).
2. Press and hold 8 to increase short deflect length by 1 unit

3. Press and hold 0 to decrease short deflect length by 1 unit

Note: As soon as either 8 or 0 is pressed a 3 digit number (eg. 015), short deflect duration units, will be displayed on line 8 of display.

Note: When setting deflects, do NOT set values to 0000 or 9999 as this will disable the system and you will be required to access the Default menu and restore original values to start again.

The ideal value of the short deflect is between 10 and 30. You can tell you have reached the best signal possible when you examine the readings and the signal quality reading in particular (it should be maximized ... ex. 99 for the best signal possible).

After you change the value of the deflect, you will be required to re-adjust delays according to the instructions in section 4.8.1.

D9 START YOUR SURVEY

Once all coarse and fine positioning and signal optimization has occurred, you are ready to start your survey. To do this, simply follow the previous instructions for running the system (starting from the Main menu, Survey menu, etc.).

D10 USE THE DIDD SOFTWARE

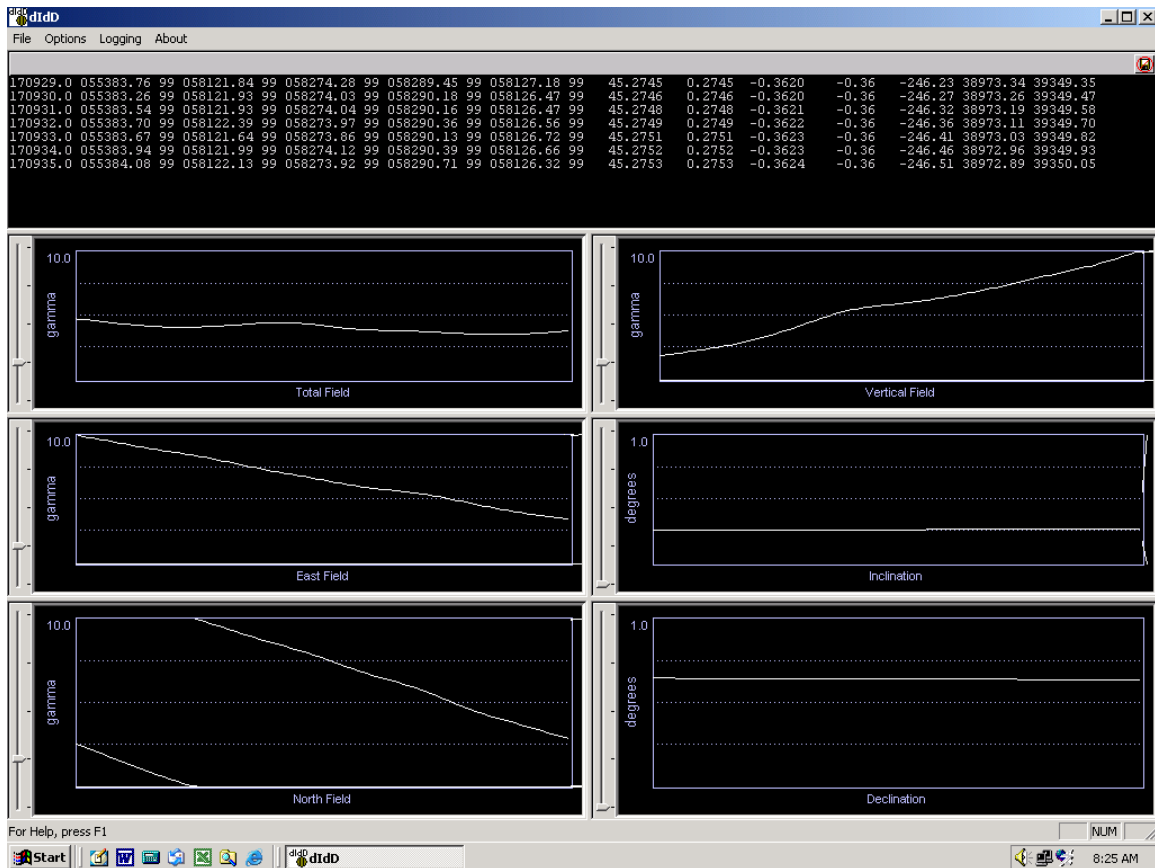
The dIdD unit comes with its own specialized software from GEM for acquiring data. It is quite simple to use and performs all calculations required to obtain the following values, including:

- Time GPS time or time set on the system
- Total Fld Total magnetic field
- SQ Signal quality for total field
- Dp Declination positive
- Dm Declination minus
- SQ Signal quality for declination
- Ip Inclination positive
- Im Inclination negative
- SQ Signal quality for inclination
- Inc Inclination
- dI Change in inclination
- Dec Declination
- dD Change in declination
- E_fld East field
- N_fld North field
- V_fld Vertical field

When you run the software, it first takes about 20 seconds to calculate values (using Gaussian filters) and it will then start to display the following graphs:

- Total Field
- North Field
- East Field
- Vertical Field
- Inclination
- Declination

The following screen shows what the software looks like and the values that are obtained.



To use the software:

1. Install the dIdD software from the dIdD CD-ROM
2. Connect the RS-232 cable on the console either to a serial port or USB (using the provided USB cable and driver software) on the computer. Note that the USB software drivers must be installed on your system for the USB port to receive data.
3. Run the dIdD. The system will start by displaying lines of data on the screen and after sufficient readings are in memory will begin to plot in the windows of the dIdD software.

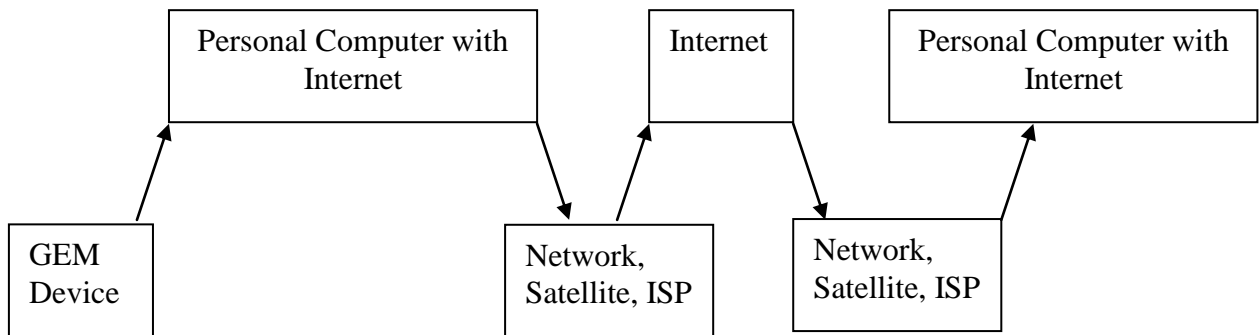
Note: dIdD files are automatically closed at 12:00 pm and a new one is opened. Thus, you will have one file for each day of data.

D1.11 COMMUNICATING OVER DISTANCES

Depending on your organization, you may be called upon to set up a remote installation using the dIdD and send commands to the unit. (GEM can provide a list of typical commands on request). There are two approaches (i.e. local computer or radio modems).

D11.1 Using a Local Computer

With this method, you will use a local computer connected via serial interface to the instrument. You require an Internet connection and software program (LapLink or PC Anywhere) to facilitate data transfer. LapLink and PC Anywhere are programs that allow you to send commands to control the computer remotely.



D11.2 Using Radio Modems

The second method requires the use of two radio modems to transfer signals over the Internet. The following diagram shows the configuration of this setup.

