

# SCINTREX ENVIMAG

## QUICK REFERENCE

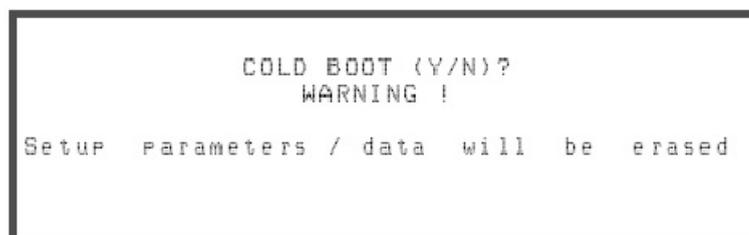
Kim Frankcombe  
Southern Geoscience Consultants



### New area or problem with mag:

If the unit has been in storage or used on another project or you think it is not behaving properly do a Cold Boot. **WARNING THIS WILL ERASE ALL DATA AND SETTINGS** from the magnetometers so **DO NOT** do this if you have data you have not yet dumped to a computer.

To Cold Boot press Aux/LCD and START buttons at the same time.



You will get a warning message telling you all data will be erased and asking if you want to continue Y(=9) for Yes or N(=5) for No. The next menu asks if you want to delete data or all tie data as well. You will not be using Tie mode so select data (1)

You will then need to set up the mag and job details. DO this to both the field and base unit.

Press INFO(=7)

```
scintrex data acquisition system v1
TIME:  hh:mm:ss      SER.#:  sssssssss
DATE:  yy:mm:dd      JOB #:  jjjjjjj
OPERATOR: 0000000000
MEMF: ppp%
BATT: bbb
Ch#?: ENT,
```

Press ENTER to change and the time field should show HH. Enter the hour in 24 hour time press ENTER to accept. Use the arrow →(=3) to move the flashing cursor to the minute field. Press ENTER to change and the time field should show MM. Enter the minutes and press ENTER when done. Use the arrow →(=3) to move the flashing cursor to the second field. set this to 0 on both magnetometers and when ready press ENTER on both units at the **same time**. They should have the same time to within 10 seconds, if not repeat the above until you get them synchronised.

Use the arrow →(=3) to move the flashing cursor to the date field. Press ENTER to change the year YY to 08 or as appropriate then press ENTER again to accept. Use the arrow →(=3) to move the flashing cursor to the month field. Press ENTER to change the month and ENTER again when done. Use the arrow →(=3) to move the flashing cursor to the day field. and repeat the process with the day. Both magnetometers should have the same date.

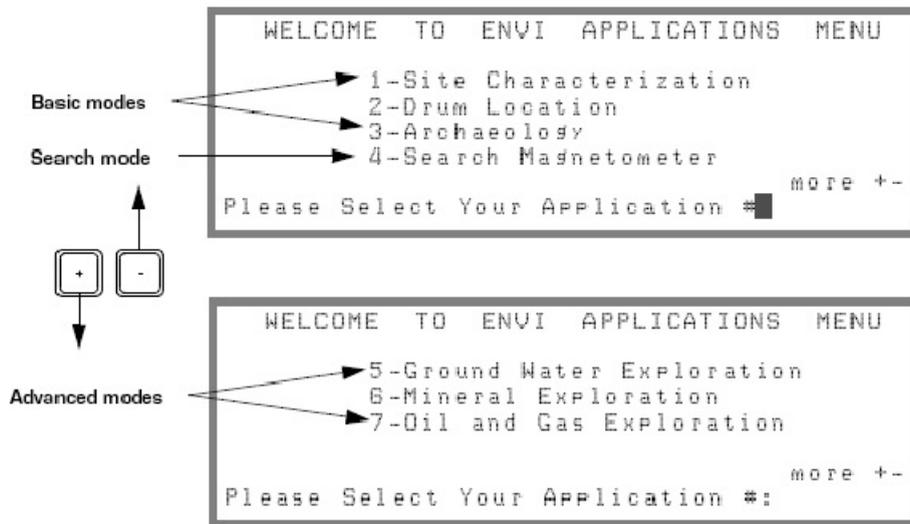
Use the arrow →(=3) to move the flashing cursor to the SER # field and press ENTER to enter the serial number of the magnetometer. This is written on the bottom of each unit after Date/Ser.: This number will help someone later if there is a problem with one of the units so do not skip this step. Use the arrow →(=3) to move the flashing cursor to the JOB # field. Enter a job number for this project if you have one. Use the arrow →(=3) to move the flashing cursor to the OPERATOR field. Press ENTER and type in your name. If you need to use two letters on the same keypad you can move one character to the right by pressing NEXT.

The above steps are the same for both magnetometers and need to be repeated after a Cold Boot. If you do not do a Cold Boot you may only need to adjust the time, Job number and operator. The clocks will drift a little so each morning check that both units have the same time even if you change nothing else.

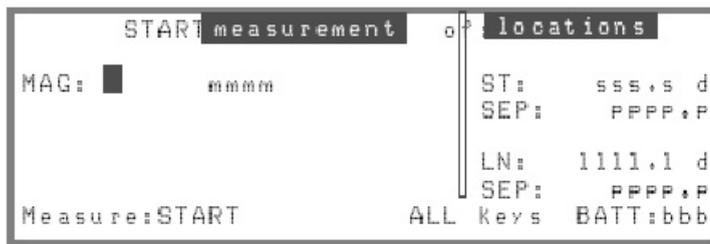
You are now ready to set the units up for survey

### Set up for field unit in Stop and Go mode;

Press Setup(=5) and ON/OFF at the same time. Select 1 for MAG only as you do not have a VLF option. When you press 1 you will get the next following screen

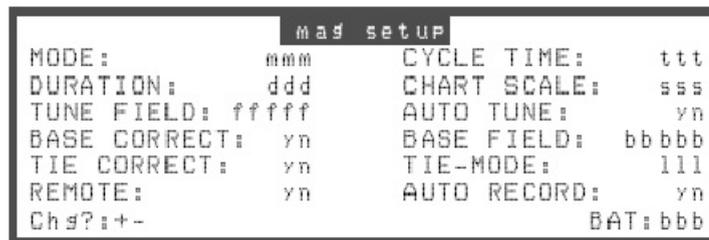


You will always be using mode 6 - Mineral Exploration. You can either press 6 on the first screen or use the + - keys to get to the second screen and then press 6 if you forget which number it is. You should then get this screen.



If the flashing cursor is not on the left hand side of the screen near MAG \*t-fld as above then move it there by pressing NEXT. Now press ENTER and you should get the following screen

Ensure the MODE is t-fld (for total field). Use the Arrow key →(=3) to move the cursor to DURATION, if it is not 2 seconds then use the + - keys to scroll between 0.5s, 1s and 2s. stop scrolling at 2s. Use the Arrow key →(=3) to move the cursor to the TUNE FIELD. This should



be within about 1000 of the actual value. If you are working in a new area and are unsure try 43000 as this will be a good start for most of Indonesia. If you are just continuing on a survey from yesterday this should not need changing. The following three options (BASE CORRECT ... REMOTE) should always be set to No. Ignore CYCLE TIME and CHART SCALE and ensure AUTO TUNE is set to Yes. If not just press ENTER and use the + - keys to change, pressing ENTER again when you are done. BASE FIELD should be 0, TIE-MODE is not used and AUTO RECORD should be No for the moment. We may change that to Yes when you

have more experience.

When you are happy with all values press ESCAPE (=0) to take you back to the previous screen.

```
START measurement 0 locations
MAG: █          mmm
Measure:START      ALL Keys BATT:bbb
ST:   sss.s d
SEP:  PPPP.P
LN:   1111.1 d
SEP:  PPPP.P
```

Press SETUP(=5) to go to the mag set up menu.

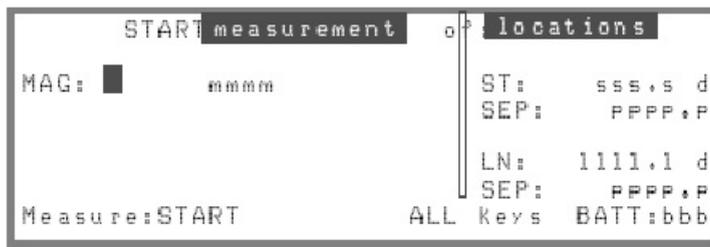
```
instrument setup
MAG SETUP:█->menu  AUTO ST,INC.:  yn
                   LINK REC/START: yn
                   CYCLE REPEAT:   yn
                   CYCLE DELAY:    ddd
                   ERASE MEMORY:   yn
                   HEATER:         yn
Ch#?:ENT.          BATT:bbb
```

Use the right arrow → to move through the menu items. Change AUTO ST. INC. to yes using the + - keys, this will increment your station number after each successful reading. Set LINK REC/START to no, CYCLE REPEAT to no and CYCLE DELAY to 0. If this is the first reading for the day and if the mag has been dumped the night before as it should have been then arrow to ERASE MEMORY and use the + - keys to change from no to yes. You will receive a warning message. Press Y(=9) for yes. This will erase all data but leave your settings intact. In Indonesia you should never need the heater on (unless you are working on one of the glaciers in Irian Jaya) When you are happy press ESCAPE(=0) to go back to the data screen.

```
START measurement 0 locations
MAG: █          mmm
Measure:START      ALL Keys BATT:bbb
ST:   sss.s d
SEP:  PPPP.P
LN:   1111.1 d
SEP:  PPPP.P
```

Press NEXT to move the flashing cursor to the right hand side of the screen and if need be use your arrows →← to position the cursor just after ST:. Press ENTER and put in the starting station. This will generally be the UTM northing if lines run N-S. However note that you can only enter 5 digits so drop the first 2 digits off the UTM. Press ENTER to finish. Then press your right arrow → to go to the direction field. When working on UTM grids this will always be positive so no need for change. Press right arrow → again to go to the SEP field. This is the distance between readings which will generally be 5m however it needs a sign. If you are





Press the NEXT key to move the flashing cursor to the right hand menu and the arrow keys →← to move to just after ST: then use the + - keys to change it to what it should be.

When you get to the end of the line move across to the next line. You will need to change the line number, station separation and you may need to change the station. To do this get the above menu arrow to the field you want and enter the new details. You can make small changes to the Station and Line by using + - or press ENTER and type a new number in otherwise. If you are changing direction go to the station separation field (top SEP), press ENTER and type in the number remembering the sign +/- . Press ENTER to finish then NEXT to put the cursor back on the left side of the screen. Press START and RECORD and move on.

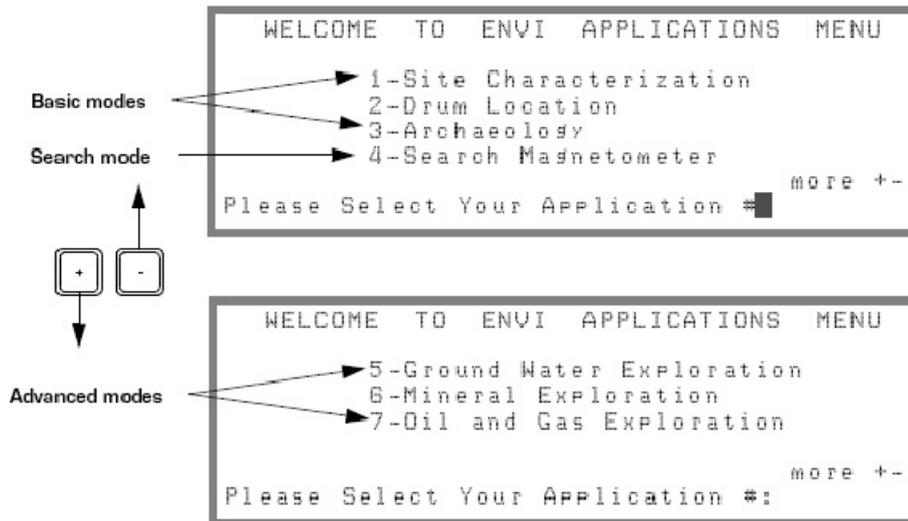
### Base Station Mode

First you need to find a good base station site. A good base station site has a low magnetic gradient ( $< 1$  nT/m) and is clear of sources of magnetic noise such as electric motors, power lines, HF radios, passing vehicles, petrol motors etc.

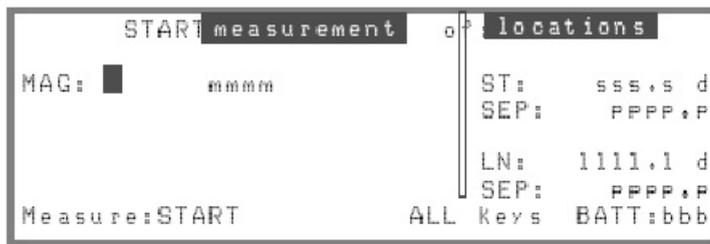
To check the magnetic gradient set a magnetometer up as for Stop and Go and take a reading where you plan to fix the base. Then take 4 readings 0.5m away from that point to the N, E, S and W. Are they within 1 nT of each other? No - try another spot. Yes - OK so far, try taking 4 readings 1m out from the centre point, are these within 1 nT of each other? Yes - OK. You need to avoid areas of steep magnetic gradient because small variations in the position of the magnetic sensor can lead to big changes in the recorded field. Changes in the position of the sensor could result from wind, small earthquake or simply putting the pole on the other side of the tree or stump you are tying it to.

Once you have found a suitable site and set the magnetometer up so its time matches the field unit you are ready to set up the base mag.

Press Setup(=5) and ON/OFF at the same time. Select 1 for MAG only as you do not have a VLF option. When you press 1 you will get the next following screen

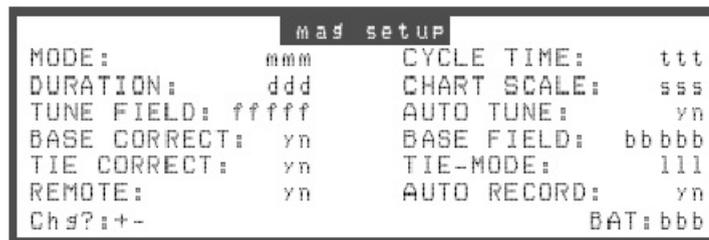


You will always be using mode 6 - Mineral Exploration. You can either press 6 on the first screen or use the + - keys to get to the second screen and then press 6 if you forget which number it is. You should then get this screen.



If the flashing cursor is not on the left hand side of the screen near MAG \*t fld as above then move it there by pressing NEXT. Now press ENTER and you should get the following screen

Ensure the MODE is base. If not change it with the + - keys. Use the Arrow key →(=3) to move the cursor to DURATION, if it is not 2 seconds then use the + - keys to scroll between 0.5s, 1s and 2s. stop scrolling at 2s. Use the Arrow key →(=3) to move the cursor to the TUNE FIELD. This should be within about 1000 of the actual value. If you are working in a new area and are unsure try 43000 as this will be a good start for most of Indonesia. If you are just



continuing on a survey from yesterday this should not need changing. Go to CYCLE TIME, press ENTER and set this to 30. This will set the base to take readings every 30 seconds. All other fields can be ignored. When you are happy with all values press ESCAPE (=0) to take you back to the previous screen.

```

START measurement  o  locations
MAG: ■          mmm
ST:      sss.s d
SEP:    PPPP.P
LN:    1111.1 d
SEP:    PPPP.P
Measure:START      ALL Keys  BATT:bbb

```

Press SETUP(=5) to go to the mag set up menu.

```

instrument setup
MAG SETUP: ■->menu  AUTO ST,INC.:  yn
LINK REC/START:  yn
CYCLE REPEAT:    yn
CYCLE DELAY:     ddd
ERASE MEMORY:    yn
HEATER:          yn
Chg?:ENT,      BATT:bbb

```

Use the right arrow → to move through the menu items. The only item you need worry about is ERASE MEMORY. If this is the first reading for the day and if the mag has been dumped the night before as it should have been then arrow to ERASE MEMORY and use the + - keys to change from no to yes. You will receive a warning message. Press Y(=9) for yes. This will erase all data but leave your settings intact. In Indonesia you should never need the heater on (unless you are working on one of the glaciers in Irian Jaya) When you are happy press ESCAPE(=0) to go back to the data screen.

```

START measurement  o  locations
MAG: ■          mmm
ST:      sss.s d
SEP:    PPPP.P
LN:    1111.1 d
SEP:    PPPP.P
Measure:START      ALL Keys  BATT:bbb

```

Press START to begin recording. You will receive a warning message reminding you to Synchronise the Base and Field units. Proceed on as we will assume you have done this. You will then be asked if you have a long cable or short cable. The spiral cable you have is the short cable so select short (=3). The base station should then start taking readings. It will turn itself off between readings so do not be alarmed when it turns off, just wait 30 seconds and it should turn itself on and take another reading. If it is doing this all is working OK.

At the end of the day turn the magnetometer on if it is off and press STOP to stop the base.

It is important that you keep the base clear of people, animals which might knock the pole or chew the wire and to protect the console from the weather. It should not rest directly on the ground or on a tree as this allows currents to flow through the chassis.

The same base station should be used for the whole survey but the field crews need to know that the base station has good data so if the field crew are working in a different camp to the base there needs to be radio or telephone contact between the fly camp and base so that the field crew can check to make sure that the base is on before they start surveying and that the

previous day's data is all OK. The base operator needs to know when the field crew have finished so they can shut down the base for the day and dump it. If this is not possible a second base will be required. These sub-bases need to be set up with the same process as the main base and ideally should have at least 2 hours of data read from them with the main base on at the same time. This will help establish the level shift between the two bases.

### **Daily startup check list**

1. Units charged OK? Check battery voltage > 12V
2. Synchronise units
3. Set operator name
4. Erase Memory (make sure dump from yesterday OK)
5. Put start note in. *prospect xxn xxe* i.e. Tandai 96n 82e
6. Go to work!
7. Finished for the day?
8. Stop the base and bring all the equipment back to the office
9. Dump the two magnetometers
10. Check that dump files have data
11. Put the units on charge and check that the charge light comes on.

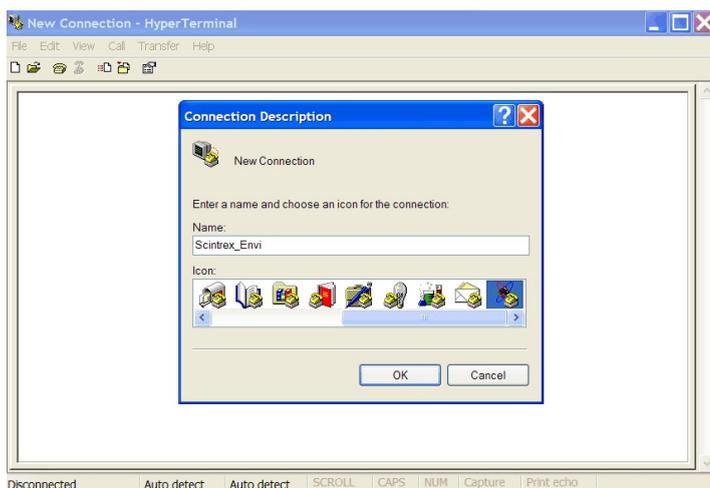
## To Dump the data

Any communications package can be used but as Hyperterminal comes free with all flavours of Windows it makes sense to use that.

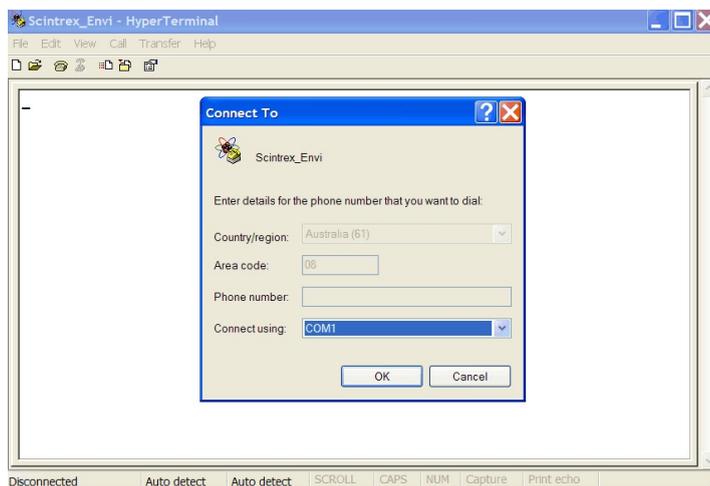
First you will need to set up a Hyperterminal connection - you should only have to do this once.

Start Hyperterminal - it is at Start\All Programs\Accessories\Communications\Hyperterminal

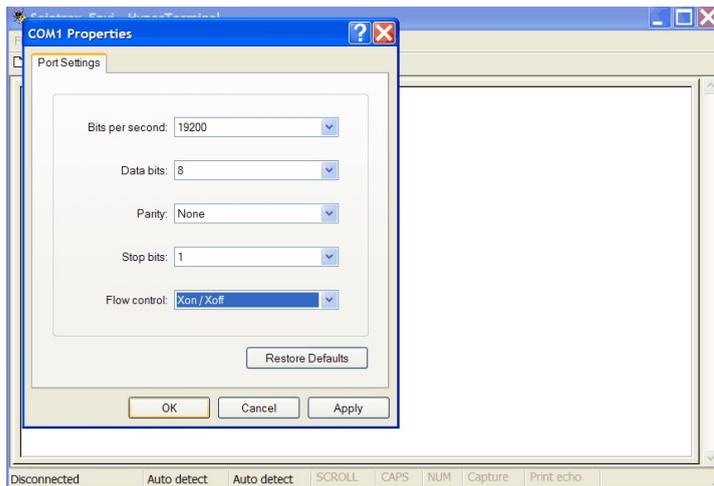
First time you start it you will be asked if you want to make Hyperterminal your default telnet program. The answer you give to this is not important as far as dumping the mag goes but select yes unless you have a telnet preference. You will then have to create a connection.



Use a sensible name (eg Scintrex\_19200) and select an icon from the list of choices. The icon you select is not important so just pick one you like.

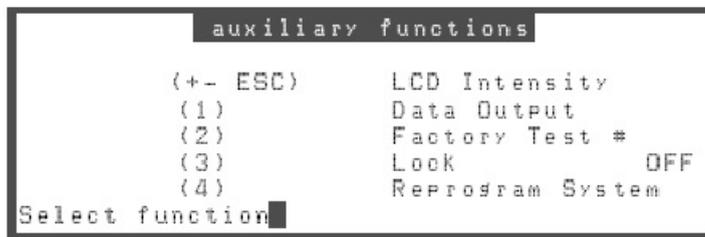


Don't worry about the Country or phone settings in the Connect To box. Make sure the Connect Using menu item uses the COM Port you have available on your computer. If you are using a USB to serial converter use the COM port number that is generated when the converter cable is plugged in.



Now you will have to set up the port settings. Change the Bits per second (Baud Rate) to 19200 and ensure you have 8 data bits, no parity, 1 stop bit and Xon/Xoff flow control.

Now plug in the serial cable from the Envimag and turn the unit on. Press AUX/LCD(=1)

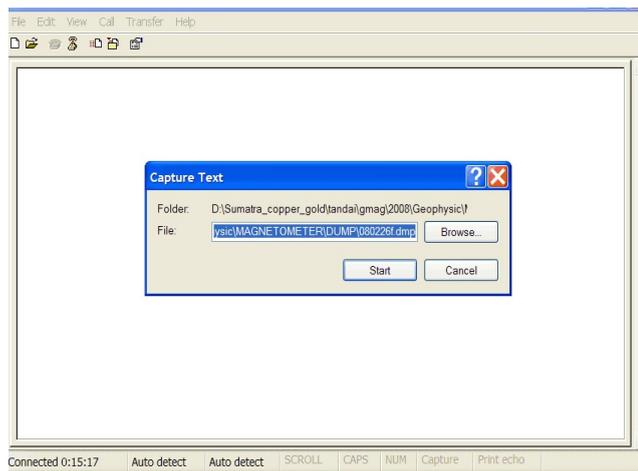


Press 1 for Data Output.



Use the NEXT key to move the flashing cursor into the bottom right hand box and the arrow  $\rightarrow\leftarrow$  keys to scroll between the four items there. Move to Baud Rate and using the + - keys change the Baud Rate to 19200, DL to 0 BIT to 1 and change the FMT to xyz +, this format dumps the operator notes as well as the data.

You now need to select a file name for the dump file and capture it to the hard disk. In HyperTerminal press Transfer/Capture Text and you will be presented with a file open dialogue. Good Housekeeping is important here and sticking to some simple rules can save problems later on. Save the dump files to a separate folder under the job folder called DUMP. These dump files should not be changed, any edits or processing should be done on copies of these files. A good naming syntax is to use the date followed by a letter for the field or base mag. If you write the data in YYMMDD format the files will be sorted properly in the directory. So the dump files for 26 February, 2008 would be 080226f.dmp for the field unit and 080226b.dmp for the base unit. Put in the appropriate file name for the unit you are dumping.



You are now ready to dump the magnetometer.

On the Envi\_Mag use the NEXT key to take you back to the left hand screen.



Now press START to begin the dump.

You should see numbers and words scrolling on the Hyperterminal screen. If you see nothing or gibberish on the screen check your Baud Rate and stop bits to make sure they are the same for both the Envi\_Mag and Hyperterminal.

When the dump has finished. Stop capture in HyperTerminal (Transfer/Capture Text/Stop).

Now you are ready to do the same with the other mag. Plug it into the computer and first ensure its Baud rate settings are the same as Hyperterminal's. Open a new file for capture and dump the data. When dumped, stop the capture. Check using Windows Explorer that both dump files exist and that they are not 0 bytes. Now would be a good time to back the dump files up to a memory stick in case you have a hard disk crash - You will not win any friends with the field crews if they have to re-walk lines they have already collected because you lost the data!

Before you exit from Hyperterminal the first time save the Envi mag configuration file using File/Save As. You will then be able to select the envimag config directly from Start/All Programs/Accessories/Communications/Hyperterminal/Scintrex\_19200

## Data Processing

The data must be checked each day to make sure all is OK.

We will do this in Excel but there are many ways it could be done.

In a processing folder, not the dump folder, open Excel.

Go to cell A1 and import the field file `YYMMDDf.dmp`

The Text Wizard has determined that your data is Delimited.  
If this is correct, choose Next, or choose the data type that best describes your data.

Original data type  
Choose the file type that best describes your data:

- Delimited - Characters such as commas or tabs separate each field.
- Fixed width - Fields are aligned in columns with spaces between each field.

Start import at row: 1 File origin: MS-DOS (PC-8)

Preview of file D:\Sumatra\_copper\_gold\tandai\gmag\2008\Geophysic\...\080226f.dmp.

1	
2	/N tandai96n 82e:
3	/T5850 65000 44054.2 0.15 14.749722 0
4	
5	/----- S C I N T R E X -----
6	/! Revision:5.0F

Buttons: Cancel, < Back, Next >, Finish

Step 1 should all be OK so press Next.

This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview below.

Delimiters

- Tab
- Semicolon
- Comma
- Space
- Other: [ ]

Treat consecutive delimiters as one

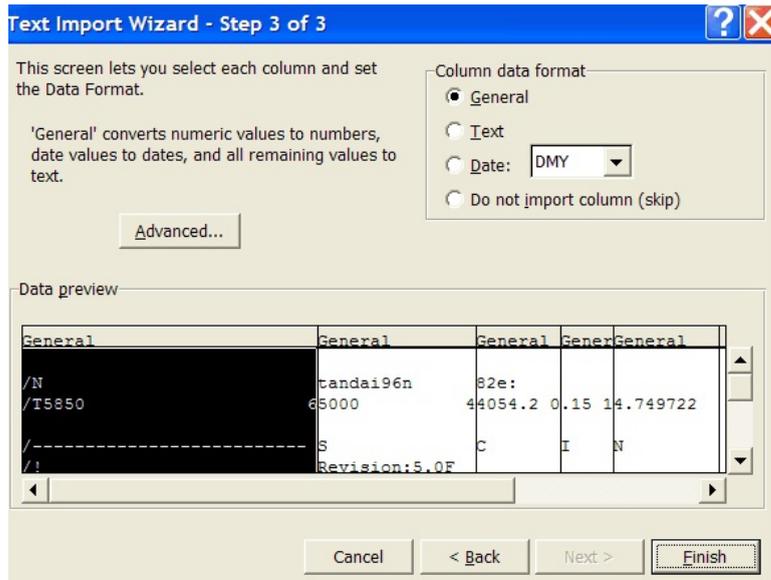
Text qualifier: [ ]

Data preview

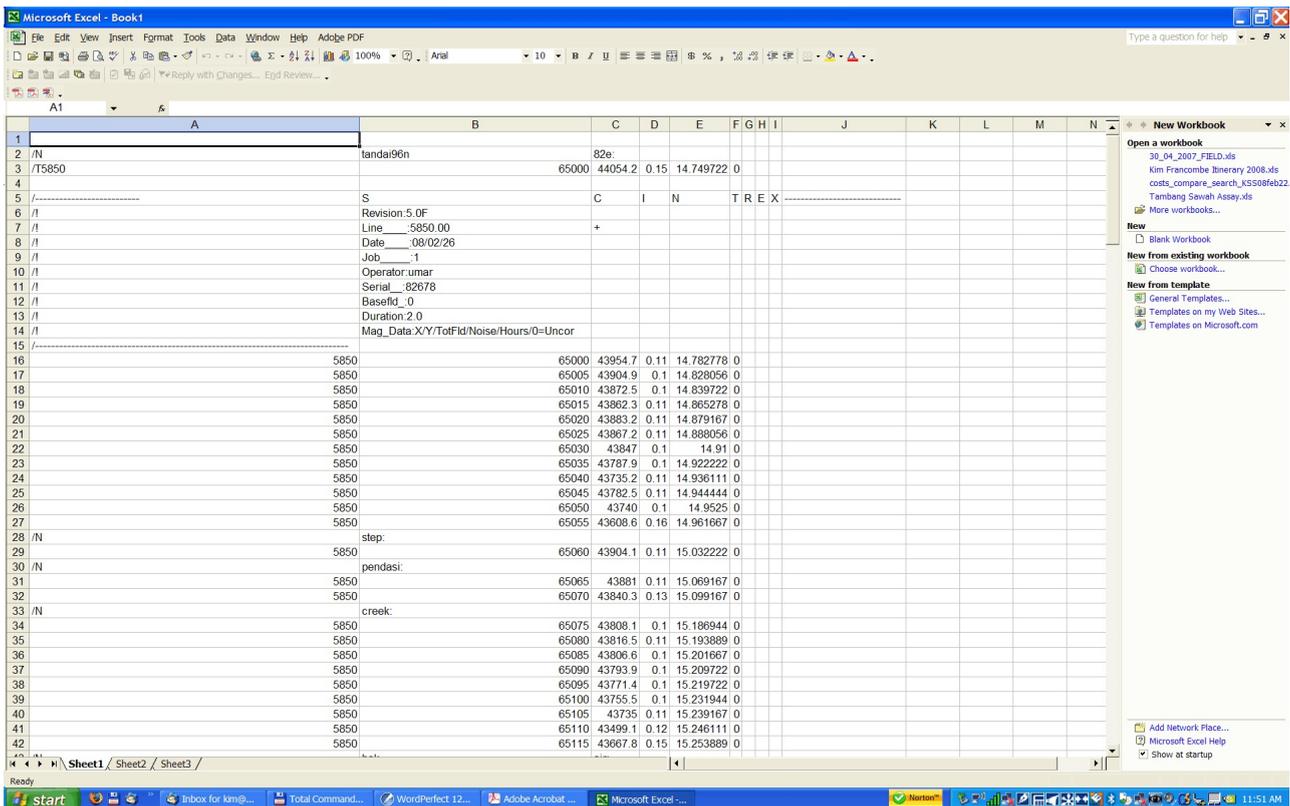
/N	tandai96n	82e:			
/T5850	65000	44054.2	0.15	14.749722	
/	-----	S	C	I	N
/!	Revision:5.0F				

Buttons: Cancel, < Back, Next >, Finish

Set the delimiter to space and press Next.

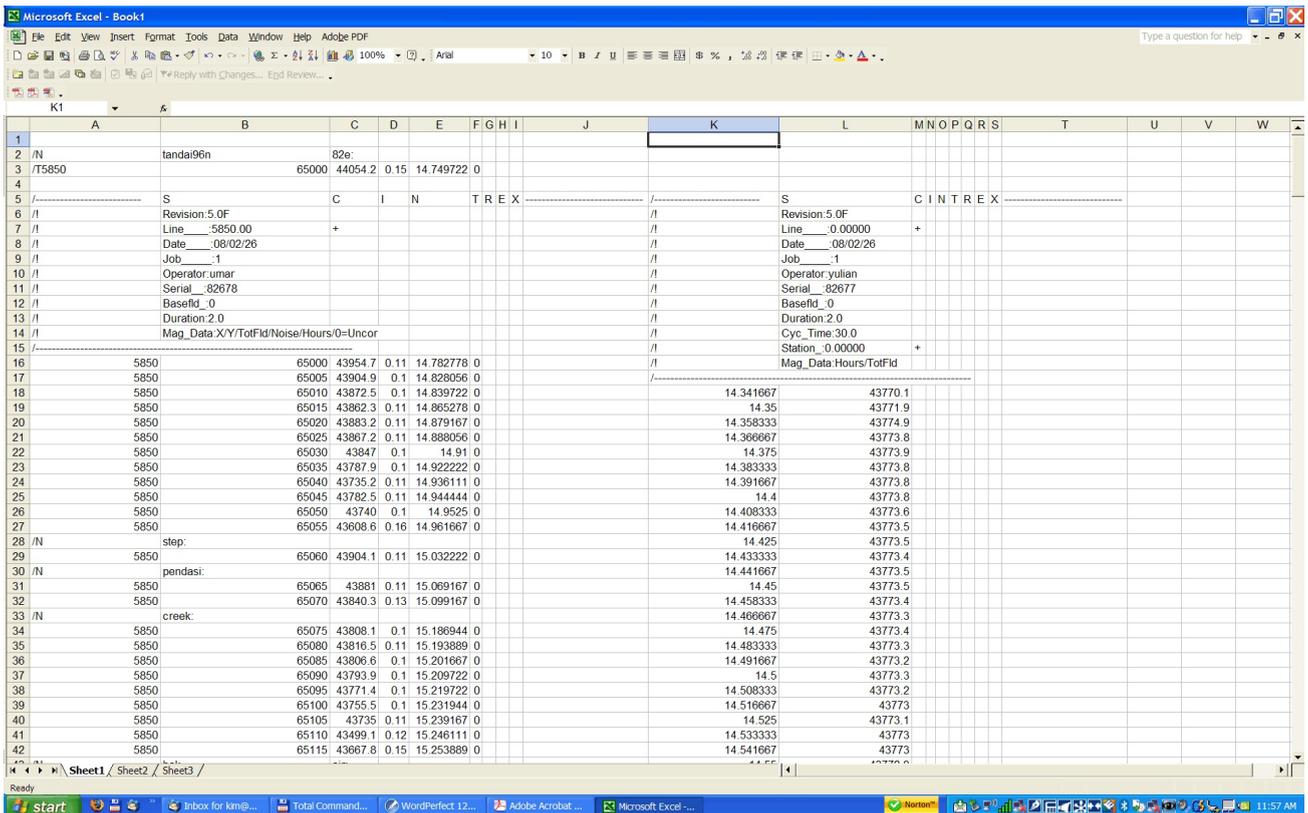


Step 3 should not need changing so press Finish. Accept putting the data in the existing sheet at cell A1 which is the default and you should have something like this.



Now go to cell K1 and import the base file YMMDDb.dmp using the same import settings as you used for the field file.

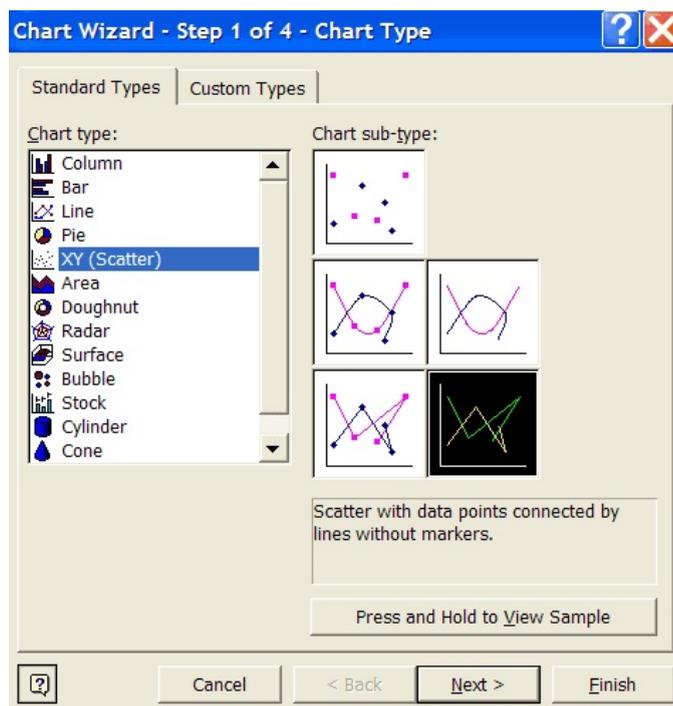
You should now have something like the following.



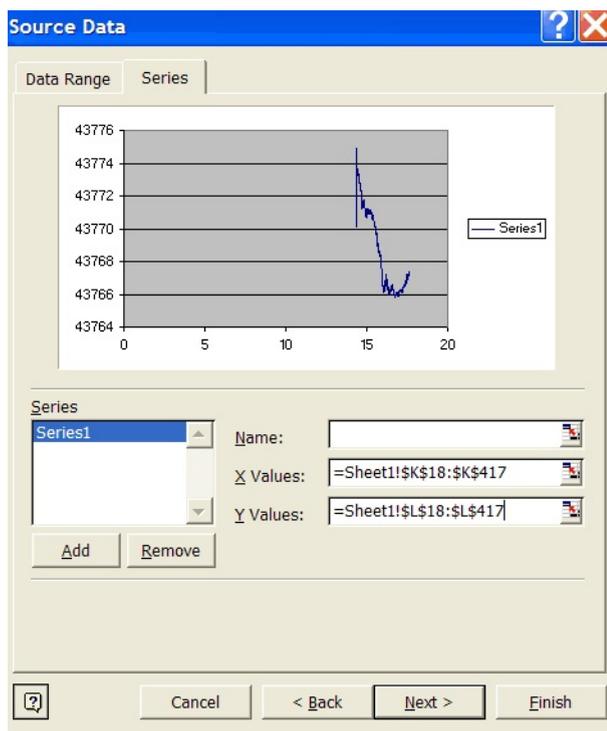
Note that the field mag has 6 columns of data while the base mag only has 2. Do not worry that the fields between the base mag and field mag do not line up.

Before we go any further save the spreadsheet in the processing folder (not the dump folder) as *YYMMDD.xls* It will therefore have the same name stub as the dump files and it will therefore be easy to associate the dump files with the processing.

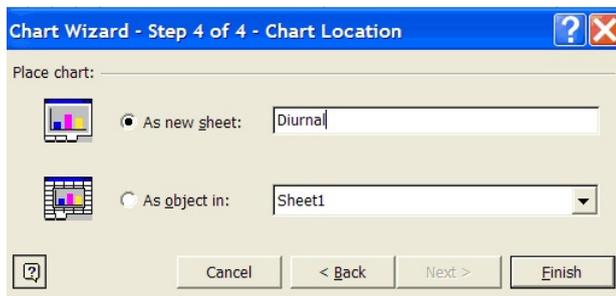
Now we need to check that the diurnal is OK. The diurnal is measured by the base station. So we plot a graph of the base station. Click on the graph icon and set the graph type to XY Scatter with lines with no points.



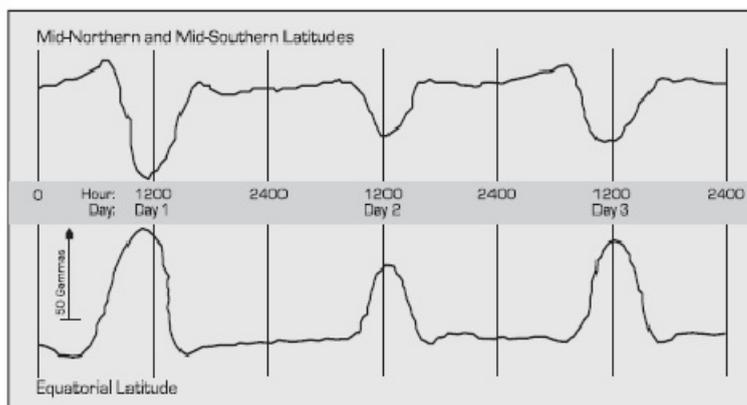
Press Next. Go to the series tab and add a series. Set the X range to all the time values in column K and set the Y range to all the mag values in column J.



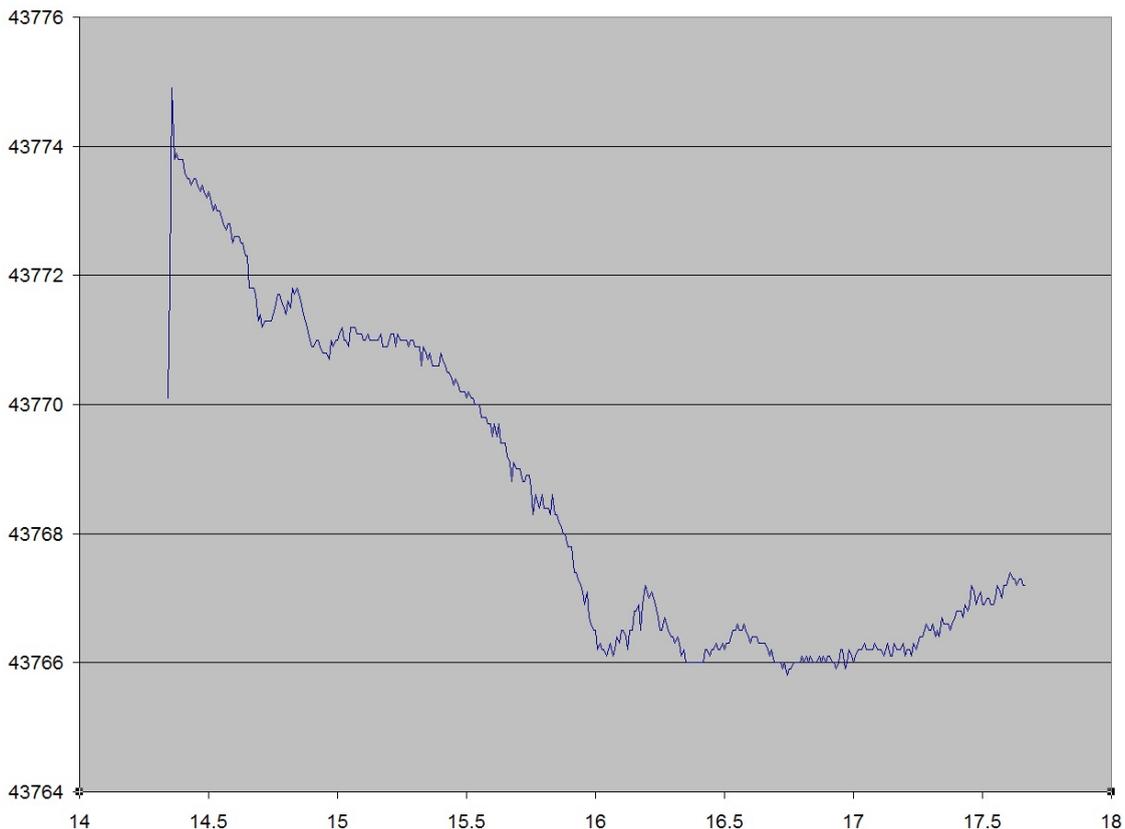
Leave the step 3 box as is and press Next. We will put the graph on its own page so change the option to “As New Sheet” and change the name from Chart1 to Diurnal.



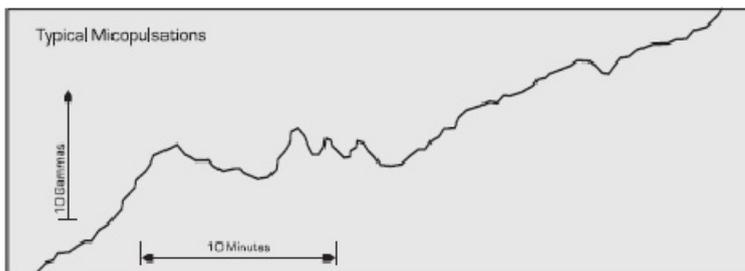
Press Finish. Change the X axis scale to reflect the data range rather than the automatic option which goes to 0. The diurnal variation should be a “bell” shaped curve with a peak at 12:00 and an amplitude of 10 to 60 nT. The following plot shows 3 days diurnal for two locations one near the equator and one at mid-latitudes. A typical Indonesian curve would look like the bottom plot.



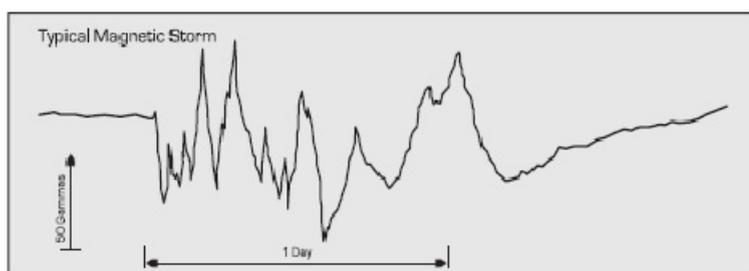
Here is the plot for half a day's diurnal from Tandai.



The spike at the start was when the unit was initially set up and should not be a problem because the field unit should not have been in use at this time. Note that apart from the setup spike there are no major spikes in the data and the bumps are only 1 nT high. This record is good. Below is a plot of a typical diurnal variation with acceptable pulsation noise.



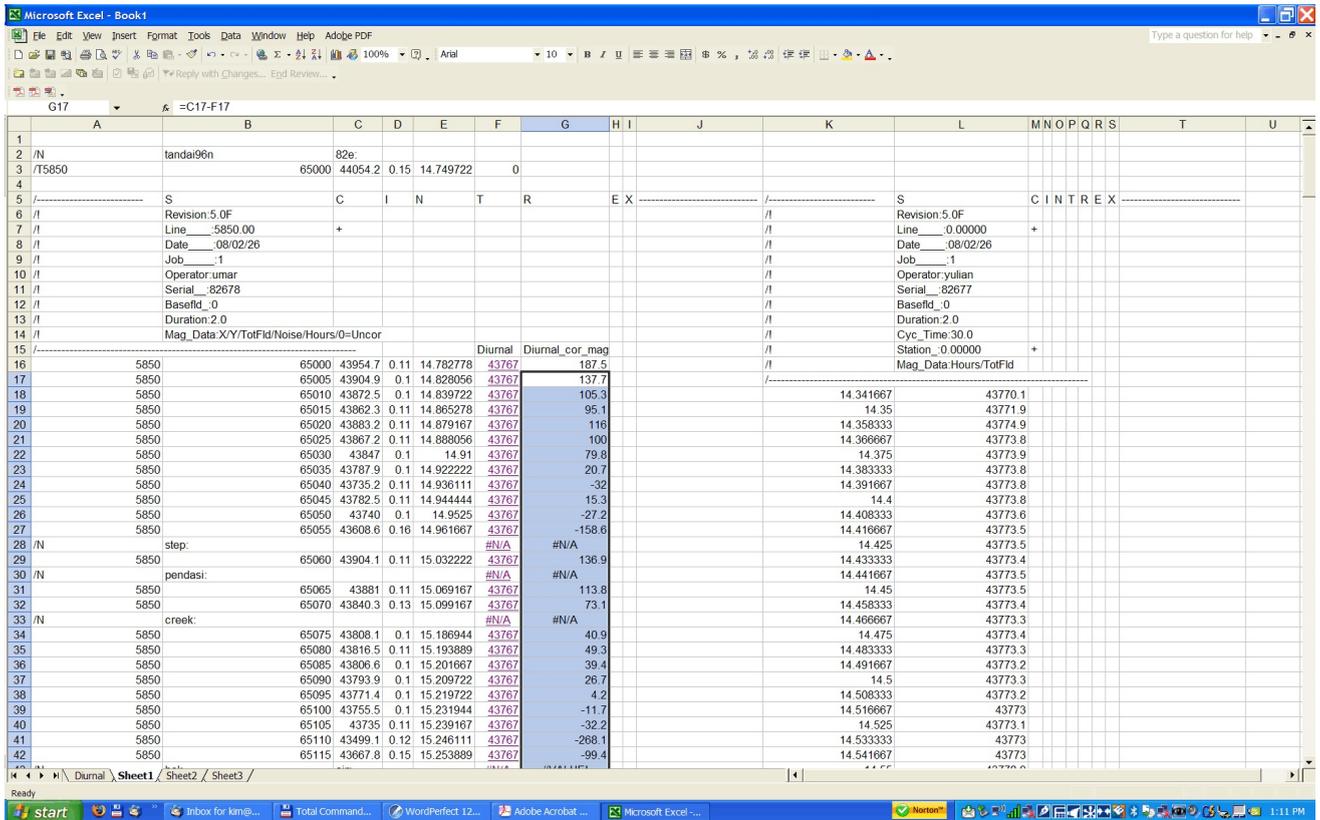
If the data have spikes it suggests a cable problem with the magnetometer sensor. If there are big bumps or anomalies in the data it may be due to a magnetic storm.



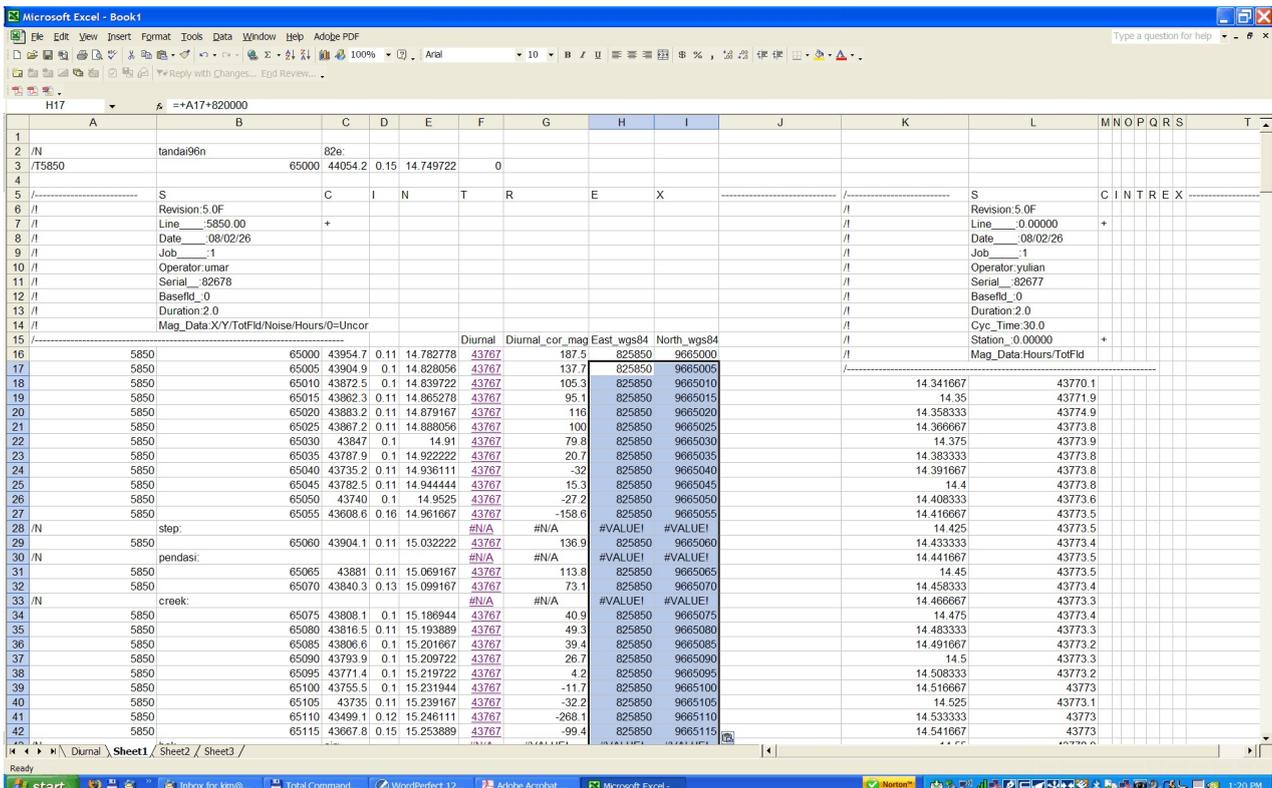
If the pulsations are high amplitude ( $> 10$  nT) then that day's survey may have to be repeated.



Label this column Diurnal. Now we will calculate the diurnal corrected magnetic value. This is just the field mag minus the diurnal =C16-F16 in this example. Copy this formula down the full field data range and label the column Diurnal\_cor\_mag.

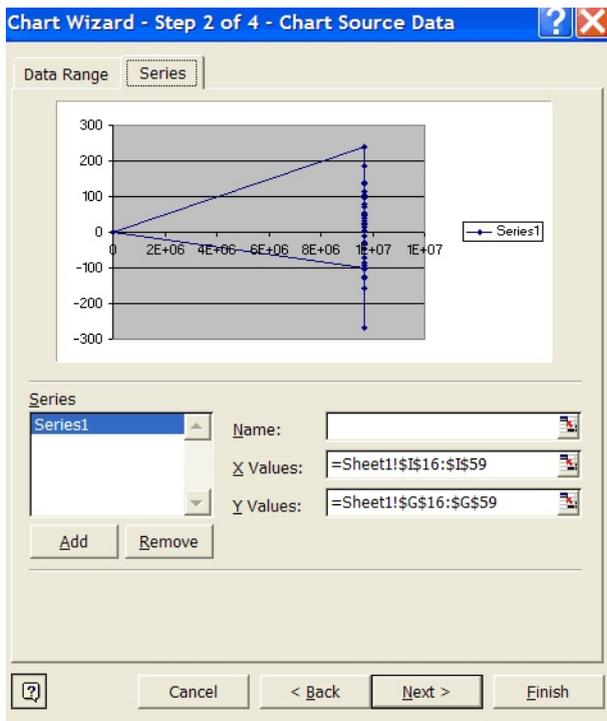


Don't worry about the #N/A and #VALUE! errors at the field labels and header lines. Now we need to add the missing digits to the easting and northing to restore them to UTM. The field crews have been instructed to put a note in at the start of the day with the survey area along with the missing digits. This should be in or near row 2 of your spreadsheet. Start in column H and add the missing easting to the X value (assumes they are doing N-S lines if E-W then the easting will be the Y value) Label this column East\_WGS84. Do the same for the northing and label this column as North\_WGS84. Copy these formula down through all the field data.

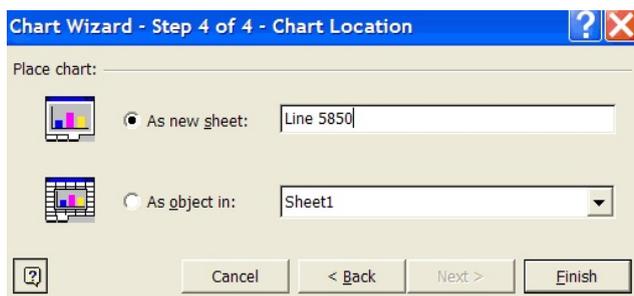


If the crew made a mistake with their line or station numbering you may be able to fix it with a simple change to the formula for calculating the UTM. If the survey is not on a UTM grid but a mine or local grid you can skip this step. Again do not worry about the #VALUE! errors for the moment.

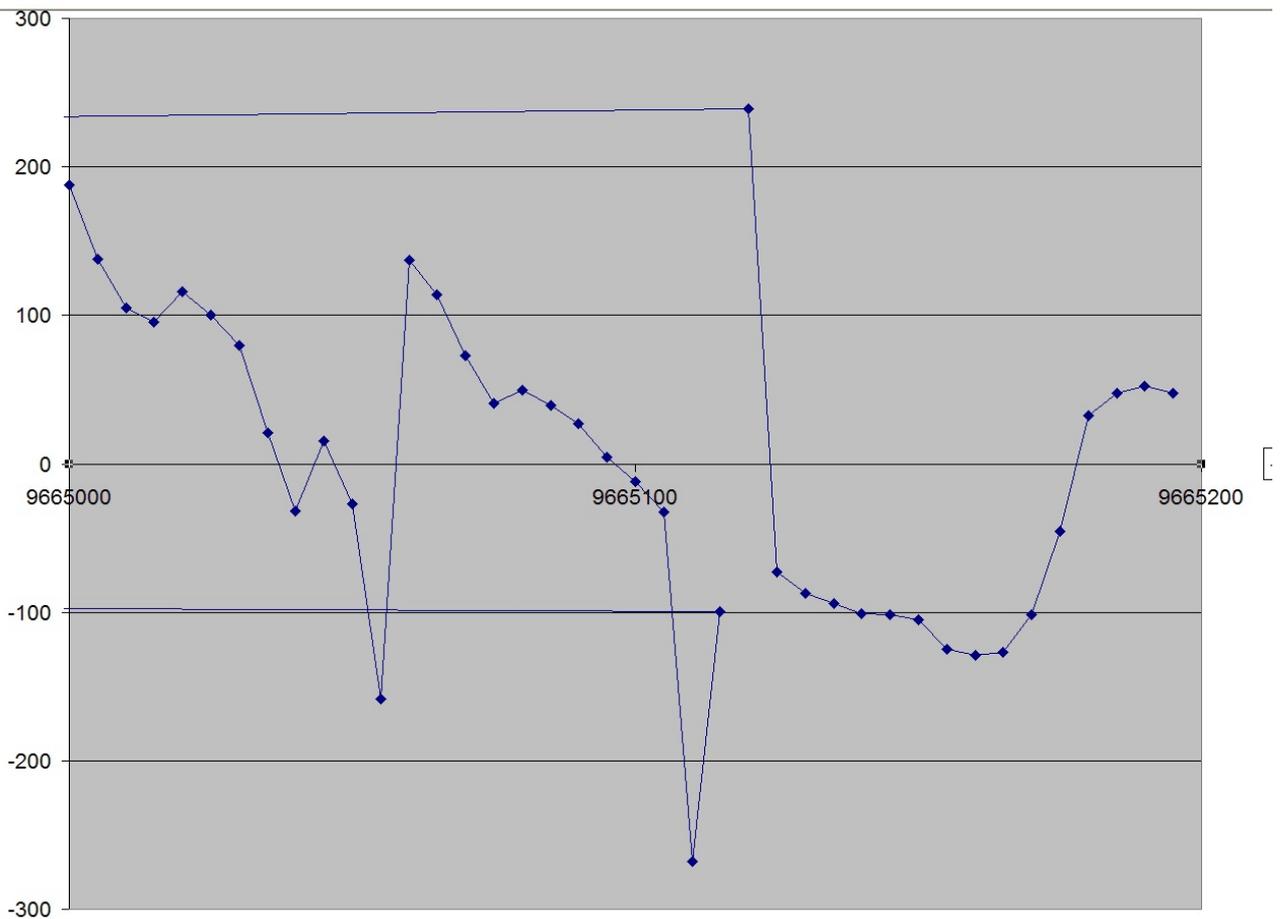
The data are now corrected and located. Now we should plot it up and see what it looks like. Click on the graph button and select XY Scatter plot, lines **with** symbols. Select a data range of column G to column I which covers the first line of field data i.e between the text headings. Go to the series tab and delete series 2. Set the X range for series 1 to the Northing column (assumes N-S lines!) Set the Y range to the diurnally corrected mag values for that line.



Don't worry for the moment about the X scale being wrong. Click on Next to go to Step 3 and change nothing, click Next to go to the final screen and change the setting to "As new Sheet" and call the sheet the line number.



You will have to manually set the X axis to sensible values. The #VALUE errors beside the field notes will cause the plot to draw lines back to zero.



This can easily be fixed by going back to the spreadsheet and deleting the #N/A and #VALUE! errors coinciding with the operator notes. You will find that these notes often correspond with big spikes in the data as the operators note any metal objects.

Now repeat the process for the other lines, creating a new graph for each one.

If all OK save the spreadsheet.

When you are ready to gather together several lines of processed data you can copy the processed data for each day into a master spreadsheet without the formula. To do this select the field data (e.g. A16 to I228 in this example) and Copy it (Ctrl-C) go to the master spreadsheet and position your cursor where you want to insert the data. Right click and select Paste special. Select values from the Paste list.

