Kappabridge User Guide
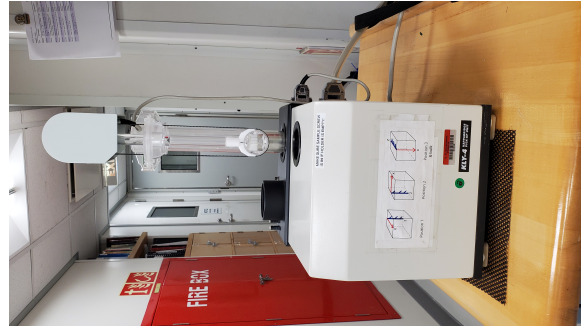
Introduction

This document is intended to guide scientists and technicians through the use of the Kappabridge KLY-4 Magnetic Susceptibility meter. Two software packages are available for measuring the anisotropy of magnetic susceptibility: The AGICO Sufar program and the AMSspin program. Users are encouraged to use the AMSspin software over the AGICO software when possible.
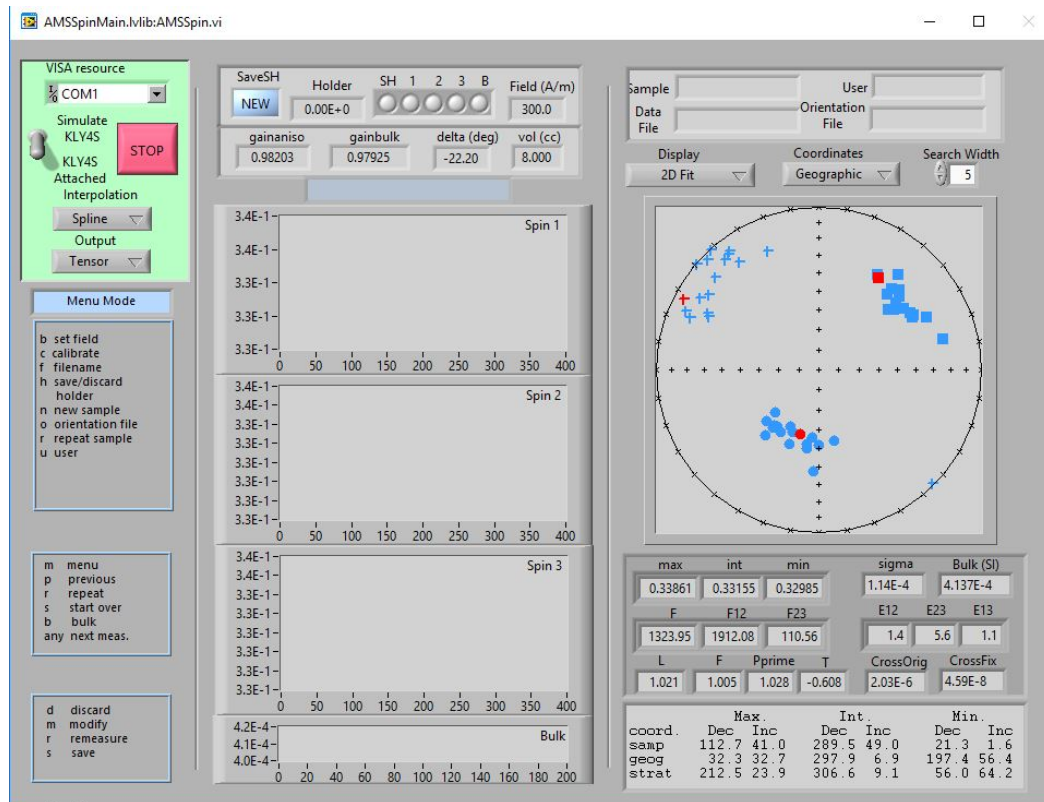
AMSspin Software

AMSspin is a Labview program written by Jeff Gee for Anisotropy of Magnetic Susceptibility measurements. The code has been modified to meet the needs of IODP. For detailed instructions on the use AMSspin and the files written by this program, see the vendor manual AMSspin – A LabVIEW Program for the Kappabridge KLY-4S and KLY-3S paper found in *IODP Share\ODP Technical Manuals\Paleomag\Current\Kappabridge*. This program is controlled with keyboard keystrokes. Be aware of what menu you are operating in as some keystrokes have multiple uses. The version of AMSspin used by IODP includes a method for measuring bulk susceptibility only and outputs data to a .csv file as well as the original AMSspin .asc files.

To Start AMSspin:

1. Remove cloth cover from Kappabridge. **It is important to remember this step. When the AMSspin program is opened, the arm will raise automatically. If the cover is still on, damage may occur to the arm.**
2. Unstrap the Kappabridge from the metal pole
3. Slide the Kappabridge away from the pole (to the left). The sensors work best with distance from the support pole.
4. Turn on the power box.
5. Open AMSSpin from the desktop. The sample handler will move to the UP position immediately upon start up.
    a. This is the AMSspin program from Jeff Gee with updates. The desktop icon is a white box with yellow triangle.

6. The software will open and be ready to run. The Kappabridge is on Com1.

7. There are three menus on the left hand side of the screen. When the program first opens, menu mode is selected.

AMSSpinMain.lvlib:AMSSpin.vi

VISA resource
COM1

Simulate
KLY4S
STOP
KLY4S
Attached
Interpolation
Spline
Output
Tensor

Menu Mode

b set field
c calibrate
f filename
h save/discard
   holder
n new sample
o orientation file
r repeat sample
u user

m menu
p previous
r repeat
s start over
b bulk
any next meas.

d discard
m modify
r remeasure
s save

SaveSH   Holder   SH 1 2 3 B   Field (A/m)
NEW   0.00E+0   300.0

gainaniso   gainbulk   delta (deg)   vol (cc)
0.98203   0.97925   -22.20   8.000

Spin 1
3.4E-1
3.4E-1
3.3E-1
3.3E-1
3.3E-1
0 50 100 150 200 250 300 350 400

Spin 2
3.4E-1
3.4E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
0 50 100 150 200 250 300 350 400

Spin 3
3.4E-1
3.4E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
3.3E-1
0 50 100 150 200 250 300 350 400

Bulk
4.2E-4
4.1E-4
4.0E-4
0 20 40 60 80 100 120 140 160 180 200

Sample   User
Data   Orientation
File   File

Display   Coordinates   Search Width
2D Fit   Geographic   5

max	int	min	sigma	Bulk (SI)
0.33861	0.33155	0.32985	1.14E-4	4.137E-4

F	F12	F23	E12	E23	E13
1323.95	1912.08	110.56	1.4	5.6	1.1

L	F	Pprime	T	CrossOrig	CrossFix
1.021	1.005	1.028	-0.608	2.03E-6	4.59E-8

```
              Max.          Int.          Min.
coord.   Dec    Inc     Dec    Inc     Dec    Inc
samp    112.7  41.0    289.5  49.0     21.3   1.6
geog     32.3  32.7    297.9   6.9    197.4  56.4
strat   212.5  23.9    306.6   9.1     56.0  64.2
```

8. Press F to assign the file name and path for saving the measurements. This command will also allow the user to select an existing file.

a. Choose a file name or select an existing file. You do not need to add any file extentions (i.e. *.csv*). However, if you do, AMSspin will strip the extension and add the appropriate extension needed for output (see *File Writing* below) . The same   goes for selecting an existing file; if you select a file with a *.txt* extension, the extension will be stripped and the data will be appended to the existing files which were initially created. For consistency, it may be a good idea to stick with selecting the *.csv* file (vs the *.txt* file) when opening an existing file.

b. The default directory that is opened when selecting a file will be the last folder you were in. It does not matter what folder you are in when naming a new file; the new file will still output to the *C:/Data/IN folder.* If you wish to select a file that has already been uploaded to LIMS, you will need to navigate to *C:/Data/Archive.* Files that have not yet been uploaded will be in *C:/Data/IN.*

c. Once a file is selected, the file name will appear in the **Data File** blank in the upper right hand corner of the screen.

d. Data will be saved to this file each time **SAVE** is selected at the end of a measurement.

e. The user may change this file at any time as long as the Menu mode of AMSspin is active.

9. Things to keep in mind when selecting and naming files:

a. If you choose to create a new file but select an existing file name (or name your file with an existing name), the previously recorded data in that file will be overwritten. You should receive the standard windows message that the file name already exists but care should be taken when naming files.

b. If you save measurements to an existing file that has already been uploaded, the output .csv file that is saved in *C:/Data/IN* will not contain the previously measured samples. It will only contain the new measurements. When this file is uploaded to LIMS, a *.csv.rep0* file will be added to the archive folder. This file will only open in a text editor such as notepad. All measurements will still be in LIMS.

Calibration Measurement:

1. Place the calibration standard cylinder (typically found in a bag on the metal pole) into the Kappabridge sample holder with the cylinder standing up so the flat ends are on the top and bottom (Figure 5).
   a. Tighten the screw so that the specimen does not move, but do not over tighten.
2. Press the **C** key of the keyboard. The calibration measurement will begin.
3. When measurement is complete, press save if the calibration measurement looks good.
   a. Two pop up windows will ask the user if they wish to overwrite the existing files. Select yes for both windows.

## Anisotropy of Magnetic Susceptibility Measurements

1. Make sure the sample holder is empty and the screw is securely in the holder (Figure 7). Also check that there are no obstructions in the path of the sample handler.

2. Press **N** to name a new specimen and to begin a measurement. **Do not put a sample in the holder at this time**

3. Use the barcode scanner to enter the TextID as the sample name in the pop up window and select OK.

    a. The TextID is required as the sample name for data upload

After the user enters a sample name, the program will move to the Measurement Mode menu. And the blue bar in the center of the screen above the empty graphs will display "Ready for Sample Holder."

Between any of the measurements the user may: Repeat a measurement (press **R**), start the entire measurement process over (press **S**), or return to the main menu (press **M).**

Selecting bulk (press **B**) will only complete the bulk susceptibility measurement. If you wish to collect a sample holder measurement for a bulk susceptibility measurement, be sure to press the **space bar** before pressing **B**. Otherwise, a bulk susceptibility measurement will be taken with no sample holder measurement.

4. Press the **space bar** to begin the sample holder measurement.

5. The sample holder value will be displayed at the top of the screen when the measurement is complete.

6. Evaluate the sample holder value

    a. The value should be small (E -5 or -6) and should be negative.

    b. If the value is high, the program will allow the user to complete the measurements, but will **not** allow the user to save the data.

- If the value is high, make sure the Kappabridge is away from the pole and that no computers/laptops/metal devices are next to the Kappabridge. Then press R to repeat the sample holder measurement. Repeat the measurement until an acceptable holder measurement is obtained. This may take several tries.
- If the value looks acceptable, continue to step 6.

7. Place the sample in the sample holder following the orientation scheme shown on the front of the Kappabridge and press the **space bar** to initiate the measurement.
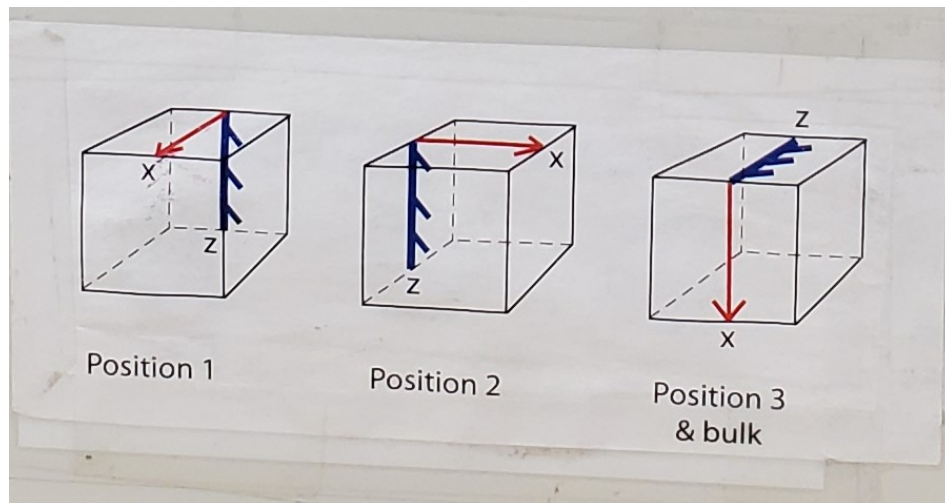
8. When the holder returns to the up position, rotate the specimen to the second position and then press the **space bar** to initiate the measurement.

9. When the holder returns to the up position, rotate the specimen to the third position and then press the **space bar** to initiate the measurement.

10. When the holder returns to the up position, press **space bar** to initiate the bulk susceptibility measurement. The sample should remain in position 3 for the bulk susceptibility measurement.

When the bulk susceptibility measurement is complete, the program will automatically move you to the third menu, Data Mode.
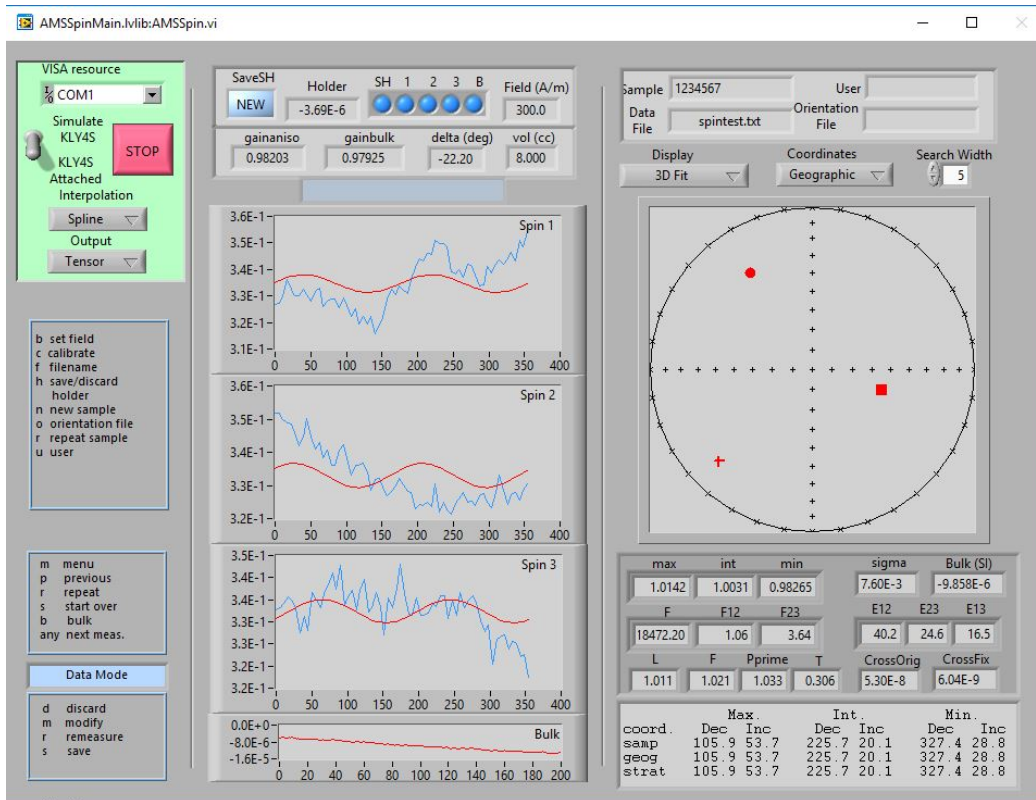
You can choose to: Discard (**D**) the measurement, modify (**M**), remeasure (**R**) the specimen, or save (**S**) the measurement. The remeasure option allows you to select which of the positions you wish to remeasure. Modify (**M**) allows you to change the sample name before saving the data.

11. Press **S** to save.

    a. If a file is already selected, the new data will be added to the file.

    b. If no file name was assigned at the start of the measurement, the program will prompt the user to designate a file name or select a file.

12. When the save is complete, the user is returned to the main menu.

13. User may save the current holder value at this time by pressing **H**.

    a. This will save the holder value and you will not need to remeasure the holder for every specimen

    b. When the holder measurement is being held it will say "OLD" under the Save SH heading at the top of the screen.
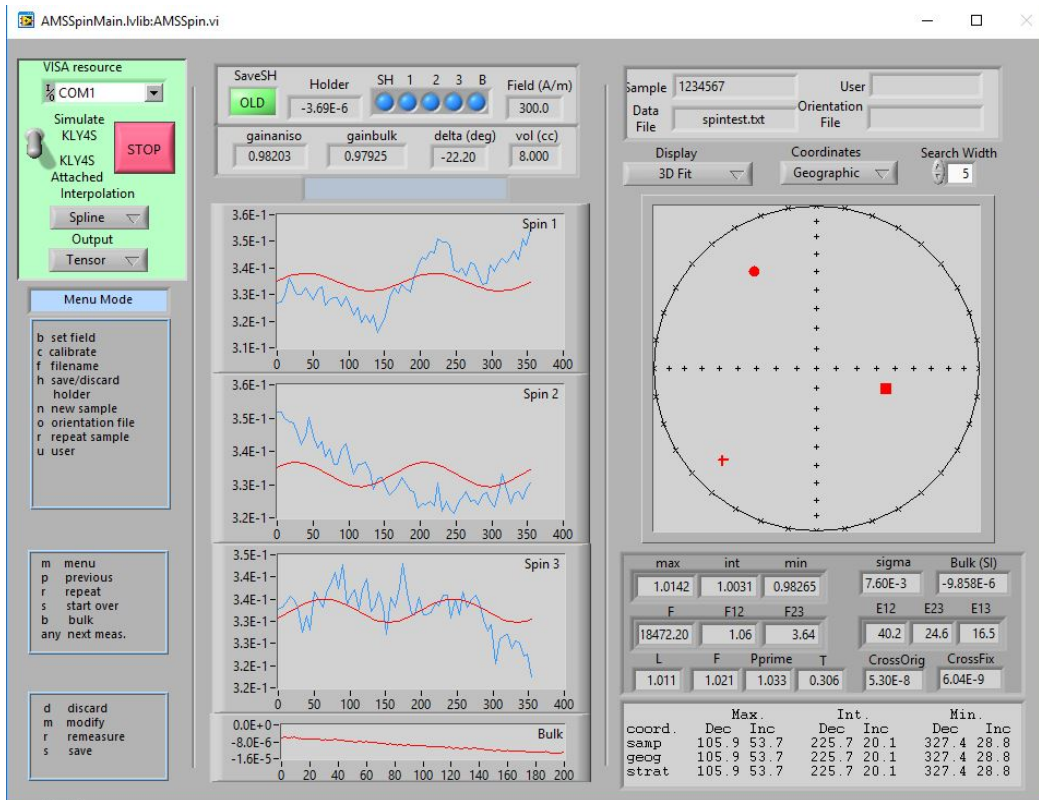
14. To continue measurements, press **N** to assign the next sample name.

15. If the holder value is saved, place the next specimen in position 1 and continue the measurements as in steps 6-11.

16. Continue this process for each sample.

To stop the program press the red STOP button.

File Writing

AMSspin will save the file as a .csv file in the folder the user selects. The default and recommended location for saving the files is *C:/Data/IN*. All other files generated by AMSspin will be written directly to the *C:/AUX_Data* folder. The .txt file that is generated by AMSspin can be opened in the Anisoft5 program. When selecting a file to open in Anisoft5, the user must change the file type from .ams to .txt in Anisoft or the files will not be visible.

Uploading Data to LIMS (AMSspin)

For AMS measurements from the AMSSpin program, MUT requires the .csv file generated by AMSspin. AMSspin and the .csv files to be uploaded must be closed for the files to upload. To complete an upload, place the files to be uploaded in the IN folder and select upload. MUT will not recognize if the same file has already been uploaded and will upload it again. This will result in duplicate data being uploaded. The Text ID must be the sample name for upload to work.

If you click upload, but do not see your file(s) in LIMS, the file(s) may have an error preventing their upload. Check the folder directory *C:/Data/Error* to see if your file(s) are there. If so, there is an error associated with the file. The file(s) may also go to *C:/Data* if they contain errors. To check for errors, right click on the suspect .csv file and open/edit with a text editor such as notepad. Most errors will be associated with a space after the sample name. Delete the space and save. Then move the edited .csv file back to the *IN* folder and upload.

AGICO Sufar Software

Sufar.exe does not run on in the new PC operating system, but through the use of DOSbox we are able to simulate the proper operating environment. The following instructions will walk the user through how to launch Sufar.exe and complete measurements.

Start the Sufar Software:

1. Remove cloth cover from Kappabridge
2. Unstrap the Kappabridge from the metal pole.
3. Slide the Kappabridge away from the pole (to the left). The sensors work best with distance from the support pole.
4. Turn on the power box. The Kappabridge will move into the Up position if not already there.
5. Open DOSBox 0.74 folder from the desktop (**Figure 1**).
6. Open DOSbox.exe
    a. In the DOSbox 0.74 window that opens, the curser should be flashing behind the prompt Z:\> All commands will be entered following a prompt of this type. **Figure 2** illustrates what the screen will look like after all commands have been entered.
7. At the prompt Z:\>, enter the command: **mount c "c:\Kappabridge\Agico software\KLY4CS\Sufar"**
    a. If the directory is correct, user will receive the message "Drive C is mounted as local directory c:\Kappabridge\Agico software\KLY4CS\Sufar\
    b. This mounts the C drive and the directories. If Sufar is moved to a different directory, this path will differ.
8. At the prompt Z:\> enter the command **c:**
    a. This command changes the current directory from Z to the C drive
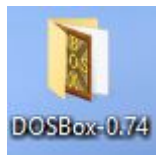9. At the prompt C:\>, enter the command **Sufar.exe**
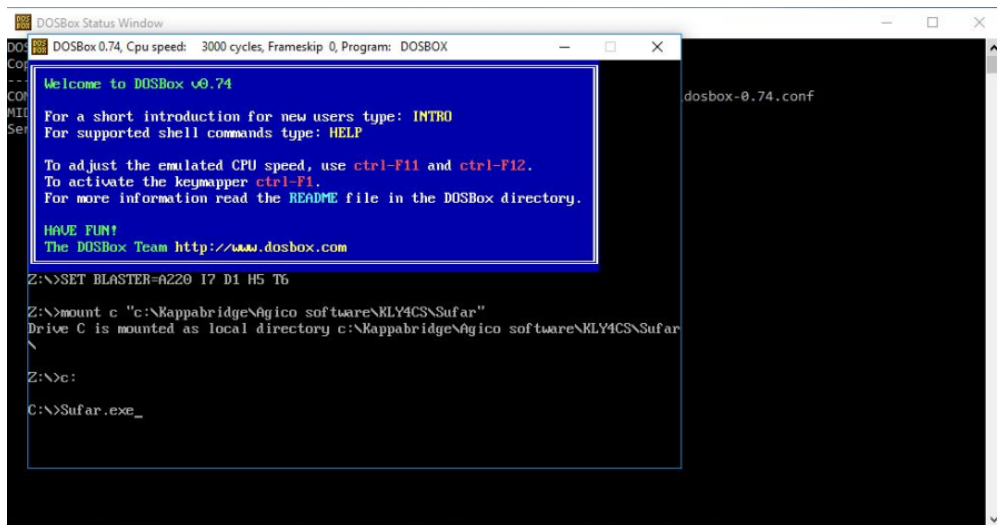

Figure 1 DOSbox- 0.74 Desktop Icon

The Sufar program should open, initialize, and be ready for measuring once the main Sufar window is displayed (**Figure 3a and b**). Sufar.exe is controlled by the F keys of the keyboard and the arrow keys. The mouse will not work within this program. The number pad to the right of the keyboard will also not work for entering any commands.
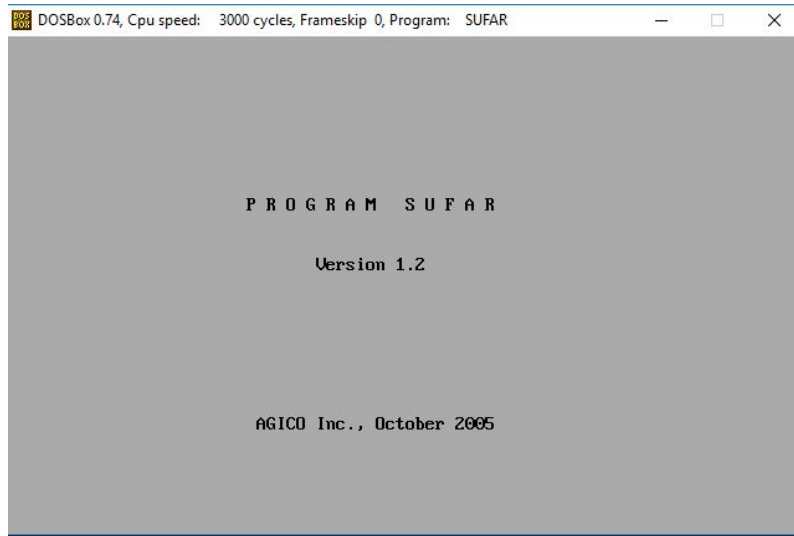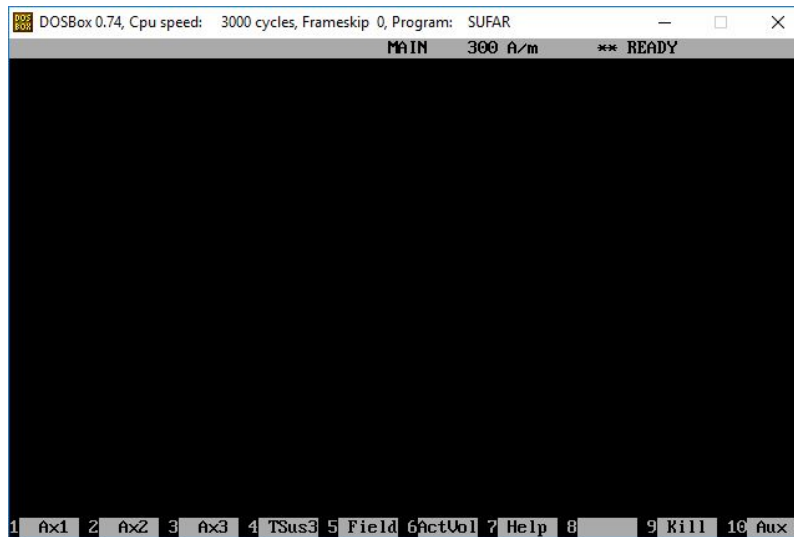

Figure 3a Sufar.exe startup window

Figure 3b Main Sufar Window

Calibration Measurement:

1. Press F10 to access the auxiliary menu (Aux) in Sufar (**Figure 4**). When in the Auxillary menu the AUX will be displayed in the grey bar at the top of the window.
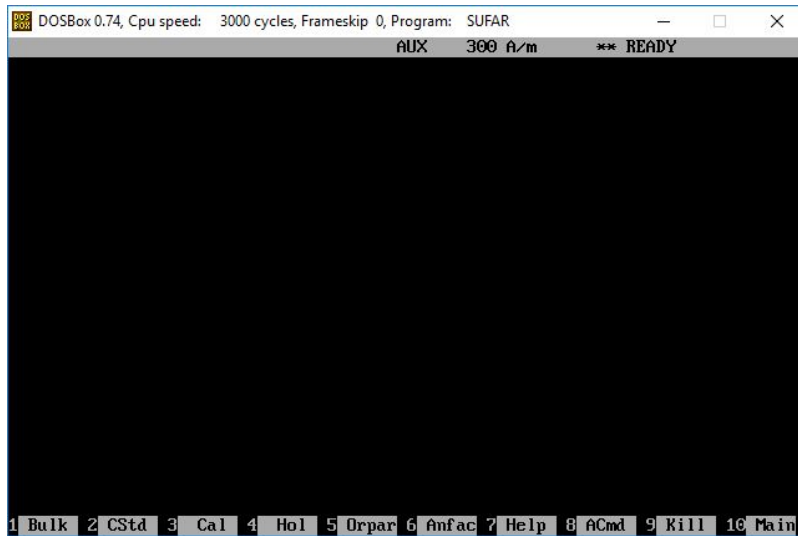
Figure 4 Sufar Auxiliary Menu window

2. Place the calibration standard (found in the bag on the pole next to Kappabridge) into the Kappabridge holder standing upright (**Figure 5**).

Figure 5 Kappabridge Holder with calibration standard.

3. Press F3 (Cal) to initiate calibration measurement.

a. The sample holder will move down into the coils and calibration measurement will be completed. The Old and New calibration information will be displayed (**Figure 6**).
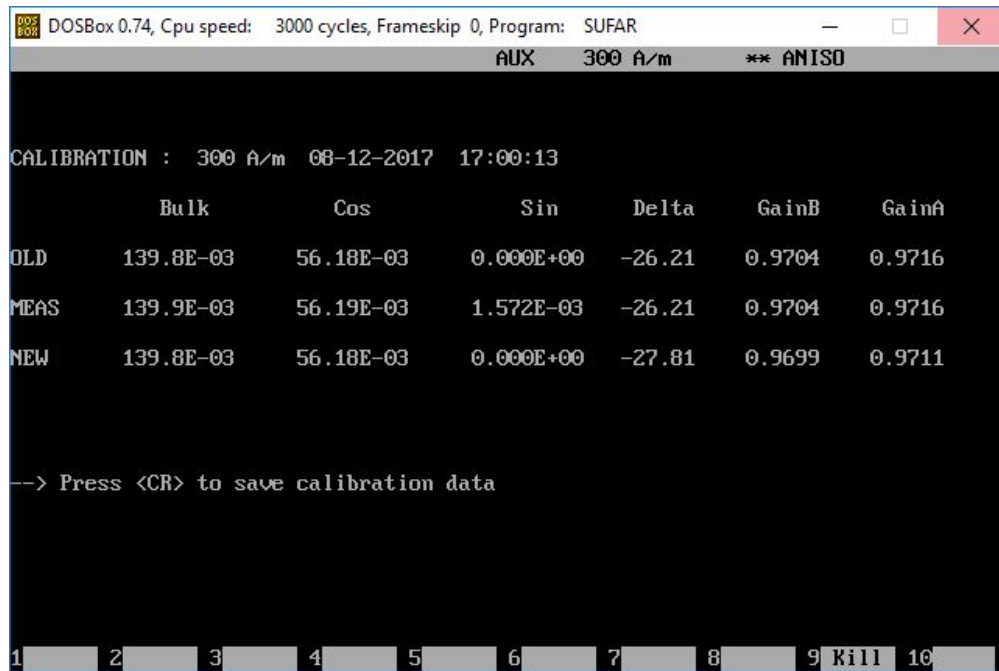
Figure 6 Calibration window when measurement is complete

4. To Save the new calibration information press Return

    a. If you do not wish to save, press F9 (Kill) to exit the calibration window

Holder Measurement:

1. Press F10 to access the auxiliary menu (Aux) in Sufar (**Figure 4**).
2. Make sure the Kappabridge holder is empty and clean and that the screw for holding the specimens is secured in place (**Figure 7**).

Figure 7 Empty Kappabridge Holder prepared for holder measurement.

Note that the screw (indicated by white arrow) must be secured in the holder before starting the measurement.

3. Press F4 (Hol)

a. The holder measurement sequence will begin. Do not touch the holder until the display indicates the measurements are completed.

b. Flashing values are 'suspicious' values. They may exceed the allowable range of error as determined by AGICO. Often our standard error value for TSus is suspicious, but still very low.

      i. It is possible to get non-suspicious values for the holder, but it often takes multiple attempts. It is recommended that no one walk past the Kappabridge during the holder measurements and that the user remain very still. Do not swivel in the chair or walk around the system.

4. When the measurement is complete, the display will prompt the user to save (**Figure 8**).

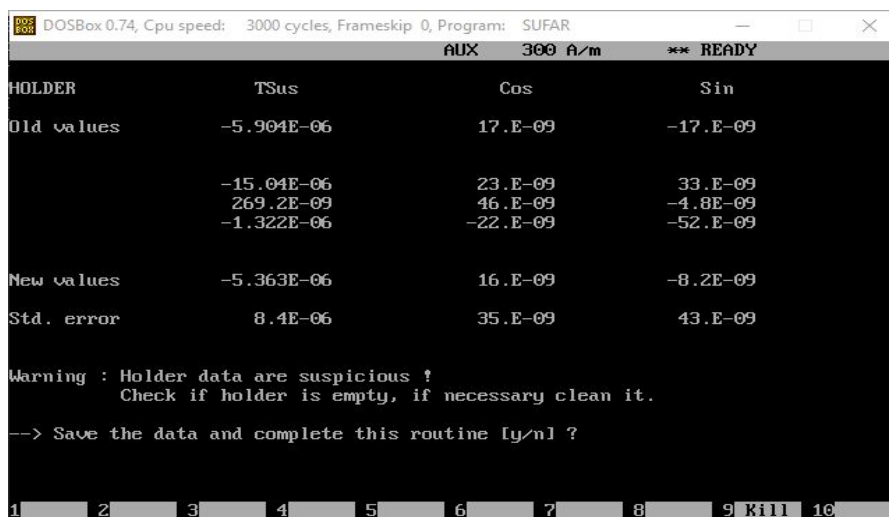a. To save the data press **Y**. If you do not wish to save, press **N.**

Figure 8 Holder Correction window after measurement is complete.

For this measurement, the values are considered suspicious and a warning is given.

Anisotropy of Magnetic Susceptibility Measurement:

1. Place a specimen in the holder in position 1.

a. The specimen should be centered in the holder and secured using the small screw in the right side of the holder.

b. Use small pieces of foam to help keep the sample secure in the holder.

2. From the Sufar Main window (**Figure 3b**), press **F1** to initiate Ax1 measurement

a. The Kappabridge will move the specimen into the measurement region and spin the specimen.

b. An asterisk will flash above the active measurement during the process. The screen will also display percentage of measurement that is completed (Transferred) and the Range that the Kappabridge is using (**Figure 9**).

c. When each measurement finishes, the data will be displayed on the screen (**Figure 10**).

d. Monitor the error percentage values as you measure. If they are high, try to remeasure the sample. This can be done by simply pressing the appropriate F command again while the specimen is in the correct position.
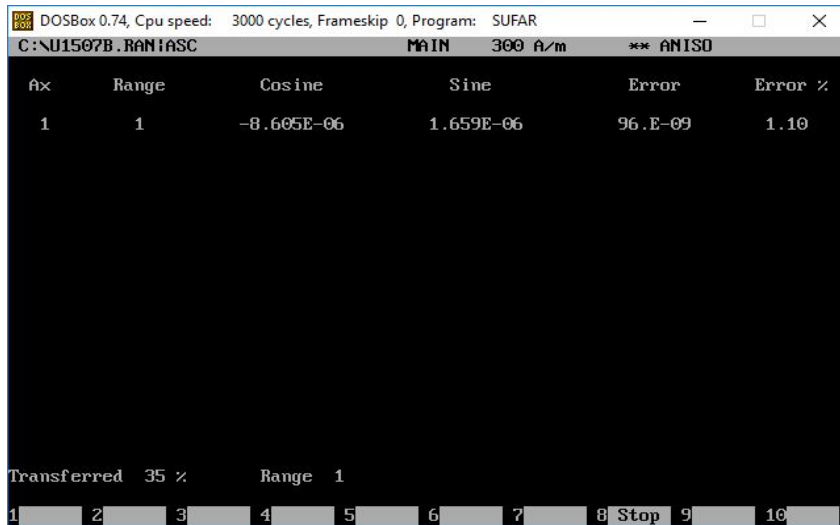
Figure 9 Sufar Display during the AX2 measurement

Figure 10 Sufar display when Ax1 measurement complete

3. Place the specimen in position 2

4. Press the **F2** key to initiate the Ax2 measurement. Data will be displayed upon measurement completion.

5. Place the specimen in position 3

6. Press the **F3** key to initiate the Ax3 measurement. Data will be displayed upon measurement completion.

7. Press **F4** to complete the bulk susceptibility measurement.

    a. The sample should be left in the holder in position 3 for this measurement.

    b. When the measurement is complete, the data for all 3 axes and the bulk susceptibility measurement will be displayed (**Figure 11**).

    c. Press **F5** to evaluate and save the data. If this is the first measurement made Sufar will display **Path ?** (**Figure 12**).
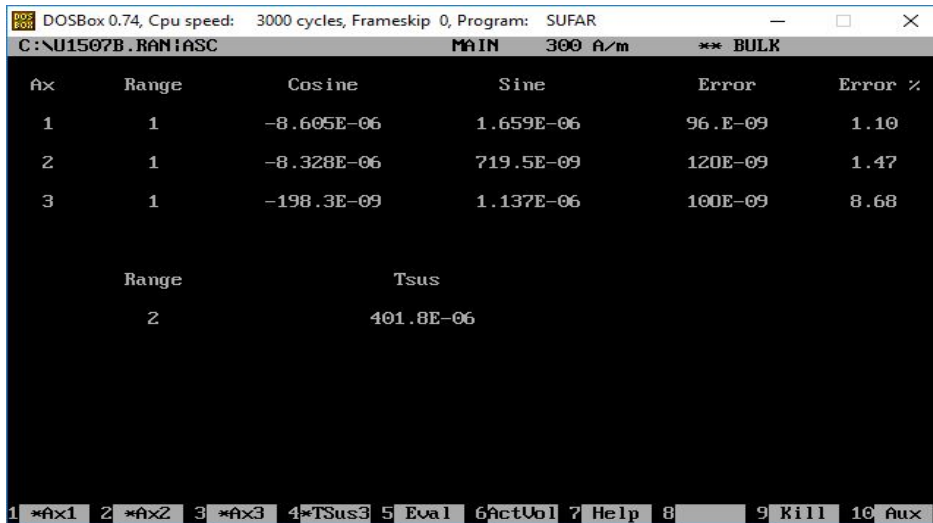
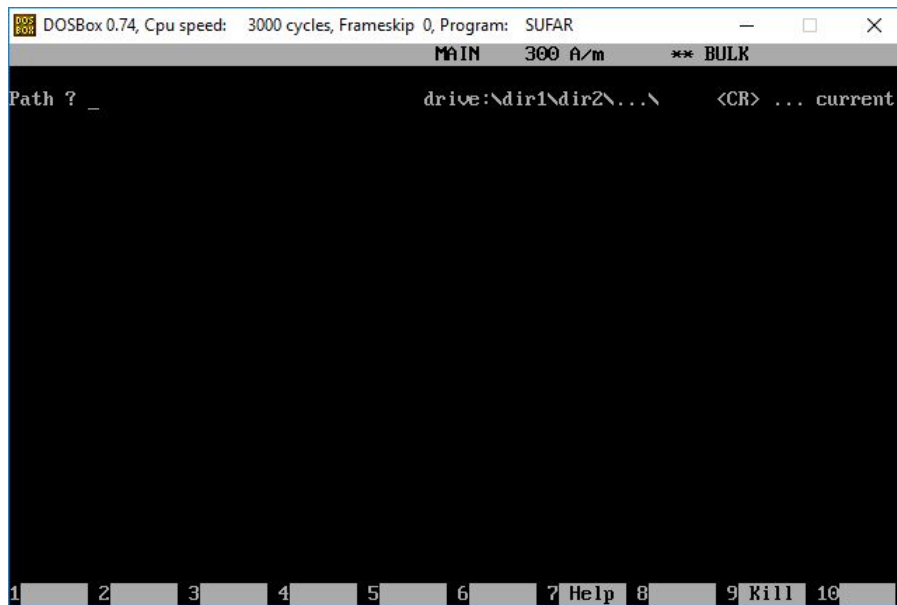*Figure 11 Sufar display after Ax1-Ax3 and bulk susceptibility measurements*

Figure 12 Sufar window requesting path to save data.

Window is displayed if F5 is pressed and no file has already been selected

8. If you wish to save to the current path, press return

    a. If you wish to save to a new path, enter the path now and press return

        i. If the path is invalid, you will be prompted again

        ii. The program assumes that the C drive is the location c:\Kappabridge\Agico software\KLY4CS\Sufar

9. At the prompt **Name of file?**, enter a file name that is less than 8 characters with no extension (Figure 13).

    a. It is recommended that file names be the Site and Hole i.e. U1508C

    b. If the file name is more than 8 characters, the program will not accept the name.
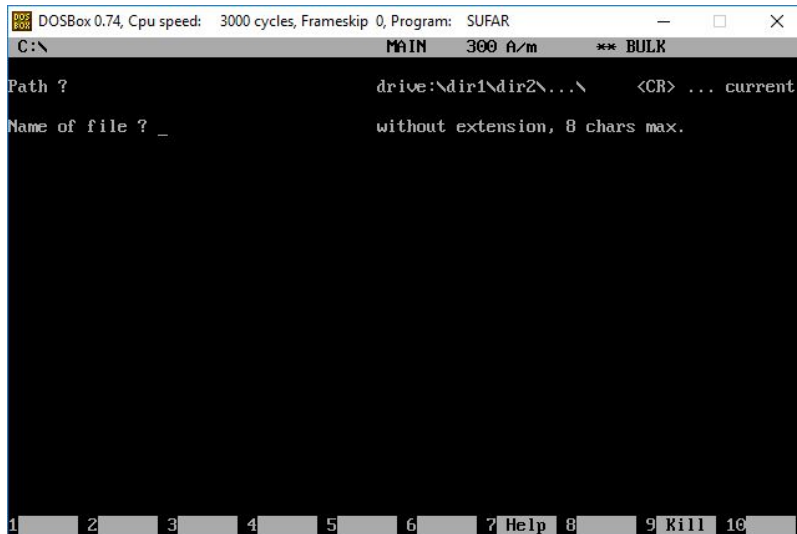
Figure 13 Sufar window prompting user to enter a file name with a maximum of eight characters

10. A new command line is now visible on the screen.

    a. If this is a file with existing measurements, the window will display the number of measurements already in the file, and ask for the new specimen name (Figure 14).

    b. If this is a new file, the window will only display the prompt asking for the specimen name.
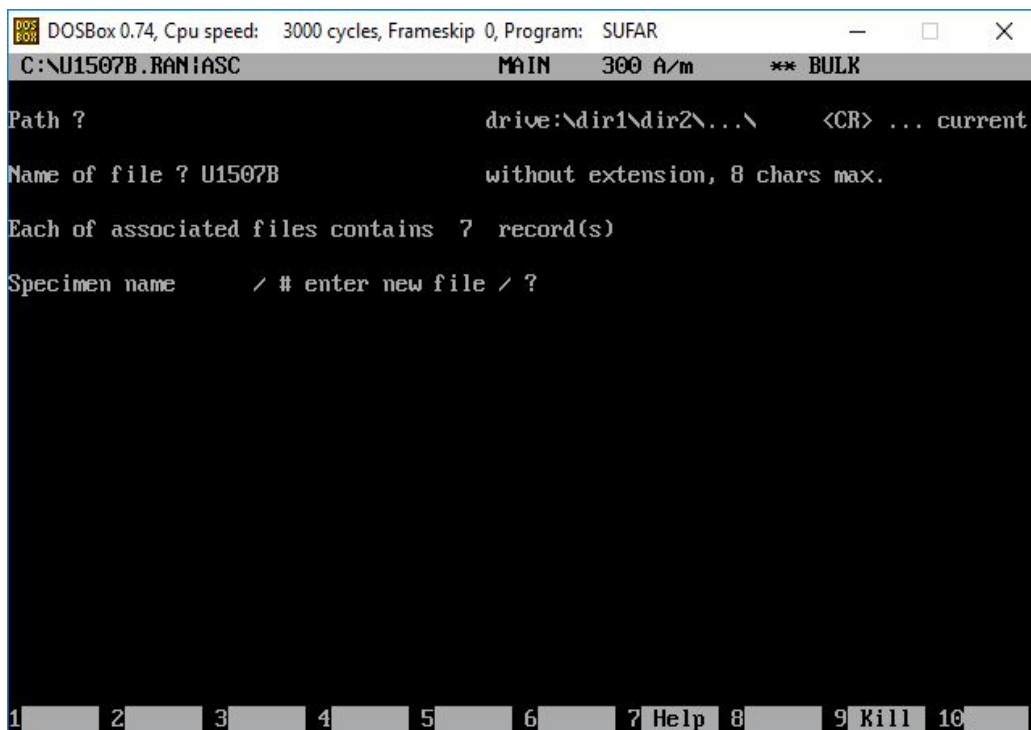

Figure 14 Sufar window prompting user to enter a specimen name or to use the # sign to indicate they wish to put the data in a new file

11. At the prompt: **Specimen name /# enter new file/?**, enter the **TextID** of the sample. Press return

    a. TextIDs are required as sample names for upload.

12. The Sufar window now displays the options for entering the orientation scheme you wish to use (**Figure 15**). Enter 1,2, or 3 and press return.

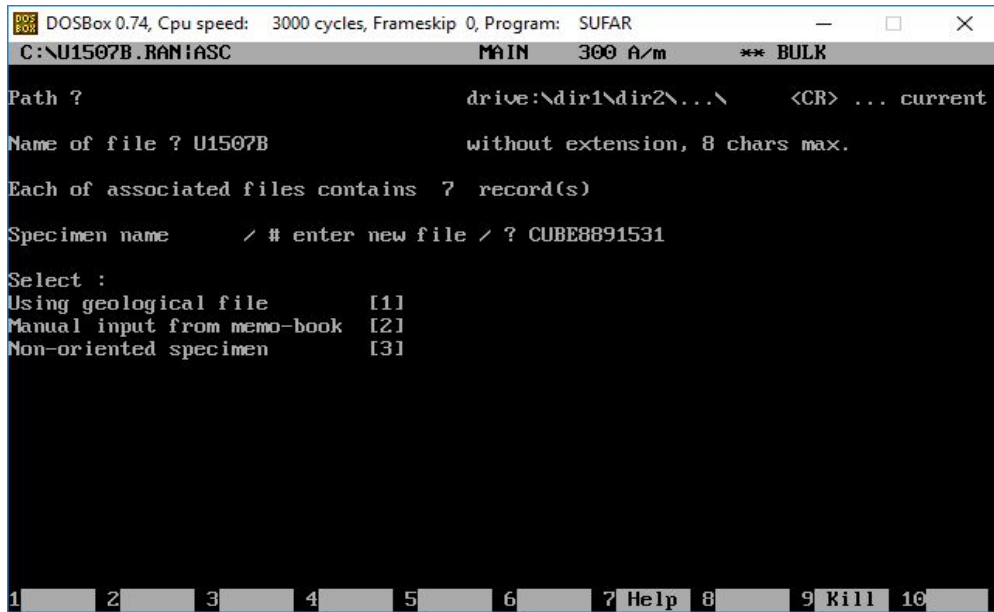   a. This will likely be number 3, Non-oriented specimen

Figure 15 Sufar window displaying options for entering specimen orientation information

13. The specimen data will now be displayed on the screen for you to evaluate (**Figure 16**). To leave this window, press ESC (the escape key).
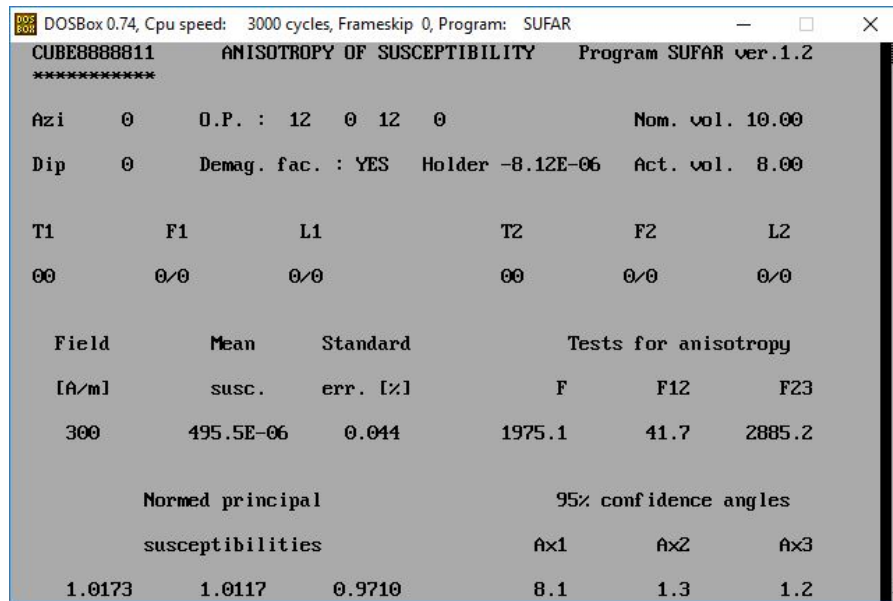

Figure 16 Sufar data evaluation window

14. Sufar will now display: Output to file (Y/N)? (**Figure 17**).

a. Pressing Y and return saves the data. You may also press return as saving the data is the default action

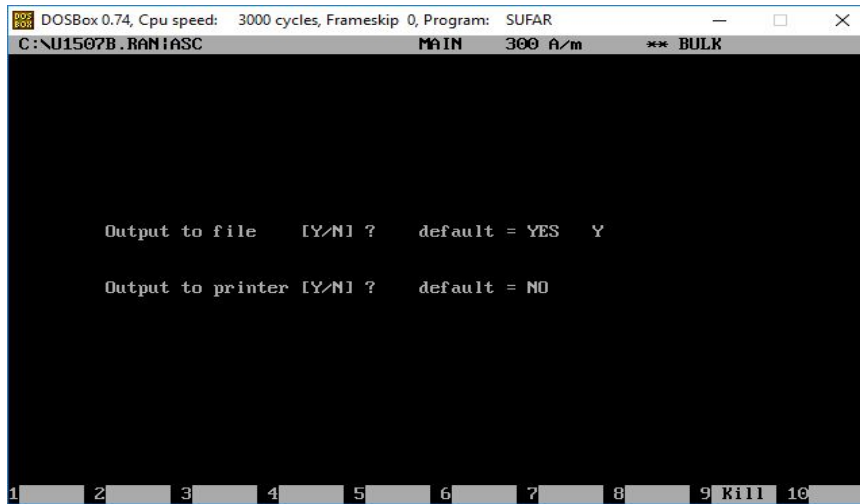   b. Pressing N and return will result in your data not being saved.

Figure 17 Sufar display asking user to choose to output data to a file and if they wish to print.

15. User is now prompted: Output to printer (Y/N)? (**Figure 17**). Pressing return will trigger the default response of N (no).

    a. Entering Y will result in data being sent to a printer

16. User will be returned to the Main Sufar window (**Figure 3b**). You may begin the next measurement now by repeating steps one through seven.

    a. The saving process will look different after the first measurement is made. The program will only prompt the user for a specimen name (**Figure 18**).

    b. If you wish to change the file that the data is saved to, enter **#** and press return. The display will now show a prompt for a Path (**Figure 12**).
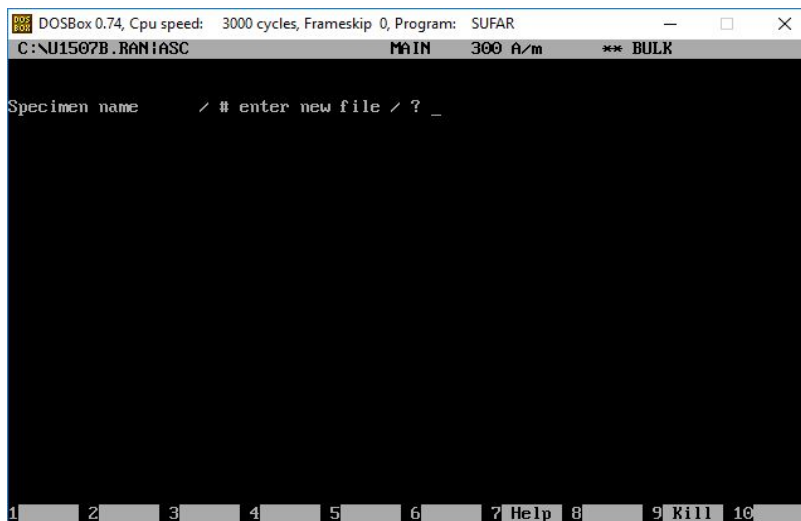

Figure 18 Sufar prompt window after initial file has been set

17. When measurements are completed and the user wishes to switch off the software, press **F1** to trigger an Ax1 measurement.

18. Then press **F8** to stop the measurement

19. Use **ctrl + Q** to quit the program.

    a. Improperly quitting the program may result in the loss of data. The last lines of the .ASC file will not be properly written.

20. Data should now appear in the .ASC file. Check the data file to ensure all data was written properly.

    a. Do not complete measurements with the .ASC file open

    b. Data will not appear in the .ASC file immediately. Data will be written to the .RAN file and transferred to the .ASC file when the program is closed.

Bulk Susceptibility Measurement:

1. Press **F10** to access the AUX menu

2. Press F1 to initiate Bulk Susceptibility measurements

3. Sufar will prompt the user to decide if new holder measurement is necessary. Enter Y or N and press return (**Figure 19**).
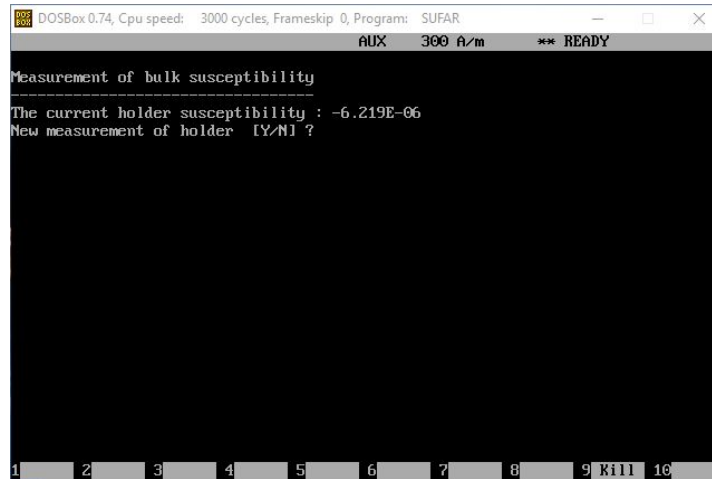
   a. The default response is N.

Figure 19 Prompt Window allowing user to measure the holder before bulk susceptibility measurements

4. User is prompted to select to measure in the current field or k-H Curve. Pressing Return will trigger the default response: current field (**Figure 20**).
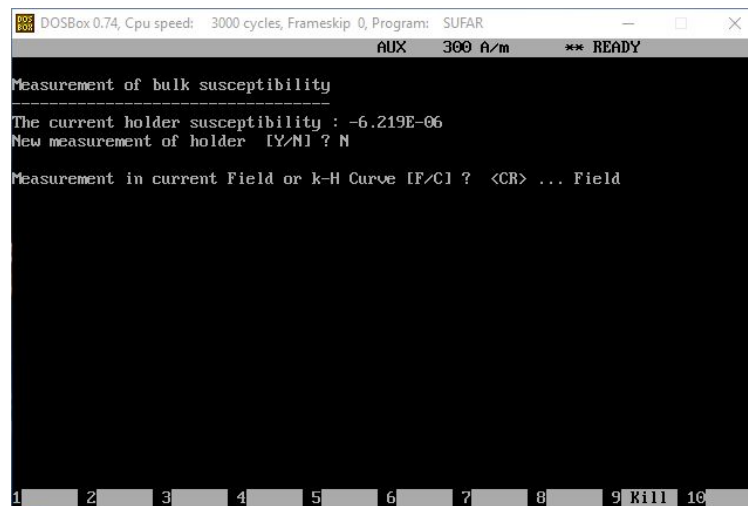

Figure 20 Prompt Window allowing user to select field for bulk susceptibility measurements

5. Place sample in holder in Position 1.

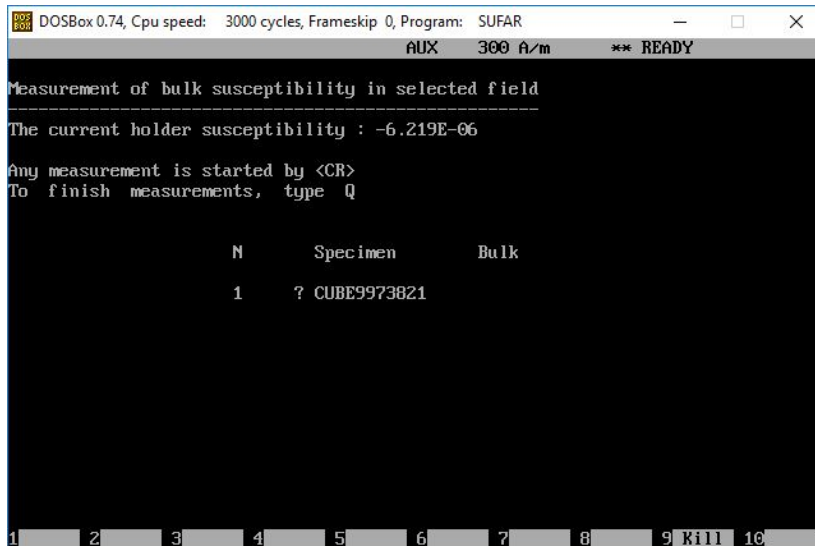6. Enter the Specimen name at the prompt (**Figure 21**).

Figure 21 Bulk Susceptibility Measurement Window

7. Use the TextID as the specimen name

8. Press Return to initiate the bulk susceptibility measurement

9. When the measurement is complete, user is prompted for the next specimen. Repeat steps 5 through 7 for all specimens.

10. When measurements are complete, enter **Q** and press return (**Figure 22**).
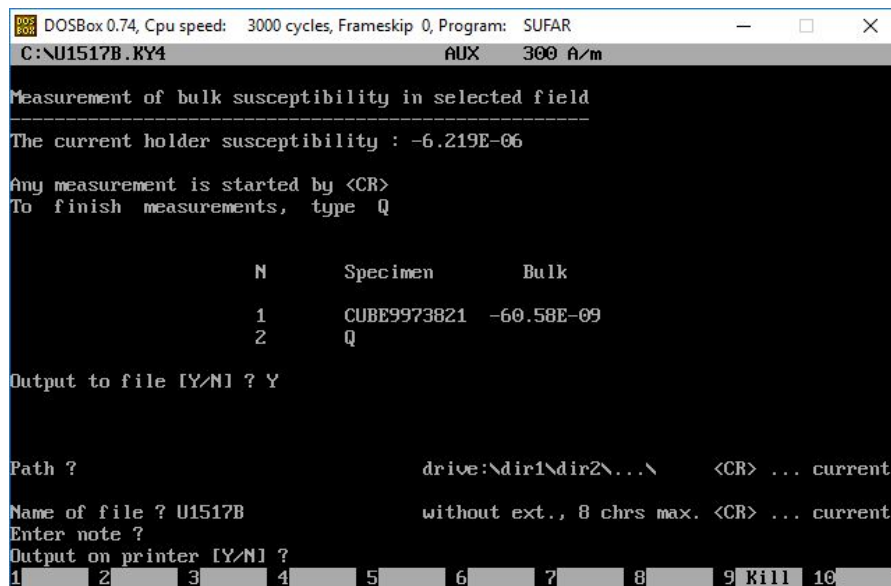

Figure 22 Saving Bulk Susceptibility data

11. User will be prompted to Output the data to a file. Enter **Y** and press return to save data (**Figure 22**).

12. User is prompted for the file path. Press return to use default file path (**Figure 22**).

13. At the Name of File? Prompt, enter a file name under 8 characters in length. Recommended file name is Site and Hole (ex. U1517B). Press return (**Figure 22**).

14. User is prompted to enter a note. This field can be left blank.

15. User is prompted to output data on a printer. Enter **N**.

16. Data should now be written to a .ky4 file at the path set by the user. Check to make sure the file has been written.

Uploading data to LIMS (SUFAR)

Uploads are completed using the MegaUploadaTron (MUT) application. For Anisotropy of Magnetic Susceptibility measurements generated by the AGICO Sufar program, MUT requires an .asc and a .ran file. To upload bulk susceptibility files, MUT requires the .ky4 file.

To complete an upload, place the files to be uploaded in the IN folder and select upload. MUT will not recognize if the same file has already been uploaded and will upload it again. This will result in duplicate data being uploaded.
The Text ID must be the sample name for upload to work. It is not possible to edit the names after the fact because the names need to be altered in the .ran file.