JR-6A Spinner Magnetometer: Quick Start Guide

V1.1; G. Matson 5/25/13; Approved by DJH 8/13/13

Introduction

This user guide will help scientists and technicians correctly use the JR-6A Spinner Magnetometer (***Figure 1***). The JR-6A measures the magnetization of discrete samples, one at a time. Some scientists prefer the spinner magnetometer to the SRM Discrete program. The spinner magnetometer is also better at measuring weaker magnetized samples. There are some caveats regarding the use of the JR-6A, however, which are discussed later in this guide. For more questions, refer to the Agico Manual located in the Pmag library and the desktop of the Dtech computer.

Figure 1: JR-6A in the Paleomagnetics Lab.

Procedures

Preparing the instrument

1. Move the spinner as far away from everything as possible:
   –Make sure it is not sitting next to the computer
   –Make sure it is not sitting next to the D-2000 AF Demagnetizer
   –Make sure it is at least 0.5 m from its power supply
2. Power on the instrument using the power switch located on the back of the power supply. The power supply is currently located above the SRM, next to the Dtech computer.
3. Let the instrument warm up for 15–30 minutes before use. Also, make sure the green lights are lit up on both the power supply and the spinner itself before starting a measurement.

4. Open the REMA6 software, located on the desktop of the Dtech computer.

Instrument Configuration and Initialization

1. On the top tool bar, under the **Settings** > **Instrument configuration**, change the information so that it corresponds with the run, then click **OK** (***Figure 2***). Select correct **Holder** and **Specimen type**. Make sure the **Specimen volume** is correct; cubes should be 8 cm^3.
2. Open the Initialization screen using **Settings** > **Orientation parameters.** the parameters should be set to 12/0/12/0. They should stay that way and shouldn't need to be changed but it is good to check and make sure.
3. Once the configuration is complete click the **Initialize** (***Figure 3***) button in the bottom left corner of the window. A dialogue box will appear and go through a series of checks. Once it is complete click **OK**.

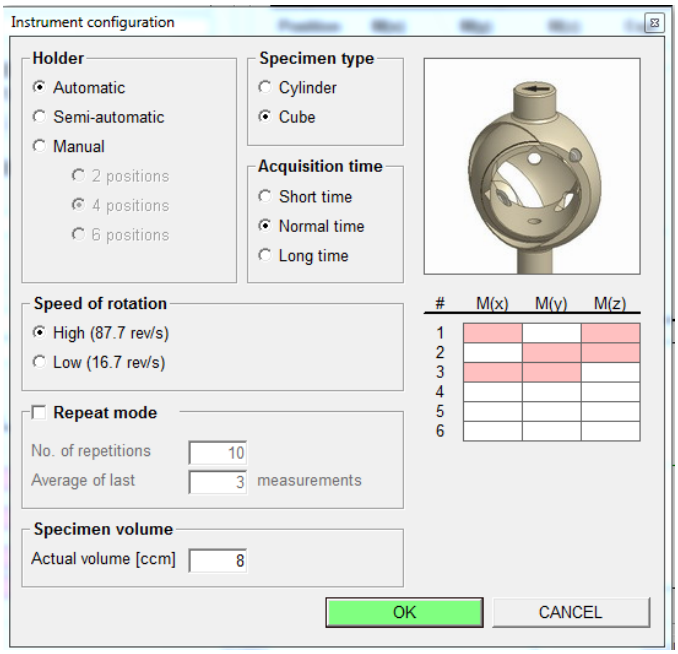

Figure 2: Instrument configuration dialogue box.

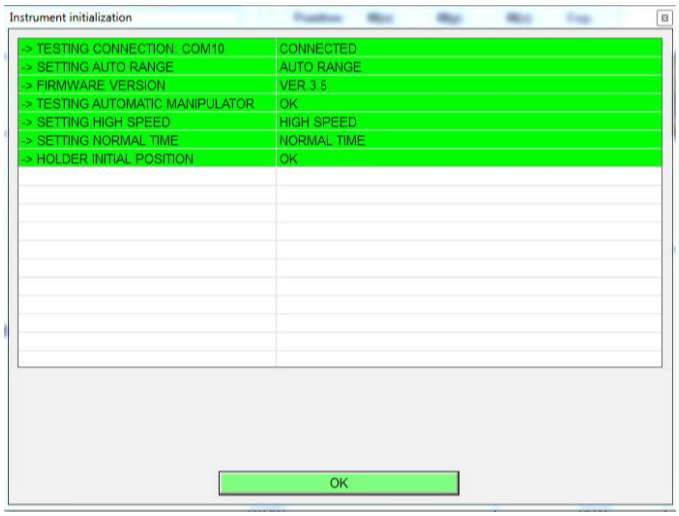

Figure 3: Instrument initialization dialogue box.

Calibrating the instrument

1. Insert the Calibration standard into the holder and tighten the set screw. Center the standard in the holder by using your fingers on either side. Wiggle the standard and tighten more if necessary; it is important that it does not slip. Close the coils and put on the shield.
2. As the standard runs, keep your hand on the spacebar. This is the kill switch/emergency stop and will need to be hit if the sample slips in the spinner and begins to scrape the side. Listen for this as the spinner operates.
3. Open the Calibration dialog box (***Figure 4***) by clicking **Execute** > **Calibration**. The spinner will begin automatically. The displayed **Phase** and **Gain** should be the "current" values. **Gain** should be within ±15% from the nominal value for the corresponding speed; **Phase** should be ±20° from nominal. If so, click **Save**. Otherwise, redo the calibration.
4. Remove the Calibration standard.

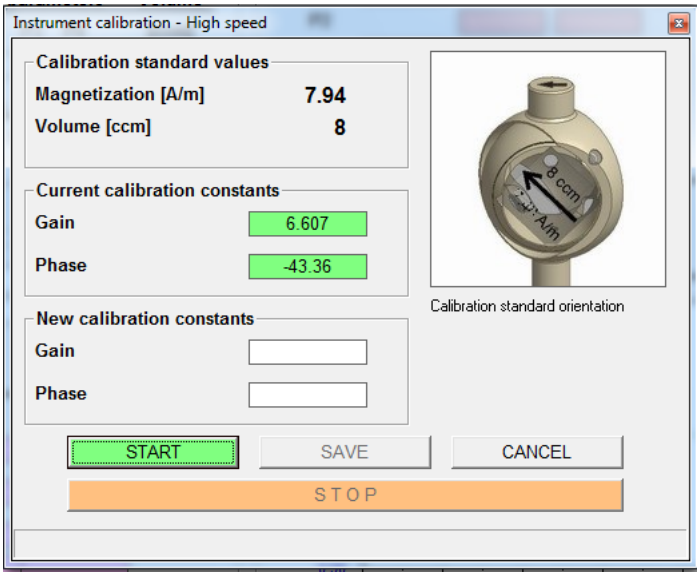

Figure 4: Calibration dialogue box.

Performing the Holder Correction

1. Click **Execute** > **Holder Correction**. The Holder Correction dialogue box (***Figure 5***) will pop up.
2. Close the coils, put on the shield, and click **Start** (green button) in the dialogue box and wait. There is an error associated with this process. The program tends to overflow (error E9) and then say that it is completed even when it hasn't gone through all three positions. See the appendix for help with this issue.
3. Click **Save** when the instrument completes its routine.

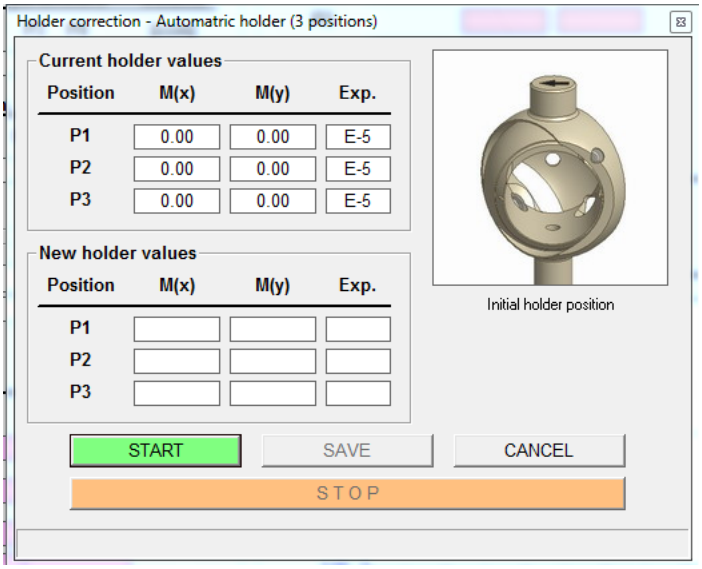

Figure 5: Holder Correction dialogue box.

Preparing Samples

1. For Japanese style cubes, no preparation is needed, simply install the cube into the holder with arrow pointed up and left (***Figure 6***, red arrow). An orientation correction will need to be applied later, however.
2. For hard rock samples, draw another arrow on the face being pointed to by the "up" arrow drawn on the split plane. In ***Figure 7***, the red arrow with hash marks is the arrow drawn on the split plane, and the gray pencil arrow is the added one used to designate the positive z-axis in the spinner's coordinates.
3. Install the cube into the spinner as seen in ***Figure 8***, with the added arrow pointing up and left. The reason for this is the differing coordinate systems between the JR 6A and IODP. See the figure on the side of the spinner from the Methods section of Expedition 342. The coordinate systems will be discussed further in the ***Appendix***.

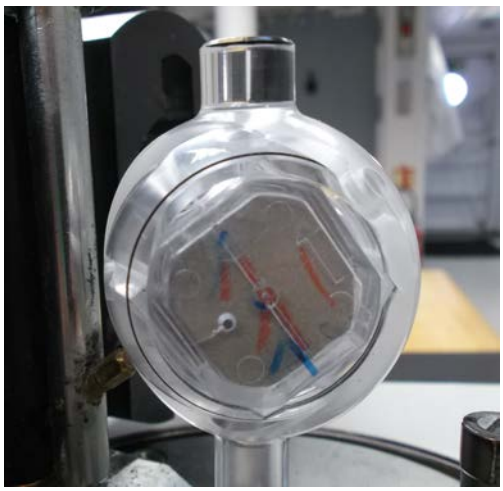

Figure 6: Japanese cube sample placement.

Figure 7: Added arrow to hard rock sample.

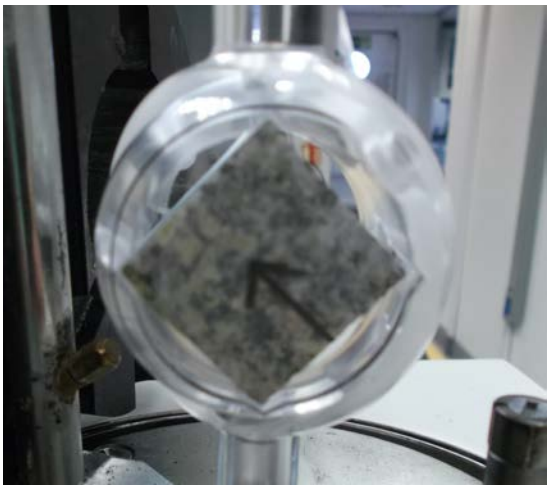

Figure 8: Hard rock sample in automatic holder of spinner.

Measuring Samples

1. Once the sample is securely installed into the holder, close the coils and put on the shield.
2. Click **File** > **New data file** to create a text file into which the program will place the data for the samples that are about to be run. Name the file appropriately – for example: 341_U1234A (Expedition_Site/Hole).
3. Click **New Specimen** in the bottom left corner of the window (***Figure 9***).
4. This will prompt the New Specimen dialogue box to open (***Figure 10***). Type the name of the sample under Name (maximum 10 characters—will truncate after 10 characters in Remasoft3.0). If the Remasoft3.0 software will not be used and only the *.txt file will be utilized to analyze the data, then the name can be longer.
5. For hard rock samples that have been prepared as above, do not enter in anything under the Orientation fields (***Figure 10***).
6. For sediment where Japanese style cubes are being used, enter *Azimuth* = **0** and *Dip* = **90** in the *Orientation* fields (***Figure 10***). This will make the correction for the coordinate system discrepancy and report the data in the IODP reference frame under “geographic coordinates” in the data files.
7. Change the *Treatment* type to reflect the treatment the sample has most recently undergone (***Figure 10***).
8. Click **OK** in the dialogue box; and when the sample is ready to be run, click **Start** in the main window (***Figure 9***, mid-bottom).

9. Once the run is completed, click **Save** (***Figure 9***, green button) in order to save the run and continue to the next specimen, or **Start** in order to redo the run.

10. The file is saved in *C:\JR6Data* into the data file that the user created. Data can be processed by Remasoft3.0 and be used to create speciment files. If this is done, be aware that the specimen files will only take the first 10 characters of the name of each specimen.

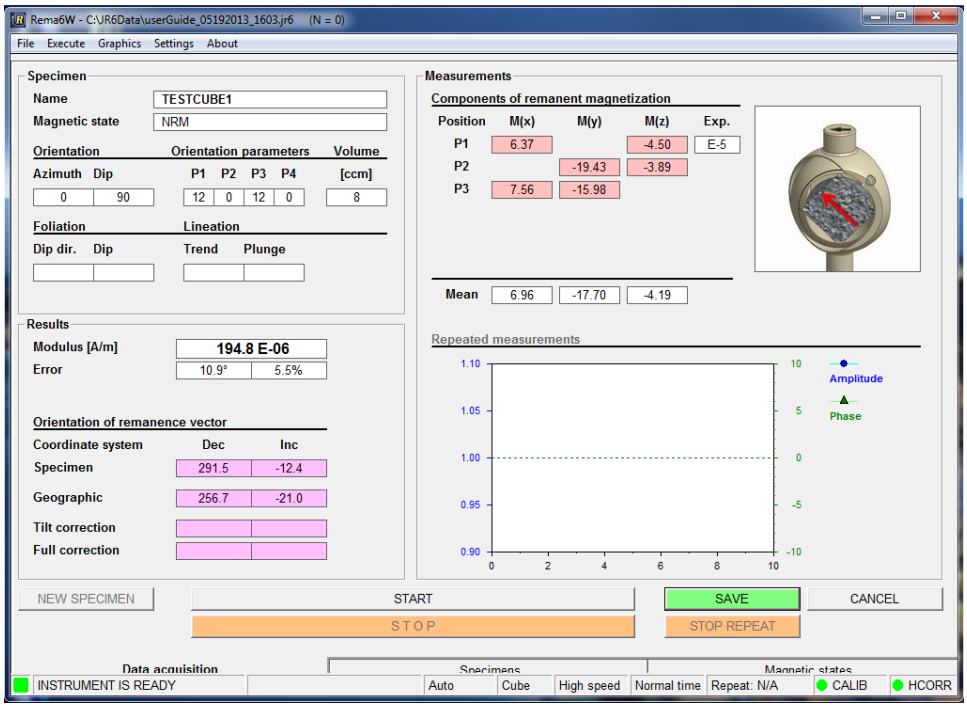

Figure 9: Main screen after sample has been run.

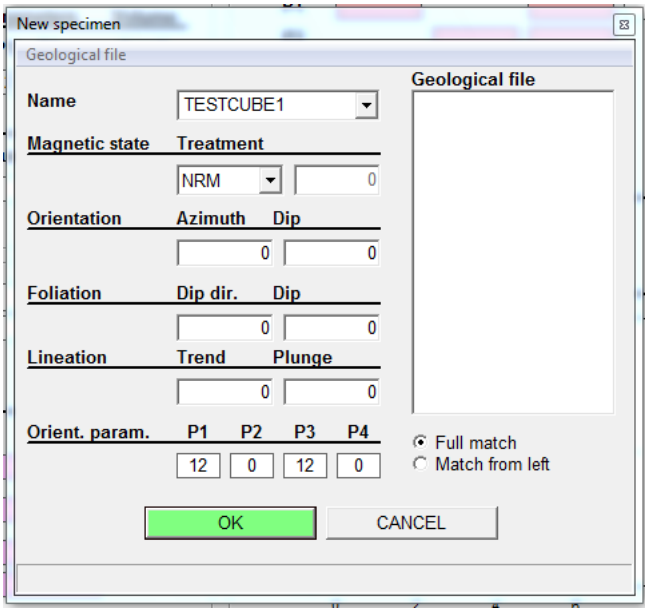

Figure 10: New Specimen dialog box.

Appendix

A.1 Holder Correction

The program has experienced errors during holder correction. Figure A.1 displays very briefly in the middle of the correction routine, displaying an E9 overflow in the bottom of the window. Following this, the program states that it has done a successful holder correction, even though it hasn't gone through all three positions yet.

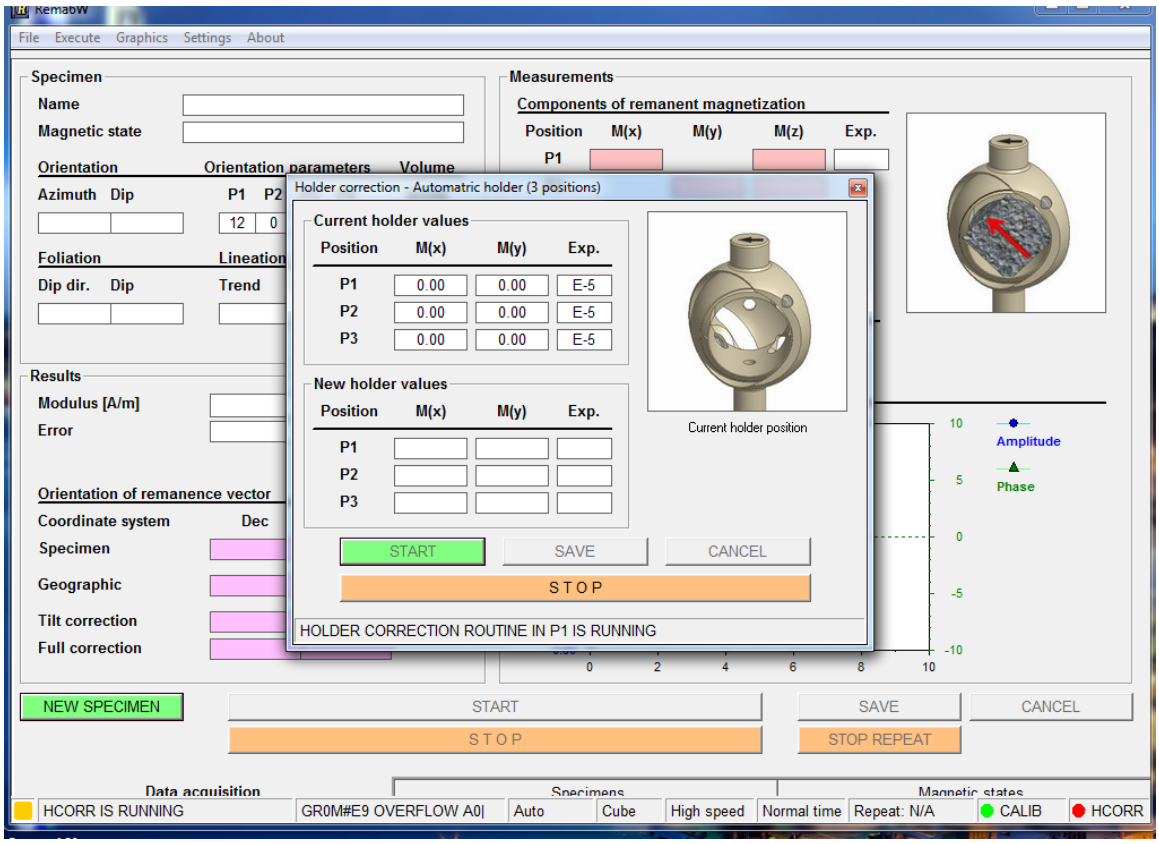

Figure A.1: E9 OVERFLOW Error.

Once the error has occurred, the correction must be started over again. One remedy used during Exp. 345 is to take off the shield and run the holder correction. Agico suggests cleaning the optical system rotation screen (see directions in the file saved in *IODP_Share\Pmag_health\JR-6A_Optical_Screen_Cleaning*).

A.2 Orientation and varying coordinate systems

The JR-6A coordinate system is different from the IODP coordinate system (from Exp. 342 "Methods"):

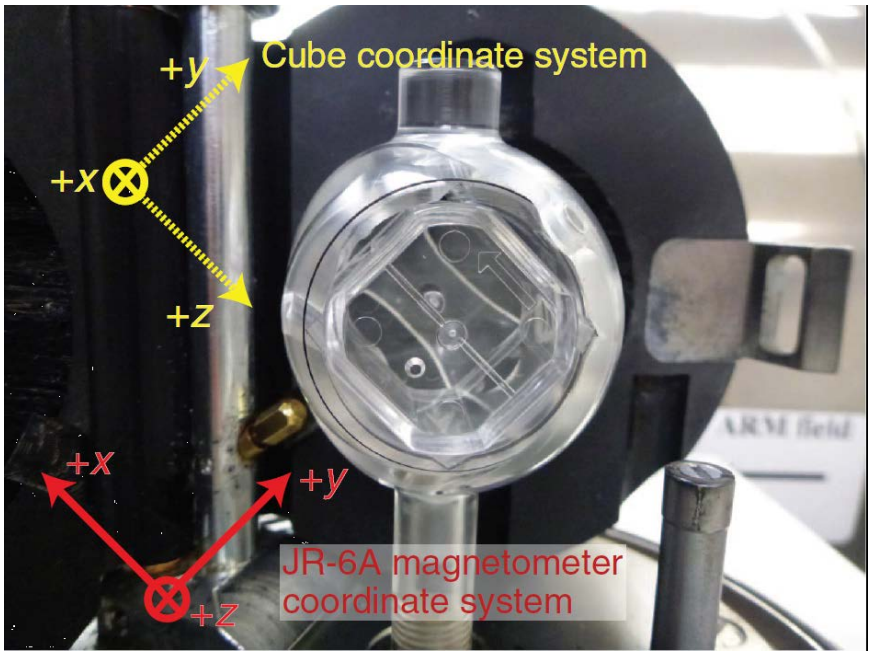

Figure A.2: Coordinate systems (Source: Exp. 342 Methods).

To convert from JR-6A coordinates to IODP coordinates, follow the directions above in ***Preparing the Sample*** and ***Measuring the Sample***. If this is followed, the correct declination for hard rock will be given in the data files under the "specimen coordinates," whereas the correct data for Japanese cubes will be given in the data files under the "geographic coordinate."

A.3 Specifications

Specifications

Cylinder Specimen Size (mm)	25.4/22
Cubical Specimen Size (mm)	20 on edge
Sensitivity (A/m)	2×10^{-6} (high speed)
Rotation Speed (rps)	High: 87.7 Low: 16.7
Measuring Range (A/m)	up to 12,500
Power	110 V/60 Hz or 220 V/50 Hz
Power Supply (dimensions/weight)	200 × 160 × 120 mm; 2.5 kg
Pick-up Unit (dimensions/weight)	290 × 130 × 310 mm; 24 kg

(Source: ascscientific.com)