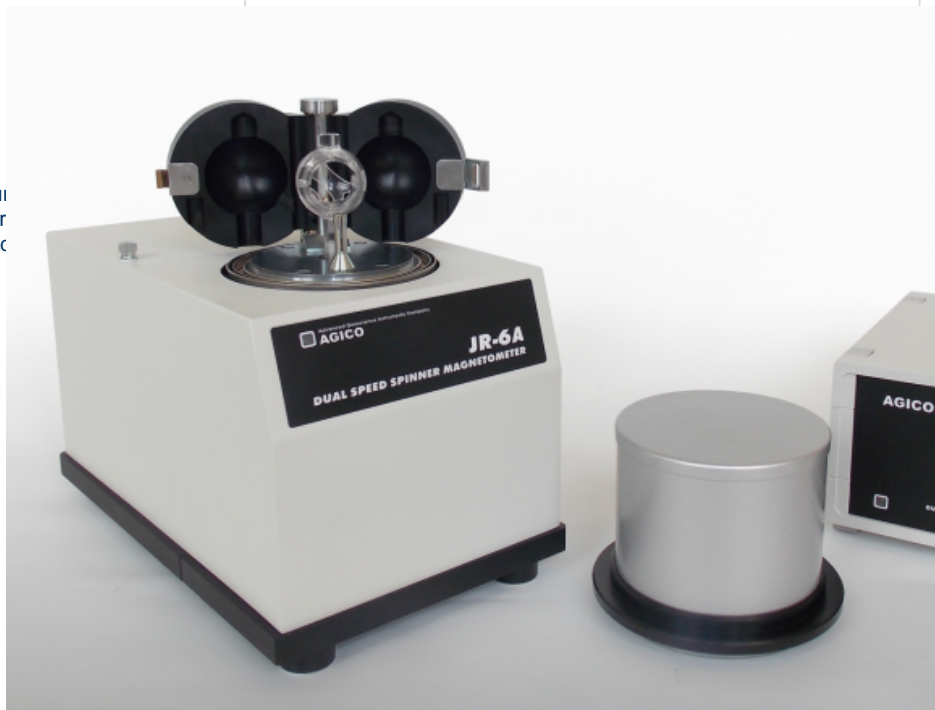


JR-6A Spinner Magnetometer: Quick Start Guide

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The AGICO JR-6A Spinner Magnetometer (Image from AGICO: <http://www.agico.com/text/products/jr6/jr6.php>)

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.



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

Procedures

Preparing the instrument

1. Move the spinner as far away from everything as possible:
 1. Make sure it is not sitting next to the computer
 2. Make sure it is not sitting next to the D-2000 AF Demagnetizer
 3. 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 JR6 workstation.
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 (version 6.2.06; release May 31, 2017), located on the desktop of the JR6 computer. The main REMA6 window will open (Figure 2).
5. Confirm that the IODPmode.cfg file is in the same folder as the Rema6.exe application (default location is C:\Agico\Rema6\Rema6.exe). This file is necessary for creating the .csv file.



Figure 2: JR-6A Main Window before initialization.

Instrument Configuration and Initialization

1. On the top tool bar of the main JR-6A window, select **Settings > Instrument configuration**. Set the correct **Holder** and **Specimen type** (Figure 3). Make sure the **Specimen volume** is correct; Japanese style cubes (rounded corners) are 7 cm^3 while cubes cut with the saw are 8 cm^3 .
2. Select **OK**.
3. Confirm that the orientation parameters are set to 12/0/12/0 on the main window (Figure 2). If they are not, select **Settings > Orientation parameters** to set them.
4. Select **OK**.
5. Click the **Initialize** button in the bottom left hand corner of the window (Figure 2). A dialogue box will appear and go through a series of checks (Figure 4). Once it is complete click **OK**.
 1. If communication fails, check that you do not have more than one version of REMA6 open on the computer.

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 the sample does not slip. Do not overtighten the screw, as it will cause the holder to break.
2. Close the coils and put on the shield.
3. Check the calibration standard settings by clicking **Settings> Calibration Standard**. The magnetization and volume values should match the values written on the cube. Then select **OK**.
4. Open the calibration dialog box by selecting **Execute > Calibration** (Figure 5).
5. Select **Start**. 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.
 1. The displayed **Phase** and **Gain** should be the "current" values. **Gain** should be within $\pm 15\%$ from the nominal value for the corresponding speed; **Phase** should be $\pm 20^\circ$ from nominal. If so, click **Save**. Otherwise, redo the calibration.
6. Remove the calibration standard from the spinner. Make sure the screw head is flush with the holder or just below the edge.



Figure 5: Calibration dialog box.

Performing the Holder Correction

1. Click **Execute > Holder Correction**. The Holder Correction dialog box will open (Figure 6).
2. Make sure the holder is empty, the screw is flush with the edge of the holder, the coils are closed, and the shield is in place.
3. Click **Start** in the dialog box and wait for measurement to complete.
 1. 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.
4. If all of the values are highlighted in green, then select **Save**. If the values are highlighted red or are blank, remeasure.

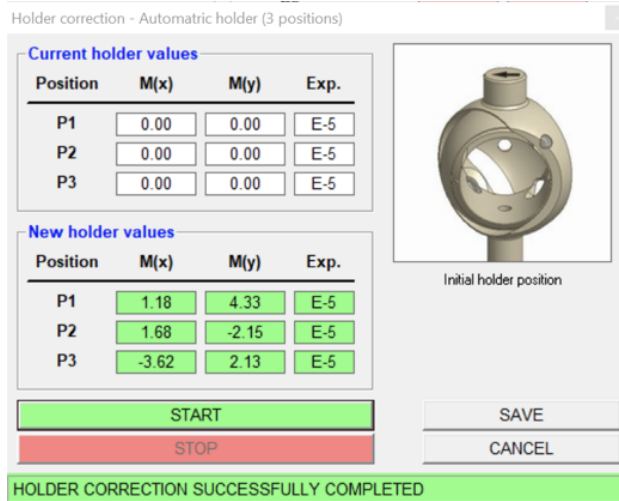


Figure 6: Holder Correction dialogue box after successful measurement.

Preparing Samples

1. For Japanese style cubes, no special preparation is needed, simply install the cube into the holder with the arrow pointed up and left (Figure 7, red arrow). An orientation correction will be applied during sample information entry.
2. For hard rock samples, there are two options for installing the cube into the holder.

Option 1:

- Install the cube in the holder in the same manner as with the Japanese style cubes with the split face arrow pointed up and left and enter the orientation correction when the samples information is entered.

Option 2:

- Draw another arrow on the face being pointed to by the “up” arrow drawn on the split plane. In

Figure 8, the red arrow with hash marks is the arrow drawn on the split plane, and the gray pencil arrow is the arrow added to designate the positive z-axis in the spinner's coordinates.

- Install the cube into the spinner as seen in Figure 9, 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 Appendix A.
- With this option 2, there is no need for further coordinate corrections.

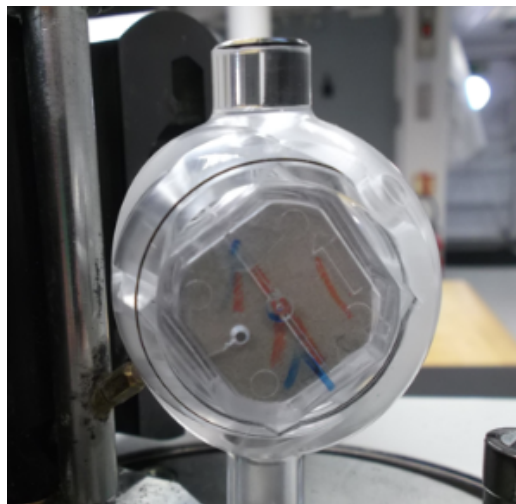


Figure 7: Japanese cube sample placement.



Figure 8: Added arrow to hard rock sample.

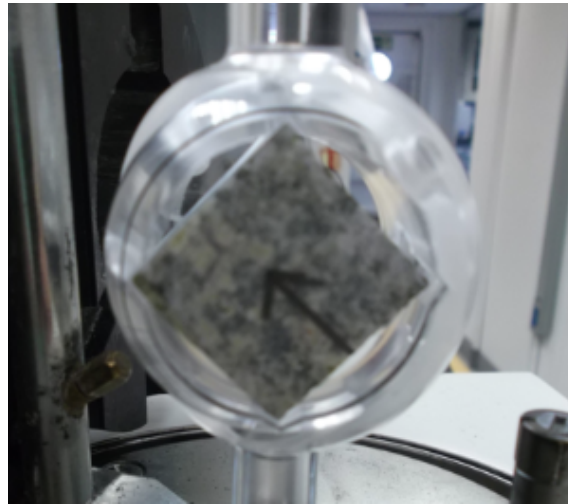


Figure 9: Hard rock sample in automatic holder of spinner.

Measuring Samples

1. Securely install the sample into the holder, close the coils, and put on the shield.
2. Click **File > New** to create a .jr6 file and to set the file path. This file path will be where the data is placed when **SAVE** is selected. Name the file appropriately – for example: 341_U1234A (Expedition_Site/Hole). Save to the folder C:\JR6Data\IN.
3. Click **New Specimen** in the bottom left corner of the window (Figure 10). This will prompt the New Specimen dialogue box to open (Figure 11).
4. Use the barcode scanner to enter the name of the sample in the Name field (sample names are truncated to 9 characters in the .jr6 file). IODP convention is to use the *Text ID* of a sample as the name.
 1. Data will upload if the name is a valid Text ID. User may manually enter the sample name if the barcode scanner is unavailable.
5. Enter the Treatment information for the cube (NRM, AFD, TD, etc.)
6. Enter the Orientation information.
 1. For Japanese cubes and hard rock cubes prepared following option 1 from the Preparing the Sample section, enter *Azimuth = 0* and *Dip = 90*. 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.
 2. For hard rock cubes prepared following option 2 of the Preparing the Sample section, leave the orientation fields blank.
7. Select **OK** in the dialogue box. The main window will now display the updated sample information (Azimuth, Dip, Name, and Treatment) (Figure 10). Select **Start** at the bottom of the window (Figure 10).
 1. During a measurement, the Stop bar at the bottom of the window or the space bar will stop a measurement immediately. Use these options if the sample comes loose in the holder.
 2. During measurements, the status of the instrument is displayed in the lower left-hand corner.
8. When the run is completed, click **Save** in the right hand bottom corner (Figure 10) in order to save the run and continue to the next specimen, or click **Start** to redo the run.

1. The file will be saved to the path set by the user. If no path has been set, the Rema6 software will prompt the user for a path.
2. Three files will be written: .csv, .jr6, and .txt. These three files are necessary for data upload to LIMS. The .csv file is an IODP specific format. For further information on file formats and uploading see **Appendix B** or the **JR6 Uploader Guide**.



Figure 10: Main screen after sample has been run.

New specimen

Geological file

Name

Treatment

Orientation		Orientation parameters				Volume
Azimuth	Dip	P1	P2	P3	P4	
<input type="text"/>	<input type="text"/>	12	0	12	0	7

Foliation		Lineation	
Dip dir.	Dip	Trend	Plunge
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 11: New Specimen dialog box.

Data Processing

IODP provides two options for processing JR-6A data: Remasoft 3.0 software and Puffin plot. To use Remasoft 3.0, export specimen files from the Rema6 main window. To use Puffin plot to process the data, download the .csv file from LIMS. An Excel macro (JR6toPuffinPlot) has been added to the JR6 PC and MAC workstation. This macro will format the LORE download file into a simple file for use within PuffinPlot. See the *Quick Start Guide to using Puffin Plot* for further details.

Appendix

A.1 Holder Correction

The Rema6 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 has not gone through all three positions yet. The new holder values cells may be empty.

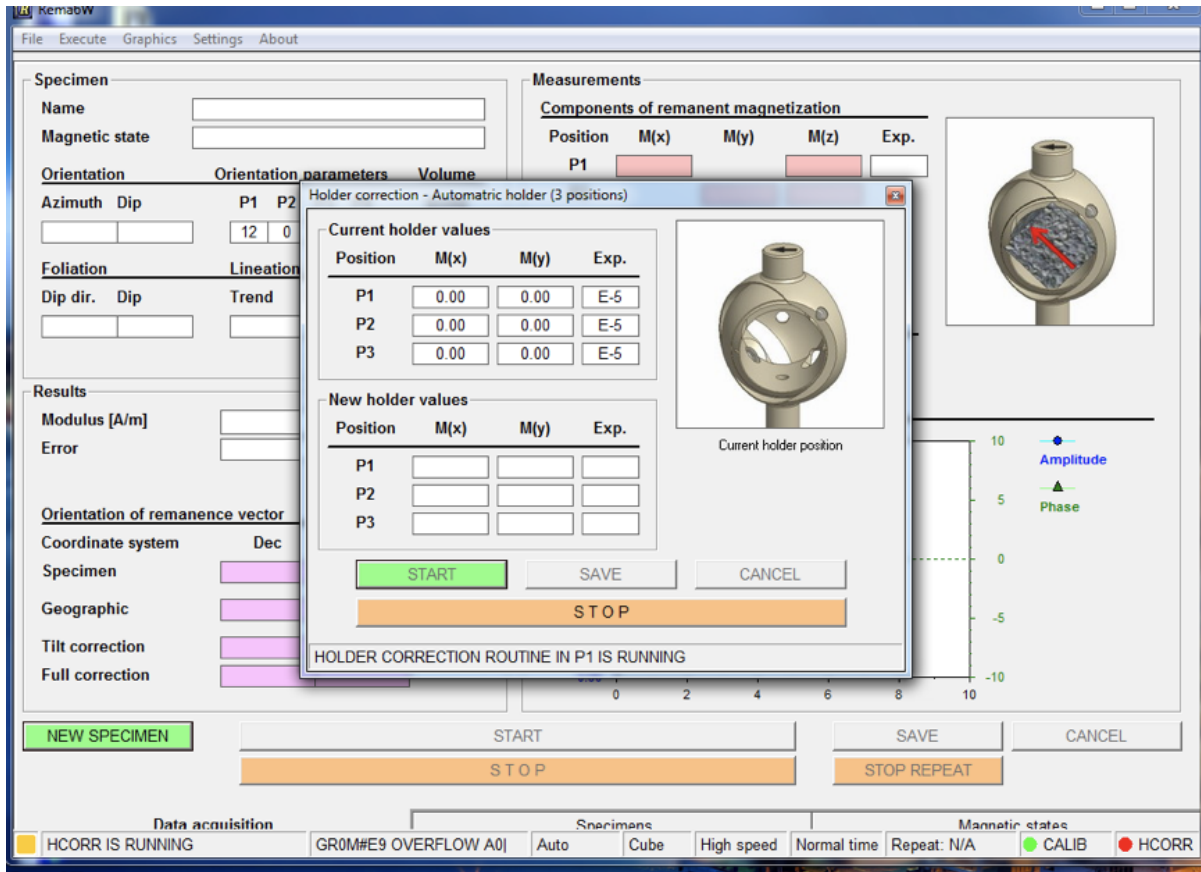


Figure A.1: E9 OVERFLOW Error.

Once the error has occurred, the holder correction measurement must be redone. Make sure the holder is clean and attempt to remeasure the holder. 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 JR6 screen cleaning files saved in *IODP_Share\IODP_Technical_Manual\PaleoMag\Current\JR-6*).

A.2 Orientation and varying coordinate systems

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

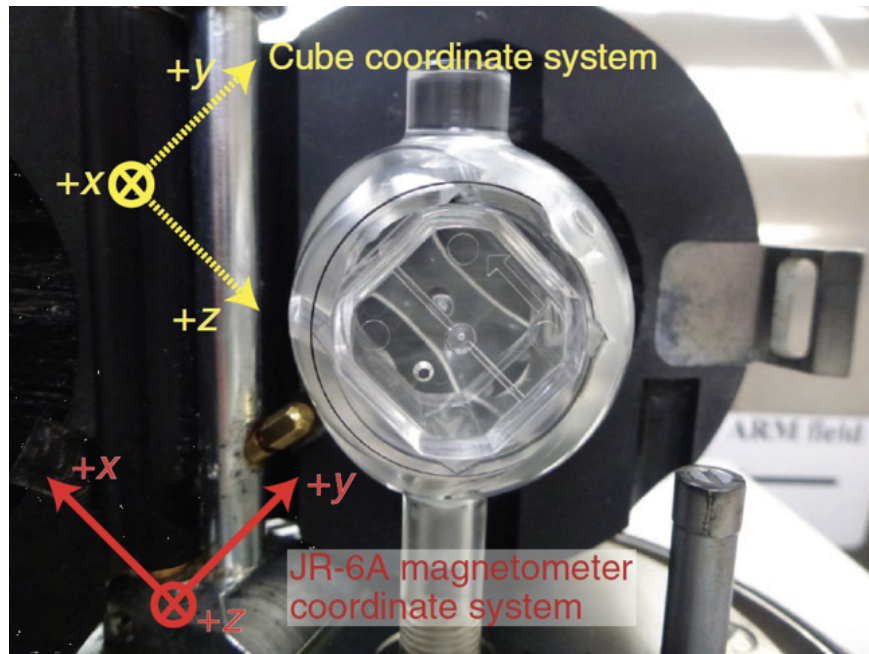


Figure A.2: Coordinate systems (Source: Exp. 342 Methods).

To convert from JR-6A coordinates to IODP coordinates, follow the directions above in Preparing the Sample and Measuring the Sample. If option 2 of Preparing the Sample is followed for hard rock cubes, the correct declination for the sample will be given in the data files under the "specimen coordinates" heading. The corrected data for Japanese cubes and hard rock cubes entered following option 1 of Preparing the Sample will be given in the data files under the "geographic coordinate" heading.

A report on orientation related issues and corrections was prepared during Exp 350 and is available in the folder: *IODP_Share\IODP_Technical_Manual\PaleoMag\Current\JR-6*.

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 x 160 x 120 mm; 2.5 kg
Pick-up Unit (dimensions/weight)	290 x 130 x 310 mm; 24 kg

(Source: ascscientific.com)

B.1 Uploading JR6 data

The current REMA6 version (6.2.06) has been modified for IODP use. REMA6 will output three file types: .csv, .jr6, and .txt. These three files are necessary for data upload to the LIMS database. The .txt file and .jr6 files are standard REMA6 outputs.

The .jr6 file is the main REMA6 program file. Data is appended to the .jr6 file after **Save** is selected and samples names are truncated to nine characters. Users can reopen the .jr6 file in Rema6 at any time to add more measurements to the file or generate specimen files for use in Remasoft 3.0.

The .txt file is a simple copy of the REMA6 measurement window at the time the user selected **Save**.

The .csv file is an IODP specific file, which includes all information that is uploaded to the LIMS database. In order to generate this file the IODPMode.cfg file must be in the same directory as the main application (REMA6.exe). The default location is C:\Agico\Rema6\Rema6.exe. If this .cfg file is not in the correct location, the .csv file will not be written and the data will not upload to LIMS.

Use the MegaUploadTron (MUT) application to upload all JR6 files. When an upload is completed the three files are copied to the archive file, but remain in the IN folder so data can be added as measurements progress. MUT will refresh every 5 seconds and will display the number of new results in the MISC column. Automatic upload will only work when new files are added to the IN folder, not when new data is added to an already existing file. Manually select the files to upload by checking the boxes on the left (must have all three files checked).

For more detailed instructions, see the **JR6 Uploader Guide** document in *IODP_Share\IODP_Technical*

Credits

The wiki version of this document originated from a Word document version (V372) that was last edited on Expedition 372 and last reviewed at the end of Expedition 374 (see Archived Versions below). Subsequent changes to this wiki page are documented in the Confluence page history.

Archived Versions

- [JR-6A Quick Start Guide V372](#): *V372 G. Matson 5/25/13; Approved by DJH 8/13/13, Edited by B. Novak 12/22/17, Reviewed by ELG 3/1/18*