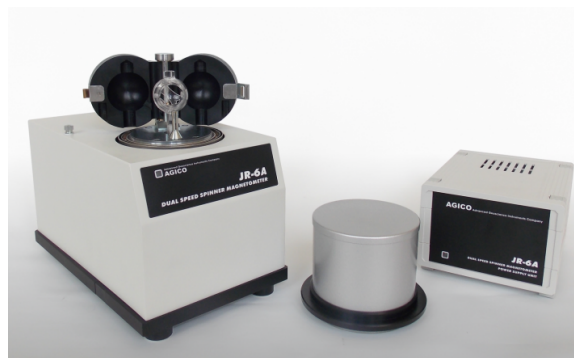


# JR-6A Spinner Magnetometer Quick Start Guide

## Table of Contents

- Introduction
- Procedures
  - Preparing the instrument
    - Instrument Configuration and Initialization
    - Calibrating the instrument
    - Performing the Holder Correction
  - Preparing Samples
  - Measuring Samples
  - Viewing Data in Rema6
  - Data Processing
- Appendix
  - A.1 Holder Correction
  - A.2 Orientation and varying coordinate systems
  - A.3 Specifications
  - B.1 Uploading JR6 data
- Credits
- Archived Versions



The AGICO JR-6A Spinner Magnetometer (Image from AGICO: <https://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.



## Procedures

### Preparing the instrument

1. Move the spinner as far away from everything as possible:
  - a. Make sure it is not sitting next to the computer
  - b. Make sure it is not sitting next to the D-2000 AF Demagnetizer
  - c. 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.

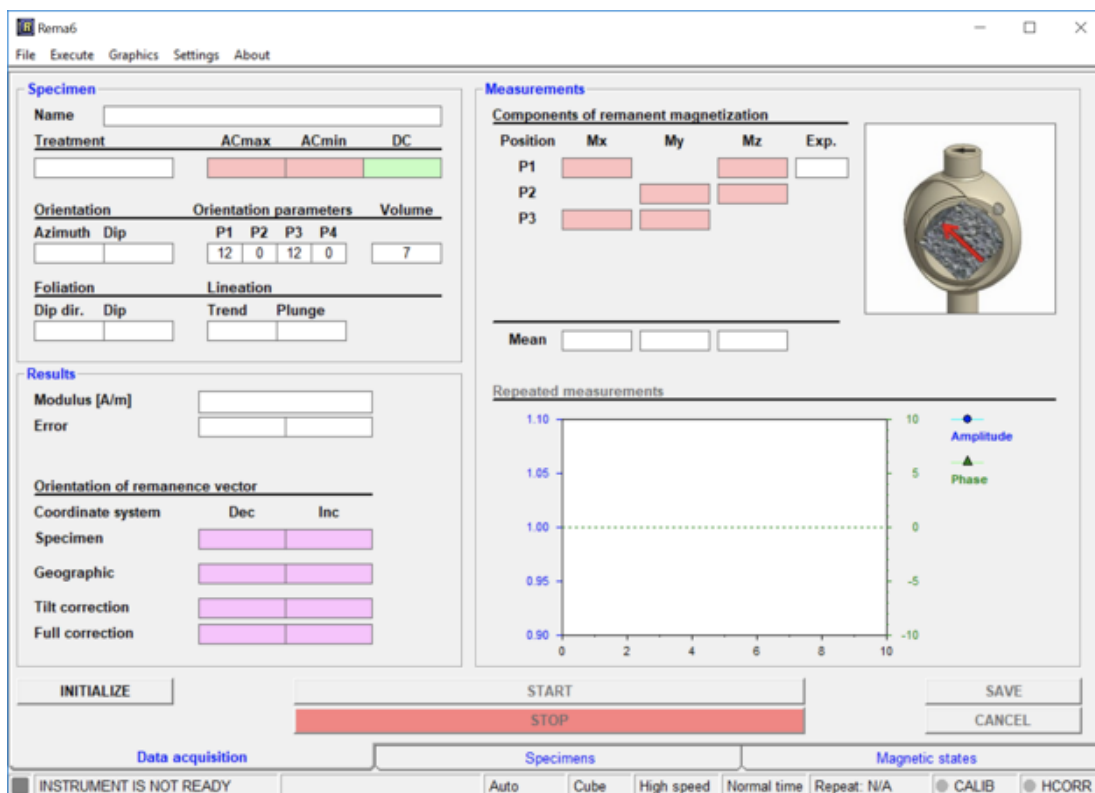


Figure 2: JR-6A Main Window before initialization.

### 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<sup>3</sup> while cubes cut with the saw are 8 cm<sup>3</sup>.
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**.
  - a. If communication fails, check that you do not have more than one version of REMA6 open on the computer.



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.
  - a. 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.

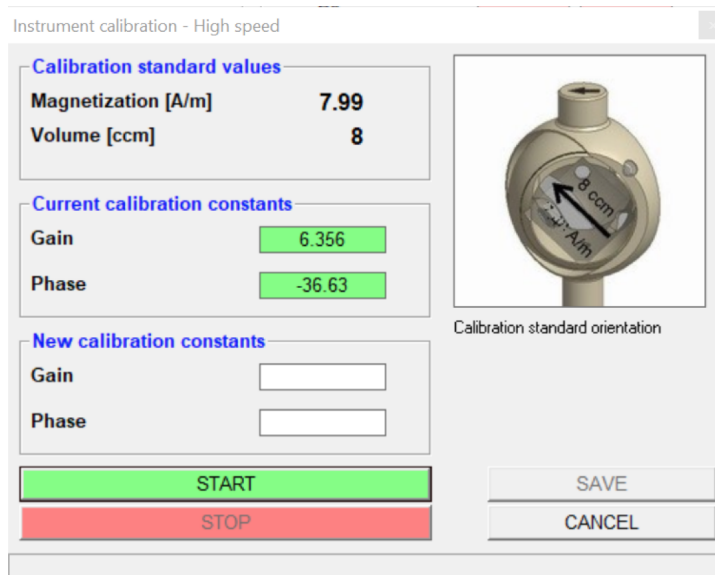


Figure 5: Calibration dialogue box.

## Performing the Holder Correction

1. Click **Execute > Holder Correction**. The Holder Correction dialogue 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 cap is in place.
3. Click **Start** in the dialogue box and wait for measurement to complete.
  - a. 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.

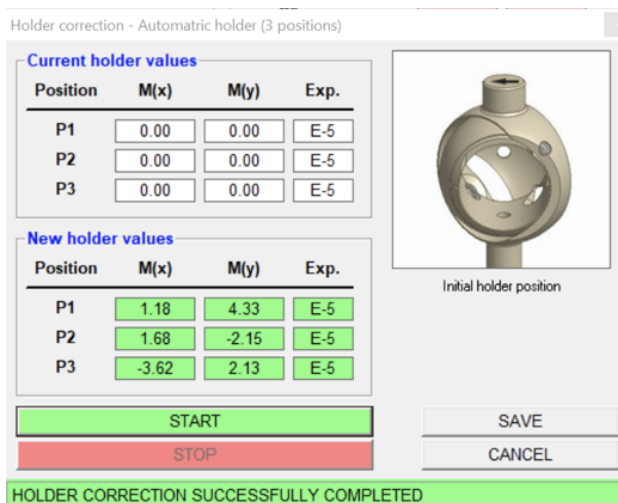


Figure 6: Holder Correction dialogue box after successful measurement.

## Preparing Samples

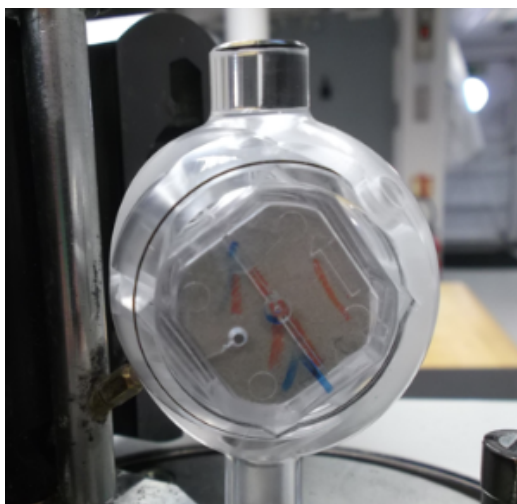
1. For Japanese style cubes, no special preparation is needed, simply install the cube into the holder with the arrow pointed up and left (Figure 7, red arrow). An orientation correction of Azimuth=0 and Dip = 90 will be applied during sample information entry.
2. For hard rock samples, there are two 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.*

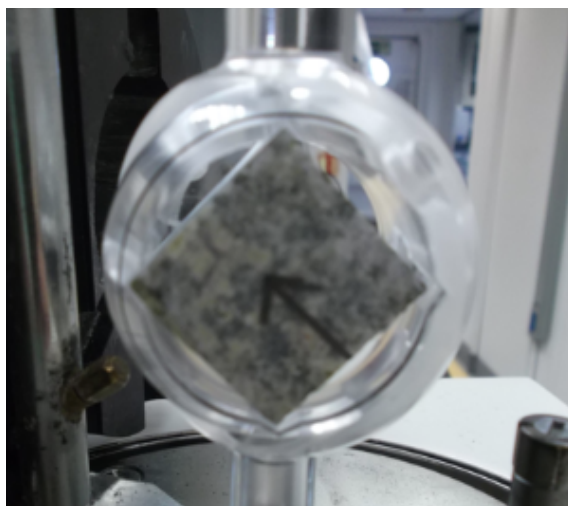


Figure 9: Hard rock sample in automatic holder of spinner.

## Measuring Samples

1. Securely install the sample into the holder, close the coils, and put on the shield cap.
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.
  - a. Data will upload if the name is a valid Text ID. User may manually enter the sample name if the barcode scanner is unavailable, but it must be the entire Text ID.
5. Enter the Treatment information for the cube (NRM, AFD, TD, etc.)
6. Enter the Orientation information.
  - a. 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.
  - b. 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).
8. Select **Start** at the bottom of the window (Figure 10).
  - a. 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.
  - b. During measurements, the status of the instrument is displayed in the lower left-hand corner.
9. When the run is completed, click **Save** in the right hand bottom corner (Figure 10) in order to save the measurement and continue to the next specimen, or click **Start** to redo the measurement.
  - a. 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.
  - b. 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.

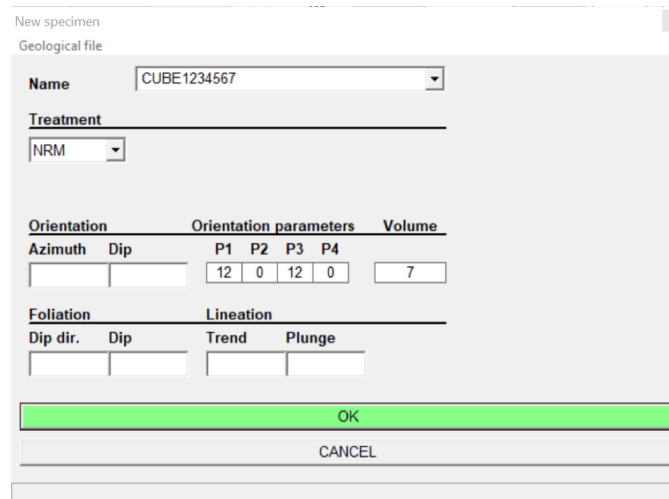


Figure 11: New Specimen dialog box.

## Viewing Data in Rema6

The measurement data can be viewed under the specimens or magnetic states tabs at the bottom of the Rema6 window (Figure 10). Be aware that specimen names will be displayed properly (entire Text ID) when specimens are first measured and saved to the file. But if the file has been reopened, the names will be truncated (BE1234567 instead of CUBE1234567). This results in measurements for a specimen being displayed in two separate groups. The user can select **File> Open** and reopen the file to force the Rema6 software to rename and group all of the measurements for a specimen.

This issue only affects the Rema6 data viewing during measurements. The user **MUST** use the full Text ID when entering sample names. Do not manually truncate sample names in Rema6 or the upload process will be complicated.

## 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.

Note: Puffin Plot was reported to incorrectly calculate values during PCA analysis on occasion during Exp 386X.



# Appendix

## A.1 Holder Correction

The Rema6 program has experienced errors during holder correction measurements. *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 or only partially filled.

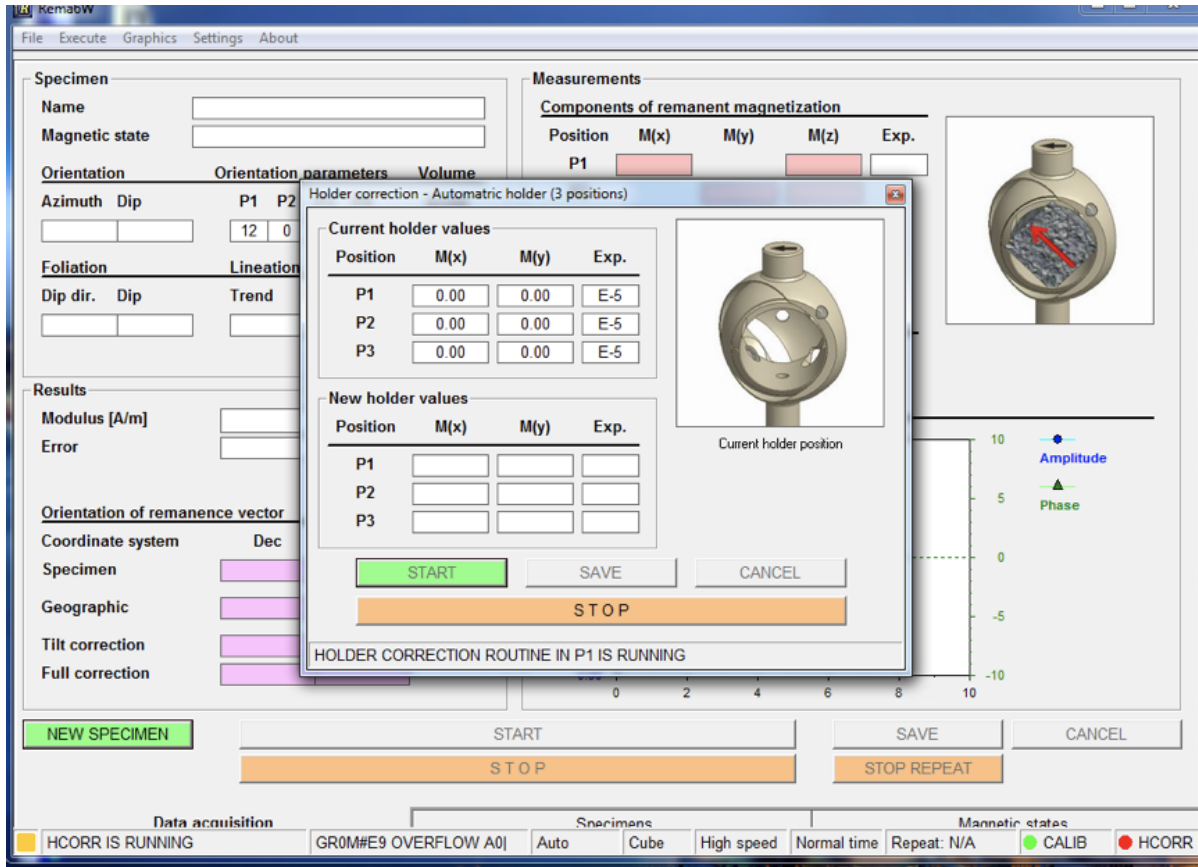


Figure A. 1: E9 OVERFLOW Error.

Once the error has occurred, the holder correction measurement must be redone. Make sure the holder is clean and attempt to remeasure the holder. Agico suggests cleaning the optical system rotation screen (see directions for the JR6 screen cleaning files [here](#)).

The error may be related to the initial position of the holder. If the actuator moves up to adjust the holder rotation, but can not rotate the holder properly, the system may indicate an error. Make sure the holder is in the proper initial position and reattempt the holder correction measurements.

## A.2 Orientation and varying coordinate systems

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



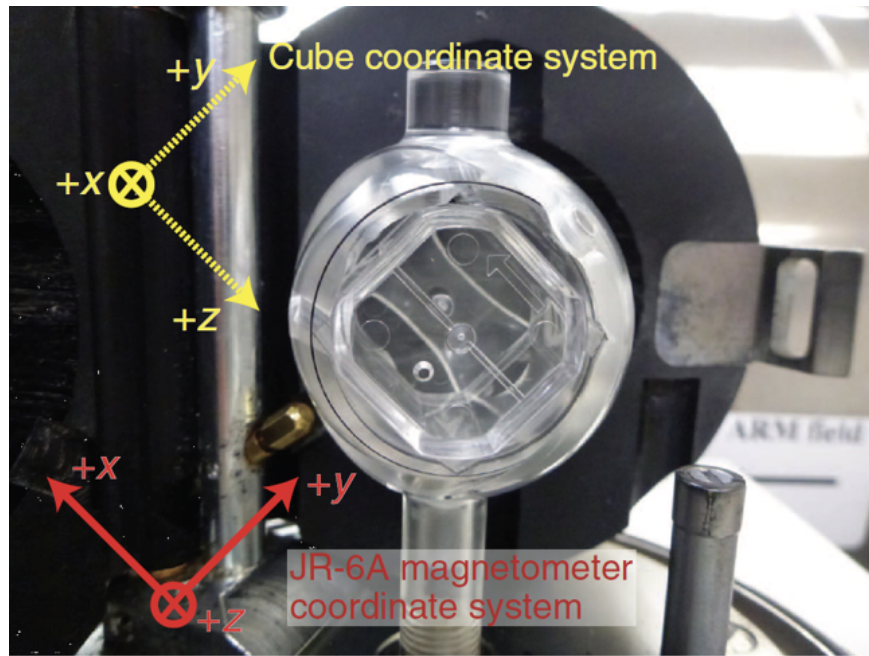


Figure A.2: Coordinate systems (Source: Exp. 342 Methods).

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 [here](#).

### A.3 Specifications

#### Specifications

Cylinder Specimen Size (mm)	25.4/22
Cubical Specimen Size (mm)	20 on edge
Sensitivity (A/m)	$2 \times 10^{-6}$ (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: <http://ascscientific.com/JR6.html>)

### 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 MegaUploadatron (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. When MUT refreshes, the number of new results will be displayed 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).

Do not delete rows from the files after upload! The uploader references the number of lines in the file to determine if new data has been added. When lines are removed, the count is inaccurate and the data may not upload properly.

For more detailed instructions, see the [legacy JR6 Uploader Guide](#).

## Credits

This document originated from Word document JR-6A\_QSG\_374\_draft.docx (see Archived Versions below for a pdf copy) that was written by G. Matson (2013-05-25) and edited by B. Novak (2017-12-27). Credits for subsequent changes to this document are given in the page history.

## Archived Versions

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- [JR-6A\\_QSG\\_374\\_draft.pdf](#): A PDF version of the JR-6A Quick Start Guide that was edited on Expedition 372, reviewed on Expedition 374, and is superseded by this wiki page.