New Features in Orchestrator

Supplement to Getting Started Guides

Windows XP Service Pack 2 Users
Click here for important information.

Revision C
Issued February 2006
Notice

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New Features and Changes

Orchestrator Improvements

Importing Orchestrator Version 6.X Test Sequences

In previous Orchestrator 7.X versions certain test sequences built or saved with Orchestrator version 6.X were not properly handled. These issues have been resolved, but note that it is not possible to use sequences created or edited with Orchestrator 7.X with older versions of Orchestrator.

Program Element Blocks in Test Sequences

A problem has been fixed that was preventing Program Element blocks from being used correctly in test sequences.

Instrument Setup Utility

A problem has been fixed that was causing certain instrument configuration settings to be incorrectly set when the Instrument Setup form was used. In the case of online operation, the settings are automatically reloaded from the instrument after this form has been used.

Import / Export of RAD Files

When loading or saving ASCII RAD files, the pathname can now be longer than 80 characters.

Importing of UA Data files

Previous versions of Orchestrator would not report a failure when a UA data file could not be read due to the file being locked. This has been corrected.

Waveform and Fast Sampling Option

Support for TA Instruments Photo Cure Accessory (PCA)

The Fast Data Sampling option now supports control of the PCA as well as the Exo Novocure unit for testing UV curing systems. Note that the DAQConfig utility must be used to correctly configure the software to the correct UV source used. Please see the UV-Curing Option and Photo-Curing Accessory Getting Started Guide for additional information.

Improved Data Export from RheoChart Application

The log file export function has been modified to improve reliability when exporting large amounts of data into Orchestrator. Previously, exporting the log while acquiring data could stop the data acquisition.
Introduction

This document summarizes some of the additions or changes made to Orchestrator Version 7.1.

Orchestrator 7.1: New Features and Changes

Waveform and Fast Data Sampling Option

The following changes have been made to improve the reliability of the Fast Sampling option in the RheoCorr external correlator:

Support for ARES UV Option

Orchestrator 7.1 and the RheoCorr external correlator contain a number of updates to better support the ARES UV Option, particularly the triggering of the UV source through the use of the Waveform and Fast Data Sampling Option. For more information on this option, consult the UV-Curing Option & Photo-Curing Accessory Getting Started Guide.

Recovery from Hardware Errors

Orchestrator and the RheoCorr correlator software now successfully handle the case where a test, using the Waveform and Fast Data Sampling option, is started but the DAQPad electronics are not connected. Previously a series of time-out errors could result.

Time Computation

In the previous version of Orchestrator, an error of approximately 2 seconds over 1000 second interval at the maximum sampling rate existed. This error was significantly smaller at lower sampling rates. This problem, with the elapsed time during a Fast Data Sampling experiment, has now been fixed in Orchestrator 7.1.

Fast Sampling Tests

Time Sweep and Temperature rate tests that use the Fast Data Sampling option now run correctly in test sequences.

Online RheoCorr Data Protected

Online RheoCorr data in Orchestrator is protected from deletion while an experiment is running.
Data File Issues

Several problems have been fixed with reading and writing data files using Orchestrator version 7.0. The problems detailed below were specific to Orchestrator version 7.0 and were due to the changes made in the internal format of the data files.

Embedded Periods

Orchestrator version 7.0 could not correctly handle parsing file and path names of data files when there was an embedded period in the name of a directory. In some cases this resulted in the overwriting of old experiment data with new files. This has now been fixed.

DMTA Three Point Bending

DMTA data runs using the Three Point Bending fixture were not correctly loaded in Orchestrator version 7.0. These data files are now loaded correctly.

ARES Extensional Viscosity Fixture

Due to a conflict in the way test geometry information is stored, experiments run using the ARES Extensional Viscosity fixture and saved with Orchestrator version 7.1 and higher cannot be loaded correctly in Orchestrator version 7.0. This also affects data files run using Orchestrator version 7.0, but loaded and saved with Orchestrator 7.1.

Orchestrator 6.X Calibration Information

Calibration information in certain Orchestrator Version 6.X files can now be successfully read in Orchestrator version 7.1.

Orchestrator 7.0 Data File Size Errors

Orchestrator version 7.0 had been incorrectly sizing an item in saved experimental data. In most cases this error is of no consequence; however, in cases where the same file is loaded and saved many times, the overall file size could end up significantly larger than expected. This problem has been corrected in Orchestrator 7.1, which will also correctly resize this item when saving the data.

Orchestrator 6.X Test Setup Files

Orchestrator 7.1 now displays Orchestrator 6.X test setup files (*.RTS), in addition to Orchestrator 7.X files (*.UTS) when browsing for Test Setup files.
Miscellaneous Fixes

A number of miscellaneous bug fixes have been made:

- **Better Support for Programmable Testing / SHRP Asphalt Testing Scripts:** A number of problems have been resolved in the execution of programmable testing scripts. The SHRP Asphalt testing scripts will now run correctly using Orchestrator 7.1.

- **Experimental Notes Saved:** The notes entered in the StartBox are now saved within an Orchestrator session.

- **Starting Tests with No Experiment Title:** Previously, if you started a test with no experiment title, it could result in error messages or system crashes. This has been corrected.

- **Instrument Name Truncation in Orchestrator Title Bar:** In some cases the instrument name displayed in the Title Bar during online operation was being truncated to just the first character. This has been corrected.

- **End of Test Blocks in Test Sequence Editor:** A problem was fixed that was preventing End of Test blocks from being edited in the Test Sequence editor.

- **Dielectric data in Time Temperature Superposition:** A change has been made that makes it possible to shift dielectric data (\(\varepsilon'\) and \(\varepsilon''\)) using the Time-Temperature Superposition functions.

- **Normal Stress Calculations in Torsion Rectangular Geometry:** A change has been made to allow the calculation of normal stress values with data run using Torsion Rectangular geometry.
Introduction

This document summarizes some of the additions made to Orchestrator between Version 6.6.3 (released February 2004) and Version 7.0.

Reasons for Developing Version 7.0

Why Version 7.0? It looks to me like the same old Orchestrator?

From the outside, Orchestrator Version 7.0 looks and feels just like the previous Version 6 releases, and if you are familiar with the operation of Orchestrator, this version will appear very similar. Under the surface though, it is a very different program. A significant number of changes have been made to provide better support for additional languages (including non-Western languages), and operate with the new ARES Extensional Viscosity Fixture (EVF).

Additionally, this software version allows data generated on other TA Instruments’ products to be read directly into Orchestrator. This includes data files generated with the Rheology Advantage software for the AR series rheometers, and Universal Analysis (UA) files generated by TA Instruments line of thermal analysis equipment.

Operating System Support

Orchestrator Version 7 will run under Microsoft Windows 2000 and XP. Windows NT, 95, 98, and ME are no longer supported. This change was required in order to support the Unicode text format that was required for internationalization.

Orchestrator can only be installed from a Windows account with Administrator rights; however, once installed, normal operation of Orchestrator does not require operation from an account with Administrator access.

Upgrade Installation Notes

If Orchestrator Version 7.0 is installed on a system with a previous version of Orchestrator installed, the following occurs:

1. File extensions previously assigned to past Orchestrator versions are now assigned to Orchestrator 7.0 (RSD data files, RTS setup files).

2. Orchestrator login profiles are maintained. However, most of the profile settings are set back to default values. This includes all of the default test and geometry settings, instrument communication settings, and a number of other user preferences that had previously been stored with the user profile.
3. All instrument specific information (e.g., calibration constants, test limits, etc.) are stored in the instrument and downloaded when the instrument comes on line. This type of information is not affected by this upgrade.

4. Multiple versions of Orchestrator can be installed and operated on the same PC. However, unless both versions are needed, it is recommended that the older version be uninstalled prior to installing Orchestrator 7.0.

**Orchestrator 7.0: New Features and Changes**

**Native Data File Formats**

The following data file formats have been affected with Orchestrator Version 7.0.

**Experiment Data Files**

Orchestrator data files are stored using a TAD file extension, with an optional two-digit number to indicate the specific test type used to generate the data. These files are not backward compatible with older versions of Orchestrator.

Previously, the RSD file extension was used to designate Orchestrator, with the same two-digit test identification system. Orchestrator Version 7.0 can be used to read existing RSD files, but cannot save any changes back to the original (RSD) format, however data files in the new TAD format can be written.

Note that when Orchestrator is installed, it associates both RSD and TAD data files with Orchestrator Version 7.0.

Improvements to the TAD file format include:

1. Sum-check fields to indicate the integrity of the data.
2. Provisions for file modification tracking via optional internal audit logs.
3. Multiple versions of the same object can be present to allow compatibility with previous versions.
4. Support for Unicode-formatted text.

**Test Setup and Test Sequence Files**

As in the case of data files, the internal format of the test setup and test sequence files has changed in Orchestrator 7.0. As a result, the Orchestrator 7.0 test setup and sequence files are not backward compatible with previous versions. Orchestrator 7.0 setup/sequence files have a UTS file extension. Older versions of Orchestrator used RTS as this file extension for test sequences, and RTSnn for stored test setups, with nn corresponding to the two-digit test mode identifier.

The older RTS files can be loaded and edited by Orchestrator 7.0, but cannot be saved back to their original format. In this case, the file is saved with the same file name, but with a UTS extension to indicate that it is in the newer format.
Orchestrator 7.0 can read all of the historical formats of previous versions, including Rhios data files, PlusV DMTA files, ACER and Minimat files, and ASCII data files formatted in either a simple row/column format or RAD file layout.

New to this version is the ability to read data files from other TA Instruments software applications, specifically Rheology Advantage rsl data files generated by AR rheometers, and Universal Analysis files generated by TA thermal analysis instruments and UA software. Data files loaded using this mechanism behave much like native Orchestrator files. These files use the same double-buffering system that allows for data editing and manipulation, recovery of initial values via the reload function, and selective displaying of parameters in both the spreadsheet and plot.

Support for Rheology Advantage File Import

To open RA (Rheology Advantage) data files in Orchestrator select “Rheology Advantage Data” from the file type drop list in the File Open dialog, or drag and drop the RSL files directly into Orchestrator. This will cause the selected file(s) to be loaded.

When the data files are loaded, the default plot and spreadsheet format of Rheology Advantage is used. For example, if the data was plotted in RA showing \( G' \) on the Y1, \( G'' \) on the Y2, and frequency on the X axis, it will be loaded in Orchestrator in that format. Additional variables not loaded when the file is opened can be loaded by using either the Load Spreadsheet Variables, Column Organizer, or Plot Layout functions. Once loaded into Orchestrator the data can be saved as a native Orchestrator TAD file.

Notes on the RA file import function:

1. This function requires RA Version 5.1 or higher installed on the computer in addition to Orchestrator. Loading of RA data is accomplished by a COM link between Orchestrator and Rheology Advantage.

2. When the data is loaded, the variable names are automatically converted from RA format to Orchestrator format. For example, complex viscosity in RA is listed as \( |n^*| \), which is automatically converted to \( \eta^* \) or \( Eta^* \) in Orchestrator when loaded.
3. Imported variables use standard data type values, which allow them to be used with data-specific analysis functions in Orchestrator.

4. The units of each variable are recalculated based on the current units setting in Orchestrator. For example, the RA data is loaded in either cgs or SI format depending on the setting. The strings used for units correspond to the standard strings used in Orchestrator.

5. The **Edit Page Scalars** function can be used to view/edit the scalar values imported from RA.

6. The **View Test Setup** function can be used to view the test programming information from the original RA file.

7. Orchestrator recognizes “hidden” RA cell values (i.e., points marked as invalid) and converts them to the appropriate Not-a-Number values.

8. Likewise, data flagged as being out of spec in RA, is marked as such in Orchestrator.

**Special Note When Using Rheology Advantage with Advantage Integrity™ Enabled**

When you are using RA with Advantage Integrity enabled, you will need to **log into the Integrity Server first** in order for Orchestrator to be able to load RA data files. To do this, start the Rheology Advantage Data Analysis module and enter a valid User ID and Password at the prompt. Once RA is running it will now be possible for Orchestrator to load RSL files. Note that if RA is in Integrity mode and not currently running when Orchestrator attempts to load RSL files, “Server Busy” error messages may appear and it may be necessary to restart Orchestrator in order to recover from this error.

**Support for Orchestrator File Export into Rheology Advantage**

Orchestrator Version 7.0 can serve as a data file server to Rheology Advantage, allowing RA (Version 5.1 or higher) to import Orchestrator data. To load Orchestrator files into RA, select “TA Orchestrator Results Files” from the file type drop line in the RA file open dialog. For additional information see the Rheology Advantage documentation.

**Support for UA Data File Import**

Universal Analysis (UA) files can be loaded into Orchestrator, using either the File Open dialog, or by a drag-and-drop operation. UA files typically use a three-digit number rather than a specific file extension to allow identification of sample files. Therefore, when any file is opened in Orchestrator without a recognized file extension, it is tested to see if it a UA file.

Notes on importing Universal Analysis files:

1. Both ANSI- and Unicode-formatted UA files are supported.

2. Data cannot be saved back to a UA file, however it can be saved as an Orchestrator TAD file.

3. Signal names are converted from UA nomenclature to Orchestrator names. The appropriate data type is set to allow the data to be used with the Orchestrator thermal analysis functions.

4. The signal units are converted to match the current setting in Orchestrator. For example, HeatFlow is loaded in either mcal or mW depending on the setting.

5. The **View Test Setup** function shows a summary of the method used to generate the data.
6. The **View Calibration Information** function shows the contents of the entire parameter block of the data file.

Orchestrator maps UA files to specific test types, depending on the source of the data as defined by the **Module** parameter. These test types are used to determine the default plot and spreadsheet layout for the data when they are loaded, and used to set the file extension when the data is saved as Orchestrator TAD files. The different types of data recognized include:

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Test Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>Differential Scanning Calorimetry (DSC)</td>
</tr>
<tr>
<td>71</td>
<td>Dynamic Mechanical Analysis (DMA)</td>
</tr>
<tr>
<td>72</td>
<td>Dielectric data (DEA)</td>
</tr>
<tr>
<td>73</td>
<td>Differential Thermal Analysis (DTA)</td>
</tr>
<tr>
<td>74</td>
<td>Thermal Mechanical Analysis</td>
</tr>
<tr>
<td>75</td>
<td>Thermogravimetric Analysis (TGA)</td>
</tr>
<tr>
<td>76</td>
<td>Combined TGA/DTA</td>
</tr>
<tr>
<td>77</td>
<td>Combined DSC/TGA</td>
</tr>
</tbody>
</table>

**ARES Extensional Viscosity Fixture (EVF)**

Orchestrator 7.0 supports the new Extensional Viscosity fixture used to measure the viscosity of melts in elongation on an ARES rheometer. See the figures here. This is implemented as a new geometry, which is available when Orchestrator is connected to an ARES rheometer. This test fixture is used in conjunction with the Extensional Viscosity Test, and produces stress, strain, and elongational viscosity as a function of time. Please see the hardware documentation for this fixture for additional information on using this test geometry.
**Enhanced Data Corrections**

Two new data corrections have been added to this release of Orchestrator:

**Test Fixture Compliance Correction**

The Test Fixture compliance correction is used to account for any flexure in the test fixtures during dynamic oscillatory measurements. The correction is based on a “Fixture Compliance” value that can be entered on the Option form of every test geometry (see the figure to the right). Note that the value entered should be the sum of the compliance values for both the upper and lower test fixtures, using units of mrad/g-cm for shear geometries and µm/kg for linear geometries. The correction value is stored as part of the data file. Data run on previous versions of Orchestrator and loaded into Orchestrator 7.0 will also be calculated with this correction, but with a compliance value of 0, no changes will be seen in old data. The default value of the fixture compliance for each geometry is set to zero, and a non-zero value must be entered if this correction is to be used.

*Example of Test Fixture Compliance Correction for ARES*

*Example of Test Fixture Compliance Correction for RSA III*
Transducer Compliance Correction (RSA III Multiple Extension)

Compliance corrections for instrument frame flexure and transducer compliance in Multiple Extension tests are now accessible in the Transducer Setup form.

The frame flexure correction is used in all test modes. It is used to account for the slight flexing of the frame under load, resulting in slight changes in the true sample strain amplitude and phase. A reasonable value for this parameter is 1.0 microns/kg.

The normal compliance correction is used to account for the transducer compliance that occurs during a Multiple Extension test, which results in differences between the measured gap value and the true sample gap (and therefore changes in calculated sample strain). Note that this value is only used in the Multiple Extension test. In other tests the actual transducer compliance is measured directly and is used to automatically adjust the measured strain signal in the instrument hardware.

Support for UV Light Source in Fast Data Sampling Option

In this release the Waveform and Fast Data Sampling Option released in Orchestrator 6.6.3 has been extended to support control of the UV light source contained in the ARES Photo Curing accessory package. This option allows the shutter in the UV source to be opened and closed at programmed points in a test when used with either the External Correlation option (available with Time and Temperature Ramp tests) or when the RheoCorr correlator software is used in a stand-alone mode.
Support for User-Selectable Fonts

Orchestrator now contains a Font Manager that can be used to set the default fonts used for plots and plotting characters. The function is accessible from the Utilities/Service menu.

This option gives you the chance to change fonts to suit your preference, or to ensure that the fonts being used contain the necessary Unicode characters. This setting is done on a per-user basis.

<table>
<thead>
<tr>
<th>Font Type</th>
<th>Description</th>
<th>Default Font Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Plot Text Font</td>
<td>This is the font used for general text in the plot</td>
<td>Arial</td>
</tr>
<tr>
<td>Color/Symbol/Lines</td>
<td>This is a special font containing plot symbols and lines. It is installed as part of Orchestrator.</td>
<td>RheoPlotSym</td>
</tr>
<tr>
<td>Symbol Font</td>
<td>The font used for Greek and mathematical symbols</td>
<td>Symbol</td>
</tr>
<tr>
<td>Alt Text Font</td>
<td>An alternate font used in Orchestrator. Should be a fixed pitch font.</td>
<td>Courier</td>
</tr>
</tbody>
</table>

NOTE: Depending on the language and characters requirements, it may be necessary to change the Orchestrator font settings to a font that contains all of the necessary Unicode characters.

Localization and Language Packs

Orchestrator Version 7.0 supports additional languages via optional language packs that can be installed using the Orchestrator program setup. These language packs consist of special files containing text strings used by Orchestrator, as well as Windows resources (dialogs, icons, bitmaps, etc) that are used by the program.

Language preferences are stored as part of the Orchestrator log-in profile. Additional profiles using other languages can be created using the Orchestrator Login Administrator (OLA) utility, which can also be used to change the default language for a given profile.

As of Version 7.0 only English and German languages are supported.

Orchestrator also uses the Windows system locale settings to control number formatting options. For example, many European languages use the comma character as the decimal separator instead of the period. Note that the locale settings in Orchestrator are based on the Language Pack being used, not the localization setting of the computer.
Enhanced Online Help System

The Orchestrator online help system has been updated to a new format called FlashHelp. FlashHelp works in conjunction with Internet Explorer and requires a special browser plug-in that is installed automatically by the Orchestrator installation CD. Please note that some software used to block popups in Internet Explorer may interfere with the operation of the FlashHelp and may need to be disabled for the Orchestrator online help to work properly.

Windows XP Service Pack 2

The security options installed with Windows XP Service Pack 2 can prevent the Orchestrator FlashHelp from displaying. If this occurs, follow these instructions to allow FlashHelp to display:

1. Open Internet Explorer.
2. Select Tools/Internet Options from the menu and click on the Advanced tab.
3. Scroll down to the Security section and check the option to "Allow active contents to run in files on My Computer."
4. Click OK.

Changing this setting allows “active content” such as the FlashHelp ActiveX control to execute code in Internet Explorer. For more information on this topic, and its implication on computer security, please see http://msdn.microsoft.com/security/productinfo/xpsp2/securebrowsing/locallockdown.aspx for a discussion on Local Machine Zone Lockdown.

Data File Change Auditing Feature

A new file integrity and change-tracking feature has been added that keeps a record of any significant change made to a data file, as well as a system log that contains all of the significant changes made to files over a period of time.

Significant changes are defined as any change that affects the value of data and/or its representation in an experiment. Examples of this would include cutting or pasting data, editing individual data cells, and using functions such as data reduction or data smoothing.

The file change-tracking system is done on a per-experiment basis. A change log can be created by logging into Orchestrator with audit logging enabled, then starting a new experiment. See the next section for information.

Once this log is created, changes will be logged and the change records written back to the experiment file each time it is re-saved. The change log cannot be viewed or edited within Orchestrator. A special application (Orchestrator Log Viewer) is required to view the change record log.
NOTE: Once a file has change tracking enabled, all changes made to the file will be logged, regardless of whether it is being accessed from an Orchestrator login that has change tracking enabled.

The Orchestrator system change system is used to log changes to all data files to a central location. Log files are created each day and contain a summary of all of significant actions in Orchestrator taken during that day.

Enabling Auditing

The Data File Change Auditing feature can be enabled for any given Orchestrator log-in profile by using the Orchestrator Log-in Administrator (Version 3 or higher).

- Check Enable per file Audit logging to enable the creation of an audit log record in all new data files created from this login, which is then appended with all significant file actions.

- Check the Enable system Audit logging option to enable the system logging function. If this is set, and the Log file directory resolves to a valid directory location, the system audit log files are created daily. These log files contain summaries of actions in Orchestrator. If system logging is enabled, and the path specified is not valid, or cannot be written to, the users setup directory will be used instead.

System log files are in the form of OrcheLogXXXXYYZZ.ocl, where XXXX is the four digit year, YY is the two digit month, and ZZ is the two digit date. The Orchestrator Log Viewer, OLV can be used to view the contents of these files.

Using the Auditing Feature in a 21 CFR 11 Environment

This feature is not designed to provide a turn-key system for 21 CFR 11 compliance, however when used in conjunction with other tools, such as the careful administration of file access rights offered by NTFS, it should be possible to offer a system that meets the requirement needed for compliance.

Such a system requires the following:

1. Passwords for each Orchestrator login to ensure proper user validation.

2. Use of restricted user accounts to control access to instrument calibration features, data editing, etc.

3. Data File Change Auditing to track any changes made to individual data files. It is possible to set the security of the log file directory so that the log files can be created and appended, but not viewed or removed by non-administrators.

4. The locking-down of certain files and directories to prevent unauthorized access to system settings. This includes the set of files in the Orchestrator setup directory.

5. Restricting the user’s log-in profile in the registry to read-only.
Storage of User Preferences

Previous versions of Orchestrator stored user preferences in ASCII formatted initialization files. Orchestrator 7.0 stores this information in the Windows registry on a per-User profile basis.

Miscellaneous Bug Fixes and Updates

1. Fast Data Sampling – RheoCorr correlator data is now AutoSaved along with the normal online page when the test is completed.

2. The software automatically continues a sequence by inferring test completion from other status variables send by the instrument. This fixes the problem where test sequences occasionally stall after a short test run.

3. A problem was fixed in the Column Organizer function where the incorrect string for the column units would be generated if the units setting of the current page did not match the general units setting in Orchestrator.

4. The spin control, used to set the number of terms in a model, is now properly enabled/disabled when the curve fit model is changed.

5. A problem was fixed with the Orchestrator Log-in Administrator (OLA) where new profiles were not being generated with the correct instrument type identifier.

6. Support for Dielectric Analysis has been added to the RSA III.