

**IBM® Automated Regression Testing Tool**  
**Version 2 Release 2 Modification 0**  
**User's Guide**  
**Program Number: 5799-GBN**  
**PRPQ: P85579**

April 1999

**Note!**

Before using this information and the product it supports, be sure to read the general information under This book is also available as an online book that can be viewed with Adobe Acrobat Reader 2.1 and later.

**Second Edition (April 1999)**

This edition applies to Version 2 Release 2 Modification 0 of the IBM Automated Regression Testing Tool, program number 5799-GBN. Changes are made periodically to the information herein.

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## Preface

This book is designed to assist users of the IBM® Automated Regression Testing Tool (ARTT).

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## Who Should Read This Book

Developers, testers, project managers, and other individuals who are using, or who are intending to use, ARTT for the regression testing of reengineered software should read this book.

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## About This Book

This user's guide describes:

- Regression testing philosophy
- ARTT, its features and execution modes
- System requirements
- Installation
- How to perform regression testing using ARTT
- Execution scenarios
- Executable samples
- Troubleshooting.

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## Version Details

This user's guide applies to ARTT version 2.2.0.

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## Getting Help

To open a problem with ARTT, please enter an electronic PMR (problem management record) in RETAIN (remote technical assistance information network [IBM]) to the queue and center ATC, 136 using the Compid 5799GBN00.

If you *do not* have access to RETAIN, in the United States you can call 1-800-237-5511 to have support personnel open a PMR for you in RETAIN.

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## Conventions and Terminology Used in This Book

The following list shows special ways in which some characters and words are displayed in this manual and describes the meaning associated with each one:

<b><u>Display Method</u></b>	<b><u>Meaning</u></b>
Monospaced type	Shows something that you type (such as a command), an example, or something that is displayed on your monitor (for example, an error message or the name of a panel).
<i>Italic type</i>	Indicates information that you supply, such as a parameter or a variable. Italic type sometimes indicates information that you should pay particular attention to.
<b>Bold type</b>	Indicates the name of an entry field on a panel or subpanel.

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## Related Information

The following publications are available in downloadable form from the IBM Year 2000 Technical Support Center Web site:

<http://www.software.ibm.com/year2000/>

Select the **Testing** link on the main home page and then look for the Application Testing Collection on the page displayed.

- IBM Application Testing Collection for MVS/ESA, Version 1 Release 5 Modification 0, User's Guide, Program Number 5799-GBN, PRPQ P85579
- IBM Application Testing Collection for MVS/ESA, Version 1 Release 5 Modification 0, General Information, Program Number 5799-GBN, PRPQ P85579

IBM has developed a Redbook that outlines the Y2K test process and augments it with real-world application examples and tool usage information.

To order this Redbook from the Internet:

1. Go to <http://www.redbooks.ibm.com/index.html>
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3. In the search field, enter the following title or document number:  
VisualAge 2000 Test Solution: Testing Your Year 2000 Conversion, document number SG24-2230



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## Chapter 1. Introduction

Regression testing is a routine practice in the world of application development. It is simply the process of verifying that an application functions in the same way as it did before changes were introduced into the application itself, the data on which the application operates, or some related software or hardware on which the application depends.

Any change to an application—whether for a bug fix, a new function, a Year 2000 code fix, or something else—can cause the application to fail. It is particularly important in Year 2000 code fixes, where code changes but function stays the same, that you know your application will not fail when handling future dates.

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### Why Invest in Regression Testing?

You may be familiar with some of the reasons often given for not investing in rigorous regression testing:

- Developers are already responsible for checking their own changes as part of unit testing, and they do not have time to create a regression test.
- The tools needed to do the testing efficiently do not exist.
- The organization does not have the budget to do regression testing.

However, many organizations have discovered that the increased code quality and decreased costs resulting from regression testing far outweigh the objections.

Regression testing helps you to detect errors early in the development cycle, thereby avoiding the significant hidden cost of high numbers of reported problems when a bug-laden application is moved into production.

---

### Automating the Regression Testing Process

Regression testing can be done manually or by using one or more tools to automate steps in the process. A typical regression testing process includes the following steps:

1. Develop test cases that test the full functionality of your application.
2. Run your application against these test cases, saving the output from each run. (This output serves as a baseline for comparison with subsequent output from the execution of your changed application.)
3. Make changes to your application.
4. Rerun the modified application against the same test cases, saving the output from each run.
5. Compare your baseline output with the output from the changed application.
6. Analyze any differences to determine whether they are expected differences (for example, a time/date stamp) or unexpected differences indicating that the product has regressed (does not function as it did before it was changed).

On the surface, regression testing seems straightforward. In practice, it can be time-consuming and complicated. ARTT, however, makes the process manageable, and maximizes efficiency far beyond what you could achieve with manual testing.

The following table shows how you can use ARTT to automate or simplify the regression testing steps listed previously:

Regression Testing Task	Task Automated or Simplified with ARTT
1. Develop test cases that test the full functionality of your application.	Even though ARTT does not create actual test cases, it can create the environment for the test cases. See Regression Testing Task number 3 in this table.
2. Run your application against these test cases, saving the output from each run. (This output serves as a baseline for comparison against subsequent output from the execution of your changed application.)	Run your application under ARTT to record the application's I/O activity, including program reads or writes, in a log file. The log file can then be used as a baseline for comparison with subsequent proof runs.
3. Make changes to your application.	<p>ARTT enables future date testing and changes to data across applications that cannot be modified on the same schedule. ARTT can:</p> <ul style="list-style-type: none"> <li>• Convert the structure of data, and the actual field values entering or exiting your application to test the application with different formats. ARTT supports over 100 date formats as well as procedures that enable you to add your own date formats.</li> <li>• Move dates backward or forward to test your application with past and future dates.</li> </ul>
4. Rerun the modified application against the same test cases, saving the output from each run.	<p>Test on a separate system/LPAR without having to have the application's data present. ARTT makes this possible by executing a proof run in which all I/O is performed using data captured from the baseline execution.</p> <p>This capability enables you to:</p> <ul style="list-style-type: none"> <li>• Complete testing more quickly, thereby saving cycle time and reducing costs.</li> <li>• Reduce testing storage requirements and setup time (for example, the time to reset databases).</li> <li>• Complete more testing.</li> <li>• Test earlier and later in the testing cycle.</li> <li>• Test components at all levels (unit, function, integration, and system).</li> </ul>

Regression Testing Task	Task Automated or Simplified with ARTT
5. Compare your baseline output to the output from the changed application.	ARTT automatically compares the I/O events from the base run (held in the log file) with those from the proof run.  When ARTT detects a difference, it tells you what the difference is as soon as it is detected. This dramatically speeds up error diagnosis.
6. Analyze any differences to determine whether they are expected differences (for example, a time/date stamp) or unexpected differences that indicate the product has regressed (does not function as it did before it was changed).	Filter output so that differences you expect to occur (for example, time stamps in data that you know will be different from run to run) are not included. In this way, you are only warned of changes that you do not expect, which reduces analysis time.

In these ways, and many more, ARTT makes regression testing easier and pays off in long-term quality improvements. These improvements translate into lower costs and increased productivity because developers spend less time fixing problems and more time creating new and better applications.

ARTT is the “black box” component of the complete “white box/black box” testing solution offered by the Application Testing Collection. (For a description of black box and white box testing, see the general information documentation that was shipped with ATC.) When the complete set of ATC tools are used together, your organization truly has a complete test solution in its arsenal of tools.

The remainder of this book focuses on ARTT and how it can help you to establish regression testing in your organization.

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## Road Map to This Book

To help you to find the information that you want, this book is divided into the following parts:

- |  |  |
|--|--|
| “Part 1. First Steps”                          | Comprising Chapters 3 and 4, this part describes how to install and start ARTT.  |
| “Part 2. ARTT for Standard Batch Programs”     | Comprising Chapters 5 to 8, this part describes how to: <ul style="list-style-type: none"><li>• Run an ARTT baseline execution (Capture) for a standard batch program.</li><li>• Execute a proof run using either the actual input for the baseline execution (Real Replay), or the copy of the input stored during the baseline execution (Virtual Replay).</li><li>• Run a standard batch program in Real Replay mode or Virtual Replay mode with data transformation.</li></ul>   |
| “Part 3. ARTT for IMS Batch Programs and MPPs” | Comprising Chapters 9 to 14, this part describes how to: <ul style="list-style-type: none"><li>• Set up an ARTT baseline execution for an IMS™ batch program (not required for an IMS MPP).</li><li>• Run a Capture (baseline) execution for either an IMS batch program or an IMS MPP.</li><li>• Execute a proof run for an IMS batch program or IMS MPP using virtual input (stored during the baseline execution).</li><li>• Run an IMS batch program or IMS MPP in Virtual Replay mode with data transformation.</li></ul> |
| “Part 4. ARTT for DB2 Programs”                | Comprising Chapters 15 to 17, this part describes how to: <ul style="list-style-type: none"><li>• Run a Capture execution for a DB2® program.</li><li>• Execute a proof run for a DB2 program using virtual input.</li><li>• Run a DB2 program in Virtual Replay mode with data transformation.</li></ul>  |
| “Part 5. ARTT for CICS Programs”               | Comprising Chapters 18 to 20, this part describes how to: <ul style="list-style-type: none"><li>• Run a Capture execution for a CICS® program.</li><li>• Execute a proof run for a CICS program using virtual input.</li><li>• Run a CICS program in Virtual Replay mode with data transformation.</li></ul>   |
| “Part 6. Appendixes”                           | Each appendix contains information that you may find helpful when working with ARTT. For example, a list of the date formats used by ARTT, and a list of ARTT’s system data sets.  |
| “Part 7. Glossary and Index”                   | The Glossary contains a list of the terms and definitions used in this book.   |

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## Chapter 2. Regression Testing with and without ARTT

Regression testing is simply the process of verifying that an application functions in the same way as it did before changes were introduced into the application itself, the data on which the application operates, or some related software or hardware on which the application depends.

Chapter 1 introduced ARTT and briefly described how it could be used to simplify or automate regression testing tasks.

### This chapter describes:

- Various scenarios for conventional regression testing
- Regression testing using ARTT's automated processes in those same scenarios
- How ARTT's features and capabilities improve regression tests and make testing faster and easier.

---

### Conventional Regression Testing

To discuss the many benefits that ARTT can provide in regression testing, it is necessary to define the following terms that are used in this chapter:

#### Data transformation

A change in a program's application data that typically (but not always) refers to data entering the program from a file or database. For example, data transformation might be needed when you have a program that accepts input from a file containing date fields in some or all of its records. If the file contains two-digit year fields and the new program accepts only four-digit year fields, data transformation is required to convert the file to the new format.

#### Functional change

A change in an application's logic that changes the business logic that is being performed. For purposes of discussion in this chapter, it is important to realize that program logic could be modified for the following reasons and NOT be considered a functional change:

- To handle file/record restructuring (for example, to expand two-digit year fields to four-digit year fields).
- For code restructuring (but not changing the function).

### Conventional Regression Testing Scenarios

When performing regression testing, you are likely to encounter at least one of the following scenarios:

- No data transformation and no functionality change (page 6)
- Data transformation but no functionality change (page 7)
- Data transformation and functionality change (page 8).

The conventional regression testing process varies for each of these scenarios. An overview of the process for each scenario follows.

## No Data Transformation and No Functionality Change

This is the simplest regression testing scenario in which you verify that code changes did not change the application's function; it does not involve changes to input data (data transformation).

Code changes for this category of testing include:

- Software upgrades
- Reengineered applications
  - Code restructuring
  - Redundant code removal
  - Windowing method of year 2000 correction.

The steps typically required in this conventional regression testing scenario are:

1. Prepare test cases.
2. Execute base run.
3. Modify program, if required.
4. Copy input data.
5. Execute proof run.
6. Compare output from base and proof runs.

Figure 1 shows the previous steps once the test cases have been prepared.

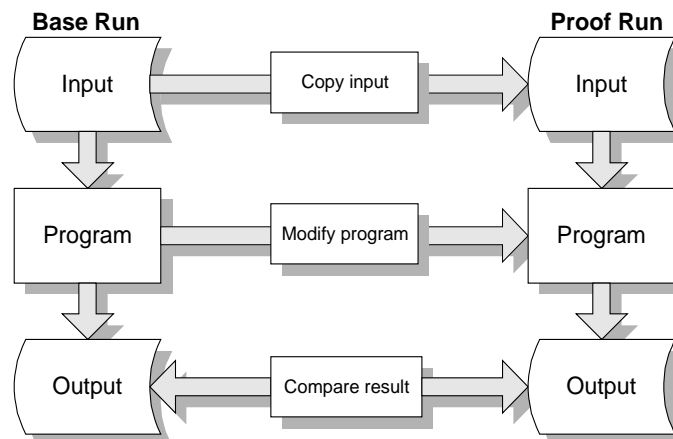


Figure 1: No Data Transformation and No Functionality Change

## Data Transformation but No Functionality Change

A more complex testing scenario is one in which you still verify that code changes did not change the application's function, but you must also manage data transformation.

Code changes for this category of testing include:

- Platform migrations
- Data file restructures
- Field additions or expansions. For instance, the expansion of:
  - Date fields, as in the case of year 2000 correction.
  - Monetary fields, as in the case of European Monetary Union (EMU) conversion.
  - Part number fields.

The steps typically required in this conventional regression testing scenario are:

1. Prepare test cases.
2. Execute base run.
3. Modify program, if required.
4. Copy and convert input data.
5. Execute proof run.
6. Convert output from proof run.
7. Compare output from base and proof runs.

Figure 2 shows the previous steps once the test cases have been prepared.

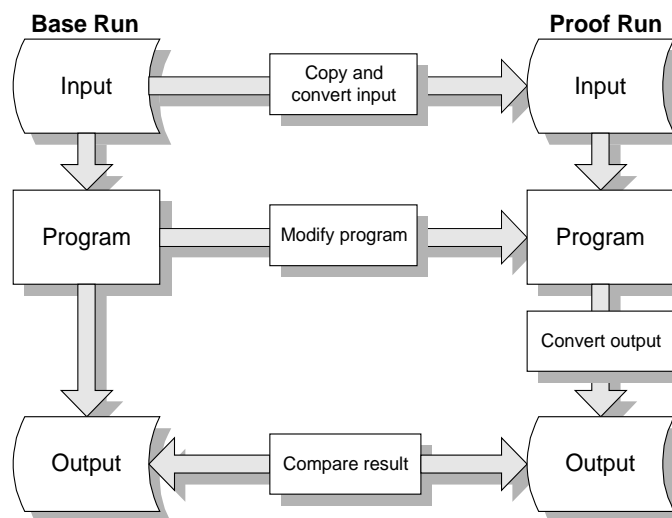


Figure 2: Data Transformation but No Functionality Change

## Data Transformation and Functionality Change

The final testing scenario is one in which code changes alter the application's function, and there is also data transformation.

**Note:** ARTT does not support the preparation and analysis of new test cases required in this regression testing scenario; it is included only for completeness.

Code changes for this category of testing include:

- Application enhancements
- New applications
- Fixes for existing problems in an application.

The steps typically required in this conventional regression testing scenario are:

1. Prepare test cases.
2. Execute base run.
3. Perform functional changes, then modify program.
4. Copy and convert input data.
5. Execute proof run.
6. Convert output from proof run.
7. Compare output from base and proof runs.

Figure 3 shows the previous steps once the test cases have been prepared.

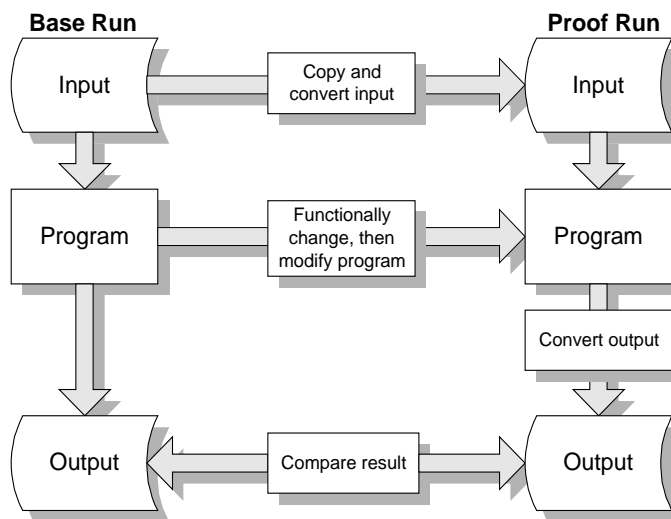


Figure 3: Data Transformation and Functionality Change

**Note:** In cases where you are applying application enhancements and fixes, this scenario tests and ensures that an application works exactly as it did before data transformation and functionality change occurred. It is also necessary to prepare new test cases to test the new functionality and remove old test cases that no longer apply to the program. It is the preparation of test cases for new function, and the analysis of new results that ARTT does not support.



## Regression Testing Issues

During conventional regression testing, issues may arise unexpectedly. The following table details some of those issues and describes what may have caused them.

Issue	Cause
<b>No Functionality Change and No Data Transformation</b>	
<b>DASD</b>	More space is required to store the copies of your input and output files.
<b>Control</b>	If you do not have a good file management system, you can easily load the wrong files when testing. This results in duplication of testing effort and makes for lost time and resources.
<b>Problem identification</b>	The output only indicates that differences exist. It does not indicate where the differences occurred. You only discover where the differences occurred after an intensive examination of the output.
<b>Comparison overheads</b>	During the examination, all records have to be checked for differences because there is no way of isolating only the ones that were processed.
<b>Granularity</b>	Because programs tend to be interdependent (output from one is input for another), a program that is incomplete or incorrect can delay or complicate testing of other programs.
<b>Concurrency</b>	Everyone wants to use the same database at the same time, which interferes with your getting a snapshot of your input data.
<b>Additional Issues with Data Transformation</b>	
<b>Data conversion</b>	Utility programs are required to convert input files.
<b>Intelligent compares</b>	To be compared, new output data sets and base output data sets must be in the same format. One of them must therefore be converted.
<b>Additional Issues with Millennium Testing</b>	
<b>No test data</b>	Input data containing the future dates that you want to test does not exist.
<b>Number of tests</b>	Millennium reengineering requires testing for more than just current dates and the year 2000. Daily, weekly, and other end-of-business periods, such as quarters, must be tested for dates beyond 2000. Also, you must test special dates, such as leap years.

On the surface, regression testing seems straightforward. In practice, as the previous information suggests, it can be complex and time consuming, especially when code must be modified, but functionality must remain the same.

---

## Automated Regression Testing

As the name implies, the Automated Regression Testing Tool (ARTT) automates many of the time consuming tasks involved with regression testing and eliminates many of the impractical requirements.

### ARTT Capabilities

ARTT simplifies conventional regression testing by enabling you to:

- **Automatically capture an entire base I/O footprint.**

When ARTT runs in Capture mode, it intercepts application calls to file handlers and uses these intercepts to build a detailed audit trail for a base execution. This exact recording of all I/O events, results, data and sequence is called an I/O footprint.

ARTT's intercept technology does not depend on a particular source language and does not need application code changes—a particular advantage when testing programs written in assembler language.

- **Automatically compare modified program results to captured base results.**

When ARTT runs in Real Replay mode or Virtual Replay mode, it intercepts application calls to file handlers and checks a modified execution in flight against a previously recorded base execution. In this way, program outputs are compared to ensure that the behavior of the program has not been affected.

The advantage of this approach is that when a difference is detected, not only are you told what the difference is, but also you are notified as soon as the difference is detected. This speeds up dramatically the diagnosis of the errors that have been introduced.

- **Test without a production environment.**

Running in Virtual Replay mode, ARTT can simulate a production environment, which enables you to:

- Test remotely
- Test components at a unit test or at an integration test level before all year 2000 transformation work is complete
- Test earlier and later in the testing cycle.

- **Transform input data as it is encountered during program execution.**

Using a conversion module in Real Replay or Virtual Replay mode, ARTT can transform input data from one format to another, enabling you to test modified programs with unmodified data, or unmodified programs with modified data. In addition, ARTT's date rolling capability enables you to age or rejuvenate data by the number of days or years that you specify.

ARTT's ability to transform input data in flight is particularly useful for year 2000 testing.

- **Transform output data as it is encountered during program execution.**

ARTT can transform output data from one date format to another, and age or rejuvenate it by the number of days or years that you specify. This enables you to intelligently compare base runs (unmodified code/data) with proof runs (modified code/data).

ARTT's ability to transform output data in flight is particularly useful for year 2000 testing.

ARTT does all of this automatically and in a nonintrusive way for programs written in assembler, COBOL, and PL/I. ARTT supports the following data environments:

- QSAM and VSAM access methods invoked from batch programs in Capture, Real Replay, and Virtual Replay modes with data transformation and date rolling for all system levels listed as prerequisites
- Static SQL Select, Fetch, Insert, Update, and Delete statements invoked from DSN programs in Capture and Virtual Replay modes with data transformation and date rolling for DB2 V4R1M0 and above
- Dynamic SQL Select, Fetch, Insert, Update, and Delete statements invoked from DSN programs in Capture and Virtual Replay modes without data transformation or date rolling for DB2 V4R1M0 and above
- DLI, BMP, and MPP programs in Capture and Virtual Replay modes with data transformation and date rolling for IMS V4R1M0 and above
- BMS, FC, TC, TS, TD, IC, DB2, and IMS CICS EXEC statements invoked from online transactions in Capture and Virtual Replay modes, as limited above, for CICS V4R1M0.

## Testing Scenarios Using ARTT

In each of the following scenarios, ARTT can make your job easier, make you more productive, and increase your confidence in the quality and efficiency of your tests:

- No data transformation and no functionality change
- Data transformation but no functionality change.

An overview of the process for each scenario follows.

### No Data Transformation and No Functionality Change

The steps required when this simplest of regression testing scenarios is run with ARTT are as follows:

1. Allocate the ARTT log file.  
When using the ARTT user interface, the log file is allocated automatically.
2. Execute a base run under ARTT control to capture the program's I/O events in the log file.
3. Modify the program, if required.
4. Execute the proof run under ARTT control.

ARTT automatically compares the I/O events from the base run (held in the log file) with those from the proof run.

Figure 4 shows the steps required to run this testing scenario once the log file has been allocated.

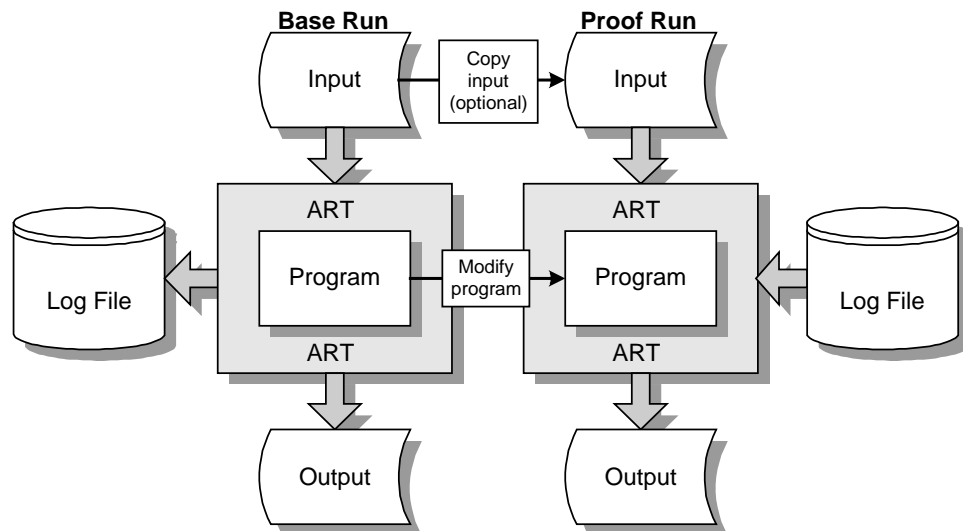


Figure 4: Using ARTT - No Data Transformation and No Functionality Change

## Data Transformation but No Functionality Change

The steps required when this regression testing scenario runs with ARTT are as follows:

1. Allocate the ARTT log file.  
When using the ARTT user interface, the log file is allocated automatically.
2. Execute a base run under ARTT control to capture the program's I/O events in the log file.
3. Modify the program.
4. Specify the old and new data formats to ARTT.
5. Execute the proof run under ARTT control.

ARTT automatically performs the date conversion, and compares the I/O events from the base run (held in the log file) with those from the proof run.

Figure 5 shows the steps required to run this testing scenario once the log file has been allocated.

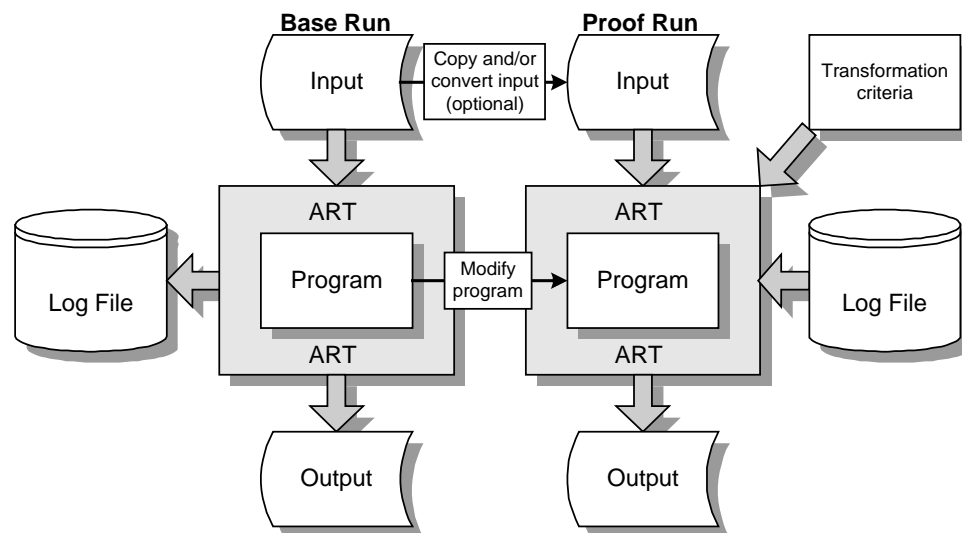


Figure 5: Using ARTT - Data Transformation but No Functionality Change

## ARTT Benefits

In addition to the capabilities described on page 10, ARTT enables you to:

- **Test more efficiently.**

Because ARTT automates much of the testing process, you can make optimum use of your time and resources. What's more, ARTT actually improves the quality of your tests.

ARTT enables you to:

- Complete more tests and complete them more quickly, thereby reducing costs.
- Reduce testing setup time (for example, the time to reset databases) and storage requirements. ARTT can use the data stored in its log file to simulate real inputs and outputs instead of requiring actual I/O files. This capability could also be used with test coverage utilities to develop a comprehensive and portable application testing package.
- Improve the quality of your tests. Because ARTT can use exactly the same input and produce the same type of output, it can function as a control test to give you more confidence in the validity of your measurements.

- **Filter the output to show or report only unacceptable differences.**

In practical regression testing, there are usually acceptable differences in the base run and proof run outputs. There may also be expected differences, which, if absent, constitute unacceptable differences.

ARTT can be instructed to:

- Recognize acceptable differences
- Simulate expected differences to avoid unacceptable differences.

For example, an acceptable difference may arise when an application puts a time stamp in records as an audit trail. A rerun of the base execution would find such a difference. An unacceptable difference may arise if an application has been modified to expand all dates to include four-digit year fields, but some outputs still have dates with two-digit year fields.

- **Check current and future executions using the same test data with data transformation.**

ARTT can transform data during program execution, which enables it to:

- Simulate changes to data fields. For instance, ARTT can be used to simulate an application execution at a future date. In such a case, if input dates are aged by 5 years and output dates are rejuvenated by 5 years, the application's results should be unaltered.
- Reformat data in flight to make new programs tolerate old file formats, and vice versa. For example, a VSAM database may be kept in an old format and still be accessed by a new ARTT-managed program using a new data format. It is therefore possible to test new programs that expect data in the new format.

This feature could also provide considerable benefit if a supplier sends you data that is not millennium-compliant after you have converted your own applications and data.

## Comparison of Regression Testing Issues

Issue	Without ARTT	With ARTT
<b>No Functionality Change and No Data Transformation</b>		
<b>DASD</b>	More space is required to store the copies of your input and output files.	ARTT uses space for the log file, but only holds the data accessed, not all data. In Virtual Replay mode, disk requirements are reduced enormously because: <ul style="list-style-type: none"> <li>• Copies of input files are not required.</li> <li>• Output files are not saved.</li> </ul>
<b>Control</b>	If you do not have a good file management system, you can easily load the wrong files when testing. This results in duplication of testing effort and makes for lost time and resources.	In Real Replay mode, inputs are verified to ensure that the correct data is used. In Virtual Replay mode, inputs come from the saved log file, so correct inputs are guaranteed.
<b>Problem identification</b>	The output only indicates that differences exist. It does not indicate where the differences occurred. You only discover where the differences occurred after an intensive examination of the output.	Comparisons are performed when differences are encountered during execution. ARTT does the following to help you to locate errors: <ul style="list-style-type: none"> <li>• Identifies the exact records in error.</li> <li>• Detects errors very close to their origin, mostly between I/Os.</li> <li>• Provides the log file that serves as an I/O trace, up to the point of the error.</li> <li>• Shows immediately whether a run is successful or not.</li> </ul>
<b>Comparison overheads</b>	During the examination, all records have to be checked for differences because there is no way of isolating only the ones that were processed.	ARTT compares only data that is actually accessed.

<b>Issue</b>	<b>Without ARTT</b>	<b>With ARTT</b>
<b>Granularity</b>	Because programs tend to be interdependent (output from one is input for another), a program that is incomplete or incorrect can delay or complicate testing of other programs.	Errors in Real Replay mode result in the early detection of faulty programs within a suite.  Virtual Replay mode allows maximum granularity because there is no reliance on the output of other programs.
<b>Concurrency</b>	Everyone wants to use the same database at the same time, which interferes with your getting a snapshot of your input data.	In Virtual Replay mode, the log file provides inputs, which eliminates database or file contention.
<b>Additional Issues with Data Transformation</b>		
<b>Data conversion</b>	Utility programs are required to convert input files.	ARTT generates reusable logic modules for converting data consistently from stored record identification and layout rules; therefore, no additional programs are required.  The conversion modules also contain date rolling logic to simulate past or future dates.  ARTT-provided date conversion modules support over 100 date formats.
<b>Intelligent compares</b>	To be compared, new output data sets and base output data sets must be in the same format. One of them must therefore be converted.	ARTT compares transformed records with untransformed records when they are encountered during execution.  Difference reporting may be limited by: <ul style="list-style-type: none"> <li>• Logical field</li> <li>• Logical file</li> <li>• Number of differences per logical file.</li> </ul>



Issue	Without ARTT	With ARTT
<b>Additional Issues with Millennium Testing</b>		
<b>No test data</b>	Input data containing the future dates that you want to test does not exist.	In Real Replay and Virtual Replay modes, data may be aged or rejuvenated when it is encountered during execution.
<b>Number of tests</b>	Millennium reengineering requires testing for more than just current dates and the year 2000. Daily, weekly, and other end-of-business periods, such as quarters, must be tested for dates beyond 2000. Also, you must test special dates, such as leap years.	<p>ARTT cannot reduce the number of runs required; however, the use of Virtual Replay mode eliminates repetitive reloading of databases and files.</p> <p>The same log file may be used for pre- and post-millennium testing.</p> <p>In Virtual Replay mode, resource usage is significantly reduced because only the log file is processed.</p>



## **Part 1. First Steps**

This part comprises Chapters 3 and 4, which describe how to:

- Install ARTT
- Start working with ARTT



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## Chapter 3. Installing ARTT

When installing ARTT, you will be instructed to perform some site administration procedures. You perform the site administration procedures only once to configure settings that are specific to running ARTT at your site.

### This chapter describes:

- User security
- Release migration
- ARTT's host environment and its software requirements
- ARTT installation steps
- ARTT installation panels
- Site customization and administration procedures
- Install verification program procedures.

---

### User Security Notice

Log files and reports generated by ARTT may contain user or site sensitive data and should be treated appropriately.

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### Release Migration Notes

- This release replaces all previous releases.
- Users of this release must recreate previously used ARTT control files, log files and conversion modules.

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### Host Environment and Software Requirements

ARTT's environment and software requirements are:

- A level of MVS™, 4.3 or later, with LE (Language Environment®), 1.5 or later, and the following software at supported levels:
  - DFSMS/MVS®
  - TSO
  - ISPF
  - REXX
  - IBM High Level Assembler or Assembler H
  - IBM Linkage Editor
  - For CICS support: CICS V4R1M0
  - For DB2 support: DB2 V4R1M0 or above
  - For IMS support: IMS V4R1M0 or above.
- A high-level qualifier that is specific to ARTT.
- A minimum of 75 cylinders of free disk space in which to install the ARTT data sets.

- The following data sets from the installation media as described in the installation read me file.

Install Notes and JCL:

*Hlq.V2R2M0.README*

ARTT Installation Libraries:

*Hlq.V2R2M0.ATGINST*

*Hlq.V2R2M0.ATGSOFT*

General Information Guide:

*Hlq.V2R2M0.ATCGI.LIST3820*

*Hlq.V2R2M0.ATCGI.PSBIN*

*Hlq.V2R2M0.ATCGI.PDFBIN*

*Hlq.V2R2M0.ATCGI.BOOK*

User's Guide:

*Hlq.V2R2M0.ATGAUG.LIST3820*

*Hlq.V2R2M0.ATGAUG.PSBIN*

*Hlq.V2R2M0.ATGAUG.PDFBIN*

The parameter *hlq* refers to the ARTT specific high-level qualifier listed previously.

- At least one free user SVC for the exclusive use of ARTT. The SVC provides secure and reliable communication between your programs and the ARTT program modules. (The default value is 253.)
- Read/write access to an authorized data set in the link list and the ability to refresh LLA, or have it refreshed automatically.
- The ability to mark as authorized a data set that is not in the link list.
- The ability to print or view a LIST3820, PostScript, or Adobe Acrobat PDF file.

ARTT supports the following data environments:

- QSAM and VSAM access methods invoked from batch programs in Capture, Real Replay, and Virtual Replay modes with data transformation and date rolling for all system levels listed as prerequisites.
- Static SQL Select, Fetch, Insert, Update, and Delete statements invoked from DSN programs in Capture and Virtual Replay modes with data transformation and date rolling for DB2 V4R1M0 and above.
- Dynamic SQL Select, Fetch, Insert, Update, and Delete statements invoked from DSN programs in Capture and Virtual Replay modes without data transformation or date rolling for DB2 V4R1M0 and above.
- DLI, BMP, and MPP programs in Capture and Virtual Replay modes with data transformation and date rolling for IMS V4R1M0 and above.
- BMS, FC, TC, TS, TD, IC, DB2, and IMS CICS EXEC statements invoked from online transactions in Capture and Virtual Replay modes, as limited above for CICS V4R1M0.

The following are known limitations:

- General or base product related:
  - ARTT does not support programs that perform their own SVC screening.
  - Environment anomalies could cause an application that does not set an explicit return code to exhibit a different return code when run under ARTT.
  - Environment anomalies could cause an application that uses non-initialized or undefined storage to exhibit different behavior when run under ARTT.
  - ARTT does not support the transformation of VSAM keys.
  - ARTT supports only A.D. Julian calendar dates in the formats specified in the shipped ARTT Date Formats control file.
  - The ARTT user interface has known limitations with variable substitution and parameter parsing when generating JCL for Capture, Real Replay, and Virtual Replay executions.
- CICS related:
  - Only one set of control files and log files are defined by the ATGOPTS module for a CICS region.
  - ARTT does not currently support IMS under CICS.
- DB2 related:
  - ATGLDCS supports only COBOL DCLGENs.
  - You cannot remove or reset ARMS control file entries.
  - ARTT does not support programs that use both DB2 and IMS.
  - ARTT does not support comparison modules for DB2 data.
  - ARTT has limitations when using dynamic SQL. For example, varying list Select statements are not supported.
- IMS related:
  - Only one set of control files and log files are defined by the ATGOPTS module for an IMS MPR region.
  - The use of the parameter CMPAT=YES is supported, but the parameter CMPAT=NO is supported only for batch DLI PSBs.
  - ARTT does not support GSAM PCBs with a RECFM of U.
  - ARTT does not support AIBs.
  - ARTT support for MPRs is currently limited to one user or session.
  - ARTT support for conversational MPPs should be limited to one scheduled transaction per session.

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## ARTT Installation Steps

1. Ensure that your environment meets the requirements detailed in “Host Environment and Software Requirements” on page 21.
2. Download the installation data sets from the installation media as described in the Installation read me file.
3. Restore *system library prefix.ATGINST* to a new partitioned data set, *system library prefix.ATGPDS*, by doing *one* of the following:
  - Type `TSO RECEIVE INDS(' system library prefix.ATGINST')` on the Option line of any ISPF panel, and then press Enter. For instructions on entering commands on ISPF panels, see “Using the Option Line” on page 43. When prompted, type the following, and then press Enter.  
`DS('system library prefix.ATGPDS')`
  - Type `RECEIVE INDS('system library prefix.ATGINST')` on the first input line of the ISPF Command Shell, and then press Enter. For instructions on entering commands on the ISPF Command Shell. When prompted, type the following command, and then press Enter.  
`DS('system library prefix.ATGPDS')`
4. Perform *one* of the following actions:
  - Type `TSO EXEC `system library prefix.ATGPDS(ATGINST)`` on the option line of any ISPF panel, and then press Enter.
  - Type `EXEC `system library prefix.ATGPDS(ATGINST)`` on the first input line of the ISPF Command Shell, and then press Enter.  
  
The ARTT - Installation Setup panel is displayed (Figure 6).
5. Specify the required information in the entry fields in the ARTT - Installation Setup panel. The information that you specify in these fields enables the installation procedure to set up ARTT correctly. For a description of the entry fields, see page 25.
6. When you have specified the required information, press Enter to submit a job that installs ARTT. If you decide not to submit the installation job, press PF3 (End). Note however, that you will have to begin the installation procedure again when you want to install ARTT.
7. Ensure that ARTT is successfully installed by verifying that all of the steps in the installation job completed with condition code zero.



8. When the data sets listed in “Appendix E. ARTT Data Sets” on page 335 have been created, do *one* of the following:
  - Mark the SATGBOOT and SATGLOAD data sets *authorized*, and add the SATGBOOT data set to the link list.
  - Copy the contents of the SATGBOOT data set to an authorized data set that is in the link list, and then copy the contents of the SATGLOAD data set to another authorized data set that is *not* in the link list.
9. Go to “Site Customization and Administration Procedures” on page 28 and complete the steps to configure and customize ARTT for your site.
10. Refresh LLA.
11. Go to page 32 to verify that ARTT functions correctly at your site.

---

## ARTT - Installation Setup Panels

This topic describes the fields on the ARTT - Installation Setup panel. Refer to the information here when you are completing step 5 of the ARTT installation procedure on page 23.

The ARTT - Installation Setup panel is displayed when you run *system library prefix.ATGPDS(ATGINST)*. On the panel, specify information that is appropriate for your site, and then press Enter to display the next installation panel.

To close the ARTT Installation Setup panel without specifying any information, press PF3 or type Cancel on the command line, and then press Enter.

```

ARTT - Installation Setup
Command ==>>

Job Statement Information:
  //Userida    JOB  CLASS=A,MSGCLASS=X,NOTIFY=Userid

Install Files Information:
  Distribution File Name    . Artt_hlq.V2R2M0.ATGSOFT
  System Libraries Prefix. . Artt_hlq           Volume      Unit
  Install Work Files Prefix. Userid           Suffix TEMP

ARTT Control Files:
  Log Files Prefix . . . . . Artt_hlq.V2R2M0    Suffix LOG
  Control Files Prefix . . . Artt_hlq.V2R2M0    Suffix VSAM

Sample Files:
  File Prefix. . . . . Userid           Volume      Unit
  VSAM File Suffix . . . . . VSAM
  QSAM File Suffix . . . . . QSAM

```

Figure 6: ARTT - Installation Setup Panel

The entry fields in the ARTT Installation Setup panel are as follows:

### **Job Statement Information**

Specify job statement information for the ARTT installation procedure. The information must conform to your site standards. This job card is also used on all the sample program JCL that is created by the installation job. It is recommended, but not mandatory, that the installer also run the sample programs.

### **Install Files Information**

Use the fields in this group to specify information about ARTT's install files.

#### **Distribution File Name**

Specify the name of the distribution file for the ARTT software, in this case, *system library prefix.ATGSOFT*. This file name should *not* be enclosed in quotes.

#### **System Libraries Prefix**

Specify a prefix for the permanent ARTT system libraries. For each of the ARTT system libraries, the ARTT installation will assign the release V2R2M0 and a particular low-level qualifier for the data set name. You must have alter access to this prefix.

#### **System Libraries Volume**

*If your site does not run SMS*, specify a volume serial number for the install procedure to use when creating libraries and work files.

#### **System Libraries Unit**

*If your site does not run SMS*, specify a unit name for the install procedure to use when creating libraries and work files.

#### **Install Work Files Prefix**

Specify a prefix for the install work files required by the installation job. These work files will be deleted at the end of the job. The default value for this field is your user ID. If you change the default value, then you must have alter access to the new prefix that you specify.

#### **Install Work File Suffix**

Specify a suffix for the install work files. This default value for this field is TEMP.

### **ARTT Control Files**

Use the fields in this group to specify information about ARTT's sample control files.

#### **Log Files Prefix**

Specify a prefix to be used to generate sample log files for your ARTT installation. You must have alter access to this prefix.

#### **Log Files Suffix**

Specify a suffix to be used to generate sample log files for your ARTT installation. The default value for this field is LOG.

**Control Files Prefix**

Specify a prefix to be used for the sample control files for your ARTT installation. You must have alter access to this prefix.

**Control Files Suffix**

Specify a suffix to be used for the sample control files for your ARTT installation. The default value for this field is VSAM.

**Sample Files**

Use the fields in this group to specify information about the files used by ARTT's sample programs.

**File Prefix**

Specify a prefix to be used for files generated by ARTT's sample programs. The default value for this field is your user ID. Remember that the information specified in the Job Statement Information entry lines is used for all sample JCL created by the installation procedure. It is therefore recommended, but not mandatory, that this prefix match the user ID specified in the Job Statement Information group on this panel. If you change the default value, then you must have alter access to the new prefix that you specify.

**File Volume**

*If your site does not run SMS, specify a volume serial number for the sample programs to use when creating libraries and work files.*

**File Unit**

*If your site does not run SMS, specify a unit name for the sample programs to use when creating libraries and work files.*

### VSAM File Suffix

Specify a suffix to be used for the VSAM files generated by ARTT's sample programs. The default value for this field is VSAM.

### QSAM File Suffix

Specify a suffix to be used for the QSAM files generated by ARTT's sample programs. The default value for this field is QSAM.

The ARTT - Installation Setup (Continued) panel is displayed when you specify information, and then press Enter on the first ARTT - Installation Setup panel. On the panel, specify information that is appropriate for your site, and then press Enter to submit the install JCL.

To close the ARTT - Installation Setup panel without specifying any information, press PF3, or type Cancel on the command line, and then press Enter.

```
ARTT - Installation Setup (Continued)
Command ==>>

Environment Details:
  ARTT SVC No. . . . . . 253
  LE Libraries Prefix. . . LE_hlq
  COBOL Libraries Prefix . . COBOL_hlq
  PL/I Libraries Prefix . . PLI_hlq
  IMS Libraries Prefix . . . IMS_hlq
  DB2 Libraries Prefix . . . DB2_hlq          DB2 Sub-system ID DSNx
  CICS Libraries Prefix. . . CICS_hlq
```

Figure 7: ARTT - Installation Setup (Continued) Panel

### Environment Details

Use the fields in this group to specify information about the environment in which ARTT is to be installed.

#### ARTT SVC No

Specify the unique SVC number allocated to ARTT at your site. The default value is 253.

#### LE Libraries Prefix

Specify the prefix allocated to LE libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

#### COBOL Libraries Prefix

Specify the prefix allocated to COBOL libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

#### PL/I Libraries Prefix

Specify the prefix allocated to PL/I libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

### **IMS Libraries Prefix**

Specify the prefix allocated to IMS libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

### **DB2 Libraries Prefix**

Specify the prefix allocated to DB2 libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

### **DB2 Sub-system ID**

Specify the DB2 subsystem ID that you wish to run the ARTT DB2 IVPs against.

### **CICS Libraries Prefix**

Specify the prefix allocated to CICS libraries at your site. This should be set to all levels of qualifier prior to the standard fixed last-qualifier. If you do not have this product at your site, use the prefix DUMMY.

---

## **Site Customization and Administration Procedures**

When you install ARTT, you perform the following site administration procedures. You perform these procedures only once for your installation:

- Customizing the site variables for the ARTT user interface
- Running ARTT's install JCL procedures
- Customizing and setting up an ARTT CICS region
- Customizing and setting up an ARTT IMS MPR region

**Important:** When you have completed these actions, return to step 10 of the ARTT installation steps on page 24.

### **Customizing the Site Variables for the ARTT User Interface**

To view and run the ARTT user interface, you must customize the ARTT user interface variables to suit your installation.

The REXX procedure `ATGSITE` in the library `system library prefix.V2R2M0.SATGEXEC` contains a list of site variables for the ARTT user interface. See "Appendix C. Site Variables" on page 323 for a description of each variable and its default value. Initially, each variable is set to its default value.

1. If necessary, change each variable to a value appropriate for your installation.
2. Save `ATGSITE` to preserve your new variables.
3. Run `ATGSITE` to validate the specified values.

The procedure assigns your specified value to each variable.

## Running ARTT's Install JCL Procedures

Edit and submit the following JCL procedures as required. The description following the name of each procedure can help you determine whether the procedure is required for your site.

1. `'system libraries prefix.V2R2M0.SATGINST(ATGLI000)'`  
This procedure creates the ARTT IMS interceptor interface module that must be linked into each user IMS program in place of the standard IMS DFSLI000 module. Run the following procedure only if you require IMS support. If you specified appropriate install parameters, you should not need to change this procedure.
2. `'system libraries prefix.V2R2M0.SATGINST(ATGOPTS)'`  
This procedure creates the ARTT ATGOPTS module that is used by the ARTT batch, DB2, and IMS IVP programs. If you specified appropriate install parameters, you should not need to change this procedure.
3. `'system libraries prefix.V2R2M0.SATGINST(ATGOPTSC)'`  
This procedure creates the ARTT ATGOPTS module that is used by the ARTT CICS IVP programs. If your ARTT link list data set is different than `'system libraries prefix.V2R2M0.SATGBOOT'`, you must change the SYSLMOD DD statement to reflect your site setup.
4. `'system libraries prefix.V2R2M0.SATGINST(ATGSITE)'`  
This procedure creates the ARTT ATGSITE module that is used by all ARTT jobs. If your ARTT authorized non-link list data set is different than `'system libraries prefix.V2R2M0.SATGLOAD'`, you must change the ATGSITE SYSLIB parameter to reflect your site setup. If your ARTT link list data set is different to `'system libraries prefix.V2R2M0.SATGBOOT'`, you must change the SYSLMOD DD statement to reflect your site setup.
5. `'system libraries prefix.V2R2M0.SATGINST(DEFARMS)'`  
This procedure creates the ARTT ARMS control file for the ARTT IVP programs. If you specified appropriate install parameters, you should not need to change this procedure.
6. `'system libraries prefix.V2R2M0.SATGINST(DEFDATE)'`  
This procedure creates the ARTT Date control file for the ARTT IVP programs. If you specified appropriate install parameters, you should not need to change this procedure.
7. `'system libraries prefix.V2R2M0.SATGINST(DEFMTS)'`  
This procedure creates the ARTT Date Formats control file. If you specified appropriate install parameters, you should not need to change this procedure.
8. `'system libraries prefix.V2R2M0.SATGINST(DFHCS)'`  
This PDS member contains the CICS resource definitions for ARTT and the ARTT CICS IVP programs. You must apply these definitions so that ARTT can support CICS. Your CICS system administrator should know how to apply these resource definitions.

## Setting up and Customizing an ARTT CICS Region

If you require CICS support, you must complete the following tasks:

1. Ensure that the SATGINST DFHCSD resources have been defined.
2. Add the following PLTPI entry after the DFHDELIM entry in the programs that are executed at CICS startup:  
DFHPLT TYPE=ENTRY,PROGRAM=ATGPLTPI
3. Ensure that the SIT Storage Protection parameter and the SIT Transaction Isolation parameter are set to off.
4. The CICS region storage size may need to be reviewed, and the DSALIM and EDSALIM values may need to be reduced.
5. If you require DB2 support under CICS, you will need to update the CICS RCT to add the ARTT CICS DB2 sample transaction A420.
6. Amend your CICS region JCL as follows:
  - a. Replace EXEC PGM=DFHSIP with EXEC PGM=ATGBOOT
  - b. Replace the EXEC parms from PARM='START=&START,SYSIN' to PARM='DFHSIP,C/START=&START,SYSIN'
  - c. Add the following ARTT libraries to the DFHRPL DD specification:  
'system libraries prefix.V2R2M0.SATGCICS'  
'system libraries prefix.V2R2M0.SATGCLOD'

## Setting up and Customizing an IMS MPR Region

If you require IMS MPR support, you must complete the following tasks:

1. Ensure that the SATGINST ATGLI000 JOB has run.
2. Amend your MPR JCL as follows:
  - a. Replace EXEC PGM=DFSRRC00 with EXEC PGM=ATGBOOT
  - b. If you are using an ATGOPTS module with a standard name, replace the EXEC parms from PARM=(MSG,...) to PARM=(DFSRRC00,'run unit/MSG',...)
  - c. If you are using an ATGOPTS module with a suffixed name (ATGOPTSx, where x is the suffix), replace the EXEC parms from PARM=(MSG,...) to PARM=(DFSRRC00,x,'run unit/MSG',...).
  - d. If your required ATGOPTS module is not in the link list, include a STEPLIB statement in your JCL for the library that contains the ATGOPTS module. The library will probably be 'hlq.ARTT.LOAD', and will have been created by the ARTT user interface.
  - e. Include an ATGPRINT DD card allocated to SYSOUT.

**Note:** ATGPRFX will need to be compiled and linked (in addition to ATGLI000) with each MPP program to be run under the ARTT region.

---

## Install Verification Program Procedures

This topic describes the sample JCL procedures and programs that you can run to test your ARTT installation. It shows the order in which the procedures and programs must be run, and describes what each procedure or program does. Ensure that all installation steps for all desired data environments are completed before you run any of these procedures.

### Batch

1. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR010C)'`

This PDS member contains a setup procedure for the batch Capture and Real Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP010C)'
```

Sample compile JCL is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTC010C)'
```

2. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR011C)'`

This PDS member contains another setup procedure for the batch Capture and Real Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP011C)'
```

Sample compile JCL is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTC011C)'
```



3. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR020C)'`

This PDS member contains the batch Capture IVP program. When you execute the program, check that the ARTP020C step completes with a MAXCC = 4 and that all other steps complete with MAXCC = 0. Check also that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTC020C)'`.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP020C)'
```

Sample compile JCL is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTC020C)'
```

4. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR021C)'`

This PDS member contains the batch Real Replay IVP program. When you execute the program, check that all steps complete with MAXCC = 0, and that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTV020C)'`.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP021C)'
```

Sample compile JCL is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTC021C)'
```

## DB2

1. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTC210C)'`

This PDS member contains a compile procedure for the DB2 Capture and Virtual Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0 (Note that the first time you run the procedure, the Bind step will fail because ARTP200C does not exist. Ignore this failure because the Bind step for ARTC200C will bind the complete plan).

**Note:** You need DB2 authority to bind the plans for the program.

For information, the source program is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP210C)'
```

2. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTC200C)'`

This PDS member contains a compile procedure for the DB2 Capture and Virtual Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0.

**Note:** You need DB2 authority to bind the plans for the program.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP200C)'
```

3. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR200C)'`

This PDS member contains the DB2 Capture IVP program. When you execute the program, check that all steps complete with MAXCC = 0, and that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTC200C)'`.

**Note:** You need DB2 authority to execute the plans created by ARTC210C and ARTC200C, both of which read certain DB2 system tables.

4. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR201C)'`

This PDS member contains the DB2 Virtual Replay IVP program. When you execute the program, check that all steps complete with MAXCC = 0, and that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTV200C)'`.

**Note:** You need DB2 authority to execute the plans created by ARTC210C and ARTC200C, both of which read certain DB2 system tables.

## IMS

1. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR300C)'`

This PDS member contains the IMS Capture IVP program. When you execute the program, check that all steps complete with MAXCC = 0, and that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTC300C)'`.

**Note:** This program uses GSAM databases and can run only when IMS is active.

2. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTR301C)'`

This PDS member contains the IMS Virtual Replay IVP program. When you execute the program, check that all steps complete with MAXCC = 0, and that the ATGPRINT resembles the shipped sample output in `'system libraries prefix.V2R2M0.SATGSREP(ARTV300C)'`.

**Note:** This program uses GSAM databases and can run only when IMS is active.

## CICS

**Note:** Complete the following step (step 1) *only* if you require support for DB2 under CICS.

1. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTC430C)'`

This PDS member contains a procedure to compile the CICS DB2 Capture and Virtual Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0.

**Note:** You need DB2 authority to bind the plans for the programs.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP430C)'
```

**Note:** Complete the following step (step 2) *only* if you require support for DB2 under CICS.

2. Submit `'system libraries prefix.V2R2M0.SATGSAMP(ARTC420C)'`

This PDS member contains a procedure to compile the CICS DB2 Capture and Virtual Replay IVP programs. When you execute the procedure, check that all steps complete with MAXCC = 0.

**Note:** You need DB2 authority to bind the plans for the programs.

For information, the program source is in:

```
'system libraries prefix.V2R2M0.SATGSAMP(ARTP420C)'
```

3. Ensure that an appropriate CICS is running, and then log on to CICS and perform the following tasks.
  - a. Start an ARTT Capture session for run unit ARTP410A. Note that this program uses files created by the ARTT batch IVP programs, and therefore requires the batch IVP to have been run. Enter the ARTT transaction to display the Session Manager panel. The following Session Manager panel shows the values that you should specify.

ARTT Session Manager	Applid: applid
"	
	User : userid
"	
	Date: : 05/04/99
"	
Please enter the following:	Time: : 17:28:16
Function :S	(S=Start, E=End)
Run Unit Name :ARTP410A	
Run Unit Status :	(N=Non-transformed, Y=Transformed)
Run Mode :C	(C=Capture, V=Virtual)
Roll Mode :	(Y=Years, D=Days)
Roll Amount :	
Run Id :	
Destination :	

- b. Run the A410 transaction specifying Action R for Account No 00000001, and then specify Action Q.

The Session Manager panel that follows shows the CICS A410 transaction values that you should specify for Action R. When you press Enter, the remaining fields in the panel are filled with appropriate values.

To end the transaction, change Action R to Q, and then press Enter.

ARTM411	ARTT Demonstration Program	Date:
Applid:		Time:
Please enter the following:		Action Codes:
Action : R		R -- Read
Account No : 00000001		A -- Add
Birthdate :		U -- Update
Information:		D -- Delete
		Q -- Quit

- c. End the ARTT Capture session for run unit ARTP410A.

The Session Manager panel that follows shows the CICS ARTT transaction values that you should specify.

ARTT Session Manager	Applid: applid
User : userid	
Date: : 05/04/99	
Time: : 17:28:16	
Please enter the following:	
Function :E	(S=Start, E=End)
Run Unit Name :ARTP410A	
Run Unit Status :	(N=Non-transformed, Y=Transformed)
Run Mode :	(C=Capture, V=Virtual)
Roll Mode :	(Y=Years, D=Days)
Roll Amount :	
Run Id :	
Destination :	

- d. Check that the newly created SYSnnnnn DD in the CICS output resembles the shipped sample output in *'system libraries prefix.V2R2M0.SATGSREP(ARTC410A)'*.

- e. Start an ARTT Virtual Replay session for run unit ARTP410A. Enter the ARTT transaction to display the Session Manager panel. The following Session Manager panel shows the values that you should specify.

```

ARTT Session Manager                               Applid:  applid
"
"                                                    User   :  userid
"                                                    Date   :  05/04/99
Please enter the following:                          Time   :  17:28:16

Function      :S          (S=Start, E=End)
Run Unit Name :ARTP410A
Run Unit Status :          (N=Non-transformed, Y=Transformed)
Run Mode      :V          (C=Capture, V=Virtual)
Roll Mode     :           (Y=Years, D=Days)
Roll Amount   :
Run Id        :
Destination   :

```

- f. Check that the newly created SYSnnnnn DD in the CICS output resembles the shipped sample output in '*system libraries prefix.V2R2M0.SATGSREP(ARTV410A)*'.
- g. **Note:** Complete the following actions only if you require support for DB2 under CICS.
1. If required, refresh the ARTP420C and ARTP430C programs.
  2. If required, start DSNC with the appropriate DB2 subsystem.
  3. Start an ARTT Capture session for run unit ARTP420C. Note that you need DB2 authority to execute the plans created by ARTC430C and ARTC420C because these programs read certain DB2 system tables. Enter the ARTT transaction to display the Session Manager panel. The following Session Manager panel shows the values that you should specify.

```

ARTT Session Manager                               Applid:  applid
"                                                    User   :  userid
"                                                    Date   :  05/04/99
Please enter the following:                          Time   :  17:28:16

Function      :S          (S=Start, E=End)
Run Unit Name :ARTP420C
Run Unit Status :          (N=Non-transformed, Y=Transformed)
Run Mode      :C          (C=Capture, V=Virtual)
Roll Mode     :           (Y=Years, D=Days)
Roll Amount   :
Run Id        :
Destination   :

```

4. Run the A420 transaction specifying SYSIBM in the **Creator** field, and SYSTABLES in the **Table Name** field.  
The *Session Manager* panel that follows shows the CICS A420 transaction values that you should specify.  
When you press Enter, output records are displayed, and then you press Clear to end the A420 transaction.

```

ARTM421          ARTT for DB2 Demonstration Program          Date: 05/04/99
Applid: applid                                         Time: 17:30:42

Please enter the following:

Creator       : SYSIBM
Table Name    : SYSTABLES

```

5. End the ARTT Capture session for run unit ARTP420C. The following panel illustrates the CICS ARTT transaction values that should be specified.

```

ARTT Session Manager                                     Applid: applid
                                                         User  : userid
                                                         Date:  : 05/04/99
Please enter the following:                               Time:  : 17:28:16

Function       :E          (S=Start, E=End)
Run Unit Name  :ARTP420C
Run Unit Status :          (N=Non-transformed, Y=Transformed)
Run Mode       :          (C=Capture, V=Virtual)
Roll Mode      :          (Y=Years, D=Days)
Roll Amount    :
Run Id         :
Destination    :

```

6. Check that the newly created *SYSnnnnn* DD in the CICS output resembles the shipped sample output in '*system libraries prefix.V2R2M0.SATGSREP(ARTC420C)*'.

7. Start an ARTT Virtual Replay session for run unit ARTP420C. Enter the ARTT transaction to display the *Session Manager* panel. The following *Session Manager* panel shows the values that you should specify.

```
ARTT Session Manager                               Applid: applid
                                                    User  : userid
                                                    Date:  : 05/04/99
Please enter the following:                         Time:  : 17:28:16

Function      :S          (S=Start, E=End)
Run Unit Name :ARTP420C
Run Unit Status :          (N=Non-transformed, Y=Transformed)
Run Mode      :V          (C=Capture, V=Virtual)
Roll Mode     :           (Y=Years, D=Days)
Roll Amount   :
Run Id        :
Destination   :
```

8. Check that the newly created *SYSnnnnn DD* in the CICS output resembles the shipped sample output in '*system libraries prefix.V2R2M0.SATGSREP(ARTV420C)*'





---

## Chapter 4. Starting ARTT

To use ARTT, you must first sign on to TSO/ISPF and then invoke ARTT's user interface. The first time that you invoke ARTT, an options panel is displayed, prompting you to specify user options. When you invoke ARTT thereafter, the ARTT Primary Menu is displayed.

The primary menu provides ARTT processing options. When you make a selection from the menu, panels and subpanels are displayed, which enable you to carry out your selected task.

### **This chapter describes:**

- Initial ARTT startup
- ARTT user options
- The ARTT Primary Menu
- Invoking ARTT after the initial startup.

## Initial ARTT Startup

If you are starting ARTT for the first time, complete the steps in the following list. The list includes some setup steps that are not required for subsequent startups. You can find more information about a step in the topic referenced by it.

If you are not starting ARTT for the first time, follow the steps under “Invoking ARTT after the Initial Startup” on page 51.

1. Sign on to TSO/ISPF.

An ISPF Primary Option Menu is displayed, like the one shown in Figure 8.

```
ISPF Primary Option Menu
Option ===>_____

0 Settings      Terminal and user parameters      User ID . . : Y001DP9
1 View          Display source data or listings   Time. . . : 12:52
2 Edit          Create or change source data      Terminal. . : 3278
3 Utilities     Perform utility functions        Screen. . . : 1
4 Foreground    Interactive language processing   Language. . : ENGLISH
5 Batch         Submit job for language processing  Appl ID . . : ISR
6 Command       Enter TSO or Workstation commands  TSO logon : PROJECT
7 Dialog Test   Perform dialog testing            TSO prefix: Y001DP9
8 LM Facility   Library administrator functions   System ID : Z
9 IBM Products  IBM program development products   MVS acct. : **NONE**
10 SCLM         SW Configuration Library Manager   Release . . : ISPF 4.3
11 Workplace    ISPF Object/Action Workplace
E EJES         Extended Jes Spool Display Facility

Enter X to Terminate using log/list defaults
```

Figure 8: ISPF Primary Option Menu

2. Execute the REXX EXEC that invokes the ARTT user interface for your installation.

The most common ways of doing this are by using either of the following:

- The Option line on the ISPF Primary Option Menu, described in “Using the Option Line” on page 43
- The ISPF Command Shell.

The ARTT Specify User Options panel is displayed (Figure 10 on page 45).

3. Specify your user options on the panel, and then press Enter. For information about specifying user options, see page 45.

The ARTT Primary Menu is displayed (Figure 11). You start most ARTT tasks from this panel. For details on the options that you can select from this panel, see page 48.

## Using the Option Line

As shown in Figure 8, most ISPF panels have an Option line on which you can enter commands.

**Note:** Depending on your ISPF settings, the Option line appears either at the top of the panel, between the panel title and content, or at the bottom of the panel.

To invoke the ARTT user interface, do the following:

1. On the Option line, type a command in the following format:

```
TSO EXEC 'data set name(member name)'
```

In the example above, *data set name* and *member name* identify the REXX EXEC that runs ARTT at your installation. For example:

```
TSO EXEC 'hlq.V2R2M0.SATGEXEC(ATGART)'
```

Note that *data set name* and *member name* are enclosed in single quotes.

2. After typing the command, press Enter to invoke the ARTT user interface.

The first time that you invoke ARTT, the *Specify User Options* panel is displayed. For a description of the panel and instructions on completing its fields, see page 45.

**Note:** On some ISPF panels, a Command line appears instead of the Option line. You can invoke ARTT from the Option line or the Command line on any ISPF panel.

## Using the Command Option

To invoke the ARTT user interface, do the following:

1. On the Option line on the ISPF Primary Option Menu, type 6 and then press Enter. The ISPF Command Shell is displayed (Figure 9).

```
ISPF Command Shell
Enter TSO or Workstation commands below:

===> exec 'redg.art.v2r2m0.satgexec(atgart)' _____
_____
_____

Place cursor on choice and press enter to Retrieve command

=> exec 'redg.art.v2r2m0.satgexec(atgart)'
=>
=>
=>
=>
=>
=>
=>
=>
=>
=>
```

Figure 9: ISPF Command Shell

2. On the first input line of the Command Shell, type a command in the following format:

```
EXEC 'data set name(member name)'
```

In the example above, *data set name* and *member name* identify the REXX EXEC that runs ARTT at your installation. For example:

```
EXEC 'hlq.V2R2M0.SATGEXEC(ATGART)'
```

Note that *data set name* and *member name* are enclosed in single quotes.

3. After typing the command, press Enter to invoke the ARTT user interface.

**Note:** When you press Enter, your command is saved.

The first time that you invoke ARTT, the Specify User Options panel is displayed. For a description of the panel and instructions on completing its fields, see page 45.

---

## ARTT User Options

The first time that you invoke the ARTT user interface, a Specify User Options panel (Figure 10) is displayed. On this panel you specify the parameters that enable ARTT to generate control file information and allocate log files for your programs. The panel also enables you to change the submission default and job statement information for your programs.

```
ARTT - Specify User Options
Command ==>_____

Control File Information:
Prefix . . . REDG.TESTPACK_____ VSAM Suffix . . VSAM_____
PDS Suffix . _____ Log Suffix . . . LOG

Log File Allocation Information:
Size . . . . 75_____ Units . . . . B (Blocks,Tracks,Cyls)
Delete Log . N (Y - Delete before reuse, N - Reuse existing log)

Navigation Information:
Submit default . Y (Yes, No) Edit ARTT JCL . N (Yes, No)

Job Statement Information:
. . . //Y001DP9 JOB , 'ARTT',MSGCLASS=E,NOTIFY=Y001DP9,USER=Y001DP9,_____
. . . //_____PRTY=3,REGION=4096K_____
. . . //*_____
. . . //*_____
```

*Figure 10: Specify User Options Panel*

The panel's entry and option selection fields and their attributes are described in the paragraphs that follow. Either read this section now to become familiar with the panel, or if needed, refer to this section while you are completing the steps shown on page 48.

## Control File Information

Use the fields in this group to specify parameters that enable ARTT to consistently name control file data sets for the programs that you run using ARTT. When you first open the `Specify User Options` panel, the fields in this group show your site default values.

### Prefix

Specify a prefix for the control and log file data sets that you generate while working with ARTT. The prefix can be up to 17 alphanumeric characters in length, but must contain high-level qualifiers that are valid for your installation. ARTT automatically adds `.ARTT` to whatever prefix you specify. This is a required field.

### PDS Suffix

Specify a suffix, up to eight alphanumeric characters in length, for the control file partitioned data sets that you generate while working with ARTT.

### VSAM Suffix

Specify a suffix, up to eight alphanumeric characters in length, for the VSAM control file data sets that you generate while working with ARTT. This is a required field.

### Log Suffix

Specify a suffix, up to three alphanumeric characters in length, for the log file data sets that you generate while working with ARTT. This is a required field.

## Log File Allocation Information

Use the fields in this group to specify parameters that enable ARTT to allocate log files for the programs that you run using ARTT. When you first open the `Specify User Options` panel, the fields in this group show your site default values. If no defaults are defined for your site, the fields are empty.

**Note:** You must specify information in each of the fields in this group.

### Size

Specify a number from 1 to 999999 to allocate that number of blocks, tracks, or cylinders for each log file that you generate while working with ARTT.

### Units

Specify `B`, `T`, or `C` to allocate space in blocks, tracks, or cylinders for each log file that you generate while working with ARTT.

### Delete Log

If you request that a new log file be allocated with the same name as an existing log file, you can:

- Specify `Y` to delete the existing log file before allocating the new file. Use this option with the `Size` field to increase or decrease the size of the new file, or with the `Units` field to change the units in which its space is allocated.
- Specify `N` to reuse the existing log file. In this case, the new log data overwrites the old data.

## Navigation Information

Use the field in this group to set a default for ARTT panels.

### Submit Default

Specify **Y** in this field to make **Y** (submit) the default selection in the `Submit...?` subpanels ( such as `Submit Batch Real Replay Program?`) generated by ARTT.

Specify **N** to change the default selection to **N** (do not submit).

### Edit ARTT JCL

Specify **Y** in this field to have the ARTT-generated JCL for the ARTT preparation utilities (options **C** and **S** on the ARTT `Primary Menu`) displayed for editing before submission.

Specify **N** to choose not to edit this JCL before submission.

## Job Statement Information

Use these entry fields to specify additional job statement information for ARTT-generated JCL. Keep in mind the following when entering information into the entry fields:

- In the first entry field, specify additional, valid job statement parameters, separated by commas. Do not insert a comma after the last job statement parameter.
- In each entry field that you use, replace the characters `/*` with `//` (slash, slash, blank); otherwise, your job statements are treated as comments.
- The following job statement is generated automatically:  

```
User ID JOB NOTIFY=User ID
```
- You cannot use these entry fields to specify additional job statement information for Capture, Real Replay, and Virtual Replay executions. Specify additional job statement information for these execution types in your original program execution JCL.

## Allocation Parameters

*The following fields are displayed on the `Specify User Options` panel only if your site does not use SMS.*

### Non-VSAM Unit

Use this field to specify a unit type when you create non-VSAM data sets using the ARTT user interface. If this field is displayed, you must specify a unit type.

### Non-VSAM Volume

Use this field to specify a volume serial number when you create non-VSAM data sets using the ARTT user interface. You are not required to specify a volume serial number in this field.

### VSAM Volume List

Use this field to specify one or more volume serial numbers when you create VSAM data sets using the ARTT user interface. If this field is displayed, you must specify one or more volume serial numbers.

## Initially Specifying Your User Options

To specify your user options:

1. Complete the appropriate fields in the `Specify User Options` panel (Figure 10). The entry fields and choices available on the panel are described on page 46.
2. When you have specified your user options, press Enter. ARTT begins its initialization routine during which it processes your site variables and allocates various project data sets.

A message box similar to the following is displayed for each step in the process.

```
Processing site variables
```

**Note:** When you start ARTT subsequently, a similar sequence of message boxes is displayed while ARTT allocates its data sets using the options that you just specified.

When initialization is complete, the `ARTT Primary Menu` is displayed. You start most ARTT tasks from this panel. For details on the options that you can select from the menu, see page 48.

## Changing User Options

You can change your user options at any time by selecting option `O` from the `ARTT Primary Menu`.

---

## The ARTT Primary Menu

The `ARTT Primary Menu` displays when ARTT has allocated its project data sets. You start most ARTT tasks from this panel.

```
ARTT - Primary Menu
Option
====>
_____
Select one of the following:
C - Capture setup
E - Capture execution
S - Data Transformation setup
V - Virtual Replay execution
R - Real Replay execution
O - User options
A - Administration functions
Press END to terminate
File Prefix . : REDG.TESTPACK
VSAM Suffix . : VSAM
PDS Suffix . :
Log Suffix . : LOG
Release . . . : 2.2.0
```

Figure 11: ARTT Primary Menu



On the Option line, specify the letter displayed next to the option that you want to select. For example, specify **E** to run a Capture execution for a batch program.

The choices available on the panel are described in the following paragraphs:

### **Capture setup**

Specify **C** to prepare for IMS execution. To run an IMS application under the control of ARTT in either Capture mode or Virtual Replay mode, several steps must be performed first. This option automates and leads you through this setup process.

### **Capture execution**

Specify **E** to run a batch program in Capture mode. When you select this option, ARTT captures a base execution of your program for later comparison with a proof run execution.

### **Data Transformation setup**

Specify **S** to display a menu containing data conversion options. On the menu, you can select to:

- Set up a file family, and then specify data conversion parameters for the family.
- Associate batch files with a file family.
- Generate a conversion module.
- Generate a comparison module.

For more information about data conversion, conversion modules, and comparison modules, see “Appendix B. Understanding Data Transformation” on page 301.

### **Virtual Replay program execution**

Specify **V** to run a program in Virtual Replay mode. When you select this option, ARTT executes a proof run of your program using input data that was stored in the log file during the Capture execution, and then compares the results with the output data stored in the log file.

### **Real Replay program execution**

Specify **R** to run a batch program in Real Replay mode. When you select this option, ARTT executes a proof run of your program using real input and output data sets, and then compares that data with the input and output data that was stored in the log file during the Capture execution.

**Note:** Real Replay mode is not supported for CICS, DB2, or IMS.

## User options

Specify `O` to display the `Specify User Options` panel. Use the panel to view or change the following:

- Control file information, used by ARTT to consistently name control file data sets
- Log file allocation information, used by ARTT to allocate program log files
- Navigation information, used by ARTT to set job submission defaults
- Job statement information, used by ARTT to generate JCL.

For more information about user options, see page 45.

## Administration functions

*This option is not always available.* When you start ARTT, the user interface checks your installation for an administration data set. If the user interface:

- Does not find a data set, it makes the Administration functions option available on your ARTT Primary Menu.
- Finds an administration data set, it checks that you have read access to it. If you have read access, the user interface makes the Administration functions option available on your ARTT Primary Menu. If you do not have read access to the data set, the Administration functions option is not available on your ARTT Primary Menu.

**Attention:** The `Administration` panel gives direct access to the ARTT control files. It does not check file updates for integrity or validity, and should therefore be used with caution.

Specify `A` to display the `Administration` panel. Use the panel to maintain the following:

- Date formats
- File control file
- Program control file
- Test control file
- Repository control file.

For a description of the ARTT control files, see page 265.

---

## Invoking ARTT after the Initial Startup

To invoke the ARTT user interface, complete the following steps:

1. Sign on to TSO/ISPF.  
An ISPF Primary Option Menu is displayed, similar to Figure 8 on page 42.
2. On the option line of the ISPF Primary Option Menu, specify the data set name and the member name of the REXX EXEC that invokes the ARTT user interface at your installation (for details, see “Using the Option Line” on page 43). Alternatively, use the ISPF Command Shell to specify and save the name of the REXX EXEC (for details, see page 43).
3. Press Enter to display the ARTT Primary Menu from which you can start most ARTT tasks.

For details of the options that you can select from this panel, see page 48.



## Part 2. ARTT for Standard Batch Programs

This part comprises chapters 5 to 8, which describe how to:

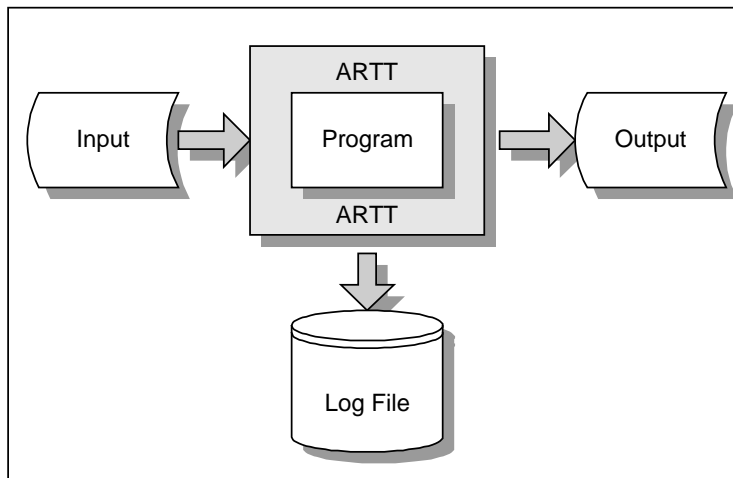
- Run an ARTT baseline execution (Capture) for a standard batch program.
- Execute a proof run using the actual input used for the baseline execution (Real Replay).
- Execute a proof run using the copy of the input stored during the baseline execution (Virtual Replay).
- Run a standard batch program in Real Replay mode or Virtual Replay mode with data transformation.



---

## Chapter 5. Capturing a Base Execution

Before reengineering begins, you need to establish your program's I/O footprint with a base execution. Run the base execution under ARTT in **Capture** mode to record your program's I/O activity, including program reads or writes, in a log file. The log file can then be used as a base for comparison with subsequent proof runs in Real Replay or Virtual Replay mode.



*Figure 12: Batch Program Running in ARTT Capture Mode*

### **This chapter describes:**

- The Capture Execute for Standard Batch panel, in which you instruct ARTT to capture your base execution. The description also includes the subpanels displayed when you select options from the panel.
- How to run a batch program in Capture mode.
- The output produced when you run a batch program in Capture mode.

---

## Preparing to Record Your Base Execution

When you record a base execution (step-by-step instructions begin on page 63), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select E, Capture execution. If your installation is configured for:

- Standard batch only, the Capture Execute for Standard Batch panel, shown in Figure 14 is displayed.
- Additional environments, such as IMS, DB2, or CICS, the Capture Execute Menu, shown in Figure 13, is displayed. In this case, type B on the command line to display the Capture Execute for Standard Batch panel.

```
ARTT - Capture Execute Menu
Option  ===>

      Select one of the following:

      B - Capture execute for Standard Batch, IMS Batch and DB2 Batch

      C - Capture Execute for CICS

      I - Capture Execute for IMS Online
```

*Figure 13: Capture Execute Menu*

*This chapter assumes an installation configured only for standard batch.*

On the Capture Execute for Standard Batch panel, specify information and options for the batch program that you want to capture. The information and options specified determine which subpanels are displayed.

Before running the batch program in Capture mode, ARTT uses the information that you specify on the panel to:

- Set up the appropriate ARTT control file records
- Allocate a log file in which to record the results of the Capture execution
- Modify the JCL to invoke ARTT properly.



## Capture Execute for Standard Batch Panel

```
ARTT - Capture Execute for Standard Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . A.JCL_____
  JCL Member . . . . DPCOBPRG
  Program Name . . . . DPCOBPRG

Specify Mandatory ARTT Run Information:
  Run ID . . . . . BASELINE
  Log ID . . . . . BASELINE

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion. . . N    (Y/N - Exclude DDnames from Capture ?)
  Run Information . . N    (Y/N - Specify Run Information Indicators ?)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 14: Capture Execute for Standard Batch Panel

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

### Specify JCL Information

Use the fields in this group to tell ARTT where to find the program that you want to run in Capture mode.

#### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library.

#### Notes:

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.A.JCL') or a partially complete library name not enclosed in quotation marks (for example, A.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

## JCL Member

Specify the name of the JCL library member containing the job stream for the batch program.

If you do not specify a member name, a list of the members in your specified JCL library is displayed in a panel similar to the one in Figure 15.

```
ARTT Member List Y001DP9.A.JCL                               Row 0001 of 0003
Command ==>_____ Scroll ==> PAGE
  Name          VV MM  Created      Changed      Size  Init  Mod  ID
_ DPCOBPRG      01.20 98/07/28 98/10/20 18:06   11   11   0 Y001DP9
_ P3350D01      01.03 98/07/28 98/09/03 12:49   11   11   0 Y001DP9
_ STCOBPRG      01.03 98/07/28 98/09/03 12:49   11   11   0 Y001DP9
**End**
```

Figure 15: JCL Library Member List

To select a member from the list, type *s* in the entry field next to the member name, and then press Enter. If the member that you selected or specified is not in the JCL library, this message is displayed in the top right corner of the panel:

```
Member does not exist in the specified JCL library.
```

## Program Name

Specify the name of the batch program that you want to run in Capture mode.

If you do not specify a program name, ARTT looks for program names when it scans the JCL job stream.

If ARTT finds:

- One program name, and you specify *Y* in the Edit JCL field, it generates Capture JCL for that program and displays the JCL for your approval.
- More than one program name or the same program name used more than once, or if you specify the program name incorrectly, a Program Selection panel is displayed containing a list of programs from which you can select one for processing.

```
ARTT - Program Selection                                     Row 1 to 3 of 3
Command ==>_____ Scroll ==> PAGE

Program selection list (in order of execution)

S  Program Step      Proc      Procstep

_  DPCOBPRG STEP1
_  P3350D01 STEP1
_  STCOBPRG STEP1

***** Bottom of data *****
```

Figure 16: Program Selection Panel

Specify one of the following in the entry field next to the program name, and then press Enter:

- S** Select a program for processing. When you press Enter, ARTT places a `Y` next to your selected program.
- R** Deselect the program.
- V** View the step JCL for the program.

To process your selected program, press PF3. The `Program Selection` panel closes, and you are returned to the `Capture Execute for Standard Batch` panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the `Capture Execute for Standard Batch` panel:

`Program not found.`

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your program in Capture mode.

### Run ID

Specify a run identifier for this execution of the program in Capture mode. The identifier enables ARTT to set up and identify unique records for this Capture execution in the Program control file and the Test control file. It can be alphabetic, numeric, or a combination of the two, up to eight characters in length; however, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

`Invalid Run ID.`

### Log ID

Specify an identifier that ARTT can use to construct a unique log file name for this Capture execution. The identifier can be alphabetic, numeric, or a combination of the two, and up to eight characters in length; however, it cannot start with a numeric character or contain blanks. The following example shows how the log file name is constructed:

`Prefix.ARTT.ProgramName.LogID.LogSuffix`

*Prefix* is the high-level qualifier, and *LogSuffix* is the log file suffix that you specified when you set up your user options. For more information about specifying the log suffix, see page 45. You specified the *ProgramName* in the similarly named entry field described on page 58.

You must specify a log identifier. If you do not, this message is displayed in the top right corner of the panel:

`Invalid Log ID.`

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Capture execution.

### Edit JCL

Specify **N** if you do not want to browse or edit the ARTT-generated JCL for this Capture execution.

Accept the default value (**Y**) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press Enter on the `Capture Execute for Standard Batch` panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

### Audit Exclusion

Specify **Y** to name up to 10 DD statements for files to be excluded from the log that ARTT generates for a Capture execution. For example, you may want to exclude certain DD statements if you know that the data content of their files varies from run to run in a random, but acceptable way.

Accept **N**, the default value, to run a Capture execution without specifying any DD statement exclusions.

**Note:** If you accept the default value (**N**), and this execution is a re-run of a previous Capture execution in which you specified DD statement exclusions, those exclusions will be effective for this execution.

Specify the DD statements that you want to exclude on a Specify Exclusion/Limitation Details panel (Figure 17) , which is displayed after you type Y in this field, and then press Enter.

```

ARTT - Specify Exclusion/Limitation Details
Command ==>_____

Program Name . : DPCOBPRG      Run ID . : BASELINE      Log ID . : BASELINE
Log File Name . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

Audit Exclude List:
  DDname 1 . .                DDname 2 . .
  DDname 3 . .                DDname 4 . .
  DDname 5 . .                DDname 6 . .
  DDname 7 . .                DDname 8 . .
  DDname 9 . .                DDname 10 .

Press ENTER to continue or END/CANCEL to cancel

```

Figure 17: Specify Exclusion/Limitation Details Panel (Capture)

To exclude a DD statement, type its ddname in the next available **Audit Exclude List** entry field, and then press Enter. The exclusion parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type Can on the command line, and then press Enter.

**Note:** ARTT automatically excludes any DD statement allocated to DUMMY, and statements with the following ddnames:

ATGSNAP	IEFRDER2	SYSDUMP
CEEDUMP	IMS	SYSTRACE
DFSVSAMP	PLIDUMP	SYSDUMP
IDCAMS	SORTWKnn	
IEFRDER	SYSABEND	

## Run Information

Specify **Y** to change the default value of one or more run information parameters for the Capture execution. You change run information parameters on a Specify Run Information panel (Figure 18), which is displayed after you press Enter on the Capture Execute for Standard Batch panel.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

```
ARTT - Specify Run Information
Command ==>>>_____

Program Name . : DPCOBPRG   Run ID . : BASELINE   Log ID . : BASELINE
Log File Name . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

Signoff Indicators :
Dev Signoff . . . N (Y/N)
Ops Signoff . . . N (Y/N)
Audit Signoff . . N (Y/N)
Captured . . . . N (Y/N)

Virtual Status Indicators:          Real Status Indicators:
Correct Today . . N (Y/N)          Correct Today . . N (Y/N)
Correct 2000 . . N (Y/N)          Correct 2000 . . N (Y/N)
Correct Beyond . N (Y/N)          Correct Beyond . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 18: Specify Run Information Panel*

For each parameter you want to change, overwrite the default value N with Y (Yes), and then press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type Can on the command line, and then press Enter.

---

## How to Record a Base Execution

If you need information on the values that you can specify in, or select from, the `Capture Execute for Standard Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 56.

**Note:** Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one instance of a program at the same time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `E` on the command line of the ARTT `Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Capture Execute for Standard Batch` panel is displayed (this chapter assumes an installation configured only for standard batch, as described on page 56).

3. Specify information, and select processing options for the program for which you are capturing data, and then press Enter. For panel details, see page 56.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Capture execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

4. If you submit a Capture execution using a log file that already exists, a `Duplicate Log File` subpanel is displayed like the one that follows:

```
Command ==>>> _____

Log File . . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

The above log already exists and will be overwritten
during this capture run.

Do you wish to overwrite this file ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel.
```

Specify `Y`, and then press Enter to overwrite the log file, or specify `N` to close the subpanel and return to the `Capture Execute for Standard Batch` panel where you can specify a new log file name.

5. If you specified Y in the **Edit JCL** field, the Capture JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Capture Program subpanel, like the one in the following step.
6. When the Submit Batch Capture Program subpanel, similar to the one that follows, is displayed, specify Y, and then press Enter to submit the Capture execution JCL for processing. Alternatively, specify N, and then press Enter to return to the Capture Execute for Standard Batch panel without submitting the JCL.

```

Command ==>_____

Submit job ? . . . Y (Y to submit, N to cancel)

Press ENTER to continue or END/CANCEL to cancel.

```

## Reading the Capture Execution Summary Report

When you successfully complete a Capture execution for a batch program, ARTT produces a Capture Execution Summary report containing the result of the Capture execution. The report (like the example in Figure 19) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG
ATGA0705I Program DPCOBPRG executed with:
ATGA0706I   Run Mode = CAPTURE
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task DPCOBPRG attached with:
ATGA0031I   Parameters = " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DPCOBPRG completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes  Inputs  Outputs  Diffs    Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT  N    1    1    0    9    0    0            Y001DP9.Y001DP9H.JOB27946.D000000B.?
ATGA0715I F1      N    1    1    8    0    0    0            Y001DP9.A.DATA1
ATGA0715I F2      N    1    1    0    8    0    0            Y001DP9.A.DATA2
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****

```

Figure 19: Capture Execution Summary Report for Standard Batch



The report shows:

- The names of the ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - ARMS control file
  - Conversion module library
  - Compare module library
  - Test control file.

For information about ARTT control files, see page 265.

- The name of the Log file as specified in the Log ID field on the Capture Execute for Standard Batch panel.
- The following run parameters:
  - Run Mode (in this case, CAPTURE)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the Capture Execute for Standard Batch panel.

The report also shows the following information for each input and output file not specifically excluded from the Capture execution:

<b>Name</b>	Symbolic name of the DD statement for each file with I/O activity in the Capture execution.
<b>S</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Capture execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Capture execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Capture execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Capture execution.
<b>Diffs</b>	Always 0 for a Capture execution.
<b>Shown</b>	Always 0 for a Capture execution.
<b>ConvMod</b>	Name of the conversion module for the file. Not applicable for a Capture execution.
<b>CompMod</b>	Name of the comparison module for the file. Not applicable for a Capture execution.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Capture execution.

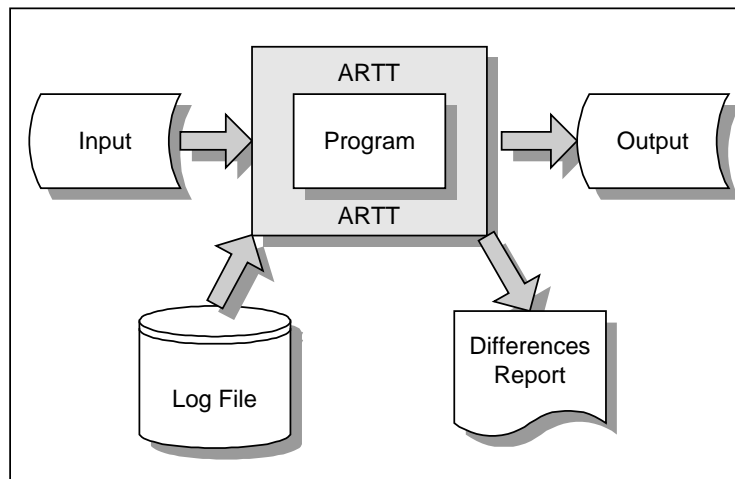


---

## Chapter 6. Executing a Proof Run Using Actual Input

After reengineering or modifying your program, you need to verify that, using the same input, the program works exactly as it did before it was modified. You can do this by executing a proof run in **Real Replay** mode.

In this mode, ARTT monitors the I/O events and data for the Replay run and compares them with the events and data recorded in the log file for the program's base run in Capture mode. If there are differences between the two runs, ARTT details the differences in its output report.



*Figure 20: Batch Program Running in ARTT Real Replay Mode*

A proof run in Real Replay mode verifies that your reengineered program works correctly when using the same, present-day data as was used during the base execution. However, how can you verify that it will work just as well in the future?

During your Real Replay execution, you can use one or more of ARTT's data conversion features to verify that your program will work correctly in the future:

- Date Rolling automatically ages or rejuvenates dates in input and output files, which enables you to test your program with future dates.
- Conversion modules instruct ARTT to allow expected differences during the Capture/Replay comparison.
- Comparison modules instruct ARTT to exclude specific data from the Capture/Replay comparison, which is sometimes useful if you cannot resolve the difference with a conversion module, for example a time stamp.

For instructions on using Date Rolling and generating and using conversion and comparison modules in Real Replay mode, see "Chapter 8. Executing a Proof Run with Data Transformation".

**This chapter describes:**

- The Real Replay Execute for Standard Batch panel, in which you instruct ARTT to execute your proof run using real input. The description also includes the subpanels displayed when you select options from the panel.
- How to run a batch program in Real Replay mode.
- How to simulate past or future dates in Real Replay mode.
- The output produced when you run a batch program in Real Replay mode.

---

## Preparing to Execute Your Proof Run

When you execute your proof run (step-by-step instructions begin on page 75), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select R, Real Replay execution to display the Real Replay Execute for Standard Batch panel, shown in Figure 21. On this panel, specify information and options for the batch program that you want to run with real input data. The information and options specified determine which subpanels are displayed.

Before running your batch program in Real Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the program's log file.

### Real Replay Execute for Standard Batch Panel

```
ARTT - Real Replay Execute for Standard Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . A.JCL_____
  JCL Member . . . . DPCOBPRG
  Program Name . . . . DPCOBPRG

Specify Mandatory ARTT Run Information:
  Run ID . . . . . BASELINE
  Log ID . . . . . BASELINE

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion /
    Report Limit . . . . N    (Y/N - Specify Exclusion/Limitation details ?)
  Run Information . . . . N   (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . . N    (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 21: Real Replay Execute for Standard Batch Panel*

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

## Specify JCL Information

Use the fields in this group to tell ARTT where to find the program that you want to run in Real Replay mode.

### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

```
Invalid Library.
```

### Notes:

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.A.JCL') or a partially complete library name not enclosed in quotation marks (for example, A.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

### JCL Member

Specify the name of the JCL library member containing the job stream for the batch program.

If you do not specify a member name, a list of the members in your specified JCL library is displayed (see Figure 15 on page 58). To select a member from the list, type S in the entry field next to the member name, and then press Enter.

If the member that you selected or specified is not in the JCL library, this message is displayed in the top right corner of the panel:

```
Member does not exist in the specified JCL library.
```

### Program Name

Specify the name of the batch program that you want to run in Real Replay mode.

If you do not specify a program name, ARTT scans the JCL job stream for program names.

If ARTT finds:

- One program name, and you specify Y in the Edit JCL field, it generates Real Replay JCL for that program and displays the JCL for your approval.
- More than one program name, or the same name used more than once, or if you specify the program name incorrectly, a Program Selection panel is displayed containing a list of programs from which you can select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

**S** Select a program for processing. When you press Enter, ARTT places a Y next to your selected program.

**R** Deselect the program.

**V** View the step JCL for the program.

To process your selected program, press PF3. The Program Selection panel closes, and you are returned to the Real Replay Execute for Standard Batch panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the Real Replay Execute for Standard Batch panel:

```
Program not found.
```

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your program in Real Replay mode.

### Run ID

Specify the run identifier that you used when the program ran in Capture mode. The Run ID enables ARTT to identify the correct records for this Real Replay execution in the Program control file and the Test control file.

You must specify a run identifier. If you do not, the Run and Log IDs panel is displayed:

```
Row 1 to 1 of 1
Command ==>>>_____

Select the required Run ID/Log ID
pair from the list below:
-----
Option  Run ID      Log ID
-----
_       BASELINE    BASELINE
***** Bottom of data *****
```

*Figure 22: Run and Log IDs Panel*

Select from the panel by typing S next to the appropriate Run ID, and then press Enter to return to the Real Replay Execute for Standard Batch panel.

## Log ID

Specify the log identifier that you used when the program ran in Capture mode. The Log ID enables ARTT to ensure that the Real Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, the `Run and Log IDs` panel is displayed (Figure 22). Select from the panel by typing `S` next to the appropriate Log ID, and then press `Enter` to return to the `Real Replay Execute for Standard Batch` panel.

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Real Replay execution.

### Edit JCL

Specify `N` if you do not want to browse or edit the ARTT-generated JCL for this Real Replay execution.

Accept the default value (`Y`) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press `Enter` on the `Real Replay Execute for Standard Batch` panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.



### Audit Exclusion/Report Limit

Specify Y, and then press Enter to display a Specify Exclusion/Limitation Details panel (Figure 23).

Accept the default value (N) to have ARTT generate Real Replay JCL without changing the DD statement exclusions, or without specifying any report limitation details.

```
ARTT - Specify Exclusion/Limitation Details
Command ==>_____

Program Name . : DPCOBPRG    Run ID . : BASELINE    Log ID . : BASELINE
Log File Name . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

Audit Exclude List:
  DDname 1 . . _____    DDname 2 . . _____
  DDname 3 . . _____    DDname 4 . . _____
  DDname 5 . . _____    DDname 6 . . _____
  DDname 7 . . _____    DDname 8 . . _____
  DDname 9 . . _____    DDname 10 . _____

Report Limitation List:
  DD1 . .          Limit 1 . .          DD2 . .          Limit 2 . .
  DD3 . .          Limit 3 . .          DD4 . .          Limit 4 . .
  DD5 . .          Limit 5 . .          DD6 . .          Limit 6 . .
  DD7 . .          Limit 7 . .          DD8 . .          Limit 8 . .
  DD9 . .          Limit 9 . .          DD10 .          Limit 10 .

Press ENTER to continue or END/CANCEL to cancel
```

Figure 23: Specify Exclusion/Limitation Details Panel (Real and Virtual Replay)

Use the `Specify Exclusion/Limitation Details` panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.

To exclude a statement, type its `ddname` in the next available `Audit Exclude List` entry field.

- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.

To specify the maximum number of differences for up to 10 DD statements:

1. Type the `ddname` of the DD statement in the next available **Report Limitation List** entry field. For example, `DD1` in Figure 23.
2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, `Limit 1` in Figure 23.
3. Press Enter to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type `Can` on the command line, and then press Enter.

### Run Information

Specify `Y` to change the default value of one or more run information parameters for the Real Replay execution.

You change run information parameters on a `Specify Run Information` panel (Figure 18 on page 62), which is displayed after you press Enter on the `Real Replay Execute for Standard Batch` panel.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

For each parameter you want to change, overwrite the default `N` with `Y` (Yes), and then press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

### Data Change

Specify `Y`, and then press Enter to display the `Specify Transformation Criteria` panel (Figure 33 on page 99) on which you can change one or more of the following for this Real Replay execution:

- The program's Roll Mode. Specify either `Y` (Year) or `D` (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.

- The Program Status. Specify whether the program is transformed (Y) or non-transformed (N).
- The Source Status. Specify whether the source data is transformed (Y) or non-transformed (N).

To simulate past or future dates, you must, in addition to specifying roll information on this panel, complete some setup steps and create a conversion module before you execute your program. For instructions on preparing for data transformation, see “Chapter 8. Executing a Proof Run with Data Transformation.”

---

## How to Execute a Proof Run Using Actual Input

If you need information on the values that you can specify in, or select from, the `Real Replay Execute for Standard Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 69.

**Note:** Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one instance of a program at the same time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `R` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Real Replay Execute for Standard Batch` panel is displayed.

3. Specify information, and select processing options for the program for which you are executing the Real Replay run, and then press Enter. For panel details, see page 69.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Real Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

4. If you specified `Y` in the **Edit JCL** field, the Real Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Real Replay Program subpanel like the one in the following step.  
If you did not choose to edit the Real Replay JCL, a Submit Batch Real Replay Program subpanel is displayed like the one that follows:
5. When the Submit Batch Real Replay Program subpanel, similar to the one that follows, is displayed, specify `Y`, and then press Enter to submit the Real Replay execution JCL for processing. Alternatively, specify `N`, and then press Enter to return to the Real Replay Execute for Standard Batch panel without submitting the JCL.

```
Command ==>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

## Reading the Real Replay Execution Summary Report

When you successfully complete a Real Replay execution for a batch program, ARTT produces a Real Replay Execution Summary report containing the result of the Real Replay execution. The report (like the examples that follow) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

The information shown in the report varies depending on whether ARTT detected any difference between the Real Replay execution and the Capture execution.

### Execution Summary Report without Differences

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG
ATGA0705I Program DPCOBPRG executed with:
ATGA0706I   Run Mode = REAL
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task DPCOBPRG attached with:
ATGA0031I   Parameters = " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DPCOBPRG completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT  N    1    1     0     9     0     0           Y001DP9.Y001DP9I.JOB30740.D000000B.?
ATGA0715I F1      N    1    1     8     0     0     0           Y001DP9.A.DATA1
ATGA0715I F2      N    1    1     0     8     0     0           Y001DP9.A.DATA2
ATGA0712I -----
ATGA0718I I/O Activity from Capture Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT  N    1    1     0     9     0     0           Y001DP9.Y001DP9H.JOB27946.D000000B.?
ATGA0715I F1      N    1    1     8     0     0     0           Y001DP9.A.DATA1
ATGA0715I F2      N    1    1     0     8     0     0           Y001DP9.A.DATA2
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****

```

*Figure 24: Real Replay Execution Summary Report without Differences for Standard Batch*

The report shows:

- The names of the ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - ARMS control file
  - Conversion module library
  - Compare module library (when used)
  - Test control file.

For information about ARTT control files, see page 265.

- The name of the log file as specified when this program ran in Capture mode.
- The following run parameters:
  - Run Mode (in this case, REAL)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the `Real Replay Execute for Standard Batch` panel.

The report also shows the following information for each input and output file not specifically excluded from the Real Replay execution:

<b>Name</b>	Symbolic name of the DD statement for each file with I/O activity in the Real Replay execution.
<b>S</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Real Replay execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Real Replay execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Real Replay execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Real Replay execution.
<b>Diffs</b>	Number of differences detected.
<b>Shown</b>	Number of differences shown.
<b>ConvMod</b>	Name of the conversion module for the file. For more information about conversion modules, see “About Transforming Data” on page 94.
<b>CompMod</b>	Name of the comparison module for the file. For more information about conversion modules, see “About Transforming Data” on page 94.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Real Replay execution.

For comparison, the I/O activity report from the Capture execution is also shown.

## Execution Summary Report with Differences

When the statistics in the Replay I/O Activity section of the report differ from the statistics in the Capture I/O Activity section, the differences are reported as shown in Figure 25 on page 80. The two I/O activity summaries are displayed, but with hexadecimal output for the fields of records that differ.

For each unmatched event, or where an event matches, but the data or return code does not, the report shows information for the data record that was read or written on Replay (indicated in the report by the letter C), and the expected data log record (indicated in the report by the letter L). ARTT derives the expected data log record from the log record stored during Capture, to which it applies relevant transformation criteria. The following information is shown for each difference:

<b>Ddname</b>	Name of the DD statement for which the request was made.
<b>REQNO</b>	Relative request number for all files.
<b>FILE REQNO</b>	Relative request number for this file.
<b>TYPE</b>	Type of request, for example, Get or Put.
<b>RC</b>	Return code for the request.
<b>FDBK</b>	Feedback code for the request.
<b>LEN</b>	Length of the record.
<b>Data</b>	Hexadecimal copy of the data record and the log record with the differences underlined with asterisks.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG
ATGA0705I Program DPCOBPRG executed with:
ATGA0706I   Run Mode = REAL
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task DPCOBPRG attached with:
ATGA0031I   Parameters = " " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ART V2.R2.M0 -- Differences Report                               Date 15/02/1999   Time 14:28:15   Page 0002
Copyright (C) 1996, 1997, 1998 National Westminster Bank, Plc., All Rights Reserved.

-----
F1      C -----  REQNO=00000007 FILE REQNO=00000002 TYPE=GET      RC=00000000 FDBK=00000000 LEN=0080
F1      L -----  REQNO=00000007 FILE REQNO=00000002 TYPE=GET      RC=00000000 FDBK=00000000 LEN=0080

F1      C 0000    F0F1D6D7 C5D54040 F7F7F1F0 F2F1E6C9 D3D2C9D5 E240D1C1 D4C5E240 40404040 01OPEN 771021WILKINS JAMES
F1      L 0000    F0F1D6D7 C5D54040 F7F7F1F0 F2F1E6C9 D3D2C9D5 E240D1C1 D4C5E240 40404040 01OPEN 771021WILKINS JAMES
F1      C 0020    4040F7F2 40C8C9C7 C840E2E3 6B40E6C1 E3C6D6D9 C46B40C8 D7F340F7 F9E74040 72 HIGH ST, WATFORD, HP3 79X
F1      L 0020    4040F7F2 40C8C9C7 C840E2E3 6B40E6C1 E3C6D6D9 C46B40C8 D7F340F7 F9E74040 72 HIGH ST, WATFORD, HP3 79X

F1      C 0040    40404040 F0F1F0F1 F9F24040 40404040                                010192
F1      L 0040    40404040 F0F1F0F1 F8F24040 40404040                                010182
                                     *
-----
F2      C -----  REQNO=00000008 FILE REQNO=00000003 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0080
F2      L -----  REQNO=00000008 FILE REQNO=00000003 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0080

F2      C 0000    F0F1D6D7 C5D54040 F7F7F1F0 F2F1E6C9 D3D2C9D5 E240D1C1 D4C5E240 40404040 01OPEN 771021WILKINS JAMES
F2      L 0000    F0F1D6D7 C5D54040 F7F7F1F0 F2F1E6C9 D3D2C9D5 E240D1C1 D4C5E240 40404040 01OPEN 771021WILKINS JAMES

F2      C 0020    4040F7F2 40C8C9C7 C840E2E3 6B40E6C1 E3C6D6D9 C46B40C8 D7F340F7 F9E74040 72 HIGH ST, WATFORD, HP3 79X
F2      L 0020    4040F7F2 40C8C9C7 C840E2E3 6B40E6C1 E3C6D6D9 C46B40C8 D7F340F7 F9E74040 72 HIGH ST, WATFORD, HP3 79X

F2      C 0040    40404040 F0F1F0F1 F9F24040 40404040                                010192
F2      L 0040    40404040 F0F1F0F1 F8F24040 40404040                                010182
                                     *
-----
ATGA0040I Program DPCOBPRG completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens  Closes   Inputs  Outputs   Diffs   Shown  ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT   N      1      1        0        9        0        0                Y001DP9.Y001DP9J.JOB31606.D000000B.?
ATGA0715I F1       N      1      1        8        0        1        1                Y001DP9.A.DATA1
ATGA0715I F2       N      1      1        0        8        1        1                Y001DP9.A.DATA2
ATGA0712I -----
ATGA0718I I/O Activity from Capture Run:
ATGA0714I Name      s  Opens  Closes   Inputs  Outputs   Diffs   Shown  ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT   N      1      1        0        9        0        0                Y001DP9.Y001DP9H.JOB27946.D000000B.?
ATGA0715I F1       N      1      1        8        0        0        0                Y001DP9.A.DATA1
ATGA0715I F2       N      1      1        0        8        0        0                Y001DP9.A.DATA2
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****

```

Figure 25: Real Replay Execution Summary Report with Differences for Standard Batch



---

## Chapter 7. Executing a Proof Run Using Virtual Input

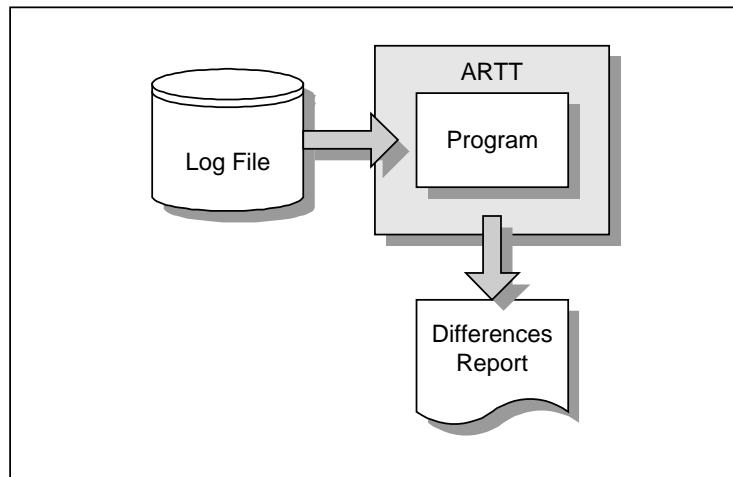
After reengineering or modifying your program, you need to verify that, using the same input, the program works exactly as it did before it was modified. You can do this by executing a proof run in Real Replay mode, as discussed in “Chapter 6. Executing a Proof Run Using Actual Input” on page 67, or you can execute a proof run in **Virtual Replay** mode.

The difference between Real Replay mode and Virtual Replay mode is that in Virtual Replay, ARTT uses *virtual* input. It takes its input directly from the log file generated by the program’s Capture execution. In addition, after comparing the Virtual Replay output with the log file, ARTT discards the output, unless the specified output data set is a spool file or an inline data set. As a result, the output data sets remain unchanged.

Using input from the log file, ARTT monitors the I/O events and data for the Virtual Replay run and compares them with the events and data recorded in the log file for the program’s base run in Capture mode. If there are differences between the two runs, ARTT details the differences in its output report.

One advantage of Virtual Replay mode is that it can reduce testing setup time; for example, the time it takes to reset databases between tests. You are then able to complete more tests, and complete them more quickly, thereby reducing costs.

Also, because the Virtual Replay proof run is independent of the real data sets, you can run testing on systems other than the production system.



*Figure 26: Batch Program Running in ARTT Virtual Replay Mode*

During your Virtual Replay execution, you can use one or more of ARTT’s data conversion features to verify that your program will work correctly in the future:

- Date Rolling automatically ages or rejuvenates dates in input and output files, which enables you to test your program with future dates.
- Conversion modules instruct ARTT to allow expected differences during the Capture/Replay comparison.
- Comparison modules instruct ARTT to exclude specific data from the Capture/Replay comparison, which is sometimes useful if you cannot resolve the difference with a conversion module, for example a time stamp.

For instructions on using Date Rolling and generating and using conversion and comparison modules in Virtual Replay mode, see “ Chapter 8. Executing a Proof Run with Data Transformation.”

**This chapter describes:**

- The Virtual Replay Execute for Standard Batch panel, in which you instruct ARTT to execute your proof run using virtual input. The description also includes the subpanels displayed when you select options from the panel.
- How to run a batch program in Virtual Replay mode.
- How to simulate past or future dates in Virtual Replay mode.
- The output produced when you run a batch program in Virtual Replay mode.

---

## Preparing to Execute Your Proof Run

When you execute your proof run (step-by-step instructions begin on page 89), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select V, Virtual Replay execution. If your installation is configured for:

- Standard batch only, the Virtual Execute for Standard Batch panel, shown in Figure 28, is displayed.
- Additional environments, such as IMS, DB2, or CICS, the Virtual Replay Execute Menu, shown in Figure 27 is displayed. In this case, type B on the command line to display the Virtual Replay Execute for Standard Batch panel.

*This chapter assumes an installation configured only for standard batch.*

```
ARTT - Virtual Replay Execute Menu
Option  ===>_____

      Select one of the following:

          B - Virtual replay execute for Standard Batch, IMS Batch and DB2 Batch

          C - Virtual replay execute for CICS

          I - Virtual replay execute for IMS Online
```

*Figure 27: Virtual Replay Execute Menu (Installation Configured for IMS, CICS and DB2)*

On the Virtual Replay Execute for Standard Batch panel, specify information and options for the batch program that you want to run using virtual (stored) input data. The information and options specified determine which subpanels are displayed.

Before running your batch program in Virtual Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the program's log file.

## Virtual Replay for Standard Batch Panel

```
ARTT - Virtual Replay Execute for Standard Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . A.JCL_____
  JCL Member . . . . DPCOBPRG
  Program Name . . . . DPCOBPRG

Specify Mandatory ARTT Run Information:
  Run ID . . . . . BASELINE
  Log ID . . . . . BASELINE

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion /
    Report Limit . . . N      (Y/N - Specify Exclusion/Limitation details ?)
  Run Information . . . N      (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . N      (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 28: Virtual Replay Execute for Standard Batch Panel

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

### Specify JCL Information

Use the fields in this group to tell ARTT where to find the program that you want to run in Virtual Replay mode.

#### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library.

**Notes:**

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.A.JCL') or a partially complete library name not enclosed in quotation marks (for example, A.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

**JCL Member**

Specify the name of the JCL library member containing the job stream for the batch program.

If you do not specify a member name, a list of the members in your specified JCL library is displayed (see Figure 15 on page 58). To select a member from the list, type S in the entry field next to the member's name and then press Enter.

If the member that you selected or specified is not in the JCL library, this message is displayed in the top right corner of the panel:

```
Member does not exist in the specified JCL library.
```

**Program Name**

Specify the name of the batch program that you want to run in Virtual Replay mode.

If you do not specify a program name, ARTT scans the JCL job stream for program names.

If ARTT finds:

- One program name, and you specified Y in the Edit JCL field, it generates Virtual Replay JCL for that program and displays the JCL for your approval.
- More than one program name, or the same name used more than once, or if you specify the program name incorrectly, a Program Selection panel is displayed containing a list of programs from which you can select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

**S** Select a program for processing. When you press Enter, ARTT places a Y next to your selected program.

**R** Deselect the program.

**V** View the step JCL for the program.

To process your selected program, press PF3. The Program Selection panel closes, and you are returned to the Virtual Replay Execute for Standard Batch panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the Virtual Replay Execute for Standard Batch panel:

```
Program not found.
```

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your program in Virtual Replay mode.

### Run ID

Specify the run identifier that you used when the program ran in Capture mode. The Run ID enables ARTT to identify the correct records for this Virtual Replay execution in the Program control file and the Test control file.

You must specify a run identifier. If you do not, a Run and Log IDs panel is displayed, like the one that follows:

```
Row 1 to 1 of 1
Command ==>>>_____

Select the required Run ID/Log ID
pair from the list below:
-----
Option  Run ID      Log ID
-----
_       BASELINE    BASELINE
***** Bottom of data *****
```

Select from the panel by typing `S` next to the appropriate Run ID, and then press Enter. If you have specified `Y` in any of the optional information fields (see *Specify Optional Information* in this topic), an appropriate panel is displayed; otherwise, a Submit Batch Virtual Replay Program subpanel is displayed.

### Log ID

Specify the log identifier that you used when the program ran in Capture mode. The Log ID enables ARTT to ensure that the Virtual Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, the Run and Log IDs panel is displayed. Select from the panel by typing `S` next to the appropriate Log ID, and then press Enter. If you have specified `Y` in any of the optional information fields, an appropriate panel is displayed; otherwise, a Submit Batch Virtual Replay Program subpanel is displayed.

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Virtual Replay execution.

### Edit JCL

Specify `N` if you do not want to browse or edit the ARTT-generated JCL for this Virtual Replay execution.

Accept the default value (`Y`) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press Enter in the Virtual Replay Execute for Standard Batch panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

### **Audit Exclusion/Report Limit**

Specify `Y`, and then press `Enter` to display a `Specify Exclusion/Limitation Details` panel (see Figure 23 on page 73).

Accept the default value (`N`) to have ARTT generate Virtual Replay JCL without changing the DD statement exclusions, or without specifying any report limitation details.

Use the `Specify Exclusion/Limitation Details` panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.

To exclude a statement, type its ddname in the next available Audit Exclude List entry field.

- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.

To specify the maximum number of differences for up to 10 DD statements:

1. Type the ddname of the DD statement in the next available **Report Limitation List** entry field. For example, `DD1` in Figure 23.
2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, `Limit 1` in Figure 23.
3. Press `Enter` to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press `PF3`, or type `Can` on the command line, and then press `Enter`.

### **Run Information**

Specify `Y` on the `Virtual Replay Execute for Standard Batch` panel, and then press `Enter` to display a `Specify Run Information` panel (Figure 18 on page 62).

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

For each parameter you want to change, overwrite the default `N` with `Y` (Yes), and then press `Enter`. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press `PF3`, or type `Can` on the command line, and then press `Enter`.

### **Data Change**

Specify `Y`, and then press then Enter to display a `Specify Transformation Criteria` panel (Figure 33 on page 99) on which you can change one or more of the following for this Virtual Replay execution:

- The program's Roll Mode. Specify either `Y` (Year) or `D` (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Program Status. Specify whether the program is transformed (`Y`) or non-transformed (`N`).
- The Source Status. Specify whether the source data is transformed (`Y`) or non-transformed (`N`).

To simulate past or future dates, you must, in addition to specifying roll information on this panel, complete some setup steps and create a conversion module before you execute your program. For instructions on preparing for data transformation, see “Chapter 8. Executing a Proof Run with Data Transformation.”



---

## How to Execute a Proof Run Using Virtual Input

If you need information on the values that you can specify in, or select from, the `Virtual Replay Execute for Standard Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 83.

**Note:** Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one program at a time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `v` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Virtual Replay Execute for Standard Batch` panel is displayed. For panel details, see page 84. (This chapter assumes an installation configured only for standard batch, as described on page 83.)

3. Specify information, and select processing options for the program for which you are executing the Virtual Replay run, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

4. If you specified `y` in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a `Submit Batch Virtual Replay Program` subpanel like the one in the following step.
5. When a `Submit Batch Virtual Replay Program` subpanel, like the one that follows, is displayed, specify `Y`, and then press Enter to submit the Virtual Replay execution JCL for processing. Alternatively, specify `N`, and then press Enter to return to the `Virtual Replay Execute for Standard Batch` panel without submitting the JCL.

```
Command ==>>> _____

Submit job ? . . . Y (Y to submit, N to cancel)

Press ENTER to continue or END/CANCEL to cancel.
```

## Reading the Virtual Replay Execution Summary Report

When you successfully complete a Virtual Replay execution for a batch program, ARTT produces a Virtual Replay Execution Summary report containing the result of the Virtual Replay execution. The report (like the example in Figure 29) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

The information shown in the report varies depending on whether ARTT detected any differences between the Virtual Replay execution and the Capture execution.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG
ATGA0705I Program DPCOBPRG executed with:
ATGA0706I   Run Mode = VIRTUAL
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task DPCOBPRG attached with:
ATGA0031I   Parameters = " " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DPCOBPRG completed with Return Code = 0.
ATGA0712I -----
-
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
-
ATGA0715I SYSOUT  N    1    1     0     9     0     0           Y001DP9.Y001DP9K.JOB32540.D000000B.?
ATGA0715I F1      N    1    1     8     0     0     0           Y001DP9.A.DATA1
ATGA0715I F2      N    1    1     0     8     0     0           Y001DP9.A.DATA2
ATGA0712I -----
-
ATGA0718I I/O Activity from Capture Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
-
ATGA0715I SYSOUT  N    1    1     0     9     0     0           Y001DP9.Y001DP9H.JOB27946.D000000B.?
ATGA0715I F1      N    1    1     8     0     0     0           Y001DP9.A.DATA1
ATGA0715I F2      N    1    1     0     8     0     0           Y001DP9.A.DATA2
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data*****

```

Figure 29: Virtual Replay Execute for Standard Batch Summary Report

This report shows:

- The names of ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - ARMS control file
  - Conversion module library
  - Comparison module library (where used)
  - Test control file.

For more information about ARTT control files, see page 265.

- The name of the log file as specified when this program ran in Capture mode.
- The following run parameters:
  - Run Mode (in this case, VIRTUAL)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the `Virtual Replay Execute for Standard Batch` panel.

The report also shows the following information for each input and output file not specifically excluded from the Virtual Replay execution:

<b>Name</b>	Symbolic name of the DD statement for each file with I/O activity in the Virtual Replay execution.
<b>S</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Virtual Replay execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Virtual Replay execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Virtual Replay execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Virtual Replay execution.
<b>Diffs</b>	Number of differences detected.
<b>Shown</b>	Number of differences shown.
<b>ConvMod</b>	Name of the conversion module for the file. For more information about conversion modules, see “About Transforming Data” on page 94.
<b>CompMod</b>	Name of the comparison module for the file. For more information about conversion modules, see “About Transforming Data” on page 94.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Virtual Replay execution.

For comparison, the I/O activity report from the Capture execution is also shown.

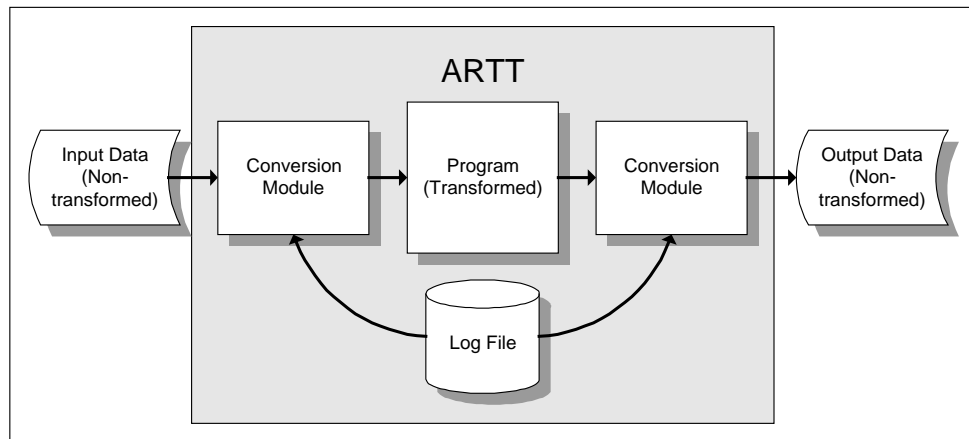


---

## Chapter 8. Executing a Proof Run with Data Transformation

After you have captured the baseline information for your standard batch program, you can transform the data input to, or output from, a Real Replay or Virtual Replay run by:

- Changing date formats (for example, from mm/dd/yy to mm/dd/yyyy)
- Rolling dates forward (aging them), or backward (rejuvenating them).



*Figure 30: Conversion Modules in Use during Real Replay of a Standard Batch Program*

To transform the data, execute your Real Replay or Virtual Replay run using a conversion module to control which date formats are changed and which dates are rolled.

### **This chapter describes:**

- How to create a conversion module to use when executing a standard batch program in Real Replay mode or Virtual Replay mode.
- How to simulate past or future dates when executing a standard batch program in Real Replay mode or Virtual Replay mode.

---

## About Transforming Data

For any type of data transformation:

- The data you want to transform must be associated with a file family.

A file family is a group of data files, each of which has the same fields with the same record length. The files in the family use the same transformation parameters, and therefore the same conversion and comparison modules.

- The file family associated with the data you want to transform must have a conversion module.

A conversion module is a reusable logic module that consistently converts data according to transformation parameters that you specify. A conversion module is created automatically when you specify details of your transformation and specify `C` next to a file family in the `Data Transformation Setup for Standard Batch` panel.

Some data transformation may require that you use a comparison module instead of a conversion module. A comparison module is similar in construction to a conversion module, but it enables you to omit specific areas of data from the comparison. A difference caused by a time stamp in an output file, for instance, could not be resolved with a conversion module. An ARTT comparison module however, could resolve the difference by excluding the time stamp from the comparison.

A comparison module is created automatically when you specify `X` next to a file family in the `Data Transformation Setup for Standard Batch` panel and include an `OMIT` statement in your transformation parameters.

In addition to associating data with a file family and creating a conversion module, if you want to transform data by:

- Changing date formats, you must specify data transformation parameters on additional panels that are displayed from the `Data Transformation Setup for Standard Batch` and `CICS` panel.
- Simulating past or future dates, you must specify roll settings *during* the Real Replay and Virtual Replay executions.

## Preparing to Transform Data

When you create a conversion module (step-by-step instructions begin on page 97), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu (Figure 11 on page 48), select S, Data Transformation setup. If your installation is configured for:

- Standard batch only, the Data Transformation Setup for Standard Batch and CICS panel, shown in Figure 32, is displayed.
- Additional environments, such as IMS, DB2, or CICS, the Data Transformation Setup Menu, shown in Figure 31 is displayed. In this case, type B on the command line to display the Data Transformation Setup for Standard Batch and CICS panel.

*This chapter assumes an installation configured only for standard batch.*

```
ARTT - Data Transformation Setup Menu
Option ==>_____

      Select one of the following:

      B - Data Transformation setup for Standard Batch and CICS

      D - Data Transformation setup for DB2

      I - Data Transformation setup for IMS
```

*Figure 31: Data Transformation Setup Menu (Installation Configured for IMS, CICS, and DB2)*

The Data Transformation Setup for Standard Batch panel shows the file families available for data transformation.

Use the panel to add a new file family, or to do the following for an existing file family:

- Create a conversion module or a compare module
- Specify a data source, or delete a data source
- Modify the data transformation parameters.

## Data Transformation Setup for Standard Batch and CICS Panel

```

ARTT - Data Transformation Setup for Standard Batch and CICS   Row 1 to 6 of 6
Command ==>_____ Scroll ==> PAGE

-----
Option      Family Name      Family Description
-----
-           AAA
-           COURSDb
-           DZ406           sss
-           GSAMDB         test
-           GSAMIN         ss
-           PSBBT001       test
***** Bottom of data *****

```

Figure 32: Data Transformation Setup for Standard Batch and CICS Panel

The options that you can specify on the panel, and the result of specifying each option, are shown in the table that follows. Type an option in the field next to the family name.

Option	Result
<b>C</b>	Create a conversion module. Submits a job to create a conversion module.
<b>I</b>	<p>Add a new file family. Displays a Specify Family subpanel, as follows:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> ARTT - Specify Family Command ==&gt;_____  Family name . . . .  Press ENTER to continue or END/CANCEL to cancel </pre> </div> <p>When you specify a family name in the subpanel, and then press Enter, an Add Family panel is displayed.</p>
<b>M</b>	Add or delete an association between a data source and a file family. Displays a File Family Maintenance panel. An entry is either added to or deleted from the file control file, depending on which action you perform. For information about adding or deleting data sources, see page 319.
<b>S</b>	View, add, or change data transformation parameters. Displays a Family Maintenance panel showing data transformation parameters for the file family. For information about adding or changing data transformation parameters, see page 307.
<b>U</b>	Same result as the S option.
<b>X</b>	Create a comparison module. Submits a job to create a comparison module.



---

## How to Create a Conversion Module

If you need information on the values that you can specify in, or select from, the `Data Transformation for Standard Batch and CICS` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 96.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `S` on the command line on the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The `Data Transformation Setup for Standard Batch` panel is displayed (Figure 32 on page 96). (This chapter assumes an installation configured only for standard batch.)

3. Type `S` next to the file family for which you want to create a conversion module, and then press Enter.

A `Family Maintenance` panel is displayed in which you can add new data transformation parameters or modify existing parameters. For instructions on completing the `Family Maintenance` panel, see page 307.

4. When you are satisfied with your data transformation parameters, press PF3 to return to the `Data Transformation Setup for Standard Batch` panel.
5. Type `C` next to the file family for which you want to create a conversion module, and then press Enter.

If you have already created a conversion module for your selected file family, a `Conversion module already exists` subpanel is displayed, like the one that follows:

```
Command ==> _____  
  
A module already exists for Family AAA  
  
                Overwrite ? . . . N (Y/N)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

To overwrite the conversion module, specify `Y` in the subpanel, otherwise specify `N`, and then press Enter

ARTT submits a job to generate your conversion module.

---

## About Simulating Past or Future Dates

Date Rolling is useful for verifying that your program will work correctly with future dates. It automatically ages dates (by rolling them forward) or rejuvenates dates (by rolling them backward) in input and output files according to values that you specify.

Rolling dates comprise two sets of procedures:

1. Initially, the data source in which you roll dates must be associated with a file family, and that file family must have its own conversion module.

You start the process of associating a data source with a file family on the `Data Transformation Setup for Standard Batch` panel. You use that same panel to create a conversion module for the file family. Instructions for both of these procedures starts on page 95.

2. Next, when you are executing your Real Replay or Virtual Replay execution, you must type `Y` in the **Data Change** field to display the `Specify Transformation Criteria` panel. On this panel, you can specify your roll information.

*Preparing to Simulate Past or Future Dates* describes how to specify roll information on the `Specify Transformation Criteria` panel. Instructions for executing a Real Replay or Virtual Replay execution using date rolling begin on page 101.

## Preparing to Simulate Past or Future Dates

When you simulate past or future dates (step-by-step instructions begin on page 101), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

You use the `Specify Transformation Criteria` panel (Figure 33) to specify Roll Mode and Roll Amount information for your standard batch program *during* your Replay execution. You can also use this panel to change the transformation status of a data source.

## Specify Transformation Criteria Panel

To display the Specify Transformation Criteria panel, specify Y in the **Data Change** field on either the Real Replay Execute for Standard Batch panel (Figure 21 on page 69), or the Virtual Replay Execute for Standard Batch panel (Figure 28 on page 84), and then press Enter.

```

ARTT - Specify Transformation Criteria                               Row 1 to 3 of 3
Command ==>_____ Scroll ==> PAGE

Program Name . : DPCOBPRG    Run ID . : BASELINE    Log ID . : BASELINE
Log File Name . : REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG

Specify Program Transformation Criteria::
Roll Mode . . . . D        (D - Days, Y - Years)
Roll Amount . . . . 0_____ (Range : -999 to 9999)
Program Status . . N        (Y - Transformed, N - Not Transformed)

Update Data Source Transformation Criteria:
-----
Sel  Data Source                                Cmod  Xmod  Stat  Family
-----
_    A.JCL                                       Y      N    N    AAA
_    REDG.TESTPACK.ARTIMS.ABTCH.PRINT          Y      N    N    BATCH
_    Y001DP9.Y001DP9.A.JCL                     Y      N    N    DZ406
***** Bottom of data *****

```

Figure 33: Specify Transformation Criteria Panel (Standard Batch)

The Specify Transformation Criteria panel enables you to change one or more of the following for your Real Replay or Virtual Replay execution:

- The program's Roll Mode. Specify either Y (Year) or D (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged), or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Program Status. Specify whether the program is transformed (Y) or not (N).
- A list of the Data Sources (data sets) for this replay execution for which you can specify transformation criteria.

To change the Roll Mode, Roll Amount, or Program Status, overwrite the existing value for the field with an appropriate value, and then press PF3.

Accept the default value (N) to run the Real Replay or Virtual Replay execution without changing any of these parameters.

The data sources for which you can specify transformation criteria are listed in the bottom part of the panel. Scroll forward or backward to view the data sources in the list. To change the transformation criteria for a data source, type *S* in the Sel column next to the data source, and then press Enter. An Update Data Source subpanel is displayed, like the one shown in Figure 34.

**Notes:**

1. The list in the bottom part of the Specify Transformation Criteria panel shows source data sets only for the type of program with which you are working. For example, if you are transforming data for an IMS batch program, the list shows only source data sets for IMS batch programs.
2. If you do not intend to transform any data, you do not need to select any source data sets for replay.

```
Command ==>>_____

Family . . : AAA
Update data source status below :

Source Name . . . . A.JCL
Source Status . . . N   (Y - Transformed, N - Not Transformed)
Conversion module . Y   (Y - Use module, N - Do not use module)
Compare module . . N   (Y - Use module, N - Do not use module)
Old record size . . 0___
New record size . . 0___

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 34: Update Data Source Subpanel*

The fields in the Update Data Source subpanel enable you to:

- Set the data source status. Specify *Y* for transformed status or *N* for non-transformed status.
- Use a conversion module. Specify *Y* to run with a conversion module or *N* to run without a conversion module.
- Use a comparison module. Specify *Y* to run with a comparison module or *N* to run without a comparison module.
- Specify an old record size. Type a record size between 1 and 99999.
- Specify a new record size. Type a record size between 1 and 99999.

**To change the information for a data source, complete the following steps:**

1. Select a data source from the Data Source column by typing `s` in the **Sel** field at the left of the panel, and then press Enter.

The `Update Data Source` subpanel is displayed.

2. Type new information for your selected data source as required, and then press Enter.

The `Update Data Source` subpanel closes and the `Specify Transformation Criteria` panel is displayed containing the new information for your selected data source.

To close the subpanel without making any changes type `Can` on the command line and then press Enter, or press PF3.

3. If you want to change the information for another data source, repeat steps 1 and 2 in this list.

Alternatively, type `Can` on the command line and then press Enter, or press PF3 to close the `Specify Transformation Criteria` panel.

---

## How to Execute a Proof Run with Data Transformation

If you need information on the values that you can specify in, or select from, the `Specify Transformation Criteria` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 99.

**Note:** Before you can run a program with date rolling in either Real Replay mode or Virtual Replay mode, each input or output file (data source) in which dates are to be rolled must be associated with a conversion module. For information about generating and working with conversion modules, see “Appendix B. Understanding Data Transformation” on page 301.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type one of the following on the command line on the ARTT Primary Menu (Figure 11 on page 48), and then press Enter:

`R` to display the `Real Replay Execute for Standard Batch` panel (Figure 21 on page 69)

`V` to display the `Virtual Replay Execute for Standard Batch` panel (Figure 28 on page 84)

3. Specify information about the program for which you are executing the Real or Virtual Replay run on the displayed panel.

- Specify **Y** in the **Data Change** field, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Real Replay or Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

The Specify Transformation Criteria panel is displayed (Figure 33 on page 99).

- Specify either **D** (Day) or **Y** (Year) in the **Roll Mode** field.
- Specify a value from -999 to 9999 in the **Roll Amount** field, and then press PF3.
- Select one or more data sets from the Data Source column by typing **S** in the **Option** field at the left of the panel.
- Type a new transformation status (either **Y** or **N**) in the Source Status column for each selected data set.
- Press PF3 to close the Specify Transformation Criteria panel and process your changes.
- If you specified **Y** in the **Edit JCL** field, the Real Replay or Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Real Replay Program or Submit Batch Virtual Replay Program subpanel like the one shown in the following step.
- When a Submit Batch Real Replay Program or Submit Batch Virtual Replay Program subpanel is displayed, similar to the one that follows, specify **Y**, and then press Enter to submit the Real Replay or Virtual Replay execution JCL for processing. To return to the Real Replay Execute for Standard Batch panel, or Virtual Replay Execute for Standard Batch panel without submitting the JCL, specify **N**, and then press Enter.

```
Command ==>_____

Submit job ? . . . Y (Y to submit, N to cancel)

Press ENTER to continue or END/CANCEL to cancel.
```

## Part 3. ARTT for IMS Batch Programs and MPPs

This part comprises Chapters 9 to 14, which describe how to:

- Set up and then run an ARTT Capture (baseline) execution for an IMS batch program.
- Execute a proof run for an IMS batch program using virtual input (stored during the baseline execution).
- Run an IMS batch program in Virtual Replay mode with data transformation.
- Run a Capture (baseline) execution for an IMS MPP (setup is not required for an IMS MPP).
- Execute a proof run for an IMS MPP using virtual input (stored during the baseline execution).
- Run an IMS MPP in Virtual Replay mode with data transformation.



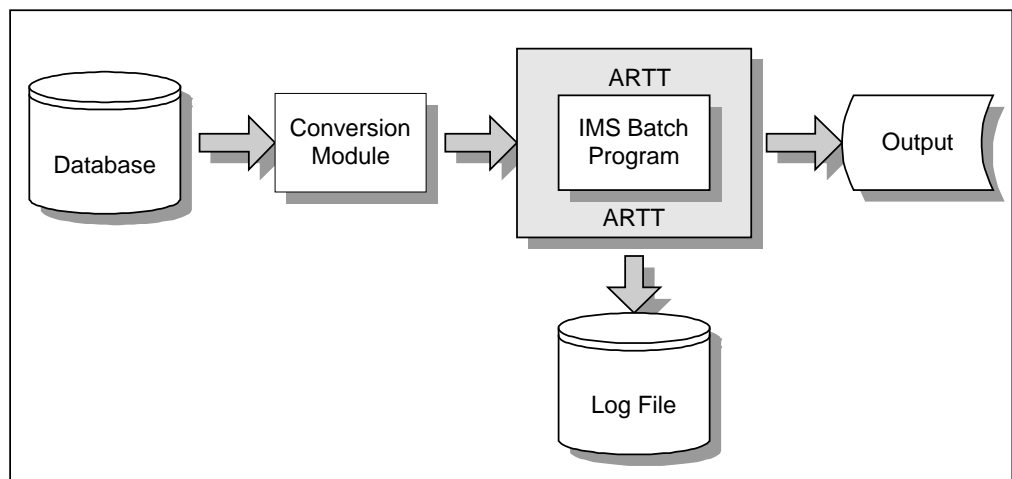


---

## Chapter 9. Capturing a Base Execution for an IMS Batch Program

Before reengineering an IMS batch program, you need to run a base execution to establish the footprint for the program. In the same way as you would for a standard batch program (see “Chapter 5. Capturing a Base Execution”), you run the base execution under ARTT in **Capture** mode to record in a log file the I/O activity of the program. You can then use the log file as a base for comparison with subsequent proof runs in Virtual Replay mode. The difference is that in this case, the program takes its input from a database instead of an input file.

Before you can run your IMS batch program in Capture mode, you must give ARTT access to your program’s databases. You use ARTT’s IMS Capture setup procedures to generate one or more conversion modules. ARTT uses these conversion modules to gain access to the IMS batch program’s databases.



*Figure 35: IMS Batch Program Running in ARTT Capture Mode*

### **This chapter describes:**

- How to give ARTT access to database data.
- How to relink your IMS batch program so that it can gain access to its data while running under ARTT.
- The *Capture Execute for IMS Batch* panel in which you instruct ARTT to capture your IMS batch base execution. The description also includes the subpanels displayed when you select options from the panel.
- How to run an IMS batch program in Capture mode.
- The output produced when you run an IMS batch program in Capture mode.

## Giving ARTT Access to Database Data

An IMS batch program is associated with one or more *program communication blocks* (PCB), each of which describes a specific program view of a database. Each PCB acts as an interface giving your IMS batch program access to a database. The PCBs are contained in the *program's specification block* (PSB), which also describes the database referenced by each PCB.

When you run an IMS batch program in Capture mode, ARTT is interposed between the program and its databases. ARTT cannot use the program's PSB, and therefore cannot use its PCBs to gain access to its databases.

ARTT's Capture setup procedures open the program's PSB and extract information from its PCBs. The setup procedures use the extracted information to generate one conversion module for each PCB. You then run a Capture execution for each conversion module, thus giving ARTT and the IMS batch program a specific view of a database.

This topic explains ARTT's Capture setup procedures and the fields in the setup panel, and then gives you step-by-step instructions for creating a conversion module.

## Specifying Data Locations

When you create your conversion modules (step-by-step instructions begin on page 114), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select C, Capture setup to view the Capture Setup for IMS panel (Figure 36).

On the Capture Setup for IMS panel, specify PSB and DBD information to enable ARTT to create a conversion module for your IMS batch Capture execution.

```
ARTT - Capture Setup for IMS                               Row 1 to 1 of 1
Command ==>_____ Scroll ==> PAGE

Press ENTER to continue or END/CANCEL to cancel

Specify PSB Setup Information:
  PSB Library . . . 'REDG.TESTPACK.ARTTIMS.PSBLIB'_____
  PSB Name . . . . _____

Specify Optional Information:
  Verify GSAM Lengths . . N                (Y - Verify lengths, N - Do not verify)

  Select/Specify DBD Libraries for PSB Setup:
  -----
  Option Selected DBD Library
  -----
  S                'REDG.TESTPACK.ARTTIMS.DBDLIB'
***** Bottom of data *****
```

Figure 36: Capture Setup for IMS Panel

The information that you specify in this panel determines which secondary panels are displayed. The panel's entry fields are grouped according to the type of information that they provide. The fields in each group, and their attributes are described in the paragraphs that follow.

## Specify PSB Setup Information

Use the fields in this group to identify a PSB for your conversion module.

### PSB Library

Specify the name of the library containing the PSB. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or if you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library

### Notes:

1. If a TSO prefix has been set in your user profile, specify a complete library name enclosed in single quotation marks (such as 'REDG.TESTPACK.ARTTIMS.PSBLIB') or a partial library name not enclosed in quotation marks (for example, ARTTIMS.PSBLIB). When you specify a partial library name, ARTT adds your TSO prefix to the name to create a fully-qualified data set name. If your TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a PSB name in this field.

### PSB Name

Specify the name of a PSB in your selected PSB library.

If the member that you specify is not in the library, or if you do not specify a PSB name, a list of the PSB's in your selected PSB library is displayed in a panel similar to the one in Figure 37. To select a PSB from the list, type *s* in the entry field next to the PSB name, and then press Enter.

ARTT Member List REDG.TESTPACK.ARTTIMS.PSBLIB							Row 00022 of 00029
Command ===> _____							Scroll ===> PAGE
Name	Size	TTR	Alias-of	AC	AM	RM	---- Attributes ---
_ LMF BMP9	00000BC0	000237		00	24	24	
_ PSB BTCH1	00000180	00042A		00	24	24	
_ PSB BTCH2	00000180	000432		00	24	24	
_ PSB BTCH3	00000098	00043A		00	24	24	
_ PSB PLI1	000002B8	000507		00	24	24	
_ PSB PLI2	000002B8	00050F		00	24	24	
_ TXNL	00000180	000422		00	24	24	
_ TXNLC	00000180	00041A		00	24	24	
**End**							

Figure 37: PSB Library Member List

When you press Enter, the member list closes and the name of your selected PSB is placed in the **PSB Name** field.

## Specify Optional Information

### Verify GSAM Lengths

When you specify **Y** in this field, ARTT analyzes your selected PSBs to find out whether any of them contain GSAM PCBs with a minimum and maximum length of 00000000. If ARTT finds such PCBs, a Capture Setup for IMS - GSAM length specification panel is displayed (Figure 38 on page 108) showing details of the PCBs.

```
ARTT - Capture Setup for IMS - GSAM length specification          Row 1 from 2
Command ==>>>                                                Scroll ==>> PAGE

Press END to continue or CANCEL to cancel

Specify lengths for listed GSAM DBD(s) :

-----
Option  PSB      DBD      Maximum  Minimum
        name     name     length   length
-----
          ACAC0079  GSAMDB2  00000000  00000000
          ACAC0079  GSAMDB   00000000  00000000
***** Bottom of data *****
```

Figure 38: Capture Setup for IMS - GSAM length specification Panel

Use the panel to specify maximum and minimum lengths for each PCB. You must specify a maximum *and* a minimum length, and the maximum length must be greater than the minimum length. You need specify these lengths only once; ARTT retains your settings for future use.

Press PF3 to close the panel and incorporate your changes into your Capture JCL.

### Select/Specify DBD Libraries for PSB Setup

This scrollable list enables you to compile a list of database description (DBD) libraries for use in this, or subsequent IMS batch Capture executions.

The list contains the following columns:

#### Option

Use this column to manipulate the DBD libraries in the scrollable list. Valid options are:

- A** Insert a new DBD library into the scrollable list *after* a specific list entry. Type **A** in the **Option** column next to the entry after which you want your new library to appear, and then press Enter. When you do this, a **Specify DBD Library** subpanel is displayed (Figure 39) on which you can specify your new DBD library name, enclosed in single quotes. When you press Enter on the **Specify DBD Library** subpanel, the name of your new DBD library is inserted into the list after the one for which you specified option **A**.
- B** Insert a new DBD library into the scrollable list *before* a specific list entry. Type **B** in the **Option** column next to the entry before which you want your new library to appear, and then press Enter. When you do this, a **Specify DBD Library**

subpanel is displayed (Figure 39) on which you can specify your new DBD library name, enclosed in single quotes. When you press Enter on the Specify DBD Library subpanel, the name of your new DBD library is inserted into the list before the one for which you specified option B.

- I Works in the same way as option A.

```
ARTT - Specify DBD Library
Command ===>_____

DBD Library . . . . ._____

Press ENTER to continue or END/CANCEL to cancel
```

Figure 39: Specify DBD Library Subpanel

- S Select a DBD library for processing. To select a library, type S in the Option column, and then press Enter.  
If you do not select a DBD library, and you press PF3 to perform Capture setup, the following message is displayed at the top right corner of the Capture Setup for IMS panel:  
No selection.
- R Deselect a previously selected DBD library. To deselect a library, type R in the Option column, and then press Enter.
- D Delete a DBD library from the scrollable list. To delete a library, type D in the Option column, and then press Enter.  
**Note:** Selecting this option deletes the DBD library only from the scrollable list, not from your system.

**Selected**

When you use the Option column to choose a DBD library for processing, S is placed in the Selected column next to your chosen library.

**DBD Library**

Shows the name of each DBD library in the scrollable list.

**Note:** The first time that you open the Capture Setup for IMS panel, the scrollable list contains only a single dummy entry. Type I in the Option column next to the dummy entry to open an Add DBD Library subpanel (Figure 39).

## Relinking Your IMS Batch Program to Include the ARTT Stub

When you have given ARTT access to your database data, there is another action that you must perform *before* you can run a Capture execution for your IMS batch program.

ARTT cannot directly intercept native IMS database calls, so you must relink your IMS batch program to include an ARTT-provided stub which substitutes ARTT database calls in place of native IMS database calls. You must also relink any other programs with which your IMS batch program is dynamically or statically linked if they perform native IMS database calls.

Once you have relinked your program to include the ARTT stub, you need only repeat the relink if you change your program code. In addition, when your program runs outside ARTT control, the stub will 'step aside' and allow the program to run with native IMS database calls.

You can relink your IMS batch program to include the ARTT stub using:

- Your program load module and the sample JCL in Figure 40.
- Your program object code and sample JCL in Figure 41.

## Relinking Your IMS Batch Program Load Module

Use the sample JCL in Figure 40 to relink the load module for your IMS batch program to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.

```

//USERNAME JOB , 'ARTT IMS RELINK', REGION=4096K, NOTIFY=USERNAME
//*-----
//* 1. RELINK EXISTING DLI/BMP LOAD MODULE & REPLACE IMS INTERFACE
//*   DFSLI000 WITH ARTT IMS INTERFACE ATGLI000
//*
//* * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
//* * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
//* * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE RELINKED
//* * REPLACE entrypt WITH ENTRY POINT FOR NEW LOAD MODULE
//* * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
//*   MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
//* * REPLACE ims-hlq WITH IMS SYSTEM QUALIFIER, EG. IMS, IMS.V6R1M0
//* * REPLACE atgli000-lib WITH LOCATION OF ARTT ATGLI000 MODULE
//* * REPLACE input-loadlib WITH LOCATION OF EXISTING IMS LOAD MODULE
//* * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
//*-----
//* STEP 1 : LINK EXISTING LOAD MODULE WITH ATGPRFX & ATGLI000
//*-----
//LINK      EXEC PGM=IEWL,
//          PARM='LIST,MAP,XREF'
//SYSLIB    DD DSN=other-link-lib,
//          DISP=SHR
//          DD DSN=ims-hlq.RESLIB,
//          DISP=SHR
//ATGLINK   DD DSN=atgli000-lib,
//          DISP=SHR
//EXISTING  DD DSN=input-loadlib,
//          DISP=SHR
//SYSLMOD   DD DSN=output-loadlib,
//          DISP=SHR
//SYSUT1    DD UNIT=SYSDA,
//          SPACE=(CYL,(1,1))
//SYSPRINT  DD SYSOUT=*
//SYSLIN    DD *
//          REPLACE DFSLI000
//          INCLUDE EXISTING(pgmname)
//          CHANGE DFSLI000(ATGLI000)
//          INCLUDE ATGLINK(ATGLI000)
//          ENTRY entrypt
//
//*-----
//* END OF MODULE
//*-----

```

Figure 40: JCL to Relink an IMS Batch Program (Load Module)

## Relinking Your IMS Batch Program Object Code

Use the sample JCL in Figure 41 to relink the object code for your IMS batch program to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.



```

//USERNAME JOB , 'ARTT IMS LINK', REGION=4096K, NOTIFY=USERNAME
//*-----
/** 1. COMPILE STEP, IF REQUIRED. (NB. CREATE OBJECT pgmname)
/** 2. LINK OBJECT MODULE AND ARTT IMS INTERFACE ATGLI000
/**
/** * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
/** * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE CREATED
/** * REPLACE entrypt WITH ENTRY POINT FOR NEW LOAD MODULE
/** * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
/**   MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
/** * REPLACE ims-hlq WITH IMS SYSTEM QUALIFIER, EG. IMS, IMS.V6R1M0
/** * REPLACE atgli000-lib WITH LOCATION OF ARTT ATGLI000 MODULE
/** * REPLACE object-lib WITH LOCATION OF COMPILED OBJECT MODULE
/** * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
/**-----
/** STEP 1 : COMPILE PROGRAM SOURCE INTO OBJECT MODULE (IF REQUIRED)
/**-----
/**-----
/** STEP 2 : LINK OBJECT LOAD MODULE WITH ATGLI000
/**-----
//LINK      EXEC PGM=IEWL,
//           PARM='LIST,MAP,XREF'
//SYSLIB    DD DSN=other-link-lib,
//           DISP=SHR
//           DD DSN=ims-hlq.RESLIB,
//           DISP=SHR
//ATGLINK   DD DSN=atgli000-lib,
//           DISP=SHR
//OBJECT    DD DSN=object-lib,
//           DISP=SHR
//SYSLMOD   DD DSN=output-loadlib,
//           DISP=SHR
//SYSUT1    DD UNIT=SYSDA,
//           SPACE=(CYL,(1,1))
//SYSPRINT  DD SYSOUT=*
//SYSLIN    DD *
//           INCLUDE ATGLINK(ATGLI000)
//           INCLUDE OBJECT(pgmname)
ENTRY      entrypt
//           NAME      pgmname(R)
/**
/**-----
/** END OF MODULE
/**-----

```

Figure 41: JCL to Relink an IMS Batch Program (Object Code)

---

## How to Create a Conversion Module to Enable ARTT to Record IMS Batch Data

**Note:** Some of the parameters used when you run an IMS batch program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one instance of an IMS batch program at the same time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `C` on the command line of the ARTT Primary Menu (**Figure 11** on page 48), and then press Enter.

The Capture Setup for IMS panel (Figure 36) is displayed.

3. On the Capture Setup for IMS panel, specify information and select processing options for the IMS batch program for which you are capturing data, and then press PF3. For panel details, see page 106.

To close the panel without taking any further action, type `Can` on the command line, and then press Enter.

4. If you try to create a conversion module for a PSB that already has a conversion module, the PSB Entries Already Exist subpanel is displayed.

```
ARTT - Overwrite conversion modules?
Command ==>>_____

Conversion modules exist for PSBBTCH1 and will be
overwritten during this Capture Setup.

Overwrite existing conversion modules ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 42: PSB Entries Already Exist Subpanel*

Specify `Y`, and then press Enter to overwrite the conversion module, or specify `N` to close the subpanel and return to the Capture Setup for IMS panel on which you can specify a different PSB.

5. If you elected to view ARTT JCL when you set up your user options, the JCL to create the conversion module is displayed for editing. When you are finished, press PF3 to display a Submit IMS Capture Setup Job subpanel.

If you did not elect to view ARTT JCL in your user options, a Submit IMS Capture Setup Job subpanel, like the one that follows, displays immediately:

```
Command ==>>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

6. On the Submit IMS Capture Setup Job subpanel, specify Y, and then press Enter to submit for processing the JCL to generate your conversion module. Alternatively, specify N, and then press Enter to return to the Capture Setup for IMS panel without submitting the JCL.

---

## Instructing ARTT to Record Your Base Execution

When you capture your base execution (step-by-step instructions begin on page 120), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select E, Capture execution to display the Capture Execute Menu.

```
ARTT - Capture Execute Menu
Option ==>>

Select one of the following:

    B - Capture execute for Standard Batch, IMS Batch and DB2 Batch

    C - Capture Execute for CICS

    I - Capture Execute for IMS Online
```

*Figure 43: Capture Execute Menu*

The options shown on the menu depend on how ARTT is configured for your installation. Figure 13 shows the options for an installation configured for IMS, CICS, and DB2.

*This chapter assumes an installation configured only for standard batch and IMS.*

From the Capture Execute Menu, select B, to display the Capture Execute for Standard Batch and IMS Batch panel.

```
ARTT - Capture Execute for Standard Batch and IMS Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . 'REDG.TESTPACK.ARTTIMS.APPJCL.NATIVE'_____
  JCL Member . . . . .APLIAR1_____
  Program Name . . . . .IMSPLIA_____

Specify Mandatory ARTT Run Information:
  Run ID . . . . .IMSPLIA_____
  Log ID . . . . .IMS_____

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion. . . N    (Y/N - Exclude DDnames from Capture ?)
  Run Information . . N    (Y/N - Specify Run Information Indicators ?)

                                Press ENTER to continue or END/CANCEL to cancel
```

*Figure 44: Capture Execute for Standard Batch and IMS Batch Panel*

Before running the IMS batch program in Capture mode, ARTT uses the information that you specify on the panel to:

- Set up the appropriate ARTT control file records
- Allocate a log file in which to record the results of the Capture execution
- Modify the JCL to invoke ARTT properly.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

## Specify JCL Information

Use the fields in this group to tell ARTT where to find the IMS batch program that you want to run in Capture mode.

### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the IMS batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

```
Invalid Library.
```

### Notes:

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'REDG.TESTPACK.ARTTIMS.JCL') or a partially complete library name not enclosed in quotation marks (for example, ARTTIMS.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

### JCL Member

Specify the name of the JCL library member containing the job stream for the IMS batch program.

If you do not specify a member name and a program name, a list of the members in your specified JCL library is displayed in a panel similar to the one in Figure 45. To select a member from the list, type **S** in the entry field next to the member name, and then press Enter.

ARTT Member List REDG.TESTPACK.ARTTIMS.APPJCL.NATIVE								Row 0001 of 0003
Command ==>								Scroll ==> PAGE
Name	VV	MM	Created	Changed	Size	Init	Mod	ID
_ ABTCHAR1	01.01	98/12/31	99/01/07 15:38		30	30	0	Y001SD7
_ APLIAR1	01.02	98/12/23	99/01/05 13:30		45	49	0	Y001SD7
_ APLIAR2	01.03	98/12/23	99/01/05 14:21		45	49	0	Y001SD7
**End**								

Figure 45: JCL Library Member List (IMS Batch)

If the member that you selected or specified is not in the JCL library, this message is displayed in the top right corner of the panel:

```
Member does not exist in the specified JCL library.
```

## Program Name

Specify the name of the IMS batch program that you want to run in Capture mode.

If you do not specify a program name, ARTT looks for program names when it scans the JCL job stream.

If ARTT finds:

- One program name, and you specify Y in the Edit JCL field, it generates Capture JCL for that program and displays the JCL for your approval.
- More than one program name or the same program name used more than once, or if you specify the program name incorrectly, a Program Selection panel is displayed containing a list of programs from which you can select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

- S** Select a program for processing. When you press Enter, ARTT places a Y next to your selected program.
- R** Deselect a previously selected program.
- V** View the step JCL for the program.

To process your selected program, press PF3. The Program Selection panel closes, and you are returned to the Capture Execute for Standard Batch and IMS Batch panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the Capture Execute for Standard Batch and IMS Batch panel:  
Program not found.

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your IMS batch program in Capture mode.

### Run ID

Specify a run identifier for this execution of the IMS batch program in Capture mode. The identifier enables ARTT to set up and identify unique records for this Capture execution in the Program control file and the Test control file. It can be alphabetic, numeric, or a combination of the two, up to eight characters in length; however, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

Invalid Run ID.

## Log ID

Specify an identifier that ARTT can use to construct a unique log file name for this Capture execution. The identifier can be alphabetic, numeric, or a combination of the two, and up to eight characters in length; however, it cannot start with a numeric character or contain blanks. The following example shows how the log file name is constructed:

```
Prefix.ARTT.ProgramName.LogID.LogSuffix
```

`Prefix` is the high-level qualifier, and `LogSuffix` is the log file suffix that you specified when you set up your user options. You specified the `Program Name` in the **Program Name** entry field described on page 118.

You must specify a log identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Log-ID.
```

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Capture execution.

### Edit JCL

Specify `N` if you do not want to browse or edit the ARTT-generated JCL for this IMS batch Capture execution.

Alternatively, accept the default value (`Y`) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press `Enter` on the `Capture Execute for IMS Batch` panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

### Audit Exclusion

Specify `Y` to name up to 10 DD statements for files to be excluded from the log that ARTT generates for a Capture execution. For example, you may want to exclude certain DD statements if you know that the data content of their files varies from run to run in a random, but acceptable way.

Accept `N`, the default value, to run a Capture execution without specifying any DD statement exclusions.

**Note:** If you accept the default value (`N`), and this execution is a re-run of a previous Capture execution in which you specified DD statement exclusions, those exclusions will be effective for this execution.

Specify the DD statements that you want to exclude on a `Specify Exclusion/Limitation Details` panel, which is displayed after you type `Y` in this field, and then press `Enter` in the `Capture Execute for Standard Batch` and `IMS Batch` panel. For an example of a `Specify Exclusion/Limitation Details` panel, see Figure 17 on page 61.

To exclude a DD statement, type its `ddname` in the next available **Audit Exclude List** entry field, and then press `Enter`. The exclusion parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type `Can` on the command line, and then press Enter.

**Note:** ARTT automatically excludes any DD statement allocated to `DUMMY`, and statements with the following ddnames:

ATGSNAP	IEFRDER2	SYSDUMP
CEEDUMP	IMS	SYSTRACE
DFSVSAMP	PLIDUMP	SYSDUMP
IDCAMS	SORTWKnn	
IEFRDER	SYSABEND	

### Run Information

Specify `Y` to change the default value of one or more run information parameters for the IMS batch Capture execution. You change run information parameters on a `Specify Run Information` panel which is displayed after you press Enter on the `Capture Execute for Standard Batch and IMS Batch` panel. For an example of a `Specify Run Information` panel, see Figure 18 on page 62.

The run information parameters are for your use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to `N` (No). Accept the default values to run the IMS batch Capture execution without changing any run information parameters.

To change a parameter, overtype the `N` with `Y` (Yes). When you have changed all of the parameters you want, press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

---

## How to Record a Base Execution

**Notes:** Before you can run a Capture execution for an IMS batch program, you must:

1. Create a conversion module for each PSB used by the program, as described in “Giving ARTT Access to Database Data” on page 106.
2. Relink your IMS batch program to include the ARTT-provided stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to do this, see page 110.

Some of the parameters used when you run an IMS batch program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one instance of an IMS batch program at the same time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `E` on the command line of the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The `Capture Execute` Menu is displayed (see **Figure 13** on page 56).

3. Select `B`, `Capture Execute for Standard Batch and IMS Batch`.

The `Capture Execute for Standard Batch and IMS Batch` panel is displayed (see Figure 44 on page 116).



4. Specify information, and select processing options for the program for which you are capturing data, and then press Enter. For panel details, see page 115.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Capture execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

5. If you submit a Capture execution using a log file that already exists, a Duplicate Log File subpanel is displayed like the one that follows:

```
Command ==>>>_____
Log File . . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

The above log already exists and will be overwritten
during this capture run.

Do you wish to overwrite this file ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel.
```

Specify Y, and then press Enter to overwrite the log file, or specify N to close the subpanel and return to the Capture Execute for Standard Batch and IMS Batch panel where you can specify a new log file name.

6. If you specified Y in the **Edit JCL** field, the ARTT-generated Capture JCL is displayed for editing. When you are finished, press PF3 to display the Submit Batch Capture Program subpanel like the one that follows:

```
Command ==>>>_____

Submit job ? . . . Y (Y to submit, N to cancel)

Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Capture JCL, the Submit Batch Capture Program subpanel is displayed.

7. On the Submit Batch Capture Program subpanel, specify Y, and then press Enter to submit the Capture execution JCL for processing. Alternatively, specify N, and then press Enter to return to the Capture Execute for Standard Batch and IMS Batch panel without submitting the JCL.

## Reading the Capture Execution Summary Report

When you successfully complete a Capture execution for an IMS batch program, ARTT produces an IMS Batch Program Capture Execution Summary report containing the result of the Capture execution. The report (like the example in Figure 46) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by ARTT.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0007I IMS DBD/PSB Library. = REDG.TESTPACK.ARTT.IMS
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.IMSPLIA.IMS.LOG
ATGA0705I Program IMSPLIA executed with:
ATGA0706I   Run Mode = CAPTURE
ATGA0707I   Status = N
ATGA0708I   Run Id = IMSPLIA
ATGA0030I Task DFSRRC00 attached with:
ATGA0031I   Parameters = "DLI,IMSPLIA,PSBPLI1,,,,,,,,,N,,,Y" (35 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DFSRRC00 completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSPRINT N    1    1      0     91      0      0              Y001DP9.Y001DP9C.JOB02108.D000000B.?
ATGA0715I REP001  N    1    1      0     21      0      0              REDG.TESTPACK.ARTTIMS.APLI.PRINT
ATGA0715I PCB002  N    0    0     13      3      0      0 PSBPL002      IMS=PSBPLI1.PCB002.COURSDB
ATGA0715I PCB004  N    0    0      0      0      0      0 PSBPL004      IMS=PSBPLI1.PCB004.GSAMDB
ATGA0715I PCB005  N    0    0      0      0      0      0 PSBPL005      IMS=PSBPLI1.PCB005.GSAMDB
ATGA0715I PCB001  N    0    0      1      0      0      0              IMS=PSBPLI1.PCB001.IMSMSGQ
ATGA0715I PCB003  N    0    0     14      0      0      0 PSBPL003      IMS=PSBPLI1.PCB003.TRANSACT
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****

```

Figure 46: IMS Batch Program Capture Execution Summary Report

The report shows:

- The names of the ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - Conversion library
  - Compare library
  - Test control file
  - Log file.

For more information about ARTT control files, see page 265.

- The following run parameters:
  - Run Mode (in this case, CAPTURE)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the Capture Execute for Standard Batch and IMS Batch panel.

The report also shows the following information for each PCB not specifically excluded from the Capture execution:

<b>Name</b>	Name of each PCB with I/O activity in the Capture execution.
<b>S</b>	Status of each PCB, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the PCB was opened during the course of the Capture execution.
<b>Closes</b>	Number of times that the PCB was closed during the course of the Capture execution.
<b>Inputs</b>	Number of times that data was read from the PCB during the course of the Capture execution.
<b>Outputs</b>	Number of times that data was written to the PCB during the course of the Capture execution.
<b>Diffs</b>	Always 0 for a Capture execution.
<b>Shown</b>	Always 0 for a Capture execution.
<b>ConvMod</b>	Name of the conversion module for the PCB.
<b>CompMod</b>	Not applicable for a Capture execution.
<b>Dataset Name</b>	Fully-qualified name of each PCB with I/O activity in the Capture execution.



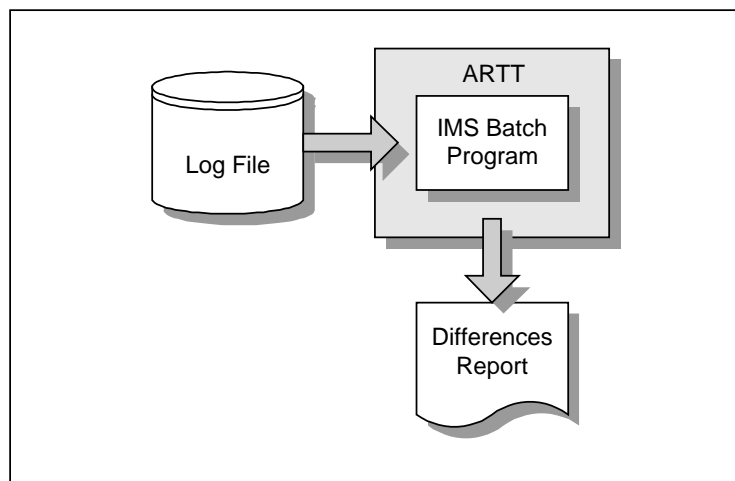
---

## Chapter 10. Executing a Proof Run for an IMS Batch Program

After reengineering or modifying your IMS batch program, you need to verify that, using the same input, the program works exactly as it did before it was modified. You can do this by executing a proof run in **Virtual Replay** mode.

In Virtual Replay, ARTT takes its input directly from the log file generated by the IMS batch program's Capture execution. ARTT discards the output from the Virtual Replay after comparing it with the log file, unless you specify a spool file or an inline data set as the output data set.

Using input from the log file, ARTT monitors the I/O events and data for the Virtual Replay run and compares them with the events and data recorded in the log file for the IMS batch program's base run in Capture mode. If there are differences, ARTT produces a report detailing the differences.



*Figure 47: IMS Batch Program Running in Virtual Replay Mode*

Date Rolling works in the same way for an IMS batch program as it does for a standard batch program. For more information, see “Instructing ARTT to Transform Data” on page 138.

Conversion modules enable ARTT to permit expected differences during the Capture/Virtual Replay comparison. ARTT uses conversion modules for an IMS batch program in Virtual Replay mode in the same way as it does for a standard batch program in Virtual Replay mode.

For more information about generating and using conversion modules in Virtual Replay mode, see “Instructing ARTT to Transform Data” on page 138.

### **This chapter describes:**

- The `Virtual Replay Execute for Standard Batch and IMS Batch` panel, in which you instruct ARTT to execute your proof run using virtual input. The description also includes the subpanels displayed when you select options from the panel.
- How to run an IMS batch program in Virtual Replay mode.
- The reports produced when you run an IMS batch program in Virtual Replay mode.

---

## Instructing ARTT to Execute Your Proof Run

When you execute your proof run (step-by-step instructions begin on page 131), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

**Note:** If the code for your IMS batch program has changed between its baseline (Capture) execution and this proof run, you must relink your program to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to relink your program, see page 110.

From the ARTT Primary Menu, select `V`, Virtual Replay execution to view the Virtual Replay Execute Menu, shown in Figure 27 on page 83.

The options shown on the menu depend on how ARTT is configured for your installation. Figure 27 shows the options for an installation configured for IMS, CICS and DB2. An installation configured only for IMS has a menu showing the following options:

- Virtual Replay execute for Standard Batch and IMS Batch
- Virtual Replay execute for IMS online.

This chapter assumes an installation configured only for Standard Batch and IMS.

Select `B`, Virtual replay execute for IMS Batch from the menu and then press Enter. The Virtual Replay Execute for Standard Batch and IMS Batch panel is displayed (Figure 48).

On this panel, specify information and options for the IMS batch program that you want to run using virtual (stored) input data. The information and options specified determine which subpanels are displayed.

```
ARTT - Virtual Replay Execute for Standard Batch and IMS Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . 'REDG.TESTPACK.ARTTIMS.APPJCL.NATIVE' _____
  JCL Member . . . . APLIAR1_
  Program Name . . . . IMSPLIA_

Specify Mandatory ARTT Run Information:
  Run ID . . . . . IMSPLIA_
  Log ID . . . . . IMS_____

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion /
    Report Limit . . . N    (Y/N - Specify Exclusion/Limitation details ?)
  Run Information . . N    (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . N    (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 48: Virtual Replay Execute for Standard Batch and IMS Batch Panel

Before running your IMS batch program in Virtual Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the program's log file.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The paragraphs that follow describe the fields in each group, and their attributes.

## Specify JCL Information

Use the fields in this group to tell ARTT where to find the program that you want to run in Virtual Replay mode.

### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library.

**Notes:**

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.A.JCL') or a partially complete library name not enclosed in quotation marks (for example, A.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

**JCL Member**

Specify the name of the JCL library member containing the job stream for the IMS batch program.

If you do not specify a member name, a list of the members in your specified JCL library is displayed (see Figure 45 on page 117). To select a member from the list, type S in the entry field next to the member's name and then press Enter.

If the member that you selected or specified is not in the JCL library, this message is displayed in the top right corner of the panel:

```
Member does not exist in the specified JCL library.
```

**Program Name**

Specify the name of the IMS batch program that you want to run in Virtual Replay mode.

If you do not specify a program name, ARTT scans the JCL job stream for program names.

If ARTT finds:

- One program name, and you specify Y in the Edit JCL field, it generates Virtual Replay JCL for that program and displays the JCL for your approval.
- More than one program name, or the same name used more than once, or if you specify the program name incorrectly, a Program Selection panel is displayed containing a list of programs from which you can select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

**S** Select a program for processing. When you press Enter, ARTT places a Y next to your selected program.

**R** Deselect the program.

**V** View the step JCL for the program.

To process your selected program, press PF3. The Program Selection panel closes, and you are returned to the Virtual Replay Execute for Standard Batch and IMS Batch panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the Virtual Replay Execute for Standard Batch and IMS Batch panel:

```
Program not found.
```



## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your IMS batch program in Virtual Replay mode.

### Run ID

Specify the run identifier that you used when you ran the program in Capture mode. The Run ID enables ARTT to identify the correct records for this Virtual Replay execution in the Program control file and the Test control file.

You must specify a run identifier. If you do not, a Run and Log IDs panel is displayed like the one that follows:

```
Row 1 to 1 of 1
Command ==>>

Select the required Run ID/Log ID
pair from the list below:
-----
Option  Run ID      Log ID
-----
          IMSPLIA    IMS
***** Bottom of data *****
```

Select from the panel by typing **S** next to the appropriate Run ID, and then press **Enter** to return to the Virtual Replay Execute for Standard Batch and IMS Batch panel.

### Log ID

Specify the log identifier that you used when you ran the program in Capture mode. The Log ID enables ARTT to ensure that the Virtual Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, the Run and Log IDs panel is displayed. Select from the panel by typing **S** next to the appropriate Log ID, and then press **Enter** to return to the Virtual Replay Execute for Standard Batch and IMS Batch panel.

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Virtual Replay execution.

### Edit JCL

Specify **N** if you do not want to browse or edit the ARTT-generated JCL for this Virtual Replay execution.

Accept the default value (**Y**) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press **Enter** in the Virtual Replay Execute for Standard Batch and IMS Batch panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

## Audit Exclusion/Report Limit

Specify `Y`, and then press `Enter` to display a `Specify Exclusion/Limitation Details` panel (see Figure 23 on page 73).

Accept the default value (`N`) to have ARTT generate Virtual Replay JCL without changing the DD statement exclusions, or without specifying any report limitation details.

The `Specify Exclusion/Limitation Details` panel is displayed after you press `Enter` on the `Virtual Replay Execute for Standard Batch and IMS Batch` panel.

Use the panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.

To exclude a statement, type its ddname in the next available **Audit Exclude List** entry field.

- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.

To specify the maximum number of differences for up to 10 DD statements:

1. Type the ddname of the DD statement in the next available **Report Limitation List** entry field. For example, `DD1` in Figure 23 on page 73.
2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, `Limit 1` in Figure 23 on page 73.

Press `Enter` to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press `PF3`, or type `Can` on the command line, and then press `Enter`.

## Run Information

Specify `Y` to change the default value of one or more run information parameters for the Virtual Replay execution. Accept `N`, the default value for each parameter, to run the Virtual Replay execution JCL for your IMS batch program without changing any run information parameters.

You change run information parameters on a `Specify Run Information` panel (Figure 18 on page 62), which is displayed after you press `Enter` on the `Virtual Replay Execute for Standard Batch and IMS Batch` panel.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to `N` (No). Accept the default values to run the IMS Virtual Replay execution without changing any run information parameters.

To change a parameter, overwrite the `N` with `Y` (Yes). When you have changed all of the parameters you want, press `Enter`. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press `PF3`, or type `Can` on the command line, and then press `Enter`.

### Data Change

Specify `Y` and press Enter to display a `Specify Transformation Criteria` panel on which you can change one or more of the following for this Virtual Replay execution:

- The program's Roll Mode. Specify either `Y` (Year) or `D` (Day).
- The program's Roll Amount. Specify a positive or negative number that tells the program the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward. For more information, see "Instructing ARTT to Transform Data" on page 138.
- The Program Status. Specify whether the program is non-transformed (`N`) or transformed (`Y`).
- The Source Status. Specify whether the source data is non-transformed (`N`) or transformed (`Y`).

For details of the `Specify Transformation Criteria` panel, see page 144.

---

## How to Execute a Proof Run

If you need information on the values that you can specify on, or choose from, the `Virtual Replay for Standard Batch and IMS Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 127.

**Note:** If the code for your IMS batch program has changed between its baseline (Capture) execution and this proof run, you must relink your program to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to relink your program, see page 110.

Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one IMS batch program at a time under ARTT control.

1. Start ARTT as described in "Invoking ARTT after the Initial Startup" on page 51.
2. Type `v` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Virtual Replay Execute Menu` is displayed (Figure 27 on page 83).

3. Type `B` on the command line of the `Virtual Replay Execute Menu`, and then press Enter.

The `Virtual Replay Execute for Standard Batch and IMS Batch` panel is displayed (Figure 48 on page 127).

4. On the Virtual Replay Execute for Standard Batch and IMS Batch panel, specify information, and select processing options for the IMS batch program for which you are executing the Virtual Replay run, and then press Enter. For panel details, see page 127.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

5. If you specified Y in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Virtual Replay Program subpanel, similar to the one that follows:

```
Command ==> _____  
  
Submit job ? . . . Y (Y to submit, N to cancel)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Virtual Replay JCL, a Submit Batch Virtual Replay Program subpanel is displayed.

6. On the Submit Batch Virtual Replay Program subpanel, specify Y, and then press Enter to submit the Virtual Replay execution JCL for processing. Alternatively, specify N, and then press Enter to return to the Virtual Replay Execute for Standard Batch and IMS Batch panel without submitting the JCL.

---

## Reading the Virtual Replay Execution Summary Report

When you successfully complete a Virtual Replay execution for an IMS batch program, ARTT produces a summary report containing the result of the Virtual Replay execution. The report (like the example in Figure 49 on page 135) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

The information shown in the report varies depending on whether ARTT detected any differences between the Virtual Replay execution and the Capture execution.

The summary report shows:

- The names of ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - Conversion library
  - Compare library (where used)
  - Test control file
  - Log file.

For more information about the control files, see page 265.

- The following run parameters:
  - Run Mode (in this case, VIRTUAL)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the `Virtual Replay - Batch Program Execution` panel.

The report also shows the following information for each PCB not specifically excluded from the Virtual Replay execution:

<b>Name</b>	Symbolic name of the DD statement for each file with I/O activity in the Virtual Replay execution.
<b>s</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Virtual Replay execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Virtual Replay execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Virtual Replay execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Virtual Replay execution.
<b>Diffs</b>	Number of differences detected.
<b>Shown</b>	Number of differences shown.
<b>ConvMod</b>	Name of the conversion module for the file. For more information about conversion modules, see “Instructing ARTT to Transform Data” on page 138.
<b>CompMod</b>	Name of the comparison module for the file. For more information about conversion modules, see “Instructing ARTT to Transform Data” on page 138.
<b>Data set Name</b>	Fully-qualified name of each file with I/O activity in the Virtual Replay execution.

For comparison, the I/O activity report from the Capture execution is also shown.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0007I IMS DBD/PSB Library. = REDG.TESTPACK.ARTT.IMS
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.IMSPLIA.IMS.LOG
ATGA0705I Program IMSPLIA executed with:
ATGA0706I   Run Mode = VIRTUAL
ATGA0707I   Status = N
ATGA0708I   Run Id = IMSPLIA
ATGA0030I Task ATGRRC00 attached with:
ATGA0031I   Parameters = "DLI,IMSPLIA,PSBPLI1,,,,,,,,,N,,,Y" (35 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
1ART V2.R2.M0 -- Differences Report                               Date 04/02/1999   Time 15:49:46   Page 0002
Copyright (C) 1996, 1997, 1998 National Westminster Bank, Plc., All Rights Reserved.
-----
REP001  C -----  REQNO=00000006 FILE REQNO=00000003 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0133
REP001  L -----  REQNO=00000006 FILE REQNO=00000003 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0133
REP001  C 0000    4040D9E4 D540C4C1 E3C540F0 F461F0F2    61F9F940 40404040 40404040 40404040      RUN DATE 04/02/99
REP001  L 0000    4040D9E4 D540C4C1 E3C540F0 F161F0F2    61F9F940 40404040 40404040 40404040      RUN DATE 01/02/99
                                           *
REP001  C 0020    40404040 40404040 40404040 40404040    4040C3D6 E4D9E2C5 40C4C1E3 C1C2C1E2      COURSE DATABAS
REP001  L 0020    40404040 40404040 40404040 40404040    4040C3D6 E4D9E2C5 40C4C1E3 C1C2C1E2      COURSE DATABAS

REP001  C 0040    C540E4D7 C4C1E3C5 40D9C5D7 D6D9E340    40404040 40404040 40404040 40404040      E UPDATE REPORT
REP001  L 0040    C540E4D7 C4C1E3C5 40D9C5D7 D6D9E340    40404040 40404040 40404040 40404040      E UPDATE REPORT

REP001  C 0060    40404040 40404040 40404040 40404040    40404040 40404040 40404040 40404040
REP001  L 0060    40404040 40404040 40404040 40404040    40404040 40404040 40404040 40404040

REP001  C 0080    40404040 40
REP001  L 0080    40404040 40
-----
SYSPRINT C -----  REQNO=00000013 FILE REQNO=00000007 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0121
SYSPRINT L -----  REQNO=00000013 FILE REQNO=00000007 TYPE=PUT      RC=00000000 FDBK=00000000 LEN=0121

SYSPRINT C 0000    40E2E3C1 E340C3C1 D3D340D9 C5E3E4D9    D5E2406E 40404040 40404040 40404040      STAT CALL RETURNS >
SYSPRINT L 0000    40E2E3C1 E340C3C1 D3D340D9 C5E3E4D9    D5E2406E 40404040 40404040 40404040      STAT CALL RETURNS >
YSPRINT  C 0020    40404040 40404040 40404040 40404040    40000000 00000000 00000000 00000000
SYSPRINT  L 0020    40404040 40404040 40404040 40404040    40000000 11000010 00000000 04000000
                                           ** *
SYSPRINT  C 0040    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000
SYSPRINT  L 0040    00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000

SYSPRINT  C 0060    00000000 00000000 00000000 00000000    00000000 00000000 00
SYSPRINT  L 0060    00000000 00000000 00000000 00000000    00000000 00000000 00

ATGA0040I Program ATGRRC00 completed with Return Code = 0.
ATGA0711I Program I/O Activity and LOG mismatch.
ATGA0712I -----

```

ATGA0713I I/O Activity from Current Run:											
ATGA0714I	Name	s	Opens	Closes	Inputs	Outputs	Diffs	Shown	ConvMod	CompMod	Dataset Name
-----											
ATGA0712I											
ATGA0715I	SYSPRINT	N	1	1	0	103	1	1			Y001DP9.Y001DP9E.JOB22640.D000000B.?
ATGA0715I	REP001	N	1	1	0	22	1	1			REDG.TESTPACK.ARTTIMS.APLI.PRINT
ATGA0715I	PCB002	N	0	0	15	6	0	0	PSBPL002		IMS=PSBPLI1.PCB002.COURSDB
ATGA0715I	PCB004	N	0	0	0	0	0	0	PSBPL004		IMS=PSBPLI1.PCB004.GSAMDB
ATGA0715I	PCB005	N	0	0	0	0	0	0	PSBPL005		IMS=PSBPLI1.PCB005.GSAMD2
ATGA0715I	PCB001	N	0	0	1	0	0	0			IMS=PSBPLI1.PCB001.IMSMSGQ
ATGA0715I	PCB003	N	0	0	14	0	0	0	PSBPL003		IMS=PSBPLI1.PCB003.TRANSACTION
-----											
ATGA0712I											
ATGA0718I I/O Activity from Capture Run:											
ATGA0714I	Name	s	Opens	Closes	Inputs	Outputs	Diffs	Shown	ConvMod	CompMod	Dataset Name
-----											
ATGA0712I											
ATGA0715I	SYSPRINT	N	1	1	0	103	0	0			Y001SD7.Y001SD77.JOB05679.D000000B.?
ATGA0715I	REP001	N	1	1	0	22	0	0			REDG.TESTPACK.ARTTIMS.APLI.PRINT
ATGA0715I	PCB002	N	0	0	15	6	0	0	PSBPL002		IMS=PSBPLI1.PCB002.COURSDB
ATGA0715I	PCB004	N	0	0	0	0	0	0	PSBPL004		IMS=PSBPLI1.PCB004.GSAMDB
ATGA0715I	PCB005	N	0	0	0	0	0	0	PSBPL005		IMS=PSBPLI1.PCB005.GSAMD2
ATGA0715I	PCB001	N	0	0	1	0	0	0			IMS=PSBPLI1.PCB001.IMSMSGQ
ATGA0715I	PCB003	N	0	0	14	0	0	0	PSBPL003		IMS=PSBPLI1.PCB003.TRANSACTION
-----											
ATGA0719I	Log File Closed.										
ATGA0041I	Main task cleanup complete.										

Figure 49: Virtual Replay Execution Summary Report for an IMS Batch Program



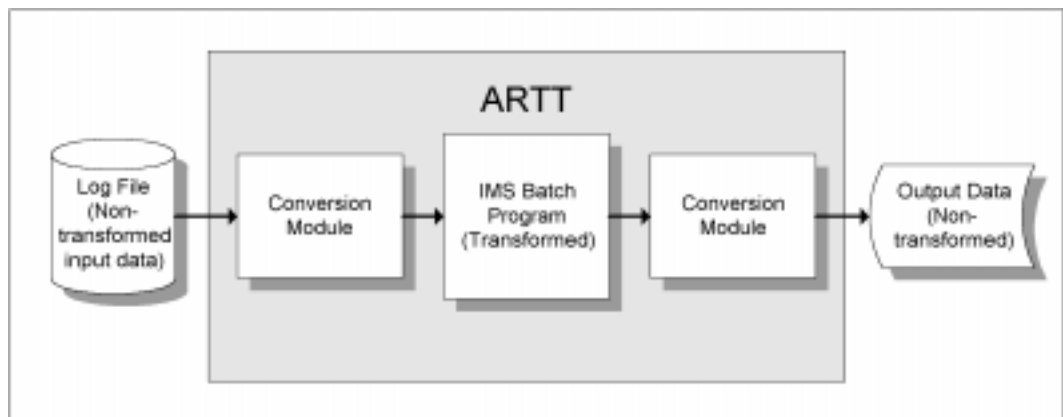


---

## Chapter 11. Executing a Proof Run with Data Transformation for an IMS Batch Program

After you have captured the baseline information for your IMS batch program, you can transform the data input to, or output from, a Virtual Replay (proof) run by:

- Changing date formats (for example, from mm/dd/yy to mm/dd/yyyy)
- Rolling the dates forward (aging them), or backward (rejuvenating them).



*Figure 50: Conversion Modules in Use during Virtual Replay of an IMS Batch Program*

To transform the data, execute your Virtual Replay run using a conversion module to control which date formats are changed and which dates are rolled.

### **This chapter describes:**

- How to prepare for data transformation when executing an IMS batch program in Virtual Replay mode
- How to simulate past or future dates when executing an IMS batch program in Virtual Replay mode.

---

## Instructing ARTT to Transform Data

All data transformation requires that you create a conversion module. A conversion module is created automatically when you specify details of your transformation and specify `Y` in the **Create Conversion Mod?** field on the `Data Transformation Setup for IMS` panel.

In addition to creating a conversion module, if you want to transform data by:

- Changing date formats, you must specify details of selected formats on additional panels, which are displayed from the `Data Transformation Setup for IMS` panel.
- Simulating past or future dates, you must specify roll settings during the Virtual Replay execution.

## Data Transformation Setup for IMS Panel

When you create a conversion module (step-by-step instructions begin on page 143), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

When you select `S`, `Data Transformation setup` from the ARTT Primary Menu (Figure 11 on page 48), the `Data Transformation Setup Menu` is displayed (Figure 31 on page 95).

The options shown on the menu depend on how ARTT is configured for your installation. Figure 31 shows menu options for an installation configured for IMS, CICS and DB2, whereas the options for an installation configured only for IMS would be:

- Data Transformation setup for Standard Batch
- Data Transformation setup for IMS.

*This chapter assumes an installation configured only for Standard Batch and IMS.*

Select I, Data Transformation setup for IMS from the menu, and then press Enter. The Data Transformation Setup for IMS panel is displayed (Figure 51).

```
ARTT - Data Transformation Setup for IMS
Command ==>_____

Setup Options:
  Define Target Data ? . . . . N      (D - DBD, P - PSB, N - Neither)
  Create Conversion Mod. ? . . N      (Y/N - Create conversion module for PSB)

DBD Setup Information:
  DBD Library . . . . 'REDG.TESTPACK.ARTTIMS.DBDLIB'_____
  DBD Name . . . . ._____

PSB Setup Information:
  PSB Library . . . . 'REDG.TESTPACK.ARTTIMS.PSBLIB'_____
  PSB Name . . . . ._____

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 51: Data Transformation Setup for IMS Panel*

On the Data Transformation Setup for IMS panel, select options and specify setup information to prepare for a proof run with data transformation for an IMS batch program.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The paragraphs that follow describe the fields or options in each group, and their attributes.

## Setup Options

The first option in this group enables you to define target data in a complete database, or in specific program views of a database.

The second option enables you to create conversion modules for your database views.

### Define Target Data?

Specify one of the following:

- D** Define target data in the database defined by the DBD specified in the **DBD Name** field
- P** Define target data in one or more of the PCBs contained in the PSB specified in the **PSB Name** field. Each PCB defines a specific program view of a database.
- N** Do not define any target data.

### Create Conversion Mod?

Specify **Y** to create a conversion module for each PCB in the specified PSB as follows:

- DBD and GSAM PCBs, create a conversion module whether target data is defined or not.
- I/O and Alternate PCBs, create a conversion module only if target data is defined.

Accept the default, **N**, to proceed without creating any conversion modules.

## DBD Setup Information

ARTT enables you to define target data for a complete database. Use the fields in this group to tell ARTT where to find the DBD for which you are defining target data.

### DBD Library

Specify the name of the library containing the DBD. You must specify a library name in this field if you have specified **D** as your option for defining target data.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

## DBD Name

Specify the name of the DBD for which you want to define target data. If you do not specify a DBD name, a member selection panel is displayed, like to the one shown in Figure 52. The panel shows all the DBDs in your specified library, and enables you to select one for processing. Select from the panel by typing **S** next to a DBD.

ARTT Member List REDG.TESTPACK.ARTTIMS.DBDLIB							Row 00001 of 00007	
Command ==>							Scroll ==> PAGE	
Name	Size	TTR	Alias-of	AC	AM	RM	---- Attributes ---	
_								
_ DP072	00000168	000239		00	24	24		
_ DP073	00000168	000241		00	24	24		
_ DP075	00000430	000307		00	24	24		
_ DP076	00000168	00030F		00	24	24		
_ DP078	00000168	000317		00	24	24		
_ DP080	00000108	00031F		00	24	24		
_ DZ406	00000268	000445		00	24	24		
**End**								

Figure 52: DBD Member List Panel

When you specify the name of a DBD in the **DBD Name** field, or when you select one from the member selection panel, one of the following is displayed:

- **Family Maintenance** panel. Displays only if your selected DBD already has parameter statements defined. Use the panel to modify existing statements or define new statements for the DBD.  
For more information about modifying parameter statements or defining new statements, see "Appendix B. Understanding Data Transformation."
- **Family Statement Select** panel. Displays only if your selected DBD has no parameter statements defined. Use the panel to define new parameter statements for the DBD.

## PSB Setup Information

ARTT enables you to define target data for the PCBs in a specified PSB. Use the fields in this group to tell ARTT where to find the PSB containing the PCBs for which you are defining target data. You must also specify data in this group of fields if you are creating conversion modules.

### PSB Library

Specify the name of the library containing your chosen PSB. You must specify a library name in this field if you have specified **P** as your option for defining target data.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

### PSB Name

Specify the name of a PSB containing the PCBs for which you want to define target data or create a conversion module. If you do not specify a PSB name, a member selection panel is displayed, like to the one shown in Figure 52. The panel shows all the PSBs in your specified library, and enables you to select one for processing.

When you specify a PSB name in the **PSB Name** field, or when you select a PSB from the member selection panel, a PCB Selection for Target Data panel is displayed like the one that follows:

```

ARTT - PCB Selection for Target Data                               Row 1 to 4 of 4
Command ==>_____ Scroll ==> PAGE

Press END to continue or CANCEL to cancel

PSB PSBBTCH1 comprises the following PCBs, select one or more for target data
specification :

Option      PCB Seq No      PCB Type      DBD Name
-           001           I/O           COURSDB
-           002           DB            TRANSACT
-           003           DB            GSAMDB
-           004           GSAM
***** Bottom of data *****

```

*Figure 53: PCB Selection for Target Data Panel*

Select from the panel by typing S in the Option column next to one or more PCBs. When you select a PCB, one of the following is displayed:

- **Family Maintenance panel.** Displays only if your selected PCB already has parameter statements defined. Use the panel to modify existing statements or define new statements for the PCB.  
For more information about modifying parameter statements or defining new statements, see “Appendix B. Understanding Data Transformation” on page 301.
- **Family Statement Select panel.** Displays only if your selected PCB has no parameter statements defined. Use the panel to define new parameter statements for the PCB.

---

## Steps for Creating a Conversion Module

If you need information on the values that you can specify on, or choose from, the `Data Transformation Setup for IMS` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 139.

**Note:** In addition to creating a conversion module, the `Data Transformation Setup for IMS` panel is also used to display the panels required for changing date formats.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `S` on the command line on the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.  
The `Data Transformation Setup Menu` is displayed (Figure 31 on page 95).
3. Type `I` on the command line on the `Data Transformation Setup Menu`, and then press Enter.  
The `Data Transformation Setup for IMS` panel is displayed (Figure 51 on page 139).
4. In the **Define Target Data** option field, specify `P` (PSB).
5. Specify a PSB library name and a PSB name in the fields in the `PSB Setup Information` group, and then press Enter.  
If you do not specify a PSB name, a `PSB Member List` is displayed. Select a PSB from the list and then press Enter.  
The `PCB Selection for Target Data` panel is displayed (Figure 53 on page 142).
6. Select one or more PCBs from the list and modify their parameters or add new parameters as required. For more information, see “Appendix B. Understanding Data Transformation” on page 301. When you are finished, press PF3 to return to the `Data Transformation Setup for IMS` panel.
7. In the **Create Conversion Mod?** option field, specify `Y`, and then press Enter.  
ARTT creates a conversion module for each of your selected PCBs. For more information about conversion modules, see page 303.

---

## Changing Date Formats

When you want to change date formats, you must specify details of selected formats on the `Family Maintenance` and `Family Statement Select` panels. These panels are displayed after you have selected appropriate options on the `Data Transformation Setup for IMS` panel.

---

## About Simulating Past or Future Dates

Date Rolling is useful for verifying that your program will work correctly with future dates. It automatically ages dates (by rolling them forward) or rejuvenates dates (by rolling them backward) in input and output files according to values that you specify.

Rolling dates comprises two sets of procedures:

1. Initially, the data source in which you roll dates must be associated with a file family, and that file family must have its own conversion module.

You start the process of associating a data source with a file family on the `Data Transformation Setup for IMS` panel. You use that same panel to create a conversion module for the file family. Instructions for both of these procedures starts on page 138.

2. Next, when you are executing your Virtual Replay execution, you must type `Y` in the **Data Change** field on the `Virtual Replay Execute for Standard Batch` and `IMS Batch` panel to display the `Specify Transformation Criteria` panel. On this panel, you can specify your roll information.

## Preparing to Simulate Past or Future Dates

When you simulate past or future dates (step-by-step instructions begin on page 146), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

You use the `Specify Transformation Criteria` panel (Figure 54) to specify Roll Mode and Roll Amount information for your IMS batch program.



## Specify Transformation Criteria Panel

To display the Specify Transformation Criteria panel, specify Y against the Data Change option on the Virtual Replay Execute for Standard Batch and IMS Batch panel (Figure 48 on page 127), and then press Enter.

ARTT - Specify Transformation Criteria		Row 1 to 9 of 52			
Command ==>		Scroll ==> PAGE			
Program Name . . :	IMSPLIA	Run ID . . :	IMSPLIA	Log ID . . :	IMS
Log File Name . . :	REDG.TESTPACK.ARTT.IMSPLIA.IMS.LOG				
Specify Program Transformation Criteria::					
Roll Mode . . . .	Y	(D - Days, Y - Years)			
Roll Amount . . . .	0	(Range : -999 to 9999)			
Program Status . .	Y	(Y - Transformed, N - Not Transformed)			
Update Data Source Transformation Criteria:					
-----					
Sel	Data Source	Cmod	Xmod	Stat	Family
-----					
	A.JCL	Y	N	N	AAA
	DB2=DB2C01C	Y	N	N	DB2C01C
	DB2=DB2C10N	Y	N	N	DB2C10N
	IMS=ACAC0079.PCB001.IMSMGQ	N	N	N	C0079FAM
	IMS=ACAC0079.PCB002.IMSMGQ	N	N	N	C0079FAM
	IMS=ACAC0079.PCB003.IMSMGQ	N	N	N	C0079FAM
	IMS=ACAC0079.PCB004.DM412	Y	N	N	C0079FAM
	IMS=ACAC0079.PCB005.DP040	Y	N	N	C0079FAM
	IMS=ACAC0079.PCB006.DZ406	Y	N	N	C0079FAM

Figure 54: Specify Transformation Criteria Panel (IMS Batch)

The Specify Transformation Criteria panel I enables you to change one or more of the following for your Virtual Replay execution:

- The IMS batch program's Roll Mode. Specify either Y (Year) or D (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged), or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Program Status. Specify whether the program is transformed (Y) or not (N).
- A list of the Data Sources (data sets) for this replay execution for which you can specify transformation criteria.

To change the Roll Mode, Roll Amount, or Program Status, overtype the existing value for the field with an appropriate value, then press PF3.

Accept the default value (N) to run the Virtual Replay execution without changing any of these parameters.

The data sources for which you can specify transformation criteria are listed in the bottom part of the panel. Scroll forward or backward to view the data sources in the list. To change the transformation criteria for a data source, type S in the Sel column next to the data source, and then press Enter. An Update Data Source subpanel is displayed, like the one shown in **Figure 34** on page 100.

**Notes:**

1. The list in the bottom part of the Specify Transformation Criteria panel shows data sources only for the type of program with which you are working. For example, if you are transforming data for an IMS batch program, the list shows only data sources for IMS batch programs.
2. If you do not intend to transform any data, you do not need to select any source data sets for replay.

The fields in the Update Data Source subpanel enable you to:

- Set the data source status. Specify Y for transformed status or N for non-transformed status.
- Use a conversion module. Specify Y to run with a conversion module or N to run without a conversion module.
- Use a comparison module. Specify Y to run with a comparison module or N to run without a comparison module.
- Specify an old record size. Type a record size between 1 and 99999.
- Specify a new record size. Type a record size between 1 and 99999.

**To change the information for a data source, complete the following steps:**

1. Select a data source from the Data Source column by typing S in the **Sel** field at the left of the panel, and then press Enter.

The Update Data Source subpanel is displayed.

2. Type new information for your selected data source as required, and then press Enter.

The Update Data Source subpanel closes and the Specify Transformation Criteria panel is displayed containing the new information for your selected data source.

To close the subpanel without making any changes type Can on the command line and then press Enter, or press PF3.

3. If you want to change the information for another data source, repeat steps 1 and 2 in this list.

Alternatively, type Can on the command line and then press Enter, or press PF3 to close the Specify Transformation Criteria panel.

---

## How to Execute a Proof Run with Data Transformation

If you need information on the values that you can specify on, or choose from, the `Specify Transformation Criteria` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 144.

**Note:** Before you can run a program in Virtual Replay mode with date rolling, each input or output file in which dates are to be rolled must be associated with a conversion module. For information about generating and working with conversion modules, see “About Conversion Modules and the Conversion Module Generator” on page 303.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `V` on the command line in the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

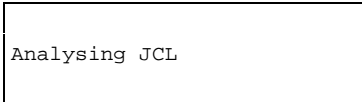
The `Virtual Replay Execute Menu` is displayed (Figure 27 on page 83).

3. Type `B` on the command line in the `Virtual Replay Execute Menu`, and then press Enter.

The `Virtual Replay Execute for Standard Batch and IMS Batch` panel is displayed.

4. Specify information about the IMS batch program for which you are executing the Virtual Replay run. For details, see page 127.
5. Specify `Y` in the **Data Change** field, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:



```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

The `Specify Transformation Criteria` panel is displayed (see Figure 54 on page 145).

6. Specify either `D` (Day) or `Y` (Year) in the **Roll Mode** field.
7. Specify a value from -999 to 9999 in the **Roll Amount** field, and then press PF3.

8. If you specified **Y** in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display the Submit Batch Virtual Replay Program subpanel like the one that follows:

```
Command ==>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

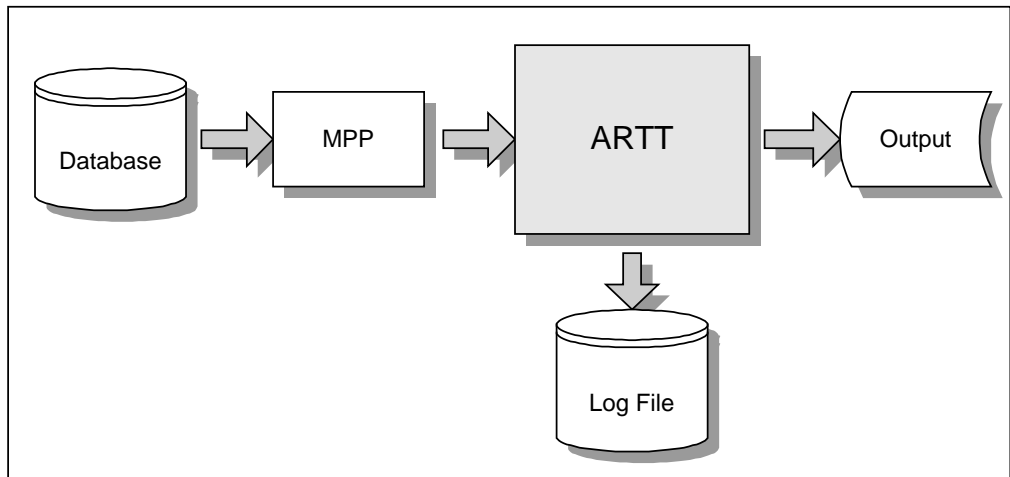
If you did not choose to edit the Virtual Replay JCL, the Submit Batch Virtual Replay Program subpanel is displayed .

9. On the Submit Batch Virtual Replay Program subpanel, specify **Y**, and then press Enter to submit the Virtual Replay execution JCL for processing. To return to the Virtual Replay Execute for Standard Batch and IMS Batch panel without submitting the JCL, specify **N**, and then press Enter.

---

## Chapter 12. Capturing a Base Execution for an IMS MPP

Before reengineering an IMS Message Processing Program (MPP), you need to run a base execution to establish the footprint for the MPP. In the same way as you would for an IMS batch program (see “Chapter 9. Capturing a Base Execution for an IMS Batch Program”), you run the base execution under ARTT in **Capture** mode to record in a log file the I/O activity of the MPP. You can then use the log file as a base for comparison with subsequent proof runs in Virtual Replay mode.



*Figure 55: IMS MPP Running in ARTT Capture Mode*

Like an IMS batch Capture, an MPP Capture execution takes its input from a database rather than from an input file. You use the ARTT user interface to create a log file and control files, and then submit your MPP which interfaces automatically with the ARTT log file and control files.

### **This chapter describes:**

- How to relink your IMS MPP so that it can gain access to its data while running under ARTT.
- The Capture Execute for IMS Online panel, in which you instruct ARTT to capture your IMS MPP base execution. The description also include the subpanels displayed when you select options from the panel.
- How to run an IMS MPP in Capture mode.
- The output produced when you run an IMS MPP in Capture mode.

---

## Relinking Your IMS MPP to Include the ARTT Stub

ARTT cannot directly intercept native IMS database calls, so you must relink your IMS MPP to include an ARTT-provided stub which substitutes ARTT database calls in place of native IMS database calls. You must also relink any other programs with which your IMS MPP is dynamically or statically linked if they perform native IMS database calls.

Once you have relinked your MPP to include the ARTT stub, you need only repeat the relink if you change the code for your MPP. In addition, when your MPP runs outside ARTT control, the stub will 'step aside' and allow the MPP to run with native IMS database calls.

You can relink your IMS batch program to include the ARTT stub using:

- Your program load module and the sample JCL in Figure 56.
- Your program object code and sample JCL in Figure 57.

### Relinking Your IMS MPP Load Module

Use the sample JCL in Figure 56 on page 152 to relink the load module for your IMS MPP to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.

### Relinking Your IMS MPP Object Code

Use the sample JCL in Figure 57 on page 154 to relink the object code for your IMS batch program to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.

```
//USERNAME JOB , 'ARTT MPP RELINK', REGION=4096K, NOTIFY=USERNAME
//*-----
/** 1. COMPILE ATGPRFX, USED TO INTERCEPT THE MPP'S ENTRY POINT
/** 2. RELINK THIS ATGPRFX INTO LOAD MODULE & REPLACE IMS INTERFACE
/**    DFSLI000 WITH ARTT IMS INTERFACE ATGLI000
/**
/** * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
/** * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE RELINKED
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE RELINKED
/** * REPLACE entrypt WITH ENTRY POINT OF LOAD MODULE TO BE RELINKED
/** * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
/**    MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
/** * REPLACE ims-hlq WITH IMS SYSTEM QUALIFIER, EG. IMS, IMS.V6R1M0
/** * REPLACE atgli000-lib WITH LOCATION OF ARTT ATGLI000 MODULE
/** * REPLACE input-loadlib WITH LOCATION OF EXISTING MPP LOAD MODULE
/** * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
/**-----
/** STEP 1 : COMPILE ATGPRFX (ARTT MPP INTERCEPT MODULE)
/**-----
//ASSEM    EXEC HLASMCL,
//          PARM.L='LET,MAP,LIST,NCAL'
//SYSLIB   DD
//          DD DSN=artt-system.SATGMACS,
//          DISP=SHR
//          ATGPRFX PROGRAM=pgmname, AMODE=31, RMODE=ANY, ENTRY=entrypt
//          END
//L.SYSLMOD DD DSN=&&STUB(ATGPRFX),
//          DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1,1))
/**-----
/** STEP 2 : LINK EXISTING LOAD MODULE WITH ATGPRFX & ATGLI000
/**-----
//LINK     EXEC PGM=IEWL,
//          PARM='LIST,MAP,XREF'
//SYSLIB   DD DSN=other-link-lib,
//          DISP=SHR
//          DD DSN=ims-hlq.RESLIB,
//          DISP=SHR
//ATGPRFX  DD DSN=&&STUB(ATGPRFX),
//          DISP=(OLD,DELETE)
//ATGLINK  DD DSN=atgli000-lib,
//          DISP=SHR
//EXISTING DD DSN=input-loadlib,
//          DISP=SHR
```

```
//SYSLMOD DD DSN=output-loadlib,  
//          DISP=SHR  
//SYSUT1 DD UNIT=SYSDA,  
//          SPACE=(CYL,(1,1))  
//SYSPRINT DD SYSOUT=*  
//SYSLIN DD *  
    INCLUDE ATGPRFX(ATGPRFX)  
    REPLACE DFSLI000  
    INCLUDE EXISTING(pgmname)  
    CHANGE DFSLI000(ATGLI000)  
    INCLUDE ATGLINK(ATGLI000)  
    ENTRY ATGPRFX  
    NAME pgmname(R)  
/*  
/*-----  
/* END OF MODULE  
/*-----
```

*Figure 56: JCL to Relink an IMS MPP (Load Module)*



```

//USERNAME JOB , 'ARTT MPP RELINK', REGION=4096K, NOTIFY=USERNAME
//*-----
/** 1. COMPILE ATGPRFX, USED TO INTERCEPT THE MPP'S ENTRY POINT
/** 2. COMPILE STEP, IF REQUIRED. (NB. CREATE OBJECT pgmname)
/** 3. LINK ATGPRFX, OBJECT MODULE AND ARTT IMS INTERFACE ATGLI000
/**
/** * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
/** * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE CREATED
/** * REPLACE entrypt WITH ENTRY POINT OF LOAD MODULE TO BE RELINKED
/** * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
/** MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
/** * REPLACE ims-hlq WITH IMS SYSTEM QUALIFIER, EG. IMS, IMS.V6R1M0
/** * REPLACE atgli000-lib WITH LOCATION OF ARTT ATGLI000 MODULE
/** * REPLACE object-lib WITH LOCATION OF COMPILED OBJECT MODULE
/** * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
/**-----
/** STEP 1 : COMPILE ATGPRFX (ARTT MPP INTERCEPT MODULE)
/**-----
//ASSEM EXEC HLASMCL,
// PARM.L='LET,MAP,LIST,NCAL'
//SYSLIB DD
// DD DSN=artt-system.SATGMACS,
// DISP=SHR
// ATGPRFX PROGRAM=pgmname, AMODE=31, RMODE=ANY, ENTRY=entrypt
// END
//L.SYSLMOD DD DSN=&&STUB(ATGPRFX),
// DISP=(NEW,PASS),
// SPACE=(CYL,(1,1,1))
/**-----
/** STEP 2 : COMPILE PROGRAM SOURCE INTO OBJECT MODULE (IF REQUIRED)
/**-----
/**-----
/** STEP 3 : LINK OBJECT MODULE WITH ATGPRFX & ATGLI000
/**-----
//LINK EXEC PGM=IEWL,
// PARM='LIST,MAP,XREF'
//SYSLIB DD DSN=other-link-lib,
// DISP=SHR
// DD DSN=ims-hlq.RESLIB,
// DISP=SHR
//ATGPRFX DD DSN=&&STUB(ATGPRFX),
// DISP=(OLD,DELETE)
//ATGLINK DD DSN=atgli000-lib,
// DISP=SHR
//OBJECT DD DSN=object-lib,
// DISP=SHR

```

```
//SYSLMOD DD DSN=output-loadlib,  
//          DISP=SHR  
//SYSUT1 DD UNIT=SYSDA,  
//          SPACE=(CYL,(1,1))  
//SYSPRINT DD SYSOUT=*  
//SYSLIN DD *  
    INCLUDE ATGPRFX(ATGPRFX)  
    INCLUDE ATGLINK(ATGLI000)  
    INCLUDE OBJECT(pgmname)  
    ENTRY ATGPRFX  
    NAME pgmname(R)  
/*  
/*-----  
/* END OF MODULE  
/*-----
```

*Figure 57: JCL to Relink an IMS MPP (Object Code)*

---

## Instructing ARTT to Record Your Base Execution

When you instruct ARTT to record your base execution (step-by-step instructions begin on page 157), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

When you select **E** from the ARTT Primary Menu, the Capture Execute Menu (Figure 13 on page 56) is displayed. The options shown on the menu depend on how ARTT is configured for your installation. Figure 13 shows the options for an installation configured for IMS, CICS, and DB2.

*This chapter assumes an installation configured only for standard batch and IMS.*

### Capture Execute for IMS Online Panel

On the Capture Execute Menu, select **I**, Capture execute for IMS Online to display the Capture Execute for IMS Online panel.

```
ARTT - Capture Execute for IMS Online
Command ==>>>_____

Specify Mandatory ARTT Run Information:
Run Unit Name. . . . LIM2AM17
Run ID . . . . . IMS2_____
Log ID . . . . . IMS_____

Specify Optional Information:
Run Information . . N      (Y/N - Specify Run Information Indicators ?)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 58: Capture Execute for IMS Online Panel*

ARTT uses the information that you specify on the panel to:

- Set up the appropriate ARTT control file records
- Allocate a log file in which to record the results of the Capture execution.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

### Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your IMS MPP in Capture mode.

### Run Unit Name

Specify a name for the logical unit of work that ARTT is to run. The Run Unit Name is also used to: construct the log file name for the MPP, construct control file entries for the MPP, and identify the MPP to the ARTT-controlled MPR. The Run Unit Name can be alphabetic, or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run unit name. If you do not, this message is displayed in the top right corner of the panel:

```
Blank Run Unit Name.
```

### Run ID

Specify a run identifier for this execution of the MPP Capture mode. The identifier enables ARTT to set up and identify unique records for this Capture execution in the Program control file and the Test control file. The Run ID can be alphabetic, or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Run ID.
```

### Log ID

Specify an identifier that ARTT can use to construct a unique log file name for this Capture execution. The identifier can be alphabetic, or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.. The following example shows how the log file name is constructed:

```
Prefix.ARTT.RunUnitName.LogID.LogSuffix
```

*Prefix* is the high-level qualifier, and *LogSuffix* is the log file suffix that you specified when you set up your user options. For more information about specifying the log suffix, see page 45 for more information. You specified the *RunUnitName* in the **Run Unit Name** entry field described in this chapter.

You must specify a log identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Log ID.
```

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Capture execution.

### Run Information

You change run information parameters on a Specify Run Information panel. The panel is displayed when you specify Y in the **Run Information** entry field on the Capture Execute for IMS Online panel, and then press Enter. See Figure 18 on page 62 for an example of a Specify Run Information panel.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to N (No). Accept the default values to run the IMS MPP Capture execution without changing any run information parameters.

To change a parameter, overwrite the N with Y (Yes). When you have changed all of the parameters you want, press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type Can on the command line, and then press Enter.

---

## How to Record a Base Execution

If you need information on the values that you can specify on, or choose from, the Capture Execute for IMS Online panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 155.

**Note:** Before you can run a Capture execution for an IMS MPP, you must relink your MPP to include the ARTT-provided stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to do this, see “Relinking Your IMS MPP to Include the ARTT Stub” on page 110.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type E on the command line of the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The Capture Execute Menu is displayed (see Figure 13 on page 56).

3. Select I, Capture Execute for IMS Online.

The Capture Execute for IMS Online panel is displayed (see Figure 58 on page 155).

4. Specify information, and select processing options for the MPP for which you are capturing data, and then press Enter.

The Capture Execute for IMS Online panel is redisplayed containing the following confirmation message:

```
The information you have specified has been added to the
ART control files. You should now start up your ART MPP and
execute the transactions you wish to capture for this Run
Unit.
```

5. If you try to create a log file that already exists, a Duplicate Log File subpanel is displayed, like the one that follows:

```
Command ==> _____  
  
Log File . . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'  
  
The above log already exists and will be overwritten  
during this capture run.  
  
Do you wish to overwrite this file ? . . . N (Y/N)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

6. Specify **Y**, and then press Enter to overwrite the log file with a new log file, and redisplay the Capture Execute for IMS Online panel containing the confirmation message shown above.  
Alternatively, specify **N** to close the subpanel and return to the Capture Execute for IMS Online panel to specify a new log file name.
  7. Start your ARTT MPR (Message Processing Region) with the same run unit name as you specified on the Capture Execute for IMS Online panel.
  8. Submit and run your MPP in the normal way for your installation.
- ARTT captures the I/O activity for the MPP and stores it in the log file set up in step 4 above. When the Capture execution completes, ARTT closes down the log file.

## Reading the Capture Execution Summary Report

When you successfully complete a Capture execution for an IMS MPP, and then close your MPR, ARTT produces a Capture Execution Summary report containing the result of the Capture execution. The report (like the example in Figure 59) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0007I IMS DBD/PSB Library. = REDG.TESTPACK.ARTTIMS.PSBLIB
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.LIM2AM17.IMS.LOG
ATGA0705I Program LIM2AM17 executed with:
ATGA0706I   Run Mode = CAPTURE
ATGA0707I   Status = N
ATGA0708I   Run Id = IMS2
ATGA0030I Task DFSRRC00 attached with:
ATGA0031I   Parameters = "MSG,022000000000,W01050000,XX,1,E,00,050,040,IM2A,ANW2AMSG" (58 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DFSRRC00 completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I PCB001   N    0    0       2       1       0       0
ATGA0715I PCB004   N    0    0       1       0       0       0 C6009004
ATGA0715I PCB005   N    0    0       1       0       0       0 C6009005
ATGA0715I PCB006   N    0    0       1       0       0       0 C6009006
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.

```

Figure 59: IMS MPP Capture Execution Summary Report

The report shows:

- The names of the ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - Conversion library
  - Compare library
  - IMS DBD/PSB library
  - Test control file
  - Log file.

For more information about ARTT control files, see page 265.

- The following run parameters:
  - Run Mode (in this case, CAPTURE)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the Capture Execute for Standard Batch and IMS Batch panel.

The report also shows the following information for each PCB not specifically excluded from the Capture execution:

<b>Name</b>	Name of each PCB with I/O activity in the Capture execution.
<b>s</b>	Status of each PCB, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the PCB was opened during the course of the Capture execution.
<b>Closes</b>	Number of times that the PCB was closed during the course of the Capture execution.
<b>Inputs</b>	Number of times that data was read from the PCB during the course of the Capture execution.
<b>Outputs</b>	Number of times that data was written to the PCB during the course of the Capture execution.
<b>Diffs</b>	Always 0 for a Capture execution.
<b>Shown</b>	Always 0 for a Capture execution.
<b>ConvMod</b>	Name of the conversion module for the PCB.
<b>CompMod</b>	Not applicable for a Capture execution.
<b>Dataset Name</b>	Fully-qualified name of each PCB with I/O activity in the Capture execution.

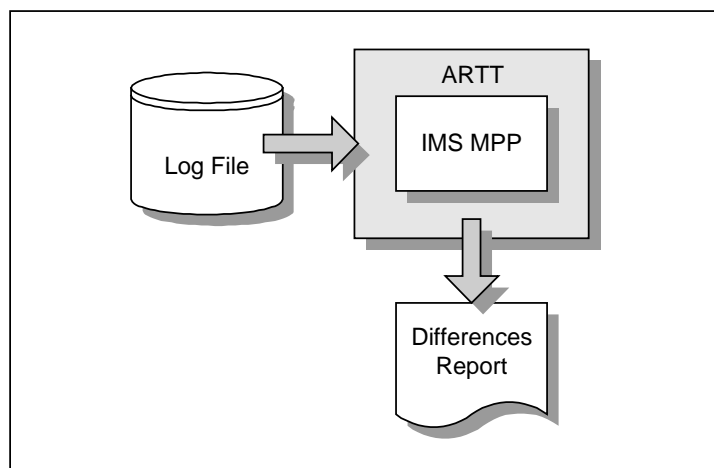


---

## Chapter 13. Executing a Proof Run for an IMS MPP

After reengineering or modifying your IMS MPP, you need to verify that, using the same input, the MPP works exactly as it did before it was modified. You do this, in the same way as you would for an IMS batch program, by executing a proof run in **Virtual Replay** mode.

For a Virtual Replay execution, ARTT takes its input directly from the log file generated by the IMS MPP's Capture execution. ARTT discards the output from the Virtual Replay after comparing it with the log file, unless you specify a spool file or an inline data set as the output data set.



*Figure 60: IMS MPP Running in Virtual Replay Mode*

Using input from the log file, ARTT monitors the I/O events and data for the Virtual Replay run and compares them with the events and data recorded in the log file for the IMS MPP's base run in Capture mode. If there are differences, ARTT produces a report detailing the differences.

Date Rolling works in the same way for an IMS MPP as it does for an IMS batch program. For more information, see "About Simulating Past or Future Dates" on page 176.

Conversion modules work in the same way for an IMS MPP as they do for an IMS batch program. For steps for creating conversion modules with an IMS MPP, see page 175.

### **This chapter describes:**

- The Virtual Replay for IMS Online panel, in which you instruct ARTT to execute your proof run using virtual input. The description also includes the subpanels displayed when you select options from the panel.
- How to run an IMS MPP in Virtual Replay mode.
- The reports produced when you run an IMS MPP in Virtual Replay mode.

---

## Instructing ARTT to Execute Your Proof Run

When you instruct ARTT to execute your proof run (step-by-step instructions begin on page 167), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

**Note:** If the code for your IMS MPP has changed between its baseline (Capture) execution and this proof run, you must relink your MPP to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to relink your program, see “Relinking Your IMS MPP to Include the ARTT Stub” on page 150.

When you select `V`, `Virtual Replay` execution from the ARTT Primary Menu, the `Virtual Replay Execute` Menu is displayed. For menu details, see Figure 27 on page 83.

The options shown on the menu depend on how ARTT is configured for your installation. Figure 27 shows the options for an installation configured for IMS, CICS and DB2. An installation configured only for IMS has a menu showing the following options:

- `Virtual Replay execute for Standard Batch and IMS Batch`
- `Virtual Replay execute for IMS online.`

This chapter assumes an installation configured only for Standard Batch and IMS.

Select I, Virtual replay execute for IMS Online from the menu and then press Enter. The Virtual Replay Execute for IMS Online panel is displayed (Figure 61). On this panel, specify information and options for the IMS MPP that you want to run using virtual (stored) input data. The information and options specified determine which subpanels are displayed.

```

ARTT - Virtual Replay Execute for IMS Online
Command ==>_____

Specify Mandatory ARTT Run Information:
  Run Unit Name. . . . LIM2AM17
  Run ID . . . . . IMS2_____
  Log ID . . . . . IMS_____

Specify JCL Steplib Libraries:
  . . . . . 'REDG.TESTPACK.ARTIMS.APPLOAD'_____
  . . . . . _____
  . . . . . _____
  . . . . . _____
  . . . . . _____

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit JCL before submission ?)
  Audit Exclusion /
    Report Limit . . . N    (Y/N - Specify Exclusion/Limitation Details ?)
  Run Information . . . N   (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . N    (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel

```

Figure 61: Virtual Replay Execute for IMS Online Panel

Before running your IMS MPP in Virtual Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the program's log file.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The paragraphs that follow describe the fields in each group, and their attributes.

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your IMS MPP in Virtual Replay mode.

### Run Unit Name

Specify the run unit name that you used when you ran the MPP in Capture mode. The Run Unit Name enables ARTT to identify the correct records for this Virtual Replay execution in the Program control file and the Test control file.

You must specify a Run Unit Name. If you do not, the following message is displayed in the top right corner of the `Virtual Replay Execute for IMS Online` panel.

```
Blank Run Unit Name.
```

### Log ID

Specify the log identifier that you used when you ran the MPP in Capture mode. The Log ID enables ARTT to ensure that the Virtual Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, the `Run and Log IDs` panel is displayed. Select from the panel by typing `S` next to the appropriate Log ID, and then press `Enter` to return to the `Virtual Replay Execute for IMS Online` panel.

## Specify JCL Steplib Libraries

Use the fields in this group to specify up to five additional step libraries in which the MPP load modules under test reside.

**Note:** If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, `'Y001DP9.A.LOAD'`) or a partially complete library name not enclosed in quotation marks (for example, `A.LOAD`). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Virtual Replay execution.

### Edit JCL

Specify `N` if you do not want to browse or edit the ARTT-generated JCL for this Virtual Replay execution.

Accept the default value (`Y`) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press `Enter` in the `Virtual Replay Execute for IMS Online` panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

### Audit Exclusion/Report Limit

Specify `Y` on the `Virtual Replay Execute for IMS Online` panel, and then press `Enter` to display a `Specify Exclusion/Limitation Details` panel (see Figure 23 on page 73).

Accept the default value (`N`) on the `Virtual Replay Execute for IMS MPP` panel to have ARTT generate Virtual Replay JCL without changing the DD statement exclusions, or without specifying any report limitation details.

Use the `Specify Exclusion/Limitation Details` panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.  
To exclude a statement, type its ddname in the next available **Audit Exclude List** entry field.
- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.  
To specify the maximum number of differences for up to 10 DD statements:
  1. Type the ddname of the DD statement in the next available Report Limitation List entry field. For example, `DD1` in Figure 23 on page 73.
  2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, `Limit 1` in Figure 23 on page 73.

Press `Enter` to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press `PF3`, or type `Can` on the command line, and then press `Enter`.

### **Run Information**

Specify **Y** on the **Virtual Replay Execute for IMS Online** panel, and then press **Enter** to display a **Specify Run Information** panel (Figure 18 on page 62).

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to **N** (No). Accept the default values to run the IMS MPP in Virtual Replay mode without changing any run information parameters.

To change a parameter, overwrite the **N** with **Y** (Yes). When you have changed all of the parameters you want, press **Enter**. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press **PF3**, or type **Can** on the command line, and then press **Enter**.

### **Data Change**

Specify **Y** on the **Virtual Replay Execute for IMS Online** panel, and then press **Enter** to display a **Specify Transformation Criteria** panel (Figure 54 on page 145) on which you can change one or more of the following for this Virtual Replay execution:

- The MPP's Roll Mode. Specify a roll mode of either **Y** (Year) or **D** (Day).
- The MPP's Roll Amount. Specify a positive or negative number that tells the MPP the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward. For more information, see "About Simulating Past or Future Dates" on page 176.
- The Program Status. Specify whether the program is transformed (**Y**) or non-transformed (**N**).
- The Source Status. Specify whether the source data is transformed (**Y**) or non-transformed (**N**).

---

## How to Execute a Proof Run

If you need information on the values that you can specify on, or choose from, the `Virtual Replay Execute for IMS Online` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 163.

**Note:** If the code for your IMS MPP has changed between its baseline (Capture) execution and this proof run, you must relink your MPP to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native IMS database calls. For instructions on how to relink your program, see “Relinking Your IMS MPP to Include the ARTT Stub” on page 150.

Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one IMS MPP at a time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `v` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Virtual Replay Execute Menu` is displayed (Figure 27 on page 83).

3. Type `B` on the command line of the `Virtual Replay Execute Menu`, and then press Enter.

The `Virtual Replay Execute for IMS Online` panel is displayed (Figure 61 on page 163).

4. On the `Virtual Replay Execute for IMS Online` panel, specify information, and select processing options for the IMS MPP for which you are executing the Virtual Replay run, and then press Enter. For panel details, see page 163.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

5. If you specified Y in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Replay IMS MPP Program subpanel, similar to the one that follows:

```
Command ==>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Virtual Replay JCL, a Submit Replay IMS MPP Program subpanel is displayed.

6. On the Submit Replay IMS MPP Program subpanel, specify Y, and then press Enter to submit the Virtual Replay execution JCL for processing. Alternatively, specify N, and then press Enter to return to the Virtual Replay Execute for IMS Online panel without submitting the JCL.



## Reading the Virtual Replay Execution Summary Report

When you successfully complete a Virtual Replay execution for an IMS MPP, ARTT produces a Virtual Replay Execution Summary report containing the result of the Virtual Replay execution. The report (like the example in Figure 62) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0007I IMS DBD/PSB Library. = REDG.TESTPACK.ARTT.IMS
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.LIM2AM17.IMS.LOG
ATGA0705I Program LIM2AM17 executed with:
ATGA0706I   Run Mode = VIRTUAL
ATGA0707I   Status = N
ATGA0708I   Run Id = IMS2
ATGA0030I Task ATGRR00 attached with:
ATGA0031I   Parameters = "MSG" (3 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA3008I -----
ATGA3009I MPP 'ACAC6009' is being scheduled.
ATGA3008I -----
ATGA0040I Program ATGRR00 completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I PCB001   N    0    0     2      1      0      0              IMS=ACAC6009.PCB001.IMSMSGQ
ATGA0715I PCB004   N    0    0     1      0      0      0 C6009004      IMS=ACAC6009.PCB004.DM412
ATGA0715I PCB005   N    0    0     1      0      0      0 C6009005      IMS=ACAC6009.PCB005.DP040
ATGA0715I PCB006   N    0    0     1      0      0      0 C6009006      IMS=ACAC6009.PCB006.DZ406
ATGA0712I -----
ATGA0718I I/O Activity from Capture Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I PCB001   N    0    0     2      1      0      0              IMS=ACAC6009.PCB001.IMSMSGQ
ATGA0715I PCB004   N    0    0     1      0      0      0 C6009004      IMS=ACAC6009.PCB004.DM412
ATGA0715I PCB005   N    0    0     1      0      0      0 C6009005      IMS=ACAC6009.PCB005.DP040
ATGA0715I PCB006   N    0    0     1      0      0      0 C6009006      IMS=ACAC6009.PCB006.DZ406
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.

```

Figure 62: Virtual Replay Execution Summary Report for an IMS MPP

The information shown in the report varies depending on whether ARTT detected any differences between the Virtual Replay execution and the Capture execution.

The summary report shows:

- The names of ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - Conversion library
  - Compare library (where used)
  - IMS DBD/PSB Library
  - Test control file
  - Log file.

For more information about the control files, see “ARTT Control Files” on page 265.

- The following run parameters:
  - Run Mode (in this case, VIRTUAL)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the Virtual Replay Execute for IMS MPP panel.

The report also shows the following information for each input and output file not specifically excluded from the Virtual Replay execution:

<b>Name</b>	Symbolic name of the DD statement for each file with I/O activity in the Virtual Replay execution.
<b>s</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Virtual Replay execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Virtual Replay execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Virtual Replay execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Virtual Replay execution.
<b>Diffs</b>	Number of differences detected.
<b>Shown</b>	Number of differences shown.
<b>ConvMod</b>	Name of the conversion module for the file. For more information about conversion modules, see “Instructing ARTT to Transform Data” on page 172.
<b>CompMod</b>	Name of the comparison module for the file. For more information about conversion modules, see “Instructing ARTT to Transform Data” on page 172.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Virtual Replay execution.

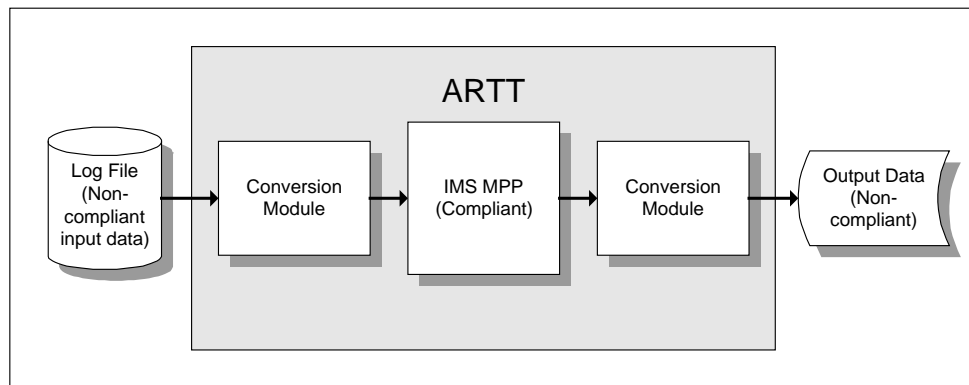
For comparison, the I/O activity report from the Capture execution is also shown.

---

## Chapter 14. Executing a Proof Run with Data Transformation for an IMS MPP

After you have captured the baseline information for your IMS MPP, you can transform the data input to, or output from, a Virtual Replay (proof) run by:

- Changing date formats ( for example, from mm/dd/yy to mm/dd/yyyy)
- Rolling the dates forward (aging them), or backward (rejuvenating them).



*Figure 63: Conversion Modules in Use during Virtual Replay of an IMS MPP*

To transform the data, execute your Virtual Replay run using a conversion module to control which date formats are changed, and which are rolled.

### **This chapter describes:**

- How to prepare for data transformation when executing an IMS MPP in Virtual Replay mode
- How to simulate past or future dates when executing an IMS MPP in Virtual Replay mode.

---

## Instructing ARTT to Transform Data

All data transformation requires that you create a conversion module. A conversion module is created automatically when you specify details of your transformation and then specify **Y** in the **Create Conversion Mod?** field on the `Data Transformation Setup for IMS` panel.

In addition to creating a conversion module, if you want to transform data by:

- Changing date formats, you must specify details of selected formats on additional panels, which are displayed from the `Data Transformation Setup for IMS` panel.
- Simulating past or future dates, you must specify roll settings during the Virtual Replay execution.

## Data Transformation Setup for IMS Panel

When you create a conversion module (step-by-step instructions begin on page 175), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

When you select **S**, `Data Transformation setup` from the ARTT Primary Menu (Figure 11 on page 48), the `Data Transformation Setup Menu` is displayed (Figure 31 on page 95).

The options shown on the menu depend on how ARTT is configured for your installation. Figure 31 shows menu options for an installation configured for IMS, CICS and DB2, whereas the options for an installation configured only for IMS would be:

- `Data Transformation setup for Standard Batch`
- `Data Transformation setup for IMS`.

This chapter assumes an installation configured only for Standard Batch and IMS.

Select **I**, `Data Transformation setup for IMS` from the menu, and then press Enter. The `Data Transformation Setup for IMS` panel is displayed (Figure 51 on page 139). On this panel, select options and specify setup information to prepare for a proof run with data transformation for an IMS MPP.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The paragraphs that follow describe the fields or options in each group, and their attributes.

## Setup Options

The first option in this group enables you to define target data in a complete database, or in specific program views of a database.

The second option enables you to create conversion modules for your database views.

### Define Target Data?

Specify one of the following:

- D** Define target data in the database defined by the DBD specified in the **DBD Name** field
- P** Define target data in one or more of the PCBs contained in the PSB specified in the **PSB Name** field. Each PCB defines a specific program view of a database.
- N** Do not define any target data.

### Create Conversion Mod?

Specify **Y** to create a conversion module for each PCB in the specified PSB as follows:

- DBD and GSAM PCBs, create a conversion module whether target data is defined or not.
- I/O and Alternate PCBs, create a conversion module only if target data is defined.

Accept the default, **N**, to proceed without creating any conversion modules.

## DBD Setup Information

ARTT enables you to define target data for a complete database. Use the fields in this group to tell ARTT where to find the DBD for which you are defining target data.

### DBD Library

Specify the name of the library containing the DBD. You must specify a library name in this field if you have specified **D** as your option for defining target data.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

### DBD Name

Specify the name of a DBD for which you want to define target data. If you do not specify a DBD name, a member selection panel is displayed, like the one shown in Figure 52 on page 141. The panel shows all the DBDs in your specified library, and enables you to select one or more for processing.

When you specify the name of a DBD in the **DBD Name** field, or when you select one from the member selection panel, one of the following is displayed:

- **Family Maintenance** panel. Displays only if your selected DBD already has parameter statements defined. Use the panel to modify existing statements or define new statements for the DBD.

For more information about modifying parameter statements or defining new statements, see “Specifying Data Transformation Parameters” on page 304.

- **Family Statement Select** panel. Displays only if your selected DBD has no parameter statements defined. Use the panel to define new parameter statements for the DBD.

## PSB Setup Information

ARTT enables you to define target data for the PCBs in a specified PSB. Use the fields in this group to tell ARTT where to find the PSB containing the PCBs for which you are defining target data. You must also specify data in this group of fields if you are creating conversion modules.

### PSB Library

Specify the name of the library containing your chosen PSB. You must specify a library name in this field if you have specified `P` as your option for defining target data.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

### PSB Name

Specify the name of a PSB containing the PCBs for which you want to define target data or create a conversion module. If you do not specify a PSB name, a member selection panel is displayed, like to the one shown in Figure 52. The panel shows all the PSBs in your specified library, and enables you to select one for processing.

When you specify a PSB name in the **PSB Name** field, or when you select a PSB from the member selection panel, a `PCB Selection for Target Data` panel is displayed like the one shown in Figure 53 on page 142.

Select from the panel by typing `S` in the Option column next to one or more PCBs. When you select a PCB, one of the following is displayed:

- `Family Maintenance` panel. Displays only if your selected PCB already has parameter statements defined. Use the panel to modify existing statements or define new statements for the PCB.  
For more information about modifying parameter statements or defining new statements, see “Specifying Data Transformation Parameters” on page 304.
- `Family Statement Select` panel. Displays only if your selected PCB has no parameter statements defined. Use the panel to define new parameter statements for the PCB.

---

## Steps for Creating a Conversion Module

If you need information on the values that you can specify on, or choose from, the `Data Transformation Setup for IMS` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 172.

**Note:** In addition to creating a conversion module, the `Data Transformation Setup for IMS` panel is also used to display the panels required for changing date formats.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `S` on the command line on the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.  
The `Data Transformation Setup Menu` is displayed (Figure 31 on page 95).
3. Type `I` on the command line on the `Data Transformation Setup Menu`, and then press Enter.  
The `Data Transformation Setup for IMS` panel is displayed (Figure 51 on page 139).
4. In the **Define Target Data** option field, specify `P` (PSB).
5. Specify a PSB library name and a PSB name in the fields in the `PSB Setup Information` group, and then press Enter.  
If you do not specify a PSB name, a `PSB Member List` is displayed. Select a PSB from the list and then press Enter.  
The `PCB Selection for Target Data` panel is displayed (Figure 53 on page 142).
6. Select one or more PCBs from the list and modify their parameters or add new parameters as required (For more information, see “Specifying Data Transformation Parameters” on page 304). When you are finished, press `PF3` to return to the `Data Transformation Setup for IMS` panel.
7. In the **Create Conversion Mod?** option field, specify `Y`, and then press Enter.  
ARTT creates a conversion module for each of your selected PCBs. For more information about conversion modules, see “About Conversion Modules and the Conversion Module Generator” on page 303.

---

## Changing Date Formats

When you want to change date formats, you must specify details of selected formats on the Family Maintenance and Family Statement Select panels. These panels are displayed after you have selected appropriate options on the Data Transformation Setup for IMS panel.

---

## About Simulating Past or Future Dates

Date Rolling is useful for verifying that your program will work correctly with future dates. It automatically ages dates (by rolling them forward) or rejuvenates dates (by rolling them backward) in input and output files according to values that you specify.

Rolling dates comprises two sets of procedures:

1. Initially, the data source in which you roll dates must be associated with a file family, and that file family must have its own conversion module.

You start the process of associating a data source with a file family on the Data Transformation Setup for IMS panel. You use that same panel to create a conversion module for the file family. Instructions for both of these procedures starts on page 172.

2. Next, when you are executing your Virtual Replay execution, you must type Y in the **Data Change** field on the Virtual Replay Execute for IMS Online panel to display the Specify Transformation Criteria panel. On this panel, you can specify your roll information.

*Preparing to Simulate Past or Future Dates* describes how to specify roll information on the Specify Transformation Criteria panel. Instructions for executing a Virtual Replay execution using date rolling begin on page 179.

## Preparing to Simulate Past or Future Dates

When you simulate past or future dates (step-by-step instructions begin on page 178), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.



## Specify Transformation Criteria Panel

To display the Specify Transformation Criteria panel (Figure 54 on page 145), specify Y against the Data Change option on the Virtual Replay Execute for IMS Online panel (Figure 61 on page 163), and then press Enter.

```

ARTT - Specify Transformation Criteria                               Row 1 to 9 of 47
Command ==>_____ Scroll ==> PAGE

Run Unit Name . : LIM2AM17    Run ID . : IMS2          Log ID . : IMS
Log File Name . : REDG.TESTPACK.ARTT.LIM2AM17.IMS.LOG

Specify Run Unit Transformation Criteria:
Roll Mode . . . . Y          (D - Days, Y - Years)
Roll Amount . . . 0_____ (Range : -999 to 9999)
Run Unit Status . N         (Y - Transformed, N - Not Transformed)

Update Data Source Transformation Criteria:
-----
Sel  Data Source                                     Cmod  Xmod  Stat  Family
-----
-    IMS=ACAC0079.PCB001.IMSMSGQ                     N      N     N     C0079FAM
-    IMS=ACAC0079.PCB002.IMSMSGQ                     N      N     N     C0079FAM
-    IMS=ACAC0079.PCB003.IMSMSGQ                     N      N     N     C0079FAM
-    IMS=ACAC0079.PCB004.DM412                       Y      N     N     C0079FAM
-    IMS=ACAC0079.PCB005.DP040                       Y      N     N     C0079FAM
-    IMS=ACAC0079.PCB006.DZ406                       Y      N     N     C0079FAM
-    IMS=ACAC0079.PCB007.GSAMDB                      Y      N     N     C0079FAM
-    IMS=ACAC0079.PCB008.GSAMDB2                    Y      N     N     C0079FAM
-    IMS=ACAC6009.PCB001.IMSMSGQ                     N      N     N     C6009FAM
  
```

Figure 64: Specify Transformation Criteria (IMS Online)

The Specify Transformation Criteria panel enables you to change one or more of the following for your Virtual Replay execution:

- The IMS batch program's Roll Mode. Specify either Y (Year) or D (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged), or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Program Status. Specify whether the program is transformed (Y) or not (N).
- A list of the Data Sources for this replay execution for which you can specify transformation criteria.

To change the Roll Mode, Roll Amount, or Program Status, overwrite the existing value for the field with an appropriate value, then press PF3.

Accept the default value (N) to run the Virtual Replay execution without changing any of these parameters.

The data sources for which you can specify transformation criteria are listed in the bottom part of the panel. Scroll forward or backward to view the data sources in the list. To change the transformation criteria for a data source, type `S` in the `Sel` column next to the data source, and then press `Enter`. An `Update Data Source` subpanel is displayed, like the one shown in **Figure 34** on page 100.

**Notes:**

1. The list in the bottom part of the `Specify Transformation Criteria` panel shows data sources only for the type of program with which you are working. For example, if you are transforming data for an IMS batch program, the list shows only data sources for IMS batch programs.
2. If you do not intend to transform any data, you do not need to select any data sources for replay.

The fields in the `Update Data Source` subpanel enable you to:

- Set the data source status. Specify `Y` for transformed status or `N` for non-transformed status.
- Use a conversion module. Specify `Y` to run with a conversion module or `N` to run without a conversion module.
- Use a comparison module. Specify `Y` to run with a comparison module or `N` to run without a comparison module.
- Specify an old record size. Type a record size between 1 and 99999.
- Specify a new record size. Type a record size between 1 and 99999.

**To change the information for a data source, complete the following steps:**

1. Select a data source from the `Data Source` column by typing `S` in the `Sel` field at the left of the panel, and then press `Enter`.  
The `Update Data Source` subpanel is displayed.
2. Type new information for your selected data source as required, and then press `Enter`.  
The `Update Data Source` subpanel closes and the `Specify Transformation Criteria` panel is displayed containing the new information for your selected data source.  
To close the subpanel without making any changes type `Can` on the command line and then press `Enter`, or press `PF3`.
3. If you want to change the information for another data source, repeat steps 1 and 2 in this list.  
Alternatively, type `Can` on the command line and then press `Enter`, or press `PF3` to close the `Specify Transformation Criteria` panel.

---

## How to Execute a Proof Run with Data Transformation

If you need information on the values that you can specify on, or choose from, the `Specify Transformation Criteria` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 177.

**Note:** Before you can run an MPP in Virtual Replay mode with date rolling, each PCB in which dates are to be rolled must be associated with a conversion module. For information about generating and working with conversion modules, see “About Conversion Modules and the Conversion Module Generator” on page 303.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `V` on the command line in the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

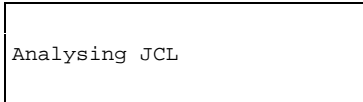
The `Virtual Replay Execute Menu` is displayed (Figure 27 on page 83).

3. Type `I` on the command line in the `Virtual Replay Execute Menu`, and then press Enter.

The `Virtual Replay Execute for IMS Online` panel is displayed (Figure 61 on page 163).

4. Specify information about the IMS MPP for which you are executing the Virtual Replay run.
5. Specify `Y` in the **Data Change** field, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:



Analysing JCL

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

The `Specify Transformation Criteria` panel is displayed (Figure 54 on page 145).

6. Specify either `D` (Day) or `Y` (Year) in the **Roll Mode** field.

7. Specify a value from -999 to 9999 in the **Roll Amount** field, and then press PF3.
8. If you specified Y in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Virtual Replay Program subpanel Like the one that follows:

```
Command ==>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Virtual Replay JCL, a Submit Batch Virtual Replay Program subpanel is displayed.

On the Submit Batch Virtual Replay Program subpanel, specify Y, and then press Enter to submit the Virtual Replay execution JCL for processing. To return to the Virtual Replay Execute for IMS Online panel without submitting the JCL, specify N, and then press Enter.

## Part 4. ARTT for DB2 Programs

This part comprises chapters 15 to 17, which describe how to:

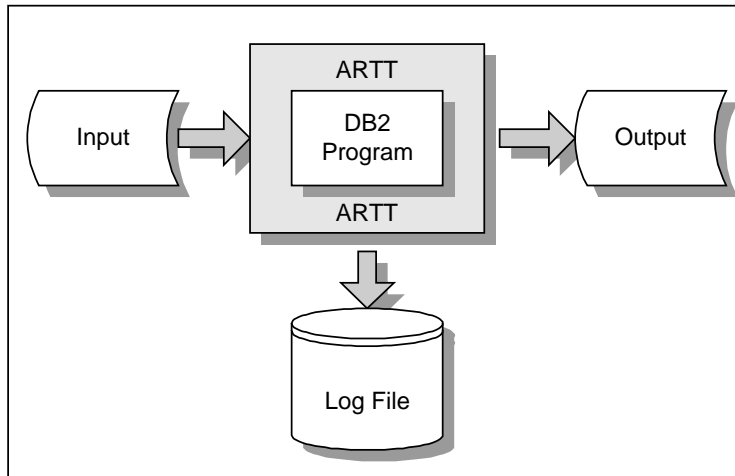
- Run a Capture (baseline) execution for a DB2 program.
- Execute a proof run for a DB2 program using virtual input (stored during the baseline execution).
- Run a DB2 program in Virtual Replay mode with data transformation.



---

## Chapter 15. Capturing a Base Execution

Before reengineering a DB2 program, you need to run a base execution to establish its I/O footprint. Run the base execution under ARTT in **Capture** mode to record your program's I/O activity, including program reads or writes, in a log file. You can then use the log file as a base for comparison with subsequent proof runs of your DB2 program in Virtual Replay mode.



*Figure 65: DB2 Program Running in ARTT Capture Mode*

### **This chapter describes:**

- How to relink your DB2 program so that it can gain access to its data while running under ARTT.
- The `Capture Execute for Standard Batch` and `DB2 Batch` panel in which you instruct ARTT to capture your DB2 base execution. The description also includes the subpanels displayed when you select options from the panel.
- How to run a DB2 program in Capture Mode
- The output produced when you run a DB2 program in Capture Mode.

---

## Relinking Your DB2 Program to Include the ARTT Stub

ARTT cannot directly intercept native DB2 database calls, so you must relink your DB2 program to include an ARTT-provided stub which substitutes ARTT database calls in place of native DB2 database calls. You must also relink any other programs with which your DB2 program is statically linked if they perform native DB2 database calls.

Once you have relinked your program to include the ARTT stub, you need only repeat the relink if you change your program code. In addition, when your program runs outside ARTT control, the stub will “step aside” and allow the program to run with native DB2 database calls.

You can relink your DB2 batch program to include the ARTT stub using:

- Your program load module and the sample JCL in Figure 66.
- Your program object code and sample JCL in Figure 67.

### Relinking Your DB2 Program Load Module

Use the sample JCL in Figure 66 on page 185 to relink the load module for your DB2 program to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.

### Relinking Your IMS MPP Object Code

Use the sample JCL in Figure 67 on page 186 to relink the object code for your IMS batch program to include the ARTT stub that intercepts IMS database calls.

**Note:** Before you submit the JCL for execution, amend it as described in the comments at the front of the JCL.



```

//USERNAME JOB , 'ARTT DB2 RELINK', REGION=4096K, NOTIFY=USERNAME
//*-----
/** 1. RELINK EXISTING DB2 LOAD MODULE & REPLACE DB2 INTERFACE
/**   DSNELI WITH ARTT DB2 INTERFACE ATGHLI
/**
/** * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
/** * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE RELINKED
/** * REPLACE entrypt WITH ENTRY POINT FOR NEW LOAD MODULE
/** * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
/**   MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
/** * REPLACE db2-hlq WITH DB2 SYSTEM QUALIFIER, EG. DB2, DSN.V5R1M0
/** * REPLACE atghli-lib WITH LOCATION OF ARTT ATGHLI MODULE
/** * REPLACE input-loadlib WITH LOCATION OF EXISTING DB2 LOAD MODULE
/** * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
/**-----
/** STEP 1 : LINK EXISTING LOAD MODULE WITH ATGHLI
/**-----
//LINK      EXEC PGM=IEWL,
//          PARM='LIST,MAP,XREF'
//SYSLIB    DD DSN=other-link-lib,
//          DISP=SHR
//          DD DSN=db2-hlq.DSNLOAD,
//          DISP=SHR
//ATGLINK   DD DSN=atghli-lib,
//          DISP=SHR
//EXISTING  DD DSN=input-loadlib,
//          DISP=SHR
//SYSLMOD   DD DSN=output-loadlib,
//          DISP=SHR
//SYSUT1    DD UNIT=SYSDA,
//          SPACE=(CYL,(1,1))
//SYSPRINT  DD SYSOUT=*
//SYSLIN    DD *
//          REPLACE DSNELI
//          INCLUDE EXISTING(pgmname)
//          INCLUDE ATGLINK(ATGHLI)
//          ENTRY entrypt
//          NAME pgmname(R)
/*
/**-----
/** END OF MODULE
/**-----

```

Figure 66: JCL to Relink a DB2 Program (Load Module)

```

//USERNAME JOB , 'ARTT IMS LINK', REGION=4096K, NOTIFY=USERNAME
//*-----
/** 1. COMPILE STEP, IF REQUIRED. (NB. CREATE OBJECT pgmname)
/** 2. LINK OBJECT MODULE AND ARTT DB2 INTERFACE ATGHLI
/**
/** * AMEND JOB CARD TO SUIT YOUR SYSTEM REQUIREMENTS
/** * REPLACE artt-system TO ARTT VERSION, EG. ATC.ARTT.V2R2M0
/** * REPLACE pgmname WITH NAME OF LOAD MODULE TO BE CREATED
/** * REPLACE entrypt WITH ENTRY POINT FOR NEW LOAD MODULE
/** * ADD ANY LIBRARIES REQUIRED BY YOUR SYSTEM TO CREATE FINAL LOAD
/** * MODULE INTO SYSLIB DD CARD IN LINK STEP (other-link-lib)
/** * REPLACE db2-hlq WITH DB2 SYSTEM QUALIFIER, EG. DB2, DSN.V5R1M0
/** * REPLACE atghli-lib WITH LOCATION OF ARTT ATGHLI MODULE
/** * REPLACE object-lib WITH LOCATION OF COMPILED OBJECT MODULE
/** * REPLACE output-loadlib WITH TARGET DSN FOR NEW ARTT LOAD MODULE
/**-----
/** STEP 1 : COMPILE PROGRAM SOURCE INTO OBJECT MODULE (IF REQUIRED)
/**-----
/**-----
/** STEP 2 : LINK OBJECT LOAD MODULE WITH ATGLI000
/**-----
//LINK EXEC PGM=IEWL,
// PARM='LIST,MAP,XREF'
//SYSLIB DD DSN=other-link-lib,
// DISP=SHR
// DD DSN=db2-hlq.RESLIB,
// DISP=SHR
//ATGLINK DD DSN=atghli-lib,
// DISP=SHR
//OBJECT DD DSN=object-lib,
// DISP=SHR
//SYSLMOD DD DSN=output-loadlib,
// DISP=SHR
//SYSUT1 DD UNIT=SYSDA,
// SPACE=(CYL,(1,1))
//SYSPRINT DD SYSOUT=*
//SYSLIN DD *
// INCLUDE ATGLINK(ATGHLI)
// INCLUDE OBJECT(pgmname)
ENTRY entrypt
// NAME pgmname(R)
/**
/**-----
/** END OF MODULE
/**-----

```

Figure 67: JCL to Relink a DB2 Program (Object Code)

---

## Instructing ARTT to Record Your Base Execution

When you capture your base execution (step-by-step instructions begin on page 192), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select E to display the Capture Execute Menu (Figure 13 on page 56). The options shown on the menu depend on how ARTT is configured for your installation. Figure 13 shows the options for an installation configured for IMS, CICS, and DB2.

*This chapter assumes an installation configured only for standard batch and DB2.*

### Capture Execute for Standard Batch and DB2 Batch Panel

From the Capture Execute Menu, select B to display the Capture Execute for Standard Batch and DB2 Batch panel (Figure 68).

```
ARTT - Capture Execute for Standard Batch and DB2 Batch
Command ==>>>_____

Specify JCL Information :
  JCL Library . . . . 'REDG.TESTPACK.ARTDB2A.JCL.V220.HYBRID'_____
  JCL Member . . . . C14NATIV
  Program Name . . . . DB2C14N_

Specify Mandatory ARTT Run Information:
  Run ID . . . . . BASELINE
  Log ID . . . . . BASELINE

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion. . . N    (Y/N - Exclude DDnames from Capture ?)
  Run Information . . N    (Y/N - Specify Run Information Indicators ?)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 68: Capture Execute for Standard Batch and DB2 Batch Panel

Before running your DB2 program in Capture mode, ARTT uses the information that you specify on the panel to:

- Set up the appropriate ARTT control file records
- Allocate a log file in which to record the results of the Capture execution
- Modify the JCL to invoke ARTT properly.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

## **Specify JCL Information**

Use the fields in this group to tell ARTT where to find the DB2 program you want to run in Capture mode.

### **JCL Library**

Specify the name of the library containing the Job Control Language (JCL) job stream for running the DB2 program. The library must either be a partitioned data set or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library.

### **Notes:**

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.Test.JCL') or a partially complete library name not enclosed in quotation marks (for example, Test.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

### JCL Member

Specify the name of the library member containing the Job Control Language (JCL) job stream for the DB2 program.

If the member you selected is not in the JCL library this message is displayed in the top right corner of the panel:

Invalid Member.

If you do not specify a member name and program name, a list of members in the specified JCL library is displayed in a panel like the one that follows:

ARTT Member List REDG.TESTPACK.ARTDB2A.JCL.V220.HYBRID									Row 0001 of 0288
Command ==> _____									Scroll ==> PAGE
Name	VV	MM	Created	Changed	Size	Init	Mod	ID	
_ #INDEX	01.81	98/06/16	98/12/04	14:40	66	87	0	Y001AP4	
_ #README	01.00	98/09/17	98/09/17	15:06	24	24	0	Y001AP4	
_ ATGOPTS	01.21	98/12/01	99/01/21	13:59	24	19	0	Y001AP4	
_ ATGSITE	01.04	99/01/11	99/01/21	13:59	13	13	0	Y001AP4	
_ CONV	01.03	99/01/13	99/01/21	12:24	25	26	10	Y001AP4	
**End**									

To select a member from the list, type **S** in the entry field next to the member name, and press Enter.

### Program Name

Specify the name of the DB2 program that you want to run in Capture mode.

If you do not specify a program name, ARTT looks for program names when it scans the JCL job stream.

If ARTT finds:

- One program name, and you specify **Y** in the **Edit JCL** field, it generates Capture JCL for that program and displays the JCL for your approval.
- More than one program name or the same program name used more than once, or if you specify the program name incorrectly, a **Program Selection** panel is displayed containing a list of programs from which you select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

**S** To select a program for processing. When you press Enter, ARTT places a **Y** next to your selected program.

**R** To deselect the program.

**V** To view the step JCL for the program.

To process your selected program, press **PF3**. The **Program Selection** panel closes, and you are returned to the **Capture Execute for Standard Batch** and **DB2 Batch** panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the **Capture Execute for Standard Batch** and **DB2 Batch** panel:

Program not found.

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your DB2 program in Capture mode.

### Run ID

Specify a run identifier for the execution of the program in Capture mode. The identifier enables ARTT to set up and identify unique records for this Capture execution in the Program control file and the Test control file. It can be alphabetic, numeric, or a combination of the two, up to eight characters in length; however, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Run ID.
```

### Log ID

Specify an identifier that ARTT can use to construct a unique log file name for this Capture execution. The identifier can be alphabetic, numeric, or a combination of the two, and up to eight characters in length; however, it cannot start with a numeric character or contain blanks. The following example shows how the log file name is constructed:

```
Prefix.ARTT.ProgramName.LogID.LogSuffix
```

*Prefix* is the high-level qualifier, and *LogSuffix* is the log file suffix that you specified when you set up your user options. For more information about specifying the log suffix, see page 45 for more information. You specified the *ProgramName* in the **Program Name** entry field, described under the *Specify JCL Information* group.

You must specify a log identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Log ID.
```

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Capture execution.

### Edit JCL

Specify **N** if you do not want to browse or edit the ARTT-generated JCL for this Capture execution.

Alternatively, accept the default value (**Y**) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press Enter on the Capture Execute for Standard Batch and DB2 Batch panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

## Audit Exclusion

Specify **Y**, and then press Enter to display a `Specify Exclusion/Limitation Details` panel, like the one shown in Figure 17 on page 61. Use this panel to name up to 10 DD statements for files to be excluded from the log that ARTT generates for a Capture execution. For example, you may want to exclude certain DD statements if you know that the data content of their files varies from run to run in a random, but acceptable way.

Accept **N**, the default value, to run a Capture execution without specifying any DD statement exclusions.

**Note:** If you accept the default value (**N**), and this execution is a re-run of a previous Capture execution in which you specified DD statement exclusions, those exclusions will be effective for this execution.

To exclude a DD statement, type its ddname in the next available **Audit Exclude List** entry field, and then press Enter. The exclusion parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type `Can` on the command line, and then press Enter.

### Notes:

1. Only actual ddnames may be excluded; therefore, CICS, DB2, and IMS logical files cannot be excluded.
2. ARTT automatically excludes any DD statement allocated to `DUMMY`, and statements with the following ddnames:

ATGSNAP	IEFRDER2	SYSDUMP
CEEDUMP	IMS	SYSTRACE
DFSVSAMP	PLIDUMP	SYSUDUMP
IDCAMS	SORTWKnn	
IEFRDER	SYSABEND	

## Run Information

Specify **Y**, and then press Enter to display a `Specify Run Information` panel like the one shown in Figure 18 on page 62.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to **N** (No). Accept the default values to run the DB2 Capture execution without changing any run information parameters.

To change a parameter, overwrite the **N** with **Y** (Yes). When you have changed all of the parameters you want, press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

---

## How to Record a Base Execution

If you need information on the values that you can specify on, or choose from, the `Capture Execute for Standard Batch and DB2 Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 187.

**Notes:** Before you can run a Capture execution for a DB2 program, you must relink your program to include the ARTT-provided stub that substitutes ARTT DB2 database calls for native DB2 database calls. For instructions on how to do this, see page 184.

Some of the parameters used when you run a program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one instance of a DB2 program at the same time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type E on the command line of the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.
3. Type B, and then press Enter to display the `Capture Execute for Standard Batch and DB2 Batch` panel.
4. Specify information, and select processing options for the DB2 program for which you are capturing data, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Capture execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

5. If you submit a Capture execution using a log file that already exists, a `Duplicate Log File` subpanel is displayed, similar to the one that follows:

```
Command ==>_____

Log File . . : Y001PD7.ARTT.DB2C14N.BASE.LOG'

The above log already exists and will be overwritten
during this capture run.

Do you wish to overwrite this file ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel.
```

Specify Y, and then press Enter to overwrite the log file, or specify N to close the subpanel and return to the `Capture Execute for Standard Batch and DB2 Batch` panel where you can specify a new log file name.



6. If you specified **Y** in the **Edit JCL** field, the Capture JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Capture Program subpanel like the one that follows:

```
Command ==> _____  
  
Submit job ? . . . Y (Y to submit, N to cancel)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Capture JCL, a Submit Batch Capture Program subpanel is displayed.

7. On the Submit Batch Capture Program subpanel, specify **Y**, and then press Enter to submit the Capture execution JCL for processing. Alternatively, specify **N**, and then press Enter to return to the Capture Execute for Standard Batch and DB2 Batch panel without submitting the JCL.

## Reading the Capture Execution Summary Report

When you successfully complete a Capture execution for a DB2 program, ARTT produces a Capture Execution Summary report containing the result of your DB2 Capture execution. The report (like the example in Figure 69) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

```
ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DB2C14N.BASELINE.LOG
ATGA0705I Program DB2C14N executed with:
ATGA0706I   Run Mode = CAPTURE
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task IKJEFT01 attached with:
ATGA0031I   Parameters = " " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA2001I No ARTT request module for DB2C14N(N) could be located. Query-Id generation will be suspended.
ATGA0040I Program IKJEFT01 completed with Return Code = 0.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYS00001 N    1    1     0     0     0     0                REDG.TESTPACK.ARTDB2A.LOAD
ATGA0715I SYSOUT  N    1    1     0     1     0     0                Y001DP9.Y001DP9M.JOB21466.D000000E.?
ATGA0715I REP001  N    1    1     0    12     0     0                Y001DP9.Y001DP9M.JOB21466.D000000F.?
ATGA0715I DB2C14N N    0    0     9     0     0     0                DB2=DB2C14N
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****
```

Figure 69: Capture Execution Summary Report for DB2

The report shows:

- The names of the ARTT files used by the program in the following order:
  - Program control file
  - File control file
  - ARMS control file
  - Conversion library
  - Compare library
  - Test control file.

For more information about ARTT control files, see page 265.

- The name of the Log file as specified in the **Log ID** field on the Capture Execute for Standard Batch and DB2 Batch panel.
- The following run parameters:
  - Run Mode (in this case, CAPTURE)
  - Program transform status (defaults to N for non-transformed)
  - Run ID, as specified in the Capture Execute for Standard Batch and DB2 Batch panel.

The report also shows the following information for each input and ddname not specifically excluded from the Capture execution:

<b>Name</b>	Symbolic name of the DD statement (logical file) for each file with I/O activity in the Capture execution.
<b>s</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Capture execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Capture execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Capture execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Capture execution.
<b>Diffs</b>	Always 0 for a Capture execution.
<b>Shown</b>	Always 0 for a Capture execution.
<b>ConvMod</b>	Name of the conversion module for the file. Not applicable for a Capture execution.
<b>CompMod</b>	Name of the comparison module for the file. Not applicable for a Capture execution.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Capture execution.



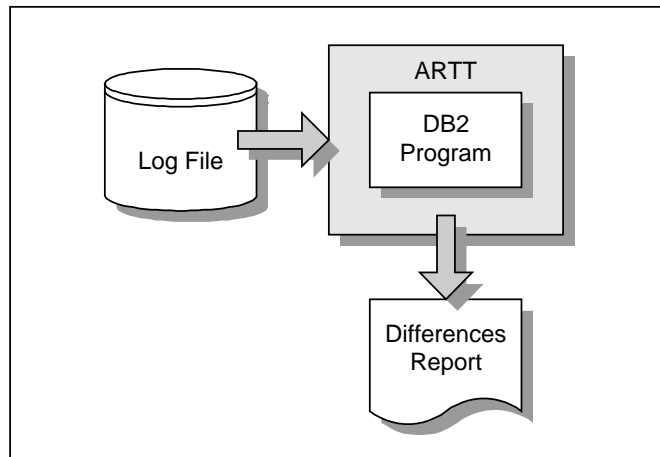
---

## Chapter 16. Executing a Proof Run

After reengineering or modifying your DB2 program, you need to verify that, using the same input, the program works exactly as it did before it was modified. You can do this by executing a proof run in **Virtual Replay** mode.

In Virtual Replay, ARTT takes its input directly from the log file generated by the DB2 program's Capture execution. ARTT discards the output from the Virtual Replay after comparing it with the log file, unless you specify a spool file or an inline data set as the output data set.

Using input from the log file, ARTT monitors the I/O events and data for the Virtual Replay run and compares them with the events and data recorded in the log file for the DB2 program's base run in Capture mode. If there are differences, ARTT produces a report detailing the differences.



*Figure 70: DB2 Program Running in Virtual Replay Mode*

Date Rolling works in the same way for a DB2 program as it does for a standard batch program.

Conversion modules enable ARTT to permit expected differences during the Capture/Virtual Replay comparison. ARTT uses conversion modules for a DB2 program in Virtual Replay mode in the same way as it does for a standard batch program in Virtual Replay mode.

For more information about generating and using conversion modules in Virtual Replay mode, see “Chapter 17. Executing a Proof Run with Data Transformation” on page 207.

### **This chapter describes:**

- The **Virtual Replay Execute for Standard Batch and DB2 Batch** panel in which you instruct ARTT to execute a proof run for your DB2 program. The description also includes the subpanels displayed when you select options from the panel.
- How to Run a DB2 Batch Program in Virtual Replay Mode.
- The output produced when you run a DB2 program in Virtual Replay mode.

---

## Instructing ARTT to Execute Your Proof Run

When you execute a proof run (step-by-step instructions begin on page 203), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

**Note:** If the code for your DB2 program has changed between its baseline (Capture) execution and this proof run, you must relink your program to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native DB2 database calls. For instructions on how to relink your program, see page 184.

When you select V, Virtual Replay execution from the ARTT Primary Menu, the Virtual Replay Execute Menu is displayed. For menu details, see Figure 27 on page 83.

The options shown on the menu depend on how ARTT is configured for your installation. Figure 27 shows the options for an installation configured for IMS, CICS and DB2.

*This chapter assumes an installation configured only for standard batch and DB2.*

Select I, Virtual replay execute for IMS Online from the menu and then press Enter. The Virtual Replay Execute for Standard Batch and DB2 Batch panel (Figure 71) is displayed. On this panel specify information and options for the DB2 program that you want to run using virtual (stored) input data. The information and options specified determine which subpanels are displayed.

```
ARTT - Virtual Replay Execute for Standard Batch and DB2 Batch
Command ==>_____

Specify JCL Information :
  JCL Library . . . . 'REDG.TESTPACK.ARTDB2A.JCL.V220.HYBRID'_____
  JCL Member . . . . C14NATIV
  Program Name . . . . DB2C14N_

Specify Mandatory ARTT Run Information:
  Run ID . . . . . BASELINE
  Log ID . . . . . BASELINE

Specify Optional Information:
  Edit JCL . . . . . Y      (Y/N - Edit tailored JCL before submission ?)
  Audit Exclusion /
    Report Limit . . . . N    (Y/N - Specify Exclusion/Limitation details ?)
  Run Information . . . . N  (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . N     (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 71: Virtual Replay Execute for Standard Batch and DB2 Batch Panel

Before running your DB2 program in Virtual Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the program's log file.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.

## Specify JCL Information

Use the fields in this group to tell ARTT where to find the program that you want to run in Virtual Replay mode.

### JCL Library

Specify the name of the library containing the job control language (JCL) job stream for the batch program. The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

You must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

Invalid Library.

### Notes:

1. If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, 'Y001DP9.A.JCL') or a partially complete library name not enclosed in quotation marks (for example, A.JCL). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).
2. Do not specify a member name in this field.

### JCL Member

Specify the name of the JCL library member containing the job stream for the batch program.

If you do not specify a member name, a list of the members in your specified JCL library is displayed (Figure 15 on page 58). To select a member from the list, type S in the entry field next to the member's name, and then press Enter.

If the member that you specified is not in the JCL library, this message is displayed in the top right corner of the panel:

Invalid Member.

### Program Name

Specify the name of the DB2 program that you want to run in Virtual Replay mode.

If you do not specify a program name, ARTT scans the JCL job stream for program names.

If ARTT finds:

- One program name, and you specify Y in the **Edit JCL** field, it generates Virtual Replay JCL for that program and displays the JCL for your approval.
- More than one program name, or the same name used more than once, or if you specify the program name incorrectly, a `Program Selection` panel is displayed containing a list of programs from which you can select one for processing.

Specify one of the following in the entry field next to the program name, and then press Enter:

- S** To select a program for processing. When you press Enter, ARTT places a Y next to your selected program.
- R** To deselect the program.
- V** To view the step JCL for the program.

To process your selected program, press PF3. The `Program Selection` panel closes, and you are returned to the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel.

- No program names in the JCL job stream, this message is displayed in the top right corner of the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel:

Program not found.

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your program in Virtual Replay mode.

### Run ID

Specify the run identifier that you used when the program ran in Capture mode. The Run ID enables ARTT to identify the correct records for this Virtual Replay execution in the Program control file and the Test control file.

You must specify a run identifier. If you do not, a `Run and Log IDs` panel is displayed similar to the one that follows:

```
Command ==>_____
Select the required Run ID/Log ID
pair from the list below:
-----
Option  Run ID      Log ID
-----
_      BASELINE    BASELINE
***** Bottom of data *****
```

Type S next to the appropriate Run ID, and then press Enter.

If you have specified Y in any of the optional information fields (see “Specify Optional Information” in this chapter), an appropriate panel is displayed, otherwise a `Submit Batch Virtual Replay Program` subpanel is displayed.



## Log ID

Specify the log identifier that you used when the program ran in Capture mode. The Log ID enables ARTT to ensure that the Virtual Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, a `Run and Log IDs` panel is displayed. Type `S` next to the appropriate Log ID, and then press Enter.

If you have specified `Y` in any of the optional information fields (see “Specify Optional Information” in this chapter), an appropriate panel is displayed, otherwise a `Submit Batch Virtual Replay Program` subpanel is displayed.

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Virtual Replay execution.

### Edit JCL

Specify `N` if you do not want to browse or edit the ARTT-generated JCL for this Virtual Replay execution.

Accept the default value (`Y`) to browse or edit the generated JCL before submitting it for execution. The JCL is displayed after you press Enter in the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel.

When you edit the JCL, you change only the temporary, ARTT-generated JCL, not your original program JCL.

### Audit Exclusion/Report Limit

Specify `Y`, and then press Enter on the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel to display a `Specify Exclusion/Limitation Details` panel (Figure 23 on page 73).

Accept the default value (`N`) to have ARTT generate Virtual Replay JCL without changing the DD statement exclusions, or without specifying any report limitation details.

Use the `Specify Exclusion/Limitation Details` panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.

To exclude a statement, type its ddname in the next available **Audit Exclude List** entry field.

- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.

To specify the maximum number of differences for up to 10 DD statements:

1. Type the ddname of the DD statement in the next available **Report Limitation List** entry field. For example, `DD1` in Figure 23.
2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, `Limit 1` in Figure 23.
3. Press Enter to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type `Can` on the command line, and then press Enter.

**Note:** Only actual ddnames may be excluded; therefore, CICS, DB2, and IMS logical files cannot be excluded.

### Run Information

Specify `Y`, and then press Enter on the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel to display a `Specify Run Information` panel. Use this panel to change the value of one or more run information parameters for your Virtual Replay execution.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

By default, each parameter is set to `N` (No). Accept the default values to run the DB2 Virtual Replay execution without changing any run information parameters.

To change a parameter, overwrite the `N` with `Y` (Yes). When you have changed all of the parameters you want, press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

### Data Change

Specify `Y`, and then press Enter on the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel to display a `Specify Transformation Criteria` panel (Figure 77 on page 216) on which you can change one or more of the following for this Virtual Replay execution:

- The program's Roll Mode. Specify either `Y` (Year) or `D` (Day).
- The program's Roll Amount. Specify a positive or negative number that tells the program the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.

- The Program Status. Specify whether the program is non-transformed (N) or transformed (Y).
- The Source Status. Specify whether the source data is non-transformed (N) or transformed (Y).

---

## How to Execute A Proof Run

If you need information on the values that you can specify on, or choose from, the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 198.

**Note:** If the code for your DB2 program has changed between its baseline (Capture) execution and this proof run, you must relink your program to include the ARTT-supplied stub that substitutes ARTT IMS database calls for native DB2 database calls. For instructions on how to relink your program, see page 184.

Some of the parameters used when you run a DB2 program with ARTT are extracted from, or changed in, one or more of the ARTT control files. For this reason, you cannot run more than one program at a time under ARTT control.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type V on the command line on the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The `Virtual Replay Execute` Menu is displayed.

**Note:** If your installation is configured only for standard batch and DB2, the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel displays when you type V, and then press Enter on the ARTT Primary Menu.

3. Type B on the command line on the `Virtual Replay Execute` Menu to display the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel.
4. On the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel, specify information, and select processing options for the program for which you are executing the Virtual Replay run, and then press Enter. For panel details, see page 198.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:

Analysing JCL

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

5. If you specified **Y** in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display the Submit Batch Virtual Replay Program subpanel.

If you did not choose to edit the Virtual Replay JCL, a Submit Batch Virtual Replay Program subpanel is displayed, like the one that follows:

```
Command ==>>_____

Submit job ? . . . Y (Y to submit, N to cancel)

Press ENTER to continue or END/CANCEL to cancel.
```

6. On the Submit Batch Virtual Replay Program subpanel, specify **Y**, and then press Enter to submit the Virtual Replay execution JCL for processing. Alternatively, specify **N**, and then press Enter to return to the Virtual Replay Execute for Standard Batch and DB2 Batch panel without submitting the JCL.

## Reading the Virtual Replay Execution Summary Report

When you successfully complete a Virtual Replay execution for a DB2 batch program, ARTT produces a Virtual Replay Execution Summary report containing the result of the Virtual Replay execution. The report (like the example in Figure 72) is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

The information shown in the report varies depending on whether ARTT detected any differences between the Virtual Replay execution and the Capture execution.

```

ATGA0001I Program Control File = REDG.TESTPACK.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.TESTPACK.ARTT.FILE.VSAM
ATGA0003I ARMS Control File. . = REDG.TESTPACK.ARTT.ARMS.VSAM
ATGA0005I Conversion Library . = REDG.TESTPACK.ARTT.CMOD
ATGA0006I Compare Library. . . = REDG.TESTPACK.ARTT.XMOD
ATGA0008I Test Control File. . = REDG.TESTPACK.ARTT.TEST.VSAM
ATGA0704I Log File . . . . . = REDG.TESTPACK.ARTT.DB2C14N.BASELINE.LOG
ATGA0705I Program DB2C14N executed with:
ATGA0706I   Run Mode = VIRTUAL
ATGA0707I   Status = N
ATGA0708I   Run Id = BASELINE
ATGA0030I Task DB2C14N attached with:
ATGA0031I   Parameters = " (0 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA0040I Program DB2C14N completed with Return Code = 0.
ATGA0711I Program I/O Activity and LOG mismatch.
ATGA0712I -----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYSOUT    N    1    1     0     1     0     0           Y001DP9.Y001DP9N.JOB28990.D000000E.?
ATGA0715I REP001    N    1    1     0    12     0     0           Y001DP9.Y001DP9N.JOB28990.D000000F.?
ATGA0715I DB2C14N  N    0    0     9     0     0     0                DB2=DB2C14N
ATGA0712I -----
ATGA0718I I/O Activity from Capture Run:
ATGA0714I Name      s  Opens Closes   Inputs  Outputs   Diffs   Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I SYS00001  N    1    1     0     0     0     0                REDG.TESTPACK.ARTDB2A.LOAD
ATGA0715I SYSOUT    N    1    1     0     1     0     0           Y001DP9.Y001DP9M.JOB21466.D000000E.?
ATGA0715I REP001    N    1    1     0    12     0     0           Y001DP9.Y001DP9M.JOB21466.D000000F.?
ATGA0715I DB2C14N  N    0    0     9     0     0     0                DB2=DB2C14N
ATGA0719I Log File Closed.
ATGA0041I Main task cleanup complete.
***** Bottom of Data *****

```

Figure 72: Virtual Replay - DB2 Batch Program Execution Summary Report

*The report shows:*

- The names of ARTT files used by the program in the following order:
    - Program control file
    - File control file
    - ARMS control file
    - Conversion module library
    - Comparison module library (where used)
    - Test control file.
- For more information about the control files, see page 265.
- The name of the Log File as specified when this program ran in Capture mode.
    - Run Mode (in this case, VIRTUAL)
    - Program transform status (defaults to N for non-transformed)
    - Run ID, as specified in the `Virtual Replay Execute for Standard Batch` and `DB2 Batch` panel.

The report also shows the following information for each input and output file not specifically excluded from the Virtual Replay execution:

<b>Name</b>	Symbolic name of the DD statement (logical file) for each file with I/O activity in the Virtual Replay execution.
<b>s</b>	Status of the file, initially N (non-transformed), held in the File control file.
<b>Opens</b>	Number of times that the file was opened during the course of the Virtual Replay execution.
<b>Closes</b>	Number of times that the file was closed during the course of the Virtual Replay execution.
<b>Inputs</b>	Number of times that data was read from the file during the course of the Virtual Replay execution.
<b>Outputs</b>	Number of times that data was written to the file during the course of the Virtual Replay execution.
<b>Diffs</b>	Number of differences detected.
<b>Shown</b>	Number of differences shown.
<b>ConvMod</b>	Name of the conversion module for the file. For more information about conversion modules, see "Instructing ARTT to Transform Data" on page 208.
<b>CompMod</b>	Name of the comparison module for the file. For more information about conversion modules, see "Instructing ARTT to Transform Data" on page 208.
<b>Dataset Name</b>	Fully-qualified name of each file with I/O activity in the Virtual Replay execution.

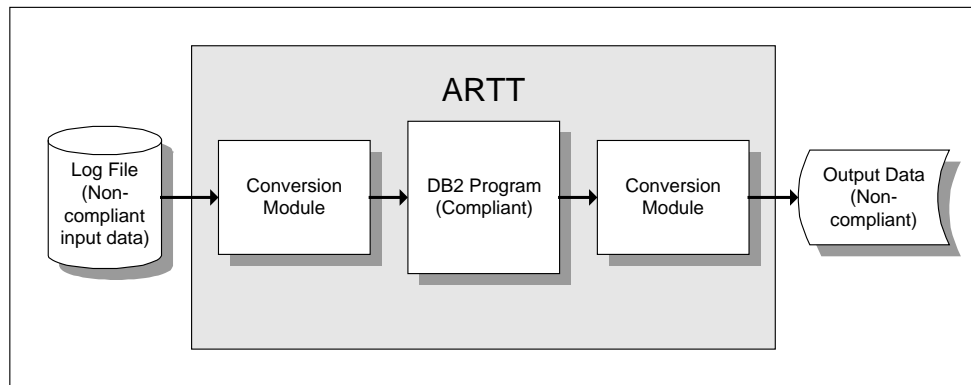
For comparison, the I/O activity report from the Capture execution is also shown.

---

## Chapter 17. Executing a Proof Run with Data Transformation

After you have captured the baseline information for your DB2 program, you can transform the data input to, or output from, a Virtual Replay (proof) run by:

- Changing date formats ( for example, from mm/dd/yy to mm/dd/yyyy)
- Rolling the dates forward (aging them) or backward (rejuvenating them).



*Figure 73: Conversion Modules in Use during Virtual Replay of a DB2 Program*

To transform the data, execute your Virtual Replay run using a conversion module to control which date formats are changed, and which are rolled.

### **This chapter describes:**

- How to prepare for data transformation when executing a DB2 program in Virtual Replay mode
- How to simulate past or future dates when executing a DB2 program in Virtual Replay mode.

---

## Instructing ARTT to Transform Data

All data transformation requires that you create a conversion module. A conversion module is created automatically when you specify details of your transformation and then specify `Y` in the **Create Conversion Mod?** field on the `Data Transformation Setup for DB2` panel.

In addition to creating a conversion module, if you want to transform data by:

- Changing date formats, you must specify details of selected formats on additional panels, which are displayed from the `Data Transformation Setup for DB2` panel.
- Simulating past or future dates, you must specify roll settings during the Virtual Replay execution.

## Data Transformation Setup for DB2 Panel

When you transform data (step-by-step instructions begin on page 212), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT `Primary Menu` (Figure 11 on page 48), select `S, Data Transformation Setup` to display the `Data Transformation Setup Menu` (Figure 31 on page 95).

The options shown on the menu depend on how ARTT is configured for your installation. Figure 31 shows menu options for an installation configured for IMS, CICS and DB2, whereas the options for an installation configured only for DB2 would be:

- Data Transformation setup for Standard Batch
- Data Transformation setup for DB2.

This chapter assumes an installation configured only for Standard Batch and DB2.



Select **D**, Data Transformation setup for DB2 from the menu, and then press **Enter**. The Data Transformation Setup for DB2 panel is displayed (Figure 74).

```

ARTT - Data Transformation Setup for DB2
Command ===>

Setup Options:
  Define Target Data ? . . . . N      (Y/N - Define target data for DCLGEN)
  Create Conversion Mod. ? . . N      (Y/N - Create conversion module for DBRM)

Target Data Information:
  Dclgen Library . . . . . 'REDG.TESTPACK.ARTDB2.DCLGEN.NONCOMP'
  Dclgen Name . . . . . DEPT

Conversion Information:
  Old Dbrm Library . . . . . 'REDG.TESTPACK.ARTDB2.DBRM.NCOM'
  Dbrm Name . . . . . DB2C14N
  New Dbrm Library . . . . . 'REDG.TESTPACK.ARTDB2.DBRM.COMP'

Press ENTER to continue or END/CANCEL to cancel

```

*Figure 74: Data Transformation Setup for DB2*

On this panel, select options and specify setup information to prepare for a proof run with data transformation for a DB2 program.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields or options in each group, and their attributes, are described in the paragraphs that follow.

### **Setup Options**

The options in this group enable you to tell ARTT whether you want to define target data or create a conversion module for your DB2 program. You must choose one setup option from this group, and if you wish, you can choose both.

#### **Define Target Data?**

Specify **Y** to define target data for the DCLGEN specified in the Target Data Information group of fields. If you choose this option, you must specify information in the fields in the Target Data Information group.

Accept the default, **N**, to proceed without defining any target data.

#### **Create Conversion Mod?**

Specify **Y** to create a conversion module for the DB2 DBRM specified in the Conversion Information group of fields. If you choose this option, you must specify information in the fields in the Conversion Information group.

Accept the default, **N**, to proceed without creating a conversion module.

## Target Data Information

Use the fields in this group to tell ARTT where to find the DCLGENs for which you want to define target data.

### Dclgen Library

Specify the name of the library containing the DCLGEN for which you want to define target data. The library name, which may be enclosed in quotation marks (see the note that follows), can be up to 46 alphabetic and numeric characters in length, including the quotation marks. The first character of the name must be an alphabetic character.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

If you specified `Y` in the **Define Target Data?** field, you must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

```
Invalid Library
```

**Note:** If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, `'Y001DP9.A.JCL'`) or a partially complete library name not enclosed in quotation marks (for example, `A.JCL`). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).

### Dclgen Name

Specify the name of the DCLGEN for which you want to define target data. You can specify a name up to eight characters in length, including blanks. The content of this field is validated only if the you specify `Y` in the **Define Target Data** field.

If you do not specify a DCLGEN name, when you press Enter, a member selection panel is displayed like the one shown in Figure 15 on page 58. The panel shows all the DCLGENs in your chosen library, and enables you to select one or more for processing.

To choose DCLGENs from the member selection panel, type `S` in the entry field next to each one that you want. When you are finished, press Enter. For each selected DCLGEN, a `Specify DB2 Target Data` panel is displayed. For panel details, see the topic entitled “Defining Target Data” on page 212

## Conversion Information

Use the fields in this group to tell ARTT where to find the DBRMs for which you want to create conversion modules.

### Old Dbrm Library

Specify the name of the library containing the non-transformed DBRM. The library name, which may be enclosed in quotation marks (see the Note that follows), can be up to 46 alphabetic and numeric characters in length, including the quotation marks. The first character of the name must be an alphabetic character.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

If you specified `Y` in the **Create Conversion Mod?** field, you must specify a library name in this field. If you do not, or you specify an incorrect name, this message is displayed in the top right corner of the panel:

```
Invalid Library
```

**Note:** If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, `'Y001DP9.A.JCL'`) or a partially complete library name not enclosed in quotation marks (for example, `A.JCL`). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).

### **Dbrm Name**

Specify the name of the non-transformed DBRM. You can specify a name up to eight characters in length including blanks. The content of this field is validated only if the you specify `Y` in the **Create Conversion Mod?** field.

If you do not specify a DBRM name, when you press Enter, a member selection panel is displayed like the one shown in Figure 15 on page 58. The panel shows all the DBRMs in your chosen old DBRM library, and enables you to select one or more for processing.

To choose DBRMs from the member selection panel, type `S` in the entry field next to each one that you want. When you are finished, press Enter. For each selected DBRM, ARTT submits a job to generate a conversion module.

### **New Dbrm Library**

This field gives you the option of specifying the name of an existing DBRM library that contains the transformed DBRM. The library name, which may be enclosed in quotation marks (see the Note that follows), can be up to 46 alphabetic and numeric characters in length, including the quotation marks. The first character of the name must be an alphabetic character.

The library must be either a partitioned data set (PDS) or a partitioned data set extended (PDSE).

If the library does not exist, this message is displayed in the top right corner of the panel:

```
Data Set Not Found
```

If you specify an incorrect library name, this message is displayed in the top right corner of the panel:

```
Invalid Library
```

**Note:** If the TSO prefix has been set in your user profile, specify either a complete library name enclosed in single quotation marks (for example, `'Y001DP9.A.JCL'`) or a partially complete library name not enclosed in quotation marks (for example, `A.JCL`). When you enter a partial library name, ARTT adds the TSO prefix to the name to create a fully-qualified data set name. If the TSO prefix has not been set, specify a complete library name (quotation marks are optional).

## Defining Target Data

If you need information on the values that you can specify on, or choose from, the *Data Transformation Setup for DB2* panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 209.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type **S** on the command line on the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The *Data Transformation Setup* menu is displayed (Figure 31 on page 95)

3. Type **D** on the command line on the *Data Transformation Setup* menu  
The *Data Transformation Setup for DB2* panel is displayed (Figure 74 on page 209).
4. Specify **Y** in the **Define Target Data?** entry field.
5. In the **Dclgen Library** entry field, specify the name of the library containing the DCLGEN for which you want to define target data.
6. In the **Dclgen Name** entry field, specify the name of the DCLGEN for which you want to define target data, and then press Enter.

The *Specify DB2 Target Data* panel is displayed.

```
ARTT - Specify DB2 Target Data                               Row 1 to 4 of 4
Command ===>_____ Scroll ===> PAGE

                                Press END to continue or CANCEL to cancel

Member: DEPT           Table Name: DEPT

Option  Column Name      --- Old Date Format ---   --- New Date Format ---
                                Type Format                Type Format
-      ADMRDEPT
-      DEPTNAME
-      DEPTNO
-      MGRNO

***** Bottom of data *****
```

Figure 75: Specify DB2 Target Data Panel

The *Specify DB2 Target Data* panel shows all the columns in your selected DCLGEN, and enables you to specify the columns that contain dates and the formats in which they are contained.

**Note:** If you do not specify a DCLGEN name in the **Dclgen Name** entry field, a member selection panel is displayed from which you can choose one or more DCLGENs for processing. When you press Enter on the member selection panel, a *Specify DB2 Target Data* panel is displayed for each selected DCLGEN.

7. On the Specify DB2 Target Data panel, select a column by typing S in its **Option** entry field, and then press Enter.

A Specify DB2 Date Format subpanel is displayed.

```

Command ==>_____

Member Name . . . . : DEPT
Table Name . . . . : DEPT
Column Name . . . . : MGRNO
Column Data Type . : CHAR(6)

Old Date Format . . . _____ Type . . _
New Date Format . . . _____ Type . . _

Press END to continue or END/CANCEL to cancel

```

Figure 76: Specify DB2 Date Format Subpanel

8. Specify old and new date formats and format types in the **Old Date Format**, **New Date Format**, and **Type** entry fields, and then press Enter.

The subpanel closes and the Specify DB2 Date Format panel is redisplayed, now showing your old and new date formats and types against the appropriate Column Name.

9. Press PF3 and the Specify DB2 Target Data panel closes. The Data Transformation Setup for DB2 panel is redisplayed with the following message in its top right corner:

Target Data Updated

---

## DB2 Consistency Token Considerations for ARTT

DB2 uses consistency tokens to ensure that the correct package is used when a DB2 application is executed. The precompiler generates the consistency token and places it into the modified source and the DBRM. It is built into the package during the bind step. At execution time, the consistency token in the executable is compared with the consistency token in the package, and the SQL statement will fail if they do not match.

ARTT also uses the consistency token to ensure that the correct ARMS entry is being used when a DB2 application is being run under ARTT. When ATGARMS is run against a DBRM it stores the consistency token in the ARMS entry, and when the application is run under ARTT, the consistency token is compared with the one in the executable. If they do not match, ARTT will fail. Therefore, once an ARMS entry has been created for a DB2 module, it must be regenerated any time the module is re-precompiled.

If you have created a conversion module for a DB2 application using both an old (non-transformed) DBRM and a new (transformed) DBRM, ARTT uses the program status to determine which ARMS entry to use and which ARMS consistency token to compare. If the program status is N, ARTT uses the ARMS entry for the old DBRM. If the program status is Y, ARTT uses the ARMS entry for the new DBRM.

---

## How to Create a Conversion Module

If you need information on the values that you can specify on, or choose from, the `Data Transformation Setup for DB2` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 209.

**Note:** In addition to creating a conversion module, the `Data Transformation Setup for DB2` panel is also used to define target data.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51
2. Type `S` on the command line of the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The `Data Transformation Setup Menu` is displayed (Figure 31 on page 95)

3. Type `D` on the command line on the `Data Transformation Setup Menu`, and then press Enter.

The `Data Transformation Setup for DB2` panel is displayed (Figure 74 on page 209).

4. If you want to specify information about date formats, define your target data as described in “Defining Target Data” on page 212.
5. On the `Data Transformation Setup for DB2` panel, specify `Y` in the **Create Conversion Mod?** entry field.
6. Specify DBRM library and member names in the entry fields in the `Conversion Information` group, and then press Enter.

If you have already created a conversion module for your selected DBRM, a `Conversion module already exists` subpanel is displayed, like the one that follows:

```
Command ==> _____  
  
A module already exists for DBRM AAA  
  
                Overwrite ? . . . N (Y/N)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

7. To overwrite the conversion module, specify `Y` in the subpanel, otherwise specify `N`, and then press Enter

ARTT submits a job to generate your conversion module.

---

## About Simulating Past or Future Dates

Date Rolling is useful for verifying that your program will work correctly with future dates. It automatically ages dates (by rolling them forward) or rejuvenates dates (by rolling them backward) in input and output files according to values that you specify.

Rolling dates comprises two sets of procedures:

1. Initially, the data source in which you roll dates must be associated with a file family, and that file family must have its own conversion module.

You start the process of associating a data source with a file family on the `Data Transformation Setup for DB2` panel. You use that same panel to create a conversion module for the file family. Instructions for both of these procedures start on page 208.

2. Next, when you are executing your Virtual Replay execution, you must type `Y` in the **Data Change** field on the `Virtual Replay Execute for Standard Batch, IMS Batch and DB2 Batch` panel to display the `Specify Transformation Criteria` panel. On this panel, you can specify your roll information.

“Preparing to Simulate Past or Future Dates” in this chapter describes how to specify roll information on the `Specify Transformation Criteria` panel. Instructions for executing a Virtual Replay execution using date rolling begin on page 218.

## Preparing to Simulate Past or Future Dates

When you simulate past or future dates (step-by-step instructions begin on page 218), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

## Specify Transformation Criteria Panel

To display the Specify Transformation Criteria panel I, specify Y against the Data Change option on the Virtual Replay Execute for Standard Batch and DB2 Batch panel (Figure 71 on page 198), and then press Enter.

```

ARTT - Specify Transformation Criteria                               Row 1 to 8 of 51
Command ==>_____ Scroll ==> PAGE

Program Name . : IMSPLIA      Run ID . : IMSPLIA      Log ID . : IMS
Log File Name . : REDG.TESTPACK.ARTT.IMSPLIA.IMS.LOG

Specify Program Transformation Criteria::
Roll Mode . . . . Y          (D - Days, Y - Years)
Roll Amount . . . 0_____ (Range : -999 to 9999)
Program Status . . Y         (Y - Transformed, N - Not Transformed)

Update Data Source Transformation Criteria:
-----
Sel  Data Source                                Cmod  Xmod  Stat  Family
-----
-    DB2=DB2C01C                                Y      N    N    DB2C01C
-    DB2=DB2C10N                                Y      N    N    DB2C10N
  
```

Figure 77: Specify Transformation Criteria Panel (DB2)

The Specify Transformation Criteria panel enables you to change one or more of the following for your Virtual Replay execution:

- The DB2 program's Roll Mode. Specify either Y (Year) or D (Day).
- The program's Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged), or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Program Status. Specify whether the program is transformed (Y) or not (N).
- A list of the Data Sources for this replay execution for which you can specify transformation criteria.

To change the Roll Mode, Roll Amount, or Program Status, overwrite the existing value for the field with an appropriate value, and then press PF3.

Accept the default value (N) to run the Virtual Replay execution without changing any of these parameters.



The data sources for which you can specify transformation criteria are listed in the bottom part of the panel. Scroll forward or backward to view the data sources in the list. To change the transformation criteria for a data source, type `S` in the `Sel` column next to the data source, and then press `Enter`. An `Update Data Source` subpanel is displayed, like the one shown in **Figure 34** on page 100.

**Notes:**

1. The list in the bottom part of the `Specify Transformation Criteria` panel shows data sources only for the type of program with which you are working. For example, if you are transforming data for an IMS batch program, the list shows only data sources for IMS batch programs.
2. If you do not intend to transform any data, you do not need to select any data sources for replay.

The fields in the `Update Data Source` subpanel enable you to:

- Set the data source status. Specify `Y` for transformed status or `N` for non-transformed status.
- Use a conversion module. Specify `Y` to run with a conversion module or `N` to run without a conversion module.
- Use a comparison module. Specify `Y` to run with a comparison module or `N` to run without a comparison module.
- Specify an old record size. Type a record size between 1 and 99999.
- Specify a new record size. Type a record size between 1 and 99999.

**To change the information for a data source, complete the following steps:**

1. Select a data source from the `Data Source` column by typing `S` in the `Sel` field at the left of the panel, and then press `Enter`.  
The `Update Data Source` subpanel is displayed.
2. Type new information for your selected data source as required, and then press `Enter`.  
The `Update Data Source` subpanel closes and the `Specify Transformation Criteria` panel is displayed containing the new information for your selected data source.  
To close the subpanel without making any changes type `Can` on the command line and then press `Enter`, or press `PF3`.
3. If you want to change the information for another data source, repeat steps 1 and 2 in this list.  
Alternatively, type `Can` on the command line and then press `Enter`, or press `PF3` to close the `Specify Transformation Criteria` panel.

---

## How to Execute a Proof Run with Data Transformation

If you need information on the values that you can specify on, or choose from, the `Virtual Replay Execute for Standard Batch and DB2 Batch` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 198.

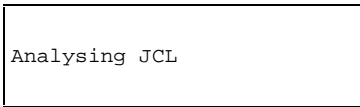
**Note:** Before you can run a DB2 program in Virtual Replay mode with date rolling, each logical file in which dates are to be rolled must be associated with a conversion module. For information about generating and working with conversion modules, see “About Conversion Modules and the Conversion Module Generator” on page 303.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type V on the command line in the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.

The `Virtual Replay Execute for Standard Batch and DB2 Batch` panel is displayed (Figure 71 on page 198).

3. Specify information about the DB2 program for which you are executing the Virtual Replay run.
4. Specify Y in the `Data Change` field, and then press Enter.

The first time that ARTT uses your specified source JCL to generate ARTT program JCL, a message box is displayed that is similar to the following:



```
Analysing JCL
```

The message box closes when ARTT completes its analysis of your JCL.

**Note:** If at any time during your Virtual Replay execution you specify different source JCL, ARTT will analyze the new source JCL before using it to generate ARTT program JCL.

The `Specify Transformation Criteria` panel is displayed (Figure 77 on page 216).

5. Specify either D (Day) or Y (Year) in the `Roll Mode` field.
6. Specify a value from -999 to 9999 in the `Roll Amount` field, and then press PF3.

7. If you specified **Y** in the **Edit JCL** field, the Virtual Replay JCL is displayed for editing. When you are finished, press PF3 to display a Submit Batch Virtual Replay Program subpanel like the one that follows:

```
Command ===>_____
Submit job ? . . . Y (Y to submit, N to cancel)
Press ENTER to continue or END/CANCEL to cancel.
```

If you did not choose to edit the Virtual Replay JCL, a Submit Batch Virtual Replay Program subpanel is displayed.

8. On the Submit Batch Virtual Replay Program subpanel, specify **Y**, and then press Enter to submit the Virtual Replay execution JCL for processing. To return to the Virtual Replay Execute for IMS Online panel without submitting the JCL, specify **N**, and then press Enter.



## Part 5. ARTT for CICS Programs

This part comprises chapters 18 to 20, which describe how to:

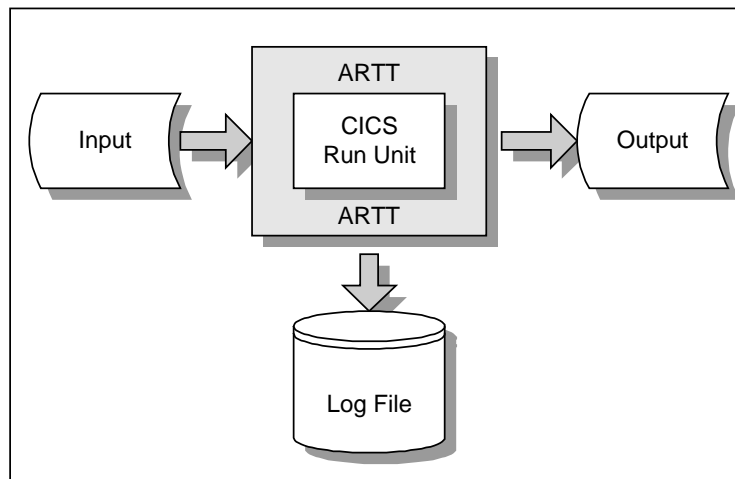
- Run a Capture (baseline) execution for a CICS run unit.
- Execute a proof run for a CICS run unit using virtual input (stored during the baseline execution).
- Run a CICS run unit in Virtual Replay mode with data transformation.



---

## Chapter 18. Capturing a Base Execution

Before reengineering begins, you need to establish your CICS run unit's I/O footprint with a base execution. Use the ARTT user interface to prepare for the base execution, then start a CICS session and execute your run unit under ARTT in **Capture** mode. When you do this, ARTT records your run unit's I/O activity, including reads or writes, in the log file that you prepared using the user interface. The log file can then be used as a base for comparison with subsequent proof runs in Virtual Replay mode.



*Figure 78: CICS Program Running In ARTT Capture Mode*

### **This chapter describes:**

- The `Capture Execute` for CICS panel, in which you prepare ARTT to capture your base execution.
- Steps to set up ARTT to capture your base execution.
- The `ARTT Session Manager` panel and how you use it to execute your CICS run unit in Capture mode.
- The reports produced when you run your CICS run unit in Capture mode.

---

## Preparing to Record Your Base Execution

When you prepare ARTT to record your base execution (step-by-step instructions begin on page 226), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select E, Capture Execution, to display the Capture Execute Menu (Figure 13 on page 56). The options shown on the menu depend on how ARTT is configured for your installation. Figure 13 shows the options for an installation configured for IMS, CICS and DB2.

From the Capture Execute Menu, select C, Capture execute for CICS, and press Enter. The Capture Execute for CICS panel is displayed (Figure 79).

```
ARTT - Capture Execute for CICS
Command ==>>>_____

Specify Mandatory ARTT Run Information:
  Run Unit Name. . . .CICSRUN
  Run ID . . . . .BASE__
  Log ID . . . . .BASE__

Specify Optional Information:
  Run Information . . N      (Y/N - Specify Run Information Indicators ?)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 79: Capture Execute for CICS Panel*

The panel's entry and option selection fields are grouped according to the type of information that they provide. The fields in each group, and their attributes, are described in the paragraphs that follow.



## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to prepare for the CICS execution in Capture mode.

### Run Unit Name

Specify a name for the logical unit of work that ARTT is to run. The Run Unit Name is also used to construct the log file name and control file entries for your CICS execution. It can be alphabetic, or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run unit name. If you do not, this message is displayed in the top right corner of the panel:

```
Blank Run Unit Name.
```

### Run ID

Specify an identifier for this execution of the run unit that you specified in Run Unit Name. The identifier enables ARTT to set up and identify unique records for this execution in the Program control file and the Test control file. The Run ID can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Run ID.
```

### Log ID

Specify an identifier that ARTT can use to construct a unique log file name for this Capture execution. The identifier can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks. The following example shows how the log file name is constructed:

```
Prefix.ARTT.RunUnitName.LogID.LogSuffix
```

*Prefix* is the high-level qualifier, and *LogSuffix* is the log file suffix that you specified when you set up your user options. For more information about specifying the log suffix, see page 45. You specified the *RunUnitName* in the **Run Unit Name** entry field, described on page 225.

You must specify a log identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Invalid Log ID.
```

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Capture execution.

### Run Information

You change run information parameters on a `Specify Run Information` panel. The panel is displayed when you specify `Y` in the **Run Information** entry field on the `Capture Execute for CICS` panel, and then press Enter. See Figure 18 on page 62 for an example of a `Specify Run Information` panel.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

For each parameter you want to change, overwrite the `N` with `Y` (Yes), and then press Enter. The panel closes and the run information parameters are stored in the Test control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

---

## How to Set up a Capture Execution

ARTT uses the information that you specify on the `Capture Execute for CICS` panel to:

- Set up the appropriate ARTT control file records
- Allocate a log file in which to record the results of the Capture execution.

If you need information on the values that you can specify on, or choose from, the `Capture Execute for CICS` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 224.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `E` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.
3. The `Capture Execute Menu` is displayed (Figure 13 on page 56).
4. Type `C` on the command line on the `Capture Execute Menu`, and then press Enter.

The `Capture Execute for CICS` panel is displayed. For panel details, see page 224.

5. Specify information, and select processing options for the CICS run unit for which you are capturing data, and then press Enter.

The `Capture Execute for CICS` panel is redisplayed containing the following confirmation message:

```
The information you have specified has been added to the
ARTT control files. You should now start up your ARTT CICS
region and execute the transactions you wish to capture for
this Run Unit.
```

If you try to create a log file that already exists, a `Duplicate Log File` subpanel is displayed like the one that follows:

```
Command ==>> _____

Log File . . : 'REDG.TESTPACK.ARTT.DPCOBPRG.BASELINE.LOG'

The above log already exists and will be overwritten
during this capture run.

Do you wish to overwrite this file ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel.
```

6. Specify `Y`, and then press Enter to overwrite the log file with a new log file, and display the `Capture Execute for CICS` panel containing the confirmation message shown above.

Alternatively, specify `N` to close the subpanel and return to the `Capture Execute for CICS` panel to specify a new log file name.

You are ready to start a CICS session to run a Capture execution for your specified run unit. For information about running a CICS Capture execution, see page 230.

---

## Preparing to Start Your ARTT Session

You start your ARTT session by completing the fields in the `ARTT Session Manager` panel, described in the following paragraphs. Either read about the panel now to become familiar with its fields and options, or refer to this section later when you are completing the startup steps which begin on page 230.

## About the ARTT Session Manager Panel

The ARTT Session Manager panel is displayed when you start a CICS session, and then specify the ARTT transaction code.

ARTT Session Manager	Applid:
	User :
	Date :
Please enter the following:	Time :
Function : S (S=Start, E=End)	
Run Unit Name : CICSRUN	
Run Unit Status : (N=Non-transformed, Y=Transformed)	
Run Mode : (C=Capture, V=Virtual)	
Roll Mode : (Y=Years, D=Days)	
Roll Amount :	
Run Id :	
Destination :	

Figure 80: ARTT Session Manager Panel

The fields on the ARTT Session Manager panel, and their attributes, are described in the paragraphs that follow.

### Specify Mandatory Information

Use the following fields to provide ARTT with information that it needs to execute your CICS run unit in Capture mode.

#### Function

Specify **S** to start or **E** to end your CICS session for ARTT.

#### Run Unit Name

Type the run unit name that you specified in the `Capture Execute for CICS` panel (for panel details, see page 224).

The run unit name can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

**Note:** If you specified **E** in the **Function** field, you need not specify a run unit name.

If you specified **S** in the **Function** field and you do not specify a run unit name, this message is displayed in the top right corner of the panel:

Blank Run Unit Name.

If you specify an incorrect run unit name, this message is displayed in the top right corner of the panel:

Invalid Run Unit Name.

## Specify Optional Information

**Note:** If you change any of the following fields on the ARTT Session Manager panel, the changes apply only for the active session.

### Run Unit Status

Use this field to specify the status of the run unit shown in the **Run Unit Name** field. Specify  $\mathcal{Y}$  for transformed status or  $\mathcal{N}$  for non-transformed status.

You can specify the status of a run unit only if you have specified  $\mathcal{S}$  in the **Function** field.

### Run Mode

Use this field to specify the run mode,  $\mathcal{C}$  for Capture or  $\mathcal{V}$  for Virtual Replay, for your CICS run unit.

You can specify a run mode only if you have specified  $\mathcal{S}$  in the **Function** field.

### Roll Mode

- Use this field to specify a roll mode, either  $\mathcal{D}$  (Day) or  $\mathcal{Y}$  (Year), for an execution in Virtual Replay mode.
- You cannot specify a roll mode for executions in Capture mode.

### Roll Amount

- Use this field to specify a roll amount for an execution in Virtual Replay mode. Specify a positive or negative number from  $-999$  to  $9999$  that indicates the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- You cannot specify a roll amount for executions in Capture mode.

### Run ID

Specify a run identifier for the execution in Capture mode of the run unit specified in the **Run Unit Name** field. The identifier enables ARTT to set up and identify unique records for this execution in the Program control file and the Test control file. The identifier can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

Blank Run ID.

### Destination

This field is not used for executions in Capture mode or Virtual Replay mode.

---

## How to Start Your ARTT Session and Run Your Capture Execution

If you need information on the values that you can specify on the `ARTT Session Manager` panel (displayed during this procedure), refer to the detailed panel description, starting on page 228.

Set up your Capture execution using the steps described in “How to Set up a Capture Execution” on page 226, and then proceed as follows:

1. Use your installation procedures to logon to CICS.
2. When the CICS logo appears, clear the screen.
3. Type `ARTT`, the transaction code for the `ARTT Session Manager` panel, in the top left corner of the panel, and then press Enter.

The `ARTT Session Manager` panel is displayed (Figure 80 on page 228).

4. Type `S` in the **Function** field.
5. In the **Run Unit Name** field, type the name of the run unit that you specified in the `Capture Execute for CICS` panel (Figure 79 on page 224), and then press Enter.

A screen displays containing the following message:

```
ATG4002I ARTT session creation complete
```

If for any reason the ARTT session could not be created, the following message is displayed:

```
ATG4004I Session could not be created
```

Check the execution reports (see “Reading the Capture Reports” on page 231) to find out why the session was not created.

6. Type the names of the CICS transactions for the Capture execution, and then press Enter.

---

## Stopping Your ARTT Session

When you have completed your capture transactions, proceed as follows:

1. Clear the screen.
2. Type `ARTT` in the top left corner of the screen, and then press Enter.  
The `ARTT Session Manager` panel is redisplayed.
3. Terminate the CICS session by typing `E` in the **Function** field, and then pressing Enter.

The following message appears in the top left corner of the screen:

```
ATG4002I ARTT session destruction complete
```

---

## Reading the Capture Reports

ARTT produces the following execution reports when capturing CICS data:

- Control Files
- Capture Summary.

An example of each report follows.

### Execution Report (Control Files)

When you start up a CICS region under the control of ARTT, an execution report is produced. The report, like the one shown in Figure 81, is produced under the ddname `ATGPRINT`, which is dynamically allocated and controlled by the ARTT program.

The control file parameters in the report will match the `ATGOPTS` used by the CICS region.

**Note:** you need `ALTER` authority in order for the ARTT user interface to create the log file, and `UPDATE` authority so that the user interface can update the control files.

```
ART V2.R2.M0 -- Execution Report
Copyright (C) 1996, 1997, 1998 National Westminster Bank, Plc., All Rights Reserved

ATGA0001I Program Control File = REDG.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.ARTT.CMOD.PDS
ATGA0006I Compare Library. . . = REDG.ARTT.XMOD.PDS
ATGA0008I Test Control File. . = REDG.ARTT.TEST.VSAM
ATGA0030I Task DFHSIP attached with:
ATGA0031I   Parameters = "START=COLD,SYSIN" (16 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA4000I EIP Intercept has been installed
```

*Figure 81: CICS Capture Execution Report (Control Files)*

The report shows the names of the control files used during the Capture execution of your CICS run unit as follows:

- Program control file
- File control file
- Conversion library
- Compare library
- Test control file.

For more information about ARTT control files, see page 265.

## Execution Report (Capture Summary)

When you successfully complete a Capture execution for a CICS run unit, an execution report is produced. The report, like the one shown in Figure 82, is produced under the ddname `SYS0000nn`, which is dynamically allocated and controlled by the ARTT program.

```

ART V2.R2.M0 - Execution Report
  Copyright C 1996, 1997, 1998, National Westminster Bank, PLC
-
ATGA0704I Log File . . . . . = REDG.ARTT.CICSRUN.BASE.LOG
ATGA0705I Run Unit CICSRUN executed with:
ATGA0706I   Run Mode = CAPTURE
ATGA0707I   Status = N
ATGA0708I   Run Id = BASE

-----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes Inputs Outputs Diffs Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I TERMLU02 N   0    0    0     1     0    0                CICS=TC.TERMLU02.ATGCART
ATGA0715I DSN8CCG  N   0    0    6     7     0    0                CICS=BMS.DSN8CCG.DSN8CCG
ATGA0715I ASKABSTM N   0    0    2     0     0    0                CICS=DT.ASKTIME.ABSTIME
ATGA0715I ASSIGN   N   0    0    2     0     0    0                CICS=EI.ASSIGN
ATGA0715I ATGMAR1A N   0    0    2     1     0    0                CICS=BMS.ATGMART.ATGMAR1
ATGA0719I Log File Closed.
  
```

Figure 82: CICS Capture Execution Report (Summary)

The report shows:

- The name of the Log file as specified on the Capture Execute for CICS panel.
- The following run parameters:
  - Run Mode (in this case, CAPTURE)
  - Run unit transformation status (defaults to N for non-transformed)
  - Run ID, as specified in the Capture Execute for CICS panel.

The report also shows the following information for each input and output file not specifically excluded from the Capture execution:

<b>Name</b>	Symbolic name of the data source
<b>s</b>	Status of the data source, initially N (non-transformed), held in the file control file.
<b>Opens</b>	Number of times that the data source was opened during the course of the Capture execution.
<b>Closes</b>	Number of times that the data source was closed during the course of the Capture execution.
<b>Inputs</b>	Number of times that data was read from the data source during the course of the Capture execution.
<b>Outputs</b>	Number of times that data was written to the data source during the course of the Capture execution.



<b>Diffs</b>	Always 0 for a Capture execution.
<b>Shown</b>	Always 0 for a Capture execution.
<b>ConvMod</b>	Name of the conversion module for the data source. Not applicable for a Capture execution.
<b>CompMod</b>	Name of the comparison module for the data source. Not applicable for a Capture execution.
<b>Dataset Name</b>	Fully-qualified name of each data source.



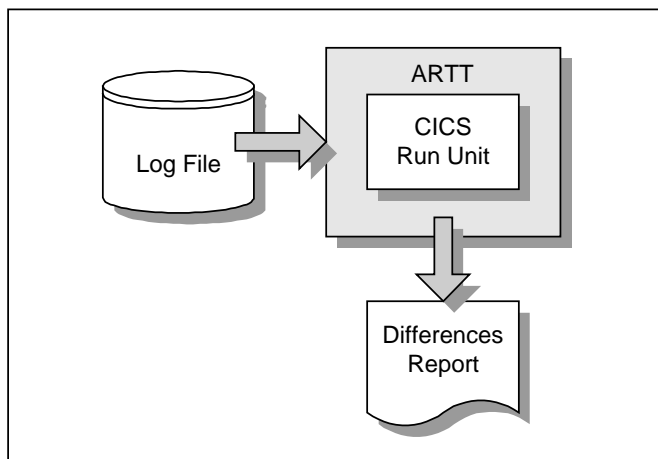
---

## Chapter 19. Executing a Proof Run

After reengineering or modifying your CICS run unit, you need to verify that, using the same input, the run unit works exactly as it did before it was modified. You do this by executing a proof run in **Virtual Replay** mode.

In Virtual Replay, ARTT takes its input directly from the log file generated by the CICS Capture execution. ARTT discards the output from the Virtual Replay after comparing it to the log file.

Using input from the log file, ARTT monitors the I/O events and data for the Virtual Replay run and compares them with the events and data recorded in the log file for the CICS run unit's base run in Capture mode. If there are differences, ARTT produces a report detailing the differences.



*Figure 83: CICS Program Running in Virtual Replay Mode*

During your Virtual Replay execution, you can use one or more of ARTT's data conversion features to verify that your run unit will work correctly in the future:

- Date Rolling automatically ages or rejuvenates dates in input and output files, which enables you to test your run unit with future dates
- Conversion modules instruct ARTT to allow expected differences during the Capture/Replay comparison.
- Comparison modules instruct ARTT to exclude specific data from the Capture/Replay comparison, which is sometimes useful if you cannot resolve the difference with a conversion module, for example, a time stamp.

For information about using Date Rolling and generating and using comparison and conversion modules in Virtual Replay mode, see "Chapter 20. Executing a Proof Run with Data Transformation" on page 247.

**This chapter describes:**

- The `Virtual Replay Execute for CICS` panel, in which you prepare ARTT to execute your proof run using virtual input. The description also includes the subpanels displayed when you select options from the panel.
- Steps to prepare for a proof run in Virtual Replay mode.
- The `ARTT Session Manager` panel and how you use it to execute your CICS run unit in Virtual Replay mode.
- The reports produced when you run your CICS run unit in Virtual Replay mode.

---

## Preparing to Execute Your Proof Run

When you complete the Virtual Replay setup procedures before executing your proof run (step-by-step instructions begin on page 243), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu, select V, Virtual Replay execution to display the Virtual Replay Execute Menu, shown in Figure 27 on page 83.

The options shown on the menu depend on how ARTT is configured for your installation. Figure 27 shows the options for an installation configured for IMS, CICS and DB2. This chapter assumes an installation configured only for CICS.

Select C, Virtual replay execute for CICS from the menu and then press Enter. The Virtual Replay Execute for CICS panel is displayed (Figure 84). On this panel, specify information and options for the CICS run unit that you want to run using virtual (stored) input data. The information and options specified determine which subpanels are displayed.

```
ARTT - Virtual Replay Execute for CICS
Command ===>_____

Specify Mandatory ARTT Run Information:
  Run Unit Name. . . . CICSAL0N
  Run ID . . . . . BASE____
  Log ID . . . . . BASE____

Specify Optional Information:
  Audit Exclusion /
    Report Limit . . . N      (Y/N - Specify Exclusion/Limitation Details ?)
  Run Information . . N      (Y/N - Specify Run Information Indicators ?)
  Data Change . . . . N      (Y/N - Specify Transformation Criteria ?)

Press ENTER to continue or END/CANCEL to cancel
```

*Figure 84: Virtual Replay Execute for CICS Panel*

Before running your CICS run unit in Virtual Replay mode, ARTT uses the information that you specify on this panel to look up the ARTT control file records that identify the run unit's log file.

The panel's entry and option selection fields are grouped according to the type of information that they provide. The paragraphs that follow describe the fields in each group, and their attributes.

## Specify Mandatory ARTT Run Information

Use the fields in this group to provide ARTT with the information that it needs to run your CICS run unit in Virtual Replay mode.

### Run Unit Name

Specify the run unit name that you used when the CICS run unit ran in Capture mode. The run unit name enables ARTT to identify the correct records for this Virtual Replay execution in the Program control file and the Test control file.

You must specify a run unit name. If you do not, the following message is displayed in the top right corner of the panel.

```
Blank Run Unit Name.
```

### Log ID

Specify the log identifier that you used when the CICS run unit ran in Capture mode. The Log ID enables ARTT to ensure that the Virtual Replay execution runs against the correct log file.

You must specify a log identifier. If you do not, a Run and Log IDs panel is displayed like the one that follows:

```
Command ==>>>_____

Select the required Run ID/Log ID
pair from the list below:
-----
Option  Run ID      Log ID
-----
_      BASELINE    BASELINE
***** Bottom of data *****
```

Type **S** next to the appropriate Run ID, and then press Enter.

If you have specified **Y** in any of the optional information fields (see “Specify Optional Information” in this chapter), an appropriate panel is displayed; otherwise a `Submit Batch Virtual Replay Program` subpanel is displayed.

## Specify Optional Information

Use the fields in this group to provide ARTT with any special requirements for your Virtual Replay execution.

### Audit Exclusion/Report Limit

Specify **Y**, and then press Enter on the `Virtual Replay Execute for CICS` panel to display a `Specify Exclusion/Limitation Details` panel (Figure 23 on page 73).

Accept the default value (**N**) to have ARTT prepare for your Virtual Replay execution without changing the DD statement exclusions, or without specifying any report limitation details.

Use the panel to:

- Review the DD statements specified for exclusion during your program's Capture execution. If necessary, you can specify additional statements for exclusion but you must not include previously excluded statements.

To exclude a statement, type its ddname in the next available **Audit Exclude List** entry field.

- Specify the maximum number of differences that you want ARTT to report for a particular DD statement.

To specify the maximum number of differences for up to 10 DD statements:

1. Type the ddname of the DD statement in the next available **Report Limitation List** entry field. For example, DD1 in Figure 23 on page 73.
2. Specify the maximum number of differences for your selected DD statement in the appropriate entry field. For example, Limit 1 in Figure 23 on page 73.
3. Press Enter to close the `Specify Exclusion/Limitation Details` panel and process your changes. The exclusion and maximum differences parameters are stored in the Program control file.

To close the panel without taking any action, press PF3, or type `Can` on the command line, and then press Enter.

### Run Information

Specify `Y`, and then press Enter on the `Virtual Replay Execute for CICS` panel to display a `Specify Run Information` panel (Figure 18 on page 62). You use this panel to change the default value of one or more run information parameters for your Virtual Replay execution.

The run information parameters are for you to use when tracking and documenting projects. ARTT does not use them.

For each parameter you want to change, overtype the `N` with `Y` (Yes), and then press Enter. The panel closes and the run information parameters are stored in the Test Control file.

To close the panel without changing any run information parameters, press PF3, or type `Can` on the command line, and then press Enter.

## Data Change

Specify `Y`, and then press Enter on the `Virtual Replay Execute for CICS` panel to display a `Specify Transformation Criteria` panel (Figure 89 on page 252) on which you can change one or more of the following for this Virtual Replay execution:

- The run unit's Roll Mode. Specify either `Y` (Year) or `D` (Day).
- The run unit's Roll Amount. Specify a number from -999 to 9999 that tells the run unit the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward. For more information, see "About Simulating Past or Future Dates" on page 251.
- The Run Unit Status. Specify whether the run unit is transformed (`Y`) or non-transformed (`N`).
- The Source Status. Specify whether the source data is transformed (`Y`) or non-transformed (`N`).

---

## How to Set up a Virtual Replay Execution

If you need information on the values that you can specify on, or choose from, the `Virtual Replay Execute for CICS` panel (displayed during this procedure), refer to the detailed description of this panel starting on page 237.

1. Start ARTT as described in "Invoking ARTT after the Initial Startup" on page 51.
2. Type `v` on the command line of the `ARTT Primary Menu` (Figure 11 on page 48), and then press Enter.  
The `Virtual Replay Execute Menu` is displayed (Figure 27 on page 83).
3. Type `C` on the command line of the `Virtual Replay Execute Menu`, and then press Enter.  
The `Virtual Replay Execute for CICS` panel is displayed (Figure 84 on page 237).
4. On the `Virtual Replay Execute for CICS` panel, specify the information, and select processing options for the run unit for which you are executing a proof run, and then press Enter. For panel details, see page 237.

The `Virtual Replay Execute for CICS` panel is redisplayed containing the following confirmation message:

```
The information you have specified has been added to the
ARTT control files. You should now start up your ARTT CICS
region and execute the transactions for which you wish to
execute this proof run.
```

You are ready to start a CICS session to run a Virtual Replay execution for your specified run unit. For information about running a CICS Virtual Replay execution, see page 243.



---

## Preparing to Start Your ARTT Session

You start your ARTT session by completing the fields in the ARTT Session Manager panel, described in the following paragraphs. Either read about the panel now to become familiar with its fields and options, or refer to this section later when you are completing the startup steps which begin on page 243.

### About the ARTT Session Manager Panel

The ARTT Session Manager panel is displayed when you start a CICS session, and then specify the ARTT transaction code.

ARTT Session Manager	Applid:
	User :
	Date :
Please enter the following:	Time :
Function : S	(S=Start, E=End)
Run Unit Name : CICSRUN	
Run Unit Status :	(N=Non-transformed, Y=Transformed)
Run Mode :	(C=Capture, V=Virtual)
Roll Mode :	(Y=Years, D=Days)
Roll Amount :	
Run Id :	
Destination :	

The fields on the ARTT Session Manager panel, and their attributes, are described in the paragraphs that follow.

## Specify Mandatory Information

Use the following fields to provide ARTT with information that it needs to execute your CICS run unit in Virtual Replay mode.

### Function

Specify **S** to start or **E** to end your CICS session for ARTT.

### Run Unit Name

Type the run unit name that you specified in the `Virtual Replay Execute for CICS` panel (for panel details, see page 237).

The run unit name can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

**Note:** If you specified **E** in the **Function** field, you need not specify a run unit name.

If you specified **S** in the **Function** field and you do not specify a run unit name, this message is displayed in the top right corner of the panel:

```
Blank Run Unit Name.
```

If you specify an incorrect run unit name, this message is displayed in the top right corner of the panel:

```
Invalid Run Unit Name.
```

## Specify Optional Information

**Note:** If you change any of the fields on the `ARTT Session Manager` panel, the changes apply only for the active session.

### Run Unit Status

Use this field to specify the status of the run unit shown in the **Run Unit Name** field. Specify **Y** for transformed status or **N** for non-transformed status.

You can specify the status of a run unit only if you have specified **S** in the **Function** field.

### Run Mode

Use this field to specify the run mode, **C** for Capture or **V** for Virtual Replay, for your CICS run unit.

You can specify a run mode only if you have specified **S** in the **Function** field.

### Roll Mode

Use this field to specify a roll mode, either **D** (Day) or **Y** (Year), for an execution in Virtual Replay mode.

### Roll Amount

Use this field to specify a roll amount for an execution in Virtual Replay mode. Specify a positive or negative number from -999 to 9999 that indicates the number of days or years by which dates in the data should be rolled forward (aged) or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.

## Run ID

Specify a run identifier for the execution in Capture mode of the run unit specified in the **Run Unit Name** field. The identifier enables ARTT to set up and identify unique records for this execution in the Program control file and the Test control file. The identifier can be alphabetic or a combination of alphabetic and numeric characters, and may be up to eight characters in length. However, it cannot start with a numeric character or contain blanks.

You must specify a run identifier. If you do not, this message is displayed in the top right corner of the panel:

```
Blank Run ID.
```

## Destination

This field is not used for executions in Capture mode or Virtual Replay mode.

---

## How to Start Your ARTT Session and Run Your Virtual Replay Execution

If you need information on the values that you can specify on the ARTT Session Manager panel (displayed during this procedure), refer to the detailed panel description, starting on page 228.

Prepare to execute your proof run using the steps described in “How to Set up a Virtual Replay Execution” on page 240, and then proceed as follows:

1. Use your installation procedures to logon to CICS.
2. When the CICS logo appears, clear the screen.
3. Type ARTT, the transaction code for the ARTT Session Manager panel, in the top left corner of the panel, and then press Enter.

The ARTT Session Manager panel is displayed (see “About the ARTT Session Manager Panel” on page 228).

4. Type S in the **Function** field.
5. In the **Run Unit Name** field, type the name of the run unit that you specified in the Virtual Replay Execute for CICS panel (Figure 84 on page 237), and then press Enter.

A screen displays containing the following message:

```
ATG4002I ARTT session creation complete
```

If for any reason the ARTT session could not be created, the following message is displayed:

```
ATG4004I Session could not be created
```

Check the execution reports (see “Reading the Virtual Replay Reports” on page 244) to find out why the session was not created.

6. Type the names of the CICS transactions for the Virtual Replay execution, and then press Enter.

---

## Stopping Your ARTT Session

When you have completed your capture transactions, proceed as follows:

1. Clear the screen.
2. Type ARTT in the top left corner of the screen , and then press Enter.  
The ARTT Session Manager panel is redisplayed.
3. Terminate the CICS session by typing E in the **Function** field, and then pressing Enter.

The following message appears in the top left corner of the screen:

```
ATG4002I ARTT session destruction complete
```

---

## Reading the Virtual Replay Reports

ARTT produces the following execution reports when executing a proof run with CICS data:

- Control Files
- Capture Summary.

An example of each report follows.

### Execution Report (Control Files)

When you start up a CICS region under the control of ARTT, an execution report is produced. The report, like the one shown in Figure 85, is produced under the ddname ATGPRINT, which is dynamically allocated and controlled by the ARTT program.

The control file parameters in the report will match the ATGOPTS used by the CICS region.

**Note:** you need ALTER authority in order for the ARTT user interface to create the log file, and UPDATE authority so that the user interface can update the control files.

```
ART V2.R2.M0 -- Execution Report
Copyright (C) 1996, 1997, 1998 National Westminster Bank, Plc., All Rights Reserved

ATGA0001I Program Control File = REDG.ARTT.PROG.VSAM
ATGA0002I File Control File. . = REDG.ARTT.FILE.VSAM
ATGA0005I Conversion Library . = REDG.ARTT.CMOD.PDS
ATGA0006I Compare Library. . . = REDG.ARTT.XMOD.PDS
ATGA0008I Test Control File. . = REDG.ARTT.TEST.VSAM
ATGA0030I Task DFHSIP attached with:
ATGA0031I   Parameters = "START=COLD,SYSIN" (16 BYTES).
ATGA0032I Initialisation complete. Passing control to application.
ATGA4000I EIP Intercept has been installed
```

Figure 85: CICS Virtual Replay Execution Report (Control Files)

The report shows the names of the control files used during the Virtual Replay execution of your CICS run unit as follows:

- Program control file
- File control file
- Conversion library
- Compare library
- Test control file.

For more information about ARTT control files, see page 265.

## Execution Report (Virtual Replay Summary)

When you successfully complete a Virtual Replay execution for a CICS run unit, an execution report is produced. The report, like the one shown in Figure 86, is produced under the ddname *SYS0000nn*, which is dynamically allocated and controlled by the ARTT program.

```

1ART V2.R2.M0 - Execution Report
  Copyright C 1996, 1997, 1998, National Westminster Bank, PLC

ATGA0704I Log File . . . . . = REDG.ARTT.CICSRUN.BASE.LOG
ATGA0705I Run Unit CICSRUN executed with:
ATGA0706I   Run Mode = VIRTUAL
ATGA0707I   Status = N
ATGA0708I   Run Id = BASE

-----
ATGA0713I I/O Activity from Current Run:
ATGA0714I Name      s  Opens Closes Inputs Outputs Diffs Shown ConvMod  CompMod  Dataset Name
ATGA0712I -----
ATGA0715I TERMLU02 N   0    0    0     1     0    0                CICS=TC.TERMLU02.ATGCART
ATGA0715I DSN8CCG  N   0    0    6     7     0    0                CICS=BMS.DSN8CCG.DSN8CCG
ATGA0715I ASKABSTM N   0    0    2     0     0    0                CICS=DT.ASKTIME.ABSTIME
ATGA0715I ASSIGN   N   0    0    2     0     0    0                CICS=EI.ASSIGN
ATGA0715I ATGMAR1A N   0    0    2     1     0    0                CICS=BMS.ATGMART.ATGMAR1
ATGA0719I Log File Closed.

```

Figure 86: CICS Virtual Replay Execution Report (Summary)

The report shows:

- The name of the Log file as specified on the Virtual Replay Execute for CICS panel.
- The following run parameters:
  - Run Mode (in this case, Virtual)
  - Run unit transformation status (defaults to N for non-transformed)
  - Run ID as specified in the Virtual Replay Execute for CICS panel.

The report also shows the following information for each input and ddname not specifically excluded from the Virtual Replay execution:

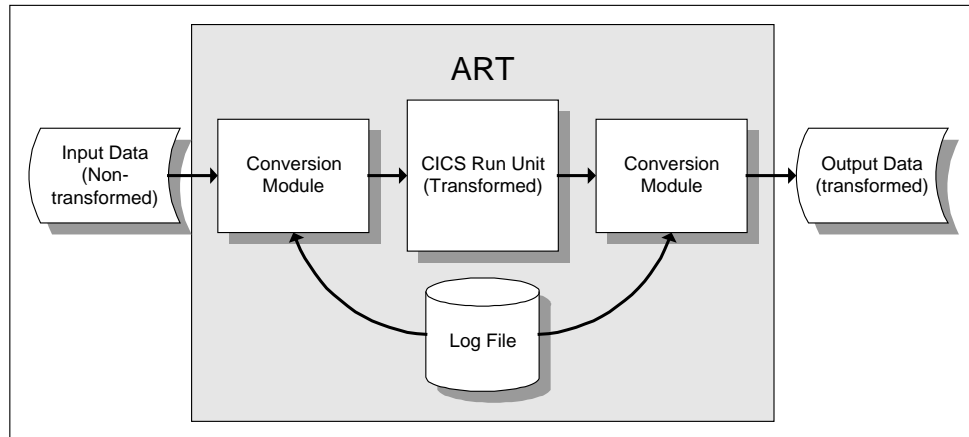
<b>Name</b>	Symbolic name of the data source
<b>S</b>	Status of the data source, initially N (non-transformed), held in the file control file.
<b>Opens</b>	Number of times that the data source was opened during the course of the Virtual Replay execution.
<b>Closes</b>	Number of times that the data source was closed during the course of the Virtual Replay execution.
<b>Inputs</b>	Number of times that data was read from the data source during the course of the Virtual Replay execution.
<b>Outputs</b>	Number of times that data was written to the data source during the course of the Virtual execution.
<b>Diffs</b>	The number of differences between the Virtual Replay and Capture executions.
<b>Shown</b>	The number of differences between the Virtual Replay and Capture executions.
<b>ConvMod</b>	Name of the conversion module for the data source. For more information about conversion modules, see “About Transforming Data” on page 248.
<b>CompMod</b>	Name of the comparison module for the data source. For more information about conversion modules, see “About Transforming Data” on page 248.
<b>Dataset Name</b>	Fully-qualified name of each data source.

---

## Chapter 20. Executing a Proof Run with Data Transformation

After you have captured the baseline information for your CICS run unit, you can transform the data input to, or output from, a Virtual Replay (proof) run by:

- Changing date formats (for example, from mm/dd/yy to mm/dd/yyyy)
- Rolling the dates forward (aging them) or backward (rejuvenating them).



*Figure 87: Virtual Replay of a CICS Run Unit*

To transform the data, execute your Virtual Replay run using a conversion module to control which date formats are changed and which dates are rolled.

### **This chapter describes:**

- How to create a conversion module to use when executing a CICS run unit in Virtual Replay mode.
- How to simulate past or future dates when executing a CICS run unit in Virtual Replay mode.

---

## About Transforming Data

For any type of data transformation:

- The data you want to transform must be associated with a file family.

A file family is a group of data files, each of which has the same fields with the same record length. The files in the family use the same transformation parameters, and therefore the same conversion and comparison modules.

- The file family associated with the data you want to transform must have a conversion module.

A conversion module is a reusable logic module that consistently converts data according to transformation parameters that you specify. A conversion module is created automatically when you specify details of your transformation and specify **C** next to a file family in the *Data Transformation Setup for Standard Batch and CICS* panel.

Some data transformation may require that you use a comparison module instead of a conversion module. A comparison module is similar in construction to a conversion module, but it enables you to omit specific areas of data from the comparison. A difference caused by a time stamp in an output file, for instance, could not be resolved with a conversion module. An ARTT comparison module however, could resolve the difference by excluding the time stamp from the comparison.

A comparison module is created automatically when you specify **X** next to a file family in the *Data Transformation Setup for Standard Batch and CICS* panel and include an **OMIT** statement in your transformation parameters.

In addition to associating data with a file family and creating a conversion module, if you want to transform data by:

- Changing date formats, you must specify data transformation parameters on additional panels that are displayed from the *Data Transformation Setup for Standard Batch and CICS* panel. For more information about changing date formats, see page 249.
- Simulating past or future dates, you must specify roll settings *during* the Virtual Replay execution. This is described in “About Simulating Past or Future Dates” on page 251.

### Data Transformation Setup for Standard Batch and CICS Panel

When you create a conversion module (step-by-step instructions begin on page 250), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

From the ARTT Primary Menu (Figure 11 on page 48), select **S**, *Data Transformation setup* to display the *Data Transformation Setup* Menu (Figure 31 on page 95).

The options shown on the menu depend on how ARTT is configured for your installation. Figure 31 shows menu options for an installation configured for IMS, CICS, and DB2.



Specify **B** on the command line in Figure 31 to display a Data Transformation Setup for Standard Batch and CICS panel, like the one that follows:

```

ARTT - Data Transformation Setup for Standard Batch and CICS   Row 1 to 6 of 6
Command ===>_____ Scroll ===> PAGE

-----
Option      Family Name      Family Description
-----
-           AAA
-           COURSDB
-           DZ406          sss
-           GSAMDB        test
-           GSAMIN        ss
***** Bottom of data *****

```

Figure 88: Data Transformation Setup for Standard Batch and CICS Panel

The Data Transformation Setup for Standard Batch and CICS panel shows each file family available for data transformation. A file family is a group of files, each of which has the same fields with the same record length. The files in the family use the same transformation parameters, and therefore the same conversion and compare modules.

Use the panel to add a new file family, or to do the following for an existing file family:

- Create a conversion module or a comparison module
- Associate a data source with a file family, or disassociate a data source from a file family
- Modify the data transformation parameters.

The options that you can specify on the panel, and the result of specifying each option, are shown in the table that follows. Type an option in the field next to a family name.

Option	Result
<b>C</b>	Create a conversion module. Submits a job to create a conversion module.
<b>I</b>	Add a new file family. Displays a <i>Specify Family</i> subpanel. When you specify a family name in the subpanel, and then press Enter, an <i>Add Family</i> panel is displayed.
<b>M</b>	Add or delete an association between a data source and a file family. Displays a <i>File Family Maintenance</i> panel. An entry is either added to or deleted from the file control file, depending on which action you perform.
<b>S</b>	View, add, or change data transformation parameters. Displays a <i>Family Maintenance</i> panel showing data transformation parameters for the file family.
<b>U</b>	Same result as the <b>S</b> option.
<b>X</b>	Create a compare module. Submits a job to create a compare module.

---

## How to Create a Conversion Module

If you need information on the values that you can specify on, or select from, the Data Transformation for Standard Batch and CICS panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 249.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type S on the command line on the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The Data Transformation Setup Menu is displayed (Figure 31 on page 95).

3. Type B on the command line on the Data Transformation Setup Menu, and then press Enter.

The Data Transformation Setup for Standard Batch and CICS panel is displayed (Figure 32 on page 96).

4. Type S next to the file family for which you want to create a conversion module, and then press Enter.

A Family Maintenance panel is displayed in which you can add new data transformation parameters or modify existing parameters.

5. When you are satisfied with your data transformation parameters, press PF3 to return to the Data Transformation Setup for Standard Batch and CICS panel.
6. Type C next to the file family for which you want to create a conversion module, and then press Enter.
7. If you have already created a conversion module for your selected file family, a Conversion module already exists subpanel is displayed, like the one that follows:

```
Command ==> _____  
  
A module already exists for Family AAA  
  
Overwrite ? . . . N (Y/N)  
  
Press ENTER to continue or END/CANCEL to cancel.
```

To overwrite the conversion module, specify Y in the subpanel, otherwise specify N, and then press Enter

ARTT submits a job to generate your conversion module.

---

## About Simulating Past or Future Dates

Date Rolling is useful for verifying that your program will work correctly with future dates. It automatically ages dates (by rolling them forward) or rejuvenates dates (by rolling them backward) in input and output files according to values that you specify.

Rolling dates comprises two sets of procedures:

1. Initially, the data source in which you roll dates must be associated with a file family, and that file family must have its own conversion module.

You start the process of associating a data source with a file family on the `Data Transformation Setup for Standard Batch and CICS` panel. You use that same panel to create a conversion module for the file family. Instructions for both of these procedures start on page 248.

2. Next, when you are executing your Virtual Replay execution, you must type `Y` in the **Data Change** field on the `Virtual Replay Execute for CICS` panel to display the `Specify Transformation Criteria` panel. On this panel, you can specify your roll information.

“Preparing to Simulate Past or Future Dates” in this chapter describes how to specify roll information on the `Specify Transformation Criteria` panel. Instructions for executing a Virtual Replay execution using date rolling begin on page 254.

## Preparing to Simulate Past or Future Dates

When you simulate past or future dates (step-by-step instructions begin on page 254), the panels described in the following paragraphs are displayed. Either read this section now to become familiar with the panels, or refer to this section later if you need information on what to specify in, or select from, the panels.

You use the `Specify Transformation Criteria` panel (Figure 89) to specify `Roll Mode` and `Roll Amount` information for your CICS test session.

## Specify Transformation Criteria Panel

To display the Specify Transformation Criteria panel, specify **Y** in the **Data Change** field on the Virtual Replay Execute for CICS panel (Figure 84 on page 237), and then press Enter.

```

ARTT - Specify Transformation Criteria                               Row 1 to 8 of 47
Command ==>>>_____ Scroll ==>> PAGE

Run Unit Name . : CICSA10N    Run ID . : BASELINE    Log ID . : BASELINE
Log File Name . : REDG.ARTT.CICSA10N.BASELINE.LOG

Specify Run Unit Transformation Criteria:
Roll Mode . . . . D          (D - Days, Y - Years)
Roll Amount . . . . 0_____ (Range : -999 to 9999)
Run Unit Status . N          (Y - Transformed, N - Not Transformed)

Update Data Source Transformation Criteria:
-----
Sel  Data Source                                Cmod  Xmod  Stat  Family
-----
-    CICS=FC.FILEXX                             N      N    N    AAA
-    CICS=TS.Q001                               N      N    N    AAA
-    CICS=TD.Q2                                 N      N    N    AAA
  
```

Figure 89: Specify Transformation Criteria Panel (CICS)

The Specify Transformation Criteria panel enables you to change one or more of the following for your Virtual Replay execution:

- The CICS run unit Roll Mode. Specify either **Y** (Year) or **D** (Day).
- The CICS run unit Roll Amount. Specify a number from -999 to 9999 that tells the program the number of days or years by which dates in the data should be rolled forward (aged), or backward (rejuvenated). Positive numbers roll dates forward, negative numbers roll dates backward.
- The Run Unit Status. Specify whether the run unit is transformed (**Y**) or not (**N**).
- A list of the Data Sources for this replay execution for which you can specify transformation criteria.

To change the Roll Mode, Roll Amount, or Run Unit Status, overwrite the existing value for the field with an appropriate value, and then press PF3.

Accept the default value (**N**) to run the Virtual Replay execution without changing any of these parameters.

The data sources for which you can specify transformation criteria are listed in the bottom part of the panel. Scroll forward or backward to view the data sources in the list. To change the transformation criteria for a data source, type `S` in the `Sel` column next to the data source, and then press Enter. An `Update Data Source` subpanel is displayed, like the one shown in **Figure 34** on page 100.

**Notes:**

1. The list in the bottom part of the `Specify Transformation Criteria` panel shows data sources only for the type of program with which you are working. For example, if you are transforming data for an IMS batch program, the list shows only data sources for IMS batch programs.
2. If you do not intend to transform any data, you do not need to select any data sources for replay.

The fields in the `Update Data Source` subpanel enable you to:

- Set the data source status. Specify `Y` for transformed status or `N` for non-transformed status.
- Use a conversion module. Specify `Y` to run with a conversion module or `N` to run without a conversion module.
- Use a comparison module. Specify `Y` to run with a comparison module or `N` to run without a comparison module.
- Specify an old record size. Type a record size between 1 and 99999.
- Specify a new record size. Type a record size between 1 and 99999.

**To change the information for a data source, complete the following steps:**

1. Select a data source from the `Data Source` column by typing `S` in the `Sel` field at the left of the panel, and then press Enter.  
The `Update Data Source` subpanel is displayed.
2. Type new information for your selected data source as required, and then press Enter.  
The `Update Data Source` subpanel closes and the `Specify Transformation Criteria` panel is displayed containing the new information for your selected data source.  
To close the subpanel without making any changes type `Can` on the command line and then press Enter, or press PF3.
3. If you want to change the information for another data source, repeat steps 1 and 2 in this list.  
Alternatively, type `Can` on the command line and then press Enter, or press PF3 to close the `Specify Transformation Criteria` panel.

---

## How to Execute a Proof Run with Data Transformation

If you need information on the values that you can specify on, or choose from, the `Specify Transformation Criteria` panel (displayed during this procedure), refer to the detailed description of this panel, starting on page 252.

**Note:** Before you can run a CICS run unit with date rolling in Virtual Replay mode, each input or output file in which dates are to be rolled must be associated with a conversion module. For information about generating and working with conversion modules, see page 250.

1. Start ARTT as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type `v` on the command line on the `ARTT Primary Menu` (Figure 11 on page 48), and then press `Enter` to display the `Virtual Replay Execute Menu` (Figure 27 on page 83).
3. Specify `C` on the command line on the `Virtual Replay Execute Menu`, and then press `Enter`. The `Virtual Replay Execute for CICS` panel is displayed (Figure 84 on page 237).
4. Specify information about the run unit for which you are executing the Virtual Replay run.
5. Specify `Y` in the **Data Change** field, and then press `Enter`. The `Specify Transformation Criteria` panel is displayed (Figure 89 on page 252).
6. Specify either `D` (Day) or `Y` (Year) in the **Roll Mode** field.
7. Specify a value from -999 to 9999 in the **Roll Amount** field.
8. Select one or more data sources from the `Data Source` column by typing `s` in the **Option** field at the left of the panel.
9. Type a new transformation status (either `Y` or `N`) in the `Source Status` column for each selected data source.
10. Press `PF3` to close the `Specify Transformation Criteria` panel and process your changes.

The `Virtual Replay Execute for CICS` panel is redisplayed containing the following confirmation message:

```
The information you have specified has been added to the
ARTT control files. You should now start up your ARTT CICS
region and execute the transactions for which you wish to
execute this proof run.
```

You are ready to start a CICS session to run a Virtual Replay execution for your specified run unit.

11. Use your installation procedures to logon to CICS.
12. When the CICS logo appears, clear the screen.

13. Type `ARTT`, the transaction code for the `ARTT Session Manager` panel, in the top left corner of the panel, and then press Enter.

The `ARTT Session Manager` panel is displayed (See “About the `ARTT Session Manager Panel`” on page 241).

14. Type `s` in the **Function** field.
15. In the **Run Unit Name** field, type the name of the run unit that you specified in the `Virtual Replay Execute for CICS` panel (Figure 84 on page 237), and then press Enter.

A screen displays containing the following message:

```
ATG4002I ARTT session creation complete
```

If for any reason the `ARTT` session could not be created, the following message is displayed:

```
ATG4004I Session could not be created
```

Check the execution reports (see “Reading the Virtual Replay Reports” on page 244) to find out why the session was not created.

16. Type the names of the CICS transactions for the `Virtual Replay` execution, and then press Enter.





## Part 6. Appendixes

This part contains the following appendixes, each of which contains information that you may find helpful when working with ARTT:

- Appendix A. Understanding ARTT's Program Interface
- Appendix B. Understanding Data Transformation
- Appendix C. Site Variables
- Appendix D. Date Formats
- Appendix E. ARTT Data Sets
- Appendix F. Sample Procedures and Programs.



---

## Appendix A. Understanding ARTT's Program Interface

At some stage, you may want to work with ARTT's program interface instead of its user interface. Your task may even *require* that you work with the program interface. For instance, you might need or prefer to use the program interface when you want to submit:

- JCL containing syntax constructs that the user interface does not support
- JCL from a library or data set environment that the user interface does not support
- Large amounts of JCL quickly.

This appendix describes each component of the ARTT program interface and explains why and when you may need to use each one of them to run ARTT.

### **This appendix describes:**

- Why you may want to use the program interface
- The components that make up the program interface
- ATGBOOT module
- ATGSITE module
- ATGOPTS module
- ARTT control files
- ARTT preparation utilities.

---

### **Why Use the Program Interface?**

When you use the user interface, ARTT takes the information that you enter in the panels and supplies it to the program interface. However, if you want to run ARTT with JCL or with library and data set environments that the user interface does not support, you need to supply the information to the program interface yourself. The user interface only supports PDS or PDSE libraries and selected JCL syntax constructs. If your programs contain something other than these supported items, you must use the program interface to run them with ARTT.

---

## What Components Make up the Program Interface?

The program interface is comprised of the following components:

- ATGBOOT
- ATGSITE
- ATGOPTS
- ATGPSBX
- ATGLDCS
- ATGARMS
- ATGCPRM
- ATGCGEN
- ATGXPRM
- ATGXGEN
- Control files:
  - File
  - Program
  - Test
  - ARMS
  - Date
  - Format
  - Repository.

---

## ATGBOOT Module

### Function:

ATGBOOT is the module that starts the execution of ARTT.

### Location:

Locate ATGBOOT in the link list data set that was specified when ARTT was installed. The module should reside *only* in that location.

### What to Modify:

Before using ATGBOOT, change both the PGM and PARM parameters of the JCL EXEC statements that invoke your program as follows:

1. Replace the program name specified for the PGM parameter with ATGBOOT.
2. Specify the following items, in the sequence shown, for the PARM parameter:

- The original program name specified for the PGM parameter
- Any ARTT options
- A slash (/)
- Any program parameters.

For example:

```
//MYSTEP EXEC PGM=MYPROG,PARM='My list of parameters'
```

Would change to:

```
//MYSTEP EXEC PGM=ATGBOOT,PARM='MYPROG{,Atgopts_suffix{,Run_unit}} /My list of parameters'
```

Where:

*Atgopts\_suffix* and *Atgboot\_parameters* are optional. When specifying:

- *Atgopts\_suffix*, enter an uppercase letter that, when concatenated to ATGOPTS, refers to a valid ARTT ATGOPTS module in the current execution search path. For further information about the ATGOPTS module, see "ATGOPTS Module" on page 264.
- *Run\_unit*, enter a name, up to eight alphanumeric or national characters, that overrides MYPROG as the Program Name or Run Unit name for IMS MPR and DB2 batch programs.

**Note:** The length of the PARM parameter is limited to 100 characters by JCL syntax rules.

## ATGBOOT Startup Sequence

As stated previously, whenever you want to run a program under the control of ARTT, you must invoke the ATGBOOT program. The following startup sequence shows the initialization steps that ARTT follows after you submit the JCL that executes your program. Among other things, the initialization sequence defines the environment or mode in which your program runs.

Knowing these steps can help you see how and when the program interface is used and the customization that is possible. When you execute ATGBOOT, the program performs the following steps:

1. Loads the ATGSITE module from the current execution path. ATGSITE defines the ARTT communication SVC and the ARTT load library from which all other ARTT system modules are executed. For more information about ATGSITE, see page 263.
2. Loads the ATGOPTS module from the current execution path. ATGOPTS defines the ARTT control files, ARTT log file name, as well as all of your load libraries and data libraries that ARTT uses for data conversion and subsystem interface access. For more information on ATGOPTS, see page 264.
3. Installs the ARTT communication SVC for the current task.
4. Turns on SVC screening for SVC 19 and SVC 20.
5. Loads your program from the current execution path.
6. Executes your program, respecting your program's authorization code bit.

**Note:** A summary of these actions is recorded in the header section of ATGPRINT, the file containing the output for this execution.

---

## ATGSITE Module

### Function:

ATGSITE is the module that specifies the ARTT communication SVC and the ARTT load library that is to be used on a site-wide basis.

### Location:

Locate the ATGSITE module JCL in the 'hlq.V2R2M0.SATGINST(ATGSITE)' data set. The ATGSITE module is loaded from the current execution path.

### When to Modify:

If you want to change the communication SVC or the ARTT load library used by your site, modify the ATGSITE module parameters.

### What to Modify:

Edit the ATGSITE parameters as described in the 'hlq.V2R2M0.SATGINST(ATGSITE)' JCL. The parameters and required changes are described in the data set header. When you are finished, submit the JCL for processing.

### Example:

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//ASSEM      EXEC HLASMCL,PARM.L='LET,MAP,LIST,CALL'
//C.SYSLIB   DD
//           DD DSN=SYS1.MODGEN,DISP=SHR
//           DD DSN=ATC.ART.V2R2M0.SATGMACS,DISP=SHR
//C.SYSIN    DD *
              ATGSITE SVC=253,
              SYSLIB=ATC.ART.V2R2M0.SATGLOAD
              ATGVRSN ,
              END   ATGSITE
//L.SYSLMOD DD DSN=ATC.ART.V2R2M0.SATGBOOT(ATGSITE),DISP=SHR
//
```

---

## ATGOPTS Module

### Function:

ATGOPTS is the module that specifies the following details on a project-wide basis: ARTT control files, the high- and low-level qualifiers for the ARTT log file name, and your load and data libraries that ARTT will use for data conversion and subsystem interface access.

### Location:

Locate the ATGOPTS module JCL in the 'hlq.V2R2M0.SATGINST(ATGOPTS)' data set. The ATGOPTS module is loaded from the current execution path.

### When to Modify:

If you want to specify different control file names, different high- or low-level qualifiers for the log file, or different load and data libraries, modify the ATGOPTS module parameters.

### What to Modify:

Edit the ATGOPTS parameters as described in the 'hlq.V2R2M0.SATGINST(ATGOPTS)' JCL. The parameters and required changes are described in the data set header. When you are finished, submit the JCL for processing.

### Example:

```
//ATCCTRAA JOB   , 'JAN GROVE' ,MSGCLASS=X,NOTIFY=ATCCTRA
//ASSEM      EXEC HLASMCL , PARM.L='LET,MAP,LIST,CALL'
//C.SYSLIB   DD
//           DD DSN=SYS1.MODGEN,DISP=SHR
//           DD DSN=ATC.ART.V2R2M0.SATGMACS,DISP=SHR
//C.SYSIN    DD *
              ATGOPTS TYPE=CSECT,
              PROGDSN=ATC.ART.PROG.VSAM,
              FILEDSN=ATC.ART.FILE.VSAM,
              TESTDSN=ATC.ART.TEST.VSAM,
              CONVLIB=ATC.ART.V2R2M0.SATGSLOD,
              COMPLIB=ATC.ART.V2R2M0.SATGSLOD,
              USERLIB=ATC.ART.V2R2M0.SATGSLOD,
              LOGHLQ=ATC.ART,
              LOGLLQ=LOG
              END
//L.SYSLMOD  DD DSN=ATC.ART.V2R2M0.SATGSLOD(ATGOPTS),DISP=SHR
//L.SYSLIB   DD DSN=ATC.ART.V2R2M0.SATGSLNK,DISP=SHR
//
```



---

## ARTT Control Files

ARTT accesses three control files to determine runtime information: the File control file, the Program control file, and the Test control file. ARTT also uses four additional control files during data conversion and subsystem interface setup and preparation: the ARMS control file, the Date control file, the Formats control file, and the Repository control file. The following topics describe ARTT's control files.

### File Control File

#### Function:

The File control file is necessary for ARTT to run. If you are performing data conversion or if you are running DB2 or IMS programs, the File control file also contains an entry for each logical data set that is associated with a conversion module or a comparison module.

#### Location:

The ATGOPTS module that was in effect for your ARTT execution points to the location of the File control file.

#### Format:

Each entry in the File control file contains the following information:

<b>File name</b>	Name of the file associated with a conversion or compare module.
<b>File family</b>	Name of the family to which the file belongs.
<b>Convert module</b>	Name of the conversion module for the file.
<b>Compare module</b>	Name of the compare module for the file.
<b>Old recsz</b>	Length of the old (non-transformed) record for the file.
<b>New recsz</b>	Length of the new (transformed) record for the file.
<b>File status</b>	Status of the file (Y for transformed or N for non-transformed).

## How to Create:

Before you can run a program under ARTT control, you must create a File control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGINST(DEFPTILE)'

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
DELETE ATC.ART.FILE.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
      NAME(ATC.ART.FILE.VSAM)-
      CYL(10 10)-
      KEYS(44 0)-
      RECSZ(107 107)-
      SHR(4 4)-
      SPEED)-
INDEX(-
      NAME(ATC.ART.FILE.VSAM.INDEX))-
DATA(-
      NAME(ATC.ART.FILE.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD *
GENERATE MAXFLDS=1
RECORD FIELD=(107,1,,1)
//SYSUT1 DD *
DUMMY DUMMY DUMMY DUMMY DUMMY YYY
//SYSUT2 DD DSN=&&DATA,DISP=(NEW,PASS),
// SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=107)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD DSN=ATC.ART.FILE.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 90: File Control File - 'hlq.V2R2M0.SATGINST(DEFPTILE)'

## When to Modify:

If you are going to use the program interface rather than the user interface to convert or compare the data in a specific file, you must set up an entry for the file in the File control file. Modify the File control file as described in this topic under "How to Modify."

## How to Modify:

The user interface automatically sets up an entry in the File control file just before it submits your JCL for execution. If you do not use the user interface, you must set up an entry as described in the following steps:

1. Start ARTT and display the ARTT Primary Menu as described in “Invoking ARTT after the Initial Startup” on page 51.
2. Type A on the command line to select Administration functions from the ARTT Primary Menu.

The ARTT - Control File Editor panel is displayed.

```
ARTT - Control File Editor
Command ==>_____

      Select one of the following options:

      1 - Program Control File Maintenance
      2 - File Control File Maintenance
      3 - Test Control File
      4 - Repository Maintenance
      5 - Date Format List
      6 - Control File Setup
```

Figure 91: ARTT - Control File Editor Panel

**Note:** Sometimes, the Administration functions option is not available on the ARTT Primary Menu. In this case, see your ARTT System Administrator for installation concerns.

3. Type 6 on the command line to select Control File Setup. The ARTT - Setup Screen is displayed.

```
ARTT - Setup Screen
Command ==>_____

      Please enter your control dataset names:

      Program Control File . . 'NICH.ARTT.PROG.VSAM'
      File Control File . . . 'NICH.ARTT.FILE.VSAM'
      Test Control File . . . 'NICH.ARTT.TEST.VSAM'
      Date Format File . . . . 'ATC.ART.V2R2M0.SATGFMTS'
      Repository File . . . . 'NICH.ARTT.REPS.VSAM'
```

Figure 92: ARTT – Setup Screen

Make sure that the panel shows the names of the control files that you want to work with. If not, make the appropriate changes, and then press Enter. The Control File Editor panel is redisplayed.

**Note:** The initial settings for this control file are determined and maintained by using option O (User Options) from the ARTT Primary Menu.

4. Type 2 on the command line of the Control File Editor panel, and then press Enter.  
The ARTT - File Control File List panel is displayed.

```

ARTT - File Control File List                                     Row 1 of 1
Command ===>_____ SCROLL ===> CSR

                                     File      Convert  Old      New
S Dataset                           Family    Module   Recsz   Recsz   St
  DUMMY                              DUMMY    DUMMY    0       0       N
***** Bottom of data *****

```

5. Perform one of the following actions:
  - Maintain a file entry by typing S in the field next to the file entry, and then pressing Enter.  
A File Control File Detail panel is displayed containing control file details for your selected file.

```

ARTT - File Control File Detail
Command===>_____ Last modified:
                                     User:
                                     Date:
                                     Time:

  Press ENTER to UPDATE or END to cancel:

File Name . . . DUMMY
File Family. . . DUMMY
Convert Module . DUMMY
Compare Module . DUMMY
Old Recsz . . . 0
New Recsz . . . 0
File Status . . N      (N or Y)

```

*Figure 93: File Control File Detail Panel*

Change the details as required, and then press Enter to update your selected control file entry.

The File Control File Detail panel closes and you are returned to the File Control File List panel.

To close the File Control File Detail panel without making any changes, press PF3.

- Create a new file entry by typing L in the field next to any entry, and then pressing Enter.

- Delete a file entry by typing `D` in the field next to the entry that you want to delete, and then pressing Enter.
- Copy a file entry by typing `C` in the field next to the entry that you want to copy, and then pressing Enter.

## Program Control File

### Function:

The Program control file is necessary for ARTT to run. As its name implies, the Program control file contains an entry for each program that is run under ARTT's control.

### Location:

The ATGOPTS module that was in effect for your ARTT execution points to the location of the Program control file.

### Format:

Each entry in the Program control file contains the following information:

<b>Program name</b>	Name of the program to run under ARTT control.
<b>Program status</b>	Status of the program ( <code>Y</code> for transformed or <code>N</code> for non-transformed).
<b>Program type</b>	Type of program; for example, COBOL or PL/I.
<b>Run mode</b>	Mode in which the program was last run (Capture, Real Replay, or Virtual Replay).
<b>Roll mode</b>	Mode in which the program rolls dates ( <code>D</code> for Day or <code>Y</code> for Year).
<b>Roll amount</b>	Number of days or years, depending on the roll mode, by which the program rolls dates.
<b>Run ID</b>	Run identifier of the last execution of the program in Capture, Real Replay, or Virtual Replay mode. See <b>Figure 14</b> on page 57 for more information.
<b>Report limitation list</b>	Maximum number of field differences reported for up to 10 DD statements (Real Replay and Virtual Replay only).
<b>Audit exclude list</b>	List of up to 10 DD statements for exclusion from the log file generated by the Capture, Real Replay, or Virtual Replay execution of the program.

## How to Create:

Before you can run a program under ARTT control, you must create a Program control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGINST(DEFPROG)'.

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
DELETE ATC.ART.PROG.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.PROG.VSAM)-
    CYL(5 5)-
    KEYS(8 0)-
    RECSZ(60 270)-
    SHR(4 4)-
    SPEED)-
INDEX(-
    NAME(ATC.ART.PROG.VSAM.INDEX))-
DATA(-
    NAME(ATC.ART.PROG.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD *
GENERATE MAXFLDS=1
RECORD FIELD=(60,1,,1)
//SYSUT1 DD *
DUMMY NDUMMY C` ``Y`` `DUMMY
//SYSUT2 DD DSN=&&DATA,DISP=(NEW,PASS),
// SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=60)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD DSN=ATC.ART.PROG.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 94. Program Control File - 'hlq.V2R2M0.SATGINST(DEFPROG)'

## When to Modify:

If you are going to use the program interface rather than the user interface to run a program under ARTT's control, you must set up an entry for the program in the Program control file. Modify the Program control file as described in this topic under "How to Modify."

## How to Modify:

The user interface automatically sets up an entry in the Program control file just before it submits your JCL for execution. If you do not use the user interface, you must set up an entry as described in the following steps:

1. Start ARTT and display the ARTT Primary Menu as described in "Invoking ARTT after the Initial Startup" on page 51.
- 2...Type A on the command line to select Administration functions from the ARTT Primary Menu.  
The ARTT - Control File Editor panel is displayed.  
**Note:** Sometimes, the Administration functions option is not available on the ARTT Primary Menu. In this case, see your ARTT System Administrator for installation concerns.
3. Type 6 on the command line to select Control File Setup. The ARTT - Setup Screen is displayed.  
Make sure that you are working with appropriate control files. If you are not, make the appropriate changes, and then press Enter. The Control File Editor panel is redisplayed.  
**Note:** The initial settings for this control file are determined and maintained using option O (User Options) from the ARTT Primary Menu.
4. Type 1 on the command line of the Control File Editor panel, and then press Enter.  
The ARTT - Program Control File List panel is displayed.

```
ARTT - Program Control File List                                     Row 1 of 3
Command ==>_____ SCROLL ==> CSR
S Program      Status Type      Mode  Roll-Amount  Roll-Mode Run-Id
  ARTP010      N                C     0           D         BASE
  ARTP200C     N                V     0           D         BASE
  DUMMY        N      DUMMY      C     0           Y         DUMMY
***** Bottom of data *****
```

Figure 95: Program Control File List Panel

5. Perform one of the following actions:

- Maintain a file entry by typing S in the field next to the file entry, and then pressing Enter.

A Program Control File Detail panel is displayed containing control file details for your selected file.

```
ARTT - Program Control File Detail
Command ==>_____ Last modified:
User: NICH

Press ENTER to update or END to cancel: Date: 1999/02/12
Time: 07:47:05

Program Name . . . . . ARTP010
Program Status . . . . . N          (N or Y)
Program Type . . . . .
Run Mode . . . . . C          (C=Capture, V=Virtual, R=Real, B=Bridging)
Roll Amount . . . . . 0
Roll Mode . . . . . D          (Y=Years, D=Days)
Run-Id . . . . . BASE

Report limitation list:                Audit exclude list:

File      Count      File      Count      File      File
```

Figure 96: Program Control File Detail Panel

Change the details as required, and then press Enter to update your selected control file entry.

The Program Control File Detail panel closes and you are returned to the Program Control File List panel.

To close the Program Control File Detail panel without making any changes, press PF3.

- Create a new file entry by typing L in the field next to any entry, and then pressing Enter.
- Delete a file entry by typing D in the field next to the entry that you want to delete, and then pressing Enter.
- Copy a file entry by typing C in the field next to the entry that you want to copy, and then pressing Enter.



## Test Control File

### Function:

The Test control file is necessary for ARTT to run. Like the Program control file, the Test control file contains an entry for each program that is run under ARTT's control. It also contains any run information, such as signoff flags, that may be associated with the program.

### Location:

The ATGOPTS module that was in effect for your ARTT execution points to the location of the Test control file.

### Format:

Each entry in the Test control file contains the following information:

<b>Program name</b>	Name of the program to run under ARTT control.
<b>Run ID</b>	Run identifier of the last execution of the program execution in Capture, Real Replay, or Virtual Replay mode. For more information, see Figure 14 on page 57.
<b>Log file ID</b>	Log file identifier for the last program execution in Capture, Real Replay, or Virtual Replay mode.
<b>Signoff flags</b>	Signoff flags for documentation purposes. Each flag defaults to N (No).
<b>Virtual status indicators</b>	Status indicators for documentation purposes. Each indicator defaults to N (No).
<b>Real status indicators</b>	Status indicators for documentation purposes. Each indicator defaults to N (No).

## How to Create:

Before you can run a program under ARTT control, you must create a Test control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGINST(DEFTEST)'.

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
DELETE ATC.ART.TEST.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.TEST.VSAM)-
    CYL(1)-
    KEYS(16 0)-
    RECSZ(60 60)-
    SHR(4 4)-
    SPEED)-
INDEX(-
    NAME(ATC.ART.TEST.VSAM.INDEX))-
DATA(-
    NAME(ATC.ART.TEST.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD  *
GENERATE MAXFLDS=1
RECORD FIELD=(60,1,,1)
//SYSUT1 DD  *
DUMMY DUMMY NNNNNNNNNNDUMMY
//SYSUT2 DD  DSN=&&DATA,DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=60)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD  DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD  DSN=ATC.ART.TEST.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 97. Test Control File - 'hlq.V2R2M0.SATGINST(DEFTEST)'

## When to Modify:

If you are going to use the program interface rather than the user interface to run a program under ARTT's control and alter any signoff flags, you must set up an entry for the program in the Test control file. Modify the Test control file as described in this topic under "How to Modify."

## How to Modify:

The user interface automatically sets up an entry in the Test control file just before it submits your JCL for execution. If you do not use the user interface, you must set up an entry as described in the following steps:

1. Start ARTT and display the ARTT Primary Menu as described in "Invoking ARTT after the Initial Startup" on page 51.

2. Type A on the command line to select Administration functions from the ARTT Primary Menu.

The ARTT - Control File Editor panel is displayed.

**Note:** Sometimes, the Administration functions option is not available on the ARTT Primary Menu. In this case, see your ARTT System Administrator for installation concerns.

3. Type 6 on the command line to select Control File Setup. The ARTT - Setup Screen is displayed.

Make sure that you are working with appropriate control files. If you are not, make the appropriate changes, and then press Enter. The Control File Editor panel is redisplayed.

**Note:** The initial settings for this control file are determined and maintained using option O (User Options) from the ARTT Primary Menu.

4. Type 3 on the command line of the Control File Editor panel.

The ARTT - Test Control File List panel is displayed.

```
ARTT - Test Control File List                                     Row 1 of 3
Command ==>_____ SCROLL ==> CSR

          --Signoff--          ---Virtual---  ----Real-----
S Program  Run-Id   Log-Id   Dev Ops Aud Capture Tdy 2000 Bynd Tdy 2000 Bynd
  ARTP010  BASE     BASE     N  N  N       N   N   N   N   N   N
  ARTP200C BASE     BASE     N  N  N       N   N   N   N   N   N
  DUMMY    DUMMY    DUMMY    N  N  N       N   N   N   N   N   N
***** Bottom of data *****
```

Figure 98: Test Control File List Panel

5. Perform one of the following actions:

- Maintain a file entry by typing **S** in the field next to the file entry, and then press Enter.

A Test Control File Detail panel is displayed containing control file details for your selected file.

```
ARTT - Test Control File Detail
Command ==>>

Press ENTER to update or END to cancel:

Last modified:
User: NICH
Date:
Time: 07:47:07

Program Name . . . . . ARTP010          Dev signoff . . . . . N (N or Y)
Run-Id . . . . . BASE                  Ops signoff . . . . . N (N or Y)
Log File-Id . . . . . BASE             Audit signoff . . . . . N (N or Y)
                                           Captured . . . . . N (N or Y)

Virtual status indicators                Real status indicators:

Correct today . . . . . N (N or Y)      Correct today . . . . . N (N or Y)
Correct 2000 . . . . . N (N or Y)       Correct 2000 . . . . . N (N or Y)
Correct beyond . . . . . N (N or Y)     Correct beyond . . . . . N (N or Y)
```

Figure 99: Test Control File Detail Panel

Change the details as required, and then press Enter to update your selected control file entry.

The Test Control File Detail panel closes and you are returned to the Test Control File List panel.

To close the Test Control File Detail panel without making any changes, press PF3.

- Create a new file entry by typing **L** in the field next to any entry, and then pressing Enter.
- Delete a file entry by typing **D** in the field next to the entry that you want to delete, and then pressing Enter.
- Copy a file entry by typing **C** in the field next to the entry that you want to copy, and then pressing Enter.

## ARMS Control File

### Function:

The ARMS control file is required for ARTT to run a DB2 application in either Capture mode or Virtual Replay mode. ARTT reads this control file during the execution of your DB2 program, as defined by the ATGOPTS module in effect for that execution.

The ARMS control file contains entries for each DBRM used that defines the relationship between untransformed, or original, program SQL, and transformed, or modified, program SQL. This information enables ARTT to track and log SQL data on a File Family and record basis.

### Location:

The ATGOPTS module that was in effect for your ARTT execution points to the location of the ARMS control file.

### Format:

Not available.

## How to Create:

Before you can run a program under ARTT control, you must create an ARMS control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGINST(DEFARMS)'.

```
//ATCCTRAA JOB  , 'JAN GROVE' ,MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
DELETE ATC.ART.ARMS.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.ARMS.VSAM)-
    CYL(1)-
    KEYS(9 0)-
    RECSZ(28 32000) -
    SHR(2) -
    SPEED)-
INDEX(-
    NAME(ATC.ART.ARMS.VSAM.INDEX)) -
DATA(-
    NAME(ATC.ART.ARMS.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD  *
GENERATE MAXFLDS=1
RECORD FIELD=(85,1,,1)
//SYSUT1 DD  *
yyyyyyyy DUMMY LOAD RECORD
//SYSUT2 DD  DSN=&&DATA,DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=85)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD  DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD  DSN=ATC.ART.ARMS.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 100: ARMS Control File - hlq.V2R2M0.SATGINST(DEFARMS)'

**When to Modify:**

If you are going to use the program interface rather than the user interface to run a DB2 program, you must set up an entry for the program in the ARMS control file. Modify the ARMS control file as described in this topic under “How to Modify.”

**How to Modify:**

This file can only be modified through either the user interface or the ATGARMS program. For a description of ATGARMS, see page 290.

**Date Control File****Function:**

The Date control file is used to maintain the date format/conversion information for DB2 columns for the purpose of creating ARTT conversion modules. The Date control file contains entries for each table and column to be treated as a date.

**Location:**

The ATGOPTS module that was in effect for your ARTT execution points to the location of the Date control file.

**Format:**

Not available.

## How to Create:

Before you can run a DB2 program under ARTT control, you must create a Date control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGINST(DEFDATE)'.

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
DELETE ATC.ART.DATE.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.DATE.VSAM)-
    CYL(1)-
    KEYS(36 0)-
    RECSZ(48 48)-
    SPEED)-
INDEX(-
    NAME(ATC.ART.DATE.VSAM.INDEX))-
DATA(-
    NAME(ATC.ART.DATE.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD  *
GENERATE MAXFLDS=1
RECORD FIELD=(48,1,,1)
//SYSUT1 DD  *
YYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY
//SYSUT2 DD  DSN=&&DATA,DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=48)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD  DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD  DSN=ATC.ART.DATE.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD  *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 101: Date Control File - 'hlq.V2R2M0.SATGINST(DEFDATE)'



**When to Modify:**

If you are going to use the program interface rather than the user interface to run a DB2 program, you must set up an entry for the program in the Date control file. Modify the Date control file as described in this topic under “How to Modify.”

**How to Modify:**

The Date control file is populated and modified by either selecting option S on the ARTT Primary Menu for DB2 or changing and submitting the sample JCL in 'hlq.V2R2M0.SATGSAMP(ATGLDCS)'. The Date control file is read by the ARTT DB2 preparation utility ATGARMS in order to create data conversion parameters that are used when data conversion modules are generated. For a description of ATGLDCS, see page 289.

**Formats Control File****Function:**

The Formats control file contains the ARTT system mapping of symbolic or mnemonic date representations to their ARTT internal numeric representation. It is used by several ARTT utility programs both inside the user interface and through the program interface to translate commonly readable date representations to ARTT-specific internal representations.

**Location:**

The ATGOPTS module that was in effect for your ARTT execution points to the location of the Formats control file.

**Format:**

Not available.

## How to Create:

The Formats control file is intended only to be created by the install process using the sample JCL in `h1q.v2r2m0.satginst(DEFMATS)`. The Formats control file can be (though it never should be) maintained through option A (Administration functions) of the ARTT user interface.

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
DELETE ATC.ART.V2R2M0.SATGFMTS
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.V2R2M0.SATGFMTS)-
    CYL(1)-
    KEYS(4 0)-
    RECSZ(62 62) -
    SHR(3 3)-
    SPEED)-
INDEX(-
    NAME(ATC.ART.V2R2M0.SATGFMTS.INDEX))-
DATA(-
    NAME(ATC.ART.V2R2M0.SATGFMTS.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD *
GENERATE MAXFLDS=1
RECORD FIELD=(62,1,,1)
//SYSUT1 DD *
0001 CDD-MMM-YYYY
...
4064 BMMYYYY
//SYSUT2 DD DSN=&&DATA,DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=62)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD DSN=&&DATA,DISP=(OLD,DELETE)
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
REPRO IFILE(IFILE) ODS(ATC.ART.V2R2M0.SATGFMTS)
//DEFAIX EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
DEFINE ALTERNATEINDEX(-
    NAME(ATC.ART.V2R2M0.SATGFMX1)-
    RELATE(ATC.ART.V2R2M0.SATGFMTS)-
    KEYS(31 5)-
    TRK(1 1)-
```

```

        SHR(3 3)-
        UNIQUEKEY-
        UPGRADE-
        REUSE)
DEFINE PATH(-
        NAME(ATC.ART.V2R2M0.SATGFMP1)-
        PATHENTRY(ATC.ART.V2R2M0.SATGFMX1))
//BLDINDEX EXEC PGM=IDCAMS
//SYSPRINT DD   SYSOUT=*
//SYSIN      DD   *
        BLDINDEX IDS(ATC.ART.V2R2M0.SATGFMTS)-
        ODS(ATC.ART.V2R2M0.SATGFMP1)
//

```

Figure 102: Formats Control File - 'hlq.V2R2M0.SATGINST(DEFMSTS)'

### When to Modify:

Due to its very nature, there should only be one Formats control file for a site and it should not be modified.

### How to Modify:

**Attention:** Modifying the date formats available for use is an advanced function that should be performed only once for your entire site. It requires not only assembler programming to support the new date formats, but it also requires continuous resynchronizing with future releases. This is not recommended.

The following describes how to use the ARTT user interface to add a new date format, change an existing date format, or delete a format that is no longer required. It does not describe the required programming support or maintenance.

1. Start ARTT and display the ARTT Primary Menu as described in "Invoking ARTT after the Initial Startup" on page 51.
2. Type A on the command line to select Administration functions from the ARTT Primary Menu.

The ARTT - Control File Editor panel is displayed.

**Note:** Sometimes, the Administration functions option is not available on the ARTT Primary Menu. In this case, see your ARTT System Administrator for installation concerns.

3. Type 6 on the command line to select Control File Setup. The ARTT - Setup Screen is displayed.

Make sure that the panel shows the names of the control files that you want to work with. If not, make the appropriate changes, and then press Enter. The Control File Editor panel is redisplayed.

**Note:** The initial settings for this control file are determined and maintained using option O (User Options) from the ARTT Primary Menu.

4. Type 5 on the command line of the Control File Editor panel, and then press Enter.

The ARTT - Date Format List panel is displayed.

ARTT - Date Format List				Row 1 of 130
Command ===>				Scroll ===> CSR
S	Code	Length	Type	Mnemonic Text
0001	11		C	DD-MMM-YYYY
0002	11		C	MMM-DD-YYYY
0003	10		C	DD-MM-YYYY
0004	10		C	MM-DD-YYYY
0005	9		C	DDMMYYYY
0006	9		C	DD-MMM-YY
0007	9		C	MMMDDYYYY
0008	9		C	MMM-DD-YY
0009	8		C	DDMMYYYY
0010	8		C	DD-MM-YY
0011	8		C	DDD-YYYY
0012	8		C	MMDDYYYY
0013	8		C	MM-DD-YY
0014	8		C	YYYY-DDD
0015	7		C	DDMMYY
0016	7		C	DDYYYY
0017	7		C	MMMDDYY
0018	7		C	YYYYDDD
0019	6		C	DDMMYY
0020	6		C	MMDDYY
0021	6		C	YYMMDD

Figure 103: Date Format List Panel

5. Perform one of the following actions:

- Maintain a file entry by typing S in the entry field next to the date format entry, and then pressing Enter.

A Date Format File Detail panel is displayed.

ARTT - Date Format File Detail		Last modified:
Commands===>		User:
Press ENTER to update or END to cancel:		Date:
		Time:
Format Code. . .	0001	
Format Length. . .	11	
Format Type. . .	C	
Format Text. . .	DD-MMM-YYYY	

Figure 104: Date Format File Detail Panel

Change the details as required, and then press Enter to update your selected control file entry.

The Date Format File Detail panel closes and you are returned to the Date Format File List panel.

To close the Date Format File Detail panel without making any changes, press PF3.

- Create a new file entry by typing **L** in the field next to any entry, and then pressing Enter.
- Delete a file entry by typing **D** in the field next to the entry that you want to delete, and then pressing Enter.
- Copy a file entry by typing **C** in the field next to the entry that you want to copy, and then pressing Enter.

## Repository Control File

### Function:

The Repository control file contains file family and date format information for the data conversion modules that you run with ARTT in Real Replay and Virtual Replay modes.

### Location:

The ATGOPTS module that was in effect for your ARTT execution points to the location of the Repository control file.

### Format:

Not available.

## How to Create:

Before you can run a program under ARTT control, you must create a Repository control file for your project. This file is created and maintained by either selecting option 0 on the ARTT Primary Menu or changing and submitting the sample JCL in `'hlq.V2R2M0.SATGINST(DEFREPS)'`.

```
//ATCCTRAA JOB  , 'JAN GROVE',MSGCLASS=X,NOTIFY=ATCCTRA
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
DELETE ATC.ART.REPS.VSAM
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(ATC.ART.REPS.VSAM)-
    CYL(1)-
    KEYS(14 0)-
    RECSZ(87 87)-
    SHR(3 3)-
    SPEED)-
INDEX(-
    NAME(ATC.ART.REPS.VSAM.INDEX))-
DATA(-
    NAME(ATC.ART.REPS.VSAM.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD *
GENERATE MAXFLDS=1
RECORD FIELD=(87,1,,1)
//SYSUT1 DD *
000000DUMMY LOAD RECORD
//SYSUT2 DD DSN=&&DATA,DISP=(NEW,PASS),
//          SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=87)
//SYSPRINT DD  SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD DSN=&&DATA,DISP=(OLD,DELETE)
//OFILE DD DSN=ATC.ART.REPS.VSAM,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
REPRO IFILE(IFILE) OFILE(OFILE)
//
```

Figure 105: Repository Control File - `'hlq.V2R2M0.SATGINST(DEFREPS)'`

### When to Modify:

If you are going to use the program interface rather than the user interface, edit this file as described in this topic under “How to Modify.”

### How to Modify:

The user interface automatically sets up an entry in the Repository control file just before it submits your JCL for execution. If you do not use the user interface, you must set up an entry as described in the following steps:

1. Start ARTT and display the ARTT Primary Menu as described in “Invoking ARTT after the Initial Startup” on page 51.

2. Type A on the command line to select Administration functions from the ARTT Primary Menu.

The ARTT - Control File Editor panel is displayed.

**Note:** Sometimes, the Administration functions option is not available on the ARTT Primary Menu. In this case, see your ARTT System Administrator for installation concerns.

3. Type 6 on the command line to select Control File Setup. The ARTT - Setup Screen is displayed.

Make sure that you are working with appropriate control files. If you are not, make the appropriate changes, and then press Enter. The Control File Editor panel is redisplayed.

**Note:** The initial settings for this control file are determined and maintained using option O (User Options) from the ARTT Primary Menu.

4. Type 4 on the command line of the Control File Editor panel, and then press Enter.

The Family List panel is displayed.

```
ARTT - Family List                                     Row 1 of 1
Command ==>_____ Scroll ==> CSR

  File      Description                                ----- Last Modified -----
S Family                                         UserId   Date       Time
  DUMMY
***** Bottom of data *****
```

Figure 106: Family List Panel

5. Perform one of the following actions:

- Maintain a family entry by typing **S** in the field next to the family entry, and then pressing Enter.  
A Family Maintenance panel is displayed containing data conversion statements for your family.

```

ARTT - Family Maintenance                                     Row 1 of 1

Command ==>_____

Enter END to update or CANCEL to cancel:                    Last modified:
                                                            User:
                                                            Date:
                                                            Time:

Family Description .
Family Name . . . . . DUMMY

Rec  Stmt ---Old--- ---New---
S Id  Type  Pos  Len  Pos  Len  -----Statement Information-----
Dft  Date   1   6   1   6  OLD=C'YYMMDD',NEW=C'YYMMDD',CUTOFF=01
***** Bottom of data *****

```

Figure 107: Family Maintenance Panel

Change the data conversion statements as required, and then press Enter to update your selected family. For information about specifying parameter statements, see “Specifying Data Transformation Parameters” on page 304. The Family Maintenance panel closes and you are returned to the Family List panel.

To close the Family Maintenance panel without making any changes, press PF3.

- Create a new file entry by typing **L** in the field next to any entry, and then pressing Enter.
- Delete a file entry by typing **D** in the field next to the entry that you want to delete, and then pressing Enter.
- Copy a file entry by typing **C** in the field next to the entry that you want to copy, and then pressing Enter.



---

## ARTT Preparation Utilities

The following is a reference list of the ARTT supplied preparation utilities. Note that the JOB Cards and various ARTT data set names will have been customized based on your installation procedures.

### ATGLDCS Program

The ATGLDCS program creates and maintains date parameters for DB2 applications in the Date control file by analyzing the DCLGENs used by a DB2 application. To run the ATGLDCS program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGLDCS)' JCL as described in the following:

```
//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
//*****
//* NAME: ATGLDCS
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT DB2 UTILITY ATGLDCS
//*
//* ATGLDCS USES THE DCLGENS GENERATED BY THE DB2 APPLICATION BUILD
//* PROCESS ALONG WITH USER SPECIFIED DATE FORMAT LAYOUTS, TO
//* DESCRIBE DATE FORMATS USED IN THE DB2 APPLICATION AND SAVE
//* THOSE DESCRIPTIONS IN AN ARTT DATE CONTROL FILE TO BE USED
//* LATER BY THE ATGARMS UTILITY.
//*
//* PARAMETERS: NONE
//*
//* DDNAME REFERENCES:
//* ATGDCLGS: LIBRARY CONTAINING THE DCLGENS FOR THE DBRM
//* INPUT, DSORG=PDS OR PDSE
//*
//* ATGIDATE: USER SPECIFIED DATE FORMAT DESCRIPTIONS FOR THE DCLGENS
//* INPUT, DSORG=PS, RECFM=FB, LRECL=80
//* LAYOUT SYNTAX:
//*      DCLGEN  TABLE      COLUMN      OLD NEW LEN
//*      NAME    NAME        NAME        FMT  FMT
//*
//* LAYOUT EXAMPLE:
//*      SYSTABL SYSTABLES  ALTEREDITS  0031003110
//*
//* NOTE: FORMAT CODES ARE DEFINED IN THE ARTT DATE FORMAT CONTROL
//* FILE (SEE DEFFMTS MEMBER IN SATGINST DATASET)
//*
//* ATGODATE: THE ARTT DATE CONTROL FILE
//* OUTPUT, DSORG=VSAM (SEE DEFDATE MEMBER IN SATGINST DATASET)
//*****
//ATGLDCS EXEC PGM=ATGLDCS
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//SYSUDUMP DD SYSOUT=*
```

```

//SYSPRINT DD   SYSOUT=*
//ATGDCLGS DD   DISP=SHR,
//              DSN=ATC.ART.V2R2M0.SATGSAMP
//ATGODATE DD   DSN=ATC.ART.V2R2M0.DATE.VSAM,DISP=SHR
//ATGIDATE DD   *
SYSTABL SYSTABLES          ALTEREDTS          003100030010
//

```

## ATGARMS Program

The ATGARMS program creates and maintains access request modules for DB2 applications in the ARMS control file by analyzing the DBRMs used by a DB2 application. To run the ATGARMS program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGLARMS)' JCL as described in the following:

```

//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
~
//*****
~
//* NAME: ATGARMS
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT DB2 UTILITY ATGARMS
//*
//* ATGARMS ANALYZES A DBRM AND GENERATES THE INFORMATION NEEDED BY
//* ARTT TO CORRELATE DB2 I/O WITH THE SQL STATEMENTS. THIS
//* INFORMATION IS SAVED IN THE ARTT ARMS CONTROL FILE TO BE USED
//* BY ARTT AT CAPTURE OR VIRTUAL REPLAY TIME. ATGARMS CAN ALSO
//* GENERATE THE CONVERSION PARAMETERS USED BY ATGCGEN.
//*
//* ATGARMS NEEDS TO BE RUN ON EACH DBRM USED BY A DB2 APPLICATION
//* BEFORE CAPTURE AND AGAIN AFTER ANY MODIFICATION BEFORE VIRTUAL
//* REPLAY.
//*
//* PARAMETERS:
//*   PARM='N' FOR NON-TRANSFORMED DBRMS
//*   PARM='Y' FOR TRANSFORMED DBRMS
//*
//* DDNAME REFERENCES:
//* ATGDBRM: DATASET NAME FOR THE DBRM TO BE ANALYZED
//*   INPUT, DSORG=PS
//*
//* ATGODATE: ARTT DATE CONTROL FILE
//*   INPUT, DSORG=VSAM (SEE DEFDATE MEMBER IN SATGINST DATASET)
//*
//* ATGFMTS: ARTT DATE FORMATS CONTROL FILE
//*   INPUT, DSORG=VSAM (SEE DEFFMTS MEMBER IN SATGINST DATASET)
//*
//* ATGARMS: ARTT ARMS CONTROL FILE

```

```

/*      OUTPUT, DSORG=VSAM (SEE DEFARMS MEMBER IN SATGINST DATASET)
/*
/* ARTFSKEL: GENERATED DATA CONVERSION PARAMETERS
/*      OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
/******
//ATGARMS EXEC PGM=ATGARMS,PARM='N'
//STEPLIB DD DSN=ATC.ART.V2R2M0.SATGLOAD,DISP=SHR
//ATGODATE DD DSN=ATC.ART.V2R2M0.DATE.VSAM,DISP=SHR
//SYSPRINT DD SYSOUT=*
//ATGDBRM DD DISP=SHR,
/          DSN=ATC.ART.V2R2M0.SATGDBRM(ARTP200C)
//ATGFSKEL DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAM200)
//ATGARMS DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.ARMS.VSAM
//ATGODATE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.DATE.VSAM
//ATGFMTS DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGFMTS
//

```

## ATGPSBX Program

The ATGPSBX program creates and maintains data conversion parameters for IMS applications in the flat files used by ATGCGEN by analyzing the PSBs used by an IMS application. To run the ATGPSBX program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGPSBX)' JCL as described in the following:

```
//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
"
//*****
//* NAME: ATGPSBX
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT IMS UTILITY ATGPSBX
//*
//* ATGPSBX WILL ANALYZE A PSB AND ITS CORRESPONDING PCBS AND CREATE
//* A FLAT FILE OF THE REQUIRED CONVERSION PARAMETERS REQUIRED FOR
//* ARTT TO RUN AN APPLICATION FOR THIS PSB IN CAPTURE OR VIRTUAL
//* REPLAY MODE.
//*
//* PARAMETERS:
//* PARM='YOUR_PSB_NAME'
//*
//* DDNAME REFERENCES:
//* STEPLIB: NORMAL STEPLIB AS WELL AS PSB/DBD LIBRARY SPECIFICATION
//* INPUT, DSORG=LIBRARY, RECFM=LOAD LIBRARY
//* NOTE: FIRST STEPLIB CARD IS THE ARTT SYSTEM LOAD LIBRARY
//* REMAINING STEPLIB CARDS ARE YOUR IMS PSB AND DBD LIBRARIES
//*
//* THE PSB MEMBERS MUST ALSO BE IN THE ARTT IMS PSB LIBRARY
//* DEFINED IN THE ATGOPTS MODULE USED FOR ANY ARTT RUN.
//*
//* OFILE: CONVERSION FILE PARAMETERS FOR EACH PSB
//* OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
//* NOTE: TO BE USED AS INPUT TO ARTT UTILITY ATGCGEN.
//* IF THE PSB PROCESSED BY ATGPSBX CONTAINED MULTIPLE PSBS, EACH
//* STANZA OF OFILE MUST BE EDITED IN TO A SEPARATE ATGCGEN INPUT
//* FILE. IN ADDITION AN ARTT FILE CONTROL FILE ENTRY MUST BE
//* BE MADE FOR EACH PSB.
//*****
//ATGPSBX EXEC PGM=ATGPSBX,PARM='ARTP300C'
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//ARTIMS DD DSN=ATC.ART.PSBLIB,DISP=SHR
//          DD DSN=ATC.ART.DBDLIB,DISP=SHR
//OFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAM300)
//SYSIN DD *
ARTD300I,00000080,00000000
```

```
ARTD3000,00000082,00000000  
//SYSPRINT DD  SYSOUT=*  
//SYSUDUMP DD  SYSOUT=*  
//
```

## ATGCPRM Program

The ATGCPRM program extracts file conversion parameters for a specified family from the ARTT user interface Repository control file. To run the ATGCPRM program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGCPRM)' JCL as described in the following:

```
//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
//*****
//* NAME: ATGCPRM
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT UTILITY ATGCPRM
//*
//* ATGCPRM WILL EXTRACT THE FILE CONVERSION PARAMETERS FOR A SPECIFIED
//* FAMILY FROM THE ARTT UI REPOSITORY CONTROL FILE.
//*
//* PARAMETERS:
//* PARM='FAMILY_FOR_WHICH_CONVERSION_PARAMETERS_ARE_DESIRED'
//*
//* DDNAME REFERENCES:
//* ATGREP: ARTT UI REPOSITORY CONTROL FILE
//* INPUT, DSORG=VSAM (SEE DEFREPS MEMBER IN SATGINST DATASET)
//*
//* ATGFAMC: FILE CONVERSION PARAMETERS FOR FAMILY SPECIFIED
//* OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
//*****
//ATGCPRM EXEC PGM=ATGCPRM,PARM='FAM010'
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//ATGREP DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.REPS.VSAM
//ATGFAMC DD DSN=&&CPRM,DISP=(NEW,PASS),
//          UNIT=SYSDA,SPACE=(TRK,1)
//SYSUDUMP DD SYSOUT=*
//ATGCGEN EXEC PGM=ATGCGEN,REGION=4M
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//IFILE DD DSN=&&CPRM,DISP=(OLD,DELETE)
//SFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSLIB(ATGCONV)
//OFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAMP010)
//SYSPRINT DD SYSOUT=*
//CEEDUMP DD SYSOUT=*
//
```

## ATGCGEN Program

The ATGCGEN program creates data conversion modules from flat data conversion parameter files. To run the ATGCGEN program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGCGEN)' JCL as described in the following:

```
//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
//*****
//* NAME: ATGCGEN
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT UTILITY ATGCGEN
//*
//* ATGCGEN WILL CREATE THE ASSEMBLER SOURCE REQUIRED TO GENERATE AN
//* ARTT CONVERSION MODULE. THIS MUST BE DONE PRIOR TO DATE ROLLING,
//* DATA CONVERSION AND ANY IMS ARTT RUN. THE ARTT UTILITY ATGCPRM
//* CAN BE USED TO EXTRACT CONVERSION PARAMETERS FROM THE ARTT UI
//* REPOSITORY CONTROL FILE, OR THE ARTT UTILITY ATGARMS CAN BE USED
//* TO CREATE CONVERSION PARAMETERS FROM DB2 DBRMS, OR THE ARTT
//* UTILITY ATGPSBX CAN BE USED TO CREATE CONVERSION PARAMETERS FROM
//* IMS PSBS AND THEIR CORRESPONDING PSBS AND DBDS.
//*
//* EACH SOURCE MODULE MUST BE ASSEMBLED AND LINKED INTO THE ARTT
//* CONVERSION MODULE LIBRARY SPECIFIED BY THE ATGOPTS MODULE. SEE
//* ATGCASM AS AN EXAMPLE.
//*
//* EACH FILE FAMILY MUST HAVE APPROPRIATE ARTT FILE CONTROL FILE
//* ENTRIES MADE FOR IT.
//*
//* PARAMETERS: NONE
//*
//* DDNAME REFERENCES:
//* IFILE: YOUR INPUT FILE CONVERSION PARAMETERS
//* INPUT, DSORG=PS, RECFM=FB, LRECL=80
//*
//* SFILE: ARTT SYSTEM ASSEMBLER SKELETON USED TO CREATE SOURCE
//* INPUT, DSORG=PS, RECFM=FB, LRECL=80
//*
//* OFILE: YOUR SOURCE CONVERSION MODULE
//* OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
//*****
//ATGCGEN EXEC PGM=ATGCGEN,REGION=4M
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//IFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAM010)
//SFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSLIB(ATGCONV)
//OFILE DD DISP=SHR,
```

```
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAMP010)
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*,DCB=RECFM=FBA
//CEEDUMP  DD  SYSOUT=*
//
```



## ATGXPRM Program

The ATGXPRM program extracts file comparison parameters for a specified family from the ARTT user interface Repository control file. To run the ATGXPRM program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGXPRM)' JCL as described in the following:

```
//NICH          JOB    CLASS=A,MSGCLASS=X,NOTIFY=NICH
//*****
//* NAME: ATGXPRM
//*
//* DESCRIPTION:
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT UTILITY ATGXPRM
//*
//* ATGXPRM WILL EXTRACT THE FILE COMPARISON PARAMETERS FOR A SPECIFIED
//* FAMILY FROM THE ARTT UI REPOSITORY CONTROL FILE.
//*
//* PARAMETERS:
//* PARM='FAMILY_FOR_WHICH_COMPARISON_PARAMETERS_ARE_DESIRED'
//*
//* DDNAME REFERENCES:
//* ATGREP: ARTT UI REPOSITORY CONTROL FILE
//* INPUT, DSORG=VSAM (SEE DEFREPS MEMBER IN SATGINST DATASET)
//*
//* ATGFAMC: FILE COMPARISON PARAMETERS FOR FAMILY SPECIFIED
//* OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
//*****
//ATGXPRM EXEC PGM=ATGXPRM,PARM='FAX010'
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//ATGREP DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.REPS.VSAM
//ATGFAMC DD DSN=&&CPRM,DISP=(NEW,PASS),
//          UNIT=SYSDA,SPACE=(TRK,1)
//SYSUDUMP DD SYSOUT=*
//ATGXGEN EXEC PGM=ATGXGEN,REGION=4M
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//IFILE DD DSN=&&CPRM,DISP=(OLD,DELETE)
//SFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSLIB(ATGOMIT)
//OFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAXP010)
//SYSPRINT DD SYSOUT=*
//CEEDUMP DD SYSOUT=*
//
```

## ATGXGEN Program

The ATGXGEN program creates data comparison modules from flat data conversion parameter files. To run the ATGXGEN program, edit and submit the 'hlq.V2R2M0.SATGSAMP(ATGXGEN)' JCL as described in the following:

```
//NICH          JOB   CLASS=A,MSGCLASS=X,NOTIFY=NICH
~
//*****
~
//* NAME: ATGXGEN
~
//*
~
//* DESCRIPTION:
~
//* THIS SAMPLE JCL ILLUSTRATES INVOKING THE ARTT UTILITY ATGXGEN
//*
//* ATGXGEN WILL CREATE THE ASSEMBLER SOURCE REQUIRED TO GENERATE AN
//* ARTT COMPARISON MODULE.  THE ARTT UTILITY ATGXPRM CAN BE USED
//* TO EXTRACT COMPARISON PARAMETERS FROM THE ARTT UI REPOSITORY
//* CONTROL FILE.
//*
//* EACH SOURCE MODULE MUST BE ASSEMBLED AND LINKED INTO THE ARTT
//* COMPARISON MODULE LIBRARY SPECIFIED BY THE ATGOPTS MODULE.  SEE
//* ATGXASM AS AN EXAMPLE.
//*
//* EACH FILE FAMILY MUST HAVE APPROPRIATE ARTT FILE CONTROL FILE
//* ENTRIES MADE FOR IT.
//*
//* PARAMETERS: NONE
//*
//* DDNAME REFERENCES:
//* IFILE: YOUR INPUT FILE COMPARISON PARAMETERS
//* INPUT, DSORG=PS, RECFM=FB, LRECL=80
//*
//* SFILE: ARTT SYSTEM ASSEMBLER SKELETON USED TO CREATE SOURCE
//* INPUT, DSORG=PS, RECFM=FB, LRECL=80
//*
//* OFILE: YOUR SOURCE COMPARISON MODULE
//* OUTPUT, DSORG=PS, RECFM=FB, LRECL=80
//*****
//ATGXGEN EXEC PGM=ATGXGEN,REGION=4M
//STEPLIB DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGLOAD
//IFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAX010)
//SFILE DD DISP=SHR,
//          DSN=ATC.ART.V2R2M0.SATGSLIB(ATGCONV)
//OFILE DD DISP=SHR,
```

```
//          DSN=ATC.ART.V2R2M0.SATGSAMP(FAXP010)
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*,DCB=RECFM=FBA
//CEEDUMP  DD  SYSOUT=*
//
```



---

## Appendix B. Understanding Data Transformation

Previous chapters in this user's guide describe how to run ARTT in Real Replay mode and Virtual Replay mode to verify that a reengineered program or run unit (application) works as it did before it was modified. Ideally, the application's input data source should contain data in the format expected by the application, and its output should be produced in a format that is similar to its input.

In reality, applications and input cannot always be modified at the same time. Input data sources *do* contain data in formats that differ from those expected by their receiving application, and output *is* often required in different formats as it becomes input to other applications.

For instance, for a standard batch execution, if an input file contains dates in the format DDMMYY, the program expects dates in the format DDMMYYYY, and the output file must contain dates in the same format as the input file, your testing could come to an abrupt halt. In these less than ideal situations, **data transformation** can allow your testing to continue uninterrupted.

### **This appendix describes:**

- ARTT data transformation methods
- The conversion module generator
- Data transformation parameters

---

## ARTT Data Transformation Methods

ARTT uses conversion modules to convert I/O data and, when necessary, previously captured log file data.

### Converting I/O Data

When an application runs under ARTT control, ARTT intercepts all input and output events to and from the application. After interception, it passes control to a conversion module, which converts the input or output data according to the parameters that you specified when you generated the module.

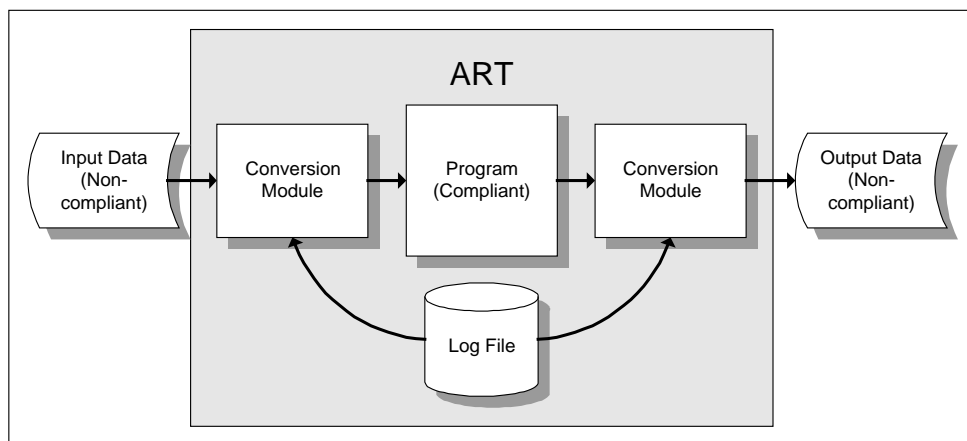


Figure 108: Conversion Modules in Use during Real Replay of a Standard Batch Program

### Converting Log File Data

If your I/O data or your application changes between the base run and the proof run, ARTT uses conversion modules to convert the data previously captured in the log file. When you run an application in replay mode, ARTT compares the input and output events captured in the log file during the base run with actual input and output events (Real Replay mode, Standard Batch only), or with actual output events from the base run (Virtual Replay mode). If either your I/O data or your application has been changed since the log file was created, there will be discrepancies in the log file unless its data is converted to accommodate the differences.

## Conversion Rules

File conversion takes place according to the relative transformation status of the input data, the application and the output data.

The table in Figure 109 shows the eight possible run scenarios, and the data and log conversion performed by ARTT during each scenario.

Transformation Status			Run Mode	Convert			
Input File	Application	Output File		Input	Log File (Input)	Output	Log File (Output)
Non-transformed	Non-transformed	Non-transformed	Capture	No	No	No	No
Non-transformed	Non-transformed	Transformed	Real/Virtual Replay	No	No	Yes	No
Transformed	Non-transformed	Non-transformed	Real/Virtual Replay	Yes	No	No	No
Transformed	Non-transformed	Transformed	Real/Virtual Replay	Yes	No	Yes	No
Non-transformed	Transformed	Non-transformed	Real/Virtual Replay	Yes	Yes	Yes	Yes
Non-transformed	Transformed	Transformed	Real/Virtual Replay	Yes	Yes	No	Yes
Transformed	Transformed	Non-transformed	Real/Virtual Replay	No	Yes	Yes	Yes
Transformed	Transformed	Transformed	Real/Virtual Replay	No	Yes	No	Yes

Figure 109: Data and Log File Conversion by Run Scenario

## About Conversion Modules and the Conversion Module Generator

ARTT provides a conversion module generator, which uses data transformation parameters that you provide to build a conversion module. ARTT uses the module to convert data in your input, output, and log files.

Each ARTT data conversion module is able to:

- Convert data from a non-transformed state to a transformed state
- Roll dates to a transformed state
- Convert data from a transformed state back to a non-transformed state
- Roll dates to a non-transformed state
- Where necessary, call date conversion modules.

In general, each file requiring data conversion needs its own conversion module. The exceptions are files with records of the same format (called a *file family* in ARTT), which may therefore use the same conversion module.

When you generate a conversion module for a file family, all the files assigned to the file family are automatically linked to the conversion module.

---

## Specifying Data Transformation Parameters

This topic describes how to use the ARTT user interface to specify data conversion parameter statements for a file family. Note that this topic applies only to Standard Batch, CICS and IMS.

A file family is a group of data sources (data sets), each of which has the same record layout (the same fields and record length). The data sources in the family use the same parameters, and therefore, the same conversion module. For more information about data sources, see “Maintaining the Data Sources for a File Family” on page 319.

Data transformation parameters enable you to establish the conversion rules for a file family. They specify:

- Selection criteria to identify different record types
- The position and format of date fields and how they should be converted
- The position, length, and value of filler fields
- Conversion rules and fillers for default record types.

When you specify parameter statements, the ARTT user interface generates a parameter list, which is used to build a conversion or comparison module.

**Note:** You must specify data transformation parameters for a file family before you associate the family with a data source.



## How to Specify Data Transformation Parameters for a File Family

To specify data transformation parameters:

1. Select S, Data Transformation setup from the ARTT Primary Menu (**Figure 11** on page 48), and then press Enter.

The Data Transformation Setup Menu is displayed (Figure 31 on page 95).

2. Select B, Batch transformation setup for Standard Batch and CICS, and then press Enter.

The Data Transformation Setup for Standard Batch and CICS panel is displayed.

```
ARTT - Data Transformation Setup for Standard Batch and CICS   Row 1 to 7 of 7
Command ==>>>                                             Scroll ==>> PAGE
-----
Option      Family Name      Family Description
-----
          AAA          kkkk
          BAAA         aa
          BATCH        test
          BBB          jjj
          DZ406        kkkkkk
          GSAMIN       ss
          PSBBT001     test
***** Bottom of data *****
```

*Figure 110: Data Transformation Setup for Standard Batch and CICS Panel*

The Data Transformation Setup for Standard Batch and CICS panel shows all of the file families to which you have access.

3. Select a file family from the panel by typing **S** next to its name, and then press **ENTER**. ARTT automatically generates the first statement in the parameter list for your chosen file family, as follows:

FAMILY *name*

A Family Statement Select panel is displayed in which you can add parameter statements for your selected family.

```

ARTT - Family Statement Select
Command ===>_____ Last modified:
                                User: Y001CH4
                                Date: 1999/02/26
                                Time: 12:03
Press ENTER to update or END to cancel:

Family Name . . . . . BATCH
Record Id . . . . . 001

Statement Type . . . . . _____ (I=If, A=And, O=Or, E=Default,
                                D=Date, F=Filler, S=String, X=Omit)

```

*Figure 111: Family Statement Select Panel*

Alternatively, you can create a new file family as follows:

1. Type **I** next to any file family in the Data Transformation Setup for Standard Batch and CICS panel, and then press **Enter**.

A Specify Family Details subpanel is displayed.

```

Command ===>

Family name . . . . . test1
Family description . . file family

Press ENTER to continue or END/CANCEL to cancel

```

*Figure 112: Specify Family Details Subpanel*

2. On the subpanel, type a name for your new file family in the **Family name** field, and a brief description in the **Family description** field, and then press **Enter**. ARTT automatically generates the first statement in the parameter list for your new file family.

A Family Statement Select panel is displayed in which you can add parameter statements for your new file family.

**Note:** You can also add a file family using the Repository Maintenance option on the Control File Editor panel. For instructions, see page 285.

---

## Data Transformation Parameters

Data transformation parameters enable you to establish conversion and comparison rules for a file family. The following table shows which parameters are processed by conversion modules, and which parameters are processed by compare modules.

Conversion module	Compare module
IF, AND, OR, DATE, STRING, FILLER and DEFAULT.	IF, AND, OR, OMIT and DEFAULT.

You can specify any type of parameter for a file family. Each module generator processes only the parameters that are appropriate for the type of module that it generates.

### IF parameter

An IF statement specifies the criteria to select a particular type of record.

When you specify an IF statement, ARTT generates a record identifier with an appropriate sequence number that identifies a specific record type for a file family.

Each IF statement, and its supporting statements, is evaluated in order according to its sequence number. Evaluation ends when either a selection criterion is satisfied, or the final DEFAULT statement is reached (see DEFAULT on page 318).

IF statements are processed by the conversion module generator and the compare module generator.

**Note:** When defining target data for an IMS DBD PCB, you must identify each segment by an IF statement like the one that follows:

```
IF nnnn=S' segmentname'
```

For a GSAM PCB, *segmentname* is **\*\*GSAM\*\***.

To create an IF statement:

1. Specify **I** in the **Statement Type** field in the Family Statement Select panel, and then press Enter.

A Conditional Statement Edit panel is displayed.

```
ARTT - Conditional Statement Edit
Command ==>_____ Last modified:
User: Y001CH4
Press ENTER to update or END to cancel: Date: 1999/02/26
Time: 12:21
Family Name . . . . BAAA
Record Id . . . . 001
---Old--- ---New---
Pos Len Pos Len
Statement Type . . . IF 3__ 3__ 3__ 3__
Boolean Operand . . EQ (EQ, NE, GT, LT, NL, NG)
Value Type C (Char, heX, Bitmap, Rrn, Segment)
Value RUN_____
```

Figure 113: Conditional Statement Edit Panel (IF)

The entry fields in the panel are as follows:

- Old Pos** Position in bytes (from 1 to 9999) of the non-transformed field, relative to the start of the record.
- Old Len** Length in bytes (from 1 to 9999) of the non-transformed field. The length of this field should be the same as the length of the transformed field.
- New Pos** Position in bytes (from 1 to 9999) of the transformed field, relative to the start of the record.
- New Len** Length in bytes (from 1 to 9999) of the transformed field. The length of this field should be the same as the length of the non-transformed field.

**Boolean Operand** Operands for your IF statement:

- EQ** Equal to the specified value
- NE** Not equal to the specified value
- GT** Greater than the specified value
- LT** Less than the specified value
- NL** Not less than the specified value
- NG** Not greater than the specified value.

Note that for BIT values (see "Value Type" in this list), only the operands EQ and NE are available.

**Value Type** Types of data, as follows:

**Character (C)**

An EBCDIC value, the length of which must match the preceding length fields.

**Hexadecimal (X)**

A combination of characters ranging from 0 to F, the length of which must match the preceding length fields. Each character represents half a byte.

**Bitmap (B)**

An eight character combination comprising the characters 0 and 1. Only the bits set to 1 are inspected.

**Relative Record Number (R)**

The number of the record relative to the start of the file. Old and new positions, and length are irrelevant.

**Segment (S)**

Not supported.

**Value** Value of the type chosen in Value Type above.

2. Specify parameters for your IF statement in the entry fields, and then press Enter.

A Family Maintenance panel is displayed containing your newly specified IF statement.

```

ARTT - Family Maintenance                                     Row 1 to 7 of 7
Command ==>_____
                                                                    Last modified:
Enter END to update or CANCEL to cancel:                    User: Y001CH4
                                                                    Date: 1999/02/26
                                                                    Time: 12:21

Family Description . . aa
Family Name . . . . . BAAA

Rec Stmt ---Old--- ---New---
S Id  Type  Pos  Len  Pos  Len  -----Statement Information-----
_ 001  If    3    3    3    3  EQ C'RUN'
***** Bottom of data *****

```

Figure 114: Family Maintenance Panel (IF Statement)

3. If you want to:

- Specify more parameters for your file family, type I, for insert or create a new record, in the entry field to the left of the IF statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
- Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

### AND and OR parameters

You can combine AND and OR statements with an IF statement to construct compound selection conditions for type of record. Specify the parameters for an AND or an OR statement exactly as you would for an IF statement. AND statements precede OR statements during evaluation, and operate in a similar manner to those used in PL/I and COBOL.

For example:

```

IF      19    3    19    3    =    C'WHI'
AND    198    3    200    3    <    X'00FF00'
AND    38     2    48     2    ¬=    C'***'
OR     43     1    48     1    =    B'01010011'
AND    138    2    156    2    ¬=    C'WE'

```

The Boolean logic is as if the previous example had been coded as follows:

```

IF (19 3 19 3 = C'WHI'
   AND 198 3 200 3 < X'00FF00'
   AND 38 2 48 2 ^= C'**)

OR (43 1 48 1 = B'01010011'
   AND 138 2 156 2 ^= C'WE') THEN TYPE 1

```

AND and OR statements are processed by the conversion module generator and the compare module generator.

To create an AND statement or an OR statement:

1. Specify A for AND or O for OR in the **Statement Type** field in the Family Statement Select panel, and then press Enter.

A Conditional Statement Edit panel is displayed for your selected statement type.

2. Specify the statement information in the panel entry fields, and then press Enter.

The only way in which this panel differs from the conditional edit panel used to specify an IF statement is that the **Statement Type** field shows AND or OR, as appropriate. For information about the entry fields in the Conditional Statement Edit panel, see page 309.

A Family Maintenance panel is displayed containing your newly specified AND or OR statement.

ARTT - Family Maintenance							Row 1 to 9 of 9	
Command ==>_____								
Enter END to update or CANCEL to cancel:							Last modified:	
							User: Y001CH4	
							Date: 1999/02/26	
							Time: 12:03	
Family Description . test								
Family Name . . . . . BATCH								
Rec Stmt ---Old--- ---New---								
S	Id	Type	Pos	Len	Pos	Len	-----Statement Information-----	
_	001	If	3	3	3	3	EQ C'RUN'	
_	001	And	198	3	200	3	EQ C'whi'	
_	001	Or	43	1	48	1	EQ B'01010011'	
***** Bottom of data *****								

Figure 115: Family Maintenance Panel (And/Or Statement)

3. If you want to:
  - Specify more parameters for your file family, type I, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
  - Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

### DATE parameter

A DATE statement defines date conversion rules for a single record type. Dates can be converted from non-transformed format to transformed format, or vice versa.

There is no limit to the number of DATE statements that you can specify for each record type. DATE statements are processed only by the conversion module generator.

When you specify a DATE statement on the ARTT user interface, you generate a FIELD D statement in your parameter list.

To create a date statement:

1. Specify D in the **Statement Type** entry field in the Family Statement Select panel.

A Date Statement Edit panel is displayed.

```

ARTT - Date Statement Edit
Command ==>_____ Last modified:
                                     User: Y001CH4
Press ENTER to update or END to cancel: Date: 1999/02/26
                                     Time: 12:03

Family Name . . . BATCH
Record Id . . . .

----- Date Information ----- -Type:
      Pos Len Type Format          C=Char
Old . . . . . 1__ 0      - _____ P=Packed
New . . . . . ____      - _____ B=Binary
                                     M=Bitmap
Cutoff Year . . . 01      -Format (example):
                                     DD/MM/YYYY
  
```

Figure 116: Date Statement Edit Panel



The **Date Information** fields in the panel are as follows:

<b>Old Pos</b>	Position in bytes (from 1 to 9999) of the non-transformed field, relative to the start of the record.
<b>Old Len</b>	Length in bytes of the non-transformed field. The ARTT user interface automatically inserts the field length when you specify <code>Type</code> and <code>Format</code> .
<b>Old Type</b>	Type of data in the non-transformed field, as follows: <i>Character (C):</i> An EBCDIC value, the length of which must match the preceding length fields. <i>Packed Decimal (P):</i> A combination of characters ranging from 0 to 9, the length of which is unimportant because numeric comparison of operands of differing lengths is permitted. <i>Bitmap (B):</i> An eight-character combination comprising the characters 0 and 1. Only the bits set to 1 are inspected.
<b>Old Format</b>	Date format for the non-transformed field, for example <code>DD/MM/YY</code> .
<b>New Pos</b>	Position in bytes (from 1 to 9999) of the transformed field, relative to the start of the record.
<b>New Len</b>	Length in bytes of the transformed field. The ARTT user interface automatically inserts the field length when you specify <code>Type</code> and <code>Format</code> .
<b>New Type</b>	Type of data in the transformed field. For a list of data types, see the previous description for <i>Old Type</i> .
<b>New Format</b>	Date format for the transformed field, for example <code>DD/MM/YYYY</code> .
<b>Cutoff Year</b>	Two-digit <i>cutoff</i> year to determine the century into which the dates fall. Years equal to or greater than the cutoff year are 20 <sup>th</sup> century (prefixed with 19); years less than the cutoff year are 21 <sup>st</sup> century (prefixed with 20).

2. Specify the statement information in the **Date Information** entry fields, and then press Enter.

A `Family Maintenance` panel is displayed containing your newly specified `DATE` statement.

3. If you want to:

- Specify more parameters for your file family, type `I`, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A `Family Statement Select` panel is displayed in which you can specify more parameters for your file family.
- Save your parameters and return to the `Data Transformation Setup for Standard Batch and CICS` panel, press PF3.

## FILLER parameter

A FILLER statement defines a filler that is to be inserted into a converted record type.

There is no limit to the number of FILLER statements that you can specify for each record type. FILLER statements are processed only by the conversion module generator.

Each FILLER statement that you specify on the ARTT user interface generates a FIELD F statement in your parameter list.

To create a filler field:

1. Specify F in the **Statement Type** entry field in the Family Statement Select panel.

A Filler Statement Edit panel is displayed.

```
ARTT - Filler Statement Edit
Command ==>_____ Last modified:
User: Y001CH4
Press ENTER to update or END to cancel: Date: 1999/02/26
Time: 12:03
Family Name . . . . . BATCH
Record Id . . . . .
---Old--- ---New---
Pos Len Pos Len
Filler Coordinates . . . 1__ 0__ 1__ 0__
Type Value -Type:
Filler Value . . . . . - - C=Char
X=Hex
```

Figure 117: Filler Statement Edit Panel

The **Filler Coordinates** fields in the panel are as follows:

- Old Pos** Position in bytes (from 1 to 9999) of the non-transformed field, relative to the start of the record.
- Old Len** Length in bytes of the non-transformed field.
- New Pos** Position in bytes (from 1 to 9999) of the transformed field, relative to the start of the record.
- New Len** Length in bytes of the transformed field.

The **Filler Value** fields in the panel are as follows:

**Type** Types of filler data are as follows:

*Character (C):*

An EBCDIC value, the length of which must match the preceding length fields.

*Hexadecimal (X):*

A combination of characters ranging from 0 to F, the length of which must match the preceding length fields. Each character represents half a byte.

**Value** Value of the filler value type chosen in the **Type** field above.

2. Specify the information for your FILLER statement in the entry fields in the panel, and then press Enter.

A Family Maintenance panel is displayed containing your newly specified FILLER statement.

3. If you want to:

- Specify more parameters for your file family, type I, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
- Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

## STRING parameter

The STRING statement enables you to copy a data string from a specified position in a non-transformed record to a specified position in a transformed record.

STRING statements are processed only by the conversion module generator.

To copy a data string from one record to another:

1. Specify S in the **Statement Type** entry field in the Family Statement Select panel.

A String Statement Edit panel is displayed.

```
ARTT - String Statement Edit
Command ==>>_____ Last modified:
User: Y001CH4
Press ENTER to update or END to cancel: Date: 1999/02/26
Time: 12:03
Family Name . . . . . BATCH
Record Id . . . . .
---Old--- ---New---
Pos Len Pos Len
String Coordinates . . . 1__ 0__ 1__ 0__
```

Figure 118: String Statement Edit Panel

The **String Coordinates** fields in the panel are as follows:

**Old Pos** Position in bytes (from 1 to 9999) of the non-transformed field, relative to the start of the record.

**Old Len** Length in bytes of the non-transformed field.

**New Pos** Position in bytes (from 1 to 9999) of the transformed field, relative to the start of the record.

**New Len** Length in bytes of the transformed field.

2. Specify the information for your STRING statement in the **String Coordinates** fields in the panel, and then press Enter.

A Family Maintenance panel is displayed containing your newly specified STRING statement.

3. If you want to:

- Specify more parameters for your file family, type I, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
- Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

## OMIT parameter

The OMIT statement enables you to omit an area of data from processing by a compare module.

OMIT statements are processed only by the compare module generator.

To omit an area of data from processing:

1. Specify **O** in the **Statement Type** entry field in the Family Statement Select panel.

An Omit Statement Edit panel is displayed.

```
ARTT - Omit Statement Edit
Command ===>                                     Last modified:
                                                User: Y001CH4
                                                Date: 1999/02/26
                                                Time: 12:03

  Press ENTER to update or END to cancel:

Family Name . . . . . BATCH
Record Id . . . . .

                                ---Old--- ---New---
                                Pos  Len  Pos  Len
Omit Coordinates . . . . . 1    0    1    0
```

Figure 119: Omit Statement Edit Panel

The **Omit Coordinates** fields in the panel are as follows:

- Old Pos** Position in bytes (from 1 to 9999) of the start of the non-transformed data area, relative to the start of the record.
- Old Len** Length in bytes of the non-transformed data area.
- New Pos** Position in bytes (from 1 to 9999) of the transformed data area, relative to the start of the record.
- New Len** Length in bytes of the transformed data area.

2. Specify the information for your OMIT statement in the **Omit Coordinates** fields in the panel, and then press Enter.

A Family Maintenance panel is displayed containing your newly specified OMIT statement.

3. If you want to:
  - Specify more parameters for your file family, type **I**, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
  - Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

## DEFAULT parameter

A DEFAULT statement is used in one of the following ways:

- On its own to define the conversion and filler rules for all the records in a file.  
**Note:** If after setting up a file family with only a DEFAULT statement, you want to add other parameter statements, type `I` on the command line of the Family Statement Select panel, and then press Enter. The panel is redisplayed so that you can select the type of statement that you want to add.
- After one or more IF statements. In this case, it defines the conversion and filler rules for those records not specifically referenced by an IF statement.

You must specify a DEFAULT statement.

DEFAULT statements are processed by the conversion module generator and the compare module generator.

To create one or more statements to identify the default for your file family:

1. Specify `E` in the **Statement Type** field in the Family Statement Select panel, and then press Enter.

The Family Statement Select panel is redisplayed, now containing only the types of statements available as defaults.

```
ARTT - Family Statement Select                               Specify DEFAULT statement
Command ==>>>_____ Last modified:
                                                                User: Y001CH4
                                                                Date: 1999/02/26
                                                                Time: 12:03
Press ENTER to update or END to cancel:
Family Name . . . . . BATCH
Record Id . . . . . 001
Statement Type . . . . . _____ (D=Date, F=Filler, S=String, X=Omit)
```

Figure 120: Family Statement Select Panel (Default)

2. Select a statement type, and then press Enter to display the statement's associated edit panel.

3. Specify your statement details in the statement edit panel, and then press Enter.  
A Family Maintenance panel is displayed containing your newly specified default statement.
4. If you want to:
  - Specify more parameters for your file family, type I, for insert or create a new record, in the entry field to the left of an appropriate statement, and then press Enter. A Family Statement Select panel is displayed in which you can specify more parameters for your file family.
  - Save your parameters and return to the Data Transformation Setup for Standard Batch and CICS panel, press PF3.

---

## Maintaining the Data Sources for a File Family

You may need to add a new data source to a file family, or delete an existing data source from the family.

### Adding a New Data Source to a File Family

1. Select S, Data Transformation setup from the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.  
The Data Transformation Setup Menu (Figure 31 on page 95) is displayed.
2. Select B, Data Transformation Setup for Standard Batch and CICS, and then press Enter.  
A Data Transformation Setup for Standard Batch and CICS panel is displayed showing the file families for which you can specify a data source.
3. Type M in the entry field next to the file family for which you want to specify a data source, and then press Enter.  
A File Family Maintenance panel is displayed.

ARTT - File Family Maintenance		Row 1 to 1 of 1		
Command ==>_____		Scroll ==> PAGE		
Family Name .. : AAA				
-----				
Option	Data Source	Conv	Comp	Source
		Mod	Mod	Status
-----				
_	A.JCL	Y	N	N
***** Bottom of data *****				

Figure 121: File Family Maintenance Panel

4. Type **I** in the entry field to the left of the dummy entry, or an existing entry in the data source list, and then press Enter.

An Enter New Data Source subpanel is displayed.

```
Command ==>_____

Family . . : AAA
Specify new data source details below :

Source Name . . . . _____
Source Status . . . N (Y - Transformed, N - Not Transformed)
Conversion module . N (Y - Use module, N - Do not use module)
Compare module . . N (Y - Use module, N - Do not use module)
Old record size . . 0____
New record size . . 0____

Press ENTER to continue or END/CANCEL to cancel
```

Figure 122: Enter New Data Source Subpanel

5. Specify the new data source name for the file family, amend the **Source Status** and **Compare Module** fields as required, and then press Enter.

The Enter New Data Source subpanel closes and the ARTT - File Family Maintenance panel is redisplayed, now showing your new data source.

If you specify a data source that is already assigned to a file family, the Duplicate FCF Entry subpanel is displayed.

```
Command ==>_____

File : A.DATA1

The specified data source already exists and is assigned to
family AAA

Do you wish to re-assign it ? . . . N (Y/N)

Press ENTER to continue or END/CANCEL to cancel
```

Figure 123: Duplicate FCF Entry Subpanel

Press Enter to reassign the data source to your current file family, or PF3 to close the subpanel and return to the File Family Maintenance panel.



## Deleting a Data Source from a File Family

1. Select **S**, Data Transformation setup from the ARTT Primary Menu (Figure 11 on page 48), and then press Enter.

The Data Transformation Setup Menu (Figure 31 on page 95) is displayed.

2. Select **B**, Data Transformation Setup for Standard Batch and CICS, and then press Enter.

A Data Transformation Setup for Standard Batch and CICS panel is displayed showing the file families to which you have access.

3. Type **M** in the entry field next to the file family from which you want to delete a data source, and then press Enter.

A File Family Maintenance panel is displayed showing the data sources for your selected file family.

4. Type **D** in the entry field next to the data source that you want to delete, and then press Enter.

The data source is removed from the File Family Maintenance panel.

**Note:** No deletion confirmation subpanel is displayed. Make sure that you want to remove the data source before you press Enter.



## Appendix C. Site Variables

The REXX procedure `ATGSITE` in the library `hlq.V2R2M0.SATGEXEC` contains the site variables for the ARTT user interface. Initially, each variable is set to the default value shown in the following table.

If necessary, edit `ATGSITE` to change each variable to a value appropriate for your installation. For more information, see “Chapter 3. Installing ARTT” on page 21.

Variable	Comments
<code>SMS="YES"</code>	Storage Management System (SMS) installed? (YES or NO)
<code>PROCLIBS="SYS1.PROCLIB"</code>	Enables a string of libraries to be specified when tailoring user JCL. Libraries are separated by blanks.
<code>MACLIBS="SYS1.MACLIB SYS1.MODGEN"</code>	Enables a string of system macro libraries to be specified in the conversion module compile JCL. Libraries are separated by blanks.
<code>ASMLIB="SYS1.PROCLIB"</code>	Name of the procedure library that holds the assemble and link procedures defined in <code>ASMPROC</code> .
<code>ASMPROC="HLASMCL"</code>	Assembler compile and link procedure name, used in the conversion module compile JCL.
<code>ASMREG="4M"</code>	Region size for assemble and link steps.
<code>ASMPROG="SYS1.LINKLIB(IEV90)"</code>	Assembler program name and location, used in the online compile of <code>ATGOPTS</code> .
<code>DATESEPS="-/.*?#,:"</code>	Characters allowed as date separators for date formats.
<code>DB2DATE="YYYY-MM-DD"</code>	Installation default for DB2 date format representation.
<code>DYNAMNBR="50"</code>	<code>DYNAMNBR</code> parameter for internally generated JCL that executes batch TSO steps.
<code>LINKPROG="SYS1.LINKLIB(IEWL)"</code>	Link edit program name and location, used in the online link of <code>ATGOPTS</code> .
<code>IEBGENER="SYS1.LINKLIB"</code>	Location of <code>IEBGENER</code> .
<code>JCLSPACE="UNIT=SYSDA, SPACE=(TRK,(1,1))"</code>	Space and placement parameters for temporary inline data sets created in the conversion module compile JCL.

<b>Variable</b>	<b>Comments</b>
BOOTPROG="ATGBOOT"	Boot program name, used when modifying the user's JCL to run ARTT. <i>Do not change unless instructed.</i>
FCFUNITS="TRACKS"	File control file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
FCFSpace="15"	File control file space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
ARMSUNITS="TRACKS"	ARMS file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
ARMSpace="15"	ARMS file space. Specify <i>Primary</i> allocation only.
IMSUNITS="TRACKS"	IMS file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
IMSSpace="15,15"	IMS library space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
IMSDIRBL="20"	IMS library allocation. Number of directory blocks.
LDCUNITS="TRACKS"	Date file allocation.
LDCSpace="15"	Date file space. Specify <i>Primary</i> allocation only.
PCFUNITS="TRACKS"	Program control file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
PCFSpace="10"	Program control file space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
TCFUNITS="TRACKS"	Test control file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
TCFSpace="10"	Test control file space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
TDFUNITS="TRACKS"	Target data file allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.

Variable	Comments
TDFSPACE="10"	Target data file space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
CSRSPACE="2 1"	Conversion module library space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
CLDDIRBL="10"	Conversion module library allocation. Number of directory blocks.
CLDUNITS="TRACKS"	Conversion module library allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
CLDSPACE="15 15"	Conversion source library space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
ULDUNITS="TRACKS"	User load library allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
ULDSPACE="1"	User load library space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
ULDDIRBL="10"	User load library allocation. Number of directory blocks.
TMPUNITS="TRACKS"	Temporary library allocation units. Specify TRACKS, CYLS, RECORDS, KB, or MB.
TMPSPACE="4 1"	Temporary library space. Specify <i>Primary Secondary</i> . For example "10" or "10 3".
TMPDIRBL="10"	Temporary library allocation. Number of directory blocks.
PREFIX=""	Default data set prefix. If blank, defaults to user ID or user-specified prefix. Maximum length is 17 characters.
BODYFCF="ARTT.FILE"	File control file: <i>userprefix</i> .BODYFCF. <i>vsamsuffix</i> . Maximum length is 17 characters.
BODYPCF="ARTT.PROG"	Program control file: <i>userprefix</i> .BODYPCF. <i>vsamsuffix</i> . Maximum length is 17 characters.

<b>Variable</b>	<b>Comments</b>
BODYTCF="ARTT.TEST"	Test control file: <i>userprefix</i> .BODYTCF. <i>vsamsuffix</i> . Maximum length is 17 characters.
BODYRCF="ARTT.REPS"	Target data file: <i>userprefix</i> .BODYRCF. <i>vsamsuffix</i> . Maximum length is 17 characters.
BODYADM="ARTT.ADMN"	File used for access security check for admin functions: <i>userprefix</i> .BODYADM. <i>vsamsuffix</i> . Maximum length is 17 characters.
BODYARMS="ARTT.ARMS"	ARMS file <i>userprefix</i> .BODYARMS. <i>vsamsuffix</i> . Maximum length is 17 characters.
BODYCONV="ARTT.CMOD"	Conversion module load library: <i>userprefix</i> .BODYCONV. <i>pdssuffix</i> . Maximum length is 17 characters.
BODYCOMP="ARTT.XMOD"	Compare module load library: <i>userprefix</i> .BODYCOMP. <i>pdssuffix</i> . Maximum length is 17 characters.
BODYIMS="ARTT.IMS"	IMS file <i>userprefix</i> .BODYIMS. <i>pdssuffix</i> . Maximum length is 17 characters
BODYLDC="ARTT.DATE"	Date file <i>userprefix</i> .BODYLDC. <i>vsamsuffix</i> . Maximum length is 17 characters.

Variable	Comments
BODYLOAD=" ARTT . LOAD"	Load module load library: <i>userprefix</i> .BODYLOAD. <i>pdssuffix</i> . Maximum length is 17 characters. Used for ATGOPTS.
BODYLOG=" ARTT"	Capture log files: <i>userprefix</i> .BODYLOG. <i>logsuffix</i> . Maximum length is 4 characters.
The following are default values for data set name suffixes. You can override them.	
SUFXVSAM=" "	VSAM control files. Maximum length is 8 characters.
SUFXPDS=" "	PDS load libraries. Maximum length is 8 characters.
SUFXLOG=" LOG"	Capture log files. Maximum length is 3 characters.
The following are default values for data set name suffixes. You can override them.	
SUFXFMTS=" "	Data format file. Maximum length is 8 characters.





## Appendix D. Date Formats

The following table shows all the date formats used by ARTT. Each date format has a unique four-digit identification code. Each code begins with a number that identifies the type of date format, as follows:

- 0 - Display
- 1 - Packed
- 2 - Bitmap
- 4 - Binary.

The date formats, which are used by ARTT for date conversion, comprise permutations of century (C), year (Y), month (M), and day (D); for example, DDMMYY or CYYMMDD.

Code	Format	Type	Code	Format	Type
0001	DD-MMM-YYYY	Display	0052	YYYY-MMMMMMMMM-DD	Display
0002	MMM-DD-YYYY	Display	0053	YY-MMMMMMMMM	Display
0003	DD-MM-YYYY	Display	0054	YYYY-MMMMMMMMM	Display
0004	MM-DD-YYYY	Display	0055	MMMMMMMM-YYYY	Display
0005	DDMMYYYY	Display	0056	CYYDDD	Display
0006	DD-MMM-YY	Display	0057	DD-YYYY-MM	Display
0007	MMDDYYYY	Display	0058	MM-YYYY-DD	Display
0008	MMM-DD-YY	Display	0059	YY	Display
0009	DDMMYYYY	Display	0060	YYYY	Display
0010	DD-MM-YY	Display	0061	YYMM	Display
0011	DDD-YYYY	Display	0062	YYYYMM	Display
0012	MMDDYYYY	Display	0063	MMYY	Display
0013	MM-DD-YY	Display	0064	MMYYYY	Display
0014	YYYY-DDD	Display	0065	YY-MM	Display
0015	DDMMYY	Display	0066	YYYY-MM	Display
0016	DDYYYY	Display	0067	MM-YY	Display
0017	MMDDYY	Display	0068	MM-YYYY	Display
0018	YYYYDDD	Display	0069	YYMMM	Display
0019	DDMMYY	Display	0070	YYYYMMM	Display
0020	MMDDYY	Display	0071	MMYY	Display
0021	YYMMDD	Display	0072	MMYYYY	Display
0022	YYDDMM	Display	0073	YYMMDD	Display
0023	DDD-YY	Display	0074	YYYYMMDD	Display
0024	YY-DDD	Display	0088	YYMDDHHMMSS	Display
0025	DDYY	Display	0089	YYYYMDDHHMMSS	Display
0026	YYDDD	Display	0090	YDDD	Display
0027	DD-YY-MM	Display	0091	IIDDIIIMIIYY	Display
0028	MM-YY-DD	Display	0092	IIDDIIIMIIYYYY	Display
0029	YY-DD-MM	Display	1009	DDMMYYYY	Packed
0030	YY-MM-DD	Display	1012	MMDDYYYY	Packed
0031	YYYY-MM-DD	Display	1016	DDYYYY	Packed
0032	YYYY-DD-MM	Display	1018	YYYYDDD	Packed

Code	Format	Type	Code	Format	Type
0033	MMM-YY	Display	1019	DDMMYY	Packed
0034	YYYYMMDD	Display	1020	MMDDYY	Packed
0035	YYYYDDMM	Display	1021	YYMMDD	Packed
0036	CYYMMDD	Display	1022	YYDDMM	Packed
0037	YY-MMM-DD	Display	1025	DDYY	Packed
0038	YYYY-MMM-DD	Display	1026	YYDDD	Packed
0039	YY-MMM	Display	1034	YYYYMMDD	Packed
0040	YYYY-MMM	Display	1035	YYYYDDMM	Packed
0041	MMM-YYYY	Display	1056	CYYDDD	Packed
0042	DD-MMMMMMMMM-YYYY	Display	1059	YY	Packed
0043	MMMMMMMMMM-DD-YYYY	Display	1060	YYYY	Packed
0045	DD-MMMMMMMMM-YY	Display	1061	YYMM	Packed
0047	MMMMMMMMMM-DD-YY	Display	1062	YYYYMM	Packed
0050	MMMMMMMMMM-YY	Display	1063	MMYY	Packed
0051	YY-MMMMMMMMM-DD	Display	1064	MMYYYY	Packed
1084	YYDDDDHHMMSS	Packed	4009	DDMMYYYY	Binary
1085	YYYYDDDDHHMMSS	Packed	4012	MMDDYYYY	Binary
1086	YYDDDDHHMM	Packed	4016	DDDDYYYY	Binary
1087	YYYYDDDDHHMM	Packed	4018	YYYYDDD	Binary
1088	YYMDDHHMMSS	Packed	4019	DDMMYY	Binary
1089	YYYYMDDHHMMSS	Packed	4020	MMDDYY	Binary
2009	DDMMYYYY	Bitmap	4021	YYMMDD	Binary
2012	MMDDYYYY	Bitmap	4022	YYDDMM	Binary
2016	DDDDYYYY	Bitmap	4025	DDYY	Binary
2018	YYYYDDD	Bitmap	4026	YYDDD	Binary
2019	DDMMYY	Bitmap	4034	YYYYMMDD	Binary
2020	MMDDYY	Bitmap	4035	YYYYDDMM	Binary
2021	YYMMDD	Bitmap	4059	YY	Binary
2022	YYDDMM	Bitmap	4060	YYYY	Binary
2025	DDYY	Bitmap	4061	YYMM	Binary
2026	YYDDD	Bitmap	4062	YYYYMM	Binary
2034	YYYYMMDD	Bitmap	4063	MMYY	Binary
2035	YYYYDDMM	Bitmap	4064	MMYYYY	Binary

---

## Creating the Date Format File

The following JCL is stored in the member DEFFMTS in the library:

```
system library prefix.V2R2M0.SATGINST
```

Run the JCL to create ARTT's Date Format file.

```
//DEFINE EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DELETE &ATGSPFX..V2R2M0.SATGFMTS
SET MAXCC=0
DEFINE CLUSTER(-
    NAME(&ATGSPFX..V2R2M0.SATGFMTS)-
    CYL(1)-
    KEYS(4 0)-
    RECSZ(62 62) -
    SHR(3 3)-
    SPEED)-
INDEX(-
    NAME(&ATGSPFX..V2R2M0.SATGFMTS.INDEX))-
DATA(-
    NAME(&ATGSPFX..V2R2M0.SATGFMTS.DATA))
//COPY EXEC PGM=IEBGENER
//SYSIN DD *
GENERATE MAXFLDS=1
RECORD FIELD=(62,1,,1)
//SYSUT1 DD *
0001 CDD-MMM-YYYY
0002 CMMM-DD-YYYY
0003 CDD-MM-YYYY
0004 CMM-DD-YYYY
0005 CDDMMYYYY
0006 CDD-MMM-YY
0007 CMMDDYYYY
0008 CMMM-DD-YY
0009 CDDMMYYYY
0010 CDD-MM-YY
0011 CDDD-YYYY
0012 CMMDDYYYY
0013 CMM-DD-YY
0014 CYYYY-DDD
0015 CDDMMYY
0016 CDDYYYY
0017 CMMDDYY
0018 CYYYYDDD
0019 CDDMMYY
0020 CMMDDYY
```

0021 CYYMMDD  
0022 CYYDDMM  
0023 CDDD-YY  
0024 CYY-DDD  
0025 CDDYY  
0026 CYYDDD  
0027 CDD-YY-MM  
0028 CMM-YY-DD  
0029 CYY-DD-MM  
0030 CYY-MM-DD  
0031 CYYYY-MM-DD  
0032 CYYYY-DD-MM  
0033 CMMM-YY  
0034 CYYYYMMDD  
0035 CYYYYDDMM  
0036 CCYYMMDD  
0037 CYY-MMM-DD  
0038 CYYYY-MMM-DD  
0039 CYY-MMM  
0040 CYYYY-MMM  
0041 CMMM-YYYY  
0042 CDD-MMMMMMMM-YYYY  
0043 CMMMMMMM-DD-YYYY  
0045 CDD-MMMMMMMM-YY  
0047 CMMMMMMM-DD-YY  
0050 CMMMMMMM-YY  
0051 CYY-MMMMMMMM-DD  
0052 CYYYY-MMMMMMMM-DD  
0053 CYY-MMMMMMMM  
0054 YYYYY-MMMMMMMM  
0055 MMMMMMMM-YYYY  
0056 CCYYDDD  
0057 CDD-YYYY-MM  
0058 CMM-YYYY-DD  
0059 CYY  
0060 CYYYY  
0061 CYYMM  
0062 CYYYYMM  
0063 CMMYY  
0064 CMMYYYY  
0065 CYY-MM  
0066 CYYYY-MM  
0067 CMM-YY  
0068 CMM-YYYY  
0069 CYYMM  
0070 CYYYYMM  
0071 CMMYY  
0072 CMMYYYY

0073 CYYMMDD  
0074 CYYYYMMDD  
0088 CYYMDDHHMSS  
0089 YYYMDDHHMSS  
0090 CYDDD  
0091 CIIDDIIMMIYY  
0092 IIDDIIMMIYYYY  
1009 PDDMMYYYY  
1012 PMDDYYYY  
1016 PDDYYYY  
1018 PYYYYDDD  
1019 PDDMMYY  
1020 PMDDYY  
1021 PYYMDD  
1022 PYYDDMM  
1025 PDDYY  
1026 PYYDDD  
1034 PYYYYMDD  
1035 PYYYYDDMM  
1056 PCYYDDD  
1059 PYY  
1060 PYYYY  
1061 PYYMM  
1062 PYYYYMM  
1063 PMYY  
1064 PMYYYY  
1084 PYYDDHHMSS  
1085 PYYYYDDHHMSS  
1086 PYYDDHHMM  
1087 PYYYYDDHHMM  
1088 PYYMDDHHMSS  
1089 PYYMDDHHMSS  
2009 MDDMMYYYY  
2012 MMDYYYY  
2016 MDDYYYY  
2018 MYYYYDDD  
2019 MDDMMYY  
2020 MMDYY  
2021 MYYMDD  
2022 MYYDDMM  
2025 MDDYY  
2026 MYYDDD  
2034 MYYYYMDD  
2035 MYYYYDDMM  
4009 BDDMMYYYY  
4012 BMDYYYY  
4016 BDDYYYY  
4018 BYYYYDDD

```

4019 BDDMMYY
4020 BMMDDYY
4021 BYYMMDD
4022 BYYDDMM
4025 BDDYY
4026 BYYDDD
4034 BYYYYMDD
4035 BYYYYDDMM
4059 BYY
4060 BYYYY
4061 BYYMM
4062 BYYYYMM
4063 BMMYY
4064 BMMYYYY

//SYSUT2 DD DSN=&&DATA,DISP=(NEW,PASS),
// SPACE=(CYL,(1,1)),DCB=(RECFM=FB,LRECL=62)
//SYSPRINT DD SYSOUT=*
//LOAD EXEC PGM=IDCAMS
//IFILE DD DSN=&&DATA,DISP=(OLD,DELETE)
//SYSPRINT DD SYSOUT=*
//SYSIN DD *

REPRO IFILE(IFILE) ODS(&ATGSPFX..V2R2M0.SATGFMTS)
//DEFAIX EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *

DEFINE ALTERNATEINDEX(-
NAME(&ATGSPFX..V2R2M0.SATGFMX1)-
RELATE(&ATGSPFX..V2R2M0.SATGFMTS)-
KEYS(31 5)-
TRK(1 1)-
SHR(3 3)-
UNIQUEKEY-
UPGRADE-
REUSE)

DEFINE PATH(-
NAME(&ATGSPFX..V2R2M0.SATGFMP1)-
PATHENTRY(&ATGSPFX..V2R2M0.SATGFMX1))

//BLDINDEX EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *

BLDINDEX IDS(&ATGSPFX..V2R2M0.SATGFMTS)-
ODS(&ATGSPFX..V2R2M0.SATGFMP1)

//

```

## Appendix E. ARTT Data Sets

The tables in this appendix show the libraries set up by the ARTT installation procedures. The libraries in the following table are set up by the installation job submitted from the ARTT - Installation Setup panel.

System Libraries	
<i>system library prefix.V2R2M0.SATGBOOT</i>	Boot library
<i>system library prefix.V2R2M0.SATGCICS</i>	CICS load library
<i>system library prefix.V2R2M0.SATGCLOD</i>	CICS sample load library
<i>system library prefix.V2R2M0.SATGDBDS</i>	IMS sample DBD library
<i>system library prefix.V2R2M0.SATGDBRM</i>	DB2 sample DBRM library
<i>system library prefix.V2R2M0.SATGEXEC</i>	REXX library
<i>system library prefix.V2R2M0.SATGINST</i>	Install library
<i>system library prefix.V2R2M0.SATGLOAD</i>	Load library
<i>system library prefix.V2R2M0.SATGMACS</i>	Macros library
<i>system library prefix.V2R2M0.SATGMLIB</i>	ISPF message library
<i>system library prefix.V2R2M0.SATGPLIB</i>	ISPF panel library
<i>system library prefix.V2R2M0.SATGPSBS</i>	IMS sample PSB library
<i>system library prefix.V2R2M0.SATGSAMP</i>	Sample source library
<i>system library prefix.V2R2M0.SATGSLIB</i>	ISPF skeleton library
<i>system library prefix.V2R2M0.SATGSLNK</i>	Sample link library
<i>system library prefix.V2R2M0.SATGSLOD</i>	Sample load library
<i>system library prefix.V2R2M0.SATGSREP</i>	Sample reports library
Sample Control File Libraries	
<i>control files prefix.FILE.suffix</i>	Sample File control file
<i>control files prefix.PROG.suffix</i>	Sample Program control file
<i>control files prefix.TEST.suffix</i>	Sample Test control file
<i>control files prefix.REPS.suffix</i>	Sample Repository control file

The libraries in the following table are set up when you submit the install DEFARMS and DEFDATE jobs.

Sample Control File Libraries	
<i>control files prefix.ARMS.suffix</i>	Sample ARMS control file
<i>control files prefix.DATE.suffix</i>	Sample Date control file

The libraries in the following table are set up when you submit the install DEFFMTS job.

<b>System Libraries</b>	
<i>system library prefix.V2R2M0.SATGFMTS</i>	Date format file
<i>system library prefix.V2R2M0.SATGFMX1</i>	Date format alternate index file
<i>system library prefix.V2R2M0.SATGFMP1</i>	Date format alternate index path

The prefix and suffix information for the system and sample libraries is set by the installation procedures using the information that you specified in the following fields on the ARTT - Installation Setup panel:

<i>system library prefix</i>	The <b>System Libraries Prefix</b> field in the Install Files Information group.
<i>control files prefix</i>	The <b>Control Files Prefix</b> field in the ARTT Control Files group.
<i>suffix</i>	The <b>Control Files Suffix</b> field in the ARTT Control Files group.

For more information about the ARTT - Installation Setup panel, see page 25.



## **Part 7. Glossary and Index**

This part contains a Glossary with a list of the terms and definitions used in this user's guide.

It also contains the Index to the user's guide.



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## Glossary

**Base run.** In regression testing, an initial execution of a program to produce output that reflects the current state of the program. The output serves as a base against which output from a modified version of the same program can be compared.

See also *Proof run*.

**Capture mode.** An ART run mode in which application calls to file handlers are intercepted by ARTT and used to build a detailed audit trail for the base run of a program. The audit file details are stored in the program log file for subsequent use by proof runs of the program in Real Replay mode or Virtual Replay mode.

See also *Real Replay mode* and *Virtual Replay mode*.

**CICS.** Customer Information Control System.

**Customer Information Control System (CICS).** An IBM licensed program that provides online transaction processing services and management for critical business applications. CICS runs on many IBM and non-IBM platforms (from the desktop to the mainframe) and is used in various types of networks that range in size from a few terminals to many thousands of terminals. The CICS application programming interface (API) enables programmers to port applications among the hardware and software platforms on which CICS is available. Each product in the CICS family can interface with the other products in the CICS family, thus enabling interproduct communication.

**Database Description (DBD).** A collection of macroparameter statements that describes an IMS database. These statements describe the hierarchical structure, organization, device type, segment length sequence fields, and alternate search fields. The statements are assembled to produce database description blocks.

**Data comparison module.** A reusable logic module, generated by ARTT from stored record identification and layout rules, that intelligently compares transformed data with untransformed data, and reports on the differences.

**Data conversion module.** A reusable logic module, generated by ARTT from stored record identification and layout rules, that converts data consistently.

See also *Date rolling*.

**Date Rolling.** A facility that enables ARTT-generated data conversion modules to age or rejuvenate data consistently, and as required.

**DB2.** An IBM relational database management system that is available as a licensed program on several operating systems. Programmers and users of DB2 can create, access, modify, and delete data in relational tables using a variety of interfaces.

**Footprint.** A record of all the I/O operations and other significant events for a program using a specific set of inputs. The footprint illustrates the behavior of the program, either before, or after modification.

**IMS.** Information Management System. Synonym for IMS/VS.

**Information Management System/Virtual Storage (IMS/VS).** A database/data communication (DB/DC) system that can manage complex databases and networks. Synonymous with IMS.

**Job Control Language (JCL).** A language used to identify a job, and describe its requirements to an operating system.

**Nonintrusive.** The ability to obtain information from an executing program without having to modify, and compile the program.

**Program Communication Block (PCB).** An IMS control block that describes an application program's interface to and view of an IMS database or, additionally for message processing and batch message processing programs, to the source and destinations of messages. PCBs are defined during PSB generation.

**Program Specification Block (PSB).** The control block that describes databases and logical message destinations used by an application program. A PSB consists of one or more PCBs.

**Proof run.** In regression testing, an execution of a modified version of a program to produce output that reflects its current state. The output from the proof run is compared with the output from an execution of an unmodified version of the same program.

See also *Base run*.

**QSAM.** Queued sequential access method.

**queued sequential access method (QSAM).** An extended version of the basic sequential access method (BSAM). When this method is used, a queue is formed of input data blocks that are awaiting processing or of output data blocks that have been processed and are awaiting transfer to auxiliary storage or to an output device.

**Real Replay mode.** An ARTT proof run mode in which a modified program uses the same inputs as the Capture mode execution of the same, unmodified program. During the Real Replay execution, the I/O operations and other events generated by the modified program are monitored by ARTT, and then compared with the program log file compiled in the Capture mode execution of the unmodified program. Any differences are reported.

See also *Capture mode* and *Virtual Replay mode*.

**Storage Management Subsystem (SMS).** A component of MVS that is used by the storage administrator to automate and centralize the management of storage.

**Supervisor Call (SVC).** A request that serves as the interface between an application program and the operating system. It protects the operating system from inappropriate user action. All operating system requests must be handled by SVCs.

**Virtual Replay mode.** An ARTT proof run mode in which a modified program uses the same inputs as the Capture mode execution of the same, unmodified program, but retrieves them from the program log file. During the Virtual Replay execution, the I/O operations and other events generated by the modified program are monitored by ARTT, and then compared with the program log file compiled in the Capture mode execution of the unmodified program. Any differences are reported.

See also *Capture mode* and *Real Replay mode*.

**Virtual Storage Access Method (VSAM).** An access method for direct or sequential processing of fixed and variable-length records on direct access devices. The records in a VSAM data set or file can be organized in logical sequence by a key field (key sequence), in the physical sequence in which they are written on the data set or file (entry-sequence), or by relative-record number.

**VSAM.** Virtual Storage Access Method.

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