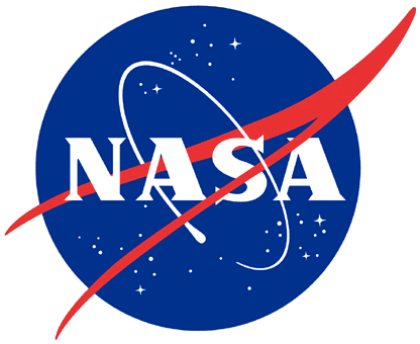
HOSC-WKBK-2100
ISS

Workbook 7:
Using the NRT Data Request Applications

HOSC Training Division

March 1999



National Aeronautics and
Space Administration

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Workbook 7:
Using the Near Real-Time (NRT) Data Request Applications

HOSC-WKBK-2100

March 1999

Prepared in support of:
NAS8-44000

Prepared by:
HOSC Training Team

Prepared for:
Mission Systems Division
Mission Operations Laboratory
Science and Engineering Directorate
Marshall Space Flight Center

Welcome

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Workbook Overview

The majority of the workbooks are designed to be self-paced requiring very little assistance from an instructor. The following table lists the workbooks and their associated course number:

Workbook Numbering System

Workbook Number	Title	Associated Course
Workbook 1	HOSC End-User Software Training	HOSC-1000 HOSC-1010 HOSC-1020 HOSC-1030
Workbook 2	Using the Databases	HOSC-2050
Workbook 3	Using the Exception Monitor Application	HOSC-2060
Workbook 4	Using the Display Generation and Operation Applications	HOSC-2070
Workbook 5	Using the Computation Generation and Operation Applications	HOSC-2080
Workbook 6	Using the Scripting Applications	HOSC-2090

Workbook Numbering System (Continued)

Workbook Number	Title	Associated Course
Workbook 7	Using the NRT Data Request Applications	HOSC-2100
Workbook 8	Using Applix	HOSC-2110
Workbook 9	Using FrameMaker	HOSC-2130
Workbook 10	Using Electronic Mail	HOSC-2140
Workbook 11	Using the Payload Information Management System (PIMS)	HOSC-2150 HOSC-2160
Workbook 12	Using the Pixmap Editor	HOSC-2170
Workbook 13	Using the Ground Support Equipment Packets Application	HOSC-2180
Workbook 14	Using the Strip Chart Recorder Applications	HOSC-2190
Workbook 15	Using the End-User Command Applications	HOSC-2120
Workbook 22	Workstation Overview and General Purpose Utilities Training	HOSC-1040
Privileged Applications		
Workbook 16	Using the Privileges within the Database Applications	HOSC-3000
Workbook 17	Using the Command System Management Application	HOSC-3010
Workbook 18	Using the User Configuration Management Application	HOSC-3020
Workbook 19	Using the System Monitor and Control Applications	HOSC-3030 HOSC-3040
Workbook 20	Using the Data Packet Generator Application	HOSC-3050
Workbook 21	Using the Database Monitor and Control Application	HOSC-3060

This workbook covers course:

HOSC-2100 - Using the NRT Data Request Applications
This course will provide the trainee with the information necessary to operate the NRT List Request, NRT Data Capture, NRT Snapshot, and the NRT Playback Request applications. In addition, aspects of Computation Operation, Display Operation, Applix Spreadsheet, and the File Export applications are addressed here as they relate to the NRT applications.

Workbook Layout

The workbooks include a welcome section that details how the document is divided into modules as well as the content of each module. The modules include a discussion of the main topic of the module, a step-by-step "Try It..." and review questions. Modules include exercises that "put it all together" and reinforce what you have learned.

The modules included in this document assist you, the user, in creating NRT List Request, NRT Snapshot Request, and NRT Data Capture Request output files. Once these output files are created, you will be shown how to use other EHS applications to view and manipulate the data within these output files. Instruction is also provided on how to initiate an NRT Playback. The intent of this course is to provide you with a thorough understanding of the NRT Data Request applications and to set you on the path toward mastering them.

This workbook and the accompanying course is divided into six modules. The first module discusses basic NRT definitions, what a NRT Data Request is, and why you might use NRT Data Requests. Modules 2 and 3 address how to create a NRT List Request and a NRT Snapshot Request. Module 4 introduces you to the Applix spreadsheet application and steps you through the process of viewing and plotting NRT List Request output files. Module 5 introduces the NRT Data Capture Request and how to export this file to a computer outside the HOSC. Module 6 provides you with instructions on how to initiate a NRT Playback Requests so that you can view NRT data just as if it were real-time data.

Each module features an exercise in which you will be asked to apply the skills you acquire during the course. The eight modules in this workbook include:

Module 1: *Definitions and Concepts*
Module 2: *NRT List Request*
Module 3: *NRT Snapshot Request*
Module 4: *Viewing NRT List Request Output in Applix*
Module 5: *NRT Data Capture Request*
Module 6: *NRT Playbacks*

Given the extensive technical requirements, extreme effort has been taken to make the EHS software as intuitive and user-friendly as possible. Hopefully, your experience with the software will be rewarding, and you'll find it satisfies your individual needs.

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Workbook Objectives

Upon completion of this workbook, you should be able to:

- Define the terms and definitions pertinent to EHS NRT Data Request applications
- Identify the purpose of each NRT Data Request application
- Illustrate the flow of a request from the workstation to the Telemetry server and back
- Use the Telemetry Database application to determine/verify MSID definitions
- View the directory of available NRT segments
- Create an NRT List Request, NRT Snapshot Request, NRT Data Capture Request, and NRT Playback Request
- Validate, submit, and check the status of any pending NRT List Request and NRT Playback Request
- Validate and submit an NRT Snapshot Request and NRT Data Capture Request
- Import NRT List Request output files.
- Plot specific data contained in an NRT output file
- Save NRT output data and associated charts
- Upload the spreadsheet file to the UDE database and mark the file as shareable
- Transfer a NRT Data Capture output file to a remote system
- Open a display to view an NRT Playback

Module 1
Definitions and Concepts

Objectives

In order to access and work with the various EHS Near Real-Time Data Request applications, you must have a fundamental understanding of terms, definitions, and concepts as used within the EHS. Information presented in this initial module is intrinsic to your understanding of NRT Data Request applications. In this module you will learn:

- the purpose of each NRT Data Request application.
- key concepts and terminology needed to create an NRT Data Request.
- how NRT Data Requests flow through and are processed by the EHS system.

Definitions

Near Real-Time Data

During HOSC system initialization, data that is to be written to the NRT Data Log (NDL) is identified. NRT data may include data which was previously down-linked in real-time, data dumped from an onboard recorder, or data replayed by a remote facility . The most recently received data is stored in cache, while older data is stored to optical disk. All logged real-time, dump, and playback data is available for subsequent retrieval.

Near Real-Time Data Request Software

NRT Data Request software provides you with the means to either define the contents of a file containing previously recorded data, or to replay previously recorded data into your workstation so that it can be monitored just as it was originally received. If a file containing the recorded data is created, other EHS applications provide you with the means to view and manipulate the data.

NRT List Request Application

The NRT List Request Application is used to create a file containing data received for specific parameters (Measurement/Stimulus Identifiers (MSIDs)) over a specified period of time. To use this software you must identify the MSIDs, any filtering criteria, and start and stop times.

NRT Snapshot Request Application

The NRT Snapshot Request application is used to create a file containing either the first or all samples of data (for all MSIDs) from a single packet. The snapshot represents a single instant in time. To use this software, you identify the time, the source of the data, and any filtering criteria. The NRT Snapshot Request application is used primarily as a troubleshooting tool and no software is provided within EHS to adequately display the resulting output file.

NRT Data Capture Request Application

The NRT Data Capture Request Application is used to create a binary file containing whole data packets for a specified period of time. To use this software, you must identify start and stop times and the data source. No software is provided within EHS to adequately display the resulting output file. The created binary file must be exported outside the EHS system for further analysis using your own applications and hardware.

NRT Playback Request Application

The NRT Playback Request Application is used to playback telemetry data so that it appears just as if it was being received in realtime. You must configure those EHS applications you wish to use to display or manipulate data to operate in playback rather than realtime mode. Any effort to uplink a command while an application is in playback mode will result in an error. To define a NRT Playback Request, you must provide start and stop times for the data in which you are interested, as well as various other data source and playback options.

NRT Output Files

The NRT List Request, NRT Snapshot Request, and NRT Data Capture applications result in the creation of an output file. For the NRT List Request and the NRT Snapshot Request, this output file is placed in the Standard Output (sto) file directory and is in a standard ASCII, tab-delimited format. NRT Data Capture output files are also created and placed in the Standard Output (sto) directory, but are in binary format.

NRT Data Segments

When data is written to the NRT Data Log, it is written in segments. A new segment is created any time that the data source or data mode changes. A directory of NRT Data Segments is available through the Show NRT Directory dialog box within each of the NRT Request Applications.

Packet Identification

Data transmitted to and within the EHS is transferred in packets. These packets conform to standard communication formats or protocols (TDM, NASCOM, PDSS, etc.). Headers within each packet identify data quality, the communication protocol and the Application Process Identifier (APID) for the

associated data. Together, the communication protocol and the APID, uniquely identify the data source (e.g., a particular onboard heater, or a pump). A single MSID may occur in more than one APID. By default, NRT Data Request applications retrieve MSID data with the highest data quality, regardless of its source, but if you desire, you can request data from an individual source by identifying in the request a communications protocol and APID.

Data Modes

Data written to the NRT Data Log can be received as real-time data, dump data, or playback data. Real-time data is data that is telemetered to the HOSC and distributed for immediate use. Real-time data received into the HOSC and written to the NRT Data Log is indexed by its time stamp and other identifying information. When a NRT Data Request is submitted for a particular time or time slice, this indexing information is used to create the output file. During periods when communications with the spacecraft are unavailable (LOS), data is recorded onboard and then played back when communications resume (AOS). This data, as it is recorded onboard, is encoded with an onboard embedded time and is referred to as dump data. When a NRT Data Request is written specifying that dump data be used, the onboard, embedded time is used to create the output file. Playback data is data generated either locally or from some other facility. Servers in the HOSC receive playback telemetry streams from the HOSC Data Distribution System and perform the same processing of the data as would be if the stream was received in real-time.

Data Types

When creating NRT List and NRT Snapshot Requests the output generated for each parameter (MSID) depends on how that MSID is defined within the Telemetry Database (or Local Table). To identify the native data type for individual MSIDs, you must initiate the Telemetry Database application's MSID Detail Form and initiate a query for those MSIDs in which you are interested. You may convert the data from its native data type to another data type if desired.

Calibrated Data

MSIDs with a native data type other than ASCII or a time format may be calibrated prior to the creation of an NRT output file. Three types of calibration may be performed: polynomial coefficient, point pair interpolation, and state code conversion. Polynomial coefficient calibration uses a standard polynomial equation to define output data. Point pair calibration uses an MSID's raw count and corresponding engineering unit values to create a third value which defines one of two linear segment endpoints. State code conversion takes numerical data and converts it into text.

Data Representation

You may want your NRT data written to the standard output file in a particular format (e.g., with a certain number of decimal places displayed). This is referred to as the data representation. The data is not converted per say, it's just being displayed in a different format or using a different numbering system.

Sample Thinning

Some parameters are sampled at higher rates than others (e.g., one MSID may be sampled 5 times in a single data packet while another is sampled only once). Sample thinning allows you to define your output file so that it contains all samples, only the first sample (even if more than one sample is available), or you can specify that you only want every Nth sample. For example, suppose there are 15 samples of a particular parameter in each data packet. You can specify that you'd like your output file to contain every fifth sample, in which case the output file would contain the first, sixth, and the eleventh sample for each data packet.

Limit/Expected State Sensing

Some parameters have limits or expected states associated with them. If a parameter has associated limits, and the data returned for that parameter exceeds those limits, you will be notified that an exception has occurred. If the data is being received in realtime or during a NRT playback, the notification appears in the Messages area of the Message Handler. These exceptions can also be indicated in NRT output files. Warning high, warning low, caution high, and caution low, are the limit violations that may be defined for an MSID. Expected state sensing associates a state with data being received. For example, it may be that an MSID returns the values 1, 2, 3, or 4 to indicate the current status of an onboard recorder. One indicates that the recorder is in PLAY mode. Two indicates that the recorder is PAUSED. Three indicates that the recorder is RECORD mode and four indicates that the recorder is in REWIND mode. In this case the actual values mean little, but the current state of the recorder is relevant. If a parameter has associated expected states, the state corresponding with each returned data value can be included in a NRT output file. To identify whether limits or expected states have been set for individual MSIDs, you must initiate the Telemetry Database application's MSID Detail Form and initiate a query for those MSIDs in which you are interested.

Concepts

The EHS is a distributed processing system in that the majority of the processing required by user initiated applications is performed on the user's workstation. The EHS workstation provides a multi-application windowed environment for access to the EHS applications. NRT Data Requests are created on the user workstation, submitted across the FDDI Ring to the Telemetry server, where the request is processed and filled. The Telemetry server accesses NDL Storage, locates the requested data, verifies that the requested data is valid and builds the data request output file according to user specifications. The output file is then returned to the user's workstation and placed in the *sto* directory for subsequent manipulation. NRT Playbacks are created in a similar manner except that rather than creating an output file, the recorded data is made available across the FDDI Ring for access by all interested users.

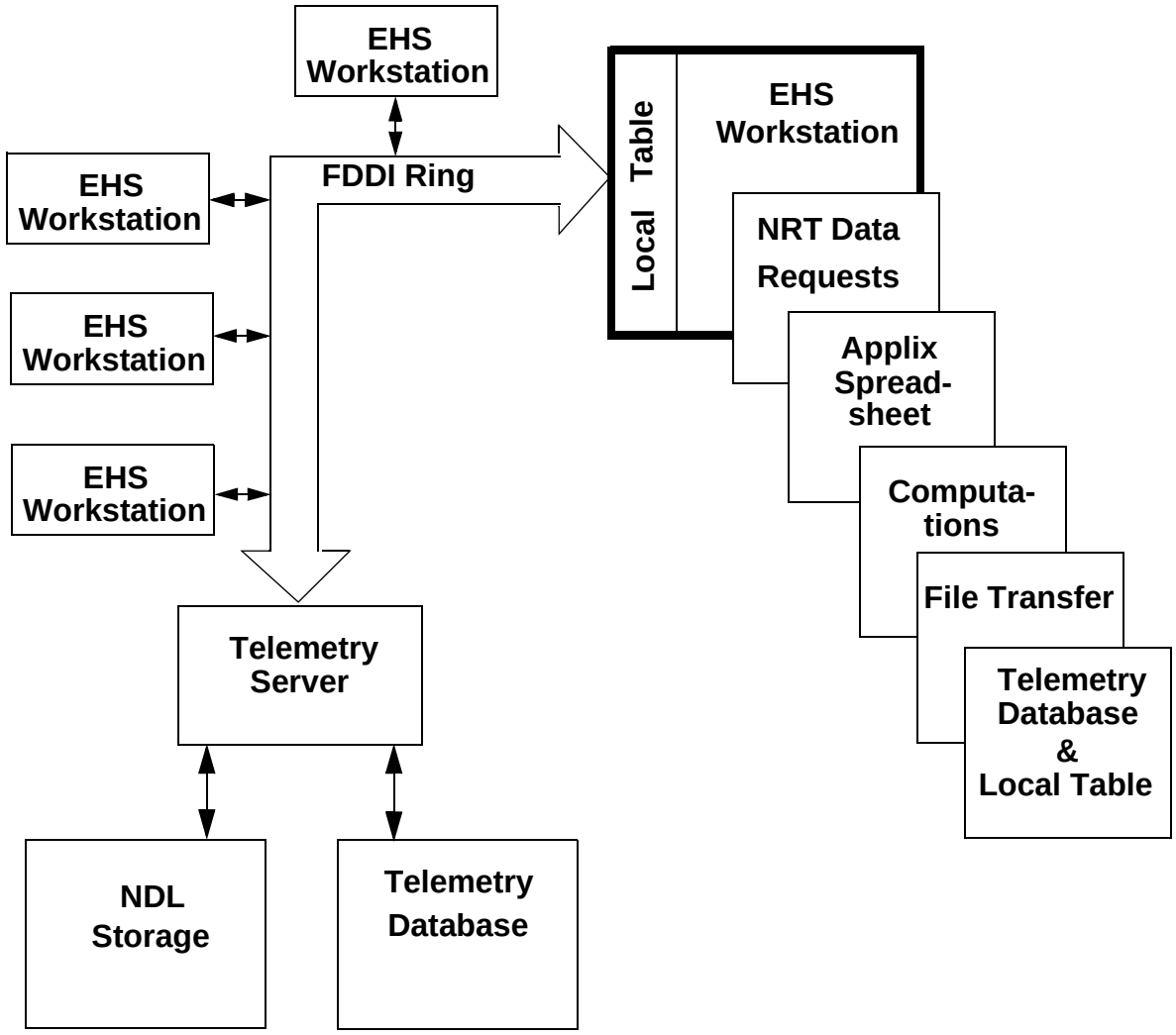

Figure 1-1. NRT Data Flow

After logging on to an **EHS Workstation** you can invoke any of NRT applications from the **Launchpad** by clicking on the **Operation** menu and selecting **NRT Data Requests**. A cascade menu is invoked listing the NRT Data Request applications. Select the desired application (see Figure 1-2. NRT Data Request Applications).

Figure 1-2. NRT Data Request Applications

The remaining modules in this workbook address how to use each of the NRT Data Request applications

Summary

This module has laid the groundwork for an understanding the NRT Data Request applications. We defined the general capabilities of each application and the relationship between the EHS workstations and the Telemetry server.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. Which application would you use to retrieve data logged to NRT the previous day for MPR76348908 (a single MSID)?

   a. NRT Data Capture Request application

   b. NRT Snapshot Request application

   c. NRT List Request application

   d. Telemetry Database application

2. You have a specialized application on your PC at the office which you use to manipulate and display data projections. The data you'd like to use as input for this application was received in the HOSC two days ago. You want to create a binary file containing the data and then transfer that file to your office PC. What EHS applications would you use?

   a. NRT List Request and File Transfer

   b. NRT Data Capture Request and File Export

   c. Retrieve UDE and File Transfer

   d. NRT Playback Request and File Transfer

3. NRT Output Files are created by

   a. your workstation

   b. the telemetry server

   c. the telemetry database

   d. your local table database

4. Once created, NRT output files are placed in the:

   a. nlr directory on your workstation

   b. pof directory on the Telemetry server

c. npr directory on the Telemetry server

d. sto directory on your workstation

5. The application used to identify the default limits and the native data type of an MSID is:

a. Telemetry Database

b. Local Table Database

c. NRT Snapshot Request

d. Applix

Answers

1. The answer is c. The NRT List Request application is used to retrieve NRT data for individual parameters (MSIDs) over a specified period of time.

2. The answer is b. The NRT Data Capture application is used to create a binary file which you can then export and use with non-EHS applications. The File Export application is used to move the file from the sto directory to the PC at your office.

3. The answer is b. NRT output files are created on the telemetry server and then transferred to your workstation and placed in the sto directory.

4. The answer is d.

5. The answer is a. The Telemetry Database application provides you with detailed information on each parameter.

Module 2
NRT List Request

Objectives

The NRT List Request application provides you with the means to create an output file containing data logged for individual MSIDs over a specified period of time. In this module you will learn:

- how to use the Telemetry Database application to determine/verify MSID definitions.
- how to view the directory of available NRT segments.
- how to create an NRT List Request.
- how to validate and submit an NRT List Request to the Telemetry Server.

Telemetry Basics

For a ground system to process telemetry, the structure of the telemetry data must be defined. Each telemetry stream or packet received by the EHS is defined in the telemetry database. The parameters in a stream are assigned a measurement/stimulus identifier (MSID). An MSID is a unique key defined for each parameter in the streams to be processed for a specific project and mission. An MSID is restricted to twenty characters, but can contain any project defined identifier that is unique. The telemetry database defines for each MSID; the MSID's location in the stream, data needed to calibrate/convert the parameter, and data to determine if the parameter is within its limits or in its expected state. The information required to perform telemetry processing, decommutation, conversion, calibration, and limit sensing of MSIDs is stored in the telemetry database. This information is also maintained on each workstation in a user-specific set of local tables. You can use the Local Table Operation (LTO) applications to change your local table information and apply these changes to your copy of the telemetry database. In the current release of the NRT Data Request applications however, data is returned using only information contained within the TDB (not in local tables). In a future software release of the NRT Data Request applications, it is planned that output files will be generated using local table information. For now, if you want to see how NRT data output will be defined for a particular MSID you must access the TDB application.

Exercises

Instructions

The following "Try It" directs you through the process of defining, validating, and submitting an NRT List Request. Carefully read and complete each step. This "Try It" has four parts: 1) checking MSID information in the telemetry

database; 2) checking the availability of NRT segments; 3) creating the NRT List Request; 4) and, validating and submitting a NRT List Request. Refer to the project-specific worksheet for a list of MSIDs to use.

Scenario

There was an experiment event earlier in the morning and now you finally have time to analyze the data recorded during that event. Since the needed data is in the NRT Data Log, you must create and submit a NRT Data Request. Because you want to retrieve data for individual parameters over a specific period of time, you need to create a NRT List Request. Before we begin building our request however, let's look at how those MSID(s) in which we are interested are defined within the Telemetry Database. This will give us an idea of what the data we are requesting should look like in our output file.

Try It - Part 1: Checking MSID Information prior to building an NRT List Request...

1. Click the **Database** menu on the Launchpad and select the **Telemetry Database** menu item.

2. From the **Telemetry Database** menu click on **Database** and then **Select Database...**. On the **Select Database** dialog box, accept the default database listed by clicking on [Select Database].

3. From the **Telemetry Database** menu bar click on **Query/Update** and then **MSID Information**. From the cascade menu click on **MSID List - Query Only...**. Enter the first MSID from your project-specific worksheet in the first row on the **MSID List -Query Only** form and click on [Execute Query].

4. Use the **MSID Detail...**, **Calibration Detail...**, and **Limit Sensing Detail...** forms to identify appropriate data processing, data representation, and limit/expected state sensing information. Also, using the **Decommutation Detail...** form, identify the valid protocol and APID (Stream Number) for this MSID.

Now that we know how the MSIDs are defined in the database, we need to determine when data was written to the NRT Data Log. Obviously, if we identify a start time for our request that is during an LOS period, we'll end up with no data in our output file. We want to make sure that data will be available and written to our output file.

Try It - Part 2: Checking the availability of NRT segments

1. Click the **Operation** menu on the **Launchpad** and select the **NRT Data Requests** cascade menu. From the cascade, select **NRT List Request**.

2. Before we begin to define our NRT List Request, we must identify a time period for which we are interested in receiving data. Let's begin by looking at the directory of NRT segments that have been written to the NRT Data Log. Select **Show NRT Directory...** from the **Options** menu.

3. Within the **Time Constraint** frame on the **Show NRT Directory** dialog box, accept the default **Time Source:** and **Time Reference:**. In the **Start Time:** fields, specify a time of 001:00:00:00. In the **Stop Time:** fields, specify a time of 365:00:00:00. Accept the default **Data Mode** and **Data Source** and click Refresh. This filters the NRT Data Log and lists all real-time NRT segments which were recorded during the year.

4. From those NRT segments listed, find the segment listed on your project-specific worksheet and write down a start time for your request which falls within the listed segment. To define a stop time for your request, add 20 seconds to your start time and make note of this time. Make sure that both your start and stop times fall within the listed NRT segment. Close the **Show NRT Directory** dialog box.

Now that you've verified MSID definitions in the Telemetry Database and established a valid start and stop time for your NRT List Request, we can confidently complete our NRT List Request.

Try It - Part 3: Creating the NRT List Request

1. In the **Name Information** frame on the **NRT List Request** main window, there are two text entry fields. In the **Request Name:** field, enter a unique filename. Your keystrokes are automatically reflected in the **Output Filename:** field.

2. In the **Time Information** frame, set the **Time Source:** to **HOSC Receipt Time**.

3. In the **Start Time:** text entry field, enter the starting GMT (DDD:HH:MM:SS) of the time segment that you selected.

4. In the **Stop Time:** text entry field, enter the ending GMT of the time segment you selected. Your start and stop times should encompass a 20 second time slice.

5. Within the **Data Source Information** and **Data Mode Information** frames, accept the default values (don't change anything).

6. From the project-specific worksheet, enter the MSID information for the first MSID in the **MSID Information** table. You can either type the information directly into the table cell, or you can use the **Select MSID...** menu item available under the **Options** menu to select the desired MSID (You can also use the right mouse button to invoke a popup menu which allows you to enter appropriate information for each cell within the **MSID Information** table).

   Note: Do not enter the technical name - only the 9-character MSID.

7. Click in the **Data Processing** column. From the **Options** menu, click **Set Data Processing** and select the processing mode that provides a value in the **Data Representation** column.

8. Click in the **Data Representation** column. From the **Options** menu, click the **Set Data Representation...** menu item. In the dialog box that appears, select the **Defaults** radio button and click Set.

9. Click in the **Limit/ES Sensing** column, enter **No**. From the **Options** menu click on **Set Limit/ES Sensing** and select **No**.

10. Click in the **Filter Test** column and from the **Options** menu, click on **Set Filter Test.** Click on **None**.

11. Repeat the above steps for each MSID as shown on your project-specific worksheet. Make sure that you remove the cursor from all completed fields

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Once you've completed the MSID Information table for all MSIDs in which you are interested, you must validate the request. The validation process ensures that the MSIDs you've listed are appropriately defined within your request and that you haven't left any of the required fields blank.

Try It - Part 4: Validating and Submitting a NRT List Request

1. On the **NRT List Request** main window click Validate... . A **Validate** dialog box will be invoked.

2. On the **Validate** dialog box, click Validate. If you followed the steps accurately, your NRT List Request should validate without errors. The successful validation message will be displayed in the main window's message area. If you have errors, the **Message Area** will identify the row of the MSID Information table in which the errors were encountered. Fix the errors and validate the request again. Once the request has validated, close the **Validate** dialog box by clicking Close.

3. On the **NRT List Request** main window, click on Submit.

Additional Exercise

Now let's go through the process of creating another NRT List Request.

1. Using the MSIDs provided on your project-specific worksheet, create another NRT List Request. Use a different name for your request and a different time period from the one used previously. Filter the data as indicated on the project-specific worksheet (For the solution to the filtering portion of this request see Appendix A).

2. Validate and submit your request.

After each of your NRT List Requests are processed by the Telemetry server, an output file is created and placed in the Standard Output (sto) directory. You'll receive a message in the Message Area stating that your output file has been created. Once you receive this message, you can open up your output file (called **xxxxxxx.sto**, where xxxxxx is your request name) in Applix to examine the results (see Module 4 in this workbook).

Summary

The NRT List Request application provides for the creation of an output file containing data for individual MSIDs over a specified time period. To ensure that you've accurately defined your NRT List Request and that the output data will be in the format you desire, use the **Telemetry Database** application to retrieve relevant information for each MSID. To ensure that NRT data is available for the time period in which you are interested, use the **Show NRT Directory** dialog box to see a listing of all NRT segments that have been written to the NRT Data Log. Once you've created a NRT List Request, you must validate the request before submitting it to the server. The **Control** dialog box can be used to check the status of any request you've submitted to the server.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. During the NRT List Request validation process, you discover that you entered the wrong MSID. What cells within the MSID List Information table must you verify/modify for accuracy?

a. all cells

b. the MSID cell

c. the MSID and Data Processing cells

d. the MSID, Data Processing, and Data Representation cells

2. What does “25a” in the **Data Representation** column of the **MSID Information** table mean?

3. If you wanted to filter NRT List Request output data such that only those values for an MSID which are greater than 5 are included, what and where would you enter this information?

4. How do you indicate in an NRT List Request that you want to include in your output file data logged in both Real-time and Dump mode?

5. True or False? The output filename for each request being process by the server is listed in the **Control** dialog box.

Answers

1. d. The MSID, Data Processing, and Data Representation cells must be verified because the default values provided within the Data Processing and Data Representation dialog boxes are passed to the application by the Telemetry Database.

2. The data displayed in the output file will be displayed as text with up to 25 characters.

3. You would enter ">A" in the **Filter Test** column, "5" in the **Filter Value A** column and the **Filter Value B** column would be left blank.

4. Within the **Data Mode Information** frame, click on the **Merge** radiobutton and ensure that **Real-time** and **Dump** are toggled on (darkened).

5. False. The **Control** dialog box provides a listing by request name not output filename.

Module 3
NRT Snapshot Request

Objectives

The NRT Snapshot Request application provides you with the means to create an output file containing data logged for all MSIDs in a single packet for a specific time. In this module you will learn:

- how to create an NRT Snapshot Request.
- how to validate and submit an NRT Snapshot Request to the Telemetry Server.

Exercises

Instructions

The following "Try It" directs you through the process of defining, validating, and submitting an NRT Snapshot Request. Carefully read and complete each step.

Try It - Creating an NRT Snapshot Request

1. Click the **Operation** menu on the **Launchpad** and select the **NRT Data Requests** cascade menu. From the cascade, select **NRT Snapshot Request**.

2. In the **Name Information** frame on the **NRT Snapshot Request** main window, there are two text entry fields. In the **Request Name:** field, enter a unique filename. Your keystrokes are automatically reflected in the **Output Filename:** field.

3. In the **Time Information** frame, set the **Time Source:** to **HOSC Receipt Time** and the **Time Reference:** to **GMT**.

4. In the **Time:** entry area, enter a time in GMT (DDD:HH:MM:SS). Use the time specified on your project-specific worksheet.

5. Invoke the **Show NRT Directory** dialog box and identify the data mode, protocol, and APID for the time provided. Enter this information in the **Data Mode and Source Information** frame.

6. In the **Processing Information** frame make the following selections:

   - **Data Processing:** Calibrated

- **Limit/ES Sensing:** Yes
- **Sample Thinning:** Return Every Sample

7. On the **NRT Snapshot Request** main window click [Validate...]. The **Validate** dialog box will be invoked.

8. On the **Validate** dialog box, click [Validate]. If you followed the steps accurately, your NRT Snapshot Request should validate without errors. The successful validation message will be displayed in the main window's message area. Once the request has validated, close the **Validate** dialog box by clicking [Close].

9. On the **NRT Snapshot Request** main window, click on [Submit].

10. Click on the **Request** menu item and select **Control ...** . Click on [Refresh] to view the current status of your pending request. You can also use this dialog box to cancel any pending requests.

After the request is processed, a file called **xxxxxxx.sto** (where xxxxxx is the request name) is created that can be opened in Applix (see Module 4).

Summary

The NRT Snapshot Request application provides for the creation of an output file containing data for a single packet for a specific time. As a result, all data included in an NRT Snapshot Request output file is processed the same (i.e., the same data processing options apply to all MSIDs, the same numbering system is used to represent all data, limit/expected state sensing, if turned on, applies to all parameters, etc.) Once you've created a NRT Snapshot Request, you must validate the request before submitting it to the server.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. An MSID is defined within the Telemetry Database as having a native data type of IUNS (Unsigned Integer). If this MSID is in an NRT Snapshot Request which uses calibrated data, what will be the data type of values in the output file?

   a. IUND - Undefined Integer

   b. IEEE - IEEE floating point format

   c. IDIS - Discrete Integer

   d. ITWO - Two's Complement Integer

2. In a NRT Snapshot Request, how do you define an appropriate number system to use for converted and calibrated data?

3. On the **NRT Snapshot** main window, if you selected **Calibrated** from the **Data Processing:** option menu button, what will the system do about those MSIDs that don't allow calibration?

Answers

1. The answer is b. IEEE floating point format

2. For Converted and Calibrated data, the system will determine the appropriate data representation.

3. The system will calibrate every MSID that allows calibration. For those MSIDs that don't allow calibration, the system will attempt to convert the data. If a value cannot be calibrated, the system will provide unprocessed data.

Module 4
Viewing NRT List Request Output in Applix

Objectives

The objective of this module is to introduce you to the Applixware spreadsheet application. Applixware is used to view and plot NRT List and Snapshot Request output file data. When created, output files are in ASCII tab-delimited format and are stored in the Standard Output (sto) directory. These files can be imported into the Applixware spreadsheet application and opened for viewing and analysis.

In this module you will learn how to:

- import NRT List Request and NRT Snapshot Request output files into the Applixware spreadsheet application.
- read the summary statistics for NRT output files.
- create a basic line plot using NRT output file data.
- store the spreadsheet to the UDE database and mark it shareable.

Applix Spreadsheet Application

Applixware is the COTS product which provides you with spreadsheet capabilities. **Applixware** provides powerful numeric calculation capabilities and versatile presentation formatting, along with the ability to easily add graphics, text, and sophisticated charts to your worksheets. A NRT output file, created using the **NRT List Request** application or a computation, can be analyzed in an **Applixware** spreadsheet.

The **NRT List Request** application result in the creation of tab-delimited, ASCII format, output files. These files are not available for viewing or manipulation within any of the NRT applications. They are intended for use within Applix. Applix is available off the **Launchpad** from the **Utilities** menu. Clicking on **Spreadsheet** invokes the application and provides you with standard spreadsheet capabilities. NRT request output files are imported into predefined Applix templates which arrange the data into an appropriate format for viewing depending on which NRT application generated the file

Scenario - Plotting a NRT Output File

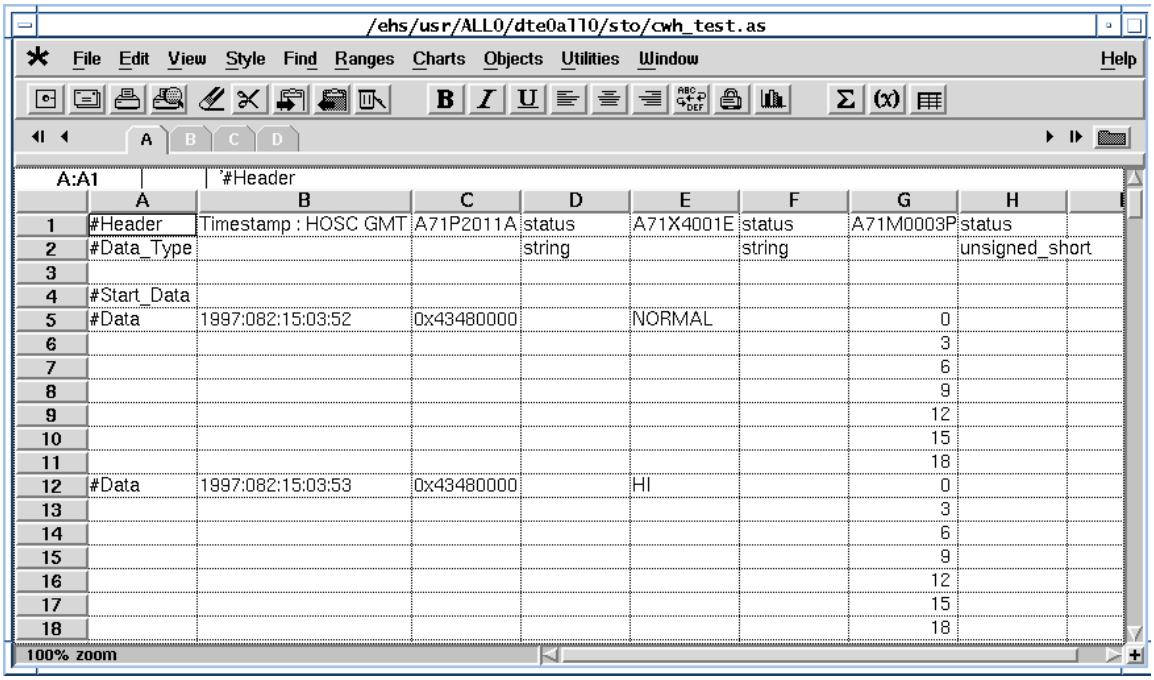
You have already submitted two NRT List requests and output files have been created for each by the Telemetry server. You now wish to view the data from these output files. To do this, you use the Applix spreadsheet application.

1. Go to the **Utilities** menu and click on **Spreadsheet**. A blank Applix spreadsheet will be invoked. Go to the **File** menu and click on I**mport** to invoke the Applix **Import** dialog box.

2. From the **sto** directory, select the file matching the output filename you provided for your first NRT List Request. Click on **ASCII grid** as the import file format. Click on Open. The request output file will open within the Applix spreadsheet.

NRT List Request Output Files

NRT List Request output files are viewed from within the Applix application (see Figure 4-1. NRT List Request output file as viewed in Applix). Columns include Time, your first MSID and Status Character, followed by subsequent MSIDs and status characters.



	A	B	C	D	E	F	G	H
1	#Header	Timestamp : HOSC GMT	A71P2011A	status	A71X4001E	status	A71M0003P	status
2	#Data_Type			string		string		unsigned_short
3								
4	#Start_Data							
5	#Data	1997:082:15:03:52	0x43480000		NORMAL		0	
6							3	
7							6	
8							9	
9							12	
10							15	
11							18	
12	#Data	1997:082:15:03:53	0x43480000		HI		0	
13							3	
14							6	
15							9	
16							12	
17							15	
18							18	

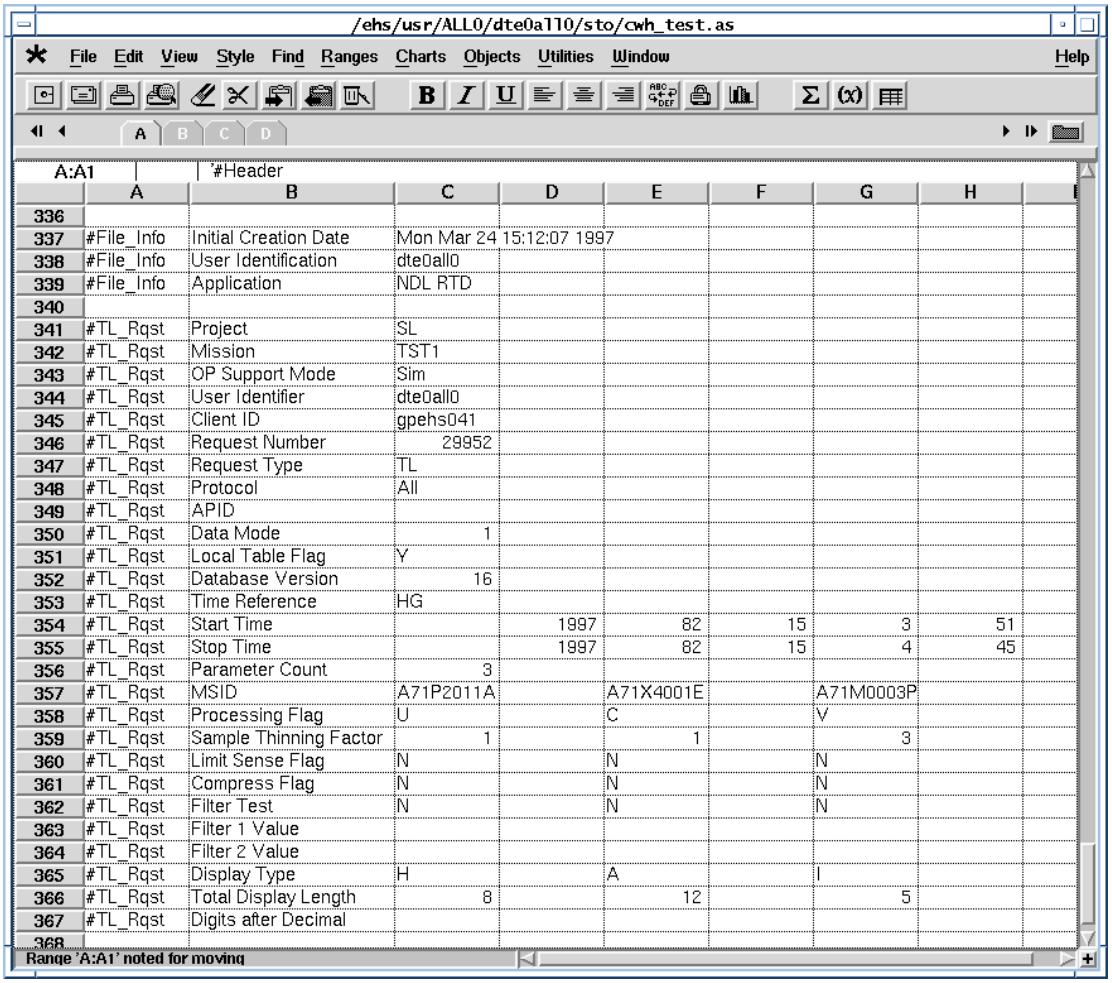
Figure 4-1. NRT List Request output file as viewed in Applix

The Time column shows all times for which you requested data. In the example above, only two seconds of data are shown. The time reference as defined in the request is GMT.

The MSID column identifies each MSID you included and its relevant data. In Figure 4-1. NRT List Request output file as viewed in Applix, shows the MSIDs. The data is displayed in the format specified in the NRT List Request.

The Status Character column displays a code that represents the status of the data received. In Figure 4-1. NRT List Request output file as viewed in Applix, no status characters are shown. The list of possible status characters is included as Appendix B to this workbook.

Also included as part of the output file is a request summary which identifies all the attributes for this particular request. An example of this summary screen is shown in Figure 4-2. Example NRT List Request output file summary.



	A	B	C	D	E	F	G	H
336								
337	#File_Info	Initial Creation Date	Mon Mar 24 15:12:07 1997					
338	#File_Info	User Identification	dte0all0					
339	#File_Info	Application	NDL RTD					
340								
341	#TL_Rqst	Project	SL					
342	#TL_Rqst	Mission	TST1					
343	#TL_Rqst	OP Support Mode	Sim					
344	#TL_Rqst	User Identifier	dte0all0					
345	#TL_Rqst	Client ID	gpehs041					
346	#TL_Rqst	Request Number	29952					
347	#TL_Rqst	Request Type	TL					
348	#TL_Rqst	Protocol	All					
349	#TL_Rqst	APID						
350	#TL_Rqst	Data Mode	1					
351	#TL_Rqst	Local Table Flag	Y					
352	#TL_Rqst	Database Version	16					
353	#TL_Rqst	Time Reference	HG					
354	#TL_Rqst	Start Time		1997	82	15	3	51
355	#TL_Rqst	Stop Time		1997	82	15	4	45
356	#TL_Rqst	Parameter Count	3					
357	#TL_Rqst	MSID	A71P2011A		A71X4001E		A71M0003P	
358	#TL_Rqst	Processing Flag	U		C		V	
359	#TL_Rqst	Sample Thinning Factor	1		1		3	
360	#TL_Rqst	Limit Sense Flag	N		N		N	
361	#TL_Rqst	Compress Flag	N		N		N	
362	#TL_Rqst	Filter Test	N		N		N	
363	#TL_Rqst	Filter 1 Value						
364	#TL_Rqst	Filter 2 Value						
365	#TL_Rqst	Display Type	H		A		I	
366	#TL_Rqst	Total Display Length	8		12		5	
367	#TL_Rqst	Digits after Decimal						
368								

Figure 4-2. Example NRT List Request output file summary

Try It - Plotting a NRT Output...

Now that you can see your NRT List Request output file's data, you decide that you want to plot the data in a graph.

1. Select the data you wish to plot beginning with cells in the HOSC time stamp column (B). Hold down the left mouse button and dragging the mouse down and right. Don't worry about selecting data you don't want included in your plot, you can delete this data later in the plot definition process (see Figure 4-3 Selecting data to plot).

2. Once you have the data you want to plot selected, click on the plot tool icon (from the icons located under the menu bar). Move the cursor into the body of your spreadsheet. Your cursor should change shape to

indicate that you are initiating a plot (chart cursor). Hold down the left mouse button and draw a box to indicate the size and location of your plot. Once you release your left mouse button, a dialog box entitled **Chart - Step by Step: Step 1 of 5** will be invoked. This dialog box is the first of 5 in step-by-step charting. Verify that the data you highlighted is reflected in the text entry field, then click on **Next >**.

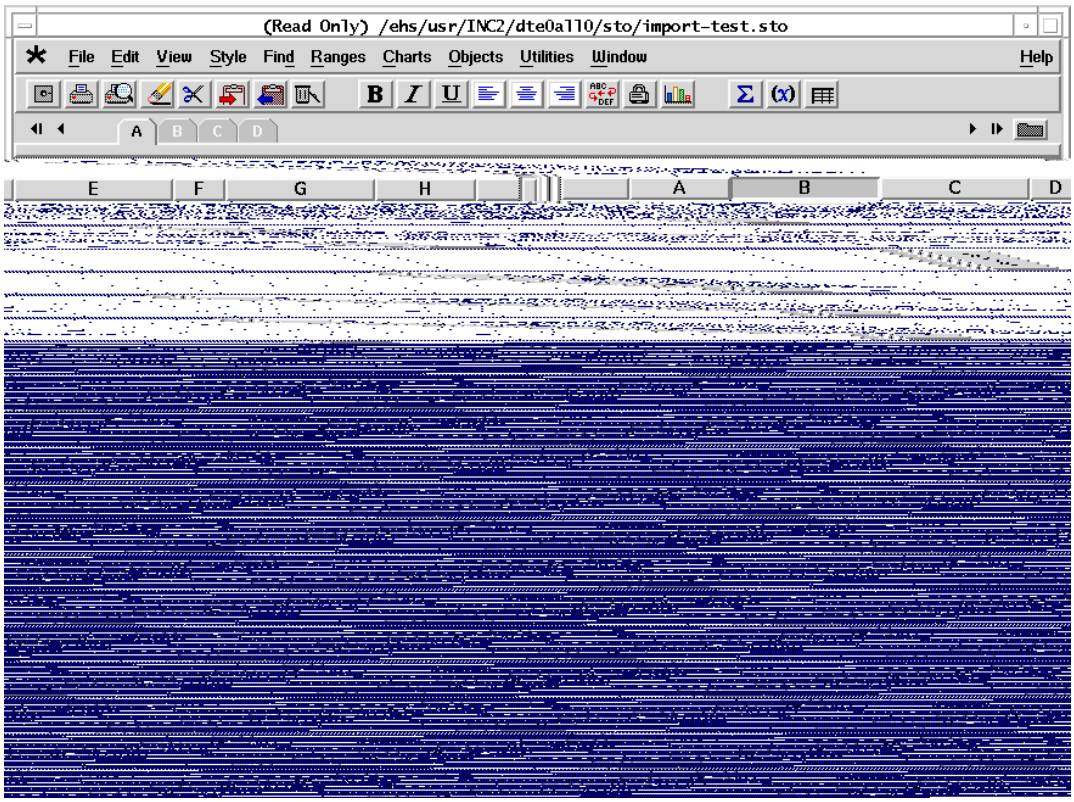


Figure 4-3. Selecting data to plot

3. On the **Chart - Step by Step: Step 2 of 5** dialog box you must identify the type of plot you'd like to create. Time plots require that you select the XY plot type (see Figure 4-4 Chart - Step by Step: Step 2 of 5 dialog box). The XY plot is the 3rd from the left in the second row. Click on **Next >**.

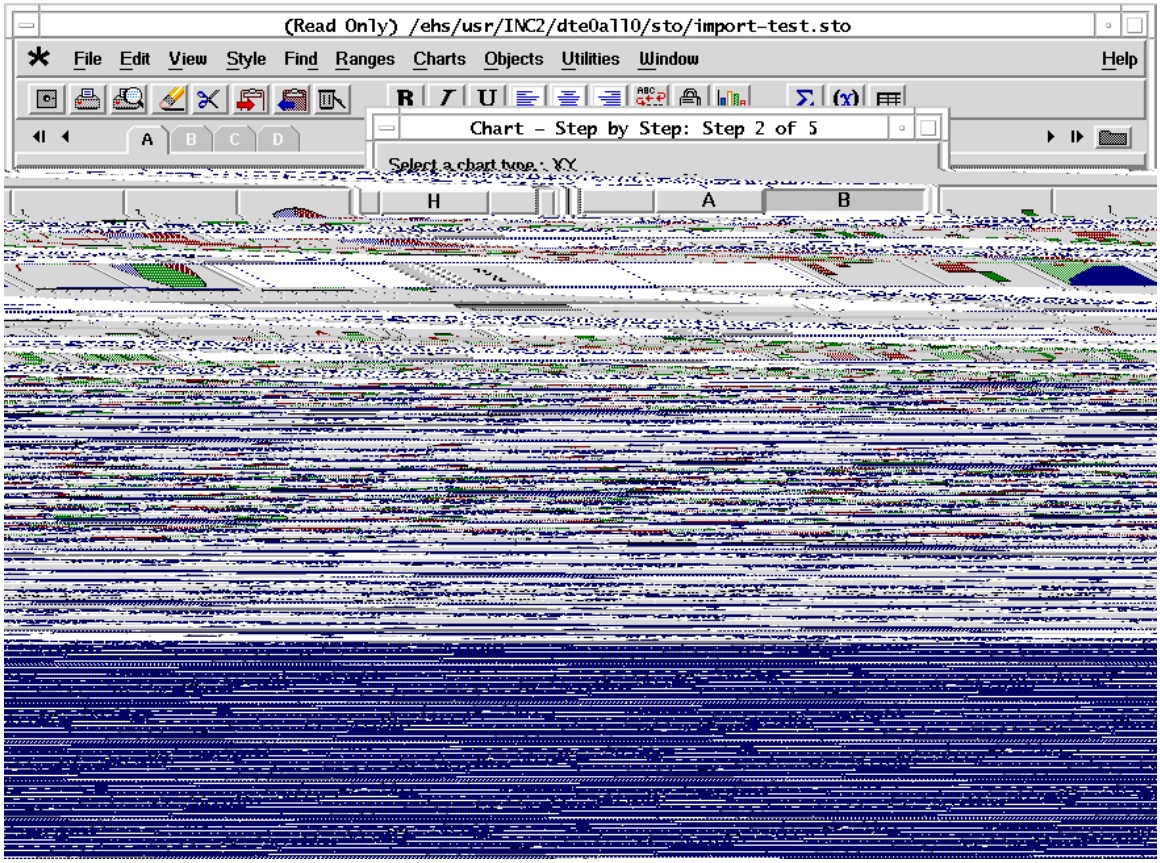


Figure 4-4. Chart - Step by Step: Step 2 of 5 dialog box

4. On the **Chart - Step by Step: Step 3 of 5** dialog box you select how you'd like the data represented (i.e., with individual data points, with just a line, with a background grid, etc.). If you've elected to plot numerous datapoints, it is more efficient to select one of the line options rather than an option which includes individual datapoints. Click on **Next >**.

5. On the **Chart - Step by Step: Step 4 of 5** dialog box, the system will begin plotting a thumbnail representation of your plot as currently defined (see Figure 4-5 Chart - Step by Step: Step 4 of 5 dialog box). If you elected to include the first row in your plot, you'll have to click on the **Column** radio button within the **Data Source Order** frame and then you must select the **Use First Row for Legend Text** toggle button. Click on **Next >**.

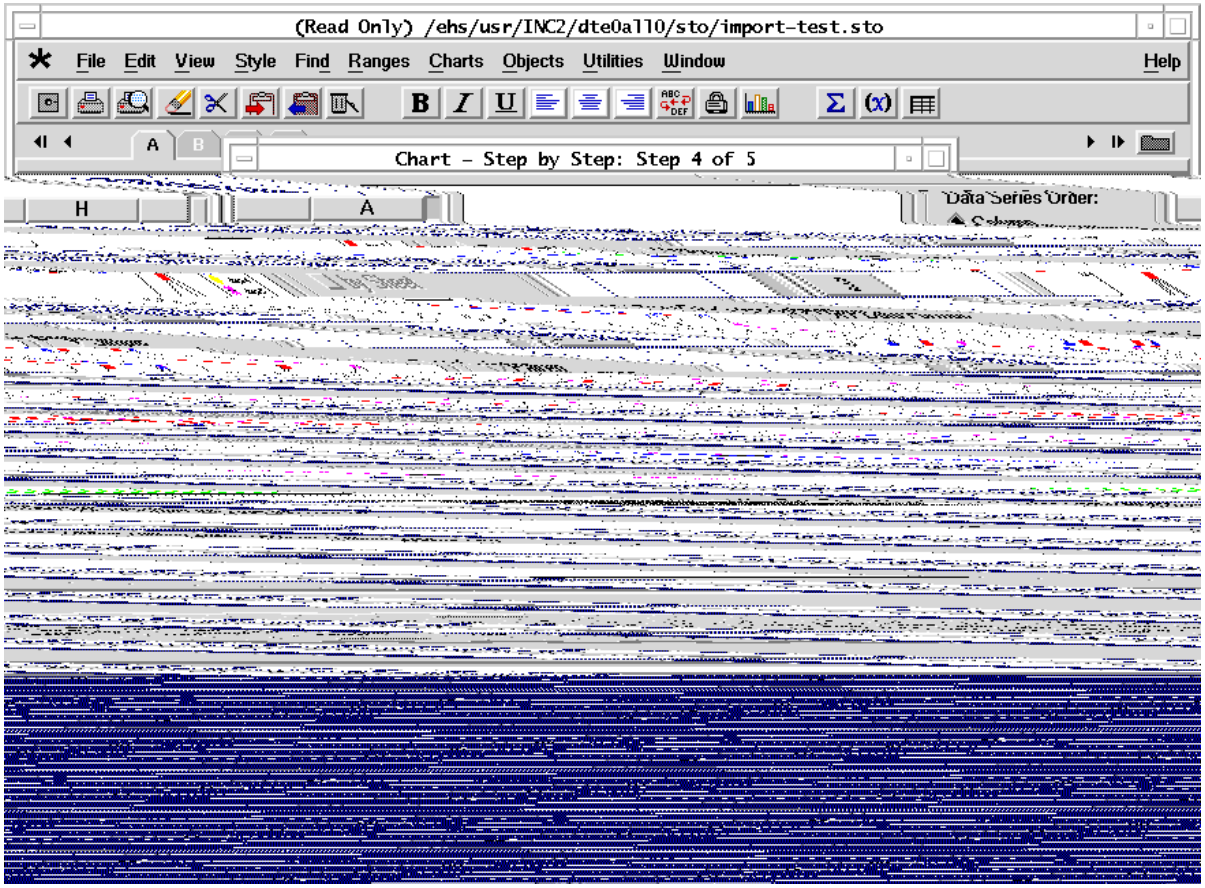


Figure 4-5. Chart - Step by Step: Step 4 of 5

6. The **Chart - Step by Step: Step 5 of 5** dialog box allows you to enter plot and axes titles. A seperate drawing package is also available for you to enter this information later. Click on **OK** and the thumbnail chart will be placed in the defined area of your spreadsheet.

7. In the current version of the Applix chart tool times displayed overlap, thus making them illegible. To fix this, go to the **Chart** menu, select the **Format** cascade menu and select **Axes...** to invoke the **Axes of Chart** dialog box (see Figure 4-6 Axes of Chart Tick Marks dialog box). Within the **Tick Count:** frame, reduce the number in the **Major:** and **Minor:** text entry fields and click on **OK**.

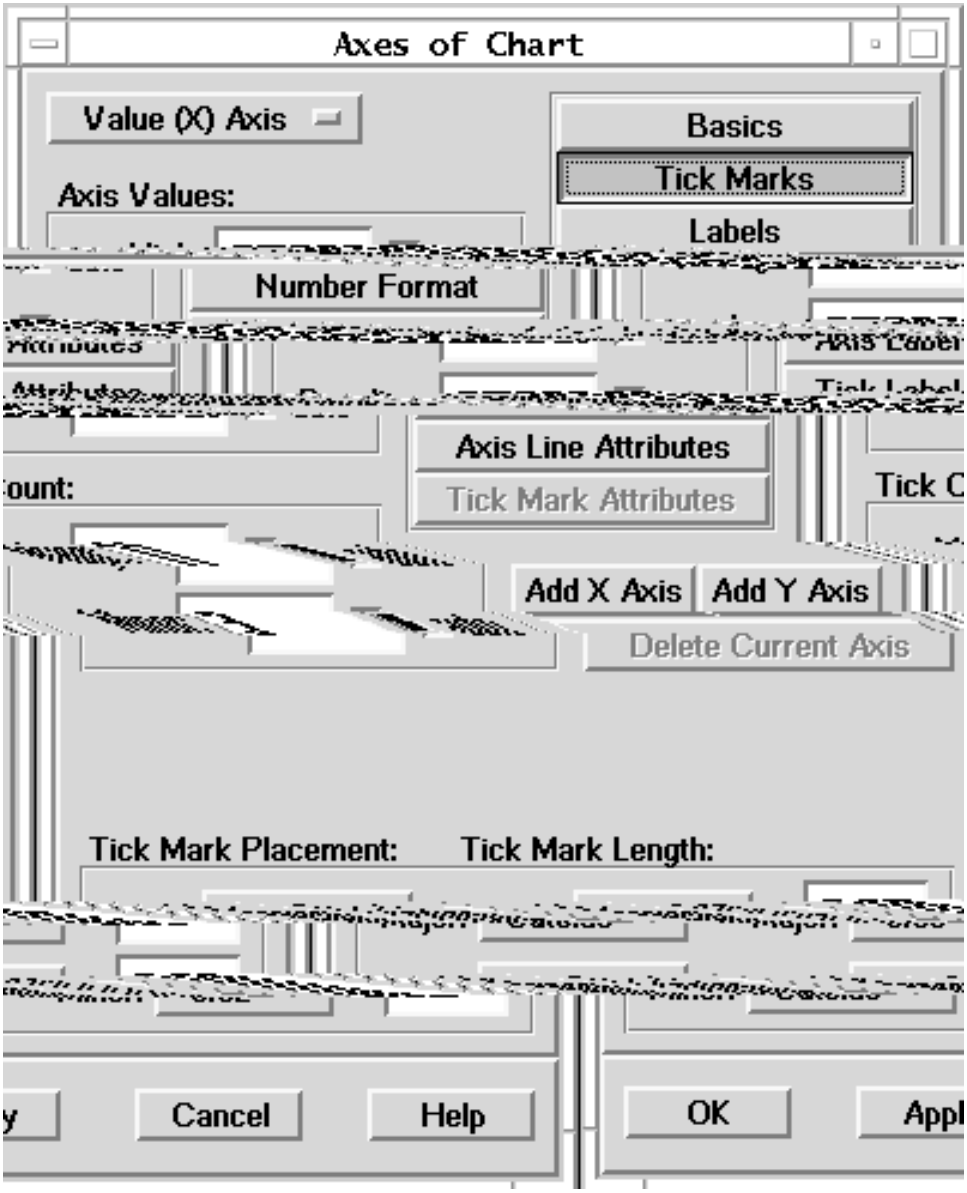


Figure 4-6. Axes of Chart Dialog Box

8. To enter MSID labels into the chart legend go to the **Chart** menu, select the **Format** cascade menu and select **Data Groups...** to invoke the **Data Groups** dialog box (see Figure 4-7 Data Groups of Chart dialog box). Within the **Data Groups:** frame there is a scrolling list identifying data 1, data 2, etc. By default, data 1 is initially highlighted. In the **Data Ranges:** frame the text fields show the range of X values that are being plotted against the range of Y values. The Y values correlate to the columns on your spreadsheet. Look at your spreadsheet and identify which columns you want included on your plot. Go to the **Data Groups:** frame and click on **Delete** to eliminate those columns (data groups) you

don't want to plot (this will also eliminate their entries from the legend). Note that text won't plot, but are still carried on the legend. Delete columns containing text (this includes all status character columns which are even numbered data groups).

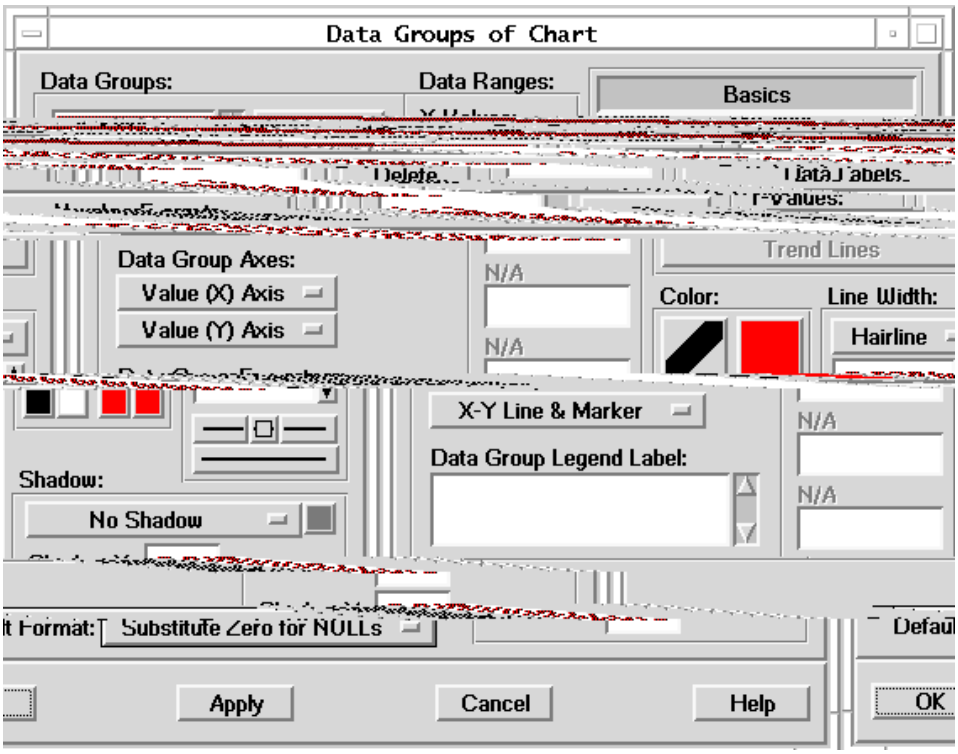


Figure 4-7. Data Groups of Chart Dialog Box

9. To enter MSID labels which will appear within your legend, select the first remaining data group and look at the **Y-Values** text field to determine the column being plotted. Enter this column number followed by a **1** in the **Data Group Legend Label:** text field. This will pull the MSID label from row 1 of the output file. Continue this same process until all data groups have been given a legend label. Click **OK**.

10. To enter additional text information and to print a chart, double click on the chart within the spreadsheet. The chart will be invoked within a drawing package and the area it once occupied on the spreadsheet will become shadowed (see Figure 4-8 Plot within the Chart drawing package). Use the tools within this application to add text to your plot.

Figure 4-8. Plot within the Chart drawing package

11. To size your plot so that it fits on a landscaped page, go to the **Utilities** menu, select **Page Setup...** and click on the **Landscape** radiobutton. You can resize your plot by first selecting the plot (indicated by handles at the corners) and then clicking and dragging one of the corner handls so that the plot fits on the landscape page. To print the plot, select **Print...** from the **File** menu. When you are through making modifications to the plot, you can exit the drawing package by selecting **Exit** from the **File** menu. You will be given the opportunity to save the changes you made to the plot within the drawing package and control will be retuned to the spreadsheet application. The plot will once again become part of the spreadsheet. When you exit the spreadsheet application, you'll be given an opportunity to save or discard your changes to the NRT output file. If your work, the file will be stored as an Applix spreadsheet and will have a **.as** file extension.

Additional Exercise

Now go through the process of creating a line chart for your second NRT List Request output file. Use a line chart format which allows you to see the specific points being plotted. Notice how the lines on the plot span those times

which have no data. Save your Applix spreadsheet. Store it to the UDE Database and mark the file as shareable.

Summary

The Applixware spreadsheet software provides the means for you to view and plot NRT List Request and NRT Snapshot output files. Once imported, Applix files and their charts can be printed and treated like other User-generated Data Elements (UDEs). They can be stored in the UDE database and marked as shareable, for use by others.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. What is the import format for NRT List Request output files being brought into an Applixware spreadsheet?

2. How do you keep empty columns from being included in your chart's legend?

3. How do you add informational (additional) text to a chart?

4. What application do you use to move a file to the UDE database?

Answers

1. ASCII grid

2. Go to the Applix spreadsheet **Chart** menu item and click on **Format**. Select **Data Groups** from the list and then edit each data group to ensure that the information you are interested in is plotted.

3. Double-click on the chart within the spreadsheet. The chart will become gray and will be opened within the Applixware drawing package for additional modifications.

4. **Store UDE** under the Launchpad's **File** menu.

Module 5
NRT Data Capture Requests

Objectives

The NRT Data Capture Request application provides you with the means to create an output file containing binary data logged for all MSIDs over a specified time period. In this module you will learn how to:

- create an NRT Data Capture Request.
- validate and submit an NRT Data Capture Request to the Telemetry Server.
- transfer the NRT Data Capture output file to a computer system outside the HOSC.

Exercises

Instructions

The following "Try It" directs you through the process of defining, validating, and submitting an NRT Data Capture Request. Carefully read and complete each step.

Scenario

There was an experiment event earlier in the day. The data from this experiment was recorded and stored on the NRT Data Log. You have software available on a computer system at your office that you'd like to use to analyze this data. In order to acquire this data you must create and submit an NRT Data Capture Request and then, once the output file is created, transfer this file to the remote system.

Try It - Creating an NRT Snapshot Request

1. Click the Operation menu on the **Launchpad** and select the **NRT Data Requests** cascade menu. From the cascade, select **NRT Data Capture Request**.

2. In the **Name Information** frame on the **NRT Data Capture Request** main window, there are two text entry fields. In the **Request Name:** field, enter a unique filename. Your keystrokes are automatically reflected in the **Output Filename:** field.

3. In the **Time Information** frame, set the **Time Source:** to **HOSC Receipt Time** and the **Time Reference:** to **GMT**.

4. In the **Time:** entry area, enter a start and stop time in GMT (DDD:HH:MM:SS). Use the times provided on your project-specific worksheet.

5. Invoke the **Show NRT Directory** dialog box and identify the data mode, protocol, and APID for the time segment provided. Enter this information in the **Data Source Information** frame and in the **Data Mode Information** frame.

6. Click Validate... . The **Validate** dialog box will be invoked.

7. On the **Validate** dialog box, click Validate . If you followed the steps accurately, your NRT Data Capture Request should validate without errors. The successful validation message will be displayed in the main window's message area. Once the request has validated, close the **Validate** dialog box by clicking Close .

8. On the **NRT Data Capture Request** main window, click on Submit .

9. Once the data capture output file has been created, click on the **Utilities** menu item on the Launchpad, then click on **File Transfer**.

10. When the **File Transfer** main window is invoked, click on File Type: and from the **Files:** list, select the data capture output file you just created.

11. Click on System: and select the appropriate system and directory where the files are to be transferred.

Currently, this service is not available. Once established, this file transfer utility will allow you to log into the remote system and set appropriate transfer options. Once these options have been defined, you click on **Send** under the **File** menu item. This sends files from the selected local directory to the selected directory on the remote system. The remote system acts as a drop-box. You must have an account on this remote system and once you've sent the file it is available for you to retrieve when you return to your office.

Summary

The NRT Data Capture Request application provides for the creation of a binary output file containing data for all parameters (MSIDs) over a specified period of time. Once you've created an NRT Data Capture Request, validated it and submitted it to the server, an output file is created. This output file can then be transferred to systems outside the HOSC by using the File Transfer application.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. (True or False) Once you create an NRT Data Capture output file, you can plot the data using the Applix spreadsheet software.

2. (True or False) Once you create an NRT Data Capture output file, you can transfer this output file directly to the PC in your office.

3. (True or False) In regard to identifying the data source for an NRT Data Capture application, it is the same as that used in the NRT Snapshot Request.

4. (True or False) Once you submit an NRT Data Capture request, you must wait for it to be processed before you can submit another request. The status of the current request is shown on the **Control** dialog box.

Answers

1. False. NRT Data Capture output files are not intended to be viewed and/or modified using any EHS application.

2. False. Once an NRT Data Capture output file is created, it can be transferred to an intermediate system that serves as a “drop-box”. Once you return to your office, you can log onto the intermediate system and retrieve (ftp) the file.

3. True. You must identify the protocol and the APID in which you are interested.

4. False. Once you submit an NRT Data Capture Request, you can continue to use your system to receive real-time data, to initiate any of the other EHS applications, and to create another NRT Request. As additional requests are submitted to the server, their status will all be shown on the **Control** dialog box.

Module 6
NRT Playbacks

Objectives

The NRT Playback application provides you with the means to play archived data back into your system just as if it was being received in real-time. You can also elect to have the data replayed at different rates from when it was initially received. Once the playback has been requested and you've received notification that the playback will begin on a specific channel, you can set-up the other EHS applications to use the playback data as their source. In this module you will learn how to:

- initiate an NRT Playback Request.
- use the Playback Status application to view the current status of all requested NRT playbacks.

Exercises

Instructions

The following "Try It" directs you through the process of defining, validating, and submitting an NRT Playback Request. Carefully read and complete each step.

Scenario

There was an experiment event earlier in the day. The data from this experiment was recorded and stored on the NRT Data Log. You'd like to use the Display Operation application to view this data once again, just as it was originally received.

Try It - Creating a NRT Playback Request

1. Click the **Operation** menu on the **Launchpad** and select the **NRT Data Requests** cascade menu. From the cascade, select **NRT Playback Request**.

2. In the **Playback Request Information** frame on the **NRT Playback Request** main window, there are two text entry fields. In the **Request Name:** field, enter a unique filename. Select **Any** as the desired **Playback Channel:**.

3. The **Meter Rate:** is use to change the speed at which the data is played back into your system. To playback data at the same rate it was originally received, select **1X**.

4. The second text entry field in the **Playback Request Information** frame is **Delay Time (min):**. In this field, enter 2.

5. In the **Time Information** frame, set the **Time Source:** to **HOSC Receipt Time** and the **Time Reference:** to **GMT**.

6. Use the times provided on your project-specific worksheet to enter appropriate start and stop times in GMT (DDD:HH:MM:SS).

7. To complete the **Packet Identification** frame, invoke the **Show NRT Directory** dialog box and identify the protocol, APID and source data mode for the time segment provided. Enter this information in the **Packet Identification** frame.

8. Click Validate... . The **Validate** dialog box will be invoked.

9. On the **Validate** dialog box, click Validate . If you followed the steps accurately, your NRT Playback Request should validate without errors. The successful validation message will be displayed in the main window's message area. Once the request has validated, close the **Validate** dialog box by clicking Close .

10. Click on the **Utilities** menu item on the Launchpad, then click on **Playback Status**.

11. Review the status of the current playback request. When the status becomes **Active** and a playback channel has been designated, exit this application and initiate the **Display Operation** application from the Launchpad.

12. Go to the **File** menu, click on **Open** and open the display titled "nrtclass". Click on the **Define** menu and then click on **Set Data Mode and Database Version...**.

13. On the **Set Data Mode and Database Version** dialog box, change the **Data Mode** to **Playback** and identify the channel on which the playback is to be initiated. Wait for the playback to begin. At the conclusion of your playback, your display will cease.

Summary

The NRT Playback Request application provides you with a way to play logged data back into your system just as if it was being received in realtime. You can use all of the EHS applications to view this data, but the initiation of commands from a display running in playback mode is suspended. You can elect to have the data played back either faster or slower than initially received. The playback, once initiated is available for others to view.

Questions

Instructions

Indicate the answers for each question below. The correct answers are given immediately following in the **Answers** section.

1. You designate a delay time for a playback so that you can:

a. Complete the NRT Playback Request dialog box before the playback begins.

b. Set up the applications you plan on using to view the NRT playback.

c. Disable commanding applications prior to initiating the NRT playback.

d. Invoke the Playback Status application prior to the NRT playback beginning.

2. (True or False) While viewing a display using NRT playback data, the time the data was originally received will be indicated in the Display Operation status bar.

3. For what reason might you be interested in playing back data at a higher rate than originally received?

Answers

1. b. The delay time commences once you receive a playback confirmation message in the Messages: area. You estimate a delay time based on how long you think it will take you to setup Operation applications to use playback data on the designated playback channel.

2. False. The time provided in the Display Operation application status bar is the current GMT. To view the time at which the playback data was originally received, you must put a time MSID on your display.

3. If the only Operation application you want to run against the received playback data is Computation Operation and you're only interested in the final output of this computation, you may want to have the data played back faster.

Appendix A
NRT List Request Filtering Options

Filter Test Expression	Example Filter Value A	Example Filter Value B	Result
Min/Max/Avg			The minimum, maximum and average values over the entire time slice are provided
Mean/Var/StdDev			The mean (average), variance, and standard deviation of all values over the requested time slice are provided.
< A	30		Only values less than 30 will be written to the output file
> A	60		Only values greater than 60 will be written to the output file
<= A	90		Only values that are less than or equal to 90 will be written to the output file
>= A	120		Only values that are greater than or equal to 120 will be written to the output file
= A	150		Only those values that are 150 will be written to the output file
<> A	190		Only those values that are not equal to 190 will be written to the output file
Delta A	5		Only values that represent a change of at least 5 from the previously received value will be written to the output file
Compressed Only			Only values that represent a change from the previously received value will be written to the output file
> A AND < B	10	20	Only values that are greater than 10 AND less than 20 will be written to the output file. For example a value of "5" WOULD NOT be written to the output file.

Filter Test Expression	Example Filter Value A	Example Filter Value B	Result
< A OR > B	10	20	Only values that are less than 10 OR greater than 20 will be written to the output file. For example, a value of "5" WOULD be written to the output file.
Compressed, < A	10		Only values differ from the previously received value and that are less than 10 will be sent to the output file.
Compressed, > A	10		Only values that differ from the previously received value and that are greater than 10 will be sent to the output file.
Compressed, <= A	10		Only values that differ from the previously received value and that are less than or equal to 10 will be sent to the output file.
Compressed, >= A	10		Only values that differ from the previously received value and that are greater than or equal to 10 will be sent to the output file.
Compressed, = A	10		Only values that differ from the previously received value and that equal 10 will be sent to the output file.
Compressed, <> A	10		Only values that differ from the previously received value and that are not equal to 10 will be sent to the output file..
Compressed, Delta A	5		Only values that differ from the previously received value by 5 will be sent to the output file.
Compressed, > A AND < B	5	8	Only values that differ from the previously received value and that are greater than 5 AND less than 8 will be entered into the output file.
Compressed, < A OR > B	10	20	Only values that differ from the previously received value and that are less than 10 OR greater than 20 will be entered into the output file.

Appendix B
Valid Entries for Each Native Data Type

When creating NRT List Requests and NRT Snapshot Requests the output generated for each MSID depends on how the MSID is defined within the Telemetry Database. The native data types supported within the EHS are:

- SASC - ASCII Character String
- SASCB - ASCII Character String
- SEBC - EBCDIC Character String
- SUND - Undefined Byte String
- IDIS - Discrete Integer
- IMAG - Signed Magnitude Integer
- IUND - Undefined Integer
- IUNS - Unsigned Integer
- ITWO - Two's Complement Integer
- ITWOW - Two's Complement Word Swapped
- FEEE - IEEE Floating Point
- FIBM - IBM Floating Point
- FMIL - Military Floating Point
- FNTL - Intel Floating Point
- FSPL - Spacelab Floating Point
- FVAX - VAX Floating Ppoint
- TDMS - SSP Data Management System Time
- TECI - ECIO GMT
- TECS - ECOS Binary GMT
- TEHS - EHS Time Word
- TERT - Earth Receive Time
- TGMT - GMT
- TGPC - Orbiter GPC GMT
- TIUS - IUS Floating Point Time
- TOOI - Orbiter OI GMT and MET
- TTSM - Time Since Midnight
- TTWO - Count Time

Note: To identify the native data type for individual MSIDs initiate the Telemetry Database application's MSID Detail Form.

Unprocessed Data

If you elect, under the data processing options within the NRT List Request or NRT Snapshot Request applications, to use **Unprocessed** data,

the only valid data representations are binary/integer, hexadecimal/integer, or octal/integer. Hexadecimal is the default data representation. Unprocessed data cannot be limit sensed. Within the NRT List Request application the filtering options available for **Unprocessed** data are:

- None
- < A
- > A
- <= A
- >= A
- = A
- <> A
- AND (when included with any of the above relational operators)
- OR (when included with any of the above relational operators)
- Compressed (when included with any of the above relational operators)

Note: If you attempt to implement an unsupported filter option (in this case, Delta for example, is unsupported), you will get a validation error. You cannot submit a request until all validation errors have been corrected.

Converted Data

If you elect, under the data processing options within the NRT List Request or NRT Snapshot Request application, to use **Converted** data, the native data types will be converted as shown in Table F-1. Valid LES sensing and NRT List Request filter options are also shown in this table.

Note: If you execute a relational filter on a Null Terminated ASCII String, the filter will execute using the character's numeric value as found in a standard ASCII table. Essentially that means that it will filter alphabetically except that all capital letters come before lower case letters. For example, "ON" comes before and therefore is less than "on", and "On".

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
SASC - ASCII Character String	Null Terminated ASCII String	ASCII	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
SASCB - ASCII Character String	Null Terminated ASCII String	ASCII	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
SEBC - EBCDIC Charac-ter String	Null Terminated ASCII String	ASCII	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
SUND - Undefined Byte String	Cannot be converted	Not Applicable	N/A	Not Applicable

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
IDIS - Discrete Integer	Unsigned Integer	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	None < A > A <= A >= A = A <> A AND OR Compressed (all) Delta (all)
IMAG - Signed Magnitude Integer	Two's Complement Integer	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	None < A > A <= A >= A = A <> A AND OR Compressed (all) Delta (all)
IUND - Undefined Integer	Cannot be converted	Not Applicable	N/A	Not Applicable
IUNS - Unsigned Integer	Unsigned Integer	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
ITWO - Two's Complement Integer	Two's Complement Integer	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
ITWOW - Two's Complement Word Swapped	Two's Complement Integer	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FEEE - IEEE Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FIBM - IBM Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FNTL - Intel Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FSPL - Spacelab Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
FVAX - VAX Floating Ppoint	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters
TDMS - SSP Data Man-agement System Time	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TECI - ECIO GMT	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
TECS - ECOS Binary GMT	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TEHS - EHS Time Word	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TERT - Earth Receive Time	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
TGMT - GMT	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TGPC - Orbiter GPC GMT	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TIUS - IUS Floating Point Time	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)

Table F-1 Converted Data Representation Options for Each Data Type

If the Native Data Type is...	The Converted Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
TOOI - Orbiter OI GMT and MET	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TTSM - Time Since Mid-night	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)
TTWO - Count Time	EHS Time Structure	ddd:hh:mm:ss ddd:hh:mm:ss:ss ddd:hh:mm:ss:ss:sss	No	None < A > A <= A >= A = A <> A AND OR Compressed (all)

Calibrated Data

If you elect, under the data processing options within the NRT List Request or NRT Snapshot Request applications, to use **Calibrated** data, the native data types will be calibrated using a polynomial equation, point pair interpolation, or state code conversion depending on how each parameter is defined in the telemetry database.

Calibrated data is not available for native data types that are of an ASCII or time format (therefore no filters are available for these data types either). The following table identifies for each remaining native data type the calibrated output data type, the valid data representations, whether LES sensing is permitted and the valid NRT List Request filters.

Table F-2 Calibrated Data Representation Options for Each Data Type

If the Native Data Type is...	the Calibrated Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
IDIS - Discrete Integer	Null Terminated ASCII String	ASCII	Yes	None < A > A <= A >= A = A <> A AND OR Compressed (all)
IMAG - Signed Magnitude Integer	IEEE Floating Point	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters
IUND - Undefined Integer	Cannot be Calibrated	None	No	None

Table F-2 Calibrated Data Representation Options for Each Data Type

If the Native Data Type is...	the Calibrated Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
IUNS - Unsigned Integer	IEEE Floating Point	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
ITWO - Two's Complement Integer	IEEE Floating Point	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
ITWOW - Two's Complement Word Swapped	IEEE Floating Point	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FEEE - IEEE Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FIBM - IBM Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters
FMIL - Military Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scientific Notation	Yes	All Filters

Table F-2 Calibrated Data Representation Options for Each Data Type

If the Native Data Type is...	the Calibrated Data Type is...	the valid Data Representations are ...	LES Sensing Allowed ?	and the Valid Filters are...
FNTL - Intel Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters
FSPL - Spacelab Floating Point	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters
FVAX - VAX Floating Ppoint	IEEE Floating Poing	Decimal/Integer Decimal/Real Decimal/Scien-tific Notation	Yes	All Filters

Appendix C
Protocol and Data Mode Descriptions

Protocol Descriptions:

Protocol	Description	Project
PDSS	Spacestation data processed as Consultative Committee for Space Data Systems (CCSDS) Packets is comprised of a 6-octet, CCSDS-defined primary header followed by an optional secondary header and source data which together may not exceed 65,535 octets. There are four types of PDSS protocols: Core, Payload, BPDU, and UDSM.	Spacestation
■ PDSS Core	Contains vehicle health, status, and housekeeping data downlinked from the ISS and made available through PDSS.	Spacestation
■ PDSS Payload	Contains payload data downlinked from the ISS and made available through PDSS.	Spacestation
■ PDSS BPDU	A protocol data unit of the bitstream function having a format of a header followed by a fixed length block of contiguous bitstream data.	Spacestation
■ PDSS UDSM	A Data Quality packet. Information contained in the packet includes: the start/stop time of the UDSM report period, the number of unplanned LOS occurrences, the number of BPDUs or packets per DSID received, the number of VCDU sequence counter errors, and the number of packet sequence counter errors per DSID.	Spacestation
TDM	Time Division Multiplexed	Shuttle and Spacelab

Protocol	Description	Project
NASCOM	NASA Communication System 4800-bit block	Other NASA Centers
PSEUDO	Data generated by a user-generated computation or script	All
HDRS-DQ	High Data Rate System Data Quality	Spacelab
GSE	Ground Support Equipment Packets produced by the GSE packets application	Spacestation and Spacelab
TIME	Time data from the HOSC Time Distribution System	All

Data Mode Descriptions:

There are three possible processing services within the POIC: PDSS, EHS FEP, and the EHS ZOE Dump Process. The table below shows the data mode assigned by these three processing services ("Types" of data). The resulting, or final data mode in which EHS system expects to receive the packets is shown in the far right column (Data Mode Processed by TNS). Playbacks from NRT and PDSS archives are considered internal to the POIC and are not shown in the table. Internal Playbacks use Playback Channels 7-11 and are allocated at the time of the playback request.

Data Modes R/T, Dump 1-3, and PB Channels 1-6, routing definitions are considered static in that the destination addresses are set up at the start of the MOP and not when a playback begins. Playback Channels 7-11 (Playbacks from Archives) routing definitions are considered dynamic in that the destination addresses are set up when the playback starts. Dynamic routing address are programmatically created and are not modifiable by the IST. Playback Channels 1-6 have been chosen to be static because the routing for the data played back from the ground recorders is defined at the same time and in the same manner as the Real-time and Dump data.

"Type" of Data	Data Mode out of PDSS	Data Mode out of FEP	Data Mode out of ZOE Dump Process	Data Mode Processed by TNS
KuBand P/L R/T,	R/T **(R/T)**			R/T
SBand Core R/T	R/T **(R/T)**			R/T
OD OIU Core R/T		R/T **(R/T)**		R/T
OD MPLM TDM R/T		R/T **(R/T)**		R/T
SBand ZOE Dump R/T	R/T **(R/T)**		S-Dump **(Dump 1)**	Dump 1
Ku Band P/L Dump	Ku-Dump-COR **(Dump 2)**			Dump 2

Ku Band Core Dump	Ku-Dump-ZOE **(Dump 3)**			Dump 3
OD OUI Core out of LOR		OD Dump **(PB CH 1)**		PB CH 1
OD MPLM TDM out of LOR		OD Dump **(PB CH 1)**		PB CH 1
KuBand P/L R/T out of LOR	LOR R/T **(PB CH 3)**			PB CH 3
SBand Core R/T out of LOR	LOR R/T **(PB CH 4)**			PB CH 4
SBand ZOE Dump out of LOR	LOR R/T **(PB CH 4)**		LOR-S-Dump **(PB CH 2)**	PB CH 2
KuBand P/L Dump out of LOR	LOR Ku-Dump-COR **(PB CH 5)**			PB CH 5
KuBand Core Dump out of LOR	LOR-Ku-Dump-ZOE **(PB CH 6)**			PB CH 6

Appendix D
Status Characters

NRT output files can only accommodate a single status character for each returned MSID data value. This appendix identifies those status characters that can be included in an NRT output file. Since only one status character can be returned for each data value, a precedence column is included in the table (Pre) which specifies the order of precedence (1 is the highest).

Status Character	Pre	Definition
c	13	Decom/Conv/Cal Status-Calibration Error
C	14	Decom/Conv/Cal Status-Conversion Error
d	16	Limits Not Defined in the Local Table
D	15	Decom/Conv/Cal Status-Decom Error
E	22	LES Status-Out of Expected State
f	10	Data Quality-DQ Failed (No data returned-old data is used)
F	9	Data Quality-DQ Failed with/Override (New data is used-bad data)
H	18	LES Status-Warning High
l	17	LES Status-LES error
L	21	LES Status-Warning low
n	1	Packet not Located (in time slice or stream)
P	4	Telemetry Processing Discrepancies
Q	11	Major Frame Format ID Error
R	2	Source Status-Source Initialized/Unavailable
S	6	Data Condition-Old/Stale Data
x	8	Data Quality-Data is Suspect (No data returned-old data is used)
v	20	LES Status-Caution Low
~	5	Data Quality-No Data (No data returned-old data used)
^	19	LES Status-Caution High
&	3	Calibration Sets Undefined

Status Character	Pre	Definition
?	7	Data Quality-DQ Suspect w/Override (New data is used-suspect data)
‘’ (space)		Source Status-Acquisition of Signal (Parameter is okay-new data is returned)

Appendix E
Abbreviations and Acronym List

A

A/G	Air-to-Ground
A/M	Automatic/Manual
ADQ	Average Data Quality
AIS	Automated Information Security
ANSI	American National Standards Institute
AOS	Acquisition of Signal
API	Application Programming Interface
APID	Application Process Identifier
	Application Process Interface Definition
APT	Active Process Table
AR	Action Request
ASCII	American Standard Code for Information Interchange
AST	Active Server Table
ATT	Attitude

B

BFS	Backup Flight System
BG	Bit-contiguous Group
BPDU	Bitstream Protocol Data Unit

C

C	Counter-dependent
C	C Programming Language
CADU	Channel Access Data Unit
CAP	Command Acceptance Pattern
CAR	Command Acceptance Response
CCBD	Configuration Control Board Directive
CCP	Central Command Processor
CCSDS	Consultative Committee for Space Data Systems
CDB	Command Database
CDD	Command Data Definition
CDQ	Current Data Quality
CLI	Command Line Interface
CM	Configuration Management
CMATS	Configuration Management Asset Tracking System
CMD	Command
CNT	Countdown Time
COTS	Commercial-Off-The-Shelf
CPU	Central Processing Unit
CRC	Circular Redundancy Check
CRR	Command Reaction Response
CSCI	Computer Software Configuration Item
CSM	Command System Management

CSS	Command System Services
CSS	Coarse Sun Sensor
CUI	Common User Interface

D

DADS	Data Acquisition and Distribution Services
DARL	Database Access Routine Library
DB	Database
DBA	Database Administrator
DBCG	Database Coordination Group
DBCR	Database Change Request
DBD	Database Developer
DCM	Document Configuration Management
DCR	Database Change Request
DCRG	Distributed Control Room Graphics
DDQ	Data Data Quality
DDS	Data Distribution System
DEMOS	Distributed Earth Model Orbiter Simulation
DG	Display Generation
DMC	Database Monitor and Control
DMC	Data Management Checklist
DO	Display Operation
DOSH	Database Operational Support History
DP	Distribute Packet

DPU	Data Processing Unit
DQ	Data Quality
DSID	Data Stream Identifier
DSN	Deep Space Network

E

EC	Experiment Computer
ECR	Engineering Change Request
EGSE	Experiment Ground Support Equipment
EHS	Enhanced HOSC System
ELF	Extremely Low Frequency
EM	Exception Monitor
EML	Extract MSID Library
ES	Expected State

F

FDDI	Fiber Distributed Data Interface
FEP	Front-End Processor
FEPSC	Front-End Processor Status and Control
FIFO	First-In-First-Out
FPTNM	Foot-Pounds to Newton-Meters
FSS	Fine Sun Sensor
FSV	Flight System Verifier
FTAM	File Transfer Access and Management

FTP	File Transfer Protocol

G

GB	Gigabyte
GCID	Ground Correlation Identification
GMT	Greenwich Mean Time
GPC	General Purpose Computer
GPS	Global Positioning System
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface

H

H/W	Hardware
HAMASE	HOSC Automated Model and Screen Editor
HAPS	HOSC Advance Planning System
HASA	HOSC Administrative Software Account
HASS	HOSC Activity Scheduling System
HCR	HOSC Change Request
HLOG	HOSC Automated Logging System
HOSC	Huntsville Operations Support Center
HPR	HOSC Problem Report
HSR	HOSC Support Request
HTT	HOSC Training Team

HUA	HOSC User Assistance
HViDS	HOSC Video Distribution System
HVoDS	HOSC Voice Distribution System

I

I/O	Input/Output
ICD	Interface Control Document
ID	Identification
IDD	Interface Description Document
IDQ	Instantaneous Data Quality
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
ISS	International Space Station
IST	Integrated Support Team

J

JSC	Johnson Space Center

K

kbps	kilobits per second
KMRTS	Kennedy Marshall Redundant Transmission System
KSC	Kennedy Space Center

L

LAN	Local Area Network
LDP	Logical Destination Processor
LES	Limit/Expected State Sensing
LOS	Loss of Signal
LOV	List of Values
LPS	Launch Processing System
LTG	Local Table Generation
LTO	Local Table Operation

M

M	Multi-syllable
MB	Megabyte
MCC	Mission Control Center
MCCU	Mission Control Center Upgrade
MDM	Multiplexer/Demultiplexer
MET	Mission Elapsed Time
MF	Maintenance Fixtures
MH	Message Handler
MOC	Mission Operations Computer
MOL	Mission Operations Laboratory
MOP	Mission, Operational Support Mode, and Project
MSFC	Marshall Space Flight Center
MSID	Measurement/Stimulus Identifier
MSL	Microgravity Science Laboratory

MTBF	Mean Time Between Failure
MUPS	Momentum Unloading Propulsion System

N

N	Normal
NASA	National Aeronautics and Space Administration
NASCOM	NASA Communications
NASDA	National Space Development Agency (Japan)
NCC	Network Control Center
NDE	Non-operational Development Environment
NDL	NRT Data Log
NDL	Near Real-Time Data Logger
NEMS	NASA Equipment Management System
NG	Bit Non-contiguous Group
NGT	NASA Ground Terminal
NRT	Near Real-Time
NSOC	NASDA Space Operations Center
NSTS	National Space Transportation System
NTP	Network Time Protocol

O

OCC	Operations Control Center
OCDB	Operational Command Database
OCR	Operations Change Request

OD	Operational Downlink
OI	Operational Instrumentation
OS	Operating System
OSF	Open Software Foundation
OTE	Operational Test Equipment

P

PAP	Payload Activity Plan
PB	Playback
PC	Polynomial Coefficient
PC	Personal Computer
PCAD	Pointing Control and Aspect Determination
PCDB	Project Command Database
PCM	PIMS Configuration Management
PDI	Payload Data Interleaver
PDRF	Playback Data Request Form
PDSS	Payload Data System Services
PFS	Primary Flight System
PI	Principal Investigator
PID	Process Identifier
PIMS	Payload Information Management System
POCC	Payload Operations Control Center
POD	Payload Operations Director
POIC	Payload Operations Integration Center

PP	Point Pair
PPS	Payload Planning System
PRT	Packet Routing Table
psi	pounds per square inch
PTC	Payload Training Complex
PTDB	Project Telelemetry Database

R

R	Range-dependent
RAM	Random Access Memory
RCS	Reaction Control System
RDBMS	Relational Database Management System
RDRP	Raw Data Record Playback
RID	Review Item Discrepancy
RPM	Rounds per Minute
RR	Replanning Request
RSS	Resident Size
RT	Real-time
RTAS	Radians to Arcsecs
RTD	Radians to Degrees
RTDS	Real-time Data System
RTS	Requirements Tracking System
RUM	Remote User Machine
RW	Reaction Wheel

S

S	Super
S&E	Science and Engineering
SC	State Code
SC	Subsystem Computer
SCM	Status and Configuration Manager
SCR	Strip Chart Recorder
SDT	Shuttle Data Tape
SGI	Silicon Graphics Indy™
SGI	Silicon Graphics Incorporated
SL	Spacelab
SM	System Monitor
SMAC	System Monitor and Control
SMCM	System Monitor and Control Configuration Manager
SN	Space Network
SNMP	Simple Network Management Protocol
SOA	Science Operations Area
SPL	Scratchpad Line
SQL	Structured Query Language
SRD	Serial Receive Device
SRS	Software Requirements Specification
SS	System Services
SSCC	Space Station Control Center

SSME	Space Shuttle Main Engine
SSUP	System Services User Profile
STS	Space Transportation System

T

T	Typical
TBD	To Be Determined
TBS	To Be Supplied
TCP/IP	Transmission Control Protocol/Internet Protocol
TDB	Telemetry Database
TDM	Time Division Multiplexer
TDRSS	Tracking and Data Relay Satellite System
TDS	Time Distribution System
TNS	Telemetry and Network Services
TNSDP	Telemetry and Network Services Distribute Packet
TTY	Teletype

U

UDE	User-generated Data Element
UDSM	User Data Summary Message
UFT	Unrestricted File Transfer
UGSE	User Ground Support Equipment
UI	User Interface
UPAR	User Profile Access Routine

UPD	User Performance Data

V

VC	Virtual Channel
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identifier
VMS	Virtual Memory System
VV	Verification and Validation

W

WCP	Workstation Command Processor
WEX	Workstation Executive
WSGT	White Sands Ground Terminal

Appendix F
Glossary

Accelerator	A sequence of keys that provides immediate access to application functions. For example, Ctrl + N to invoke the **New** menu item.
Activation Type	Method used within local table application to activate a group. The defined methods are Time and Control.
Active Window	The workstation window that has input focus and in which keyboard entries impact and may appear. See "Input Focus."
Analog	A mechanism in which data is represented by continuously variable physical quantities.
Application Main Window	The primary window of a software application.
Application Process Identifier (APID)	The APID is an 11-bit field that is included in Consultative Committee for Space Data Systems (CCSDS) headers. It uniquely identifies the vehicle that created the source packet.
Application Title Bar	The bar at the top of a main window that consists of the window menu button, the title area, and the minimize and maximize buttons.
Apply Pushbutton	A pushbutton that implements any changes made within its dialog box, but leaves the dialog box on the screen so that additional changes can be made. See "OK Pushbutton."
Approve	In PIMS, this action is taken by a reviewer to signify his approval that a document, change request or data request be placed in the baselined state.
Archived Database	A telemetry database that no longer reflects the current real-time telemetry characteristic information. Only one archive database is available online at a time.
Attributes Defaults Bar	The area below the menu bar on the main window where application **Text:**, **Line:**, and **Fill:** default attributes are set.
Avtec™	A manufacturer of telemetry transmit and receive devices used in the Huntsville Operations Support Center (HOSC) Enhanced HOSC System (EHS) as the primary telemetry processing hardware devices.
Baselined	In PIMS, the final state of the review cycle. When a document, change request or data request has been approved by all reviewers, the approver may place it in the baselined state.

Baselined Database	Database that reflects the current real-time telemetry or command characteristic information for a particular mission activity. Baselined databases have completed validation.
Bitstream Protocol Data Unit (BPDU)	A protocol data unit of the bitstream function having a format of a header followed by a fixed length block of contiguous bitstream data.
Block	NASA Communications (NASCOM) 4800-bit block format utilized for the transfer of data via the GSFC/MSFC Multiplexer/Demultiplexer (MDM) system.
Calibrated	Three types of calibration exist for telemetry samples: polynomial, point pair interpolation, and state code conversion. If calibration is requested, Telemetry and Network Services (TNS) automatically converts the unprocessed sample and then performs calibration on the sample for that Measurement/ Stimulus Identifier (MSID) as defined in the local table.
Cancel Pushbutton	A pushbutton that allows a user to exit a dialog box without implementing any changes.
Cascade Menu	A sub-menu or menu-within-a-menu that appears when you highlight a menu function that has an arrow to the right of its name. Cascade menus are used to group similar functions together beneath the pulldown menu.
Caution	A standard icon used throughout the user guide set to represent destructive actions which could result in loss of data.
Caution Limits	A range defined by a high and low value for an analog MSID in the Telemetry Database (TDB) and Local Table. A color code (yellow) represents values within those ranges in the application.
CCSDS Packet	A source packet comprised of a 6-octet, CCSDS defined primary header followed by an optional secondary header and source data which together may not exceed 65535 octets.
Channel Access Data Unit (CADU)	Protocol data unit used for transmission from the ISS to the PDSS. A CADU consists of a CVCDU that has been prefixed and delimited by a synchronization marker.
Click	The action of pressing and releasing a mouse button. Typically, this is a left mouse button action.
Coded Virtual Channel Data Unit (CVCDU)	A VCDU to which a block of error-correcting Reed Solomon (RS) check symbols has been attached.
Command System Manager	The position in charge of controlling the commanding system utilizing the Command System Managment software. For AXAF projects, this is known as the PAYCOM position.

Commercial-Off-The-Shelf (COTS) Software	Software applications that have been purchased from a commercial software vendor as opposed to those that were developed internally.
Computation	A FORTRAN or C program used to further manipulate telemetry parameters. These programs are created by the Computation Generation application and are executed in Computation Operation.
Configuration Management (CM) Tools	Institutional applications that allow users to access and perform tasks, such as tracking requirements and equipment, scheduling resources, and logging into automated problem report systems.
Control Indicator	Used to indicate that the group will be activated for limit/ expected state (LES) sensing with either the control MSID or a control MSID plus delay time.
Control Panel	The area of a window where application pushbuttons and other graphical components are located.
Converted	The process of translating raw telemetry data into an American National Standards Institute (ANSI) standard data representation so that the sample can be properly interpreted by the machine which processes the data.
Counter-dependent	A parameter whose occurrence in telemetry is dependent on an incrementing or decrementing counter in the data.
Critical Command	A command whose initiation and execution could possibly cause damage to a payload or spacecraft and impair the mission.
Database Administrator	An individual who is primarily responsible for managing the RDBMS engine and administering database accounts. He/she also has the privilege to edit restricted database fields in any database, but is normally not recommended to edit data values that drive the telemetry and command processing for the EHS system.
Database Coordination Group	A working group which includes representatives from the appropriate project operations personnel, project source DB developers, MOL DB developers and the HOSC validation team. Review and approve/dissaprove DBCRs, resolve conflicts and evaluate any DB related issues.
Database Developer	An individual that has the privilege to edit restricted fields (e.g., decom, etc.) for both operational and non-operational databases that drive telemetry and command processing for the EHS system.
Dataset	A saved set of a command's modifiable fields used to update a command prior to being transmitted.

Data Stream Identifier (DSID)	A field within a Secondary EHS Protocol Header for PDSS Payload Data used as a unique identifier for the data stream. This bit denotes if the type of data contained therein is CCSDS packet data (0) or BPDU (1).
Delivered Database	A database must be delivered before it can become pre-released. A delivered database has not been validated for operational testing.
Delta Limit	Maximum acceptable difference between consecutive samples of a parameter.
Desktop	The computer monitor backdrop area on which all windows are opened. May also be referred to as workspace.
Development	In PIMS, the first state of the review cycle in which a document, change request or data request is still being written or is being updated.
Direction Keys	A group of computer keyboard arrow keys which allow users to move up, down, left, and right within an application or menus.
Disapprove	In PIMS, the action taken by a reviewer to signify disapproval and recommendation against moving a document, change request or data request into the baselined state.
Discrete Values	Telemetry values that have states (e.g., on or off).
Double-click	The action of pressing and releasing a mouse button twice in rapid succession.
Drag	To press and hold down a mouse button while moving the mouse on the desktop (and the pointer on the screen). Typically, dragging is used while moving and resizing windows.
Drawing Tools Palette	A group of tool buttons that is used to create graphic objects in order to display telemetry data, initiate commands, and start scripts and computations. The palette is located on its own floating dialog box or the application window.
Dump	During periods when communications with the spacecraft are unavailable, data is recorded onboard and played back during the next period when communications resume. This data, as it is being recorded onboard, is encoded with an onboard embedded time and is referred to as dump data. When a near real-time (NRT) request is written specifying that dump data is desired, the onboard embedded time is used to fulfill the request.
Dynamic Objects	Graphical objects that represent updating telemetry data.
Ellipse	A geometric shape which can be created on a display (i.e., a plane of a cone, an oval shape, etc.).

Expected State	Text state code which indicates the nominal value of a parameter.
Expert Mouse Actions	Clicks or double-clicks of mouse buttons which are non-standard and which activate special functions.
Filter	The filter function is used within a dialog box to refine and define subsets of files you want to work with using a string search and wildcard. Characters can be used to implement the filter function.
Fonts	A style of printed text characters.
Graphical User Interface (GUI)	A way of interacting with computers using graphics-oriented software and hardware.
Grayed out	A menu selection item that has been made insensitive, which is visually shown by making the menu text gray rather than black. Items that are grayed out are not currently available.
Greenwich Mean Time (GMT)	The solar time for the meridian passing through Greenwich, England. It is used as a basis for calculating time throughout most of the world. Displayed within the HOSC, it follows the format ddd:hh:mm:ss.
Grid	A pattern of horizontal and vertical lines forming squares of uniform size on a display, used as a reference for locating points.
Group Parameter Composition	Parameter composition where the bits of a parameter are contiguous and a multiple occurrence of that parameter exists as a group of samples.
Groups	MSIDs which have been grouped together, primarily for use with the Exception Monitor (EM) application.
Hazardous Command	A command whose initiation and execution could pose a threat to human life or the entire mission.
Help	A standard icon used throughout the user guide set to indicate that a cross-reference is provided to assist in solving problems or to answer questions.
Huntsville Operations Support Center (HOSC)	A facility located at the Marshall Space Flight Center (MSFC) that provides scientists and engineers the tools necessary for monitoring, commanding, and controlling various elements of space vehicle, payload, and science experiments. Support consists of real-time operations planning and analysis, inter- and intra-center ground operations coordination, facility and data system resource planning and scheduling, data systems monitor and control operations, and data flow coordination.
I-beam Insertion Bar	A graphical image used to represent the insertion point of text in a text entry area which provides a visual cue that text entry is anticipated by the system.

Icon	A graphical representation of an object on the desktop. Objects can be minimized (iconified) to clear a cluttered workspace, and restored (opened), as needed.
Input Focus	A window or window element that is activated, and available for subsequent actions. Input focus is usually indicated by highlighting or changing the color of the activated element.
Input Slider	An input object that allows users to change values of pseudo parameters and computational constants assigned to objects. Pseudos can be used in other applications (i.e., scripts, computations, etc.).
Insensitive	An object or area of an application window that does not have input focus.
Integrated Support Team (IST)	Institutional groups at the HOSC responsible for configuring, monitoring, and resolving problems with computer systems and application software.
Launchpad	A floating menu bar that is used to initiate all HOSC software applications.
Legend	A table that labels parameters plotted on a chart or grid.
Limit Delta	Maximum acceptable difference between consecutive samples of a parameter.
Limit/Expected State Sensing (LES)	A configurable option in Display Operation that allows the user to select whether he wants to see limit violation status or not. The incoming data is compared against the Local Table limits.
Limits	Defined ranges for a measurement which are used to indicate off-nominal conditions: Caution High, Caution Low, Warning High, and Warning Low.
Line Plot	A plot that uses lines to represent the relationships among telemetry values.
Local Table	A subset of the TDB stored on a workstation or server used for telemetry processing.
Maximize Button	A control button that is located to the right of the application title bar. When pressed, this button enlarges the application window to its largest state.
Menu Bar	The area at the top of a window that contains the titles of pull-down menus.
Merge	The combining of data from different sources for a specific time slice. During merge, the best (cleanest) data from each source will be used to create a contiguous segment of data for the specified time slice.
Message Area	The part of the application window where system messages/ responses are shown.

Message Dialog Box	An area that provides information, gives the current status of data, asks questions, issues warnings, or draws attention to errors.
Mini-Application	A secondary main window activated from within a main window application.
Minimize button	A control button located to the right of the application title bar. When pressed, it iconifies the window.
Mission, Operational Support Mode, and Project (MOP)	A MOP is what delineates one EHS activity from another. MOP information is available in the common configuration file on every node.
Mnemonic	An underlined character on a menu item, that allows users to initiate the item by typing letters on a keyboard. A user-friendly name used to reference a command residing in the command database.
Mode Independent	Mode Independent is used to describe any process that is not dependent on a data mode.
Modifiable Commands	Commands containing at least one data field which can be updated during operational activities prior to their uplink transmission.
Mouse	A pointing device that is used along with a keyboard in point-and-click user interfaces. The mouse used with HOSC workstations contains three mouse buttons. The left mouse button is used to activate and select items on windows. The middle mouse button is used for move functions. The right mouse button is used to access popup menus.
MSID Text Field	An output object for viewing telemetry containing a label for the telemetry parameter, as well as the current value of the parameter displayed in a specified format (i.e., decimal, hex, octal, binary, American Standard Code for Information Interchange (ASCII), etc.).
Multiple Drawing Mode	A mode that allows users to draw multiple objects of the same type.
Native Data Type	Defined in the database and indicates how the MSID data will be interpreted in the HOSC.
Nominal	A color code indicating expected conditions within defined limits of parameters.
Non-Shareable	A flag has been set to not allow other users to retrieve your User-generated Data Element (UDE) from the UDE Database and use it on their local workstation.
Normal	A telemetered parameter that occurs once per packet.
Note	A standard icon used throughout the user guide set to direct your attention to specific items of concern.

OK Pushbutton	A pushbutton that implements any changes specified within a dialog box. The dialog box is dismissed after this pushbutton has been selected.
Option Menu Button	A pushbutton which, when clicked, displays a menu of related options. The selected option is shown as the pushbutton label.
Output Slider	An object that displays telemetry parameters.
Packet	A data unit comprised of octets that a source application generates.
Parameter Composition	Describes how the bits of a parameter can be arranged in a packet for a sample(s) of that parameter.
Pixmap Object	A picture that can be either drawn using the pixmap editor, or scanned and assigned using the pixmap editor.
Playback	Playback data can originate either internally or from some other facility. Project servers in the HOSC receive Playback telemetry streams from the HOSC Data Distribution System (DDS) and perform the same processing as would be performed on real-time telemetry streams.
Pointer	Sometimes called the mouse cursor, the pointer shows the location of the mouse on the desktop. The pointer's shape depends on its mode. (e.g., on a window frame, the pointer is an arrowhead, while you are waiting for an action to complete, the pointer becomes clock).
Point Pair Calibration	A measurement which is calibrated using a series of linear segments. The linear segments are defined by a pair of points for each segment. Each point consists of a raw count value and a corresponding engineering unit value.
Pointer Shapes	A graphical shape that a pointer assumes in the drawing mode (e.g., cross-hairs, I-beams, hour-glasses, etc.).
Polynomial Coefficient Calibration	A measurement is calibrated using the following polynomial calibration equation: where: eu - engineering units cnts - counts eu = COEF0 + (cnts1 x COEF1) + (cnts2 x COEF2) + (cnts3 x COEF3) + (cnts4 x COEF4) + (cnts5 x COEF5) + (cnts6 x COEF6) + (cnts7 x COEF7) + (cnts8 x COEF8) + (cnts9 x COEF9).
Popup Menu	A menu that is invoked when the right mouse button is clicked. Functions available are the most common and vary from application to application.
Predefined Commands	Commands completely defined prior to an operational activity. Predefined commands contain no modifiable data fields.

Pre-released Database	A database that has been validated for operational testing. It is used to validate UDEs (displays, comps, etc.) prior to the baseline release of the database.
Project Telemetry Database	Contained within the Telemetry Database, includes the telemetry definitions needed to drive HOSC telemetry processing for a specific project/mission. The source of the real-time telemetry processing tables found in the Telemetry Local Table identified by a project/mission/revision prefix. Also included are tables to contain user copy data, an error log, and an Initial Load Table.
Protocol	**1:**Provides the formulas for passing messages, specifies the details of message formats, and describes how to handle error conditions. More important, it allows us to discuss communication standards independent of any particular vendor's network hardware. A communication protocol allows one to specify or understand data communication without depending on detailed knowledge of a particular vendor's network hardware. **2**: A term referring to the type of source data used in the construction of an EHS packet. EHS Packet Protocols include: "C" - CCSDS packet, "P" - pseudotelemetry packet, "T" - encapsulated TDM packet, "B" - encapsulated block packet, and "D" - TDS packets.
Pseudo MSID/Parameter	A parameter identification (ID) that has been assigned to contain the output from a computation.
Pseudo Packet	A telemetry packet consisting of external pseudo MSIDs. External pseudo MSIDs are generated (either by EHS computations or scripts), packetized and multicast on the project LAN.
Pulldown Menu	A list or menu of possible options that is hidden under a general phrase and invoked by clicking the left mouse button.
Pushbutton	A control that causes an immediate action. To press a pushbutton on the screen, point to it and click the left mouse button.
Radiobuttons	A group of buttons that allows users to make only one selection at a time. Radiobuttons are small diamond-shaped buttons.
Range-dependent	A parameter whose occurrence in telemetry is dependent on the value of a range parameter.
Real-time Data	Real-time data is telemetered to the HOSC and distributed for immediate use. Real-time telemetry data, received into the HOSC system and written to the NRT log, is indexed by its time stamps and other identifying information. When an NRT request is submitted that covers a particular time slice, this indexing information is used to meet that request.

Recall Text	Area within an application that allows users to input up to 256 characters.
Release	In PIMS, an action taken by the manager of a document or request that releases it from the baselined state back into the development state for modifications.
Resize Borders	The area that surrounds the framed area of an application, and is used to change the height or width of the window.
Resize Handles	Up to eight handles surrounding an object that allows users to resize objects, displays, or windows.
Review	In PIMS, the second state of the review cycle in which the document, change request or data request has been written and submitted for review and approval.
Sample Composition	Describes how the samples of a parameter are arranged in a major frame.
Scatter Plot	A plot that uses unconnected dots to represent the relationships among telemetry values.
Scratchpad Line (SPL) Directives	Provides users with the capability to start and stop displays, computations, and scripts. A user may also uplink and modify commands and update pseudo MSIDs through the use of SPL directives.
Script	A file containing a sequence of directives that can be invoked in a single step.
Scroll Bar	A control that allows the contents of a window area to be displayed without resizing a window or list.
Select Button	The mouse button used for most operations. By default the select button is the left mouse button.
Set Pushbutton	A pushbutton that allows a user to implement changes based on selections made within a dialog box. Reacts like the OK pushbutton and closes the dialog box.
Setup Message Area	The dialog box that allows users to change the number of lines displayed within the message area of the application main window.
Shareable	A flag has been set to allow other users to retrieve your UDE from the UDE Database and use it on their local workstation.
Shotgun	Parameter composition when the bits of a parameter are scattered in multiple non-contiguous words of a major frame.
Slider Box	A graphical component of the scroll bar, which is dragged to provide a different view of the same file, list, or text area.
State Code Calibration	A measurement is converted to a text state code.
Static Object	A graphical object that is not receiving telemetry data.

Status Bar	A feature that allows the viewing of application critical configurations within the main window.
Submit	In PIMS, an action taken by the manager of a document, change request or data request in which the document or request is placed in a state of review and approval and released from development.
Subset	A collection of measurements from the total measurement set that is bounded as an integer number of octets but does not constitute the packet itself. A mini-packet.
Super	A parameter that occurs more that once per packet.
Superseded Database	If a baselined database already exists for a project and mission, before a new baselined database can be released, the current baselined database is designated as superseded.
Switch MSID	A parameter whose value determines which limit or calibration set will be used for the specified MSID.
TDM	Time Division Multiplexed - a technique for transmitting multiple parameters within a single serial bit stream by interleaving them, one after the other.
Time Indicator	Indicates that a group will be activated based on a defined start time and deactivated based on a defined stop time.
Time Plot	A plot against time containing up to four Y-Axis parameters.
Time Reference	A time format that is represented in either GMT or Mission Elapsed Time (MET).
Time Tag	A time reference marking an event. For example, a parameter goes out-of-limits at 230:16:00:00. The time tag for the out-of-limit event is 230:16:00:00.
Tip	A standard icon used within the HOSC user guide set to indicate that suggestions or hints are provided.
Togglebuttons	Small buttons that can be switched “on” or “off.” To switch a togglebutton, point to it and click the select button. Black indicates that the desired attribute is in effect or “on.”
Tolerance	Number of times the MSID exceeds the limit value before an EM warning message is issued.
Typical	Parameter composition when the bits of a parameter are contiguous.
Unprocessed	Raw telemetry data.
User-generated Data Element (UDE)	A user-generated file. For example, a display, script, computation, pixmap, etc., is a UDE.

User Data Summary Message (UDSM)	A PDSS Data Quality packet. Information contained in the packet include: the start/stop time of the UDSM report period, the number of unplanned LOS occurrences, the number of BPDUs or packets per DSID received, the number of VCDU sequence counter errors, and the number of packet sequence counter errors per DSID.
Virtual Channel (VC)	A CCSDS construct whereby a physical communications channel is shared among different users, each of whom uses part of the available bandwidth for a virtual channel of CCSDS CADUs incorporating predetermined CCSDS identifiers for each user.
Virtual Channel Identifier (VCID)	A binary identifier located within the VCDU header, which when concatenated with the spacecraft identifier, uniquely identifies a particular spacecraft virtual channel.
Virtual Channel Data Unit (VCDU)	A CCSDS data set of specific structure and fixed length, which includes CCSDS specified headers and into which user data is packaged for transmission over the space-to-ground link.
Warning Limits	A color code (red) representing limit violations of a parameter.
Wildcard	Placeholders for other characters in a string. Three wildcards are permitted in most HOSC applications. The "*" which represents any combination of characters, and the "?" which represents any single character. A blank can be used to replace a single "*" to indicate "all". Database applications use Oracle as their basis and therefore "%" is used like the "*" and an underscore character "_" is used like the "?". Blank operates the same in database applications as othe HOSC applications and represents "all."
Window Menu	The menu that appears when you press the window menu button, which is located to the left of the application title bar on a window frame. Every window has a system menu that enables you to control the position of the window.
Workspace	The area on a terminal where the windows of a user's environment appear. The workspace is sometimes referred to as a desktop or root window.
XY Plot	A plot that contains one X-Axis and up to four Y- Axes parameters.