

March 16, 2001
Ref. No.: EOS/ETS-031601-C11

National Aeronautics and
Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Mr. Willie Fuller
Code 581
Building 32, Room N212D

Subject: Contract No.: NAS9-98100
CSOC SODA Task Order Number GM36
EOSDIS Test System (ETS) Multimode Portable Simulator for Aura
(MPS/Aura) Delivery of the Release 1.0 Software

Dear Mr. Fuller:

We are pleased to deliver Release 1.0 of the ETS Multimode Portable Simulator (MPS) for the Aura spacecraft (MPS/Aura). This is the first major delivery of MPS/Aura using our Scalable, Integrated Multimission Simulation Suite (SIMSS) infrastructure and architecture with extensions for the EOS Aura spacecraft.

The major capabilities in this release consist of porting the software from the MPS/Aqua simulator and adding spacecraft-specific extensions. We have also included the directive enhancements that were Beta-delivered with MPS/Aqua Release 6.2. A complete list of the simulator capabilities is included in Attachment A. The simulator is set up to use the Aqua Project Data Base (PDB) for test or demonstration purposes, since an Aura PDB is not yet available.

A hard copy of the MPS/Aura User's Guide for Release 1 will be made available to the users in the near future. In addition, a soft copy of the User's Guide will be placed on the ETS Documentation web site at URL <http://esdis-it.gsfc.nasa.gov/ETS/etsdoc.html>.

This delivery package contains 12 attachments as listed below. A completed Mission Systems Configuration Management (MSCM) form is included in Attachment L. If you have any questions concerning this delivery, please call me at 301-805-3420.

Sincerely yours,

Dave Green,
CSOC ETS Task Leader

EOSDIS Test System (ETS) Multimode Portable Simulator for Aura (MPS/Aura)
Delivery of the Release 1.0 Software
March 16, 2001, Ref. No.: EOS/ETS-031601-C11

Delivery Package Reviewed and Approved by:

Laura Hepfer
CSOC Quality Assurance

Janice Swope
CSOC ETS Customer Service Representative

The following attachments contain the details of the MPS software delivery.

- Attachment A - describes the delivery contents for this release
- Attachment B - describes the operational changes
- Attachment C - contains the instructions to build and install the software
- Attachment D - contains any special operating instructions
- Attachment E - contains a list of the resolved DRs
- Attachment F - contains a list of the unresolved DRs
- Attachment G - contains the matrix of requirements addressed by this release
- Attachment H - contains the known system limitations
- Attachment I - contains the release history summary matrix
- Attachment J - contains a listing of the delivery media contents
- Attachment K - contains documentation references
- Attachment L - contains the Mission Systems Configuration Management (MSCM) form

Distribution: (* - Letter Only)

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				Xu, F.
				Task File

Attachment A – Description of Delivery Contents

The MPS/Aura Release 1.0 consists of custom software executables that are being delivered on one CD-ROM. Two copies are being provided.

Enterprise Oracle and Oracle Programmer for Windows NT are necessary for operation of this release. These products were provided with a previous release. The license to use Oracle belongs to the CSOC contract. Therefore, Oracle and Oracle Programmer may be installed only on CSOC computers.

A soft copy of this MPS/Aura Release 1.0 delivery letter and set of attachments is also being delivered. The attachments have been formatted on a 3.5" IBM PC diskette utilizing the MS WORD word processing tool.

Attachment B – Summary of Operational Changes

Operational Capabilities of MPS/Aura Release 1.0

Most of the capabilities being delivered in this release are being ported from the MPS/Aqua simulator. New or modified capabilities with this release are noted in *Italics*.

Since the Aura PDB is not yet available the software is set up to access the Aqua PDB.

Telemetry:

- Transmit telemetry in IP or Serial (clock/data) mode
- Pack telemetry packets and CLCWs into CADUs when in Serial mode
- Generate one stream of CADUs when in Serial mode
- Generate one stream of telemetry formatted as EDUs when in IP mode
- Start or stop one telemetry stream
- Ingest the PDB files
- Generate telemetry packets from information contained in the PDB
- Maintain telemetry nodes from information contained in the PDB
- Populate telemetry packets with data values from information contained in the PDB
- Generate correct secondary headers for SC, GIRD, and SUROM-TIE (no secondary header) telemetry packets using information from the PDB
- Generate instrument telemetry packets using secondary key information from the PDB
- Display EDU data when in IP mode
- Display CADU data when in Serial mode
- Set values into telemetry points by mnemonic
- Display telemetry node values by mnemonic
- Convert telemetry values to Engineering Units (EU) for display using information from the PDB
- Accept operator-entered telemetry values in EU and convert to Raw Counts for inclusion in telemetry packets
- Reset packet count for the telemetry stream
- Static packet data can be overwritten (by byte location) and by modification of telemetry mnemonic
- Incrementing packet sequence counters per APID
- Generation of individual APIDs can be inhibited
- Telemetry logs will be created (viewable by offline utility)
- Packet Headers and Packet Data are updated
- Packet data can be shown in hexadecimal or octal format and addressed in hexadecimal or decimal form
- Packet Sequence Counters can be reset
- Packet Sequence Counters can be modified
- Packet Version field can be modified
- Packet APID field can be modified

- Packet Type field can be modified
- Packet Secondary Header Flag field can be modified
- Packet Length field can be modified
- CCSDS Unsegmented TimeCode (CUC) can be modified
- Packet rate may be controlled
- CLCW transmitted via EDUs when in IP mode
- IP packets are transmitted with variable lengths
- CLCW can be overridden by the operator
- Transmission of CLCW can be inhibited when in IP mode
- Scenario file (script) capability to set telemetry nodes and buffers
- Set telemetry data values in response to spacecraft commands received (end-item verification)
- Set initial telemetry data values at initialization
- Allow simultaneous display and set of multiple telemetry container items via GUI screens
- Simulate spacecraft memory dumps
- Use the PDB telemetry state text file to locate end-item verifier values
- Maintain and update telemetry data values in APID 1000 (*GIIS fields removed*)
- *Telemetry parameters may be set and viewed by Parameter ID*
- *CLCW Transmit Start and Stop is coupled to H/K Telemetry Start and Stop*
- *Telemetry values may be set using simple expressions*
- *Telemetry values may be set using trigonometric expressions*
- *Telemetry values may be set using Boolean expressions*
- *Telemetry values may be set to other telemetry mnemonic values*
- *Telemetry values may be saved in intermediate variables for later use*

Command:

- Ingest command-related PDB files
- Identify commands using information from the PDB
- Display event messages with command mnemonics and submnemonics
- Set telemetry points in response to commands received (end-item verification) using information from the PDB
- Recognize spacecraft Command Loads
- Display Command Load data
- Copy Command Load data to a Memory Dump buffer
- Inhibit the Command Load data copy facility via operator directive
- Validate checksums of received Command Loads
- Ingest type AD, BC, and BD commands
- Display Total CLTUs count
- Reset Total CLTUs count
- Display Rejected CLTUs count
- Reset Rejected CLTUs count

- Display Instrument commands count
- Reset Instrument commands count
- Display Spacecraft commands count
- Reset Spacecraft commands count
- Display BC commands count
- Reset BC commands count
- Display BD commands count
- Display current Spacecraft CLCW
- Update Spacecraft and instrument CLCW
- Display current Instrument CLCW
- Validate commands based on individual, all, or none of the following validation criteria: CLTU Start and Tail Sequences, BCH Error Code, Transfer Frame Header Fields, FARM (Valid Frame Sequence), User Command Packet Header
- Generate event messages based on ingest
- Log raw commands (viewable by offline utility)
- Display raw command in hexadecimal or octal format addressed in either hexadecimal or decimal fashion
- Display command packet headers for instrument commands
- Display command packet headers for spacecraft commands
- Update command accepted and rejected counters in telemetry
- *Command submnemonics are saved in container items and may be viewed after command receipt*
- *Expected Spacecraft ID changed to CC Hex*

Time:

- Maintain and update SC time (GIRD)
- Maintain and update GMT time
- Synchronize SC and GMT times

General:

- Control all simulator module functions via scenario scripts
- Selection of scenario scripts may be via operator type-in or via a file selection browse window
- Start scenario scripts in response to commands received
- Start a scenario script from a scenario script
- Execute multiple scenario scripts simultaneously
- Provide operator control of multiple scenario scripts started by the operator
- Save the last 10 operator directives
- Allow editing of saved operator directives before re-execution
- EDOS Service Header (ESH) fields may be viewed
- ESH field contents may be modified by the operator

- Validation of Command Data Block (CDB) header fields of commands received
- Modification of expected values of CDB header fields
- All viewable buffers may be displayed
- Addition, deletion, and modification of command end-item verifiers via SQL scripts
- Logs of commands received or telemetry transmitted may be retransmitted via IP output *or Serial output*
- *Expected Spacecraft ID may be modified in EOSGS module*
- *CLCW ESH field contents may be modified by the operator*
- *Event messages to the screen may be inhibited or enabled by severity (color)*

Attachment C – Release 1.0 Installation Instructions

This attachment contains the instructions for installing the MPS/Aura Release 1.0 Server and Client. The information presented in this attachment has been checked for accuracy by the independent test team.

Instructions for installation of the Aura Server and Client software:

1. Insert the delivery media into the appropriate drive.
2. To install the Aura Client:
 - a) On the desktop, click on the Start button, and then select Run from the resulting menu.
 - b) When the Run window appears select the Browse... button.
 - c) From the Browse Window, select the Removable drive that contains the installation CD.
 - d) Click on the Client folder.
 - e) From within the Client folder, double click on the Setup.exe icon.
 - f) The screen will be filled with an Aura Client background and a smaller window with the title "Welcome to Aura Client 1.0" will appear. Click on the Next button to proceed to the next step.
 - g) The next window will contain the licensing agreement. Click on Yes to accept the agreement and proceed.
 - h) After all of the files are copied, a window with the title "Setup Complete" will appear. Click on the Finish button to end.
 - i) An Aura Client icon will now be installed on the desktop.
3. To install the Aura Server:
 - a) On the desktop, click on the Start button, and then select Run from the resulting menu.
 - b) When the Run window appears select the Browse... button.
 - c) From the Browse Window, select the Removable drive that contains the installation CD.
 - d) Click on the Server folder.
 - e) From within the Server folder, double click on the Setup.exe icon
 - f) A window with the title "Run Window" will appear. Click on the Okay button to proceed to the next step.
 - g) The screen will then be filled with an Aura Server background and a window with the title of "Welcome to Aura Server 1.0" will appear. Click the Next button to proceed.
 - j) The next window will contain the licensing agreement. Click on Yes to accept the agreement and proceed.

- h) Next a window will show the completion status as the files are copied. When the copying is complete click on the Finish button to finish the installation.
- i) An Aura Server icon will be installed on the desktop.

Attachment D - Special Operating Instructions

This attachment contains new special operating instructions for MPS/Aura Release 1.0. The information presented in this attachment has been checked for accuracy by the independent test team.

User's Guide Updates

A User's Guide is being updated to include the information presented in this section. When completed, the updated User's Guide will be available from the ETS home page at <http://esdis-it.gsfc.nasa.gov/ETS/ets.html>.

The User's Guide for MPS/Aura Release 1.0 will be nearly identical to that for MPS/Aqua Release 6.0. The GSPM1 module is being replaced by the EOSGS module with the same functionality, and the SCPM1 module is being replaced by the SCAURA module.

EOSGS module – new functionality

When added to a project, the EOSGS module **defaults the Spacecraft ID to zero** so it must be set during simulator initialization. To set the Spacecraft ID, click on the interior of the EOSGS module and select *Configure/Setup* from the pop-up menu. Enter the Spacecraft ID in hex and click Apply. Once entered, the Spacecraft ID will be saved and restored with the other project information so it need never be set again.

The other new functionality added to the EOSGS module is the ability to modify the EDOS Service Header of CLCW packets. This capability is identical to that of the Modify Telemetry Header capability. See Paragraph EOSGS-5.1.4 of the MPS/Aqua Release 6.0 User's Guide for details.

<p>The remaining paragraphs of this attachment discuss functionality added to and changed in the SCAURA module.</p>

Container Item Names

The container item names in SCAURA are very similar to those in SCPM1. Until the User's Guide is available, the following guidelines will allow the user to determine most container names.

- The telemetry point container names are the mnemonic string, just as they were in SCPM1.
- Container names for referencing telemetry points by Parameter ID may be constructed by appending the one to five digit parameter ID to the string "TLM#". See below.

- In cases where the name has changed, most container names may be obtained by dropping the letters “pm1” from the container name given in the MPS/Aqua User’s Guide.

CLCW Transmission

The status of CLCW packet transmission in IP mode is now linked to H/K telemetry packet transmission by default. CLCW transmission is disabled at startup, as is telemetry transmission. Starting telemetry transmission will start CLCW transmission, and stopping telemetry transmission will stop CLCW transmission. However, the converse is not true. That is, starting or stopping CLCW transmission will not affect the state of telemetry transmission. Also, they can be uncoupled by setting container item CLCWTransmitLinked to zero.

Spacecraft ID

The expected Spacecraft ID used when validating incoming commands has been changed to 0xCC, the Aura Spacecraft ID. If necessary, the expected Spacecraft ID may be changed by setting the container item cmdscid to the desired value.

Telemetry Value Entry via Parameter ID

The capability to view telemetry parameter values by Parameter ID (aka LRV) has been added. The syntax is “TLM#n” and “TLM#n__EU”, where n is the one to five decimal digit Parameter ID of the telemetry parameter. Do not enter leading zeros. As before, two underscores precede the EU designator.

Example:

Given that PRO_TP_FDMT and PRO_TP_FDMT__EU are the container names for a raw telemetry parameter and its associated engineering value. TLM#118 and TLM#118__EU are the additional names using the Parameter ID in decimal. All four items are updated when any of one of them is changed.

Command Event Message Syntax

The display of the event message describing commands received has been changed to add the command mnemonic Parameter ID. The Parameter ID is given immediately after the command mnemonic and has the format #n, where n is the one to five digit Parameter ID. In the example which follows the Parameter ID is #12068.

```
059:20:12:40 Proj 0 SCAURA#2: Rec'd VCID:0 FrmSeq:236 APID:457
PktSeq:1644 GNC_ENABLE_OD2C1MDR #12068 RATE_CONTROL=0 RATE_SIGN=1
W_SELECT=0
```

Display of Command Submnemonic Values

During initialization, container items are now created for every command submnemonic. The syntax of these container items is *submnem_name#n*, where n is the one to five digit Parameter ID of the parent command. These container items are viewable at any time via the *get* directive, or via the *Display/Set Container Items* window. They will always reflect the latest value received, and are preset to zero during initialization.

In the command receipt example given above, the “RATE_SIGN” submnemonic container point for the GNC_ENABLE_OD2C1MDR command may be accessed via the *get* directive:

```
get rate_sign#12068
```

There is quite a bit of duplication of submnemonic names in the PDB, so be sure to get the correct command Parameter ID.

Using TxFile to Supply Serial Output

The TxFile module has been modified to work with modules requesting serial output. The main difference is that the requesting module, not TxFile, controls the rate of reading and sending data. There are no changes to the TxFile screens but the **Interval** and **Use log file timing** fields are ignored in serial transmission mode.

When TxFile is linked to a module requesting serial output, its transmission mode is automatically changed to serial transmission mode. The operator must specify the file to read, the read mode and the number of times to transmit the file. Reading and transmitting starts as soon as the **Send** button is clicked. Event messages will inform the operator when the transmission mode changes to serial, when serial transmission starts, when the serial transmission stops, and each time the end-of-file is reached.

The following table provides step by step instructions for the TxFile Transmit screen:

Step	TxFile Serial Transmission Mode
1	Enter the file name in the Filename field.
2	Select Auto-Complete File in the Output Mode region. If the Output Mode region is not available for selection, click to select the Offset option in the File Read Mode region first.
3a	The Log Module can create files with a header on each record, as described in the User's Guide. TxFile can use that header to determine the amount of data to transmit in each record. To transmit a log file with headers, click to set the Log file option.
3b	For raw data files with no Log Module header, select the Offset option in the File

	Read Mode region and enter the fixed record size in bytes in both the Blocksize and Offset data entry fields.
4	Set the Cycles field to the number of times to transmit the file. Set Cycles to zero to specify an indefinite number of times.
5	Click Apply and note any error messages in the event message log. If necessary correct the file name and repeat this step until there are no errors.
6	Click Send to start the serial transmission. Transmission will automatically stop when the file has been sent the specified number of times.
7	Optionally click Stop to halt the serial transmission before completion.
8	Optionally click Send to resume or repeat the serial transmission. If the transmission was previously stopped, it will be resumed <u>at the halted position</u> in the file. If the end of transmission was reached, the original request will be repeated. If the Send button is not available, click on the Stop button first.

Scenario Enhancements

The SIMSS baseline is being enhanced to allow more advanced assignment of values to container items. All of the functions described below, except for the Boolean nand and nor functions, have been tested and shown to work correctly.

With these enhancements, telemetry mnemonics may be set to values derived from any combination of arithmetic expressions, arithmetic functions, Boolean functions, and other mnemonics. These directives may be used to create more sophisticated scenario files. The length of an individual set directive is limited to 100 characters. Intermediate variables which have single character names have been created in part to allow writing of expressions that would otherwise be too long. In order to use any of the following expressions, specification of an equal sign in one of the following forms is required (=, +=, -=, *=, /=, ^=) after the mnemonic name and before the expression.

- Set directive using arithmetic expressions

A container item may be set to an arithmetic expression using the symbols for addition (+), subtraction (-), division (/), multiplication (*) and raise to a power (^). Parentheses are recommended to specify the precedence order.

Example:

set mnemonic = 2 * (7^3)

- Set directive using arithmetic and Boolean functions

A container item may also be set to an arithmetic expression using functions from the following table. The following rules apply:

- The function names must be in lower case

- The parenthesis around the function argument are required syntax.
- Arguments to the Boolean functions must be in decimal.
- The Boolean functions perform a bit-wise AND, OR, etc.

Function Description	Set directive example
Arcsine (x)	Set mnemonic = asin (x)
Arccosine (x)	Set mnemonic = acos (x)
Arctangent (x)	Set mnemonic = atan (x)
Degrees to radians (x)	Set mnemonic = dtor (x)
Radians to degrees (x)	Set mnemonic = rtod (x)
Square root (x)	Set mnemonic = sqrt (x)
Log (x)	Set mnemonic = ln (x)
Exponent (x)	Set mnemonic = exp (x)
Tangent (x)	Set mnemonic = tan (x)
Sine (x)	Set mnemonic = sin (x)
Cosine (x)	Set mnemonic = cos (x)
Sine in radians (x)	Set mnemonic = rsin (x)
Cosine in radians (x)	Set mnemonic = rcos (x)
Arcsine in radians (x)	Set mnemonic = rasin (x)
Arccosine in radians (x)	Set mnemonic = racos (x)
Arctangent in radians (x)	Set mnemonic = ratan (x)
Add x to mnemonic's current value.	Set mnemonic += x
Subtract x from mnemonic's current value	Set mnemonic -= x
Multiply mnemonic's current value by x	Set mnemonic *= x
Divide mnemonic's current value by x	Set mnemonic /= x
Raise mnemonic's value to the power of x	Set mnemonic ^= x
AND two values together	Set mnemonic = mnemonic and 1
OR two values	Set mnemonic = mnemonic or 7
OR two values and Negate the result ¹	Set mnemonic = mnemonic nor 1
Exclusive OR two values	Set mnemonic = mnemonic xor 7
NAND two values ¹	Set mnemonic = mnemonic nand 15

- Set directives using mnemonics in expressions

Container names may be used instead of numbers in an expression. In the simplest case, a container item may be set to the current value of another container item.

```
set mnemonicA = mnemonicB
```

Container items may also be combined together to create expressions.

```
set mnemonicA = (mnemonicB + mnemonicC)/2
```

¹ The nand and nor functions don't work.

- Intermediate variables

Twenty six intermediate variables have been created to allow for saving and using intermediate values. These variables are case-sensitive 'A' through 'Z', and must be entered in upper case. When set, these variables retain their values as long as the simulator runs. However, while they can be used in expressions, they are not container items and therefore, cannot be read via the "get" directive.

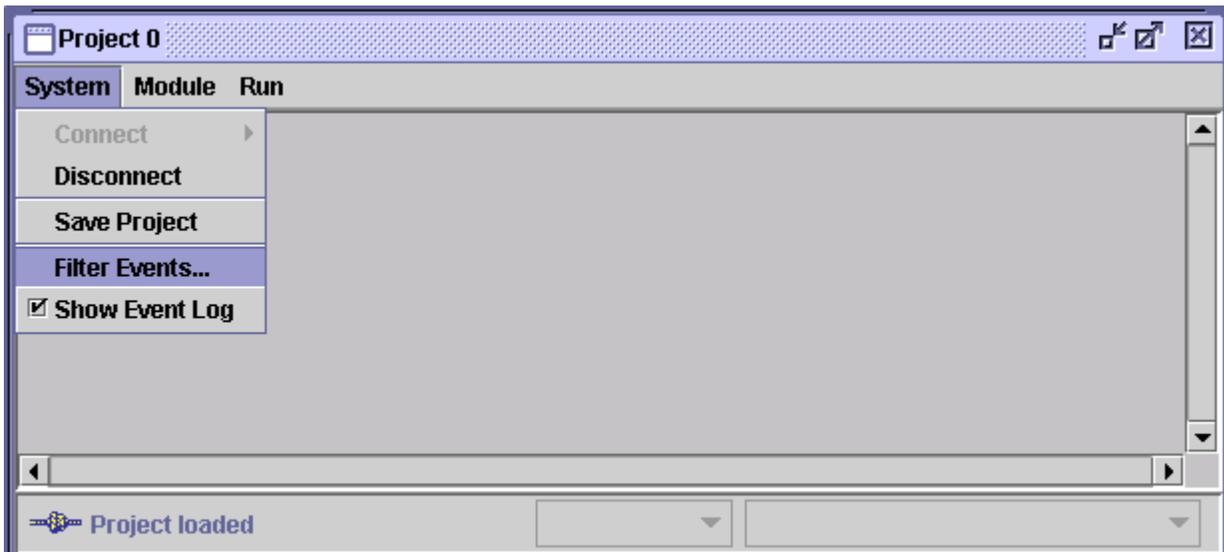
Example:

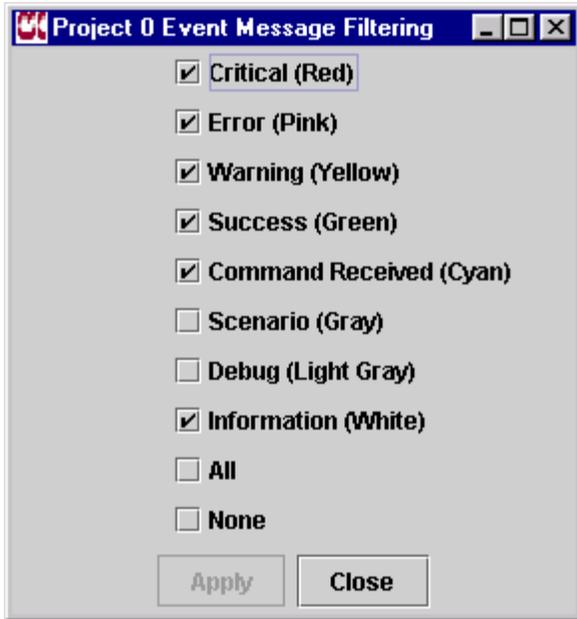
```
set A = Amnemonic
•
• ; other directives
•
; Amnemonic may have changed value, so

set mnemonicB = A
```

Event Message Filtering

The SIMSS baseline has been enhanced to allow filtering of event messages by color or type. On the System Menu in the Project Window, there is a new entry named "Filter Events..."





When "**Filter Events...**" is selected the Event Message Filtering screen appears. This image shows the default filtering scheme. Only event messages with the selected colors will be displayed in the event message portion of the screen. All event messages will continue to be generated and written into the event message log file.

To disable the display of any of these event message types, clear its checkbox.

To enable the display of any of these event message types, check its checkbox.

Use the **Apply** button for changes to take effect. Use the **Close** button to dismiss this screen.

Event message filtering was implemented to control the volume and type of event messages being sent to the screen. It is still possible to overwhelm the client software with too many messages and lose control of the user interface. There was also the concern that more important event messages might get "lost" among the multitude of routine, scenario-generated, and debug information messages. This is the main reason for limiting the number of directives that may be executed each second from scenario files.

Several changes were made to support filtering.

- When a scenario file is executed, the successful setting of container items to specified values will now be reported in Scenario (Gray) event messages. The ordinary event message responses to directives submitted from the directive line will continue to have the Information (White) type.
- When the operator uses any configuration or data entry screens, the ordinary responses to fields being changed will now have the Debug (Light Gray) type. Abnormal event message responses will continue to have the error or warning color.
- When command subsystem debug event messages are enabled, they will have the Command Received (Cyan) type instead of the Debug (Light Gray) type.

Limitations to scenario processing

- When the scenario color is disabled, the limit on the number of scenario directives executed per second is increased. Testing has shown that about 50 directives per second can be supported.
- Scenario files that start, stop, and modify telemetry packet generation must still be limited to 15-20 directives per second. This is because the telemetry generator (TlmGen) software can be overwhelmed by the requests.

Playback File Creation

Along with the repair to allow TxFile to interface to the Serial Output module comes the ability to generate files of Channel Access Data Units (CADUs) for serial replay. These instructions describe how to create a disk file of CADUs for later replay.

IMPORTANT

When creating a file of telemetry CADUs for later replay, ensure that the MPS connection to the Matrix Switch is disabled to prevent inadvertent transmission of data.

The procedure for building a file of CADUs is as follows:

1. Build a project with the SCAURA module connected to a Log Module and a Serial Output module, as shown in the figure on the second page following.

The picture actually shows three windows. The main configuration window is in the background with a Link Information window on top of it. The Log Configuration window is at the top of the figure. Note that the EOSGS module, which appends EDOS Service Headers to telemetry packets, is not needed when operating the simulator in serial mode. The third output channel of SCAURA is used, as indicated in the Link Information window. The Serial Output module is used to provide a clock signal to the SCAURA module so it will create CADUs at the proper rate.

2. After loading the database, perform the extra SCAURA configuration step of setting the simulation mode to serial. To do this, click on the **Select Simulation Mode** option of the **SCAURA Configuration Menu**, and select **Serial Mode** in the resulting window. See Paragraph SCAURA-5.1 in the User's Guide for more information.
3. Configure the Serial Output module frequency to 16383. See the Serial Output section of the User's Guide. No other setup is necessary.
4. Configure the Log Module by entering a file name. You may also deselect the **Log With Header** option and the **Variable Length Output** option. If you deselect the **Variable Length Output** option you must ensure that the Packet size is set to 256 bytes.

When replaying the file created, the TxFile module must be set to a complementary configuration. It is suggested that Notepad be used to create a text file containing setup and descriptive information for the log file being created. Give it the same name as the log file, with an extension of .txt, and save it in the same folder as the log file.

5. The Virtual Channel Identification (VCID) and Replay fields of the VCDU header must be set to indicate that playback VCDUs are being generated. After running the project, and before starting telemetry transmission, enter the following two set directives to the SCAURA module:

```
set vcd2vcid 1  
set vcd2replay 1
```

6. Run the usual telemetry startup scenario file, any special telemetry value setup scenario files desired, then start telemetry transmission by clicking on the **SRL** button of the SCAURA Main Display.
7. At 16 Kbit the file will take 32 times longer to create than to play back at 524 Kbit. For example a four minute playback file will take 128 minutes to create.
8. After the file creation is complete, reset the two VCDU header parameters (see Step 5) to the following values:

```
set vcd2vcid 2  
set vcd2replay 0
```


Serial Mode Operations

The project shown in the picture below will allow serial command receipt simultaneously with transmission of 1 or 4 or 16 Kbit housekeeping telemetry, and simulated playback of telemetry at the 524 Kbit rate.

When building a project with multiple serial output modules, the first serial output module added will connect itself to the lower number serial output line and the next will be forced to connect to the higher number serial output line. It is suggested that the convention be adopted of using the first serial output module to transmit 1/4/16k housekeeping telemetry and the second to transmit playback data.

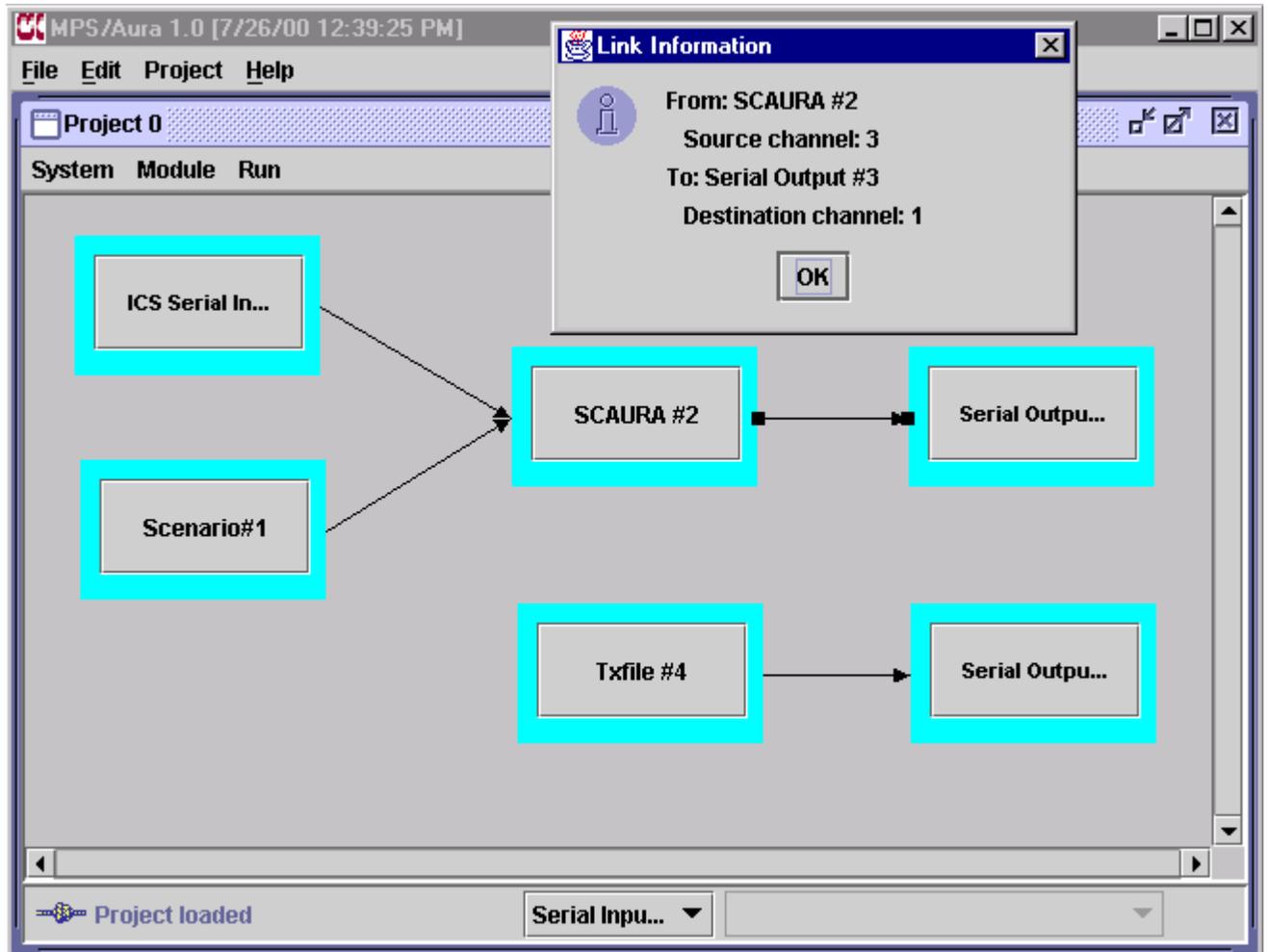
Connect output channel 3 of SCAURA to the first Serial Output module added to the project, and connect the Serial Input module to input channel 2 of SCAURA. Note that the EOSGS module is not used.

Connect TxFile to the second Serial Output module. TxFile will be used to transmit the 524 Kbit playback file. Set the parameters of TxFile to correspond to the file type to be transmitted, as described in the section on playback file creation above. If the **Log With Header** option was selected when the file was created, select the **Log file** option in TxFile. Otherwise, select **Offset** in the **File Read Mode** region and set the **Blocksize** and **Offset** fields to 256, the size of a CADU in bytes.

Follow these steps during initialization:

1. After loading the database, perform the extra SCAURA configuration step of setting the simulation mode to serial. To do this, click on the **Select Simulation Mode** option of the **SCAURA Configuration Menu**, and select **Serial Mode** in the resulting window. See Paragraph SCAURA-5.1 in the User's Guide for more information.
2. Configure the Serial Output module that is connected to TxFile as follows:
 - Set the frequency to 524288
 - Select the Reed-Solomon check box
 - Set the Frame Length and Frame Size values to 256 bytes
 - Set the RS Length value to 32 bytes
3. Configure the Serial Output module that is connected to SCAURA as follows:
 - Set the frequency to 1024, 4096, or 16384
 - Select the Reed-Solomon check box
 - Set the Frame Length and Frame Size values to 256 bytes
 - Set the RS Length value to 32 bytes

4. The Serial Input module should default to the correct setup. Ensure that its configuration agrees with that shown in Paragraph SI-5.1 of the User's Guide.
5. Run the usual telemetry startup scenario file, any special telemetry value setup scenario files desired, then start telemetry transmission by clicking on the **SRL** button of the SCAURA Main Display.
6. To begin playback emulation, follow the TxFile setup directions in the paragraph above and the "Using TxFile to Supply Serial Output" directions in this Attachment.



Attachment E – Resolved Discrepancy Reports

Since this is the first delivery of MPS/Aura, there were no open Discrepancy Reports (DRs) on the system and there were no DRs resolved in MPS/Aura Release 1.0.

Attachment F – Unresolved Discrepancy Reports

Most of the Discrepancy Reports (DRs) and Change Requests (CRs) listed in the following table were written against the MPS/Aqua simulator. They are being carried forward because the software has been ported to MPS/Aura from that simulator. Only DR # ETS0436 is new. The table includes the DR/CR Number, Status, Severity, and a short description. A full description of each DR/CR follows the summary table. Complete information on all DRs/CRs may be accessed via the Internet at <http://iree.gsfc.nasa.gov/ddts/>.

Summary of Open Discrepancy Reports

Critical (Severity 1)	Urgent (Severity 2)	Routine (Severity 3)	Change Request (CR)	Total
0	1	5	3	9

Status Definitions

N – New	A - Assigned Analysis	R - Analysis Entered
V - Assigned Verification	T – Tested	C – Closed
W – Withdrawn	P – Postponed	X – Duplicate

ETS #	SMO No.	Type	Severity	Status	Description
ETS0338	SMOdr05701	CR	3	A	PM MPS sim window management
ETS0343	SMOdr05706	CR	3	A	removing links
ETS0363	SMOdr05924	DR	3	A	Telemetry data values entered by operator are not validated
ETS0378	SMOdr06292	DR	3	A	Packet Sequence count anomaly
ETS0379	SMOdr06294	DR	2	A	Cannot use two output modules for same output
ETS0392	SMOdr06633	DR	3	A	Loading database
ETS0406	SMOdr07803	CR	3	N	MPS Scenario Execution from Command Subfields
ETS0423	SMOdr08499	DR	3	A	MPS-1 Crash During MODIS IOE-1
ETS0436	SMOdr09840	DR	3	N	Nand and Nor functions don't work

DR: SMODR05701 (ETS0338) Related NCR: Submitted: 991103
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 991217

Title: PM MPS sim window management

SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 2.1
Subsystem: MPS-PM/Aqua
Test Phase: unit test
Severity: 3
Date found: 991101
Location: Denver
Submitter: Vince Ruland
Organization: ETS
Phone number: 720-895-4068
Email: vhruland@west.raytheon.com

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Problem (Added 991103 by vruland) *****

Any window brought up or opened will disappear behind the main project screen as soon as it's clicked on. In order to have access to these windows, we have to ensure that a portion of the windows are visible outside of the main screen so they can be clicked on. Suggest a better window management akin to a "start" menu bar in windows that allows the user to select any window at any time, whether it is buried under other windows or not.

***** Analysis Info (Added 991221 by eshurie) *****

Information provided by E. Noone 12/17/99:

Window management is controlled by Win NT. Clicking on the icon in the task bar (which is usually at the bottom of the screen) will get the window to pop to the front.

Initial indication is that no software change may be required.

DR: SMOdr05706 (ETS0343) Related NCR: Submitted: 991103
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 991109

Title: removing links

SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 2.1
Subsystem: MPS-PM/Aqua
Test Phase: unit test
Severity: 3
Date found: 991029
Location: Denver
Submitter: Vince Ruland
Organization: ETS
Phone number: 720-895-4068
Email: vhruland@west.raytheon.com

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Problem (Added 991103 by vruland) *****

There should be an easier way to remove an incorrect link or a link made in error rather than going into the design mode to delete it. After the link is deleted, the create links mode has to be re-entered in order to continue creating links.

***** Admin Comments (Added 991109 by eshurie) *****

Per DRB meeting (11/8/99), the developers stated that the changes needed for this enhancement will be very involved.

DR: SMOdr05924 (ETS0363) Related NCR: Submitted: 991217
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 000117

Title: Telemetry data values entered by operator are not validated

SUBMITTAL INFORMATION	ANALYSIS INFORMATION
Project: ETS	Assignee1/Org: Ernest Quintin
Rel/Ver: 3.0	Phone: 301-805-3649
Subsystem: MPS-PM/Aqua	Email: equintin@csc.com
Test Phase: acceptance test	Assignee2/Org:
Severity: 3	Phone:
Date found: 991217	Email:
Location: GSFC	Date due (Sev=1,2):
Submitter: Ernest Quintin	
Organization: ETS Dev Group	
Phone number: 301-805-3649	
Email: equintin@csc.com	

***** Problem (Added 991217 by equintin) *****
No validation is being performed on the values entered in the Set Directive Window. If the value entered exceeds the number of bits specified for the telemetry point, high order bits are truncated when the packet is built. If you enter a hex value, the telemetry point gets set to zero. Binary values are interpreted as decimal. In addition, the system does not notify the user concerning the invalid entry

DR: SMOdr06292 (ETS0378) Related NCR: Submitted: 000131
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 000202

Title: Packet Sequence count anomaly

SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 3.0
Subsystem: MPS-PM/Aqua
Test Phase: unit test
Severity: 3
Date found: 000128
Location: Denver
Submitter: Vince Ruland
Organization: ECS
Phone number: 720-895-4068
Email: vhruland@west.raytheon.com

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Problem (Modified 000202 by eshurie) *****

When an APID's sequence count is manually edited, the next packet output from the MPS simulator contains the edited number incremented by one instead of the number entered in the edit field.

***** Admin Comment (Modified 000202 by eshurie) *****

(At 01/28/2000 DRB meeting, this DR was approved for Analysis in advance of its imminent submittal to the DRTT.)

DR: SMOdr06294 (ETS0379) Related NCR: Submitted: 000131
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 000215

Title: Cannot use two output modules for same output

SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 3.0
Subsystem: MPS-PM/Aqua
Test Phase: IV&V
Severity: 2
Date found: 000128
Location: GSFC
Submitter: Hillary Shein
Organization: I&T
Phone number: 301-982-5414
Email: hshein@averstar.com

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Problem (Added 000131 by hshein) *****

I attempted to send duplicate telemetry to the PM EMOS system by configuring two output modules to transmit the telemetry stream coming from the simulator module.

When two output modules (with the same output stream) were present, neither output module transmitted data. When the second output module was removed, the original output module transmitted data as expected.

This does not cause a problem with two output modules in the "normal" configuration (one for telemetry and one for CLCW's).

DR: SMOdr06633 (ETS0392) Related NCR: Submitted: 000404
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 000512

Title: Loading database

SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 4.0
Subsystem: MPS-PM/Aqua
Test Phase: unit test
Severity: 3
Date found: 000331
Location: Denver
Submitter: Vince Ruland
Organization: EMOS
Phone number: 720-895-4068
Email: vhruland@west.raytheon.com

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Problem (Added 000404 by vruland) *****
Please describe the problem you are experiencing below, including
what you did, what you expected to happen, and what actually happened:

A user should be able to load a new version of the database into
the SC module without having to cycle the entire project first.

Whenever the apply button is clicked for the Load Database on a
SC module, the previous instance of the database should be purged
before the module loads the new instance.

***** Admin Comment (Modified 000515 by eshurie) *****
At 5/12/00 DRB, the developer got more information on this
request, and will write a memo assessing the difficulty of the
different programming options.

Per DRB on 4/14/00, this DR is on HOLD pending further
contemplation of it by Denver. (Would not be able to be
done within a week.)

DR: SMOdr07803 (ETS0406) Related NCR: Submitted: 000821
Status: NEW Class: ETS Forwarded: 000821

Title: MPS Scenario Execution from Command Subfields
SUBMITTAL INFORMATION

Project: ETS
Rel/Ver: 6.0
Subsystem: MPS-PM/Aqua
Test Phase: unit test
Severity: 3
Date found: 000804
Location: GSFC
Submitter: Ed Weidner
Organization: Other
Phone number: (301)867-0023
Email: eweidner@qssmeds.com

***** Configuration (Added 000821 by eweidner) *****
MPS version 6.0 Beta

***** Admin Comment (Added 000821 by eshurie) *****
8/21/00: Per Carolyn Dent, this DR - Spcfrft_A0104 - is really an
ETS problem and will now be moved from Spacecraft in the drtt to
the ETS class in the drtt. (The spcfrft number will no longer exist)
Email dated 8/21/00 follows:

This appears to be an MPS not a IVVF problem. The problem
should be moved to the ETS with the Element MPS-Aqua or MPS.

Thanks, Carolyn

***** Problem (Modified 000821 by eshurie) *****
The MPS does not currently spawn scenarios from command subfields
(via command scenario file), only from the prime command mnemonic.
Since many commands require subfields to designate the prime
action (such as CERES mode commands for example), this greatly
limits the fidelity of the tool.

Note: This would also require the constraint of only allowing a
command to be listed once in the command scenario file to be
adjusted to either allow multiple times or recognize subfields as
well.

DR: SMOdr08499 (ETS0423) Related NCR: Submitted: 001113
Status: ASSIGNED-ANALYSIS Class: ETS Asgnd-Analysis: 001208

Title: MPS-1 Crash During MODIS IOE-1

SUBMITTAL INFORMATION

Project: ETS
DR Type: Problem
Rel/Ver: 6.0
Subsystem: MPS-PM/Aqua
Module: Simulator
Affected-Requirement:
Test Phase: unit test
Severity: 3
Date found: 001107
Location: GSFC
Submitter: MODIS IOT
Organization: Other
Phone number: 301-614-5025
Email: modiot@mcst.gsfc.nasa.gov

ANALYSIS INFORMATION

Assignee1/Org: Ernest Quintin
Phone: 301-805-3649
Email: equintin@csc.com
Assignee2/Org:
Phone:
Email:
Date due (Sev=1,2):

***** Configuration (Added 001113 by MODIOT) *****
Please describe the current system configuration:

The MPS-1 (Located in the ISR) was brought up on port A4 to be used by the SIM-S configuration. The predefined project for server/client version 6.0 was loaded and database version 000822-005 was ingested. The simulator was configured for nominal 16kbps telemetry. Several scenario files were run via the Command-Scenario capability of the simulator to mimic the functionality of MODIS.

***** Problem (Added 001113 by MODIOT) *****
Please describe the problem you are experiencing below, including what you did, what you expected to happen, and what actually happened:

The MPS-1 ran smoothly for the first five hours of the test. There were no indications of any problems with the simulator.

Abruptly, the server component of the software crashed, leaving the client component disconnected and "lost". The "Dr. Watson" monitoring software caught the crash and produced the standard Windows NT illegal exception violation report. At the time of the crash, the only activity the simulator was performing was standard telemetry broadcasting (no scenario files were executing, and no commands were being interpreted).

Attempts to bring up another instance of the server component for the client component to reconnect to failed to succeed. The client component would not reconnect. The client component had to be exited, and a new instance started to successfully connect to the new server component.

The result of recycling the client component was the complete loss of the state of the simulator at the time of the crash. The client component will reset all telemetry to a default value when it is started, thereby negating

all activities that had been previously performed during the IOE. It took a significant amount of time to restore the simulator's state to what it was prior to the server component crash.

The cause for this software crash was not obvious, and is presently still a mystery. After restarting the server component, it operated without incident for the remainder of the MODIS IOE-1.

[In the past, it has been noted that the MPS server and client components appear to have a memory leak. When the software exits, it does not release the memory allocated to it, etc. Perhaps the crash was caused by over five hours of slow memory leaks. This would explain why the incident did not occur again: the test finished in less than 3 hours after the server component was restarted.]

DR: SMOdr09840 (ETS0436)
Status: NEW

Related NCR:
Class: ETS

Submitted: 010315

Title: Nand and Nor functions don't work
SUBMITTAL INFORMATION

Project: ETS
DR Type: Problem
Rel/Ver: 1.0
Subsystem: Aura
Module: Simulator
Affected-Requirement:
Test Phase: system I&T
Severity: 3
Date found: 010315
Location: GSFC
Submitter: Ernest Quintin
Organization: ETS Dev Group
Phone number: 301-805-3649
Email: equintin@csc.com

***** Problem (Added 010315 by equintin) *****
Please describe the problem you are experiencing below, including
what you did, what you expected to happen, and what actually happened:

The Nor function always returns zero, no matter what input it
is given.

The Nand function always returns an error message indicating that it
cannot find the mnemonic, but it appends the letter n to the mnemonic.
Ex: mod_cr_sr_grat_ch_bn not found

***** History *****
batchbug 010315 112110 Submitted to ETS by equintin
batchbug 010315 112110 Enclosure "Problem" added by equintin

Attachment G – Requirements Matrix

The following Level 4 Requirements list has been adapted from the Proposed Aura Level 4 Requirements list delivered earlier. Since many of the capabilities resulting from these requirements were ported from the Aqua simulator rather than representing work done to produce Release 1.0 of the Aura simulator, those requirements that are new to the Aura simulator and are satisfied with Release 1, are marked with an asterisk (*) in the Release column.

The Date of Insert/Update column may be used together with the Comments column to identify changed requirements and provide easy traceability. When a requirement is changed, a new entry is added just below the existing entry. Rather than being deleted, the original entry will be marked as being superceded.

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-01	1	The MPS/Aura simulator shall be capable of receiving command data as UDP command blocks.		
CMD-02	1	The MPS/Aura simulator shall be capable of configuring command receipt processing in IP mode.		
CMD-02.01	1	The MPS/Aura simulator shall be capable of configuring IP mode command receipt to UDP MULTICAST mode.		
CMD-02.02	1	The MPS/Aura simulator shall be capable of configuring IP mode command receipt to any valid UDP MULTICAST IP address.		
CMD-02.03	1	The MPS/Aura simulator shall be capable of configuring IP mode command receipt to any valid UDP MULTICAST Port number.		
CMD-02.04	1	The MPS/Aura simulator shall be capable of configuring IP mode command receipt to any block length between one and 6000 bytes.		
CMD-03	1	The MPS/Aura simulator shall accept operator directives that enable or disable the following elements of the command validation process: Codeblock BCH Parity Validation, Transfer Frame Header Validation, FARM Protocol Validation, and User Command Packet Header Validation.		
CMD-03.01	1	When the Codeblock BCH parity validation element is enabled, the command subsystem will verify for each codeblock of each received CLTU that the BCH parity byte matches a computed value and that the spare bit is equal to zero. If any codeblock of a CLTU fails validation, an event message will be generated and that entire CLTU will be discarded. When this element is disabled, the parity byte will be assumed to be valid.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-03.02	1*	When the Transfer Frame Header validation element is enabled, the command subsystem will verify that all of the fields of the Transfer Frame header, except the sequence number, match expected values and ranges as defined in the ICD. If the Transfer Frame Header validation fails, an event message will be generated and the entire Transfer Frame will be discarded. If applicable, the CLCW corresponding to that Transfer Frame's virtual channel will be updated with error information. When this element is disabled, the Transfer Frame header values will be assumed to be valid.		Spacecraft ID was changed to 0xCC; otherwise no change from Aqua.
CMD-03.03	1	When the FARM validation element is enabled, the command subsystem will verify that the Transfer Frame sequence number is valid as expected for FARM-1 protocol as defined in the ICD. If the FARM validation fails, an event message will be generated and the entire Transfer Frame will be discarded. If applicable, the CLCW corresponding to that Transfer Frame's virtual channel will be updated with error information. When this element is disabled, the Transfer Frame sequence number will be assumed to be valid.		
CMD-03.04	1	When the Command Packet Header validation element is enabled, the command subsystem will verify that the Command Packet Header fields contain valid values as defined in the ICD. If the Command Packet Header validation fails, an event message will be generated and the Command Packet will be discarded. This requirement is applicable to the spacecraft command packet format and the instrument command packet format. When this element is disabled, the Command Packet Header is assumed to be valid.		
CMD-04	1	The MPS/Aura simulator shall accept operator directives to change all fields of the spacecraft and instrument CLCWs.		
CMD-05	1	The MPS/Aura simulator shall simulate spacecraft command acceptance according to the COP-1 protocol.		
CMD-05.01	1	The MPS/Aura simulator shall perform Type AD spacecraft command acceptance checks in accordance with the FARM-1 protocol if FARM-1 protocol checking is enabled.		
CMD-05.01.1	1	The MPS/Aura simulator shall reject Type AD spacecraft commands and post a command rejected event message if the Lockout bit is set in the spacecraft CLCW.		
CMD-05.01.2	1	The MPS/Aura simulator shall reject Type AD spacecraft commands, post a command rejected message, and set the Lockout bit in the spacecraft CLCW if (1) the Frame Sequence Count in the Transfer Frame header is more than 90 counts greater than or more than 90 counts less than (modulo 256) the Report Value field of the spacecraft CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-05.01.3	1	The MPS/Aura simulator shall reject Type AD spacecraft commands, post a command rejected message, and set the Retransmit bit in the spacecraft CLCW if (1) the Frame Sequence Count in the Transfer Frame header is between one and 90 counts greater than (modulo 256) the contents of the Report Value field of the spacecraft CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		
CMD-05.01.4	1	The MPS/Aura simulator shall reject Type AD spacecraft commands and post a command rejected message if (1) the Frame Sequence Count in the Transfer Frame header is between one and 90 counts less than (modulo 256) the contents of the Report Value field of the spacecraft CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		
CMD-05.01.5	1	The MPS/Aura simulator shall clear the spacecraft CLCW Lockout bit upon receipt of an UNLOCK Control Command (Type BC) containing the spacecraft VCID.		
CMD-05.01.6	1	The MPS/Aura simulator shall set the spacecraft CLCW Report Value field to the data value contained within the third byte of a SET V(R) Control Command (Type BC) containing the spacecraft VCID.		
CMD-05.01.7	1	The MPS/Aura simulator shall increment the Report Value field (modulo 256) of the spacecraft CLCW upon receipt of a Type AD spacecraft command whose Frame Sequence Count matches the current spacecraft CLCW Report Value field contents, provided that FARM-1 protocol checking is enabled.		
CMD-05.02	1	The MPS/Aura simulator shall perform Type AD instrument command acceptance checks in accordance with the FARM-1 protocol if FARM-1 protocol checking is enabled.		
CMD-05.02.1	1	The MPS/Aura simulator shall reject Type AD instrument commands and post a command rejected event message if the Lockout bit is set in the instrument CLCW.		
CMD-05.02.2	1	The MPS/Aura simulator shall reject Type AD instrument commands, post a command rejected message, and set the Lockout bit in the instrument CLCW if (1) the Frame Sequence Count in the Transfer Frame header is more than 90 counts greater than or more than 90 counts less than (modulo 256) the Report Value field of the instrument CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		
CMD-05.02.3	1	The MPS/Aura simulator shall reject Type AD instrument commands, post a command rejected message, and set the Retransmit bit in the instrument CLCW, if (1) the Frame Sequence Count in the Transfer Frame header is between one and 90 counts greater than (modulo 256) the Report Value field of the instrument CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-05.02.4	1	The MPS/Aura simulator shall reject Type AD instrument commands and post a command rejected message if (1) the Frame Sequence Count in the Transfer Frame header is between one and 90 counts less than (modulo 256) the Report Value field of the instrument CLCW <u>and</u> (2) FARM-1 protocol checking is enabled.		
CMD-05.02.5	1	The MPS/Aura simulator shall clear the instrument CLCW Lockout bit upon receipt of an UNLOCK Control Command (Type BC) containing the instrument VCID.		
CMD-05.02.6	1	The MPS/Aura simulator shall set the instrument CLCW Report Value field to the data value contained within the third byte of a SET V(R) Control Command (Type BC) containing the instrument VCID.		
CMD-05.02.7	1	The MPS/Aura simulator shall increment the Report Value field (modulo 256) of the instrument CLCW upon receipt of a Type AD instrument command whose Frame Sequence Count matches the current instrument CLCW Report Value field contents, providing that FARM-1 protocol checking is enabled.		
CMD-06	1	The MPS/Aura simulator shall provide the capability to monitor and display command processing status.		
CMD-07	1	Upon operator request, the MPS/Aura simulator shall store received commands for posttest review subject to specified storage capacities.		
CMD-08	1	The MPS/Aura simulator shall use information from the PDB to perform command identification processing. The Command subsystem shall match command bit patterns received to stored bit patterns to locate command mnemonics in the PDB.		
CMD-09	1	The MPS/Aura simulator shall provide the capability to respond to that subset of spacecraft commands that are defined in the Aura PDB Command Execution Verification (CEV) file. If the PDB CEV file contains end-item verifier telemetry mnemonics associated with the identified command, the associated telemetry point(s) will be set to the corresponding value(s) defined in the CEV file.		
CMD-10	1	The MPS/Aura simulator shall generate a simulator event message whenever a command is received.		
CMD-10.01	1	The MPS/Aura simulator shall generate a simulator event message to display the command mnemonic whenever a valid command is decoded.		
CMD-10.02	1	The MPS/Aura simulator shall generate a simulator event message to display the values of command submnemonics whenever a command containing submnemonics is decoded.		
CMD-10.03	1*	The MPS/Aura simulator shall provide for the storage of command submnemonic values, to be viewable by the operator, for the life of a simulations session.	3/7/2001	NEW

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-11	1	The MPS/Aura simulator shall generate a simulator event message whenever a command error is detected		
CMD-11.01	1	The MPS/Aura simulator shall generate a simulator event message indicating the command error detected whenever a command in error is decoded, provided that command validation is enabled.		
CMD-11.02	1	The MPS/Aura simulator shall generate an event message indicating that an unknown command has been received whenever a command cannot be matched to any PDB entry.		
CMD-12	1	The MPS/Aura simulator shall perform verification of selected fields of the Command Data Block (CDB) header of received commands. The fields to be verified shall be Message Type, Source, Destination, spacecraft identifier (SCID), and Sequence Count.		
CMD-12.01	1	The MPS/Aura simulator shall generate event messages reporting inconsistencies in the verifiable fields of the CDB.		
CMD-12.02	1*	The MPS/Aura simulator shall accept and execute operator directives that set expected values for verification of the CDB header.		Added logic to EOSGS to accept expected Spacecraft ID
CMD-12.03	1	The MPS/Aura simulator shall permit the operator to enable and disable CDB verification.		
CMD-13	1	The MPS/Aura simulator shall receive spacecraft memory and table loads via command blocks and shall store the load data in a load buffer (simulated spacecraft memory.)		
CMD-13.01	1	The MPS/Aura simulator shall perform a validation of the command load data checksum, for those loads that contain a checksum.		
CMD-13.02	1	The MPS/Aura simulator shall permit the operator to inhibit the checksum validation.		
CMD-14	1	The MPS/Aura simulator shall be capable of simulating a spacecraft memory dump of loaded data.		
CMD-14.01	1	The MPS/Aura simulator shall be capable of copying a single memory load from the load buffer to the dump buffer.		
CMD-14.02	1	The MPS/Aura simulator shall permit the operator to inhibit copying the memory load to the dump buffer.		
CMD-15	1	The MPS/Aura simulator shall process commands that request or configure for a spacecraft memory dump.		
CMD-16	1	The MPS/Aura simulator interface with EOC shall comply with the command interface formats and protocols specified in the EDOS to EGS Elements interface document		
CMD-17	1	The MPS/Aura simulator shall be capable of updating multiple command counters in telemetry. The command counters to be updated shall be as agreed upon with Aura project representatives.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
CMD-18	1	The MPS/Aura simulator shall interpret VCID 0 (spacecraft), VCID 1 (instrument), and VCID 16 and 17 (TIE critical) commands.		
CMD-19	1	The MPS/Aura simulator shall be capable of interpreting multipart commands.		
CMD-20	1	The MPS/Aura simulator shall be capable of logging up to 8 MB of received commands during a testing session.		
CMD-21	1	The MPS/Aura simulator shall be capable of receiving spacecraft commands in a CLTU bitstream through the serial interface at rates from 125 bps to 2 Kbps.		REWORDED.
CMD-22		The MPS/Aura simulator shall be capable of receiving spacecraft command packets via a 1553B bus interface.	3/7/2001	NEW. See also requirement GEN-21.
CMD	TBN	The MPS/Aura simulator shall be capable of a <TBN> simulation of spacecraft Stored Command Processing		NEW.
CMD	TBN	The MPS/Aura simulator shall be capable of receiving instrument memory and table loads via command blocks and shall store the load data in a load buffer (simulated memory.)		NEW. Exact capability is TBN.
GEN-01	1	The MPS/Aura simulator shall be Year 2000 compliant		
GEN-02	1	The MPS/Aura simulator shall be capable of maintaining an internally generated time code to a resolution of 125 milliseconds..		REWORDED. RENUMBERED from TLM-33.
GEN-02.01	1	The MPS/Aura simulator shall be capable of setting GMT and simulated spacecraft time as directed by the operator.		REWORDED. GUI-06 is being removed because it is a duplicate of this req.
GEN-03	1	The MPS/Aura simulator shall be capable of executing a scenario script file.		
GEN-03.01	1	The MPS/Aura simulator shall be capable of executing operator directives via a scenario script to update telemetry parameters by mnemonic.		
GEN-03.02	1	The MPS/Aura simulator shall be capable of executing operator directives via a scenario script to retrieve and display the value of any telemetry parameter by mnemonic.		
GEN-03.03	1	The MPS/Aura simulator shall be capable of executing operator directives via a scenario script to start and stop telemetry transmission.		
GEN-03.04	1	The MPS/Aura simulator shall be capable of executing operator directives via a scenario script to start and stop transmission of CLCW packets.		
GEN-03.05	1	The MPS/Aura simulator shall be capable of executing operator directives via a scenario script to enable and disable all elements of command validation that are under operator control. See “CMD” requirements for those command validation elements that are controllable by the operator.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
GEN-03.06		The MPS/Aura simulator shall provide a scenario file container name verification capability, the purpose of which is to verify that all telemetry and command mnemonics appearing in scenario scripts exist in the PDB.		NEW.
GEN-04	1	The MPS/Aura simulator shall be capable of providing files of received or generated test data on electronic and physical media.		
GEN-05	1	The MPS/Aura simulator shall acknowledge an operator request within 2 seconds of its entry.		REWORDED slightly.
GEN-06	1	The MPS/Aura simulator shall start execution of an operator request within 5 seconds of its entry.		REWORDED slightly.
GEN-07	1	The MPS/Aura simulator shall be capable of maintaining an internal time code to a resolution of 125 milliseconds.		TO BE REMOVED. Duplicate of GEN-02.01
GEN-08	1	The MPS/Aura simulator shall comply with the set of display guidelines specified in DSTL-92-007, Human-Computer Interface Guidelines, August, 1992.		
GEN-09	1	The MPS/Aura simulator shall comply with security provisions specified in the NASA Automated Information Security Handbook, NHB 2410.9A.		
GEN-10	1	The MPS/Aura simulator shall comply with the NASA Communications (Nascom) Access Protection Policy and Guidelines.		
GEN-11	1	The MPS/Aura simulator shall provide a hard disk drive with sufficient capacity to store the program bootstrap, executable files, and other simulation environment files, such as the Project Data Base and scenario files used during tests, and a TBD percent reserve.		
GEN-12	1	The MPS/Aura simulator shall provide a physical media storage device that can be used to support the exchange of small amounts of information with external systems and for system backups and data logging.		
GEN-13	1	The MPS/Aura simulator shall be portable.		
GEN-14	1	The MPS/Aura simulator shall provide an Ethernet interface that conforms to 10BaseT of the IEEE 802.3 standard.		
GEN-15	1	The MPS/Aura simulator shall interface with the EOC through the Ethernet interface using the Internet Protocol (IP) suite, including TCP/IP and UDP/IP.		
GEN-16	1	The MPS/Aura simulator shall receive CLTUs in command data blocks from the EOC and output EDUs (packets and CLCWs) to the EOC through the Ethernet interface. All data transfers through this Ethernet interface shall be based on UDP/IP protocol.		REWORDED slightly.
GEN-17	1	The MPS/Aura simulator shall provide a capability to permit modification of the Command End-Item Verifiers file.		REWORDED.

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
GEN-17.01	1	The MPS/Aura simulator Command End-Item Verifiers modification utility shall permit the addition of a single record to the file of end-item verifiers at each invocation.		REWORDED.
GEN-17.02	1	The MPS/Aura simulator Command End-Item Verifiers modification utility shall permit the modification of a single record of the file of end-item verifiers at each invocation. The Low Limit and State Text fields shall be the only fields that may be modified.		REWORDED.
GEN-17.03	1	The MPS/Aura simulator Command End-Item Verifiers modification utility shall permit the deletion of a single record from the file of end-item verifiers at each invocation.		REWORDED.
GEN-18	1	The MPS/Aura simulator shall provide a file selection browse capability.		
GEN-19	1	The MPS/Aura simulator shall provide a configuration save and restore capability.		
GEN-19.01	1	The MPS/Aura simulator shall be capable of saving module configuration information. The information saved shall consist of the modules that constitute a project, and the module links and link source/destination numbers.		
GEN-19.02	1	The MPS/Aura simulator shall be capable of saving configuration information for IP modules, log modules, and Serial modules.		
GEN-19.03	1	The MPS/Aura simulator shall be capable of saving multiple configurations in separate disk files.		REWORDED slightly.
GEN-19.04	1	The MPS/Aura simulator shall permit the operator to name a disk file in which configuration information shall be saved.		
GEN-19.05	1	The MPS/Aura simulator shall permit the operator to restore configuration information upon initialization.		
GEN-19.06	1	The MPS/Aura simulator shall be capable of restoring configuration information from an existing named disk file.		
GEN-19.07	1	The MPS/Aura simulator shall be capable of displaying the names of the disk files containing configuration information when responding to a restore request during initialization.		
GEN-19.08		The MPS/Aura simulator shall be capable of displaying the file creation date when responding to a restore request during initialization.		
GEN-20	1	The MPS/Aura simulator shall be capable of executing multiple scenario script files simultaneously, up to the limit imposed by CPU and memory capacities.		
GEN-20.01	1	The MPS/Aura simulator shall permit the operator full control of scenario script files that the operator has invoked. The control directives available shall consist of START, STOP, PAUSE, and RESUME.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
GEN-20.02	1	The MPS/Aura simulator shall be capable of starting a scenario script in response to a command received. The operator shall not be able to STOP, PAUSE, or RESUME a scenario script started this way.		
GEN-20.03	1	The MPS/Aura simulator shall be capable of invoking a scenario script from within a scenario script. The operator shall not be able to STOP, PAUSE, or RESUME a scenario script started this way.		
GEN-20.04	1	The MPS/Aura simulator shall be capable of displaying the status of all scenario scripts that were started by the operator. This status shall consist of an indication as to whether the scenario script is running, paused, or finished, a display of the current line number, and a display of the directive currently being executed.		
GEN-21		The MPS/Aura simulator shall provide a 1553B bus interface for the purpose of receiving command packets and transmitting telemetry packets.	3/7/2001	NEW. See CMD-22 and TLM-37 requirements for further details.
GEN	TBN	Scenario script processing shall be enhanced to include if/then/else or loop execution based on values in container items in the connected module.		NEW.
GEN	TBN	Scenario script processing shall be enhanced to include triggering from command submnemonics.	3/7/2001	To be deleted. Actual functionality is covered by requirements CMD-10.03 and GEN-20.02.
GEN	TBN	The MPS/Aura simulator shall be capable of selecting packets or VCDUs to be logged from a stream of mixed packets or VCDUs based on <TBN> criteria.		NEW.
GEN	TBD	The MPS/Aura simulator shall provide a limited command generation capability, the purpose of which is to facilitate verification of simulator operational readiness.		NEW.
GEN	TBD	The MPS/Aura simulator shall provide a limited telemetry data quality monitoring capability, the purpose of which is to facilitate verification of simulator operational readiness.		NEW.
GUI-01	1	The MPS/Aura simulator shall accept and validate all operator directives.		
GUI-01.01	1	The MPS/Aura simulator GUI shall maintain a history list of directives entered by the operator. This history list shall store a maximum of 10 operator directives.		
GUI-01.02	1	The MPS/Aura simulator GUI shall permit the operator to re-execute directives stored in the history list.		
GUI-01.03	1	The MPS/Aura simulator GUI shall permit the operator to edit directives stored in the history list.		
GUI-02	1	The MPS/Aura simulator GUI shall provide the capability to display command packets received.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
GUI-03	1	The MPS/Aura simulator GUI shall provide the capability to display telemetry and CLCW packets transmitted.		
GUI-04	1	The MPS-Aura simulator GUI shall provide the capability to display command and telemetry status.		
GUI-05	1	The MPS/Aura simulator GUI shall provide the capability to display the current receive and transmit network configuration to the operator.		
GUI-06	1	The MPS/Aura simulator shall accept and execute operator directives that set spacecraft time and GMT.		TO BE REMOVED – Duplicate of GEN-02.
GUI-07	1	The MPS/Aura simulator shall provide the capability to display the EDOS Service Header appended to transmitted telemetry packets.		
GUI-08	1	The MPS/Aura simulator shall provide the capability to display the Telemetry Packet Header of a selected APID.		
GUI-09	1	The MPS/Aura simulator shall provide the capability to display GMT and Spacecraft times.		
GUI-10	1	The MPS/Aura simulator shall provide the capability to display the current values of the spacecraft and instrument CLCWs.		
GUI-11	1	The MPS/Aura simulator shall provide the capability to display event messages.		
GUI-11.01	1*	The MPS/Aura simulator shall provide the operator with the capability to suppress display of event messages. The filtering mechanism shall be keyed to the event message color.	3/7/2001	NEW. Added to describe functionality provided.
GUI-11.02	1	The MPS/Aura simulator shall log all generated event messages to a disk file.	3/7/2001	Added to describe functionality provided.
GUI-12	1	The MPS/Aura simulator shall provide the capability to display telemetry and CLCW transmit status.		
GUI-13	1	The MPS/Aura simulator shall provide the capability to display command receipt status.		
GUI-14	1	The MPS/Aura simulator shall be capable of updating all displays periodically.		
GUI-15	1	The MPS/Aura simulator shall provide a generic buffer display.		
GUI	TBD	The MPS/Aura simulator shall provide a single display giving the telemetry packet enable status and transmit interval for all APIDs in the PDB.		NEW.
INIT-01	1	The MPS/Aura simulator shall be capable of selecting a desired version of the PDB at operator request during initialization.		
INIT-01.01	1	During initialization, the MPS/Aura simulator shall provide the operator with the capability to select one version of the Aura PDB from among those available.		RENUMBERED from INIT-01.02. Removed original INIT-01.01

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
INIT-01.02	1	During initialization, if the operator does not select a version of the Aura PDB, the MPS/Aura simulator will default to the most recent version available.		RENUMBERED from INIT-01.03
INIT	TBD	Dependence upon Oracle as a database repository shall be removed.		NEW. The SIMSS baseline software is being modified to ingest PDB flat files directly during initialization. The completion date of this activity is TBD.
MDL-01		The MPS/Aura simulator shall provide a telemetry parameter modeling capability. The purpose of this capability is to simulate the behavior of a limited set of telemetry parameters.		The modeling requirements (MDL-n) are Placeholders. The MPS/Aura simulator shall inherit the SIMSS Modeling capability when it achieves sufficient maturity. The completion date of that activity is TBD. The exact modeling requirements are also TBD.
MDL-02		The MPS/Aura simulator shall turn on and off selected modeling under operator control.		
MDL-03		The MPS/Aura simulator shall be capable of changing between static, table, or algorithm models under operator control		
MDL-04		The MPS/Aura simulator shall accept and execute modeling directives that enable or disable selected modeling.		
MDL-05		The MPS/Aura simulator shall accept and execute modeling directives that associate any telemetry parameter with any predefined model.		
MDL-06		The MPS/Aura simulator shall accept and execute modeling directives that change between static, table, or algorithm models.		
MDL-07		The MPS/Aura simulator shall provide the operator with an offline capability to access model functions and coefficients.		
MDL-08		The MPS/Aura simulator shall provide the operator with an offline capability to translate ASCII-formatted files containing static, table, and algorithm modeling information into a binary form readable by The MPS/Aura simulator.		
TLM-01	1	The MPS/Aura simulator shall be capable of switching between IP and serial modes of operation for command receipt and telemetry transmission.		
TLM-02	1	The MPS/Aura simulator shall provide the capability to transmit one stream of telemetry when in IP mode.		
TLM-03	1	The MPS/Aura simulator shall be capable of independently configuring telemetry and CLCW transmit when in IP mode.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-03.01	1	The MPS/Aura simulator shall be capable of transmitting packets containing CLCWs independently of telemetry transmission when in IP mode		
TLM-03.02		The MPS/Aura simulator shall default the CLCW packet transmission rate to 8 packets per second.		NEW.
TLM-03.03		The MPS/Aura simulator shall be capable of adjusting the frequency of CLCW packet transmission under operator control. The purpose of this requirement is to permit the CLCW transmission rate to match that of the telemetry transmission.		NEW.
TLM-03.04	1	The MPS/Aura simulator shall be capable of independently configuring IP mode telemetry and CLCW transmission to UDP MULTICAST mode when in IP mode.		RENUMBERED.
TLM-03.05	1	The MPS/Aura simulator shall be capable of independently configuring IP mode telemetry and CLCW transmission to any valid UDP MULTICAST IP address when in IP mode.		RENUMBERED.
TLM-03.06	1	The MPS/Aura simulator shall be capable of independently configuring IP mode telemetry and CLCW transmission to any valid UDP MULTICAST Port number when in IP mode.		RENUMBERED.
TLM-03.07	1	The MPS/Aura simulator shall be capable of independently configuring IP mode telemetry and CLCW transmission to any block length between one and 6000 bytes when in IP mode.		RENUMBERED.
TLM-03.08	1	The MPS/Aura simulator shall be capable of independently configuring IP mode telemetry transmission to variable block length when in IP mode.		RENUMBERED.
TLM-04	1	The MPS/Aura simulator shall be capable of transmitting one stream of CADUs when in serial mode.		REWORDED.
TLM-04.01	1	When in serial mode, the MPS/Aura simulator shall build S-band I-Channel CADUs as described in the Aura Spacecraft to Ground ICD.		REWORDED.
TLM-04.02	1	When in serial mode, the MPS/Aura simulator shall build and transmit I-Channel Fill CADUs as described in the Aura Spacecraft to Ground ICD when there is not enough telemetry data available to fill a CADU.		REWORDED.
TLM-05	1	The MPS/Aura simulator shall accept and execute operator directives that set the value of any telemetry parameter by mnemonic.		
TLM-06	1	The MPS/Aura simulator shall accept and execute operator directives that set the value of any location in the Aura-simulated spacecraft memory.		
TLM-07	1	The MPS/Aura simulator shall accept and execute operator directives that request the value of any telemetry parameter for display.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-07.01	1	The MPS/Aura simulator shall be capable of displaying telemetry parameter values in decimal raw counts and in Engineering Units		
TLM-07.02	1	The MPS/Aura simulator shall use the PDB to define raw-data-to-EU and EU-to-raw-data conversions for telemetry parameters.		
TLM-07.03	1	The MPS/Aura simulator shall permit the operator to update telemetry parameter values in decimal, hex, and octal raw data numbers, and in Engineering Units.		
TLM-07.04	1	The MPS/Aura simulator shall be capable of displaying multiple telemetry parameter values in a GUI window.		
TLM-07.05	1	The MPS/Aura simulator shall be capable of displaying multiple iterations of a GUI window for display and update of telemetry parameters.		
TLM-07.06	1*	The MPS/Aura simulator shall be capable of accessing telemetry parameters by mnemonic and by parameter ID.	3/7/2001	NEW. Added to describe functionality provided.
TLM-07.07	1*	The MPS/Aura simulator shall be capable of accepting directives to set telemetry values using simple expressions (addition, subtraction, multiplication, etc.), trigonometric functions (sin, cos, etc.), Boolean expressions, the values or other telemetry parameters, and any combination thereof.	3/7/2001	NEW.
TLM-08	1	The MPS/Aura simulator shall accept and execute operator directives that request the contents of any telemetry packet.		
TLM-09	1	The MPS/Aura simulator shall accept and execute operator directives that request the value of any location or block of locations in simulated spacecraft memory.		
TLM-10	1	The MPS/Aura simulator shall set initial telemetry parameter values from information extracted from the Aura PDB.		REWORDED.
TLM-11	1	The MPS/Aura simulator shall accept and execute operator directives that result in changes to telemetry packet header values.		
TLM-12		The MPS/Aura simulator shall accept and execute telemetry directives that control the Aura Solid State Recorder.		PLACEHOLDER. Exact requirement is TBN. A low fidelity emulation may be achieved through the use of scenario scripts.
TLM-13	1	The MPS/Aura simulator shall provide for the storage of housekeeping telemetry to be used as playback data.		
TLM-14	1	The MPS/Aura simulator shall use the information from the Aura PDB to generate and transmit telemetry packets.		
TLM-14.01	1	The MPS/Aura simulator shall be capable of creating CCSDS-format telemetry packets from information contained in the Aura PDB telemetry packet specification file.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-14.02	1	The MPS/Aura simulator shall provide the capability to generate and transmit telemetry packets with APIDs identical to the Aura spacecraft.		
TLM-14.03	1	The MPS/Aura simulator shall use the APID and secondary key fields of the Aura PDB packet definition file to identify unique packets.		
TLM-14.04	1	The MPS/Aura simulator shall generate a telemetry packet for each unique combination of APID and secondary key.		
TLM-14.05	1	The MPS/Aura simulator shall accept and execute operator directives to set the packet generation rate for any APID defined in the Aura PDB.		
TLM-14.06	1	The MPS/Aura simulator shall populate the telemetry packet primary header fields in the following list in accordance with information obtained from the Aura Spacecraft to Ground ICD and applicable CCSDS documents: Version Number, Type, Secondary Header Flag, APID, Sequence Flag, Sequence Count, and Packet Length.		
TLM-14.07	1	The MPS/Aura simulator shall place the secondary key into the telemetry packet at the offset specified by the Aura PDB telemetry packet specification file and shall use the number of bits specified by that file.		
TLM-14.08	1	The MPS/Aura simulator shall generate a telemetry packet secondary header in accordance with the secondary header type (SC, GIRD, or None for SUROM-TIE packets) implied by the contents of the packet type field of the Aura PDB telemetry packet specification file. For each secondary header type, the contents shall be as described in applicable sections of the Aura Spacecraft to Ground ICD.		
TLM-15	1	The MPS/Aura simulator shall insert simulated spacecraft time in the telemetry packet headers		
TLM-16	1	The MPS/Aura simulator shall maintain data values for all telemetry parameters defined in the PDB telemetry parameter specification file. These data values shall be available for display to the operator and for inclusion into telemetry packets.		
TLM-16.01	1	The MPS/Aura simulator shall be capable of inserting telemetry point values into packets using information from the Aura PDB telemetry description and telemetry parameter specification files.		
TLM-16.02	1	The MPS/Aura simulator shall use the APID and secondary key fields of the PDB telemetry parameter specification file to determine the correct packet for each telemetry parameter.		
TLM-17	1	The MPS/Aura simulator shall send out telemetry packets at specified intervals of spacecraft time. These specific intervals shall be as defined by the PDB for each APID and secondary key combination and shall be modifiable by the operator.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-18	1	The MPS/Aura simulator shall be capable of simulating spacecraft memory dumps. The MPS/Aura simulator shall build packets based on the contents of the simulated spacecraft memory.		REWORDED.
TLM-19	1*	The MPS/Aura simulator shall accept and execute directives that start and stop transmission of telemetry data.		REWORDED.
TLM-19.01		The MPS/Aura simulator shall start transmission of telemetry and CLCW packets upon receipt of a start telemetry directive when in IP mode, unless startup of CLCW packet transmission is inhibited. In that case only telemetry packet transmission shall be started.		NEW. SUPERCEDED.
	1*	The MPS/Aura simulator shall start transmission of telemetry and CLCW packets upon receipt of a start telemetry directive when in IP mode, unless startup of CLCW packet transmission is unlinked from telemetry startup. In that case only telemetry packet transmission shall be started.	3/7/2001	Reworded.
TLM-19.02		The MPS/Aura simulator shall stop transmission of telemetry and CLCW packets upon receipt of a stop telemetry directive when in IP mode.		NEW. SUPERCEDED.
	1*	The MPS/Aura simulator shall stop transmission of telemetry and CLCW packets upon receipt of a stop telemetry directive when in IP mode, unless stopping of CLCW packet transmission is unlinked from telemetry stop. In that case only telemetry packet transmission shall be stopped.	3/7/2001	Reworded.
TLM-19.03	1*	The MPS/Aura simulator shall be capable of starting and stopping the transmission of CLCW packets independently of telemetry transmission when in IP mode.		NEW.
TLM-19.04		The MPS/Aura simulator shall be capable of setting a flag, under operator control, which, when set, shall inhibit startup of CLCW packet transmission when telemetry transmission is started in IP mode.		NEW. SUPERCEDED.
	1*	The MPS/Aura simulator shall be capable of maintaining a flag, under operator control, which, when set, shall link startup of CLCW packet transmission to telemetry transmission startup when in IP mode.	3/7/2001	Reworded.
TLM-20	1	The MPS/Aura simulator shall accept and execute operator directives that start and stop logging of telemetry and CLCWs independently.		
TLM-21	1	The MPS/Aura simulator shall generate EDUs and EDOS data headers based on the User Datagram Protocol (UDP) format defined in the EDOS External ICD Data Format Control Document.		
TLM-22	1	The MPS/Aura simulator shall allow modification of any field within the EDOS data header.		

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-23	1	The MPS/Aura simulator shall provide the capability of transmitting the CLCW in the form of EDUs to EOC through EBnet.		
TLM-24	1	The MPS/Aura simulator shall provide the capability to enable and disable the transmission of CLCW EDUs.		TO BE REMOVED. Duplicate of TLM-19.03.
TLM-25	1	The MPS/Aura simulator shall provide for the storage of EDUs during the testing session for later transmission.		
TLM-26	1	The MPS/Aura simulator shall transmit EDUs on an as built basis.		
TLM-27	1	The MPS/Aura simulator shall provide the capability to transmit EDUs using the UDP protocol.		
TLM-28	1	The MPS/Aura simulator interface with the EOC shall comply with the telemetry interface formats and protocols specified in the EDOS to EGS Elements interface document		
TLM-29	1	The MPS/Aura simulator, when acting as a spacecraft, shall comply with the telemetry data formats and protocols specified in the TGT to EDOS interface document.		RENUMBERED from PMTLM-31.
TLM-30	1	The MPS/Aura simulator, when acting as an EPGS, shall comply with the telemetry data formats and protocols specified in applicable interface documents for the EPGS to EDOS interface.		RENUMBERED from PMTLM-32.
TLM-31	1	The MPS/Aura simulator shall provide the capability to accept Aura telemetry data by electronic transmission and by physical media.		RENUMBERED from PMTLM-33.
TLM-32	1	The MPS/Aura simulator shall be capable of transmitting the contents of a user provided file containing Aura telemetry data.		RENUMBERED from PMTLM-34.
TLM-33	1	The MPS/Aura simulator shall set, adjust, and operate the spacecraft clock as commanded.		TO BE REMOVED. Duplicate of GEN-02.
TLM-34	1	The MPS/Aura simulator shall provide the capability to store up to 8MB of transmitted EDUs.		RENUMBERED from PMTLM-38.
TLM-35	1	The MPS/Aura simulator shall be capable of modifying multiple consecutive buffer locations via a single operator directive.		RENUMBERED from PMTLM-39.
TLM-36		The MPS/Aura simulator shall be capable of a limited simulation of clock correlation telemetry. The details of the implementation of this requirement are TBD.		RENUMBERED from PMTLM-40. SUPERCEDED.
	1*	The MPS/Aura simulator shall be capable of a limited simulation of clock correlation telemetry. This simulation shall be limited to populating APID 1000 packets with simulated time and a simulated VCDU sequence counter value, as described in the Aura Spacecraft to EOS Ground System ICD	3/7/2001	Reworded to describe functionality provided. GIIS time, required in the Aqua simulator, has been removed.

Attachment G – Requirements Matrix

MPS/Aura Requirement	Release	MPS/Aura Requirement Description	Date of Insert/Update	Comments
TLM-36.1	1	The MPS/Aura simulator shall maintain correlation between the simulated VCDU sequence counter transmitted in APID 1000 packets and in CLCW packets, when operating in IP mode.	3/7/2001	Added to describe functionality provided.
TLM-36.2	1	The MPS/Aura simulator shall maintain correlation between the simulated VCDU sequence counter transmitted in APID 1000 packets and the enclosing CADU, when operating in Serial mode.	3/7/2001	Added to describe functionality provided.
TLM-37		The MPS/Aura simulator shall be capable of transmitting telemetry packets over a 1553B interface, employing multiple subaddresses.	3/7/2001	NEW. See also requirement GEN-21.
TLM		The MPS/Aura simulator serial output shall be modified to work correctly with the Serial module event-driven handshaking.		
TLM	TBD	The MPS/Aura simulator shall be capable of reading telemetry packets from a disk file and interleaving them into the stream of simulator-generated packets.		NEW.
TLM	TBN	The MPS/Aura simulator shall be capable of simulating an instrument memory dump of loaded data.		NEW. The exact capability is TBN.
TLM	1	The MPS/Aura simulator shall be capable of starting and stopping IP-mode telemetry and CLCW transmission via a single operator directive.	3/7/2001	To be removed. Implemented as part of TLM-19.
TLM	TBN	The MPS/Aura simulator shall be capable of a <TBN> simulation of Solid State Recorder operation.		NEW.

The requirements defined as To Be Determined (TBD) and/or To Be Negotiated (TBN) are capabilities that may be added to the MPS/Aura simulator. The exact Level 4 requirements will be defined after negotiation of the desired capability.

Attachment H – System Limitations

H.1 MPS/Aura Release 1.0 Limitations

The following limitations apply to MPS/Aura Release 1.0. Some of these are Discrepancy Reports (DRs) against SIMSS baseline products and have been recorded in their DR repository.

Problem Description	Workaround
The event message window can accept no more than 50 messages per second. The Scenario module can easily overrun this limit and flood the GUI with messages.	Use Sleep directives to slow scenario files to 50 directives per second or less. Note: This is an improvement since Release 6.0 of the MPS/Aqua simulator.
The Generic Container Buffer display is limited to 1400 bytes of data (= 700 words, or 350 double words). A request for more data than that will result in a display of 1400 bytes of information. <i>This is SIMSS Defect # 102.</i>	To view data that is beyond byte 1400 of the buffer, set the offset to 1400, or as required to view the data.
If a container item name such as a telemetry mnemonic is entered into multiple displays of the <i>Display/Set Container Items...</i> window and updated in a higher numbered display, the update will not be reflected in lower numbered display(s).	Do not duplicate container item names unless absolutely necessary.
The scenario file names display window can only accept 1400 bytes of information. If the file names in the folder total more than 1400 bytes, the excess will not be displayed. <i>This is SIMSS Defect # 212. This defect was written against the Server crash upon attempt to display more than 1400 characters of filenames.</i>	If the desired file does not appear in the file selection window, it may be started by typing its name in the filename entry line. Alternatively, one may keep the number of files low by spreading files among two or more folders.
After the first scenario script is started the default folder reverts to the server folder.	Double-click on the scenario folder icon in the file selection window. This will cause the simulator to read and display the contents of the scenario folder.
Occasionally the scenario file selection display becomes unreadable.	Pressing the Page Down then the Page Up key will restore the display.

Problem Description	Workaround
When using SQL*Plus to select entries from the Oracle calcurve table via the conversion type field, <i>conv_type</i> , it is necessary to put a space after the type entry. e.g. “U_5D “, not “U_5D”.	Given at left.
The module TxFile cannot accept blank space in the filename or path given to it.	Place files to be transmitted by TxFile into the root of the drive, or create a path with no spaces in the folder names.
IP addresses that contain leading zeros will be interpreted differently from those that do not have leading zeros. ex. 239.020.002.005 is not equal to 239.20.2.5	Don’t put leading zeros on IP addresses when setting up the input IP and output IP modules.
<p>The nand and nor Boolean functions do not work.</p> <p><i>This is SIMSS Defect # 312. It has also been recorded in DRTT as DR # SMOdr09840.</i></p>	<p>Since nand is equivalent to and-not, the following will work: AND the mnemonic with the desired operand NEGATE the result SUBTRACT one from that result.</p> <p>Example: set mnem 13 set mnem = mnem and 7 {result is 5} set mnem = - mnem - 1 {result is -6}</p> <p>Since nor is equivalent to or-not, the following will work: OR the mnemonic with the desired operand NEGATE the result SUBTRACT one from that result.</p>

Attachment I - Release History Summary Matrix

Attached is the release history summary matrix, which reflects the MPS/Aura Release 1.0 delivery. Modules inherited from the SIMSS baseline have the SIMSS Release Number, while the MPS/Aura modules EOSGS and SCAURA have the current MPS/Aura Release Number.

Release History Summary Matrix

System: **MPS/Aura**

Release Number		1.0												
Delivery Date		3/16/01												
Configuration Item	CI No.													
Core (Client)	1.1	4.0												
Core (Server)	1.2	4.0												
SCAURA (Client)	1.3	1.0												
SCAURA (Server)	1.4	1.0												
EOSGS (Client)	1.5	1.0												
EOSGS (Server)	1.6	1.0												
IP Input (Client)	1.7	4.0												
IP Input (Server)	1.8	4.0												
IP Output (Client)	1.9	4.0												
IP Output (Server)	2.0	4.0												
Logging (Client)	2.1	4.0												
Logging (Server)	2.2	4.0												

Delivery Date		3/16/01												
Configuration Item	CI No.													
Scenario (Client)	2.3	4.0												
Scenario (Server)	2.4	4.0												
Serial Input (Client)	2.5	4.0												
Serial Input (Server)	2.6	4.0												
Serial Output (Client)	2.7	4.0												
Serial Output (Server)	2.8	4.0												
TxFile (Client)	2.9	4.0												
TxFile (Server)	3.0	4.0												

Attachment J - Delivery Details

J.1 Software

A complete listing of the MPS/Aura software file names is available upon request.

J.2 Hardware for MPS/Aura

No new hardware is being delivered for MPS/Aura. The existing PCs on which the MPS/Aura simulator runs may also be used to run the MPS/Aura simulator.

J.2.1 Hardware for MPS/Aura units in GSFC, Building 32

There are two CSOC-owned PCs presently installed in Building 32.

PC #1:

Qty	Common Name	Model [Serial No.]	Mfg	CSOC No.	Description
1	Computer	E-4200 001-343-8943	Gateway	C0060047	Intel Pentium II 400 Mhz w /512 Cache, 256 MB SDRAM PC100 6ns Micron, Matrox Millenium II 8MB AGP Video card, Toshiba 32x SCSI CD ROM Drive, Seagate 9.1 GB hard disk, IOMEGA 100 mb internal zip drive
1	Monitor	VX1100 811053233	Gateway	C0060041	21" Monitor
1	Mouse	Intellimouse 2570734- 10000	Gateway		
1	Keyboard	Q9045A1837	Gateway		
1	Timing Card	PCIDCC20-P	Industrial Computer Source		PCI counter/timer card
2	Serial I/O Cards	97B1423 97B1424			Mfg name is FASTCOMESCC/P

PC #2:

Qty	Common Name	Model [Serial No.]	Mfg	CSOC No.	Description
1	Computer	E-4200 001-343-8944	Gateway	C0060050	Intel Pentium III 450 Mhz w /512 Cache, 256 MB SDRAM PC100 6ns Micron, Matrox Millenium II 8MB AGP Video card, Toshiba 32x SCSI CD ROM Drive, Seagate 9.1 GB hard disk, IOMEGA 100 mb internal zip drive
1	Monitor	VX1100 811053233	Gateway	C0060041	21" Monitor
1	Mouse	Intellimouse	Gateway		
1	Keyboard		Gateway		
2	Serial I/O Cards	97B1428 97B1429			Mfg name is FASTCOMESCC/P

J.2.2 Hardware for MPS/Aura at Denver

There is one CSOC-owned PC at Denver.

Qty	Common Name	Model [Serial No.]	Mfg	CSOC No.	Description
1	Computer	E-4200 001-343-8946	Gateway	C0060052	Intel Pentium III 450 Mhz w /512 Cache, 256 MB SDRAM PC100 6ns Micron, Matrox Millenium II 8MB AGP Video card, Toshiba 32x SCSI CD ROM Drive, Seagate 9.1 GB hard disk, IOMEGA 100 mb internal zip drive
1	Monitor	VX1100 811053230	Gateway	C0060043	21" Monitor
1	Mouse	Intellimouse	Gateway		
1	Keyboard		Gateway		

Attachment K - Documentation References

The following documents have been employed as the main sources for direction and information in producing Release 1.0 of the MPS/Aura simulator. The Data Format Control Document (DFCD) for Aura is not yet available so the PM-1 (Aqua) DFCD, which is understood to be very similar, was used.

Document	Location*
Earth Observing System (EOS) Common Spacecraft Program Interface Control Document between the EOS Aura Spacecraft and the EOS Ground System, Dated April 15, 2000, Document No. D27515, Preliminary (more commonly known as "The Space to Ground ICD")	1
Data Format Control Document for the Earth Observing System (EOS) Mission Operations Segment (EMOS) Project Database Volume 1: PM-1 Users Revision -, dated January 2000	4
TRW, EOS Chemistry Spacecraft Flight Software Requirements Specification, ES-SDA-005, Rev. A, dated 23 August, 2000	1
TRW, EOS Aura Spacecraft Flight Software User's Guide, No.: D31189, version dated 15 September, 2000	1
TRW, EOS Aura Command Allocation Document, No.: D31174, dated July 27, 2000	1
TRW, EOS Aura Telemetry Allocation Document, No.: D31175, dated September 22, 2000	1
TRW, EOS PM-1 Spacecraft Equipment Specification for Transponder Interface Electronics, No.: EQ4-4957, latest version dated 11 February, 1999	1
TRW, Interface Control Document Between the Earth Observing System (EOS) Data and Operations System (EDOS) and the EOS Ground System (EGS) Elements CDRL B301	2
Consultative Committee for Space Data Systems, CCSDS 102.0-B-4: Packet Telemetry Blue Book, Issue 4, Nov. 1995	3
--, CCSDS 202.1-B-1: Telecommand Part 2.1 – Command Operations Procedures Blue Book, Issue 1, Oct. 1995	3
NASA, GSFC, Earth Observing System Data and Information System (EOSDIS) Test System (ETS) Review Version of Level 4 Requirements for the MPS/Aura, December 5, 2000	5

*Location Legend:

Number	Designation
1	TRW web server (URL not listed for security reasons)
2	http://esdis-it.gsfc.nasa.gov:8080/servlet/DOCcat?nCatType=ICD
3	http://ccsds.org/publications.html
4	ftp://198.118.192.20/pub/fot/pm1/pdb/DFCD/
5	http://esdis-it.gsfc.nasa.gov/ETS/etsdoc.html

Attachment L — Mission Systems Configuration Management Form

This attachment contains the completed Mission Systems Configuration Management (MSCM) form for the delivery of MPS/Aura Release 1.0.

Mission Systems Configuration Management Form

<u>1. ORIGINATOR</u> Dave Green	<u>2. ORGANIZATION</u> CSC	<u>3. PHONE</u> 301-805-3420	<u>4. E-MAIL ADDRESS</u> dsgreen@csc.com		
<u>5. ELEMENT</u> ETS (MPS/Aura)		<u>6. INSTALLATION PRIORITY</u> Routine	<u>7. TRACKING NUMBER</u> (Assigned by CM Office)		
<u>8. SOURCE CHANGE REQUEST(S):</u> ETS delivery of MPS for EOS Aura (MPS/Aura)		<u>9. APPROVALS</u> Element Manager _____ / / Flight Ops Director _____ / / Operations Manager _____ / /			
<u>10. DELIVERED SYSTEM</u> (Check all that apply)					
	Name	Version	Media Identification	Identification Date	
<input type="checkbox"/>	Hardware	_____	_____	_____	
<input checked="" type="checkbox"/>	Software	MPS/Aura	R1.0	CD-ROM	03/16/01
<input type="checkbox"/>	Database	_____	_____	_____	
<input checked="" type="checkbox"/>	Documentation:				
	MPS/Aura delivery package	N/A	3.5 " Diskette	03/16/01	
	MPS/Aura Release 1 User's Guide	R1.0	http://esdis-it.gsfc.nasa.gov/ETS/etsdoc.html	TBS	
<input type="checkbox"/>	Other	_____	_____	_____	
<u>11. CHANGE DESCRIPTION</u> Release 1.0 of MPS/Aura (MPS/Aura) _____ _____					
<u>12. ATTACHMENT(S):</u> Check if YES <input checked="" type="checkbox"/> Description: MPS/Aura Release 1.0 delivery package (cover letter with attachments) dated 03/16/01 _____					
<u>13. CM OFFICE USE</u>					
	Location (Bldg/Room)	Slot location(s)			
Hardware	_____ / _____	_____			
Media	_____ / _____	_____			
Documentation	_____ / _____	_____			
Installation date	_____ / _____ / _____	CM Office Signature _____			

Form MSCM (970327)