



**ascari**

**Automation GUI  
and SECSML  
v1.5**

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## Who Is This Guide For?

This guide is intended for the person who performs all or some of the following functions:

- Equipment Characterisation
- Equipment Automation Development

This guide will refer to the following related manuals:

- Ascari Automation Implementation Guide
- Ascari Automation State Modeller Guide

## Additional Copies of This Guide

If you want additional printed copies of this Guide please contact Ascari at [www.ascari-it.com](http://www.ascari-it.com)

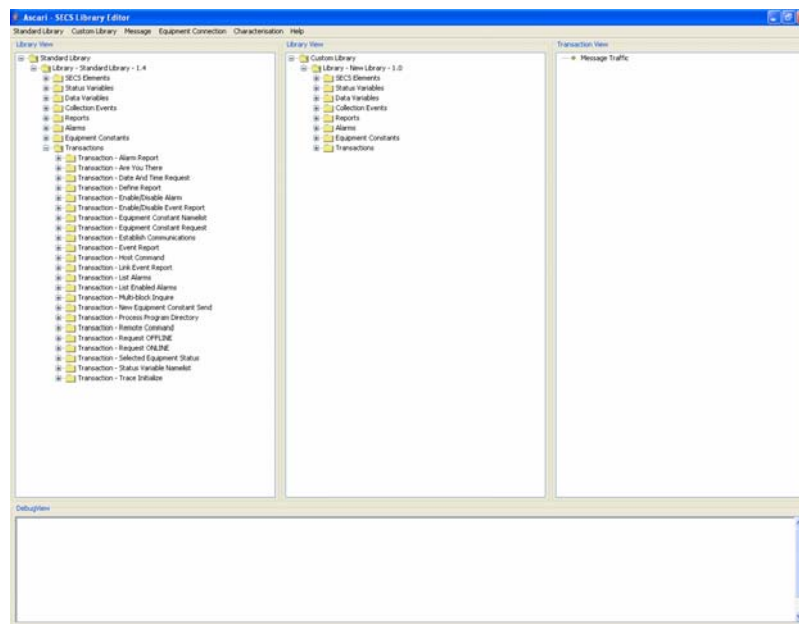
# Introduction to the Automation GUI

## What is the Automation GUI?

The Ascari Automation GUI is a JAVA™ program that allows rapid implementation of automated equipment interfaces. The GUI provides a number of features:

- The ability to build a driver used for implementation in an automation environment
- The ability to characterise a SECS-II compliant tool
- The ability to 'listen' to tool messages within a running scenario to build up the SECS-II driver
- A preconfigured SECS-II compliant stream and function library to be used as a template for developing your own driver
- A tool to easily develop tool and version specific SECS-II stream and function library's with only the SECS-II components needed for the automation transactions required

## Screen Layout



The Automation GUI display is split into three distinct panes. For the purposes of this document the panes will be referred to as Standard, Custom and Transaction reading from left to right.

## Standard Pane

Once loaded the Standard pane shows a SECS-II compliant library already supplied with the GUI. Any updates to this library will be made available to licensed users of the Automation GUI free of charge. The version of the standard library supplied and currently being used is shown in the standard library tree structure.

## Custom Pane

The Custom pane is where you will create a new, or load an existing custom library and build up the SECS-II components you will need for automating a particular tool. Note that you do not need to build up ALL transactions, only the ones necessary for a particular automated scenario. The components are built up by dragging items from the Standard pane and dropping them into the appropriate section of the Custom pane.

## Transaction Pane

The Transaction pane shows responses from the tool connected.

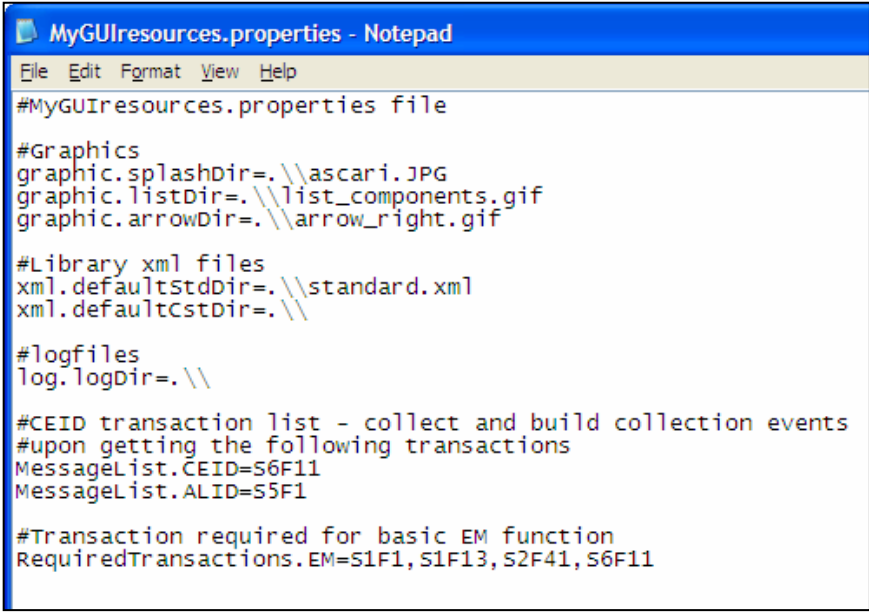
The Transaction pane shows both sent and received messages, populated with sent and returned data, from the equipment to which the product has established a connection.

## DebugView Pane

The DebugView pane shows additional informational messages.

## Configuring the Properties File

The GUI is highly configurable in many different ways. Using the '.properties' file packaged with this product it is possible to configure graphic and xml file directories, log file locations and message listings by stream and function for the picking up of Event Reports and Alarm Reports. An example properties file is shown below:



```
MyGUIresources.properties - Notepad
File Edit Format View Help
#MyGUIresources.properties file
#Graphics
graphic.splashDir=\\.\\ascari.JPG
graphic.listDir=\\.\\list_components.gif
graphic.arrowDir=\\.\\arrow_right.gif
#Library xml files
xml.defaultStdDir=\\.\\standard.xml
xml.defaultCstDir=\\.\\
#logfiles
log.logDir=\\.\\
#CEID transaction list - collect and build collection events
#upon getting the following transactions
MessageList.CEID=S6F11
MessageList.ALID=S5F1
#Transaction required for basic EM function
RequiredTransactions.EM=S1F1,S1F13,S2F41,S6F11
```

The properties file can also specify any standard transactions required by the Equipment Manager that should be automatically incorporated into the Custom Pane. This is shown in the last section of the above properties file.

The GUI should always be restarted after any change to the '.properties' file as the changes are picked up upon starting the application.

## Menus and Right Mouse Click

Subsets of the menus available in the GUI are accessible by clicking the right mouse button or "right clicking". The menus will be context based.

## Summary Procedure Steps

The steps to creating an automated interface using the GUI are as follows:

- Open the GUI and ensure that a standard library is loaded.
- An existing saved custom library file can be loaded for editing, alternatively the default blank custom library can be utilised.
- Drag transactions from the standard library to the custom library, any associated SECS-II Elements will automatically be placed in the relevant section of the Custom Pane.
- If required, edit existing transactions or, create new transactions in accordance with the message or transaction format specified in the equipments GEM SECS-II manual.
- For any transaction that may require input data such as a PPID (Process Program ID) or a MID (Material ID) etc. an alias should be provided in the format of '\$Var', for example \$PPID or \$MID would be suitable aliases. A value should also be entered for the specified alias.
- Once you are satisfied save a copy of the newly compiled custom library.
- Connect to the tool.
- Use the characterisation menu to list and store status variables and equipment constants in their respective sections of the custom library.
- Send transactions to the tool from the GUI.
- Verify responses.
- Any 'Equipment to Host' primary messages will automatically appear in the Transaction Pane and will have an entry in the transaction log file.
- Save the library upon completion of characterisation.
- The transaction log can be viewed after the characterisation session in order to view the transactions sent and received throughout the execution of a specific scenario during a session.

# Establishing Tool Connection

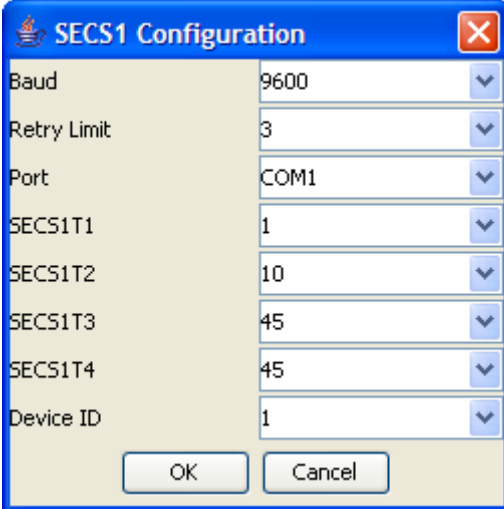
## Physical Connection

The details of physical connection to the tool are beyond the scope of this manual. It is assumed that a physical connection to the tool via either RS-232-C (SECS-II I), HSMS (High-Speed SECS-II Message Services) or TCP-IP/TELNET has already been achieved.

## Configuring SECS-II Serial Communication

If communication with the tool is via RS-232-C then the following menu option should be used:

**MENU** Equipment Connection → Configure SECS-II 1



Setting	Value
Baud	9600
Retry Limit	3
Port	COM1
SECS1T1	1
SECS1T2	10
SECS1T3	45
SECS1T4	45
Device ID	1

The settings in this menu must correspond to the settings in the associated configuration for the port on the tool. Baud rate, SECS-II timers and the Device ID can be equipment specific and should be set in accordance with their respective settings on the equipment.

<b>Baud</b>	<i>The baud rate of the port.</i>
<b>Retry Limit</b>	<i>The number of retries.</i>
<b>Port</b>	<i>The port that is to be used for the communication on your own laptop or pc.</i>
<b>SECSIT1</b>	<i>Timer T1: Time period for inter-character timeout in the block transfer protocol.</i>
<b>SECSIT2</b>	<i>Timer T2: Time period for timeout in the block transfer protocol.</i>
<b>SECSIT3</b>	<i>Timer T3: Time period for reply timeout in the message protocol.</i>
<b>SECSIT4</b>	<i>Timer T4: Time period for inter-block timeout in the message protocol.</i>
<b>Device ID</b>	<i>A 15-bit field used to identify the device.</i>

## Configuring HSMS Communication

If communication with the tool is via HSMS then the following menu option should be used:

**MENU** Equipment Connection → Configure HSMS

Field	Value
Connection Mode	PASSIVE
Local Port	5000
Remote Port	5001
Local IP	127.0.0.1
Remote IP	127.0.0.1
Link Test Timer	1000
HSMST3	45
HSMST5	10
HSMST6	5
HSMST7	5
HSMST8	20
Device ID	1

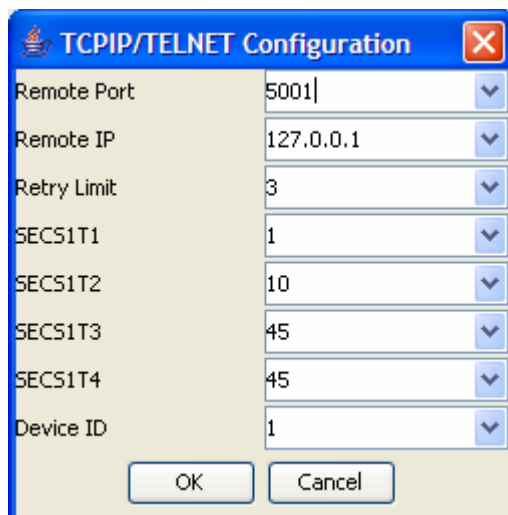
The settings in this menu must correspond to the settings in the associated configuration for the port on the tool.

<b>Connection Mode</b>	<i>PASSIVE or ACTIVE.</i>
<b>Local Port</b>	<i>The port upon the local device (where the GUI is running)</i>
<b>Remote Port</b>	<i>The port upon which the target equipment listens remotely.</i>
<b>Local IP</b>	<i>The IP address of the local device (where the GUI is running).</i>
<b>Remote IP</b>	<i>The IP address of the equipment targeted for characterisation.</i>
<b>Link Test Timer</b>	<i>Length of time for lower level heartbeat (zero value means no heartbeat).</i>
<b>HSMST3</b>	<i>Timer T3: Time period for reply timeout in the HSMS protocol.</i>
<b>HSMST5 protocol.</b>	<i>Timer T5: Time period for connect separation timeout in the HSMS</i>
<b>HSMST6</b>	<i>Timer T6: Time period for control timeout in the HSMS protocol.</i>
<b>HSMST7</b>	<i>Timer T7: Time period for connection idle timeout in the HSMS protocol.</i>
<b>HSMST8</b>	<i>Time T8: Time period for network inter-character timeout in the HSMS protocol.</i>
<b>Device ID</b>	<i>A 15-bit field used to identify the device.</i>

## Configuring TCP-IP/TELNET Communication

If communication with the tool is via TCP-IP/TELNET then the following menu option should be used:

**MENU** Equipment Connection → Configure TCP-IP/TELNET



The settings in this menu must correspond to the settings in the associated configuration for the equipment. Remote Port, Remote IP, SECS-II timers and the Device ID can be equipment specific and should be set in accordance with their respective settings on the equipment.

<b><i>Remote Port</i></b>	<b><i>The port upon which the target equipment listens remotely.</i></b>
<b><i>Remote IP</i></b>	<b><i>The IP address of the equipment targeted for characterisation.</i></b>
<b><i>Retry Limit</i></b>	<b><i>The number of retries.</i></b>
<b><i>SECSIT1</i></b>	<b><i>Timer T1: Time period for inter-character timeout in the block transfer protocol.</i></b>
<b><i>SECSIT2</i></b>	<b><i>Timer T2: Time period for timeout in the block transfer protocol.</i></b>
<b><i>SECSIT3</i></b>	<b><i>Timer T3: Time period for reply timeout in the message protocol.</i></b>
<b><i>SECSIT4</i></b>	<b><i>Timer T4: Time period for inter-block timeout in the message protocol.</i></b>
<b><i>Device ID</i></b>	<b><i>A 15-bit field used to identify the device.</i></b>

## Building the Custom Library

### Standard Library Pane

This is a read-only pane and has two commands:

**MENU** Standard Library → Load Standard Library

This menu will load or re-load the standard SECS-II library.

**MENU** Standard Library → Close Standard Library

This menu closes the standard SECS-II library currently open.

The standard library has been pre-built and conforms to the SECS-II Standard. The version of the standard library supplied and currently being used is shown in the standard library tree structure.

### Custom Library Pane

#### Loading or Creating a Custom Library

This is the main working pane and is used to build the transactions required for the tool you are automating. On first opening the GUI a new custom library is automatically created for you. To load a custom library that you have previously created and saved, simply use the command:

**MENU** Custom Library → Load Custom Library

To create a new library use the menu command:

**MENU** Custom Library → Create Custom Library

#### Saving A Custom Library

To save a custom library, simply use the menu command:

**MENU** Custom Library → Save Custom Library

The default location for your files is specified in the GUI properties file shipped with this product.

### Adding Library Items

Library items can be added to the following library sections:

- Status Variables
- Data Variables
- Collection Events
- Alarms
- Transactions

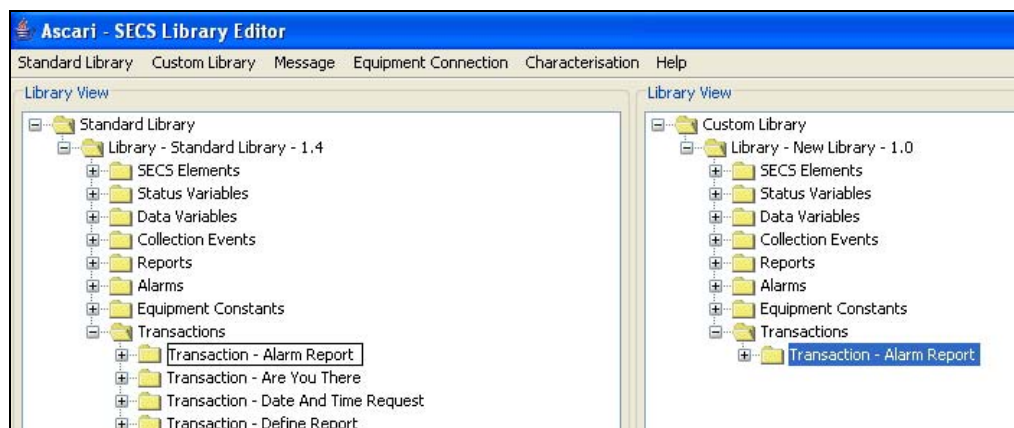
This is done by clicking on one of those elements in the custom library and using the following menu:

**MENU** Custom Library → Add Library Item

‘Or’

**RIGHT-MOUSE-CLICK** → Add Library Item

Alternatively you can drag items from the Standard Library pane and drop them onto the corresponding element in the Custom Library as shown below.



Items can be edited or removed by highlighting the item and using one of the following commands:

**MENU** Custom Library → Edit Library Item

**MENU** Custom Library → Remove Library Item

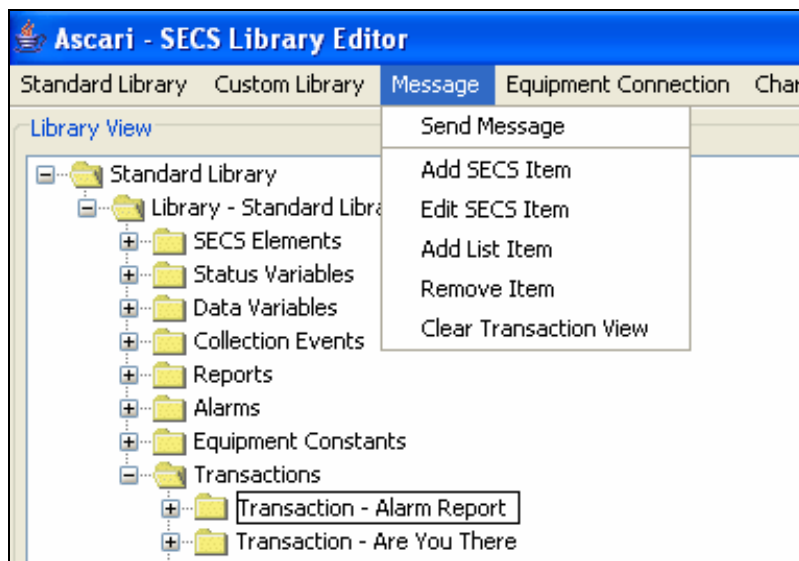
‘Or’

**RIGHT-MOUSE-CLICK** → Remove Library Item

**RIGHT-MOUSE-CLICK** → Edit Library Item

## Building Messages within the Custom Library

The Message menu allows you to build up specific messages within the Custom Library. Alternatively performing a right mouse click once selecting the transaction or transaction component will provide an appropriate subset of the 'Message' menu shown below.



### Add and Edit SECS-II Item

Depending on the highlighted item these commands will allow the addition of SECS-II items, or the editing of items, to the selected library item or node. SECS-II Items themselves are male in nature and thus can not contain child objects however Library Sections (such as the 'Transactions' node) and List Items (shown above) are female and can contain children of type SECS-II Item. SECS-II items can be added to a transaction at any level below and including the Primary and Secondary nodes providing that the selected object is female in nature.

If the selected object is a Primary or Secondary node it must be the case that it has no associated children before a SECS-II Item can be added. It can be stated that a Primary or Secondary node can contain 1 List item with 'n' children or one singular SECS-II Item. Primary or Secondary nodes can be edited in the same fashion as any other editable object within the library.

### Add List Item

This command allows you to add List items to a particular library object providing the library object is of the correct type. List Items can be added to a transaction at any level below and including the Primary and Secondary nodes providing the selected object is female in nature. If the selected object is a Primary or Secondary node it must contain no children before a List Item can be added as described above.

## Remove Item

This command will remove the currently selected node from the library if it is a List Item or a SECS-II Item. If a List Item has been selected then it must be noted that all children associated with that List Item will also be removed from the transaction along with the node selected for removal.

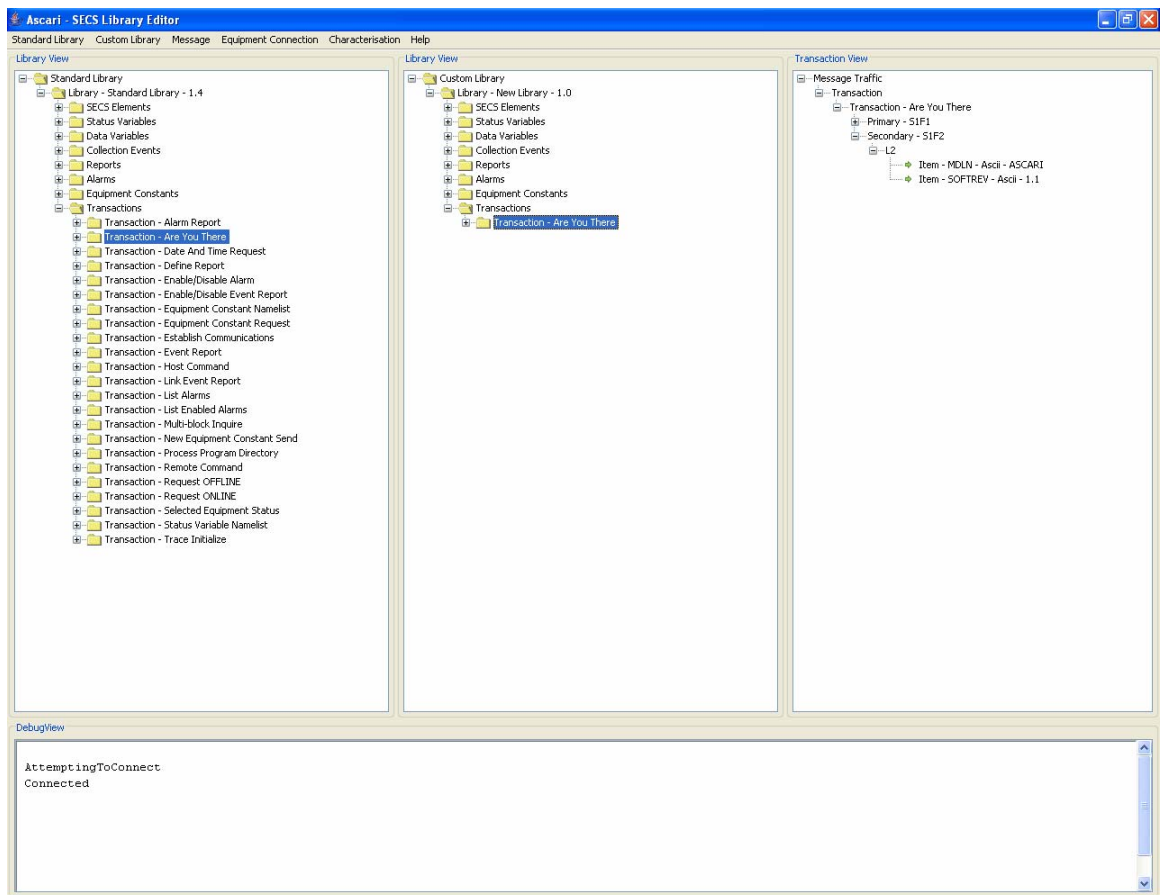
## Clear Transaction View

This command will clear any results contained in the Transaction View Window. This can be done safely as all Transaction View content is recorded in an equipment/session specific log file located in a user specified directory.

## Send Message

When you highlight a message in the Custom Library, the message can be sent to the tool with this command. Any reply to the command is displayed in the Transaction View window. An example of a message reply after sending an S1F1 transaction is shown below:

Alternatively a message can be sent by highlighting the desired message, right clicking the mouse and selecting 'Send Message' from the popup menu.



## Creating Template Transactions

Some SECS-II Messages can be of variable length. The primary message, the secondary message or both the primary and secondary message for the transaction may be of variable length. The following gives an example:

**Primary**                      **S1F3 – Selected Equipment Status Request (SSR)**

Ln

1. <SVID1>

.

.

n. <SVIDn>

**Secondary**                      **S1F4 – Selected Equipment Status Data (SSD)**

Ln

1. <SV1>

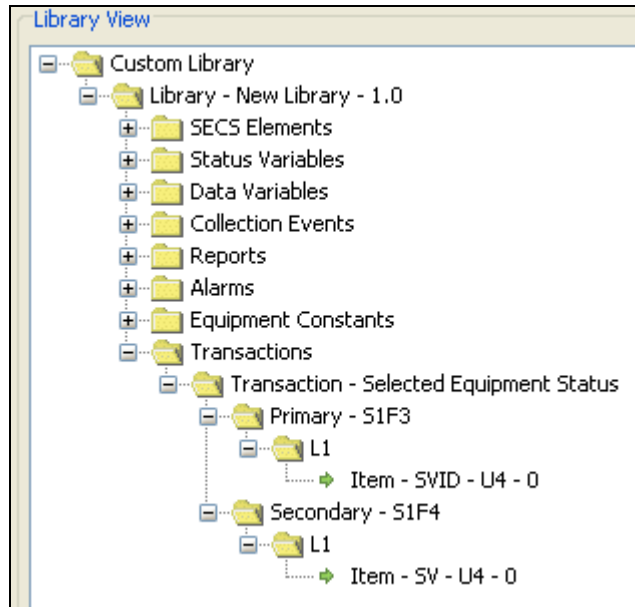
.

.

n. <SVn>

When the message is of a variable length the message should be created within the custom library using only ONE instance of the expected reply item. The message can then be dynamically be modified at runtime by the equipment manager using the template defined and adding instances of the template item (or items) to the message sent or received.

The following shows how the above messages should be constructed in the GUI.



The following shows a further example for a more complex template structure.

<pre>L, 2   1. &lt;DATAID&gt;   2. L, a     1. L, 2       1. &lt;RPTID<sub>1</sub>&gt;       2. L, b         1. &lt;VID<sub>1</sub>&gt;         .         .         b. &lt;VID<sub>b</sub>&gt;     a. L, 2       1. &lt;RPTID<sub>a</sub>&gt;       2. L, c         1. &lt;VID<sub>1</sub>&gt;         .         .         c. &lt;VID<sub>c</sub>&gt;</pre>	<pre>Library View ├── Custom Library │   ├── Library - New Library - 1.0 │   │   ├── SECS Elements │   │   ├── Status Variables │   │   ├── Data Variables │   │   ├── Collection Events │   │   ├── Reports │   │   ├── Alarms │   │   ├── Equipment Constants │   │   └── Transactions │   │       ├── Transaction - Define Report │   │       │   ├── Primary - S2F33 │   │       │   │   ├── L2 │   │       │   │   │   └── Item - DATAID - U4 - 0 │   │       │   │   │       └── L1 │   │       │   │   │           └── L2 │   │       │   │   │               └── Item - RPTID - U4 - 0 │   │       │   │   │                   └── L1 │   │       │   │   │                       └── Item - VID - U4 - 0 │   │       │   └── Secondary - S2F34</pre>
---	---

## Walk Through Example - S1F1

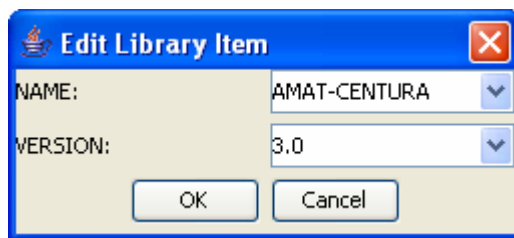
In this section we will walk through the creation of an equipment driver that supports a simple S1F1. For the purpose of this section we will assume that the resultant S1F2 from the tool will be:

MDLN	'ASCARI'	- Equipment Model Type
SOFTREV	'1.1'	- Software Revision Code

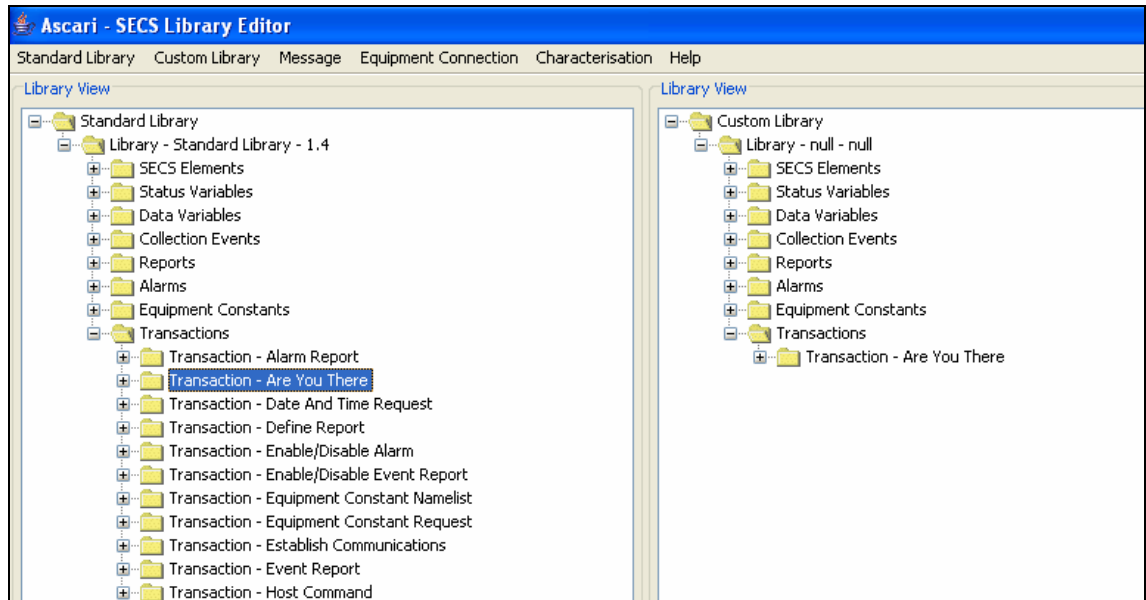
## Building the Custom Tool Library

You now have to build the custom library. It is recommended that at this stage you save the custom library with a name and version number you have assigned yourself.

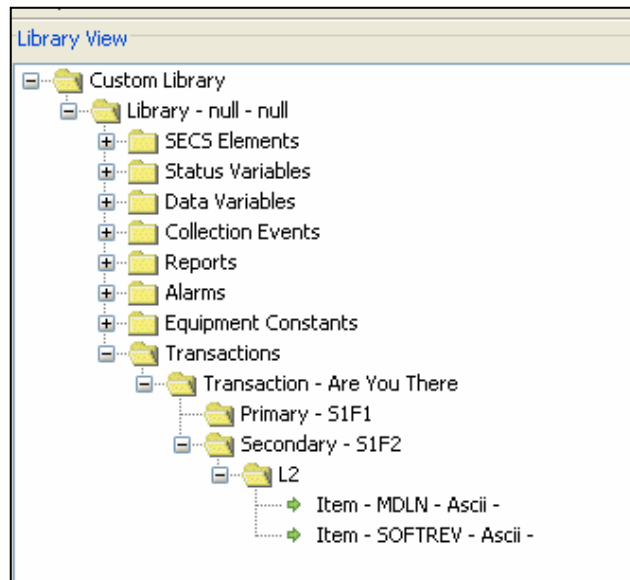
**MENU** Custom Library → Save Custom Library



Now drill into the 'Transactions' node and drag an "Are You There" (S1F1) transaction from the Standard Library and drop it onto the 'Transactions' node of the Custom Library. The screen should look like this:



For the purpose of this example all that is required is the transaction 'S1F1 – Are You There' and so upon dragging this transaction across the creation of the equipment specific custom library is complete. At this point, it will usually be the case that more transactions shall be required and that they may also require some editing once dragged across. You may click on the plus sign in the Custom Library to look at the details of the transaction:



Once all transactions have been dragged across the library should once again be saved.

## Setup Communications

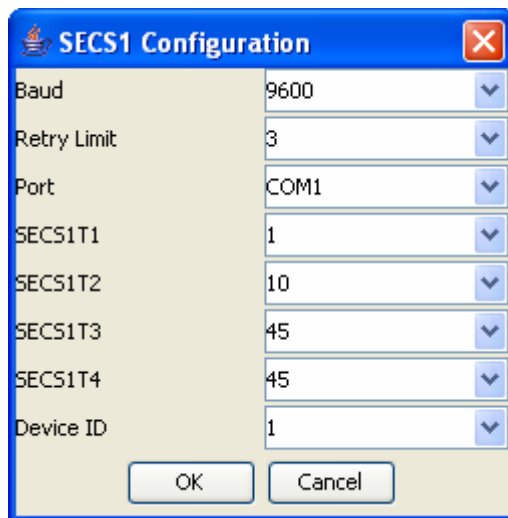
Once a custom library has been created and configured with the appropriate transaction (S1F1 in this case), the first step is to establish communications with the tool. It is assumed that the tool you are communicating with has a valid SECS-II port and that it has been enabled. If you are unsure how to do this please consult the vendor's documentation for the tool, a GEM SECS-II manual for the correct software revision for example.

## Connecting To the Tool

Using the following command to set up the tool connectivity:

**MENU** Equipment Connection

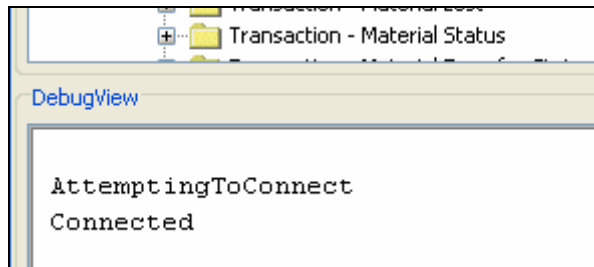
Set up the appropriate connection, either SECS-II I, HSMS or TCP-IP. Note that the properties for the connection type you selected must be configured correctly to match the tool, for example:



Once the configuration has been set up correctly use the following menu to establish connection to the tool:

**MENU** Equipment Connection → Start Connect

The DebugView window should respond with:



If the connection is not successful you will have to check the equipment and the tool connection parameters are correctly configured.

## Sending the Message to the Tool

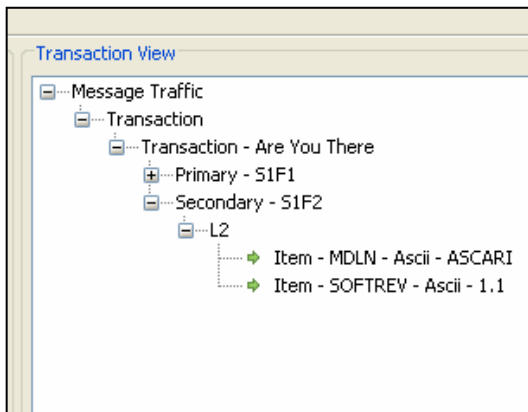
All that remains is to send the message we have built to the tool. This is done by clicking on the transaction you wish to send (in this example, Are You There) and use the menu command:

**MENU** Message → Send Message

Or

**RIGHT-MOUSE-CLICK** → Send Message

The Transaction View window will show the response from the tool as shown below:



As you can see, the tool name is ASCARI and the software version is 1.1 as expected. You are now in a position to build up further transactions and test each one.

## Equipment Characterisation

### What is required for characterisation?

As you now have the required information to establish communications and send and receive messages to and from equipment, it is an appropriate time to mention characterisation. In short, characterisation means “to acquire the characteristics of a tool or equipment such that they can be used in the production, and execution, of Equipment Manager software or logic”.

Much of the information required is provided in the equipments GEM SECS-II manual. This should, in all cases, be used as a yardstick or reference when automating any equipment. Information required when automating an equipment in the majority of cases is as follows:

Status Variable listing.

Equipment Constant listing.

Collection Event listing.

List of associated Reports.

List of associated Data Variables.

The Transactions required to complete an automated scenario.

Once the GUI has been successfully connected to an equipment, as described above, characterisation can begin. In order to acquire the items listed above, a number of steps should be taken, the first of which is to add the transactions required for the retrieval of the above information. This should be done by dragging and dropping the desired transactions from the Standard Library Pane to the new Custom Library Pane as described previously.

### Required Transactions

The basic transactions required for characterisation are:

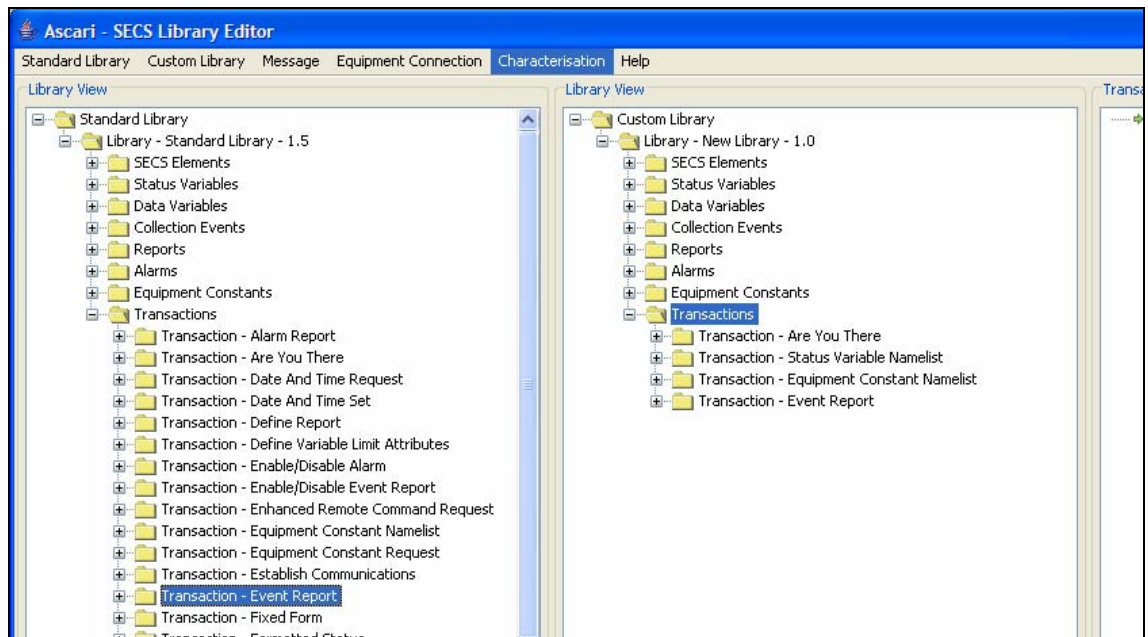
“Are You There” (S1F1) or “Establish Communications” (S1F13)

“Status Variable NameList” (S1F11)

“Equipment Constant NameList” (S2F29)

“Event Report” (S6F11)

Additional Transactions, similar to the “Event Report” transaction, for capturing Equipment Events may also be required. Refer to the equipment SECS-II manual for details relating to which equipment transactions contain an CEID (Collection Event Id) element.



## Acquiring Status Variables and Equipment Constants

Status Variables and Equipment Constants can be the first pieces of information that are gathered from the equipment in our characterisation sequence. This can be done using one of the following methods:

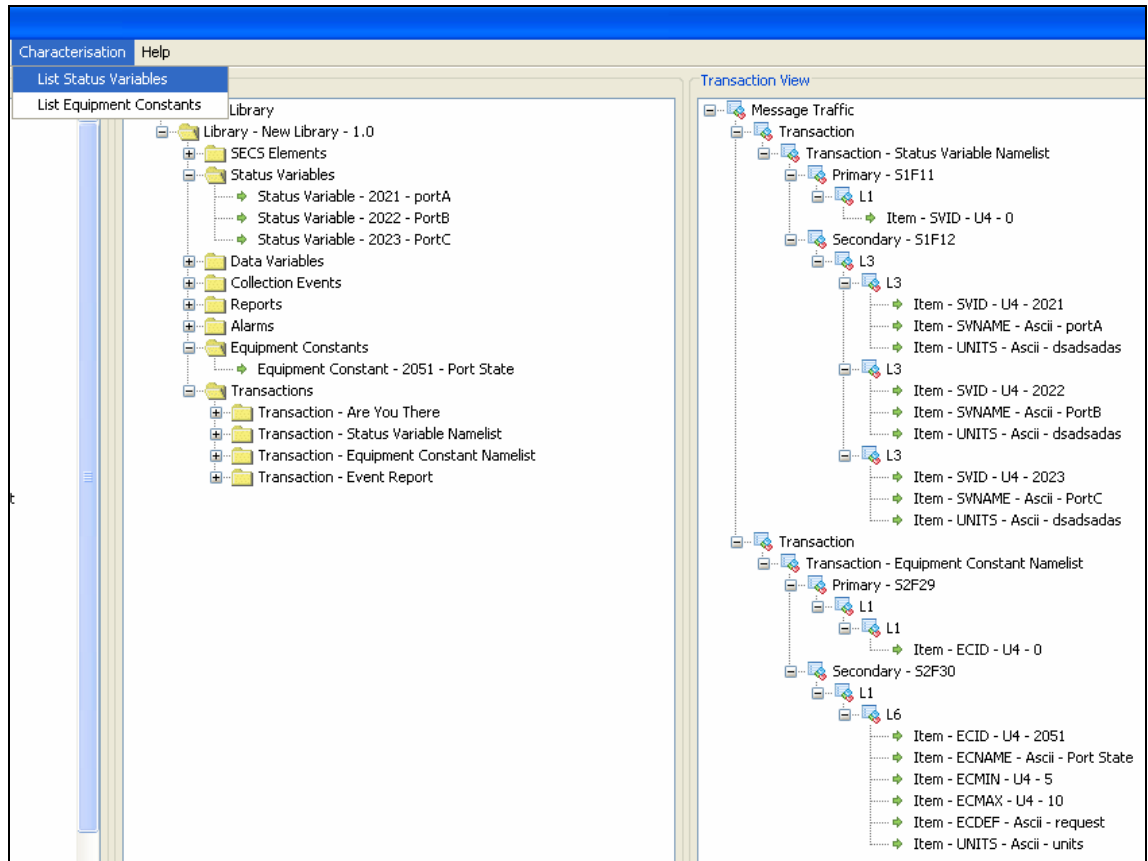
Highlight the transaction that will be sent and:

**MENU** Message → Send Message

Or

**RIGHT-MOUSE-CLICK** → Send Message

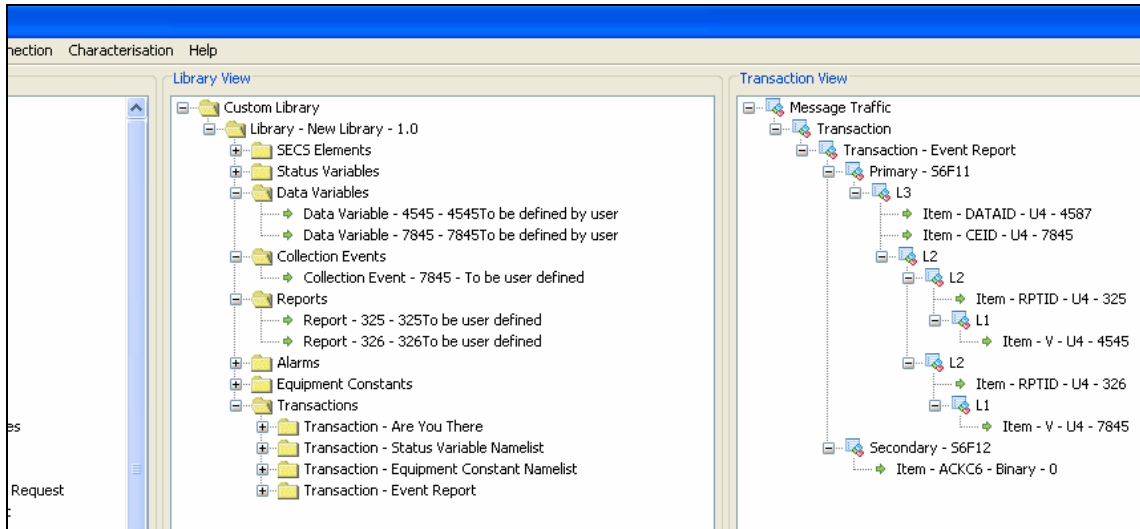
Or preferably simply use the characterisation menu and select the appropriate submenu item as shown below:



As shown above once the transactions have been executed, and the data retrieved from the equipment, the objects that have been returned are added to the correct Library Section for later use. This is advantageous as it eliminates the need to manually enter this information into our driver from the GEM SECS-II manual.

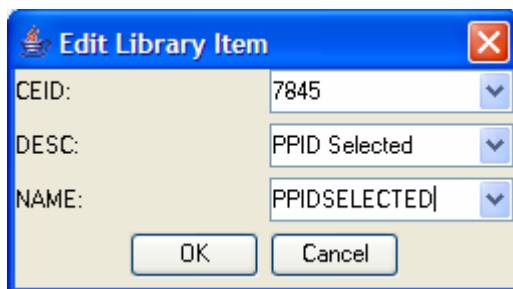
## Acquiring Collection Events and Associated Data

The next section of the library that should be populated is the Collection Event Library Section. As there is no GEM standard transaction defined for the retrieval of an event listing from an equipment it is often the case that this task involves creating and defining events manually from the equipments GEM SECS-II manual and in turn manually defining and linking associated reports and data variables. However with the GUI, this task becomes much less daunting. The GUI has been engineered such that, once in 'listening mode', it can be connected to an equipment as an event listener. This means that any event output from the equipment (e.g. S6F11 message detail) will be picked up by the GUI and added to the Collection Events Library Section. Additionally, any associated Reports and Data Variables will be parsed from the incoming message, correctly linked, and added to the appropriate Library Section. An incoming collection event with associated report data can be seen below:



As we can see above the collection event produced by the equipment has been captured in the GUI along with the associated Reports and Report Data. Once this detail has been acquired it is necessary to provide appropriate names for each received item. These names can be any string, however they should always be meaningful with respect to the object type to which they are allocated.

The string names given to Collections Events, Reports and Data Variables will be the exact names used within the Equipment Manager logic when automating the equipment. String names can be given by editing the SECS-II Item as previously described in this document. Example:



It is the Report name 'PPIDSELECTED' that will be used within the equipment manager. For more detail refer to the Equipment Manager Guide provided with this software release.

## Scenario Specific Transactions

Now that we have the required Status Variable Listing, Equipment Constant listing and all our Collection Events, associated Reports and Data Variables we should now focus our efforts on building up the Transactions Library Section such that we can execute, using the GUI, an automated scenario on the equipment. Transactions can be added to our custom library and edited as described in this document and should correspond to those specified in the section of the GEM SECS-II manual that specifies an automated scenario.

Once a full automated cycle has been achieved characterisation is complete.

## Equipment Specific Non-Standard Transactions

Upon characterising an equipment it may become apparent that one or more of the transactions required to perform an automated scenario can not be found in the standard library. Although rare (generally 70 – 80% of equipments are generic) it may be the case that one or more custom transactions may be required such that the equipment can be instructed to perform a non-standard automated task.

As mentioned earlier in this document it is possible to add library items to specific Library Sections of the Custom Library Pane. If it is the case that a custom transaction that can not be located in the Standard Pane is required, a new transaction should be added using the methodology described previously. For example, click on the Transactions node and:

**MENU** Custom Library → Add Library Item

‘Or’

**RIGHT-MOUSE-CLICK** → Add Library Item

When prompted you must provide the string name of the transaction via the input dialog. Once provided the GUI will prompt for the information required for both the Primary and Secondary message characteristics. This data is input using the following input dialog and should be taken from the section of the equipments GEM SECS-II manual that specifies the message detail of the custom transaction.

The screenshot shows a dialog box titled "Add Library Item". It contains the following fields and values:

Field	Value
Direction:	ToHost
Function:	
Generic:	True
Mnemonic:	
Multiblock:	True
Name:	
Reply Required:	True
Stream:	

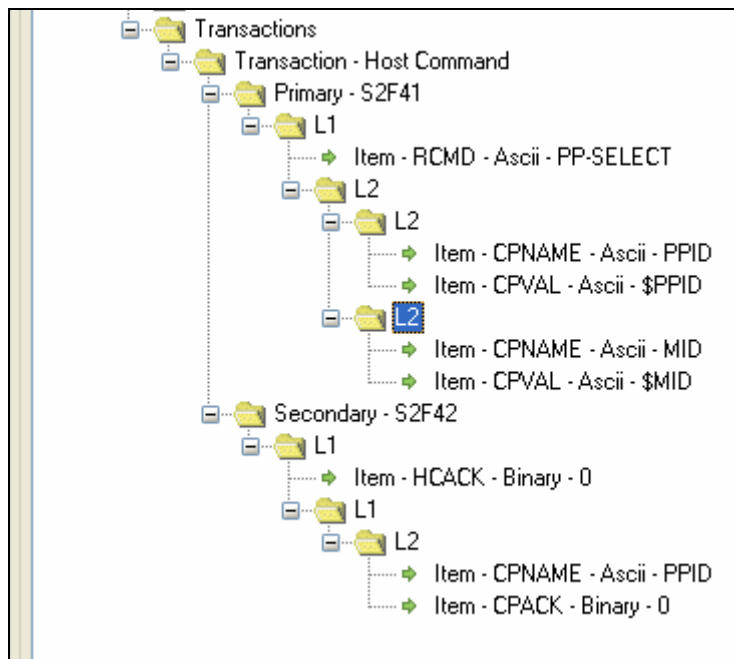
Buttons: OK, Cancel

Direction	The direction of the message. Values are 'ToHost' (Host Entity) or 'ToEquipment'.
Function	The SECS-II Function component of the message, example Sn(Fn).
Generic	For a standard message set to 'True' or for a custom message (described in next section) set to 'False'.
Mnemonic	Message acronym – i.e. 'ERS' Primary: 'Event Report Send'.
Multiblock	Message contains multiple blocks – 'True' or 'False'.
Name	Name of the message i.e. 'Event Report Send.
Reply Required	Is a reply to this message required? 'True' or 'False'
Stream	The SECS-II Stream component of the message, example (Sn)Fn.

This information should be provided for both the Primary and Secondary message components of the custom transaction. The transaction should now be built by adding the appropriate List Items or SECS-II Items, as described in the GEM SECS-II manual, using the methodology described earlier in this document.

## Alias Mapping for Transaction Message Detail

When adding SECS-II Items to a specific transaction it may be the case that an alias should be provided for this particular parameter. For example when sending a Host Command to an equipment to select a recipe or process program, it may be a requirement of the equipment that a recipe name or PPID and a material ID or MID are provided within the primary of the S2F41. An example of this message detail could be the PPID 'INERT' and the MID 'NL4001', this is the recipe to run and the lot of wafers that will be processed on this recipe. The S2F41 'Host Command' message detail is as follows:



Looking at the message detail we can see that there is a SECS-II List Item, each containing two SECS-II Items, for both the PPID and MID parts of the Host Command. 'CPNAME' is the name of the parameter and 'CPVAL' holds the value that will be sent down to the equipment. For example:

```
CPNAME:      'PPID'
CPVAL:       'INERT'
```

This will select the 'INERT' recipe on the equipment.

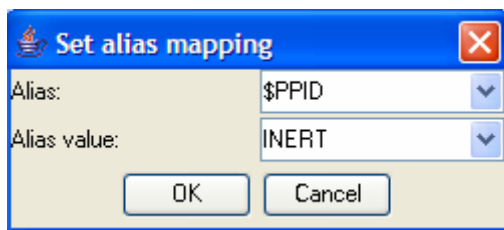
In order to get this information into the message the 'CPVAL' parameter of the Host Command should be given an alias that reflects the 'CPNAME'. This allows us to create a mapping for the alias such that a value need only be input to the GUI once. Example:

CPNAME: 'PPID'  
CPVAL: '\$PPID'

Once the alias has been provided a value should be assigned, this is done as follows:

**RIGHT-MOUSE-CLICK** → Map Alias

The following input dialog is displayed. This is where the parameter value should be provided.



When sending the Host Command shown above to the equipment it will be this value that is sent in place of the alias.