Converting Projects from ELOP II V3.5 to ELOP II V4.1

1 Overview

This document describes how to convert an unchanged project. Projects must be modified in accordance with the safety manual (HI 800 013).

	The consequences for safe operation depend on the application and must be checked jointly by the operating company and the acceptance authorities!

The new version, ELOP II V4.1, allows one to open ELOP II V3.5 projects and convert them to the V4.1 format.

Note	Projects converted from ELOP II V3.5 to ELOP II V4.1 cannot be converted back to the ELOP II V3.5 format! Archive the project in ELOP II V3.5 prior to converting it.

1.1 Converting a Project in ELOP II V4.1 for "Online Test" Purposes

The user may only convert a project from ELOP II V3.5 to ELOP II V4.1 without following the procedure described in this document if the converted code is not loaded into the H41q/H51q PES.
Once the project has been converted to ELOP II V4.1, the H41q/H51q PES can be monitored using the ELOP II V4.1 "Online-Test" function.
This conversion does not affect the function of the H41q/H51q PES.

	We strongly recommend not loading the converted version into the H41q/H51q controller without taking the measures described in this document.

1.2 Rules for the Conversion

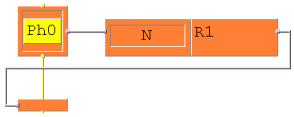
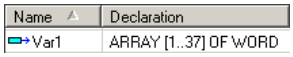
- The conversion is only forwards compatible.
- Projects may be converted without restrictions.
- An online test is available for converted projects .
- The reload function can be used for converted projects.
- After conversion and code generation in ELOP II V4.1, a new code version will be created for ELOP II V3.5 projects that use sequential function charts (SFC) or array variables.

1.3 Observe the Rules when Converting from V3.0 to V3.5

Projects created with ELOP II version V3.0 can only be converted to V4.1 if they are first converted from V3.0 to ELOP II V3.5.
Please observe the conversion instructions in the HI 800 107 manual, "Instructions for conversion of user programs from ELOP II-NT V 3.0 to ELOP II V3.5".

1.4 Changes in ELOP II V4.1

The following table provides an overview of the ELOP II changes causing a modified CRC when converting a project from ELOP II V3.5 to ELOP II V4.1.
The function of the logic must be tested in all parts of the application program affected by these changes.

Change	Remarks
Sequential Function Chart (SFC) 	The order in which the sequential function chart (SFC) elements were created has been revised. Effect: The code version changes if the V3.5 project contains SFC elements.
Variables of Type Array 	The processing sequence of the POUs (Logic) associated with array variables has been revised. Effect: The code version changes if array variables are used in the V3.5 project.

2 Converting a Project from V3.5 to V4.1

2.1 Preparing the ELOP II V3.5 Project for Conversion

Perform the following steps to prepare the ELOP II V3.5 project for conversion:

- Use ELOP II V3.5 to open the project planned for conversion.
  Before activating the C code comparator in the resource properties, C code must have been generated for each resource. If this is not the case, generate the code for the resources.

- Perform the following steps for <u>each</u> resource in your project:
  - Select *Properties* from the resource's context menu.
  - Select the *Code generator* tab.
  - Activate the following settings:
    - *Start target code comparator*
      The target code comparator compares target code generated by the C compiler (GCC) in two consecutive runs. This method prevents errors that can be caused by a non-safe, standard PC.

    - *Generate code image (for comparator)*
    - *Start code comparator*
      The C code comparator identifies changes in the application program. The same resource in the same project must be selected as the Resource for code image (C code (old)).

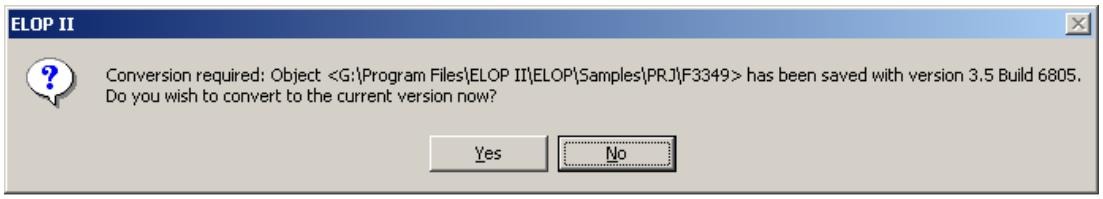
  - Apply the settings using the "Apply" button.
  - Open the resource's context menu and start the *Code Generator.*
    If the option "Create reloadable code" is set in the "Code generator" tab, the reloadable code must be created for this resource as described in the HI 800 105 operating system maual.
    This can also be performed after conversion to V4.1.
  - Select *Documentation->RES docu (generated)* from the resource's context menu.
  - Click the Export button and save the file with the extension ".txt" .

- Once all resources have been edited, select *Project -> Close* on the menu bar to close the project.
- Close ELOP II V3.5.

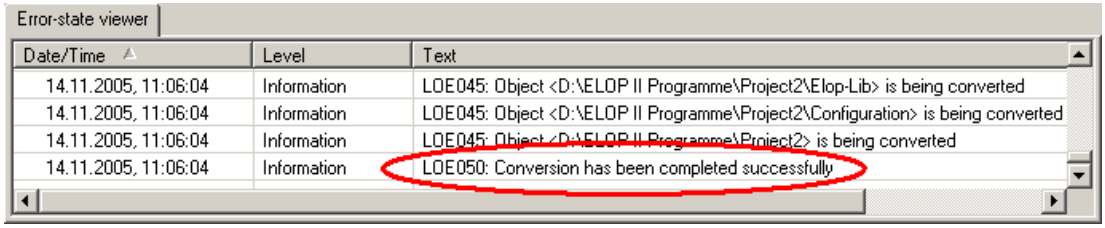
2.2 Converting a Project from V3.5 to V4.1

Use ELOP II V4.1 to open and convert the prepared ELOP II V3.5 project. Perform the following steps:

- Start ELOP II V4.1
- Open the project prepared as described in chapter 2.1.
- Click “Yes“ to confirm the dialog box.



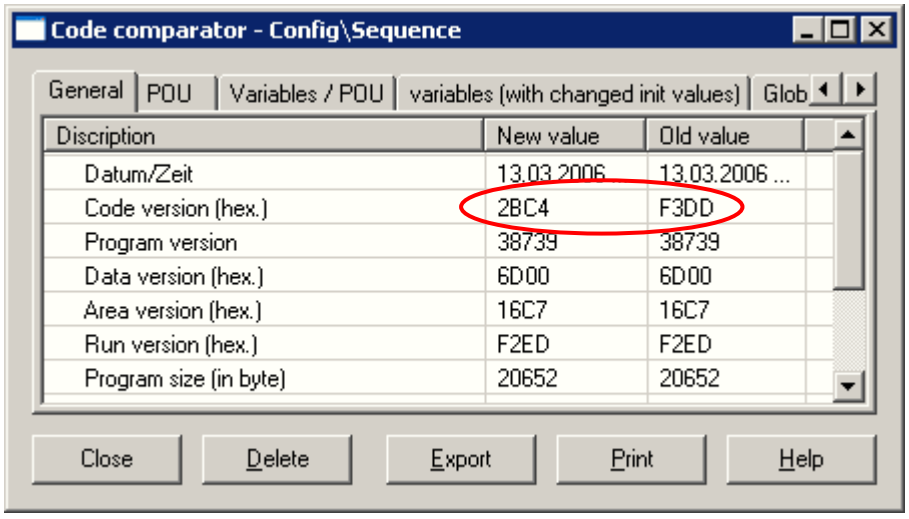
- Select *Tools->Error State Viewer* on the menu bar and check whether the conversion was completed successfully.



2.3 Comparing the Code Versions

Perform the following steps for <u>each</u> resource in the project:

- Select a resource and start the code generator.
  During code generation, the code comparator dialog box opens and shows the result of the code comparator’s.
- Check the “Code comparator” dialog box to see if the code version (hex.) has changed.



⚠	If the code version has changed, the changes must be verified.

2.3.1 Information about the Code Version

Whenever a user program is compiled, a code version is generated. The code version is calculated by using a CRC32 polynomial. According to the statements of the probability theory, the probability that a change of the application program generates the same code version, is equal to the probability, that exactly one of 2^{32} cases occurs. This probability is equal to 2^{-32}, what corresponds to approximately $2{,}328 \cdot 10^{-10}$.
This probability is so low, that such an error does not need to be considered for the creation of the code version of an application program and can be excluded.

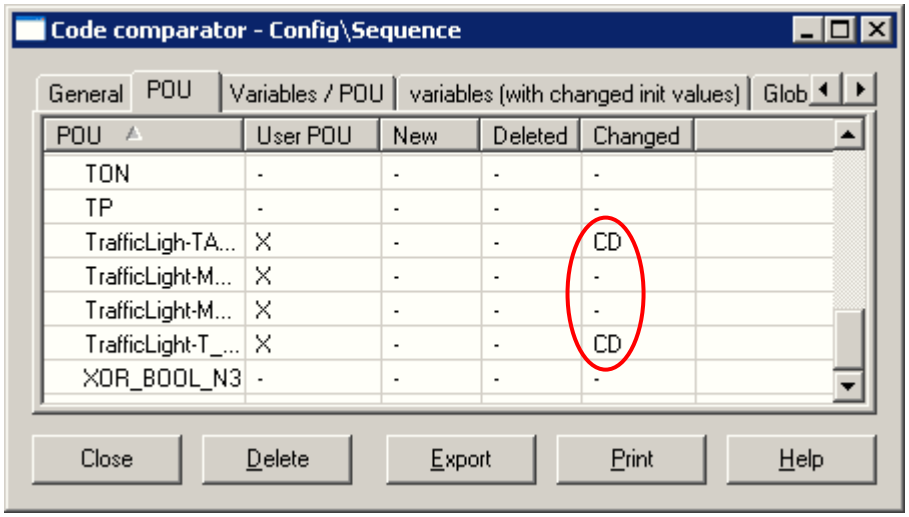
2.3.2 The Code Version was not Changed

If the code version did not change, the application program code also did not change during conversion.
The code can continue to be used in ELOP II V4.1 without further examination.

2.3.3 The Code Version Changed

A change can be localized to a module using the code comparator. In this way, the effort for testing the application program can be reduced.

Changes to a POU are displayed in the file ”H5Cvgl.TXT“ and in the “POU” tab located in the “Code comparator” dialog box.
C: Change in the C code
D: Change in the Data



2.3.3.1 Required Test Measures

All changes displayed in the code comparator must be tested.

⚠	To ensure the safe function of the generated code, a thorough function test of the logic must be performed for **each** program part (function block instance) using a POU with a chaged code version.

The test can also be performed in a special test system. This allows one to test the changed code inependently of the system in use. Once the code test has been successfully completed, it can be loaded into the system by performing a reload.

2.4 Not Plausible POU's Changes

If the code comparator detects a change in the POU, but the user did not modify the POU and it does not contain any of the changes described in chapter 1.4, a potential cause might be a changed processing sequence.

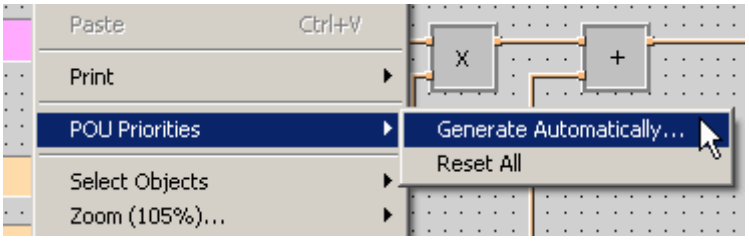
2.4.1 Information about this Behavior

If not defined explicitely, the processing sequence is determined by the POE's graphic postion.
This behavior may lead to different processing sequences, e.g. when using different character fonts for the POE's instance names.

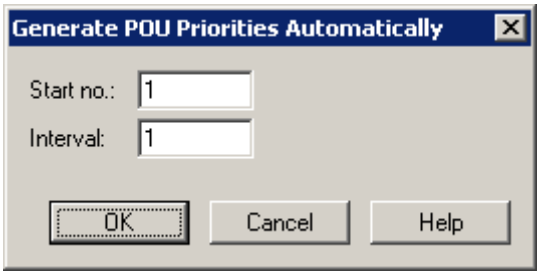
2.4.2 Preventing the Described POU Change

Perform the following steps to generate the POU priorities and thus prevent a POU change.

- Open ELOP II V3.5
- Restore the original ELOP II V3.5 project from the archive.
- Perform the following steps for <u>each</u> changed POU:
  - Open the changed POU.
  - Select *POU Priorities->Generate Automatically...* from the opened POU's context menu



  - Confirm the default values to generate the POU priorities.



  - Close the edited POU and confirm the changes.
- Once all resources have been edited, perform the conversion from V3.5 to V4.1 once again (see chapter 2.1, 2.2 and 2.3).

2.4.2.1 Result: No POU's Change

A changed processing sequence was the cause for the POU's modification if the edited POUs did not change after the conversion from V3.5 to V4.1 is completed. The priorities may remain set until the POU is modified. When the POU is modified, the module priorities must either be reset or re-generated.

2.4.2.2 Result: The POU Changed Again

If the edited POU changed again after conversion from V3.5 to V4.1 is completed, please contact HIMA support.

2.5 Checking the Variable Assignment

If the code version changed while converting to V4.1, an additional test must be performed on the resource.
By comparing *Res docu (generated)* from V3.5 with *Res docu (generated)* from V4.1, the user can check if changes in the variable assignment occurred during conversion to V4.1.

2.5.1 Save Res docu (generated) in V4.1

- Open the converted project with ELOP II V4.1.
- Select *Documentation-> Res docu (generated)* from the resource's context menu.
- Click the Export button and save the file with the extension ".txt".

2.5.2 Comparing both Resource Documentations

To compare the two *Res docu* (generated), use a comparator (e.g. MS WinDiff) that allows one to compare two documents with one another.

- Open the comparator (MS WinDiff)
- Open *Res docu (generated) V3.5* created in chapter 2.1.
- Open *Res docu (generated) V4.1* created in chapter 2.5.1.
- Check if the comparator indicates a change in the following areas of the *Res docu (generated)*:
  - Modules (generated):
    Assignment of the I/O variables in the modules
  - BUSCOM variables:
    Assignment of variables that are transferred via a bus system.
  - HIPRO-N/-S:
    Assignment of variables that are transferred via HIPRO-N/-S.

Please contact HIMA support if a change is detected in these areas.

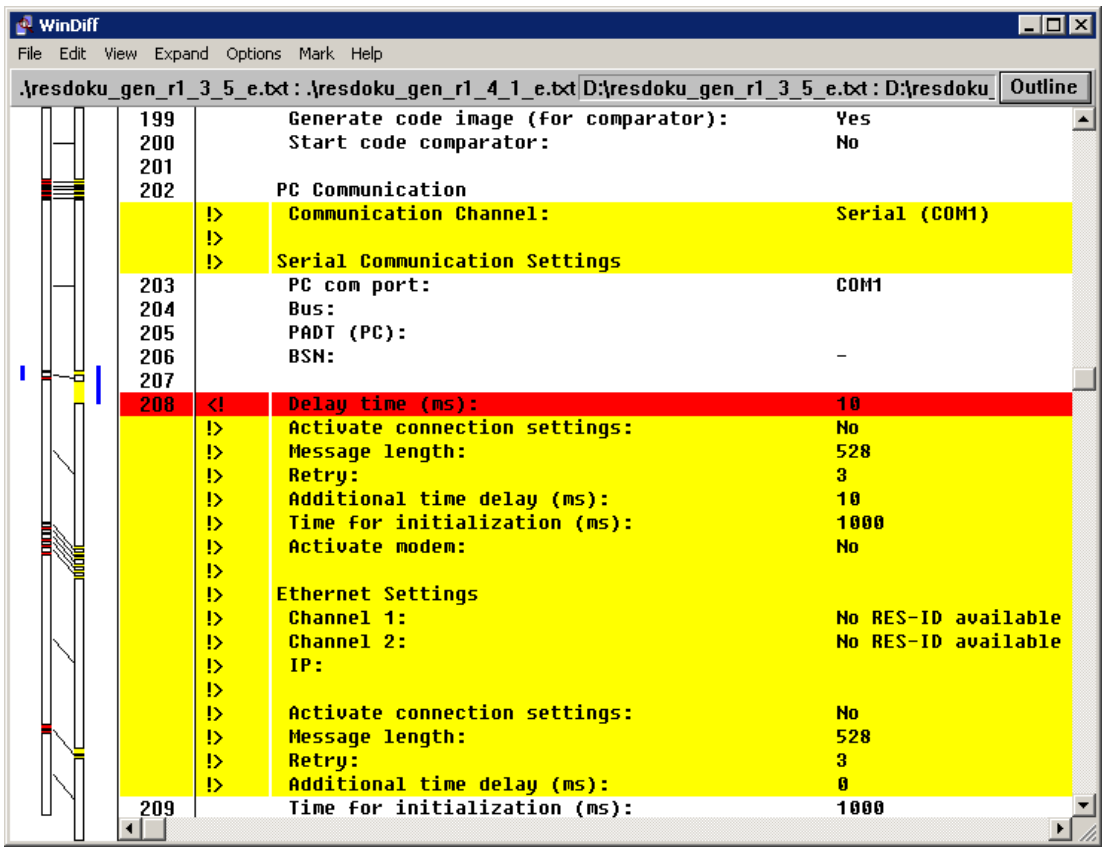
2.5.3 Changes due to Extensions in V4.1

The following changes are not critical and result from extensions or text modifications in the ELOP II V4.1 programming tool.

Legend:
MS WinDiff was used for the following comparisons.
The yellow rows were added in ELOP II V4.1.
The red rows were deleted from ELOP II V4.1.

2.5.3.1 Change due to a Text Modification in ELOP II V4.1.

2.5.3.2 Extension of the PC Communication in ELOP II V4.1.



3 Conversion Aborted

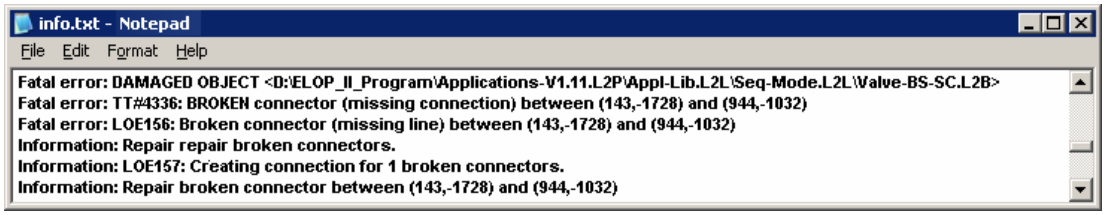
If an ELOP II V3.5 project contains broken connectors, the conversion is aborted. Perform the following steps to convert the project to V4.1 anyway:

- Follow the instructions described in chapter 2.1 to prepare the conversion of the ELOP II V3.5 project to ELOP II V4.1.
- Open the “ELOP II Control Center“.
- Open the “Command Prompt“.
- Enter the following command in the command prompt
  LCConvVer –f –r –d –x [Path\Project] >Info.txt.
  The option "- x" repairs critical errors during the conversion procedure (e.g. broken connectors). Please refer to the ELOP II Control Center *Documentation->Tools Documentation* for more information about the "LCConvVer" conversion tool.

If the ELOP II V3.5 project was successfully converted to ELOP II V4.1, the following message appears in the command prompt:
"Information: LOE050: Conversion has been completed successfully"

Perform the following steps to check the repaired errors:

- Open the “Info.txt“file and search for error messages.
  The file “Info.txt” contains messages (error, status, etc.) generated during conversion to ELOP II V4.1.



⚠	All application program functions in which errors were repaired (e.g. broken connectors) must be tested.

- Compare the code versions and check the changes as described in chapter 2.3.

4 Support

Contact HIMA support for any problems with or questions about conversion.

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