

## Migrating Projects to AmbiL\_PLC rev 3.40

### 1. Introduction

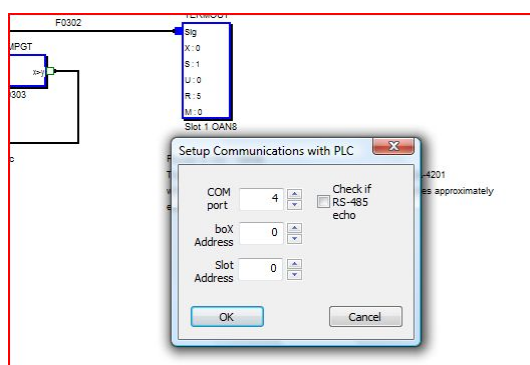
AmbiL\_PLC is AmbiLogique's PLC support software, designed to run on a Windows® personal computer (desktop or portable) and communicate with an AmbiLogique system via a standard RS-232 serial port. It has also been demonstrated to run successfully on Linux systems equipped with CrossOver or Wine overlays, and on Apple computers equipped with the Parallels overlay.

The introduction of the PLC Processor Module CPDA-02 introduced some new requirements on the support software:-

- a new library of function blocks including the new bit assembler block
- a need to be able to extend the list of supported processors without rebuilding the software
- a need for support for the new K-Factors facility in the CPDA-02 and other customer-special processors

### 2. New Features in Rev 3.40

- a) Processor list now in external file: adding a new processor does not involve a new release of this software
- b) Internal Processor list now supports new CPDA-02.
- c) If the project processor does not match the target processor on connection, a warning is given.
- d) K-Factor management facility added.
- e) Limits on no. of function blocks in each processor: warning when full.
- f) Help updated to reflect the above changes.
- g) The existing libraries for CPDA-01 and CPDA-99 have been renamed to provide a more rational relationship with the processor name.
- h) Some customer-special processors support upstream networking; this requires specification of boX and Slot addresses, and the provision to suppress RS485 echoes. For normal production PLC's these boxes in the "Connect" dialog should be left in their default '0' '0' and 'unchecked' states.



#### AmbiLogique Ltd

1812 Opunake Road, RD29, Hawera 4679, New Zealand

+64 6 764 6567 ph

[www.ambilogique.com](http://www.ambilogique.com)

[sales@ambilogique.com](mailto:sales@ambilogique.com)

### 3. Processor Library Issues

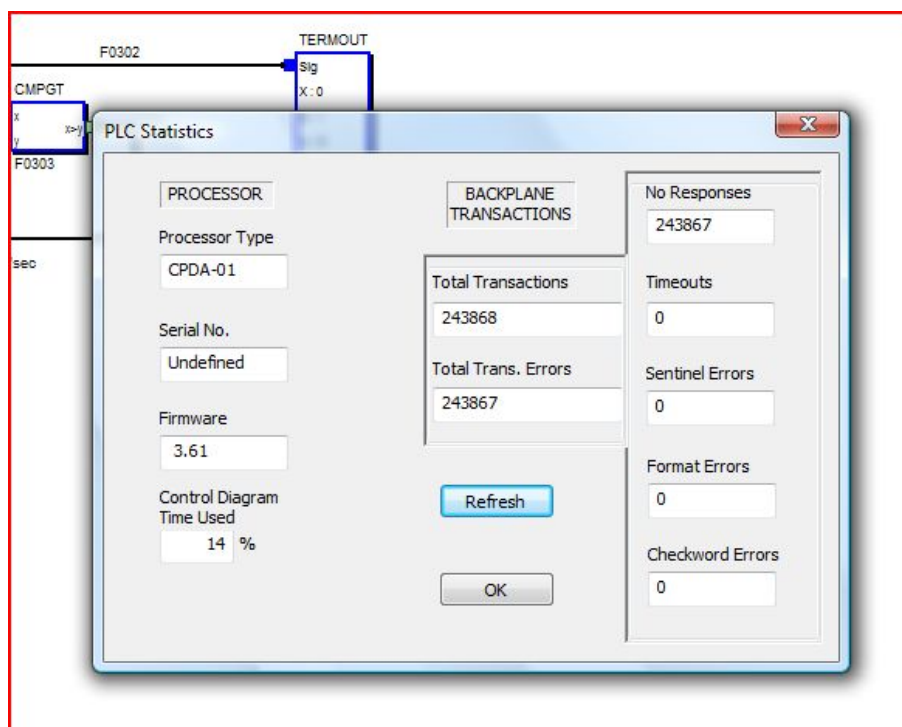
Because the libraries have been renamed, when an older project (prepared under AmbiL\_PLC earlier than 3.40) is loaded, the software complains that it cannot locate the library file CPDA0101.all (for example). This is a non-fatal exception, and the project can be uploaded, verified and monitored as usual. However, it cannot be edited by the addition of function blocks, because no library is available.

### 4. Updating a Project to a New Library

- Once the older project has been loaded and the "OK" button has been pressed on the library file warning, select Project->Processor. The new table of available libraries is then presented, and the appropriate library can be selected. Note that this dialog now supports double-clicking the desired library name.
- Now Project->Compile the project: the new library will then be associated with your project, and it is up-to-date for the future.

### 5. NEW FEATURE: Processor Statistics

This feature under the Project menu shows some of the properties of the PLC Processor to which the program is connected. CPDA-01's with firmware 3.61 and above carry their serial number in electronic form, and this will show on the Statistics dialog. Where the control diagram connects with expansion modules, either on the backplane or via communications cables, the quality of service is displayed in this dialog.



In the case above, the serial number had not been embedded into the CPDA-01. Production units have the serial number embedded as part of the test and calibration process. The system being examined here carried a control diagram which called for input from an EXDA-01 Expansion Module in Slot 1. However no module was fitted, so the No-Response count is almost 100%.

The Control Diagram Time Used is expressed as a percentage of the slot time (62.5 milliseconds for a CPDA-01). This can become important when the function block count exceeds 200.

Pressing the "Refresh" button updates the Time Used and Backplane Transaction statistics.

### 6. NEW FEATURE: K-Factors

The K-factors (or K-Values) feature is a valuable addition to the capabilities of the CPDA-02 and the Auroa gas turbine controllers based on AmbiLogique's PLC technology.

K-Factors are constants which you place at fixed locations in a special area of the PLC memory. These are not available on all PLC processors. K-factors are a significant advance on the normal constants you incorporate into your PLC control diagrams.

K-Factors are very useful for constants which might need frequent alteration, for example for tuning a PID loop, or for compensating for production tolerances in a product.

Each K-factor can be imported into the control diagram via a TERMIN block using the sUbslot assigned to K-Factors. Please refer to the manual for the processor you are using for details of the sUbslot which addresses the K-Factors. The CPDA-02 for example accesses its K-Factors via sUbslot 6. The Register value in the TERMIN block corresponds with the line number (starting at 0) of the item in the KF file. We explain the KF file a few paragraphs below.

The Mask value in your TERMIN is normally 0, so that the output is the analog value you have edited into that location. However, there is no reason why you cannot have an array of digital values in a K-Factor, and mask them out in the usual way for digital inputs to your control diagram. This is a nice way of providing the equivalent of a DIL switch bank for selecting options within a product.

In early processors (e.g. CPDA-01), the only way of introducing constant numeric values into a control diagram is by assigning a numeric label to an incoming cross-reference. This mechanism is still available, and is useful for constants which never change. The disadvantage of these constants is that they are consolidated by the compiler so that only one copy of each value is stored. If you decide to change a constant, the compiled version of your control diagram will change, because the reference map into the constants will change. This in turn means that a change to just one constant causes re-compilation of the entire control diagram. This then requires that the new control diagram is re-loaded into the PLC. This is time-consuming and involves halting the PLC for a significant time, so the K-Factors facility was introduced to address this problem.

If you change a K-Factor, its location will not change. Because of the requirements of the Flash memory in the PLC, the entire changed block (not necessarily the entire K-Factor table) needs to be updated. However, this only takes a second or so, and the PLC is only halted for this brief upload period.

- In order to ease the control and documentation of K-Factors, the details are stored in a text file 'KFsomething.txt' which you can edit and maintain with any normal text editor like Notepad or Notepad++. We refer to this as the 'KF file.' 'something' is a file name which you assign, but the full filename must start with 'KF' and the '.txt' extension must be maintained. In this way, KF files are distinct from any other text files you might have in your working folders.

You might (for example) have a separate K-Factor file for every product you make which incorporates a PLC.

Each line of the file contains details of a single K-factor, and has the form:-

```
aa <t> name_of_factor <t> minval <t> maxval <t> startval
```

'aa' is the address of the factor (0 upwards);

<t> is one or more tabs;

'name\_of\_factor' is a name which you assign to the factor. Note that this cannot include tabs or spaces, so it is recommended that you use underscores to separate words;

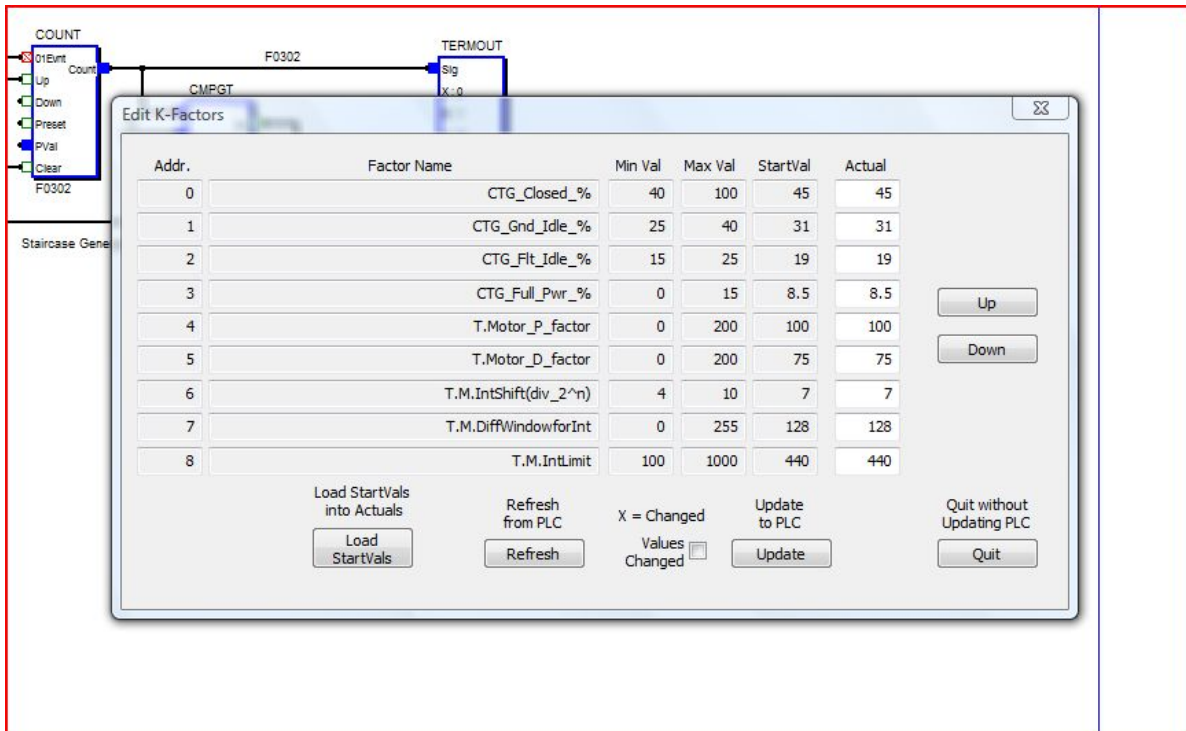
'minval' is a low limit for the factor value: this is a reminder and will not constrain the value;

'maxval' is a high limit for the factor value: this is also only a reminder;

'startval' is the starting or recommended value for the factor.

The 'aa' address field is there as a help when you are editing the K-Factors. Please note that the K-Factors are loaded into the PLC in the strict order in which they appear in the KF file. If your address fields are not consecutive, starting from 0, you will not have the K-Factors loaded where you expect.

When you select the K-Factor Edit facility, a 'File Open' dialog opens, which asks you to identify which '.kfe' file you wish to load. When you have selected this, a new window opens with the editor showing a table which is populated with the contents of the '.kfe' file.



Addr.	Factor Name	Min Val	Max Val	StartVal	Actual
0	CTG_Closed_%	40	100	45	45
1	CTG_Gnd_Idle_%	25	40	31	31
2	CTG_Flt_Idle_%	15	25	19	19
3	CTG_Full_Pwr_%	0	15	8.5	8.5
4	T.Motor_P_factor	0	200	100	100
5	T.Motor_D_factor	0	200	75	75
6	T.M.IntShift(div_2^n)	4	10	7	7
7	T.M.DiffWindowforInt	0	255	128	128
8	T.M.IntLimit	100	1000	440	440

Buttons: Up, Down, Load StartVals into Actuals, Refresh from PLC, X = Changed Values Changed, Update to PLC, Quit without Updating PLC, Quit

The 'Up' and 'Down' buttons allow you to scroll through a file which contains more than 9 items. You can have up to 128 K-Factors in any project.

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There are 4 buttons which control the relationship between what you see on the screen and what is in the PLC:

- Load StartVals
- Refresh
- Update Target
- Quit without Updating

'Load StartVals' takes the starting values you specified in the .kfe file and loads these into the 'Actual' column of the table. Together with the 'Upload' button, this provides a very quick way of getting these values into the PLC to get your project going.

'Refresh' will re-download the K-Factors stored in the PLC into the 'Actual' column of the table;

'Update' will upload the K-Factors from your 'Actual' table into the PLC;

'Quit' will close the window without altering the PLC contents.

When the window is first opened, it will 'Refresh' automatically. You can then edit the K-Factors as needed. It is essential to hit the 'Update' button if you want the changes to be uploaded into the PLC, otherwise the changes will be lost when you 'Quit' the editor.

When you alter any of the 'Actual' values, the 'Values Changed' checkbox shows 'X' to remind you that the values displayed no longer match those in the PLC.

### **WARNING SAFETY-CRITICAL SYSTEMS**

A Safety-Critical system is a system whose failure or malfunction could cause death, significant injury or loss of property.

AmbiLogique products incorporate electronic hardware and software, both of which carry a remote but real possibility of failure. AMBILOGIQUE DOES NOT WARRANT, CLAIM OR REPRESENT THAT ITS PRODUCTS ARE INFALLIBLE.

It is therefore THE RESPONSIBILITY OF THE DESIGNER of any safety-critical system which incorporates AmbiLogique products to ensure that:-

1. The system is designed so that any failure of an AmbiLogique component will not cause death, injury or loss of property.
2. The system incorporates independent monitoring means which detect the failure of any of the electronic control elements.
3. The system has alternative and independent means of control which enable it to be controlled and shut down in an orderly manner.
4. Any and all other industry-specific safety requirements are fully implemented.

#### **Revision History:**

R 0.0 2016-03-30 Initial issue.