

Options for Editing the Concurrent I/O Ladder

Introduction

This document will provide a brief description of the Concurrent I/O (CIO) Ladder and then describe options for viewing and revising the User Ladder from the programming pendant or offline with a PC. For detailed information regarding the functions of the Ladder and how to change it, refer to the links below or training options at [Yaskawa Academy](#).

CAUTION! Do not attempt to edit the Ladder without proper training and knowledge. Hazardous operation conditions could result!

Description of the CIO Ladder

Concurrent I/O is the name given to a built-in programmable logic controller (PLC) that processes signals to and from the controller's input/output structure. This process is controlled separately, yet in parallel with the INFORM language which controls the Robot/Base/External Axes operation.

The Concurrent I/O consist of two parts, the System Ladder, and the User Ladder. The System Ladder is the factory defined section of the Concurrent I/O selected for your application that includes standard ladder instructions as well as special application features. The System Ladder can be viewed in Editing or Management security level but cannot be edited by the customer. The User Ladder is accessible for viewing in Editing security level and editing in Management security level.

Yaskawa installs a predefined System Ladder for your application and configuration. Understanding the System Ladder and perhaps modifying the User Ladder may be necessary so that your installation can process external and robot signals to perform functions automatically in addition to those implemented via INFORM jobs.

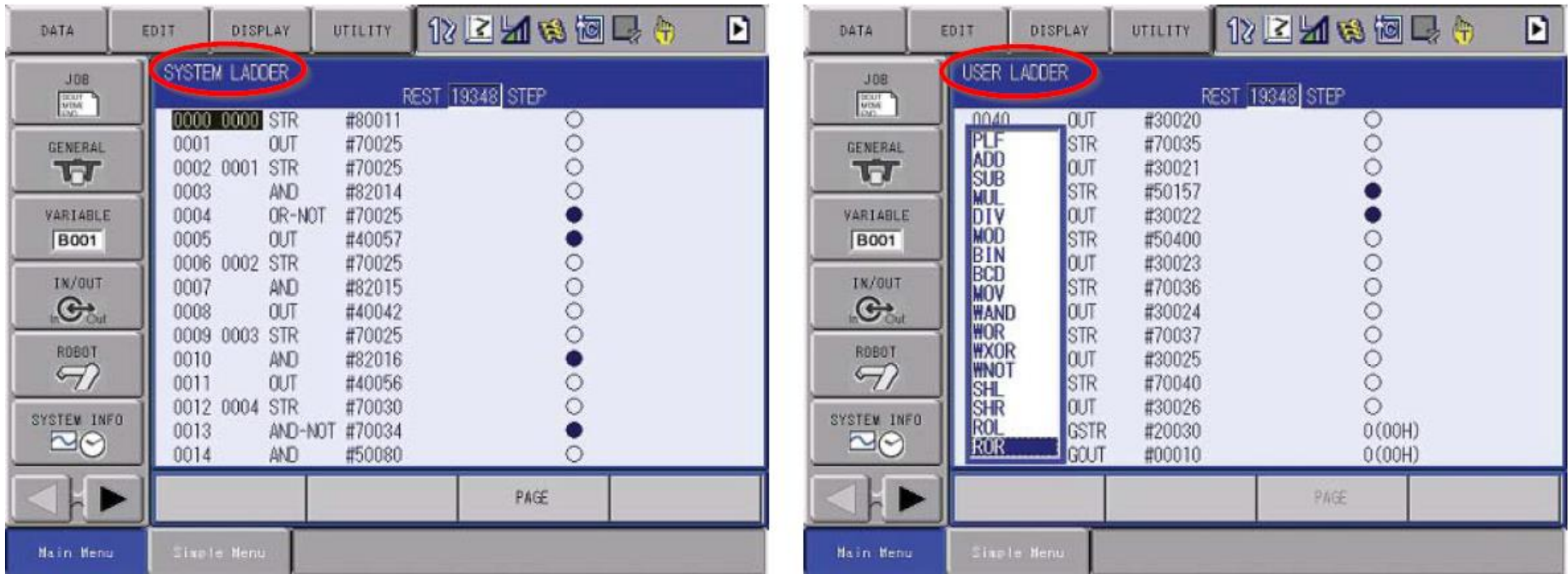
Additional information on Concurrent I/O concepts, instructions and features is available for each controller model on Motoman.com. Links are provided below.

Controller	Manual Name / Link
DX100	Concurrent I/O
DX200	Concurrent I/O
FS100	Concurrent I/O
YRC1000	Concurrent I/O
YRC1000micro	Concurrent I/O

This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

Ladder Program

The Ladder Program is available from the programming pendant (choose IN/OUT and the “LADDER PROGRAM”). It allows you to view both the System and User ladders and (with MANAGEMENT level security) update the User Ladder. *The ladder is displayed using mnemonic codes.* Refer to the example screen shot below.

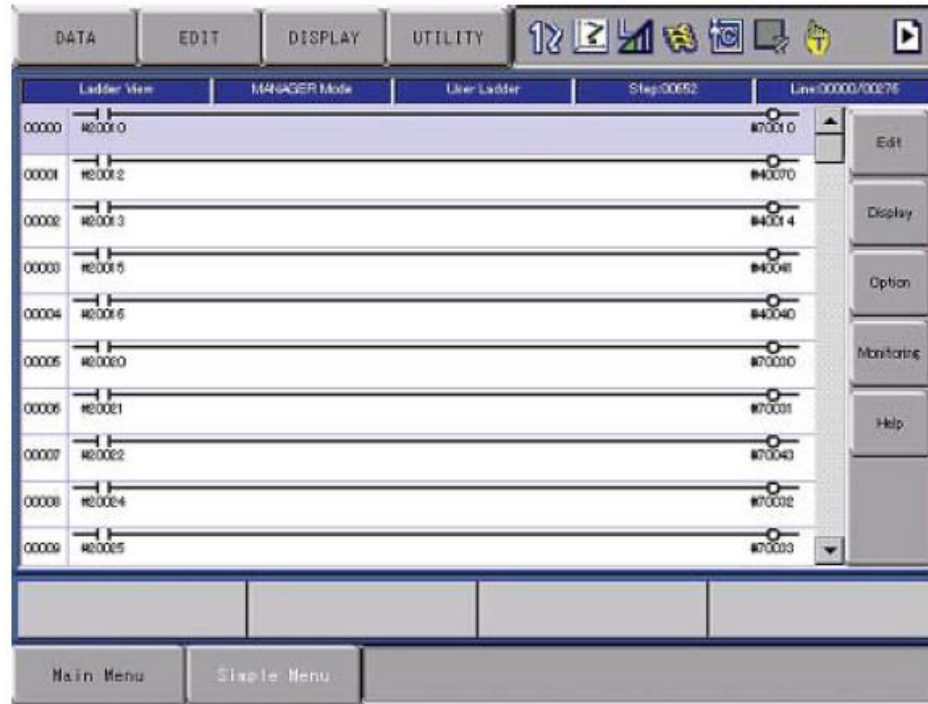


The purpose and use of the mnemonic codes are explained in the Concurrent I/O Manual links above.

This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

Ladder Editor

The Ladder Editor is available from the programming pendant (choose IN/OUT and the “LADDER EDITOR”). It allows you to view both the System and User ladders and (with MANAGEMENT level security) update the User Ladder. *The ladder is displayed graphically, like what you might see with a PLC.* Refer to the example screen shot below.



This graphical view will be easier to understand and edit for many users than the textual representation of the Ladder Program.

This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

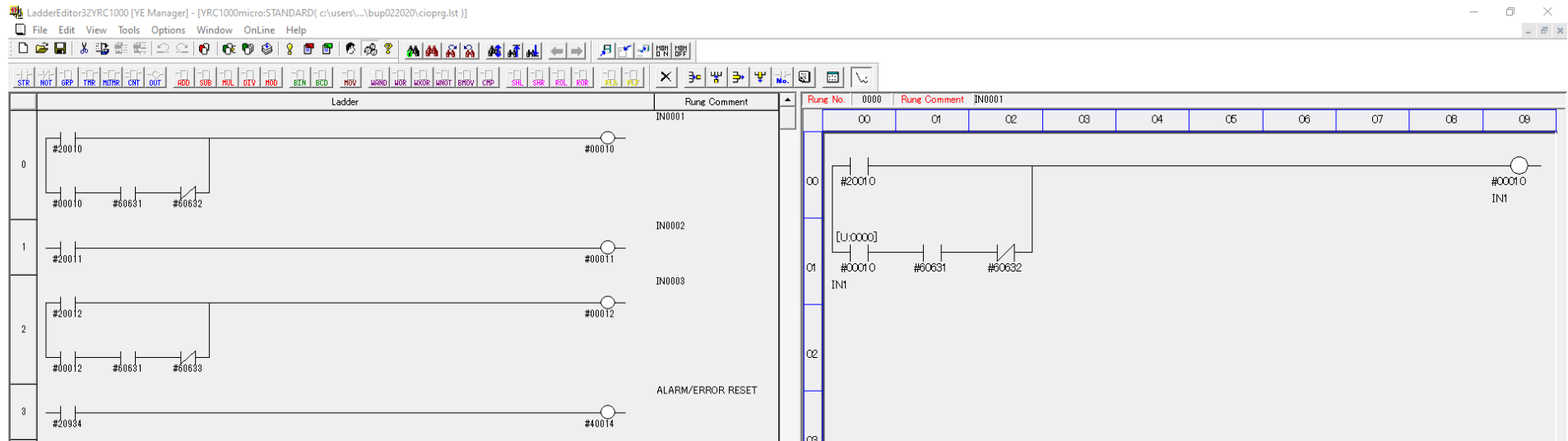
Ladder Editor for Windows

The contents of the Concurrent I/O ladder can be saved to an external memory device inserted into the programming pendant. (Choose EX. MEMORY, SAVE, I/O Data, C.IO PRGM and then press ENTER.) The file is saved as plain text. It can be copied to a Personal Computer, edited, and then copied back to the controller.

Yaskawa sells a PC-based software package that allows users to create and edit YRC concurrent input/output (CIO) ladder programs offline in a graphical environment. Versions are available for the NX, FX, DX and YRC series of controllers. In addition to representing the ladder graphically, the program offers the following features:

- Drag and drop editing
- Ability to assign descriptive names to input and output signals
- Five standard ladder templates (arcwelding, handling, standard, air gun and motor gun)
- Printing function that allows the user to print a hard copy of the ladder program
- Online function that allows the user to connect to the controller. The following operations can be performed online: Reception, Transmission, Verification and Monitoring

A screen shot of the Ladder Editor for YRC1000 is shown below.



This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

Editing the Ladder with a Text Editor

Lastly, the CIO Program can be copied to a PC as described above and edited with any text editor. If you understand the mnemonics and rules for the CIO Ladder, you can make changes, save the file out and load it back into the controller.

Extreme caution must be used with this approach. The other methods described above each enforce syntax and rule checking to be sure a viable ladder is created. With this approach, it would be very easy to create a ladder that will not load correctly or will produce unexpected results.

The same portion of the user ladder shown above in the Ladder Editor for YRC1000 is shown below as plain text mnemonics.

```
STR #20010
STR #00010
AND #60631
AND-NOT #60632
OR-STR
OUT #00010
STR #20011
OUT #00011
STR #20012
STR #00012
AND #60631
AND-NOT #60633
OR-STR
OUT #00012
STR #20934
OUT #40014
```