Quantum using EcoStruxure™ Control Expert
Change Configuration On The Fly
User Guide

(Original Document)

12/2018
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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠️ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.
PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠️ WARNING

UNGUARDED EQUIPMENT

● Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
● Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.
Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:
- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.
OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.

- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer’s instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer’s instructions and the machinery used with the electrical equipment.

- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.
About the Book

At a Glance

Document Scope

This manual provides information on the Quantum Change Configuration On The Fly (CCOTF) function.

The CCOTF function is for:
- Standalone systems
- Hot Standby systems

Validity Note

This document is valid for EcoStruxure™ Control Expert 14.0 or later.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Go to the Schneider Electric home page <a href="http://www.schneider-electric.com">www.schneider-electric.com</a>.</td>
</tr>
</tbody>
</table>
| 2    | In the Search box type the reference of a product or the name of a product range.  
   - Do not include blank spaces in the reference or product range.  
   - To get information on grouping similar modules, use asterisks (*). |
| 3    | If you entered a reference, go to the Product Datasheets search results and click on the reference that interests you.  
   If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you. |
| 4    | If more than one reference appears in the Products search results, click on the reference that interests you. |
| 5    | Depending on the size of your screen, you may need to scroll down to see the data sheet. |
| 6    | To save or print a data sheet as a .pdf file, click Download XXX product datasheet. |

The characteristics that are presented in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.
## Related Documents

<table>
<thead>
<tr>
<th>Title of documentation</th>
<th>Reference number</th>
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</thead>
<tbody>
<tr>
<td>EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual</td>
<td>35006144 (English), 35006145 (French), 35006146 (German), 35013361 (Italian), 35006147 (Spanish), 35013362 (Chinese)</td>
</tr>
<tr>
<td>EcoStruxure™ Control Expert, Operating Modes</td>
<td>33003101 (English), 33003102 (French), 33003103 (German), 33003104 (Spanish), 33003696 (Italian), 33003697 (Chinese)</td>
</tr>
<tr>
<td>EcoStruxure™ Control Expert, System Bits and Words, Reference Manual</td>
<td>EIO00000002135 (English), EIO00000002136 (French), EIO00000002137 (German), EIO00000002138 (Italian), EIO00000002139 (Spanish), EIO00000002140 (Chinese)</td>
</tr>
<tr>
<td>Modicon Quantum, Update Procedure, User Guide</td>
<td>EIO00000002381 (English)</td>
</tr>
<tr>
<td>EcoStruxure™ Control Expert, OS Loader, User Manual</td>
<td>35006156 (English), 35006157 (French), 35006158 (German), 33003672 (Italian), 35006159 (Spanish), 33003673 (Chinese)</td>
</tr>
<tr>
<td>Quantum using EcoStruxure™ Control Expert, Hardware Reference Manual</td>
<td>35010529 (English), 35010530 (French), 35010531 (German), 35013975 (Italian), 35010532 (Spanish), 35012184 (Chinese)</td>
</tr>
<tr>
<td>Quantum EIO, Remote I/O Modules, Installation and Configuration Guide</td>
<td>S1A48978 (English), S1A48981 (French), S1A48982 (German), S1A48983 (Italian), S1A48984 (Spanish), S1A48985 (Chinese)</td>
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</table>
You can download these technical publications and other technical information from our website at [www.schneider-electric.com/en/download](http://www.schneider-electric.com/en/download).

<table>
<thead>
<tr>
<th>Title of documentation</th>
<th>Reference number</th>
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<tr>
<td>Quantum using EcoStruxure™ Control Expert, Hot Standby System, User Manual</td>
<td>35010533 (English), 35010534 (French),</td>
</tr>
<tr>
<td></td>
<td>35010535 (German), 35013993 (Italian),</td>
</tr>
<tr>
<td></td>
<td>35010536 (Spanish), 35012188 (Chinese)</td>
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<tr>
<td>Grounding and Electromagnetic Compatibility of PLC Systems, Basic</td>
<td>33002439 (English), 33002440 (French),</td>
</tr>
<tr>
<td>Principles and Measures, User Manual</td>
<td>33002441 (German), 33003702 (Italian),</td>
</tr>
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<td></td>
<td>33002442 (Spanish), 33003703 (Chinese)</td>
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Part I
Introduction to Quantum Change Configuration On The Fly

Overview
This part describes the Change Configuration On The Fly (CCOTF) function in Quantum systems.

What Is in This Part?
This part contains the following chapters:

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<tr>
<th>Chapter</th>
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Chapter 1
CCOTF Presentation

Overview
This chapter describes the Quantum CCOTF function and compatibilities.

What is in This Chapter?
This chapter contains the following sections:

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Section 1.1
CCOTF General Information

Overview
This section presents general requirements for the Quantum CCOTF function.

What Is in This Section?
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<tr>
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General Requirements for Quantum CCOTF

Overview

CCOTF allows modifications of a PLC I/O configuration in RUN mode.

The changes that can be made in the local drop or a S908 RIO drop are as follows:
- add a discrete or analog module in a free slot
- delete a discrete or analog module
- modify the configuration and adjustment parameters of a module

The changes that can be made in an Ethernet IO drop are as follows:
- add a Quantum or Modicon M340 EIO drop
- add a discrete or analog module in a free slot
- delete a discrete or analog module
- modify the configuration and adjustment parameters of a module

The RIO drops management in a Quantum system is based on:
- a network:
  - S908 network (see Quantum using EcoStruxure™ Control Expert, Hardware, Reference Manual) in an S908 Quantum system
  - Ethernet network (see Quantum EIO, Remote I/O Modules, Installation and Configuration Guide) in a Quantum Ethernet I/O Quantum system
- communication modules:
  - a CRP module, placed in the local drop
  - a CRA module, placed in each RIO drop

The following graphic shows an example of Quantum standalone architecture with a Quantum RIO drop:
Hardware Requirements

The CCOTF function is not available for safety Quantum PLCs.

Control Expert Requirements

**NOTE:** Unity Pro is the former name of Control Expert for version 13.1 or earlier.

The minimum Control Expert/Unity Pro software versions required to use CCOTF in a:

- **Standalone system is:**
  - Local drop or S908 RIO drops: Unity Pro XL, XLS 5.0 or higher
  - Quantum Ethernet IO drop: Unity Pro XL 6.0 or higher
  - Modicon M340 Ethernet IO drop: Unity Pro XL 7.0 or higher

- **Hot Standby system is:**
  - Local drop with S908 RIO drops: Unity Pro XL, XLS 4.1 or higher
  - Local drop with Quantum Ethernet IO drops: Unity Pro XL 6.0 or higher
  - Local drop with Modicon M340 Ethernet IO drops: Unity Pro XL 7.0 or higher

Firmware Requirements

The minimum firmware versions required to use the CCOTF function with a local or S908 RIO drop are:

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Reference</th>
<th>Firmware Version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standalone CPU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140 CPU 311 10</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 434 12A/U</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 534 14A/B/U</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 651 50</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 651 50 S</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 651 60</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 652 60</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 658 60</td>
<td>SV3.20 or later</td>
<td></td>
</tr>
<tr>
<td><strong>Hot Standby CPU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140 CPU 671 60</td>
<td>SV2.70 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 672 60</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 672 61</td>
<td>SV2.80 or later</td>
<td></td>
</tr>
<tr>
<td>140 CPU 678 61</td>
<td>SV3.20 or later</td>
<td></td>
</tr>
<tr>
<td><strong>S908 RIO module</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140 CRA 93x 00</td>
<td>SV2.00 or later</td>
<td></td>
</tr>
<tr>
<td>140 CRP 93x 00</td>
<td>SV2.00 or later</td>
<td></td>
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</tbody>
</table>

**NOTE:** Modules PV03 and later can be upgraded (see page 51) to allow CCOTF function.
The minimum firmware versions required to use the CCOTF function with an Ethernet IO drop are:

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Reference</th>
<th>Firmware Version</th>
<th>CCOTF Function</th>
</tr>
</thead>
</table>
| **Standalone CPU**   | 140 CPU 651 50 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Limited |
|                      | 140 CPU 651 60 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Limited |
|                      | 140 CPU 652 60 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Full |
|                      | 140 CPU 658 60 | • SV3.20 or later | Full |
| **Hot Standby CPU**  | 140 CPU 671 60 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Limited |
|                      | 140 CPU 672 60 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Full |
|                      | 140 CPU 672 61 | • SV3.00 or later  
• SV3.10 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Full |
|                      | 140 CPU 678 61 | • SV3.20 or later | Full |
| **Ethernet IO module** | 140 CRP 312 00 | • SV1.00 or later  
• SV2.00 or later (to manage add Ethernet IO drop + Modicon M340 Ethernet IO drops) | Full |
|                      | 140 CRA 312 00 | • SV1.00 or later | Full |
|                      | BMX CRA 312 10 | • SV1.00 or later | Full |

CCOTF function level description:
- Limited: 1 x 140 CRP 312 •• module in the system, no add drop functionality, 16 Ethernet IO drops maximum
- Full: 1 x 140 CRP 93x 00 (S908) + 1 x 140 CRP 312 •• (EIO) modules in the system, add drop functionality, 31 Ethernet IO drops maximum.
Recommendation

**DANGER**

**HAZARD OF ELECTRIC SHOCK**
Do not manipulate a module that is supplied by a dangerous voltage. Read and understand the preventive measures that are described in the Grounding and Electromagnetic Compatibility of PLC Systems (see Grounding and Electromagnetic Compatibility of PLC Systems, Basic Principles and Measures, User Manual) user manual.

Failure to follow these instructions will result in death or serious injury.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
</table>
**RISK OF UNEXPECTED EQUIPMENT BEHAVIOR**
Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.

Take these recommendations into account before adding an Ethernet RIO drop or adding / removing a module from the local or RIO drop:

- Adding an Ethernet RIO drop in a Quantum Ethernet I/O system:
  - configure the Ethernet RIO drop in Control Expert
  - connect the Ethernet RIO drop in the system
  - write the sequences of application program to manage the new Ethernet RIO drop

- Adding a module in the Control Expert configuration:
  - configure the module in Control Expert
  - plug the module in the hardware configuration
  - write the sequences of application program to manage the new module

- Removing a module from the configuration:
  - remove the sequence of application program that is related to the removed module
  - unplug the module from the hardware configuration
  - remove the module from the Control Expert configuration
NOTE: Adding, through a CCOTF operation, a Discrete Module supporting both Discrete Inputs and Discrete Outputs (e.g. 140 DDM 390 00, 140 DDM 690 00) in a local drop or S908 Remote I/O drops, leaves the Module inactive and the Value of Discrete Inputs not updated in the PLC Memory when the task output update is inhibited with %SW9 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual).

Quantum System Configuration Overview

A Quantum configuration can have:
- a local drop and S908 Remote I/O drops in an S908 system
- a local drop and Ethernet Remote I/O drops in a Quantum Ethernet I/O system
- a local drop with S908 Remote I/O drops and Ethernet Remote I/O drops

The local drop and each remote I/O drop can be made of two racks (backplanes):
- The Main (Primary) rack contains the CPU and the Remote I/O drop adapter
- The Extended (Secondary) rack is linked to the main rack with two backplane expanders

CCOTF modifications can be performed on the main rack or the extended rack.

The picture below shows the elements that can be part of a Quantum drop:

1. Power Supplies (140 CPS ••• ••)
2. CPU (140 CPU ••• ••) or RIO adapter
3. First backplane Expander (140 XBE 100 00)
4. Second backplane Expander (140 XBE 100 00)
5. Backplane expander Cable (140 XCA 717 0•)
6. Cable end marked as "Primary"
Number of CCOTF Modifications

Validating a CCOTF modification requires a Build Changes in Control Expert.

The number of CCOTF modifications allowed in one CCOTF transaction (a transaction is defined by the operations done between two Build Changes) depends on the system:

- In a local drop or S908 RIO drops, 1 modification is allowed by transaction.
- In a Quantum Ethernet RIO drop:
  - 1 add Ethernet RIO drop is allowed by transaction
  - 4 add or 4 delete modules modifications are allowed by transaction (in the same drop)
  - 1 parameter modification is allowed by transaction (in the same drop)
- In a Modicon M340 Ethernet RIO drop:
  - 1 add Ethernet RIO drop is allowed by transaction
  - 4 add or 4 delete modules modifications are allowed by transaction (in the same drop)
  - Parameters (Configuration or Adjustment) modifications are allowed on 4 channels of the same module, in the same drop, by transaction.
    - A parameter modification on 1 channel causes this channel to be reset.
  - 1 Modicon M340 Ethernet RIO drop module application specific function parameter modification is allowed by transaction (BMX EHC ••• module only)

The number of modifications allowed is available in both the Standard connected mode as well as in the Virtual connected mode (see EcoStruxure™ Control Expert, Operating Modes).

The number of CCOTF modifications allowed in a transaction respect a hierarchy:

- An add Ethernet RIO drop allows to add various module and modify the modules parameter within the same transaction.
- An add module in an Ethernet RIO drop allows to modify the added module parameters within the same transaction. 3 other modules can be added within the same transaction.
- A parameter modification performed on a Modicon M340 channel in an Ethernet RIO drop allows parameters modifications to be performed on 3 other channels on the same module, in the same drop, within the same transaction.

No higher level CCOTF modification is allowed within the same transaction: no add or delete module nor add drop are authorized after an initial parameter modification. A Build Changes must be performed before performing a higher level CCOTF modification.

To perform more than one CCOTF transaction it is necessary to proceed in several steps:

- perform a Build Changes
- transfer the current modifications in the PLC before doing next modifications.
The picture below shows what happens if the number of allowed CCOTF modifications is exceeded in a Quantum system with S908 RIO drops:

NOTE: A CCOTF modification is valid with these two actions:
- Adding / Deleting / Modifying a module or adding an Ethernet RIO drop in the Control Expert configuration screen is carried out.
- Performing a **Build Changes** of the modifications.

**Example of a CCOTF Modification**

Recommended CCOTF modification procedure:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insert a new module in a free slot of the Control Expert configuration screen.</td>
</tr>
<tr>
<td>2</td>
<td>Modify the parameters of this module.</td>
</tr>
<tr>
<td>3</td>
<td>Validate the parameters modification.</td>
</tr>
</tbody>
</table>

NOTE: These 3 actions are considered as one CCOTF modification and require one build change to be considered as a completed transaction.

NOTE: Program modifications (add, delete or modify a sequence of code) are not considered part of the CCOTF modification. Only I/O configuration modifications (if they are allowed) are counted as CCOTF modifications.
Limitations

For eX80 modules, the CCOTF limitations are unchanged until last Control Expert version. Quantum ERIO modules that are configured with an M580 PLC have these limitations:

- You can add an online Quantum ERIO drop only for M580 and M580 Hot Standby PLCs.
- You can add or remove only discrete and analog Quantum I/O modules.
- You can add or remove these expert modules:
  - 140 ERT 854 10
  - 140 ERT 854 20
  - 140 ERT 854 30
- You cannot add or remove these modules:
  - GEN ANA IO
  - 140 NRP 312 00
  - 140 NRP 312 01
  - 140 XBE 100 00
  - 140 EHC 105 00
  - 140 EHC 202 00
  - GEN IO
  - 140 ESI 062 10
Section 1.2
CCOTF Allowed Actions and Diagnosis

Overview
This section describes CCOTF allowed actions and System Words and Bits for a Quantum local drop, S908 RIO drop and Ethernet RIO drop.

What Is in This Section?
This section contains the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>Local Drop and S908 RIO Drop Allowed Actions and Diagnosis</td>
<td>26</td>
</tr>
<tr>
<td>Ethernet RIO Drop Allowed Actions and Diagnosis</td>
<td>29</td>
</tr>
<tr>
<td>Impact of a CCOTF Modification on the State RAM</td>
<td>32</td>
</tr>
</tbody>
</table>
Local Drop and S908 RIO Drop Allowed Actions and Diagnosis

CCOTF Allowed Actions

These actions can be done on discrete or analog modules in a Quantum local drop and a Quantum S908 RIO drop (both main or extended racks) that are in the RUN mode:

- Add a module in a drop:
  - Add a new module
  - Copy/Paste a module in the same S908 RIO drop.
    The Copy/Paste is done from and to the main or extended drop rack. The new module has the parameter values of the copied module.
- Delete a module from a drop
- Modify module parameters

NOTE:
- It is not possible to move a module with the CCOTF function.
- Not all module parameters can be modified (including, for example, its I/O data type: State Ram or Device DDT).

Control Expert Connection Ports

The table below indicates the possible connection points for CCOTF modifications, which depend on the physical connection link between the computer and the Quantum system:

<table>
<thead>
<tr>
<th>Physical link</th>
<th>Module available for connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus Serial</td>
<td>140 CPU *** module</td>
</tr>
<tr>
<td>Modbus Plus</td>
<td>140 CPU *** module</td>
</tr>
<tr>
<td>USB</td>
<td>140 CPU *** module</td>
</tr>
<tr>
<td>Ethernet</td>
<td>140 CPU *** module (if available)</td>
</tr>
<tr>
<td></td>
<td>140 NOE *** communication module</td>
</tr>
</tbody>
</table>
%SW98 and %SW99 S908 CRA Module Compatibility System Words

NOTE: All S908 RIO drops configured in the S908 RIO bus must be CCOTF compatible. This means that the corresponding bits in the system word %SW98 and %SW99 must be set to 1. No CCOTF modification is allowed if one of the S908 RIO drops configured in the S908 RIO bus is not CCOTF compatible.

NOTE: 800 Series I/O and Sy/Max I/O are not CCOTF compatible. When the CCOTF function is configured, neither 800 Series I/O nor Sy/Max I/O must be connected to the S908 RIO bus.

The following graphic shows the content of %SW98 and %SW99 system Status Register words (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) used to diagnose the S908 CRA modules compatibility:

%SW100 CCOTF Modifications Counting System Word

The system word %SW100 is incremented each time a CCOTF modification is performed in the local drop or in an S908 RIO drop. The system word value is reset to 0 on each transition from STOP to RUN mode.

%SW100 = XXYY, where:
- XX is incremented each time a CCOTF modification is done in RUN mode in an S908 RIO drop,
- YY is incremented each time a CCOTF modification is done in RUN mode in the local drop.
Status Bits

The status bit of a module is set to 0 while the module is configured but not present. The status bits are in the system words %SW180 to %SW339 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual). This impacts the system bits %S118 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) or %S119 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) and %S10 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) for local and S908 RIO drops.

On the other hand, when a parameter is changed, the module is re-started and status bit is set to 0 during several ms. This also impacts the system bits %S118 or %S119 and %S10 for local and S908 RIO drops.

**NOTE:** When adding, deleting or modifying parameters in one module, the other modules available in the system are not impacted and their status bit remain at 1.
Ethernet RIO Drop Allowed Actions and Diagnosis

CCOTF Allowed Actions

These actions can be done in a Quantum Ethernet RIO system that is in the RUN mode:

- Add a Quantum or Modicon M340 Ethernet RIO drop
- In a Quantum Ethernet RIO drop (both main or extended racks):
  - Add a new module (see page 34) in a drop
  - Copy/Paste a module (see page 34) in the same Ethernet RIO drop.
    The Copy/Paste is done from and to the main or extended drop rack. The new module has
    the parameter values of the copied module.
  - Delete a module (see page 34) from a drop
  - Modify module (see page 34) parameters
- In a Modicon M340 Ethernet RIO drop (both main or extended racks):
  - Add a new module (see page 35) in a drop
  - Copy/Paste a module (see page 35) in the same Ethernet RIO drop.
    The Copy/Paste is done from and to the main or extended drop rack. The new module has
    the parameter values of the copied module.
  - Delete a module (see page 35) from a drop
  - Modify module (see page 35) parameters
  - Modify module application specific function parameter (BMX EHC ••• module only)

NOTE: It is not possible to move a module with the CCOTF function.
The table below indicates the possible connection points for CCOTF modifications, which depend on the physical connection link between the computer and the Quantum system:

<table>
<thead>
<tr>
<th>Physical link</th>
<th>Module available for connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus Serial</td>
<td>140 CPU ••• module</td>
</tr>
<tr>
<td>Modbus Plus</td>
<td>140 CPU ••• module</td>
</tr>
<tr>
<td>USB</td>
<td>140 CPU ••• module</td>
</tr>
<tr>
<td>Ethernet</td>
<td>140 CPU ••• module (if available)</td>
</tr>
<tr>
<td></td>
<td>140 NOE 771 •• communication module</td>
</tr>
<tr>
<td></td>
<td>140 CRA 312 00 module on a Quantum Ethernet RIO drop or BMX CRA 312 10 module on a Modicon M340 Ethernet RIO drop (service port) (^1).</td>
</tr>
<tr>
<td></td>
<td>Dual ring switch located in the Ethernet RIO network main ring (^1).</td>
</tr>
<tr>
<td></td>
<td>Switches located in the Ethernet RIO network sub-rings (^1).</td>
</tr>
</tbody>
</table>

\(^1\) **NOTE:** A configured 140 NOC 780 00 distributed I/O head module must be interlinked with the 140 CRP 312 00 remote I/O head module in the local drop.

**%SW66 Ethernet RIO CCOTF Status Word**

The system word %SW66 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) holds the Ethernet RIO CCOTF function status.

\[ %SW66 = XXYY, \]

- **XX** is associated with the Ethernet RIO CCOTF status code (Succeed, Not completed, etc.).
- **YY** is associated with the Ethernet RIO CCOTF processing status (Idle, In progress, Completed, etc.).

**%SW101 Ethernet RIO CCOTF Modifications Counting System Word**

The system word %SW101 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) is incrementing each time an Ethernet RIO drop CCOTF modification is performed in a PLC.

The system word value is reset to 0 on cold-start, warm-start or after an application download.

\[ %SW101 = XXYY, \]

- **XX** is reserved.
- **YY** is incrementing each time an Ethernet I/O configuration modification is done in RUN mode.
%SW152 to %SW153 Ethernet RIO Drop Error Status System Words
The %SW152 to %SW153 Quantum system words (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) hold the Ethernet RIO drops error status.

%SW641 to %SW702 Ethernet RIO Drop Modules Health Status System Words
The %SW641 to %SW702 Quantum system words (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) hold the Ethernet RIO drop modules health status.

Status Bits
When adding a module, the health bit of the module is set to 0 during the time where the module is configured but not present. The health bits are in the system words %SW641 to %SW702 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual). This impacts the system bits%S117 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) and %S10 (see EcoStruxure™ Control Expert, System Bits and Words, Reference Manual) for Ethernet RIO drops.

On the other hand, when a parameter is changed, the module is re-started and status bit is set to 0 during several ms. This also impacts the system bits %S117 and %S10 for Ethernet RIO drops.

NOTE: When adding, deleting or modifying parameters in one module, the other modules available in the system are not impacted and their health bit remain at 1.
Impact of a CCOTF Modification on the State RAM

Overview

When a discrete output module is inserted in RUN in a Quantum configuration, all the output bits associated to this module in the state RAM (see EcoStruxure™ Control Expert, Operating Modes) are set to 0 (and all forced bits are immediately unforced).

When an analog output module is inserted in RUN in a Quantum configuration, all the output words associated to this module in the state RAM (see EcoStruxure™ Control Expert, Operating Modes) are set to 0.

When a discrete or analog input module is inserted in RUN in a Quantum configuration, all the input bits or words associated to this module in the state RAM (see EcoStruxure™ Control Expert, Operating Modes) are kept in the same state (including forced bits).
Section 1.3
CCOTF Compatible Modules

Overview
This section describes CCOTF compatible modules and bus management.

What Is in This Section?
This section contains the following topics:

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<thead>
<tr>
<th>Topic</th>
<th>Page</th>
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</thead>
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<tr>
<td>Modicon X80 Drop Hardware Compatibility</td>
<td>35</td>
</tr>
<tr>
<td>CCOTF Bus Management Compatibility</td>
<td>36</td>
</tr>
</tbody>
</table>
Quantum Hardware Compatibility

Ethernet RIO Drop Compatibility
A compatible Quantum Ethernet RIO drop must contain a 140CRA31200 Ethernet communication module.

Analog and Discrete Modules Compatibility
The table below lists the Quantum I/O modules that can be added / deleted / modified in RUN mode:

<table>
<thead>
<tr>
<th>Analog Modules</th>
<th>Discrete Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>140 ACI 030 00</td>
<td>140 DDI 153 10</td>
</tr>
<tr>
<td>140 ACI 040 00</td>
<td>140 DDI 353 00</td>
</tr>
<tr>
<td>140 ACO 020 00</td>
<td>140 DDI 353 10</td>
</tr>
<tr>
<td>140 ACO 130 00</td>
<td>140 DDI 364 00</td>
</tr>
<tr>
<td>140 All 330 00</td>
<td>140 DDI 673 00</td>
</tr>
<tr>
<td>140 All 330 10</td>
<td>140 DDI 841 00</td>
</tr>
<tr>
<td>140 AIO 330 00</td>
<td>140 DDI 853 00</td>
</tr>
<tr>
<td>140 AIO 330 00</td>
<td>140 DAI 340 00</td>
</tr>
<tr>
<td>140 AMM 090 00</td>
<td>140 DAI 353 00</td>
</tr>
<tr>
<td>140 ARI 030 10</td>
<td>140 DAI 440 00</td>
</tr>
<tr>
<td>140 AVI 030 00</td>
<td>140 DAI 453 00</td>
</tr>
<tr>
<td>140 AVO 020 00</td>
<td>140 DAI 540 00</td>
</tr>
<tr>
<td>140 ATI 030 00</td>
<td>140 DAI 543 00</td>
</tr>
<tr>
<td>140 AVI 030 00</td>
<td>140 DAI 553 00</td>
</tr>
<tr>
<td>140 AVO 020 00</td>
<td>140 DAI 740 00</td>
</tr>
<tr>
<td>140 AAI 330 00</td>
<td>140 DAI 753 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DAI 763 00</td>
</tr>
<tr>
<td>140 AII 330 10</td>
<td>140 DAI 840 00</td>
</tr>
<tr>
<td>140 AII 330 10</td>
<td>140 DDO 153 10</td>
</tr>
<tr>
<td>140 AIO 330 00</td>
<td>140 DDO 353 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDO 353 01</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDM 353 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDM 390 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDM 690 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDD 364 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDI 330 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDO 840 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DDO 855 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DIO 330 00</td>
</tr>
<tr>
<td>140 AII 330 00</td>
<td>140 DIO 840 00</td>
</tr>
</tbody>
</table>

NOTE: On a S908 network, 800 Series I/O modules and Sy/Max I/O modules are not compatible with the CCOTF function.

140 ERT 854 10 and 140 ERT 854 20 Modules
In an Ethernet RIO drop, 140 ERT 854 10 and 140 ERT 854 20 modules (expert family devices) are compatible with the CCOTF function and can be added / deleted / modified in RUN mode.

Quantum Safe Modules
Hot Swapping Quantum Safe modules (140 All 330 00, 140 All 330 10, 140 AIO 330 00, 140 DII 330 00 and 140 DIO 330 00) is not allowed by the intrinsic safety standards.
However, if such modules already exist in an application, the CCOTF function can be used on these modules for changing their configuration parameters.
Modicon X80 Drop Hardware Compatibility

Ethernet RIO Drop Compatibility

A compatible Modicon X80 drop must contain a BMXCRA31210 Ethernet communication module.

**NOTE:** The BMXCRA31200 Ethernet communication module does not manage the CCOTF function.

Analog and Discrete Modules Compatibility

The table below lists the Modicon X80 I/O modules that can be added / deleted / modified in RUN mode in a Quantum Ethernet I/O system:

<table>
<thead>
<tr>
<th>Analog Modules</th>
<th>Discrete Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMX AMI 0410</td>
<td>BMX DAI 0805</td>
</tr>
<tr>
<td>BMX AMI 0800</td>
<td>BMX DAI 0814</td>
</tr>
<tr>
<td>BMX AMI 0810</td>
<td>BMX DAI 1602</td>
</tr>
<tr>
<td>BMX ART 0414</td>
<td>BMX DAI 1603</td>
</tr>
<tr>
<td>BMX ART 0814</td>
<td>BMX DAI 1604</td>
</tr>
<tr>
<td>BMX AMO 0210</td>
<td>BMX DAI 1614</td>
</tr>
<tr>
<td>BMX AMO 0410</td>
<td>BMX DAI 1615</td>
</tr>
<tr>
<td>BMX AMO 0802</td>
<td>BMX DAO 1605</td>
</tr>
<tr>
<td>BMX AMM 0600</td>
<td>BMX DAO 1615</td>
</tr>
</tbody>
</table>

**NOTE:** ¹Firmware V2.1 equal or higher must be installed

Expert and Communication Modules Compatibility

The table below lists Modicon X80 modules compatibility:

<table>
<thead>
<tr>
<th>Module</th>
<th>CCOTF Action Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMX EHC 0200</td>
<td>• Modify configuration and adjustment parameters</td>
</tr>
<tr>
<td>BMX EHC 0800</td>
<td>• Modify application specific function</td>
</tr>
</tbody>
</table>
CCOTF Bus Management Compatibility

Bus and Drop Compatibility

The modifications can be done only in the Quantum local drop, Quantum RIO drops connected to the S908 network or Quantum RIO drops connected to the Ethernet network in a Quantum Ethernet I/O system.

It is not possible to do any change on the DIO Bus in RUN.

The online modification in RUN option must be validated in the Control Expert CPU configuration screen (see page 47) to allow CCOTF modifications.

If 800 Series I/O and Sy/Max I/O are connected to the S908 RIO network, an error is displayed by Control Expert during the build process.

This table describes the bus and drop compatibility with the CCOTF function:

<table>
<thead>
<tr>
<th>Type of Drop</th>
<th>Modifications Authorized in RUN mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL Drop</td>
<td></td>
</tr>
<tr>
<td>Main RACK</td>
<td>Yes</td>
</tr>
<tr>
<td>Extended RACK</td>
<td>Yes</td>
</tr>
<tr>
<td>S908 RIO Drop</td>
<td></td>
</tr>
<tr>
<td>Sy/Max drop</td>
<td>No</td>
</tr>
<tr>
<td>800 Series drop</td>
<td>No</td>
</tr>
<tr>
<td>Quantum drop</td>
<td></td>
</tr>
<tr>
<td>Main RACK</td>
<td>Yes</td>
</tr>
<tr>
<td>Extended RACK</td>
<td>Yes</td>
</tr>
<tr>
<td>NOTE: It is not possible to add an extended rack with the CCOTF function.</td>
<td></td>
</tr>
<tr>
<td>Ethernet RIO Drop</td>
<td></td>
</tr>
<tr>
<td>Quantum drop</td>
<td>Main RACK Yes</td>
</tr>
<tr>
<td></td>
<td>Extended RACK Yes</td>
</tr>
<tr>
<td></td>
<td>NOTE: It is not possible to add an extended rack with the CCOTF function.</td>
</tr>
<tr>
<td>Modicon M340 drop</td>
<td>Main RACK Yes</td>
</tr>
<tr>
<td></td>
<td>Extended RACK Yes</td>
</tr>
<tr>
<td></td>
<td>NOTE: It is not possible to add an extended rack with the CCOTF function.</td>
</tr>
<tr>
<td>DIO Bus</td>
<td>No</td>
</tr>
</tbody>
</table>
Chapter 2
System Upgrade to Use CCOTF

Overview
This chapter describes how to replace your hardware or upgrade your firmware to take advantage of the CCOTF function for Quantum system.

It is necessary for the Quantum system to be stopped during the upgrade procedure.

The system upgrade can be done with:
- a temporary STOP (few minutes required) for changing the hardware modules
- a complete STOP for upgrading the CPU, Copro and CRP/CRA firmware

NOTE: To download the CPU, Copro, CRA and CRP firmware, please access to Schneider Electric website www.schneider-electric.com.

WARNING
SYSTEM NO LONGER ACTIVE
Before stopping the system, always positively confirm that there is no critical operation in progress.
The system is no longer active.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

What Is in This Chapter?
This chapter contains the following sections:

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
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<tbody>
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<td>Standalone System Upgrade</td>
<td>38</td>
</tr>
<tr>
<td>2.2</td>
<td>Hot Standby System Upgrade</td>
<td>44</td>
</tr>
<tr>
<td>2.3</td>
<td>Firmware Upgrade</td>
<td>51</td>
</tr>
</tbody>
</table>
Section 2.1
Standalone System Upgrade

Overview
This section describes how to replace your hardware or upgrade modules firmware to take advantage of the CCOTF function for a Quantum standalone system.

What Is in This Section?
This section contains the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle</td>
<td>39</td>
</tr>
<tr>
<td>Replacing Standalone Hardware Modules</td>
<td>41</td>
</tr>
</tbody>
</table>
Principle

General

The picture below shows an example of a Quantum standalone configuration to be upgraded to be CCOTF compatible:

1 PLC
2 Drop number 2
3 Drop number 32

In order to make a Quantum configuration CCOTF compatible, there are several steps to follow:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace the hardware <em>(see page 41)</em> or upgrade the firmware <em>(see page 51)</em> for the CPU and S908 CRP (in a Quantum system with S908 RIO drops).</td>
</tr>
<tr>
<td>2</td>
<td>Modify the application.</td>
</tr>
<tr>
<td>3</td>
<td>(In a Quantum system with S908 RIO drops, replace the hardware <em>(see page 43)</em> or upgrade the firmware <em>(see page 52)</em> for all the S908 CRA modules connected to the RIO bus.)</td>
</tr>
</tbody>
</table>
Quantum Ethernet RIO Communication Modules

To benefit from the latest CCOTF function actions, Quantum CPU and Ethernet RIO communication module (140 CRP 312 00) need to be updated to the latest version (see page 18):

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace the hardware (see page 41) or upgrade the firmware (see page 51) for the CPU and Quantum Ethernet CRP (in a Quantum system with Ethernet RIO drops).</td>
</tr>
<tr>
<td>2</td>
<td>Modify the application.</td>
</tr>
</tbody>
</table>

Modicon M340 Ethernet RIO communication module (BMXCRA31210) is CCOTF compatible.
Replacing Standalone Hardware Modules

Replacing PLC Procedure

This procedure describes how to replace the modules in a standalone local drop to be CCOTF compatible:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upload the application program running on the Quantum CPU to Control Expert.</td>
</tr>
<tr>
<td>2</td>
<td>Export the application in the XEF format on the Control Expert workstation.</td>
</tr>
</tbody>
</table>

**WARNING**

**LOSS OF COMMUNICATION**

Before changing the mode of PLC to STOP, always confirm that there is no critical operation in progress. The system is no longer active.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Stop the PLC and power it off.</td>
</tr>
<tr>
<td>5</td>
<td>If using a PCMCIA card, remove it then remove its batteries to empty the card.</td>
</tr>
</tbody>
</table>
| 6    | In a Quantum system with:  
|      | ● S908 RIO drops, disconnect the S908 RIO cables from the S908 CRP module (140 CRP 93* 00).  
|      | ● Ethernet RIO drops, disconnect the Ethernet cables from the Quantum Ethernet CRP module (140 CRP 312 00). |
| 7    | Replace hardware or upgrade *(see page 51)* the CPU firmware with a compatible version:  
|      | ● V2.80 (or higher firmware version) for a local drop with S908 RIO drops  
|      | ● V3.10 (or higher firmware version) for a local drop with Ethernet RIO drops |
| 8    | In a Quantum system with:  
|      | ● S908 RIO drops, replace hardware or upgrade *(see page 51)* the S908 CRP firmware with a compatible version V2.00 (or higher firmware version).  
|      | ● Ethernet RIO drops, replace hardware or upgrade *(see page 51)* the Quantum Ethernet CRP firmware with a compatible version V2.00 (or higher firmware version). |
| 9    | Power on the PLC. |
| 10   | If using a PCMCIA card, insert the batteries in the PCMCIA card and then insert the PCMCIA card in the CPU.  
**NOTE:** The CPU must be in the No Conf state. |
| 11   | Import the XEF file of the application into Control Expert. |
| 12   | In the Local Bus editor replace the current version of the CPU with the new firmware CPU version. |
Click on the **Online modification in Run** check box in the CPU configuration screen to enable the new function.

The dialog below shows the check box in the Configuration tab:

---

13. Rebuild the application using **Rebuild all**. The CPU is in STOP mode.

15. Download the application to the CPU while the CPU is in the STOP mode. At the end of the application download, all the application data in the PLC have their initial values.

16. In a Quantum system with:
   - S908 RIO drops, reconnect the S908 RIO cable to the S908 CRP module.
   - Ethernet RIO drops, reconnect the Ethernet cables to the Quantum Ethernet CRP module.
Replacing the S908 CRA Modules in a Quantum System with S908 RIO Drops

Replacing S908 CRA modules in the S908 RIO drops can only be done after the local drop of the PLC has been updated to be CCOTF compatible with upgraded CPU and S908 CRP modules.

The following table represents the procedure to replace an S908 CRA (140 CRA 93* 00):

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make sure that a powered off RIO drop is supported by the application.</td>
</tr>
<tr>
<td>2</td>
<td>Power off the S908 RIO drop.</td>
</tr>
<tr>
<td>3</td>
<td>Disconnect the S908 RIO cable from the S908 CRA module.</td>
</tr>
<tr>
<td>4</td>
<td>Replace hardware or upgrade (see page 51) the S908 CRA firmware with a compatible version V2.00 (or higher firmware version).</td>
</tr>
<tr>
<td>5</td>
<td>Reconnect the S908 RIO cable on the S908 CRA module.</td>
</tr>
<tr>
<td>6</td>
<td>Power on the S908 RIO drop.</td>
</tr>
</tbody>
</table>

Repeat steps 2 through 7 for all S908 RIO drops.

NOTE: To allow CCOTF modifications, all S908 RIO drops configured on the RIO bus must be CCOTF compatible (see page 27).
Section 2.2
Hot Standby System Upgrade

Overview
This section describes how to replace your hardware or upgrade modules firmware to take advantage of the CCOTF function for Quantum Hot Standby system.

What Is in This Section?
This section contains the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle</td>
<td>45</td>
</tr>
<tr>
<td>Replacing Hot Standby Hardware Modules</td>
<td>47</td>
</tr>
</tbody>
</table>
Principle

General

The picture below shows an example of a Quantum Hot Standby configuration to be upgraded to be CCOTF compatible:

1. Primary PLC (PLC A)
2. Standby PLC (PLC B)
3. Drop number 2
4. Drop number 32
In order to make a Quantum Hot Standby configuration CCOTF compatible, there are several steps to follow:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace the hardware (see page 47) or upgrade the firmware (see page 51) for the CPU and S908 CRP (in a Quantum system with S908 RIO drops) in Standby PLC B.</td>
</tr>
<tr>
<td>2</td>
<td>Replace the hardware (see page 50) or upgrade the firmware (see page 51) for the CPU and S908 CRP (in a Quantum system with S908 RIO drops) in Primary PLC A.</td>
</tr>
<tr>
<td>3</td>
<td>Modify the application in both PLCs.</td>
</tr>
<tr>
<td>4</td>
<td>In a Quantum system with S908 RIO drops, replace the hardware (see page 50) or upgrade the firmware (see page 52) for all the S908 CRA modules connected to the RIO bus.</td>
</tr>
</tbody>
</table>

**Quantum Ethernet RIO Communication Modules**

To benefit from the latest CCOTF function actions, Quantum CPU and Ethernet RIO communication module (140 CRP 312 00) need to be updated to the latest version (see page 18):

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace the hardware (see page 47) or upgrade the firmware (see page 51) for the CPU and Quantum Ethernet CRP (in a Quantum system with Ethernet RIO drops) in Standby PLC B.</td>
</tr>
<tr>
<td>2</td>
<td>Replace the hardware (see page 50) or upgrade the firmware (see page 51) for the CPU Quantum Ethernet CRP (in a Quantum system with Ethernet RIO drops) in Primary PLC A.</td>
</tr>
<tr>
<td>3</td>
<td>Modify the application.</td>
</tr>
</tbody>
</table>

Modicon M340 Ethernet RIO communication module (BMXCRA31210) is CCOTF compatible.
Replacing Hot Standby Hardware Modules

Overview
The modules must be replaced in the following order:
- Standby PLC (see page 47) (PLC B in this example)
- Primary PLC (see page 50) (PLC A in this example)
- S098 CRA modules (see page 50) in the S908 RIO drops (in a Quantum system with S908 RIO drops)

Replacing PLC B Procedure
The procedure below describes how to replace the modules in the Standby PLC:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make sure that the application program running on the Quantum Hot Standby CPUs has been exported in the XEF format and is available on the computer. If not, upload the application program from one of the two PLCs to Control Expert.</td>
</tr>
<tr>
<td>2</td>
<td>Export the application in the XEF format on the Control Expert workstation.</td>
</tr>
</tbody>
</table>

⚠️ WARNING
SYSTEM NO LONGER ACTIVE NOR REDUNDANT
Before stopping the system, always positively confirm that there is no critical operation in progress. The system is no longer active nor redundant.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Stop the Standby PLC (PLC B) and power it off. <strong>NOTE:</strong> At this point, the system is no longer operating redundantly.</td>
</tr>
<tr>
<td>5</td>
<td>If using a PCMCIA card, remove it then remove its batteries to empty the card.</td>
</tr>
<tr>
<td>6</td>
<td>Disconnect the fiber optic sync link cable on CPU B.</td>
</tr>
</tbody>
</table>
| 7    | In a Quantum system with:
- S908 RIO drops, disconnect the S908 RIO cables from the S908 CRP B module (140 CRP 93* 00).
- Ethernet RIO drops, disconnect the Ethernet cables from the Quantum Ethernet CRP B module (140 CRP 312 00). |
| 8    | Replace hardware or upgrade (see page 51) the CPU B firmware with a compatible version:
- V2.70 (or higher firmware version) for local drop with S908 RIO drops
- V3.10 (or higher firmware version) for local drop with Ethernet RIO drops |
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 9    | In a Quantum system with:  
|      | ● S908 RIO drops, replace hardware or upgrade *(see page 51)* the S908 CRP B firmware with a compatible version V2.00 (or higher firmware version).  
|      | ● Ethernet RIO drops, replace hardware or upgrade *(see page 51)* the Quantum Ethernet CRP B firmware with a compatible version V2.00 (or higher firmware version). |
| 10   | Power on PLC B. |
| 11   | When using a PCMCIA card, insert the batteries in the PCMCIA card and then insert the PCMCIA card in CPU B.  
|      | **NOTE:** The CPU must be in a **No Conf** state. |
| 12   | Import the XEF file of the application. |
| 13   | In the Local Bus editor replace the current version of the CPU with the new firmware CPU version. |
| 14   | Click on the **online modification in Run** check box in the CPU configuration screen to enable the new function.  
|      | The dialog box below shows the check box in the Configuration Tab: |
| 15   | Rebuild the application using **Rebuild all** and download into CPU B. The CPU is in STOP mode. |
| 16   | In a Quantum system with:  
|      | ● S908 RIO drops, reconnect the S908 RIO cable to the S908 CRP B module.  
|      | ● Ethernet RIO drops, reconnect the Ethernet cables to the Quantum Ethernet CRP B module. |
17 Connect the fiber optic sync link cable onto the CPU B.
18 Connect Control Expert to PLC A.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Connect the fiber optic sync link cable onto the CPU B.</td>
</tr>
<tr>
<td>18</td>
<td>Connect Control Expert to PLC A.</td>
</tr>
</tbody>
</table>

**WARNING**

**LOSS OF COMMUNICATION**

Before changing the mode of PLC A to STOP, always confirm that there is no critical operation in progress. The system is no longer active nor redundant.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 19   | Stop PLC A.  
**NOTE:** The system is no longer active nor redundant. |
| 20   | Connect Control Expert to PLC B. |

**WARNING**

**UNEXPECTED APPLICATION BEHAVIOR - LOSS OF DATA**

At the end of the application download, all the application data in the PLC B have their initial value. Before changing the mode of PLC B to RUN, always confirm that the application can restart with initial values.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Put the PLC B in RUN mode.</td>
</tr>
<tr>
<td>22</td>
<td>Ensure that PLC B becomes the Primary.</td>
</tr>
</tbody>
</table>
System Upgrade

Changing PLC A Procedure

This procedure follows Changing PLC B Procedure and describes how to replace the PLC A:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1    | Power off PLC A that is in STOP mode.  
|      | **NOTE:** At this point, the system is no longer operating redundantly. |
| 2    | If using a PCMCIA card, remove it then remove its batteries to empty the card. |
| 3    | Disconnect the fiber optic sync link cable on CPU A. |
| 4    | In a Quantum system with:  
|      | • S908 RIO drops, disconnect the S908 RIO cables from the S908 CRP A module (140 CRP 93* 00).  
|      | • Ethernet RIO drops, disconnect the Ethernet cables from the Quantum Ethernet CRP A module (140 CRP 312 00). |
| 5    | Replace hardware or upgrade *(see page 51)* the CPU A firmware with a compatible version:  
|      | • V2.70 (or higher firmware version) for local drop with S908 RIO drops  
|      | • V3.10 (or higher firmware version) for local drop with Ethernet RIO drops |
| 6    | In a Quantum system with:  
|      | • S908 RIO drops, replace hardware or upgrade *(see page 51)* the S908 CRP A firmware with a compatible version V2.00 (or higher firmware version).  
|      | • Ethernet RIO drops, replace hardware or upgrade *(see page 51)* the Quantum Ethernet CRP A firmware with a compatible version V2.00 (or higher firmware version). |
| 7    | Power on PLC A. |
| 8    | When using a PCMCIA card, insert the batteries in the PCMCIA card and then insert the PCMCIA card in CPU A.  
|      | **NOTE:** The CPU must be in a **No Conf** state. |
| 9    | In a Quantum system with:  
|      | • S908 RIO drops, reconnect the S908 RIO cable to the S908 CRP A module.  
|      | • Ethernet RIO drops, reconnect the Ethernet cables to the Quantum Ethernet CRP A module. |
| 10   | Connect the fiber optic sync link cable onto the CPU A. |
| 11   | An automatic transfer from Primary to Standby is done. |
| 12   | Make sure PLC A runs as Standby. |

Replacing the S908 CRA Modules in a Quantum System with S908 RIO Drops

Replacing S908 CRA modules in the S908 RIO drops must only be done after the local drop of the Primary PLC *(see page 50)* and the Standby PLC *(see page 47)* have been updated with upgraded CPUs and S908 CRP modules.

To replace the S908 CRA module, follow the procedure described in the CCOTF with a standalone system dedicated chapter. *(see page 43)*
Section 2.3
Firmware Upgrade

Upgrading the Firmware

CPU/Copro Compatibility
The Copro (co-processor) in the 140 CPU module is a processor dedicated to:
- embedded Ethernet link management in high-end standalone CPUs in a standalone system
- Hot Standby fiber optic link management in a Hot Standby system

The Copro firmware version depends on the Quantum CPU firmware version.

The table below shows the CPU and Copro firmware required to be CCOTF compatible:

<table>
<thead>
<tr>
<th>System</th>
<th>Quantum CPU Firmware Version</th>
<th>Copro Firmware Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone</td>
<td>V2.80</td>
<td>V2.80 to V2.89</td>
</tr>
<tr>
<td></td>
<td>V3.00</td>
<td>V3.00 to V3.09</td>
</tr>
<tr>
<td></td>
<td>V3.10</td>
<td>V3.00 to V3.09</td>
</tr>
<tr>
<td>Hot Standby</td>
<td>V2.70</td>
<td>V2.70 to V2.79</td>
</tr>
<tr>
<td></td>
<td>V2.80</td>
<td>V2.80 to V2.89</td>
</tr>
<tr>
<td></td>
<td>V3.00</td>
<td>V3.00 to V3.09</td>
</tr>
<tr>
<td></td>
<td>V3.10</td>
<td>V3.10</td>
</tr>
</tbody>
</table>

CPU Firmware Upgrade
The CPU firmware download is done through Modbus or Modbus Plus, using the OS Loader tool (see EcoStruxure™ Control Expert, OS Loader, User Manual).

The procedure to follow is described in the Modicon Quantum, Update Procedure, User Guide.

Copro Firmware Upgrade
The Copro firmware download is done through Modbus or Modbus Plus, using the OS Loader tool (see EcoStruxure™ Control Expert, OS Loader, User Manual).

The procedure to follow is described in the Modicon Quantum, Update Procedure, User Guide.

S908 CRP Firmware Upgrade
The S908 CRP firmware download is done through Modbus or Modbus Plus, using the OS Loader tool (see EcoStruxure™ Control Expert, OS Loader, User Manual).

The procedure to follow is described in the Modicon Quantum, Update Procedure, User Guide.
System Upgrade

S908 CRA Firmware Upgrade
The S908 CRA firmware download is done through Modbus or Modbus Plus, using the OS Loader tool *(see EcoStruxure™ Control Expert, OS Loader, User Manual).*
The procedure to follow is described in the Modicon Quantum, Update Procedure, User Guide.

Quantum Ethernet CRP Firmware Upgrade
The Quantum Ethernet CRP firmware download is done through Ethernet, using the OS Loader tool *(see EcoStruxure™ Control Expert, OS Loader, User Manual).*
The procedure to follow is described in the Modicon Quantum, Update Procedure, User Guide.
Chapter 3
Quantum CCOTF Performance

Key Performance

Cycle Time Impact

The table below describes the cycle time, which depends on the modification done:

<table>
<thead>
<tr>
<th>Modification</th>
<th>Maximum Time Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inserting a new module</td>
<td>30% of the Mast Task cycle time</td>
</tr>
<tr>
<td>Deleting a module</td>
<td>30% of the Mast Task cycle time</td>
</tr>
<tr>
<td>Modifying parameters of an existing module</td>
<td>30% of the Mast Task cycle time</td>
</tr>
</tbody>
</table>

**NOTE:** The percentage varies depending on the cycle time. For cycle time lower than 80 ms, the max time impact could be higher.

**NOTE:** A CCOTF modification only impacts the module concerned.

Time to Complete a CCOTF Modification in a RIO drop

To understand how a CCOTF modification is performed, the following points have to be considered:

- A CCOTF modification is managed at the Mast task frequency.
- When a CCOTF modification is done in a RIO drop, several specific requests are sent to the CPU in order to modify the CPU memory area containing the I/O drop configuration. This modification is performed when the **Build Changes** button is selected in Control Expert.
- Memory areas containing all the I/O drop configurations are contiguous in the CPU memory, if the CCOTF modification is related to the first RIO drop, all the other memory areas related to the other RIO drops have to be shifted in the CPU memory.
- If the CCOTF modification is related to the last RIO drop, only the area of this drop is modified. An important consequence of this point is that a CCOTF modification in the last RIO drop will require less Mast task cycles than a CCOTF modification in the first RIO drop.
- Inserting a new module is completed when the status bit of this module is set to 1.

**NOTE:** The worst case possible is to add a new module in the first RIO drop. The time needed by the system to complete a CCOTF modification is lower than 4 seconds.
Part II
Using CCOTF with a Standalone System

Overview
This part describes using CCOTF with a Quantum standalone system.

What Is in This Part?
This part contains the following chapters:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Chapter Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Add Ethernet RIO Drop</td>
<td>57</td>
</tr>
<tr>
<td>5</td>
<td>Add/Delete Modules</td>
<td>63</td>
</tr>
<tr>
<td>6</td>
<td>Modify Module Parameters</td>
<td>69</td>
</tr>
<tr>
<td>7</td>
<td>CCOTF Troubleshooting</td>
<td>75</td>
</tr>
</tbody>
</table>
Chapter 4
Add Ethernet RIO Drop

Overview
This chapter describes the procedure to add a Quantum Ethernet RIO drop or a Modicon M340 Ethernet RIO drop in a Quantum standalone system.

What Is in This Chapter?
This chapter contains the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding an RIO Drop Using the Standard Connected Mode</td>
<td>58</td>
</tr>
<tr>
<td>Add a Remote I/O Drop in a Standalone System While in the Virtual Connected Mode</td>
<td>60</td>
</tr>
</tbody>
</table>
## Adding an RIO Drop Using the Standard Connected Mode

### Introduction

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNINTENDED EQUIPMENT OPERATION</td>
</tr>
<tr>
<td>• Verify that the margin between watchdog timers and task execution times is great enough to handle the increased processing time required to support the CCOTF modification.</td>
</tr>
<tr>
<td>• Anticipate performance decrease due to the increased traffic resulting from the new RIO drop in the system.</td>
</tr>
<tr>
<td>Failure to follow these instructions can result in equipment damage.</td>
</tr>
</tbody>
</table>
Adding an RIO Drop

This describes the process of adding an RIO drop using the **standard connected mode**:

1. Connect Control Expert to the PAC.
2. Add the drop in the Control Expert configuration screen of the remote I/O network.
3. Add the modules in the remote I/O drop.
4. If necessary, modify the parameters or mapping in the module configuration screen.
5. Select the **Build Changes** menu item. **NOTE:** The drop configuration screen indicates a detected error for the new modules. For an MX80 drop, the device DDT memory area is cleared.
6. Install the drop in the remote I/O network. **NOTE:** The input module memory image is refreshed with default values.
7. Add the code sequence to manage the new drop and modules in the application program.
8. Select the **Build Changes** menu item. **NOTE:** In output modules, verify that all output bits are well-managed via the LED display of the module.
9. Connect field-wiring terminal strip on modules. **NOTE:** The input memory image is set with physical values.
10. Test that the modifications have been accounted for correctly.

Modify the application, and select the **Build Changes** menu item.

**NOTE:** An RIO drop contains 1 or 2 racks (linked with a backplane expander cable).
Add Ethernet RIO Drop in a Standalone System

Add a Remote I/O Drop in a Standalone System While in the Virtual Connected Mode

Prerequisite

⚠️ WARNING

RISK OF UNEXPECTED EQUIPMENT BEHAVIOR
Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the On line modification in RUN or STOP check box is selected can have an immediate impact on the process.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Addition in Offline Mode

In this mode, it is possible to modify the I/O configuration when the application is offline. The application that is downloaded onto the PACs has to be generated with the Virtual connected mode check box enabled in the Project settings → General → Build settings.

The following flow-chart describes the action to be done when adding a remote I/O drop while in the OFFLINE Virtual Connected Mode:

1. Add the Ethernet RIO drop.
2. Add the drop in the Control Expert configuration screen of the Ethernet RIO bus.
3. Add the modules in the Ethernet RIO drop.
4. If necessary, modify the parameters or mapping in the modules configuration screen.
5. Add the sequence of code to manage the new drop and modules in the application program.
6. Save the application program.

NOTE: A remote I/O drop contains 1 or 2 racks (linked with a backplane expander cable).
Addition When Connected to the Quantum Remote I/O System

The following flow-chart describes the action to be done when adding a remote I/O drop while in the CONNECTED Virtual Connected Mode:

1. Open the application.
2. Connect Control Expert to the PLC. The Build Changes button is highlighted.
3. Click on the Build Changes button. The set of modifications is transferred into the CPU.
4. Insert physically the drop with its modules in the Ethernet RIO network.
   **NOTE**: The Active (Quantum) or Run (Modicon M340) LED in the LED display of the physical modules are steady on.
5. Connect the field-wiring terminal strip on the modules.
6. Test that the modifications have been correctly taken into account.
7. If not OK, modify the application and perform a Build changes.
8. If OK, END.
Chapter 5
Add/Delete Modules

Overview
This chapter describes the procedures to add or delete modules in a local, S908 RIO or Ethernet RIO drop of a Quantum standalone system.

What Is in This Chapter?
This chapter contains the following topics:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add/Delete a Module in a Standalone System while in the Standard Connected Mode</td>
<td>64</td>
</tr>
<tr>
<td>Add/Delete a Module in a Standalone System while in the Virtual Connected Mode</td>
<td>66</td>
</tr>
</tbody>
</table>
Add/Delete a Module in a Standalone System while in the Standard Connected Mode

**Addition**

The following flow-chart describes the action to be done when adding a module while in the Standard Connected Mode:

1. Connect Control Expert to the PLC.
2. Add first the module in the Control Expert configuration screen of the drop.
3. If necessary, modify the parameters or mapping in the module configuration screen.
4. Perform a Build changes.
   - NOTE: The new module is displayed in faulty state in the configuration screen of the drop.
5. Insert physically the module in the drop.
   - NOTE: The ‘Active’ (Quantum) or ‘Run’ (Moxicon M046) LED in the LED display of the physical module is steady on.
6. Add the sequence of code to manage the new module in the application program.
7. Perform a Build changes.
   - NOTE: In case of an output module, verify that all output bits are well managed regarding the process in the LED display of the physical module.
8. Connect the field-wiring terminal strip on the modules.
9. Test that the modifications have been correctly taken into account.
10. Modify the application and perform a Build changes.

NOTE: One Ethernet RIO drop can have up to 4 modules added in one CCOTF transaction.
Deletion

**WARNING**

**POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR**

Remove the field wiring terminal strip on the module before deleting a module.

*Failure to follow these instructions can result in death, serious injury, or equipment damage.*

The following flow-chart describes the action to be done when deleting a module while in the Standard Connected Mode:

1. Connect Control Expert to the PLC.
2. Disconnect the field-wiring terminal strip on the module.
3. Delete the sequence of code related to this module in the application program.
4. Perform a Build changes.
5. Remove physically the module from the drop.
   *NOTE:* The module is displayed in faulty state in the configuration screen of the drop.
6. Delete the module in the Control Expert configuration screen of the drop.
7. Perform a Build changes.
8. Test that the modifications have been correctly taken into account.
   - Not OK: Modify the application and perform a Build changes.
   - OK: END

*NOTE:* One Ethernet RIO drop can have up to 4 modules deleted in one CCOTF transaction.

*NOTE:* A Modicon M340 discrete module with time stamped channels in a Modicon M340 Ethernet RIO drop can not be deleted.
Add/Delete a Module in a Standalone System while in the Virtual Connected Mode

Addition/Deletion in Offline Mode

In this mode, it is possible to modify the I/O configuration when the application is offline. The application that is downloaded onto the PLCs has to be generated with the Virtual connected mode check box enabled in the Project settings → General → Build settings.

The following flow-chart describes the action to be done when adding or deleting a module while in the OFFLINE Virtual Connected Mode:

Adding a module
- Add the module in the Control Expert rack configuration screen.
- If necessary, modify the parameters or mapping in the module configuration screen.
- Add the code sequence to include the module in the application.

Deleting a module
- Delete the code sequence related to this module in the application.
- Delete the module in the Control Expert Rack configuration screen.

Save the application.

NOTE: One Ethernet RIO drop can have up to 4 modules added/deleted in one CCOTF transaction.

NOTE: A Modicon M340 discrete module with time stamped channels in a Modicon M340 Ethernet RIO drop can not be deleted.
Add/Delete Modules in a Standalone System

Addition/Deletion when Connected to the Quantum System

WARNING

POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR

Remove the field wiring terminal strip on the module before deleting a module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when adding or deleting a module while in the CONNECTED Virtual Connected Mode:

1. Open the application.
2. Connect Control Expert to the PLC. The Build Changes button is highlighted.
3. Add/ Delete the module.
4. Add a module:
   - Click on the Build Changes button. The set of modifications is transferred into the CPU.
   - Add physically the module in the drop.
   - NOTE: The ‘Active’ (Quantum) or ‘Run’ (Modicon M340) LED in the LED display of the physical module is steady on. In case of an output module, verify that all output bits are well managed regarding the process in the LED display.
   - Connect the field-wiring terminal strip on the module.
5. Delete a module:
   - Click on the Build Changes button. The set of modifications is transferred into the CPU.
   - NOTE: The ‘Active’ (Quantum) or ‘Run’ (Modicon M340) LED in the LED display of the physical module changes from ON to OFF.
   - Disconnect the field-wiring terminal strip from the module.
   - Remove physically the module from the drop.
6. Test that the modifications have been correctly taken into account.
7. Modify the application and perform a Build changes.

END
Chapter 6
Modify Module Parameters

Overview
This chapter describes the procedures to modify module parameters in a local, S908 RIO or Ethernet RIO drop of a Quantum standalone system.

What Is in This Chapter?
This chapter contains the following topics:

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<th>Topic</th>
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<tr>
<td>Modify Module Parameters in a Standalone System while in the Standard Connected Mode</td>
<td>72</td>
</tr>
<tr>
<td>Modify Module Parameters in a Standalone System while in the Virtual Connected Mode</td>
<td>73</td>
</tr>
</tbody>
</table>
Modify Module Parameters in a Standalone System

General

Parameter Types

There are two kinds of parameters to take into account:

Configuration parameters  linked to the application memory mapping or the CPU operating system

Example: input/output starting and ending addresses, mapping, task, etc.

Adjustment parameters  that impact module behavior

Example: input/output type, timeout value, filter selection, dual mode, output shut down state, automatic restart, fail state, fallback value, data format, channels, input/output range, etc.

(see EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual)

NOTE: In a pre-existing module only the adjustment parameters can be modified.
In a newly inserted module all parameters can be modified before the Build changes.

This dialog box shows the configuration parameters screen:
Modicon M340 Ethernet RIO Drop Modules

Modicon M340 modules parameter modification causes a channel reset on the following modules:

- analog I/O modules: modified channel reset
- BMX EHC 0200 and BMX EHC 0800 modules: modified channel reset
- discrete I/O modules: group of channels containing the modified channel reset

BMX EHC 0200 and BMX EHC 0800 modules use specific parameters with the following type: **Application Specific Function** (Example: frequency mode, event counting mode, one shot counter mode, modulo loop...). The application specific functions can be modified with the CCOTF function.
Modify Module Parameters in a Standalone System while in the Standard Connected Mode

Parameter Modifications

⚠️ WARNING

RISK OF UNEXPECTED EQUIPMENT BEHAVIOR
Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when modifying module parameters (see page 70) while in the Standard Connected Mode:

1. Connect Control Expert to the PLC.
2. Open the Bus Editor.
3. Modify the module parameters.
4. Validate the modification and perform a Build changes.
5. Test that the modifications have been correctly taken into account.
   - Not OK
   - OK
5.1 Modify the application and perform a Build changes.
5.2 END

OK
Modify Module Parameters in a Standalone System while in the Virtual Connected Mode

Parameter Modifications in Offline Mode

It is possible to modify the I/O configuration and the application offline. The application that is downloaded in the PLCs has to be generated with the Virtual Connected Mode check box enabled in the Project settings dialog box.

⚠️ WARNING

RISK OF UNEXPECTED EQUIPMENT BEHAVIOR

Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process. Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when modifying module parameters (see page 70) from a standalone drop while in the OFFLINE Virtual Connected mode:

1. Open the Local Bus editor then double click on the module.
2. Modify the module parameters.
3. Validate the modification.
4. Save the application program.
Parameter Modifications when Connected to the Quantum System

The following flow-chart describes the action to be done when modifying module parameters from a standalone drop while in the CONNECTED Virtual Connected Mode:

- Open the application.
- Connect Control Expert to the PAC. The **Build Changes** button is now available.
- Press the **Build Changes** button.
- Test that the modifications have been accounted for correctly.
  - If Not OK, modify the application, and press the **Build Changes** button.
  - If OK, END.
# Chapter 7
## CCOTF Troubleshooting

### General Troubleshooting List

**Overview**

If a CCOTF modification can not be performed on Quantum Standalone system, check the following potential problems and their solutions in the table below:

<table>
<thead>
<tr>
<th>Potential Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CPU does not have operating system version 02.80 or higher.</td>
<td>Replace the CPU module with a CCOTF compatible CPU or upgrade the operating system.</td>
</tr>
<tr>
<td>The S908 CRP module does not have firmware version 02.00 or higher.</td>
<td>Replace the S908 CRP module with a CCOTF compatible S908 CRP or upgrade the firmware.</td>
</tr>
<tr>
<td>The S908 CRA modules in all Quantum RIO drops connected to the RIO link do not have firmware version 02.00 or higher.</td>
<td>Replace the S908 CRA module with a CCOTF compatible S908 CRA or upgrade the firmware.</td>
</tr>
<tr>
<td>Unity Pro V5.0 or higher version is not installed.</td>
<td>Install Control V14.0 or higher version.</td>
</tr>
<tr>
<td><strong>NOTE:</strong> Unity Pro is the former name of Control Expert for version 13.1 or earlier.</td>
<td></td>
</tr>
<tr>
<td>The processor type is not replaced in the Control Expert configuration tab.</td>
<td>Replace the non CCOTF processor by the CCOTF corresponding processor in the Control Expert configuration table.</td>
</tr>
<tr>
<td>The <strong>Online modification in RUN</strong> check box is not selected.</td>
<td>Check <strong>Online modification in RUN</strong> in the CPU configuration tab <em>(see page 41)</em>.</td>
</tr>
<tr>
<td>PLC has an application that is not CCOTF compatible.</td>
<td>The application must be rebuilt <em>(Build -&gt; Rebuild All menu in Control Expert)</em> and downloaded in both PLCs after changing the processor and checking the <strong>Online modification in RUN</strong> check box.</td>
</tr>
<tr>
<td>At least one Quantum S908 RIO drop is not compatible with the CCOTF function.</td>
<td>Check that all Quantum S908 RIO drops that are configured in the application have their corresponding bits at 1 in %SW98 and %SW99 (except drops not powered on).</td>
</tr>
<tr>
<td>A Quantum S908 RIO drop that has been upgraded has its corresponding bit at 0 in %SW98 or %SW99.</td>
<td>Power off then power on the S908 RIO drop.</td>
</tr>
<tr>
<td>A new CCOTF modification is not allowed.</td>
<td>Wait until previous CCOTF modification is completed.</td>
</tr>
<tr>
<td>The Ethernet CRP is not ready.</td>
<td>Try to make the CCOTF modification again.</td>
</tr>
</tbody>
</table>
NOTE: A Quantum S908 RIO drop which does not contain any I/O module has its corresponding bit at 0 in %SW98 or %SW99, but CCOTF modifications are not blocked.

<table>
<thead>
<tr>
<th>Potential Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Ethernet CRA connection is not always available.</td>
<td>Check the Ethernet connections of all the communication modules involved in the Ethernet RIO daisy chain ring.</td>
</tr>
<tr>
<td>Ethernet RIO drop connection is lost during the CCOTF modification.</td>
<td>The drop is automatically re-configured with the new configuration when the connection with the Ethernet CRP is established.</td>
</tr>
</tbody>
</table>
Part III
Using CCOTF with a Hot Standby System

Overview
This part describes using CCOTF with a Quantum Hot Standby System.

What is in This Part?
This part contains the following chapters:

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<td>83</td>
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<td>10</td>
<td>Add/Delete Modules</td>
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<td>11</td>
<td>Modify Module Parameters</td>
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<tr>
<td>12</td>
<td>CCOTF Troubleshooting</td>
<td>103</td>
</tr>
</tbody>
</table>
Chapter 8
Introduction to CCOTF with a Hot Standby System

Hot Standby CCOTF Actions

Overview

CCOTF function allows modifications when the PLC is in RUN (see page 17) mode.

NOTE: Local I/O can be used but they are not part of the redundant system in a Quantum Hot Standby (see Quantum using EcoStruxure™ Control Expert, Hot Standby System, User Manual) system environment.

NOTE: The CCOTF modification can only be done if the module is compatible (see page 34).

WARNING

UNEXPECTED EQUIPMENT BEHAVIOR
Always transfer the application to the Standby PLC after modifying the configuration in the Primary PLC. The application in both PLCs must be the same.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

S908 RIO Drop Specifics

The application transfer from Primary to Standby PLC after one CCOTF transaction is recommended. However, transferring the application after more than one CCOTF transaction will not generate an S908 RIO drop reset if a Switchover occurs.

Two system Status Register Words: %SW98 and %SW99 allow to manage the S908 CRA compatibility (see page 27).

A CCOTF modification can only be performed on the Primary PLC with the other PLC in Standby state.

NOTE: In an S908 system, Control Expert can be connected to the Primary or the Standby PLC. Connection to the Primary is preferred.
**Ethernet RIO Specifics**

If a Switchover occurs after a CCOTF transaction and before the application transfer, the Ethernet RIO drop gets the configuration from the new Primary (configuration preceding the CCOTF modification). The output values of the modified drop depend on the Primary application, no glitch or bump will appear on the outputs.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEXPECTED EQUIPMENT BEHAVIOR</strong></td>
</tr>
<tr>
<td>Make sure that your system responds appropriately if the drop takes back its previous configuration.</td>
</tr>
<tr>
<td><strong>Failure to follow these instructions can result in death, serious injury, or equipment damage.</strong></td>
</tr>
</tbody>
</table>

The application must be transferred from Primary to Standby PLC after one CCOTF transaction. Transferring the application after more than one CCOTF transaction can lead to the Ethernet RIO drop reset if a Switchover occurs.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNEXPECTED EQUIPMENT BEHAVIOR</strong></td>
</tr>
<tr>
<td>Ensure that your application program does not operate a Switchover before starting any CCOTF modification.</td>
</tr>
<tr>
<td><strong>Failure to follow these instructions can result in death, serious injury, or equipment damage.</strong></td>
</tr>
</tbody>
</table>

A CCOTF modification can only be performed on the Primary PLC with the other PLC in Standby state.

**NOTE:** In an Ethernet RIO system, Control Expert can only be connected to the Primary PLC.

**Application Program Mismatch Bit %SW60.3**

Before doing any CCOTF modification, make sure that the system word %SW60.3 (see Quantum using EcoStruxure™ Control Expert, Hot Standby System, User Manual) is set to 1.

The logic mismatch command behavior depends on the Quantum system:

- In a local or S908 RIO drop, if system bit %SW60.3 is not set to 1, the Standby PLC goes to the OFFLINE state after the first CCOTF modification and no other CCOTF modifications are allowed.
- In an Ethernet RIO drop, is system bit %SW60.3 is not set to 1, CCOTF modifications are not allowed.
Number of CCOTF Modifications Allowed

Validating a CCOTF modification requires a Build Changes in Control Expert.

The number of CCOTF modifications allowed (see page 22) in one CCOTF transaction depends on the system.
Chapter 9
Add Ethernet RIO Drop

Overview
This chapter describes the procedure to add a Quantum Ethernet RIO drop or a Modicon M340 Ethernet RIO drop in a Quantum Hot Standby system.

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This chapter contains the following topics:

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<tr>
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</table>
Add an Ethernet RIO Drop in a Hot Standby System while in the Standard Connected Mode

Addition

The following flow-chart describes the action to be done when adding an Ethernet RIO drop while in the Standard Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Connect Control Expert to the Primary.
3. Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.
4. Add the drop in the Control Expert configuration screen of the Ethernet RIO bus.
5. Add the modules in the Ethernet RIO drop.
6. If necessary, modify the parameter or mapping in the module configuration screen.
7. Perform a Build Changes.
   - NOTE: The new module is displayed in fault state in the configuration screen of the RIO drop.
8. Insert physically the drop in the Ethernet RIO network.
   - NOTE: The Active (Quantum) or Run (Modicon M340) LED in the LED display of the physical modules are steady on.
9. Add the sequence of code to manage the new drop and modules in the application program.
10. Perform a Build Changes.
    - NOTE: In case of an output module, verify that all output bits are well managed regarding the process in the LED display of the physical module.
11. Connect the field-wiring terminal strip on the modules.
12. Test in the Primary application that the modifications have been correctly taken into account.
   - Test Not OK Modify the application and perform a Build Changes.
   - Test OK
13. Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %SW60.5 in the Primary PLC).
14. Access the Command Register system bit %SW60.3. Set this bit to 0 to validate the application program mismatch.
15. Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.

NOTE: 1 Ethernet RIO drop contains 1 or 2 racks (linked with a backplane expander cable).
Add an Ethernet RIO Drop in a Hot Standby System while in the Virtual Connected Mode

Addition in Offline Mode

In this mode, it is possible to modify the I/O configuration while the application is offline. The application that is downloaded onto the PLCs has to be generated with the Virtual connected mode check box enabled in the Project settings → General → Build settings.

The following flow-chart describes the action to be done when adding an Ethernet RIO drop in a Hot Standby system while in the OFFLINE Virtual Connected Mode:

1. Add the Ethernet RIO drop.
2. Add the drop in the Control Expert configuration screen of the Ethernet RIO bus.
3. Add the modules in the Ethernet RIO drop.
4. If necessary, modify the parameters or mapping in the modules configuration screen.
5. Add the sequence of code to manage the new drop and modules in the application program.
6. Save the application program.

NOTE: 1 Ethernet RIO drop contains 1 or 2 racks (linked with a backplane expander cable).
Add Ethernet RIO Drop in a Hot Standby System

Addition when Connected to the Quantum System

The following flow-chart describes the action to be done when adding an Ethernet RIO drop in a Hot Standby system while in the CONNECTED Virtual Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Open the application.
3. Connect Control Expert to the PLC. The Build Changes button is highlighted.
4. Access the Command Register system bit %SW60.3. Set this bit to 1 to invalidate the application program mismatch.
5. Click on the Build Changes button. The set of modifications is transferred into the CPU.
6. Add physically the drop with its modules in the Ethernet RIO network.

**NOTE:** The ‘Active’ (Quantum) or ‘Run’ (Modicon M340) LED in the LED display of the physical modules are steady on.
7. Connect the field-wiring terminal strip on the modules.
8. Test that the modifications have been correctly taken into account.
   - If Not OK, Modify the application and perform a Build Changes.
   - If OK, proceed.
9. Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %SW0.5 in the Primary PLC).
10. Access the Command Register system bit %SW60.3. Set this bit to 0 to invalidate the application program mismatch.
11. Perform a switch over to verify that the Standby is able to become Primary with the new IO configuration.
Chapter 10
Add/Delete Modules

Overview
This chapter describes adding and deleting modules in a Quantum Hot Standby system.

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This chapter contains the following sections:

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<td>Add/Delete Modules in an S908 or Ethernet RIO Drop</td>
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Section 10.1
Add/Delete Modules in the Local Drop

Overview
This section describes adding and deleting modules in the local drop with a Quantum Hot Standby system.

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This section contains the following topics:

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Add/Delete Modules in a Hot Standby System

Add/Delete a Module in a Hot Standby Local Drop while in the Standard Connected Mode

Addition

The following flow-chart describes the action to be done when adding a module in the local drop while in the Standard Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Connect Control Expert to the Primary.
3. Access the Command Register system bit 150W00.3. Set this bit to 1 to validate the application program mismatch.
4. Add first the module in the Control Expert configuration screen of the local Drop.
5. If necessary, modify the parameters or mapping in the module.
6. NOTE: The new module is displayed in faulty state in the configuration screen of the local drop.
7. Perform a Build Changes.
8. Insert physically the module in the Primary local drop. NOTE: The ‘active’ LED in the LED display of the physical module is steady on. In case of an output module, verify that all output bits are in non active state regarding the process in the LED display.
9. Add the sequence of code to manage the new module in the application program.
10. Perform a Build Changes.
11. NOTE: In case of an output module, verify that all output bits are well managed regarding the process in the LED display of the physical module.
12. Connect the field-wiring terminal strip on the module.
13. Test in the Primary application that the modifications have been correctly taken into account.
14. Insert physically the module in the Standby local drop. NOTE: The ‘active’ LED in the LED display of the physical module is steady off. In case of an output module, verify that all output bits are well managed regarding the process in the LED.
15. Force an application transfer from the Primary to Standby.
16. Connect the field-wiring strip from the module.
17. Access the Command Register system bit 150W00.3. Set this bit to 0 to validate the application program mismatch.
18. Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.
Deletion

**WARNING**

**POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR**

Remove the field wiring terminal strip on the module before deleting a module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when deleting a module from the local drop while in the Standard Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Connect Control Expert to the Primary.
3. Access the Command Register system bit %SW168.3. Set this bit to 1 to validate the application program mismatch.
4. Disconnect the field wiring terminal strip on the module.
5. Delete the sequence of code related to this module in the application program.
6. Perform a Build Changes.
7. Remove physically the module from the Primary local drop.
   **NOTE:** The module is displayed in faulty state in the configuration screen of the drop.
8. Delete the module in the Control Expert configuration screen of the drop.
9. Perform a Build Changes.
10. Test in the Primary application that the modifications have been correctly taken into account.
    - **Test**
      - Not OK
        - Modify the application and perform a Build Changes.
      - OK
11. Disconnect the field wiring strip from the module.
12. Force an application transfer from the Primary to Standby.
13. Remove physically the module from the Standby local drop.
14. Access the Command Register system bit %SW168.3. Set this bit to 0 to invalidate the application program mismatch.
15. Perform a switch-over to verify that the Standby is able to become Primary with the new I/O configuration.
Add/Delete a Module in a Hot Standby Local Drop while in the Virtual Connected Mode

Addition/Deletion in Offline Mode

In this mode, it is possible to modify the I/O configuration when the application is offline. The application that is downloaded onto the PLCs has to be generated with the Virtual connected mode check box enabled in the Project settings → General → Build settings.

The following flow-chart describes the action to be done when adding or deleting a module in the local drop while in the OFFLINE Virtual Connected Mode:

**Adding a module**
- Add the module in the Control Expert rack configuration screen.
- If necessary, modify the parameters or mapping in the module configuration screen.
- Add the code sequence to include the module in the application.
- Save the application.

**Deleting a module**
- Delete the code sequence related to this module in the application.
- Delete the module in the Control Expert Rack configuration screen.

---

Addition/Deletion when Connected to the Quantum System

**WARNING**

POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR
Remove the field wiring terminal strip on the module before deleting a module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.
The following flow-chart describes the action to be done when adding or deleting a module in the local drop while in the CONNECTED Virtual Connected Mode:

**Add a module**
- Click on the Build Changes button. The set of modifications is transferred into the CPU.
- Add physically the module in the Primary local drop.
- NOTE: The ‘Active’ LED in the LED display of the physical module is steady on. In case of an output module, verify that all output bits are well managed regarding the process in the LED display.
- Connect the fields-wiring terminal strip on the module.
- Test in the Primary application that the modifications have been correctly taken into account.

**Delete a module**
- Click on the Build Changes button. The set of modifications is transferred into the CPU.
- Disconnect the field-wiring strip from the module.
- Remove physically the module from the drop.

**Add a module**
- Force an application transfer from Primary to Standby.
- Access the Command Register system bit 5.SW60.3. Set this bit to 0 to invalidate the application program mismatch.
- Perform a switch over to test that the standby is able to become Primary with the new I/O configuration.

**Delete a module**
- Force an application transfer from Primary to Standby.
- Disconnect the field-wiring strip from the module.
- Remove physically the module from the Standby local drop.

**Test**
- Not OK: Modify the application and perform a Build changes.
- OK: Test
Section 10.2
Add/Delete Modules in an S908 or Ethernet RIO Drop

Overview
This section describes adding and deleting modules in an S908 RIO drop or Quantum Ethernet RIO drop with a Quantum Hot Standby system.

What Is in This Section?
This section contains the following topics:

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<tr>
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</table>
Add/Delete a Module in a Hot Standby S908 RIO Drop or Quantum Ethernet RIO Drop while in the Standard Connected Mode

Addition

The following flow-chart describes the action to be done when adding a module in a RIO drop while in the Standard Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Connect Control Input to the Primary.
3. Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.
4. Add the module in the Control Expert configuration screen of the RIO drop.
5. If necessary, modify the parameters or mapping in the module configuration screen.
6. Perform a Build Changes.
   - **NOTE:** The new module is displayed in faulty state in the configuration screen of the RIO drop.
7. Insert physically the module in the RIO drop.
   - **NOTE:** The “Active” (Quantum) or “Run” (Modicon M340) LED in the LED display of the physical module is steady on. In case of an output module, verify that all output bits are well managed regarding the process in the LED display.
8. Add the sequence of code to manage the new module in the application program.
9. Perform a Build Changes.
   - **NOTE:** In case of an output module, verify that all output bits are well managed regardless of the process in the LED display of the physical module.
10. Connect the field-wiring terminal strip on the module.
11. Test in the Primary application that the modifications have been correctly taken into account.
   - **Test**
     - **OK**
     - **Not OK**
       - Modify the application and perform a Build Changes.
12. Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %SW60.3 in the Primary PLC).
13. Access the Command Register system bit %SW60.3. Set this bit to 0 to invalidate the application program mismatch.
14. Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.

**NOTE:** One Ethernet RIO drop can have up to 4 modules added in one CCOTF transaction.
Deletion

⚠️ WARNING

POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR
Remove the field wiring terminal strip on the module before deleting a module.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when deleting a module from a RIO drop while in the Standard Connected Mode:

1. Be sure that the other PLC's in RUN Standby state.
2. Connect Control Expert to the Primary.
3. Access the Command Register system bit %MN903. Set this bit to 1 to validate the application program mismatch.
4. Disconnect the field-wiring terminal strip on the module.
5. Delete the sequence of code related to this module in the application program.
6. Perform a Build Changes.
7. Remove physically the module from the RIO drop.
   NOTE: The module is displayed in faulty state in the configuration screen of the RIO drop.
8. Delete the module in the Control Expert configuration screen of the RIO drop.
9. Perform a Build Changes.
10. Test in the Primary application that the modifications have been correctly taken into account.
11. Modify the application and perform a Build Changes.
12. Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %MN905.0 in the Primary PLC).
13. Access the Command Register system bit %MN903. Set this bit to 0 to invalidate the application program mismatch.
14. Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.

NOTE: One Ethernet RIO drop can have up to 4 modules deleted in one CCOTF transaction.
NOTE: A Modicon M340 discrete module with time stamped channels in a Modicon M340 Ethernet RIO drop can not be deleted.
Add/Delete Modules in a Hot Standby System

Add/Delete a Module in a Hot Standby S908 RIO Drop or Quantum Ethernet RIO Drop while in the Virtual Connected Mode

Addition/Deletion in Offline Mode

In this mode, it is possible to modify the I/O configuration while the application is offline. The application that is downloaded onto the PLCs has to be generated with the Virtual connected mode check box enabled in the Project settings → General → Build settings.

The following flow-chart describes the action to be done when adding or deleting a module in a Hot Standby system while in the OFFLINE Virtual Connected Mode:

NOTE: One Ethernet RIO drop can have up to 4 modules added/deleted in one CCOTF transaction.

NOTE: A Modicon M340 discrete module with time stamped channels in a Modicon M340 Ethernet RIO drop can not be deleted.
Add/Delete Modules in a Hot Standby System

Addition/Deletion when Connected to the Quantum System

**WARNING**

**POSSIBLE UNEXPECTED EQUIPMENT BEHAVIOR**

Remove the field wiring terminal strip on the module before deleting a module.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when adding or deleting a module in a Hot Standby system while in the CONNECTED Virtual Connected Mode:

<table>
<thead>
<tr>
<th>Add a module</th>
<th>Delete a module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be sure that the other PLC is in RUN Standby state.</td>
<td>Be sure that the other PLC is in RUN Standby state.</td>
</tr>
<tr>
<td>Connect Control Expert to the PLC. The Build Changes button is highlighted.</td>
<td>Connect Control Expert to the PLC. The Build Changes button is highlighted.</td>
</tr>
<tr>
<td>Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.</td>
<td>Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.</td>
</tr>
<tr>
<td>Add/Modify the module.</td>
<td>Add/Modify the module.</td>
</tr>
</tbody>
</table>

**Add a module**

- Click on the Build Changes button. The set of modifications is transferred into the CPU.
- Add physically the module in the I/O drop.
- NOTE: The ‘Active’ (Quantum) or ‘Run’ (Modicon M340) LED in the LED display of the physical module is steady on. In case of an output module, verify that all output bits are well managed regarding the process in the LED display.
- Connect the field-wiring terminal strip on the module.

**Delete a module**

- Click on the Build Changes button. The set of modifications is transferred into the CPU.
- NOTE: The ‘Active’ (Quantum) or ‘Run’ (Modicon M340) LED in the LED display of the physical module changes from ON to OFF.
- Disconnect the field-wiring strip from the module.
- Remove physically the module from the I/O drop.

**Test**

- Test that the modifications have been correctly taken into account.
- If Not OK, test OK and modify the application and perform a Build Changes.

- Force an application transfer from Primary to Standby by using the keyboard either on the Primary or the Standby (or by setting %SW60.5 in the Primary PLC).
- Access the Command Register system bit %SW60.3. Set this bit to 0 to invalidate the application program mismatch.
- Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.
Chapter 11
Modify Module Parameters

Overview
This chapter describes the procedures to modify module parameters in a local, S908 RIO or Ethernet RIO drop of a Quantum Hot Standby system.

Various types of parameters can be modified (see page 70) and Modicon M340 Ethernet RIO drop modules may have specific parameters and behavior (see page 71).

What Is in This Chapter?
This chapter contains the following topics:

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</tr>
<tr>
<td>Modify Module Parameters in a Hot Standby Drop while in the Virtual Connected Mode</td>
<td>101</td>
</tr>
</tbody>
</table>
Modify Module Parameters in a Hot Standby System

Modify Module Parameters in a Hot Standby Drop while in the Standard Connected Mode

Parameter Modifications

⚠️ WARNING

RISK OF UNEXPECTED EQUIPMENT BEHAVIOR
Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.

The following flow-chart describes the action to be done when modifying module parameters while in the Standard Connected Mode:

- Be sure that the other PLC is in RUN Standby state
- Connect Control Expert to the Primary PLC
- Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.
- Open the local Bus Editor.
- Modify the module parameters.
- Validate the modification and perform a Build Changes.
- Test the application in the Primary application that the modifications have been correctly taken into account.
  - OK → Modify the application and perform a Build Changes.
  - Not OK
- Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %SW60.5 in the Primary PLC).
- Access the Command Register system bit %SW60.3. Set this bit to 0 to invalidate the application program mismatch.
- Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.
Modify Module Parameters in a Hot Standby Drop while in the Virtual Connected Mode

Parameter Modifications in Offline Mode
It is possible to modify the I/O configuration and the application offline. The application that is downloaded in the PLCs has to be generated with the Virtual Connected Mode check box enabled in the Project settings dialog box.

WARNING

RISK OF UNEXPECTED EQUIPMENT BEHAVIOR
Before doing any CCOTF modification, ensure that your system responds appropriately. Modifications made when the on line modification in RUN check box is selected can have an immediate impact on the process.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following flow-chart describes the action to be done when modifying module parameters while in the OFFLINE Virtual Connected Mode:

- Open the Local Bus editor then double click on the module.
- Modify the module parameters.
- Validate the modification.
- Save the application program.
Parameter Modifications while Connected to the Quantum System

The following flow-chart describes the action to be done when modifying module parameters while in the CONNECTED Virtual Connected Mode:

1. Be sure that the other PLC is in RUN Standby state.
2. Open the application.
3. Connect Control Expert to the Primary PLC. The Build Changes button is highlighted.
4. Access the Command Register system bit %SW60.3. Set this bit to 1 to validate the application program mismatch.
5. Click on the Build Changes button.
6. Test in the Primary application that the modifications have been correctly taken into account.
   - Not OK: Modify the application and perform a Build Changes.
   - OK: Force an application transfer from Primary to Standby by using the Keypad either on the Primary or the Standby (or by setting %SW60.5 in the Primary PLC).
7. Access the Command Register system bit %SW60.3. Set this bit to 0 to invalidate the application program mismatch.
8. Perform a switch over to verify that the Standby is able to become Primary with the new I/O configuration.
# Chapter 12
## CCOTF Troubleshooting

**Troubleshooting List**

**Overview**

If a CCOTF modification cannot be performed in the Quantum Hot Standby system, check the following potential problems and their solutions in the table below:

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system is running as a Standalone system, without redundancy.</td>
<td>Verify that one PLC is in RUN Primary state and the other is in RUN Standby state.</td>
</tr>
<tr>
<td>Unity Pro 4.1 or higher version is not installed.</td>
<td>Install Control Expert V14.0 or higher version.</td>
</tr>
<tr>
<td><strong>NOTE:</strong> Unity Pro is the former name of Control Expert for version 13.1 or earlier.</td>
<td></td>
</tr>
<tr>
<td>At least one of the two PLCs has an application that is not CCOTF compatible.</td>
<td>The application must be rebuilt (Build -&gt; Rebuild All menu in Control Expert) and downloaded in both PLCs after changing the processor and checking the Online Modification in RUN check box.</td>
</tr>
<tr>
<td>CCOTF modification is not allowed.</td>
<td>The system must be running in a Hot Standby configuration (one PLC is in RUN Primary state and the other in RUN Standby state).</td>
</tr>
<tr>
<td>CCOTF modification is not allowed in an Ethernet RIO drop.</td>
<td>Verify that Control Expert is connected to the Primary PLC.</td>
</tr>
<tr>
<td></td>
<td>Verify that the application program mismatch bit %SW60.3 is set to 1. (see page 80)</td>
</tr>
<tr>
<td>A new modification generating more than one mismatch in an Ethernet RIO drop is done.</td>
<td>Transfer the application from Primary to Standby before doing the new modification (Control Expert proposes an application transfer when trying the new modification). If no application transfer is performed and a Switchover occurs, glitches or bumps may appear on the output (see page 80).</td>
</tr>
</tbody>
</table>

If the potential problem is not described above, refer to the CCOTF general Troubleshooting list (see page 75).
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