



VCL PROBLEM DETECTION

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A

VCL Problem Detection and Reporting in the RTU

Intended Audience

This document is intended for those who program VCL algorithms to execute in the RTU and those who manage MISER installations where RTU-based VCL algorithms are important for system operation.

Overview

This User Note provides some background into the methodology used to detect and report VCL problems in the RTU. The RTU VCL algorithms are primarily the result of the content of the algorithms files. However, the Point Database also plays a major role in VCL algorithm operations. Inexperienced MISER users rarely make alterations to VCL algorithm files and experienced users know that they should not make alterations without proper testing and precautions. Still, both inexperienced and expert users often make what seem to be relatively innocent changes to the point database and this may inadvertently affect VCL operations. Therefore, from a troubleshooting standpoint, it is valuable to have the RTU detect and report some of the more bothersome issues.

Background

The way to differentiate between a point in the RTU and a point that only resides in MISER is that RTU points have an RTU ID, NCC, and an IN/OUT address. This User Note specifically deals with points stored in the RTU.

An opcode (operation code) is a single, executable machine language instruction that specifies the operation to be performed.

Basic Architecture and Design

Sometimes VCL algorithms stop working. There are two general root causes for this type of problem, either a point definition was changed or an algorithm file has changed. The RTU goes to some effort to verify operations whenever:

- **A point definition changes** — this typically happens via the Host **DPT/XDPT** (Define Point / Point Database GUI) programs or by using the **DIP/ENP** (Disable Point / Enable Point) programs.

NOTE: All four of these Host programs affect the RTU point definition and can be the cause of problems.

Many MISER installations restrict user access to the Host **DPT/XDPT** programs; most sites allow all operators full access to the Host **DIP/ENP** programs. It may seem that disabling a point is an innocuous operation, but it can cause a major VCL failure.

- **An algorithm file is loaded** — this might mean a new (previously non-existent) VCL algorithm file is loaded or a pre-existing VCL algorithm file is reloaded with or without any changes having been made to the file.

Beginning with the r05c RTU software release, the RTU has some verification logic that it uses to try and find problems. This verification logic is executed whenever a point definition changes and also when an algorithm file is loaded. The following list covers some of the VCL algorithm problems that can be recognized and reported by the RTU using this verification logic:

- **NOT_FOUND_RECORD_NUMBER** — the Host record number used in a VCL calculation is not associated with any known AI, DI, DV, SP, or AO point within the RTU.
- **NOT_FOUND_POINT_DEFINITION** — the Host record number used in a VCL calculation is associated with some point within the RTU, but the RTU does not have a corresponding Host point definition.
- **NOT_FOUND_POINT_ID** — the RTU has no point ID information available for this point.
- **NOT_FOUND_POINT_SCALING** — the RTU has no scaling information available for this point (applies to AI, SP, and AO point types only).
- **UNSUPPORTED_POINT_TYPE** — the Host record number for the point in question corresponds to a type that is not supported by VCL in the RTU. Supported point types are: AI, DI, DV, SP, and AO.
- **UNSUPPORTED_POINT_SUBTYPE** — the Host record number for the point in question corresponds to a subtype that is not supported by VCL in the RTU.
- **BAD_SCALING** — the RTU has scaling information that is available for this point, but it contains one or more invalid values (applies to AI, SP, and AO point types only).
- **POINT_DISABLED** — the point is disabled within the RTU.
- **BAD_OPCODE** — the algorithm file contains an opcode that the RTU does not know how to execute.

Reporting the Problem

The RTU is able to report the above problems using several mechanisms:

- Upon detection of a problem, the RTU will attempt to start the thirteenth AUX DV (since AUX DV points typically begin at 225 in a pointmap) AUX DV 237 (= 225+13-1) will be used in typical situations.

NOTE: For this to be useful the pointmap must include an AUX DV entry and that entry must specify thirteen or more DV points.

It is helpful if this DV point is defined in the Host. Once a problem is detected, this DV will start and stay turned on until some other process (such as a user-issued **STP** command) turns it back off.

- Upon detection of a problem, the RTU will format and send an error report COS to the Host. This can be found in the Host error log using the Host ERR command. Examples of these error reports are shown in the next section.

NOTE: It is necessary to have the *RTU Custom Param 10 Setting* for “enable ASCII (text-based) error reporting cos to host” turned on.

This setting is supported by all released V8 RTU software versions (refer to the *RTU Diag User Manual, Custom Parameter 10* for more information). Also, the MISER Host computer needs to support ASCII error reporting COS.

VCL PROBLEM DETECTION

Common Examples of Problem Reports in the Error Log

Below are examples of problem reports and a discussion of their likely cause.

```
[2015-NOV-20 10:51:44.00] HSQVMS      HSTNCC RTU 1:112 sent the
following message                      regarding point rec #13570:
VCL                                     PointDefinition pnt CL AUS-DI-
225 di 225                             POINT_DISABLED
```

The above message indicates that the point “CLAUS-DI-225” was disabled, causing a problem because the RTU determined that the point is currently in use by one or more VCL algorithms. This was detected while the RTU was processing commands related to a change in the point definition, as indicated by the text “PointDefinition” contained within the problem report message. One likely cause is that the point was disabled using the Host **DIP** command.

```
[2015-NOV-20 10:54:43.47] HSQVMS      HSTNCC RTU 1:112 sent the
following message                      regarding point rec #13570:
VCL                                     AddToStorage pnt CL AUS-DI-225
di 225                                 POINT_DISABLED
```

This message is nearly identical to the above example, but in this case the problem was detected while the RTU was processing commands related to adding a VCL algorithm file to the RTU. This is indicated by the text “AddToStorage” contained within the problem report message. One likely cause is that a VCL algorithm was downloaded using the Host VCL program “Load” menu option and the point was disabled at the time.

```
[2015-NOV-20 10:57:54.60] HSQVMS      HSTNCC RTU 1:112 sent the
following                               message: VCL PointDefinition
pnt (rec #0)                           dv 237
NOT_FOUND_POINT_DEFINITION
```

The above message indicates DV point 237 does not have a Host point definition present in the RTU. This causes an error because the RTU has determined that the point is currently in use by one or more VCL algorithms. This was detected while the RTU was processing commands related to a change in the point definition, as indicated by the text “PointDefinition” contained within the problem report message. One likely cause is that the point was deleted using the Host **DPT/XDPT** programs.