505D Application Release

Overview

This Product Change Notification describes the updates made when moving the Application software listed below from Rev A to Rev B. In this release, the new PID Optimizer feature has been released and known issues discovered have been resolved.

- GUI Application 5418-6947 Rev B
- GAP Application 5418-6768 Rev B

In order to update the Application Software above to Rev B, the following Footprint updates must also be made:

- VxWorks 5418-6479 Rev A
- Qt Footprint 5418-6755 Rev B

IMPORTANT **It is Woodward's recommendation that all units in the field be updated to the latest software revisions as soon as they are received.**

Release of the PID Optimizer

The Automated PID Dynamic Optimizer is a routine which allows the control to automatically analyze the system and calculate the P, I, and D terms. The PID Optimizer routine can be initiated from the controller Dynamics Optimizer screen and will provide reasonable and stable results. To calculate optimized system dynamics, small and progressively larger adjustments are made to the valve demand in order to measure the turbine system. The optimizer routine remains within user specified process and valve movement limits to ensure that the turbine system remains within acceptable operating limits.

By running the PID Optimizer, the resulting dynamics provide the following benefits:

1) Improved system response to events such as load changes and load rejection
2) Tighter control at the setpoint
3) Response behavior which matches the control loop and application (offline speed control vs load control, etc.)
4) Improved system diagnostics: The routine provides insight into turbine system control problems outside of PID tuning and can help to identify them. Some examples include:
    a. Non-Linear turbine response due to poppet staging or slew rate limited valve response
    b. High system dead-time
    c. High signal noise
    d. Response time variation due to high system friction, loose linkage, or coupling, varying hydraulic pressure, or varying steam conditions.

Overview of the Automated PID Optimizer Routine

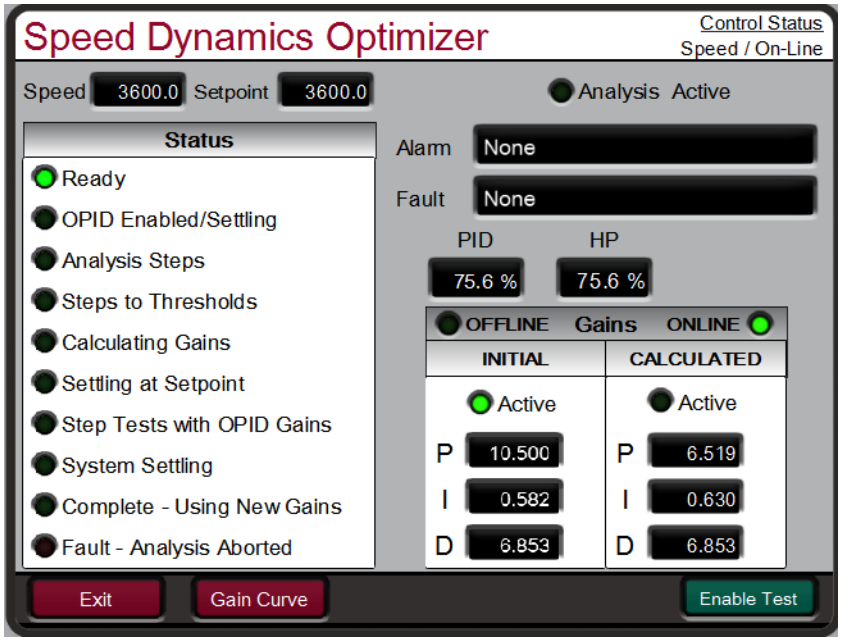


Figure 1: Speed Dynamics Optimizer Screen

The Dynamics Optimizer screen is shown above. The current status overview is on the left hand side of the screen and results are given on the right. The menu bar on the bottom of the screen contains buttons, which allow the configuration and operation of the Optimizer routine.

The process of finding optimized system dynamics includes two modes; first the analysis mode and then the setpoint step mode. The trend below gives an overview of the entire Optimization routine. The actuator demand is given in yellow, speed setpoint in white, and speed in red. The left portion of the trend is the Analysis Mode. The right portion of the trend is the Setpoint Step Mode.

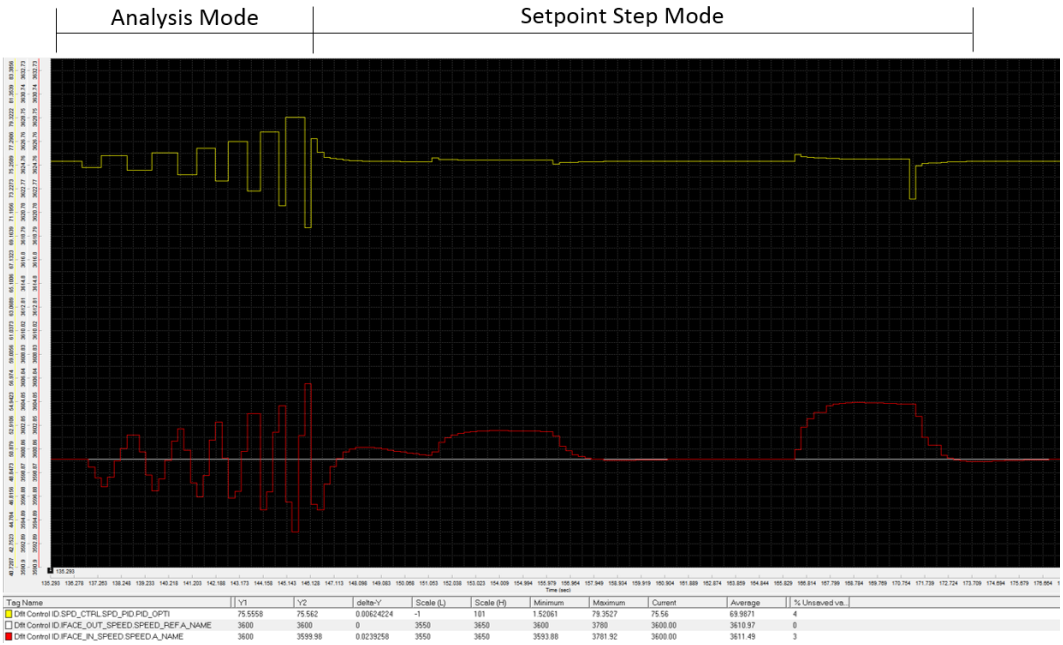


Figure 2: PID Optimizer Modes

Analysis Mode
During the Analysis Mode, the optimizer begins by making small actuator movements, which progressively increase until the measured process signal movement can be differentiated from signal noise. The initial movement direction (up or down) depends on system conditions. Once there is enough process signal movement, the optimizer begins moving the actuator up and down until the process signal moves beyond the +/- the threshold values (calculated from signal noise) and performs the system analysis to calculate gains.

On the front panel, the status will progress through the following steps during the Analysis Mode:

- OPID Enabled/Settling
- Analysis Movement
- Movement to Thresholds
- Calculating Gains

Setpoint Step Mode
Once new gains have been calculated for P, D, and I the PID will control at the setpoint using the newly calculated gains. The routine then performs setpoint step tests to validate the system response.

During the Setpoint Step Mode, there are four setpoint step tests:

1) Step the setpoint up or down (amount depends on system noise, but less than the **Process Limit** configured). Whether it moves up or down depends on the sign of the **Process Limit**.
2) Step the setpoint back to the initial setpoint
3) Step the setpoint by a higher amount than the first setpoint step test
4) Step the setpoint back to the initial setpoint

At any stage in this mode, if a fault occurs, the optimizer will abort and change the PID gains from the calculated values back to the initial values.
On the front panel, the status will progress through the following steps during the Setpoint Test Mode:

- Settling at Setpoint
- Step Tests with OPTI Gains
- System Settling
- Complete – Using New Gains

Once the routine is complete, the new gains can either be accepted by pressing the ‘Accept’ button within the Test Menu at the bottom of the screen. Alternatively, the gains can be rejected by pressing the ‘Reset Test’ button at the bottom of the screen, and the PID gains will change back to the initial values. If accepted, the current dynamics (offline or online, depending on the current operating mode) will be updated to the calculated values and the optimizer will reset. For information on configuring the PID Optimizer test, please see manual 86839V1 – Chapter 5: 505 Operation, Section: Automated PID Dynamic Optimizer.

Additional Features Released

In addition to the PID Optimizer, the Revision B Application software files include the following feature additions:

Alarm and Trip History
A file is now generated on the control named ‘ae_eventlog.csv’ which contains a history of all Alarm and Shutdown events. This file can be retrieved with AppManager. In addition, First-Out Trip History for the last 6 first out trips has been added to the Trip Summary page.

Woodward Links Updates
Updates to the MFR300, LS-5, VS-II pages, and logic to allow for easy interfacing between Woodward products. Improvements to the Screen layout and information displayed for each device as well as a routine to automatically detect the configured baud rate of the connected device (CAN Port #3 only).

Auto Screen Dimming
This feature ramps the backlight from 75% (default) to 25% to decrease heat when the display is not being used which will increase screen life. When any key on the front panel is pressed, the screen ramps back to normal brightness levels.

Speed Dynamics Speed Switch for Mechanical Drives
Prior to the Rev B release, Mechanical Drive applications switched from Offline to Online dynamics at Minimum Governor. In Rev B, there is now a service parameter in the 'Speed Control' Service Menu where this speed can be set between Low Idle and Max Governor speed. The default of this value is Minimum Governor.

Time Zone Update
Prior to the Rev B release, only integer values could be used to set the time zone. In the Rev. B release, half-hour Time Zone settings can be made in Debug.

Issues Detected and Resolved

The Revision B Application software files include resolution to the following known issues:

Potential Rate Group Slip when using Automated File Collection in AppManager
When Automatic File Collection is used in AppManager to access and download files from the control, it has been observed that a Rate Group Slip on the 505D Control can occur intermittently. Please see Service Bulletin #01635.

Actuator Fault Latching
Specific to the 0-200mA range, when the actuator circuit was opened (either with an E-Stop or opening field wiring) with load on the driver, the actuator fault was latched in and could not be cleared, even when the circuit was made healthy. To clear the fault, the unit could be put into Configuration Mode (IOLOCK) and then exit Configuration Mode, and the unit would reset with the fault cleared.

This issue has been fixed in Revision B such that the actuator fault no longer latches.

IP Address 2 and IP Address 3 not saved through power cycle
The IP Addresses for port 2 and port 3 were not being saved through a power cycle of the unit. The unit would boot back up with default IP addresses once power was restored to the unit. This has been fixed such that configuring the IP Address from the front screen will retain the IP through a power cycle.

IP Conflict Management
In Rev New of the VxWorks Footprint, the 505 would claim an IP address at initialization, even in the case of an IP conflict, causing the other device to be booted off the network. This has been updated to keep the 505 off the network in the case of a conflict, instead of interrupting communications on the other device.

Minimum Droop Value
The tunable range for the Droop Percentage on the low end was 1.0. This has been updated to 0.0 to allow the Droop Percentage to be changed to 0.0.

Various Minor Bug Fixes

Update Procedure

Recommend that all units be upgraded to Revision B of both the GAP and GUI application files. In order to update the GAP and GUI applications to Revision B, the VxWorks Footprint must be at Revision A and the Qt Footprint must be at Revision B. Regardless of the unit's current revision, the procedure below will bring the units to latest SW revisions.

Equipment and Software Needed

- Woodward AppManager Software (version 3.07 or later)
- A desktop computer or laptop
- Obtain Updated GUI application file **5418-6947.OBJ_B.zip**
- Obtain Updated GAP application file **5418-6768.OBJ_B.zip**
- Obtain Updated VxWorks Service Pack* **9927-2459_NEW.exe**
- Obtain Updated Qt Footprint **5418-6755_B.exe**

*9927-2459_NEW.exe will update the VxWorks (PN 5418-6479) Revision to A.

Obtaining Software

To obtain the software files above, go to http://www.woodward.com/software.aspx and search for the following:

GAP: “5418-6947”
GUI: “5418-6768”
VxWorks: “5418-6479”
Qt Footprint: “5418-6755”

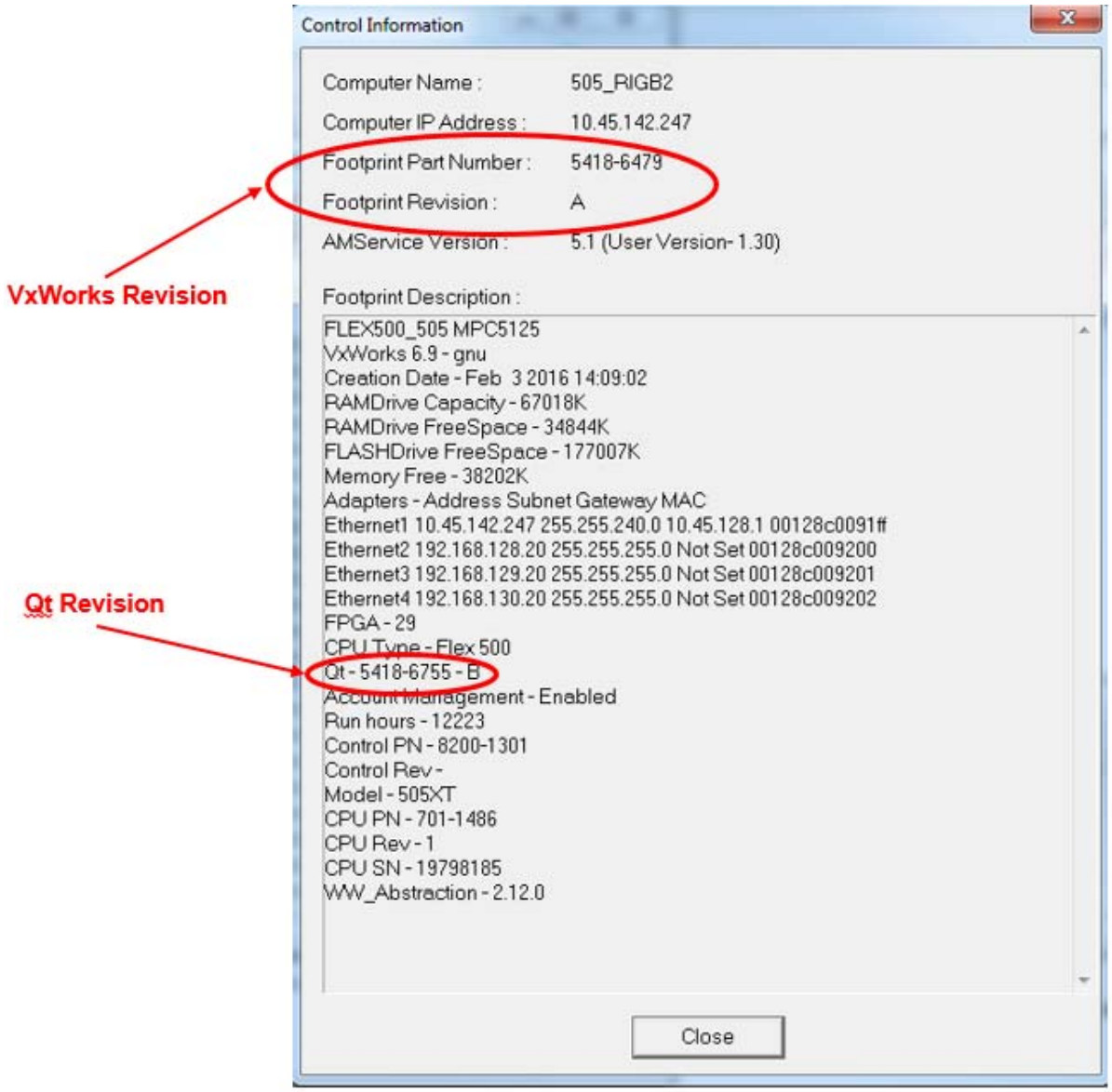
AppManager has been provided with the System Documentation CD shipped with the 505. The latest AppManager can also be downloaded from the link above. For information on how to use AppManager, refer to 505 manual 26839V2, Appendix E for step-by-step instructions for performing each of the tasks in the procedure below.

Update Procedure

IMPORTANT **The turbine must be shut down to perform the following procedure. If it is not, the AppManager program will not allow the application to be stopped, which will prevent the procedure from being performed.**

Updating the VxWorks and Qt Footprints

1. Using AppManager, view the Control Information screen to verify the current Footprint revision levels for VxWorks and Qt.
    a. If VxWorks is and Revision A and Qt is at Revision B, proceed to the GAP and GUI application update procedure.
    b. If VxWorks is at Revision A but Qt is not at Revision B, proceed to step 4 of this procedure.
2. Stop the GAP and GUI applications
3. VxWorks Service Pack Installation - Within the Control application view panel in AppManager, go to Control > Install Service Pack and select the **9927-2459_NEW.exe** on your computer. Once the Service Pack is complete and the control has rebooted, proceed to the next step.
4. Qt Service Pack Installation - Within the Control application view panel in AppManager, go to Control > Install Service Pack and select the **5418-6755_B.exe** on your computer. Once the Service Pack is complete and the control has rebooted, proceed to the next step.
5. Using AppManager, view the Control Information screen to verify that the Footprint revision levels are up-to-date:



Update the GAP and GUI applications to Revision B using the follow procedure.

1. If unit has been configured: Download the current tunable settings file from the control. If unfamiliar with using Control Assistant, refer to 505 manual 26839V2, Appendix E for step-by-step instructions on “Retrieving Control Tunables” from the 505.
2. If unfamiliar with using AppManager, refer to 505 manual 26839V2, Appendix F for step-by-step instructions.
3. In the Control application view panel, stop the application by selecting Control/Stop Application or the Maroon Square button on the right side Toolbar.
4. Switch to the GUI application view panel (brown background) and Stop the application by selecting Control/Stop Application or the Maroon Square button on the right side Toolbar. The status of this application will now say Stopped.
5. The display on the control will switch to the 505 splash screen when no GUI is running.
6. Switch back to the Control application view panel.
7. Under Control menu, select Transfer Application Files.
8. In the dialog box that opens browse to find the new GAP executable file named: **5418-6768_b.out**.
9. When transfer is complete, select the file, and start the application by selecting Control/Start Application or the Blue Triangle button on the right side Toolbar.
10. Switch to the GUI application view panel (brown background) by using the Swap button on the right side Toolbar (or Control/Show GUI Applications View)
11. Under Control menu, select Transfer GUI applications.
12. In the dialog box that opens browse to find the new GUI file named: **5418-6947_b_build01.wgui**.

13. When transfer is complete (takes about a minute), select the file, and start the application by selecting Control/Start Application or the Blue Triangle button on the right side Toolbar.
14. GUI initialization will take about 2 minutes.
15. If unit was configured: Upload the current tunable settings file (from step 1) from your PC into the control. Refer to 505 manual 26839V2, Appendix E, “Sending Control Tunables”.
    a. **Note that due to block name changes, the following Tunable settings may not have transferred**
        i. **MFR300 Configuration**
        ii. **LS-5 Configuration**
        iii. **VS-II Configuration**
        iv. **TimeZone**
        v. **Droop Minimum Value Setting**

    Using the front panel, reconfigure these settings.

16. Procedure is complete. Both application files are now in AutoStart, and the control will boot up normally after any power cycle.

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