UC5™ Control Module Update File
Version 6.0.0.0
February 1, 2017

1   Firmware Release Description

NORAC Systems International is introducing new firmware for the NORAC UC5™ Boom Height Control Systems. This is a complete update package that may update all NORAC devices on the CANBus. **Updating the UC5 system is not mandatory.**

2   Compatibility

- This update is compatible with all production level UC5 hardware and firmware.
- This version is compatible with ISOBUS Universal Terminals.
- This version is compatible with Ag Leader Edge, InSight, Integra, Versa, InCommand, and Compass displays.
- This version is compatible with the HARDI HC 9500, HC 9600, HC 8500, and HC 8600 displays.

3   Firmware Package 6.0.0.0

- Added sprayer makes/models.
- North American Rogator improvements.
- Reincorporated functionality for Active Roll systems with target rods.
- Improve auto component update process.
- Improve Hybrid Mode™ control logic.
- Improve Severe Terrain control logic.
- Increase reliability of sensor Crop and Hybrid Mode readings.

3.1.1   Component Versions

Part Number	Description	Firmware Version
43710	Controller Module	6.0.0.0
43720	Valve Module	0.4.0.3
43732	Input Module Pass Thru	0.4.0.4
43750	Ultrasonic Sensor	2.0.0.7
43741	Roll Sensor Ver. 2	2.0.0.3

4   Release History

4.1   *Firmware Package 5.2.0.0 (April 13, 2016)*

- Add compatibility with Ag Leader InCommand and Compass displays.

       o   Update boom override height integration.
- Remove blank settings screen.
- Add more Active Wing Roll types.

4.1.1 Component Versions

Module	Firmware Version
Controller	5.2.0.0
Valve Module	0.4.0.3
Input Module	0.4.0.4
Height Sensor	2.0.0.5
Roll Sensor	2.0.0.3

4.2 Firmware Package 5.0.0.0 (January 20, 2016)

- Improved on/off valve control logic to increase performance.
- Removed main lift reaction and slant reaction settings.
- Updated Headland Mode to allow remote switches as the trigger.
- Added Terrain assist which allows the booms to be quickly raised by pressing a button when crossing severe terrain.
- Added UC5 Ultrasonic Max™ Sensor compatibility.
- Added new types for NORAC Active Wing Roll™ products for increased performance in terraced land.
- Increased stability on all types of Active Roll™ when one wing is manually overridden.
- Added a minimum set point option which does not allow the target height to be set too low. This prevents the control system from causing damage to the sprayer by trying to position the boom lower than it can go.
- Improved performance for Safe Mode on Active Roll machines.

4.2.1 Component Versions

Module	Firmware Version
Controller	5.0.0.0
Valve Module	0.4.0.3
Input Module	0.4.0.4
Height Sensor	2.0.0.5
Roll Sensor	2.0.0.3

4.3 Firmware Package 4.8.0.0 (January 7, 2015)

- Changed the naming convention of the firmware packages so the number now matches the Control Module version.
- Made updates to improve how the controller handles situations where a Position Sensor loses readings.

- Updated Headland Mode to prevent situations where the system would not return to auto when manually overridden.
- Updated communication with Ag Leader displays to prevent the "Preparing System" message from being displayed on every power up. This message will be displayed until a complete Automatic Setup is performed.
- Improved communication with the Ag Leader displays so the Ag Leader Auto/Manual button works for Lift and Slant systems.
- On Ag Leader proprietary setups (systems on CAN A) the UC5™ will display a message indicating the controller has lost communication. This is displayed for approximately 30 seconds and then the system functions as expected.

4.3.1 Component Versions

Module	Firmware Version
Controller	4.8.0.0
Valve Module	0.4.0.2
Input Module	0.4.0.3
Height Sensor	2.0.0.1
Roll Sensor	2.0.0.0

4.4 Firmware Package 1156 (July 29, 2014)

- Added support for Ag Leader 5.4 display firmware.
- Changes to the boom override height warning message to help prevent booms from accidentally being placed into automatic mode when folded.
    - Lowered the default boom override height to 60 inches (150 cm) for all types that did not have a preset boom override height.
    - Ag Leader displays now use the NORAC boom override, which allows the override height to be modified for different sprayer types.
- Modified the firmware downgrade process to prevent Ultrasonic Sensors and Roll Sensors from becoming stuck in programming mode.
    - Sensors will now only be upgraded if they contain an incorrect sensor version instead of programming all sensors every time an update is performed.
    - If a sensor firmware upgrade does fail, the Control Module will automatically recover it.
- Created a safe mode to allow UC5 Active Roll™ to function in the absence of some sensor readings.
    - If the spring target (top rod) on an Active Roll system is not detected, the UC5 will be in a Safe Mode that provides basic collision avoidance.
    - If the cylinder target (bottom rod) on an Active Roll system is not detected, the UC5 will revert to functionality similar to Passive Roll.

4.4.1 Component Versions

Module	Firmware Version
Controller	4.6.4.0
Valve Module	0.4.0.1
Input Module	0.4.0.1
Height Sensor	2.0.0.1
Roll Sensor	2.0.0.0

4.5 Firmware Package 1141 (October 23, 2013)

- Updated the Severe Terrain (5 height sensor) logic to put more priority on maintaining the correct boom height at the outer sensors.
- Updated the Hybrid Mode™ logic to improve performance.
- Modified the Double Tap logic to prevent operators from accidentally putting the UC5 System into Automatic while the booms are folded. At least one boom section must now be in auto before the double tap feature will function.
- Added required diagnostic messages to the Control Module for AEF certification.
- Improved the communication speed and reliability with Virtual Terminals making the operation easier.
- Updated the manual valve tests to only report height changes based off the outer wing sensors so the reported value represents boom tip movement instead of an average of the two readings.
- A fix to Full Down Mode that allows the wings to go to Automatic before the center section is at the correct height.
- Added more diagnostics information to the Virtual Terminal screens, primarily during the Automatic Setup.
- Added support for the NORAC PULSE™ display.
- Added a one-time registration reminder after 200 hours of use.
- Now forces an automatic setup after performing a control module firmware update or a system default.

4.5.1 Component Versions

Module	Firmware Version
Controller	4.6.0.0
Valve Module	0.4.0.1
Input Module	0.4.0.1
Height Sensor	2.0.0.1
Roll Sensor	2.0.0.0

4.6 Firmware Package 1120 (Beta) (March 2013)

- This firmware will display a message on virtual terminals and ECHO™ indicating that the UC5™ firmware is beta firmware when the system powers up.

- Added Hybrid Crop Mode. This can be enabled on the virtual terminal Settings page by selecting Hybrid Mode™ instead of Soil or Crop Modes. On the proprietary screens of the HC8500 and HC9500 selecting Crop Mode™ now puts the UC5 System into Hybrid Mode.
- Added support for Position Sensors. Position Sensors can be tested on Auto Height or Auto Terrain systems.
- Added a double tap return to auto option. This allows the operator to place the UC5 System into Auto by double tapping the main lift down sprayer switch twice. This must be enabled in the Options menu.
- Added messaging to make the crop height data available to third party devices if requested.

4.6.1   Component Versions

Module	Firmware Version
Controller	4.3.2.0
Input Module	0.4.0.1
Valve Module	0.4.0.1
Height Sensor	2.0.0.1
Roll Sensor	2.0.0.0

4.7   Firmware Package 1115 (October 2012)

- Made the UC5 compatible with the HC8500 and HC9500 so that it can operate on CAN A or CAN B.
- UC5 firmware updates can be done through the HC8500 and 9500 on both CAN A and CAN B.
- With AutoSlant systems the boom override height warning is now being displayed correctly.
- On the HC8500 and HC9500 running on CAN A displays if the boom was above 60 inches (150 cm) the boom would not go into automatic. It now displays the Ag Leader warning as it used to.
- Updates were made to improve the translations for Dutch on the Virtual Terminals and ECHO display.
- Added the Tee Jet Matrix 570 VT as a supported Virtual Terminal.
- Changes to the HPZ type:
  - In the Automatic Setup the "HPZ" model has been changed to "All HPZ and HAZ (<33m)"
  - Slant deadband was changed from 9 to 20 to match UC4+™.
  - Reduced the left and right wing gains by half based off previous testing performed in Denmark.
  - Changed to slant deadzones to 100ms based of previous testing performed.
  - Set the slant gains to 5 to match the UC4+™ HD4 settings.
  - Enabled remote switches.
  - Reduced the Passive Roll™ reference filter constant to match UC4+.
  - Reduced the slant cool down timer to match UC4+.
  - Changed minimum crop and soil height to 254 mm from 500 mm.
- Changes to the HAZ type:
  - In the Automatic Setup the "HAZ" type has been changed to "HAZ booms >33m".

- o Made all the same default changes as in the HPZ type.
- o Reduced the slant gains to 2 to match the UC4+ HD6 type.
- o Enabled the slant bypass precharge to 15 cycles.
- Created an HPZ and HAZ <33m AutoSlant type.
  - o This resembles the UC4+ HD5 type settings.

4.7.1 Component Versions

Module	Firmware Version
Controller	4.3.0.5
Input Module	0.4.0.0
Valve Module	0.4.0.1
Height Sensor	2.0.0.1
Roll Sensor	2.0.0.0