VERSION 7.2E
February 2026

Product Release Notes

Robotics Firmware

ROSS

PRODUCT RELEASE NOTES

Welcome to the Robotics Firmware 7.2e Release Notes. Please read this document to find essential information about changes to the software running on the Ross Robotics product line.

These release notes previously formed part of the SmartShell Release Notes. Going forward, SmartShell Release Notes will cover SmartShell, Robotics Server, Integrated Server, Bridge Server and SmartShell CX Panel Adapter applications. Robotics Release Notes will cover firmware and software relating to Furios, CamBots, legacy Furio joystick, and CAN-based Collision Avoidance.

This document includes version history for recent past releases. However, the **KNOWN ISSUES** section applies only to the most recent release.

CONTENTS

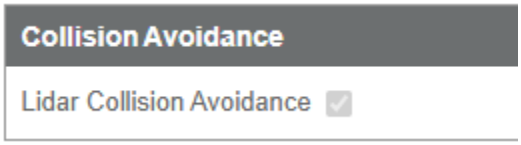
VERSION HISTORY

VERSION 7.2e – FEBRUARY 2026

This release includes updates for Artimo XY50 pedestals only. For all other robots running Furio firmware, 7.0c is the latest release.

WHAT'S NEW

- **FURIO FIRMWARE FOR ARTIMO XY50 PEDESTAL**
    - **Lidar Collision Avoidance** – Artimo now uses its lidars to detect obstacles in its path and come to a stop before a collision occurs.
        - Lidar Collision Avoidance will be automatically enabled on upgrade to 7.2e. It can be disabled in the Axis Settings page of the Web UI.



        - When a Studio Map has been loaded, this feature uses the same payload radius defined for studio limits. If no Studio Map has been loaded, it will default to a 20 cm buffer zone around the robot base.
        - The system uses 2D lidar positioned 35 cm above the floor, optimized for detecting obstacles with a minimum width of 5 cm within that plane. Obstacles outside this detection plane, such as items very close to the floor, suspended obstacles, or obstacles encountered at different heights or very close proximity, may not be detected early enough to avoid contact. This includes other Artimo robots operating in close range.
        - Transparent or reflective materials, such as mirrors or glass, will not be detected by the lidars.

          ⚠**Warning**: lidar collision avoidance, as well as bumpers, will be disabled while the touchscreen is being used to jog the robot.
        - New in 7.2e, requests to recall presets or moves while the touchscreen is being used to jog the robot will be rejected, and a warning pop-up will be shown in SmartShell.
        - If an obstacle is detected in the path of the robot, behavior is the same as for studio limits.
            - The robot will slow down and stop before its payload radius intersects with the detected obstacle or limit
            - A notification will be shown in SmartShell, indicating that the robot has encountered a "Detected Obstacle". In 7.2e, changes have been made to when these notifications are sent. Refer to **RSW-554** in the Bugs Addressed section

- If a move or preset is in progress, the XY portion of the move will stop, but other axes will continue to move until the move or preset is complete.

UPGRADE CONSIDERATIONS

- There are no specific upgrade considerations for this release. Lidar collision avoidance will be automatically enabled after update. It can be disabled in the Web UI, but this is not recommended.

LOAD LINEUP

- New in 7.2e:
    - Furio Firmware – Artimo free-roaming pedestal
        - Furio-arm64-7.2.500.01
            - Runs on Artimo free-roaming pedestal only.

- Unchanged from 7.2d:
    - Furio Firmware – Artimo free-roaming pedestal
        - Artimo OS 1.02
        - Artimo axis configuration
            - Left Wheel – 5130ER-007-01_148 and Copley Firmware 4.60
            - Right Wheel – 5130ER-006-01_148 and Copley Firmware 4.60
            - Caster – 5130ER-008-01_145
        - Artimo dolly board firmware 0.18 (see note in upgrade considerations)

- Unchanged from 7.2c:
    - Furio Firmware – Artimo free-roaming pedestal
        - Artimo axis configuration:
            - Pan – 5130ER-003-01_144

- Unchanged from 7.2b:
    - Furio Firmware – Artimo free-roaming pedestal
        - Artimo axis configuration:
            - Tilt – 5130ER-004-01_142

- Lift – 5130ER-005-01_141

- Unchanged from 7.0c:
  - Furio-phy-7.0.300.01
    - Runs on phyCORE-equipped VR600, VR100, and X-series heads
  - Furio-i686-7.0.300.01
    - Runs on CamBot XY pedestals having Furio OS
    - Upgrading CamBot OS to Furio OS requires a flash card replacement

- Unchanged from 7.0b:
  - Furio Firmware
    - Latest Furio OS is version 20210505-1 for Gen2 bricks, and 20211016-1 for Gen3 bricks.
  - CamBot Firmware
    - 3.4.300.3105 for 520PT and 600PT/600PTL heads
    - 3.7.200.3112 for XY pedestals
  - Joystick Firmware 4.6.100.7375
  - Collision Avoidance Firmware 1.2.70 (Tested on Collision Avoidance Module 5100AR-750-02)

- SmartShell & Servers – tested with SmartShell Release 8.0a:
  - SmartShell Configurator 8.0.45
  - SmartShell 8.0.100.12
  - Robotics Server 8.0.100.12

BUGS ADDRESSED

ARTIMO

- Exiting mapping mode failed to properly load the map so that Artimo reported an error of 'no map loaded' on subsequent targeting. This problem has now been resolved, and the map is properly saved and loaded when mapping completes. (RSW-559)
- Corrupted map provenance field, caused by RSW-559, could result in failure to load the Localization tab in the Web UI. This has now been resolved, and the Localization Tab will load correctly (RSW-560)
- The logic used to exclude areas of the studio during localization was failing to remove all lidar points in the excluded areas. This could sometimes make it harder to distinguish the correct orientation of the robot when targeting in a studio with significant symmetry outside of its excluded areas. Note that the robot still requires fixed landmarks

in the map that are not symmetrical for successful targeting. (RSW-564)

- Artimo was responding to small variations in timing of synch signals by switching between internal and external synch sources. This has now been corrected to make Artimo less sensitive to small variations in its timing cycle. (RSW-578)
- A change to tally handling code resulted in Artimo failing to start if the AllowCutOnAir parameter was set to true. This has now been corrected, and the parameter is handled properly (RSW-591)
- Version 7.2d introduced a check for deviation of the robot from its intended path, which would result in a message that "Preset has been aborted. The robot was unable to follow the desired path." Customer feedback has indicated that this check was too sensitive and could result in failure of valid moves with long trajectories, or when moving close to a limit. The default threshold for triggering this feature has been increased from 10 cm to 50 cm so that proximity to a limit, or small fluctuations in localization, should not cause it to trigger (RSW-612)
- SmartShell notifications shown when a robot approached a studio limit were shown only when the robot first approached the limit, and not on any subsequent attempts to move in the direction of the limit, which meant that the reason for blocking motion could be lost if other notifications had happened in the intervening time. A new notification will now be shown each time the operator is blocked from moving the robot towards a studio limit or object detected by lidar (RSW-554).

VERSION 7.2d – NOVEMBER 2025

This release includes updates for Artimo XY50 pedestals only. For all other robots running Furio firmware, 7.0c is the latest release.

WHAT'S NEW

- **Furio Firmware for Artimo XY-50 pedestal**
  - **Cut speed in the Web UI** – added the feature to include a **Cut Ratio** in the Axis Settings for non-XY axes to Artimo. See 7.0c release notes below for details of this feature.
  - **Improved Targeting Algorithm** – changes have been made to the algorithm used to determine where the robot is located in the studio to make it both easier to target and to reduce the chance of errors.
    - The system checks whether the top two pose estimates are distinct enough to confirm an accurate target, preventing mis-targeting when lidar data could fit more than one position in the studio.
    - A reduction in the number of points that have to hit a mapped wall makes it easier to target in more places in the studio.

- The ability to set exclusion zones has been introduced – these allow sections of the studio that could cause problems to the targeting algorithm to be excluded. Typical scenarios where exclusion zones could help include:
  - Studios with moving set pieces
  - Studios with green screens where the walls have a curved profile at lidar height
- The map view in the Web UI has been updated to include features from the studio map such as obstacles and exclusion zones, as well as the current robot position and scan.

- **Touchscreen updates** – the touchscreen on the Artimo pedestal has been updated to include:
  - **Axis jog** – the touchscreen can now be used to jog any axis on the robot. When jogging XY, the robot will first align wheels with the pan direction so that subsequent motion is relative to the pan direction. This is different to jog mode in SmartShell.

    ⚠ **Warning – bumpers are disabled when touchscreen jog mode is active.**
  - **ESTOP activation** – the touchscreen will now display a warning when ESTOP is active.
    - If the touchscreen is in use when ESTOP is activated, it will exit to the main menu and show a warning. Jog mode will be disabled while ESTOP is active but all other functions of the touchscreen will still work, and other menu screens can be accessed while ESTOP remains active.
    - If the touchscreen is not in use when ESTOP is activated, it will light up with a full-screen warning display until the ESTOP button is released.
  - **Help screen** – the help screen now includes a QR code with a link to CMS documentation on the Ross website. The information on how to acquire login credentials for gated content is found on the documentation site itself.

UPGRADE CONSIDERATIONS

- This release includes an update to the dolly board firmware, which requires a programmer tool due to an issue with upgrading dolly board firmware over the web UI (RSW-359). Failure to update the dolly board firmware will only impact the issues specifically identified as requiring the updated dolly board firmware in the list of Bugs Fixed. All other bug fixes and new features will work with either dolly board firmware 0.17 or 0.18.
- A hotfix for ROB-6379 has been installed in some sites which included Copley Indexer files to enable STO debounce. These indexer files are no longer necessary

with 7.2d, as the configuration is now applied directly from the Furio firmware. It is OK to leave the Copley Indexer files as is.

LOAD LINEUP

- New in 7.2d:
  - Furio Firmware – Artimo free-roaming pedestal
    - Furio-arm64-7.2.400.04
      - Runs on Artimo free-roaming pedestal only.
    - Artimo OS 1.02
    - Artimo axis configuration
      - Left Wheel – 5130ER-007-01_148 and Copley Firmware 4.60
      - Right Wheel – 5130ER-006-01_148 and Copley Firmware 4.60
      - Caster – 5130ER-008-01_145
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- Unchanged from 7.2c:
  - Furio Firmware – Artimo free-roaming pedestal
    - Artimo axis configuration:
      - Pan – 5130ER-003-01_144

- Unchanged from 7.2b:
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      - Tilt – 5130ER-004-01_142
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    - Upgrading CamBot OS to Furio OS requires a flash card replacement

- Unchanged from 7.0b:
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    - Latest Furio OS is version 20210505-1 for Gen2 bricks, and 20211016-1 for Gen3 bricks.
  - CamBot Firmware
    - 3.4.300.3105 for 520PT and 600PT/600PTL heads
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- SmartShell & Servers – tested with SmartShell Release 8.0a:
    - SmartShell Configurator 8.0.45
    - SmartShell 8.0.100.12
    - Robotics Server 8.0.100.12

BUGS ADDRESSED

Artimo

- Small misalignment of the casters could result in the robot accumulating some rotational drift, which was not being compensated for by the error correction. This could result in a pan offset of approximately 0.5 degrees over a typical move. This issue has now been resolved by adding a feedback loop to correct for pan error, resulting in pan error of <0.15 degrees on a typical move. (RSW-209)
- A delay in the calculation of pan position could cause a pan offset of up to 0.4 degrees. This has now been corrected (RSW-177)
- Targeting of the robot could fail when it was positioned close to a non-mapped object such as another robot, or in areas of the studio where non-mapped objects were blocking visibility of the studio walls. This has been addressed by the introduction of the new targeting algorithm, which has reduced the number of lidar points that need to line up with a wall in the studio map. (RSW-12, RSW-68)
- Casters were realigning during an A-B-A move, causing image shake. This has now been corrected (RSW-56)
- Artimo was continuing to report small XY movements while the robot was stationary due to noise introduced by the localization algorithm. This could result in a pan only preset including unwanted XY movement, or unwanted movement of virtual objects in AR/VR applications. This has been resolved by suppressing updates of XY position while the wheels are stationary. (RSW-59, RSW-90)
- Running a looped move would sometimes fail after a few iterations due to small errors in return time. This has now been corrected, and looped moves should continue to run until halted (RSW-290)
- Limitations in caster alignment time can sometimes prevent Artimo from following its planned XY trajectory during a move. When this happened, the robot could move in unexpected directions. A check has been put in place to halt a move if the robot veers too far from the desired path. This will trigger a popup warning that the shot recall has been aborted. (RSW-206)
- The presence of a studio limit could impact the trajectory of a preset recall, by causing it to veer off as the limit was approached, or slow and stop before reaching a preset that was placed close to the limit. This has been corrected by increasing the rate of deceleration when approaching a limit to reduce the distance at which the limit first impacts motion, and ensuring that deceleration is applied evenly in the heading direction of the robot to prevent curves in the robot path. (RSW-494, RSW-445)
- Caster LEDs were not retaining their directional colour when XY was stationary, but other axes were moving. Directional colouring (amber for direction of travel, blue for

direction away from travel) is now only used while the robot is moving in XY. When the robot is stationary with other axes moving, or rotating in place, both directional LEDs will be amber. LEDs are turned off when all axes on the robot are stationary. (RSW-174)

- Improvements to the localization algorithm have improved accuracy when pan is rotating at the same time that the robot is moving in an arc (RSW-211)
- Changes have been made to logging of localization problems to reduce multiple repeated logging messages from overloading the logs obscuring the original source of a problem. (RSW-297, RSW-326)
- Tilt value could be reported inaccurately with a 72 degree offset depending on the tilt position when the robot was power-cycled. This has now been corrected by validating and correcting tilt position on start-up. There is still a potential problem if the robot does not have the tilt end-stops installed and is powered up right at the extremes of its operational range, but will not occur in normal operation with end stops in place to limit tilt range to +/-25 degrees. (RSW-322)
- Artimo was changing motor amplifier configuration on start-up, potentially overriding settings loaded into the motors. This has now been corrected, and Artimo will not alter motor configurations. (RSW-316)
- Loosening of the belts on the caster motors could lead to a squealing sound. Drive wheel and caster motor configuration files have been updated to prevent this. (ROB-6739)
- Loading a new localization map that covered a smaller area than the original map loaded onto an Artimo pedestal could result in the edge of the original map remaining in place around the newly loaded map. This has now been resolved, and the old map will be properly cleared before loading the new map. (RSW-151)
- Bug fixes that require upgrade of dolly board firmware (see Upgrade Considerations)
    - Upgrade of the dolly board firmware via the Web UI was not working. This means that upgrade from version 0.17 requires a programmer tool. This issue has been fixed when upgrading from version 0.18 (RSW-359)
    - XY axes were taking too long to home after a wheel motor had been disabled when the casters were positioned at 90 degrees. This has now been corrected and homing timing will not be increased due to the position of the casters (RSW-217)

VERSION 7.0c – OCTOBER 2025

This release includes updates for all robots running Furio firmware except for Artimo.

WHAT'S NEW

Furio firmware for non-Artimo robots

- **XY tracking for Furio dollies and SkyDolly**

- A new updated model for translating track position into the XY position and orientation of the dolly has been introduced. This new GenDolly2 algorithm offers improved accuracy and adds support for Barcode Position Sensor (BPS) tracking and S-shaped track. If you are upgrading to 7.0c and already use the existing GenDolly algorithm, position reporting will be unaffected by the upgrade. Use of the new algorithm requires template changes to explicitly select it.

  The new GenDolly2 algorithm:

  - Fixes an error that could cause up to 25mm of error in XY position on curved tracks when using the previous GenDolly algorithm.
  - Improves support for SkyDolly and for the BPS for track position measurement.
  - Still assumes a perfect track and does not account for manufacturing and installation tolerances.

    On a perfect track, the accuracy of GenDolly2 for a U-shaped track with a 3m radius is ±2 mm of XY position error and ±0.15 degrees of orientation (pan) error.

    Any error or non-linearity in the radius or the alignment of the tracks will have a significant effect on this. For example:

    - Each 1mm error in the measured radius of a U-shaped track with a 3m radius can result in up to 5mm of linear error and 0.05 degrees of pan error
    - On a floor dolly, each 1 mm of rail elevation difference contributes 6.2mm of position error perpendicular to the track direction when SE lift is at full extension (2228 mm). A VR600 head is assumed in this calculation.
    - On a SkyDolly, each 1 mm of rail elevation difference contributes 3.1mm of position error perpendicular to the track direction when S2 lift is at full extension (1558 mm). A VR600 head is assumed in this calculation.
  - Introduces support for placing curved track sections with different radii directly adjacent to each other.

    Minimum Length Requirement

    Each continuous curved segment—whether it consists of a single track piece or multiple adjacent sections of the same radius—must have an inner rail length at least equal to the dolly wheelbase.

    - For floor dollies, the wheelbase is 500 mm.
    - For SkyDolly, the wheelbase is 800 mm.

    In practical terms, for a floor dolly, the minimum curve angle that meets this requirement is:

- 12.82° for a 2.6 m radius track
- 10.9° for a 3.0 m radius track

The generalized formulas are:

- Floor Dolly:

$$arcLengthInDegrees = 2 * \arcsin(\frac{500}{2 * (nominalTrackRadius - 360)})$$

- SkyDolly:

$$arcLengthInDegrees = 2 * \arcsin(\frac{800}{2 * (nominalTrackRadius - 500)})$$

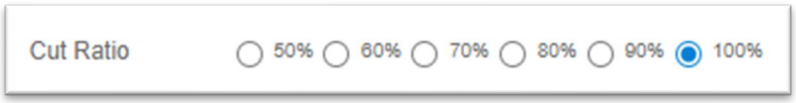
Placement of Curves with Different Radii

Adjacent curved sections may now have different radii, provided each section (or group of same-radius sections) individually satisfies the minimum inner-rail length condition above. There is no longer a requirement to insert a straight section between curves of different radii.

However, if curved sections are not directly adjacent (i.e., separated by a straight run), that straight segment must still be longer than the dolly's wheelbase—500 mm for floor dollies and 800 mm for SkyDolly.

  - Adds support for tracks with a combination of left and right-hand curves. This feature is only available when using BPS for track position sensing.
  - Includes a new track generation tool for use with the new algorithm and supports configuration of tracks for Furio with wiredraw or BPS and for Sky Dolly with BPS. GenDolly2 does not support SkyDolly with wiredraw.

- **Cut speed adjustment in the Web UI**
  - The Axis Settings page in the web UI now includes an option to allow adjustment of the maximum cut speed and acceleration on a per-axis basis for all non-XY axes. This new **Cut Ratio** allows individual axes to be slowed down if cuts feel too fast without necessarily slowing down the entire cut. When upgrading to 7.0c, the adjustment will default to 100% so that existing cut speed and acceleration is unaffected by the upgrade.
  - When using the Slow Cue / Slow Cut features in SmartShell, all axes will be slowed down by the same percentage after the Cut Ratio has been applied to individual axes.



UPGRADE CONSIDERATIONS

- Configurations using Ethernet Collision Avoidance should be reviewed since the default multicast address suggested in the Furio template (224.0.0.1) is the reserved "all hosts" multicast group that addresses all hosts on the same network segment. Consider switching to the newly-supported unicast configuration instead.

LOAD LINEUP

- New in this release
  - Furio-phy-7.0.300.01
    - Runs on phyCORE-equipped VR600, VR100, and X-series heads
  - Furio-i686-7.0.300.01
    - Runs on CamBot XY pedestals having Furio OS
    - Upgrading CamBot OS to Furio OS requires a flash card replacement

- Unchanged from 7.2c:
  - Furio Firmware – Artimo free-roaming pedestal
    - Furio-arm64-7.2.300.07
      - Runs on Artimo free-roaming pedestal only.
    - Artimo OS 1.01
    - Artimo dolly board firmware 0.17
    - Artimo axis configuration:
      - Pan – 5130ER-003-01_144
      - Left Wheel – 5130ER-007-01_144
      - Right Wheel – 5130ER-006-01_144
      - Tilt – 5130ER-004-01_142
      - Lift – 5130ER-005-01_141

- Unchanged from 7.0b:
  - Furio Firmware
    - Latest Furio OS is version 20210505-1 for Gen2 bricks, and 20211016-1 for Gen3 bricks.
  - CamBot Firmware
    - 3.4.300.3105 for 520PT and 600PT/600PTL heads
    - 3.7.200.3112 for XY pedestals
  - Joystick Firmware 4.6.100.7375
  - Collision Avoidance Firmware 1.2.70 (Tested on Collision Avoidance Module 5100AR-750-02)

- SmartShell & Servers – tested with SmartShell Release 7.3a:
  - SmartShell 7.3.100.09
  - Robotics Server 7.0.100.8410 & Integrated Server 7.0.100.8410
    - Requires Visual C++ Redistributable Packages for Visual Studio 2017 (32-bit)
    - Requires .NET Framework 4.5.2
  - SmartShell CX Panel Adapter 1.0.0-2025.04.08-14.04
    - for CX-Panel users
  - Bridge Server 7.0.100.8410

BUGS ADDRESSED

FURIO FIRMWARE – XY PEDESTALS

- Loading a studio map with a robot name that included a space would succeed, but the map would fail to load after reboot. Robot names which include spaces are now supported. (RSW-281)
- Furio XY peds failed to respect a section of circular studio limits or a circular studio boundary when the studio map was created with a marker that had a non-zero rotation. This was resolved for Artimo in 7.2c and has now been resolved for all XY pedestals. Circular obstacles can be safely used regardless of marker orientation. (RSW-60, RSW-281)
- XY move validation failed to check that an XY trajectory's velocity stayed below the pedestal maximum velocity limit. As a result, any move segment that exceeded the maximum velocity limit fell short of its target position. This was resolved for Artimo in 7.2c and has now been resolved for other XY pedestals. Trajectories properly consider the maximum velocity when validating a move. (RSW-147, RSW-97)

FURIO FIRMWARE

- Cut speed was too fast. Added an option to reduce the max speed and acceleration used in preset cuts and move cues. See new "Cut speed adjustment in the Web UI" feature in "What's New" above for details. (ROB-5582)
- GenDolly algorithm yielded inaccurate XY position and pan orientation around a curve. Introduced corrected algorithm as GenDolly2. (RSW-18/ROB-5677)
- GenDolly algorithm was difficult to configure. Introduced an updated GenDolly configuration tool that supports the new GenDolly2 algorithm. (RSW-19/ROB-2619, ROB-1013)
- Recalling presets or moves in quick succession could sometimes result in the system getting into a state where no presets could be recalled. Requesting a preset would result in the progress bar being displayed in SmartShell, but no robot movement. The log would show a message "Planning queue is not empty". This has now been resolved, and rapid re-cueing of presets should work as expected. (RSW-121)
- Interrupting the replay of a move with recorded axes would result in any axis that was recorded in the original move not being replayed in replay of any subsequent

recorded move. This has now been resolved, and the recorded axes will work when the same or other moves are recalled. (RSW-279)

- In firmware versions prior to 5.x, it was possible to set a non-zero start time for the first keyframe in a move, so that the robot would remain stationary after the move was triggered until the start time was reached. This feature has been restored for all robots running Furio firmware, except XY pedestals. (RSW-231)
- Ethernet-based collision avoidance – The Furio template previously suggested use of the reserved "all hosts" multicast group 224.0.0.1. Furio templates have been updated with a new default multicast group of 239.0.0.1. However, the Collision Avoidance Setup Guide For Two Dollies (5100DR-309-XX) outlines use of unicast for a two-dolly setup. (RSW-343)
- Ethernet-based collision avoidance – Furio would crash if Ethernet Collision Avoidance was setup with unicast IP addresses. Support has been added for unicast communications. (RSW-343)
- X-series heads were experiencing intermittent loss of analog lens control, requiring a powercycle to recover control. Added additional checks in the DAC read/write logic to catch exceptions from crashing the lens thread. (ROB-6328)
- BPS-equipped dollies were experiencing track disable events due to spurious "high acceleration" events. This was fixed by suppressing the acceleration check in the Track Safety feature when using a BPS. The acceleration is still checked and unexpected values are logged, but the Track axis will not disable. (ROB-6105)
- The VR600's pan axis hard limit range has been extended from ±178° to ±350°. To utilize this increased range, update the UpperLimitPosition and LowerLimitPosition parameters for the Pan Axis in the Furio configuration template.

  ⚠ **Important**

  Operating in this extended this range introduces risk: if the head is powered off or rebooted while outside the safe homing range, it will home in the wrong direction and wrap cables around the column.

  Before initiating a homing procedure, manually reposition the pan axis within the safe range of [-178°, +178°] to ensure proper operation and avoid damage. (ROB-6353)

VERSION 7.2c – JULY 2025

WHAT'S NEW

- **Furio Firmware for Artimo XY-50 pedestal**
  - Additional information in the Web UI to enhance supportability
    - Status page now shows the firmware revisions for all motor controllers
    - Version information now includes the OS version
  - Web UI supports upgrade of OS, replacing previous SD card-based upgrade

UPGRADE CONSIDERATIONS

- **Upgrade for pre-7.2b releases**

  See notes for 7.2b below when upgrading from a pre-release version of 7.2

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    - Artimo OS 1.01
    - Artimo axis configuration:
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        - Requires Visual C++ Redistributable Packages for Visual Studio 2017 (32-bit)
        - Requires .NET Framework 4.5.2
    - SmartShell CX Panel Adapter 1.0.0-2025.04.08-14.04
        - for CX-Panel users
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BUGS ADDRESSED

Artimo

- This release has added improvements to the stability of the lidar-based localization as well as tuning of the control loops that have together contributed to significant improvements in move accuracy and fixes to several associated issues:
    - Move runs were failing to reach the desired end position, with XY position error greater than 30mm and pan error greater than 1 degree. Improvements to localization and tuning of the control loops mean that moves are now reaching their desired XY position within the expected tolerance of 20mm. Pan accuracy is improved, but is still outside of the stated tolerance and will be addressed in follow-up releases. (RSW-52, RSW-146, RSW-77)
    - Multiple cues were often required to cue a move successfully, sometimes up to five cues. In most cases, moves are now ready to run after a single cue, and at worst require a second cue to correct a pan error. (RSW-53)
    - Looped moves would fail after a few cycles due to failure to return to the correct XY and pan start position at the end of the move. Improvements in move and cueing accuracy mean that looped moves can now be run successfully. (RSW-149)
    - Poor quality lidar scans were impacting mapping and localization accuracy. This has been improved by using averaging to ensure that lidar scans used during mapping and targeting are more stable. (RSW-65)
    - Fast pan rotation could cause localization to lose lock, resulting in a requirement to retarget the robot. Corrections to the localization algorithm now mean that accurate position monitoring is maintained even during fast pan rotation (RSW-159)
    - Failure to properly compensate for the motion of the robot when using the lidar data for blur compensation was causing errors in the reported position of the robot during motion, which resulted in moves failing to reach their target position. (RSW-102)
    - Failure to consider the delay in the pan and XY traction motors was contributing to failure to correct for discrepancies between the desired and actual trajectory of the robot (RSW-101).
    - Use of desired rather than actual velocity when compensating for robot motion during localization was causing problems when the robot approached a limit where its velocity was reduced – resulting in large position errors and a requirement to retarget the robot (RSW-108)

- Moves were not always reaching the desired position due to the inability of the control loop to correct for drift of the robot position away from the desired trajectory. The gains of the control loop have been tuned so that it can now compensate for drift caused by factors such as small errors in caster alignment (RSW-172)

- SmartShell messaging during targeting failures had not been updated to reflect Artimo-specific workflows and still referenced outdated floor-based targeting. This has been corrected - pop-up messages now display context-appropriate language based on the targeting method in use. Additionally, logging has been enhanced to ensure that every targeting attempt includes a clear result entry. (RSW-76)

- XY move validation failed to check that an XY trajectory's velocity stayed below the pedestal maximum velocity limit. As a result, any move segment that exceeded the maximum velocity limit fell short of its target position. This has now been resolved, and trajectories properly consider the maximum velocity when validating a move. (RSW-147, RSW-97)
- Stopping and re-starting joystick control of XY motion could result in unnecessary caster movement which could cause image shake. This unnecessary caster movement has now been removed (RSW-119)
- A slight image shake was sometimes visible at the start of a curved move run, due to unwanted movement of the casters. Recalculation of the trajectory after the move cue to ensure that the casters are properly aligned for the exact start position of the robot means that shake is no longer seen in the image at move start. (RSW-11)
- Calculation of the time for moves using tension of 100 for "stop and turn" behaviour did not take into account the time required for caster realignment, which resulted in moves falling short of their desired position. Time for caster alignment is now included when the move trajectory is planned (RSW-61, RSW-62)
- Inputting a noisy sync signal could cause unexpected behaviour such as robot failing to respond to joystick control. Monitoring of the external sync signal has been improved, and robot will switch to an internal sync signal if the external sync signal is not stable. Logging has been improved to better understand the source of problems with sync signals. (RSW-106, RSW-107)
- The colors of the motion LEDs at the base of the pedestal were reversed. This has now been corrected so the amber light indicates the direction in which the pedestal is currently moving, and the blue represents the direction that the pedestal is moving away from (RSW-100, ROG-1810)

    - Artimo failed to respect a section of circular studio limits or a circular studio boundary when the studio map was created with a marker that had a non-zero rotation. This has now been resolved, and circular obstacles can be safely used regardless of marker orientation. (RSW-60)
    - Fixed an issue where the Web UI did not show a reminder to restart the robot when settings had been changed if the user switched to the tally page (RSW-51)

VERSION 7.2b – MAY 2025

WHAT'S NEW

- **Furio Firmware for Artimo XY-50 pedestal**

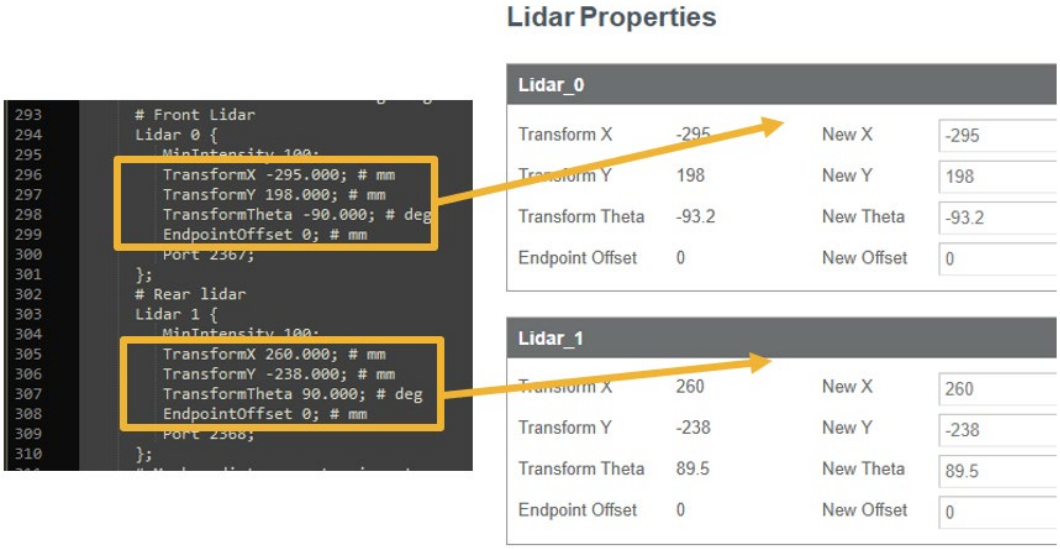
  This release adds support for the Artimo XY-50 free-roaming pedestal. The XY-50 has several key features that distinguish it from the CamBot XY pedestal, including:

  - **Lidar-based localization.** Artimo uses lidar to localise itself within the studio to maintain position accuracy without the need for periodic re-targeting. This removes the need for the permanently mounted floor target that is required by CamBot XY.
  - **Actively controlled casters** eliminate the uncontrolled caster swivel that occurs with passive casters when the pedestal changes direction. When a passive caster swivels, it imparts a small rotation impulse to the payload it supports. Active casters provide better image stability.
  - **Suspension** for dampening of vibrations caused by floor imperfections.
  - **Pan stage at base of lift allows rapid rotation of base.** With the visible base rotation linked to pan, Artimo is best steered using pan relative steering. Note that unlike other Furio robots, Artimo pan limits are relative to the floor.
  - **Tally Lamp and Lamp Brightness Control** – Artimo offers a two-color tally 'lamp', red for on-air, and green for preview. The intensity of both these lamps is configurable through the Furio web interface.
  - **Motion LEDs and Brightness Control** – Artimo dolly is equipped with forward and rearward motion LEDs. Forward movement direction is indicated by an amber color, while the trailing end of the dolly is lit in blue. The intensity of each color is configurable through the Furio web interface.
  - **Unique Default Credentials** – Later this year, Artimo pedestals will ship with unique default credentials (UDC) for the Linux root account. The default factory-programmed password will be printed on the 5130AR-012-xx serial number label. Should a user change this password, booting the robot with DIP switch #3 set to ON will reset the root password to the factory-programmed UDC.

UPGRADE CONSIDERATIONS

- **Manual Transfer of Calibration Values**

  When upgrading from pre-release versions of 7.2 (excluding 7.2.200.02), users must manually transfer lidar calibration values from the Artimo_conf.tmpl template file to the new Factory Settings page.



- **Recalibration Recommended**

  For all upgrades from pre-release versions of 7.2, it is strongly recommended to recalibrate the lidars using the Lidar Calibration Tool, followed by studio remapping. The tool automatically optimizes the Transform Theta values for both Lidar 0 and Lidar 1, resulting in improved preset and move recall accuracy.

LOAD LINEUP

- New in this release:
  - Furio Firmware – Artimo free-roaming pedestal
    - Furio-arm64-7.2.200.04
      - Runs on Artimo free-roaming pedestal only.
    - Artimo OS 1.00
    - Artimo dolly board firmware 0.17
    - Artimo axis configuration:
      - Pan – 5130ER-003-01_142
      - Tilt – 5130ER-004-01_142
      - Left Wheel – 5130ER-007-01_143
      - Right Wheel – 5130ER-006-01_143
      - Lift – 5130ER-005-01_141
- Unchanged from 7.0b:
  - Furio Firmware
    - Furio-phy-7.0.200.04

        - Runs on phyCORE-equipped VR600, VR100, and X-series heads
      - Furio-i686-7.0.200.04
        - Runs on CamBot XY pedestals having Furio OS
        - Upgrading CamBot OS to Furio OS requires a flash card replacement
      - Latest Furio OS is version 20210505-1 for Gen2 bricks, and 20211016-1 for Gen3 bricks.
    - CamBot Firmware
      - 3.4.300.3105 for 520PT and 600PT/600PTL heads
      - 3.7.200.3112 for XY pedestals
    - Joystick Firmware 4.6.100.7375
    - Collision Avoidance Firmware 1.2.70 (Tested on Collision Avoidance Module 5100AR-750-02)

- SmartShell & Servers – tested with SmartShell Release 7.3a:
  - SmartShell 7.3.100.09
  - Robotics Server 7.0.100.8410 & Integrated Server 7.0.100.8410
    - Requires Visual C++ Redistributable Packages for Visual Studio 2017 (32-bit)
    - Requires .NET Framework 4.5.2
  - SmartShell CX Panel Adapter 1.0.0-2025.04.08-14.04
    - for CX-Panel users
  - Bridge Server 7.0.100.8410

BUGS ADDRESSED

Artimo bugs resolved from pre-release versions of 7.2:

- Artimo pedestals were experiencing intermittent disconnections, with varying symptoms such as SmartShell failing to reconnect after a lost connection and complete loss of network ping. The root cause was traced to incorrect RAM timing settings in the Linux kernel, which caused the hardware to operate at unstable margins. The issue was resolved by correcting the RAM timing configuration. Additionally, the investigation led to improvements in the Furio process's memory management, enhancing overall system stability. (ROG-1574)
- During XY axis operation, the wheel amplifiers would occasionally report errors such as tracking errors and overcurrent, which in turn triggered SmartShell disconnection events. The issue was resolved by retuning the wheel amplifiers. (ROG-1746)
- Rapid reversal of direction when controlling the tilt axis with a joystick could result in crossing of the tilt limits and consequently the tilt axis hitting the mechanical end-stops and becoming disabled, requiring a reboot of the pedestal to recover. (ROG-1797)
- XY movement of the pedestal with the joystick could result in up to 5-second delay as the base first rotated into position before forward motion started. This has been resolved by using a J-shaped trajectory where forward motion starts before rotation

of the base is complete. This J-curve can result in a sideways movement of up to 90 mm before Artimo starts to move in the desired direction. (ROG-1575)

- Fixed an issue where lens control would not work from SmartShell after a power cycle or reboot. The issue was observed with a Fujinon HA18x7.6BERD-S6B lens. The timing of the digital lens detection routine was modified to better conform to timing requirements of Fujinon lenses. (ROG-1558)
- After recalling a preset, controlling Artimo pan, lift, or tilt with a joystick further towards a limit would result in crossing the axis limits. Axis limits are now being respected. (ROG-1509, ROG-1361)
- Recalling presets and moves could result in a large position error from the stored position. This has been significantly improved through changes to pedestal calibration, map creation, and continuous fitting to the map. (ROG-1512, ROG-1778)
- It was not possible to turn off the tally light. This feature is now available through the web interface. (ROG-1715)
- The mapping process has been improved to provide better instructions to operators and clearer feedback about progress (ROG-1652, ROG-1704)

CamBot XY bugs fixed for Artimo

- It was not possible to set persistent and temporary pan limits on CamBot XY pedestals. Setting pan limits is supported on Artimo pedestals, where pan limits are set relative to the floor, but is still not possible for CamBot XY pedestals.

Separation of Release Notes for Robotics Firmware and SmartShell

This release marks a split in the SmartShell Release Notes. The development cycle for SmartShell and the Robotics Server has been split from the development cycle for the software running on the robotics platforms, so releases will be reported independently:

- SmartShell release notes will continue to report changes to SmartShell and the software running on the Robotics Server, Integrated Server, Bridge Server and SmartShell CX Panel Adapter applications
- Robotics Firmware release notes will report changes to the software running on all Ross robotics platforms, including Artimo, Furios, CamBots, legacy Furio joystick, and CAN-based Collision Avoidance.

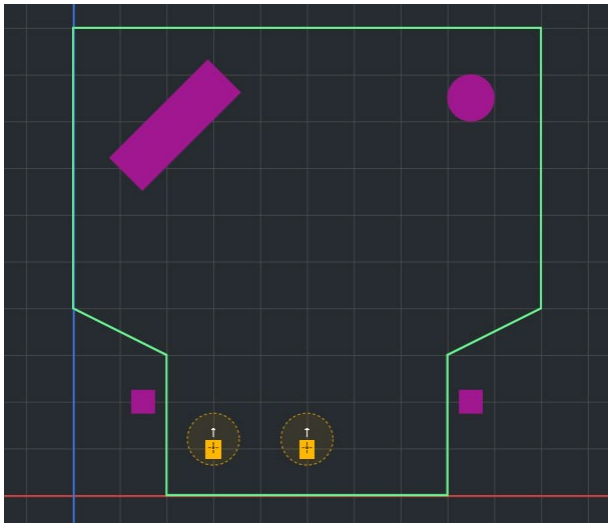
Both sets of release notes will report the full suite of software versions against which they were tested.

VERSION 7.0b – JUNE 2024

WHAT'S NEW

- **Furio Firmware**

  Studio Limits for XY axis – Studio limits define an area of operation for XY pedestals which no part of the pedestal may cross. Fixed obstacles can also be defined. The shape of the area of operation and of the obstacles can be a polygon of arbitrary shape, a rectangle, or a circle.



  Studio limits are created in a separate tool, Studio Creator. A 'studiocfg' file is exported from Studio Creator and loaded onto a robot through the new Studio Tab in the Furio web interface.

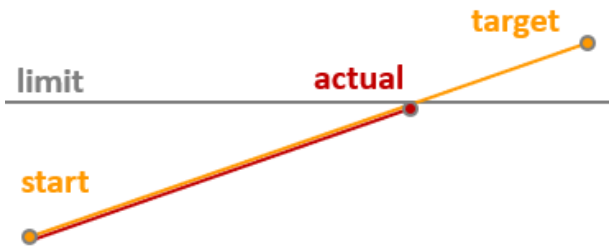
  Various messaging in SmartShell and the Furio web interface warn operators if the pedestal is beyond limits. A pedestal could find itself beyond limits after loading a studio map, or returning from local control, in which case the primary indicator can be seen in SmartShell:

  When beyond limits, the XY axis can only be operated by the joystick and movement is permitted only towards the closest edge of the operating zone, within a range of 90 degrees in either direction.

  - **Barcode Positioning Sensor for Track position** – Support added for a new type of track position sensor that relies on barcode tape affixed to the rail

instead of a wiredraw cable. Presets and moves are maintained when upgrading from the wiredraw sensor type to the new barcode sensor type.

- **Ethernet Collision Avoidance** – Collision Avoidance data is now exchanged over the Ethernet network, rather than CAN bus. This removes the limitations of number of dollies and track length imposed by the CAN-based collision avoidance system.
- **Change to XY limit behaviour** – The following diagram illustrates the pedestal behavior in the case of a preset or move to a target position that is beyond a limit. The XY axis now stops at the first limit encountered. Joystick operation is unchanged; the XY axis also stops at the limit.



Previously, for presets and moves the XY trajectory was altered to follow the limit.

- **SmartShell**
  - **Station Name in title bar** – If configured, the Station Name is displayed in the SmartShell window title bar.

LOAD LINEUP

- SmartShell 7.0.100.8411
- Robotics Server 7.0.100.8410 & Integrated Server 7.0.100.8410
  - Requires Visual C++ Redistributable Packages for Visual Studio 2017 (32-bit)
- Furio Firmware
  - Furio-phy-7.0.200.04
    - Runs on phyCORE-equipped VR600, VR100, and X-series heads
  - Furio-i686-7.0.200.04
    - Runs on CamBot XY pedestals having Furio OS
    - Upgrading CamBot OS to Furio OS requires a flash card replacement
  - Latest Furio OS is version 20210505-1 for Gen2 bricks, and 20211016-1 for Gen3 bricks.
- CamBot Firmware
  - 3.4.300.3105 for 520PT and 600PT/600PTL heads
  - 3.7.200.3112 for XY pedestals
- Bridge Server 7.0.100.8410
- Joystick Firmware 4.6.100.7375
- VISCA Protocol Converter Firmware 3.4.150.2962
- Vinten Legacy Protocol Converter Firmware 1.3.100.2671

- Collision Avoidance Firmware 1.2.70 (Tested on Collision Avoidance Module 5100AR-750-02)

BUGS ADDRESSED

FURIO FIRMWARE – XY PEDESTALS

- Difficulties could occur when trying to exit local control mode while the ped was in motion. Switching out of local control mode would result in the ped continuing to move, but no longer responding to control from either the local control joystick or the SmartShell joystick. Corrected a logic error such that any input from the local control box is canceled when switching to remote mode. (ROB-5289)
- When entering local control mode, the operator had to wait two seconds for the local stick to calibrate. Touching the stick during the calibration period would result in the pedestal moving when the local control stick was released to its rest position. To reduce the window of opportunity of this problem, calibration only occurs the first time Furio reads data from the local control box, either on first switch from remote to local mode, or on boot if the local control box is set to local mode.. The previous behaviour can be restored by configuring parameter CalibrationOnce to false in Furio template under LocalControlOptions:

  CalibrationOnce { Value FALSE; };

  (ROB-2661)
- In a looped move, pan would rotate to bizarre angle during start of second loop (third sequence). Corrected a logic error and the move loops correctly once more. (ROB-5752)
- Pedestal stopped short of the X or Y limit, by as much as 50 cm. This occurred under joystick control, typically when approaching the limit at high speeds. The new Studio Limits implementation has fixed this issue. (ROB-3915)
- XY limits could be exceeded while operating in tank mode. The new Studio Limits implementation has fixed this issue. (ROB-4018)

FURIO FIRMWARE

- Joystick control parameters on Track, Pan, and Tilt have been adjusted to offer smoother starts and stops. (ROB-5120)
- Re-enabling the track axis after a track safety error required five or more attempts, or a reboot, before the axis would stay enabled. Corrected an initialization error in the track Safety feature and now the track axis enables on first try. (ROB-4180)
- Accessing the web interface with a motor missing or missing a Collision Avoidance node would crash the Furio application. Corrected a logic error and the web interface correctly reports the inoperative motor. (ROB-5509)

SMARTSHELL

- Unable to control Furio from joystick panel of SmartShell 2 after SmartShell 1 had disconnected. SmartShell 2, connecting after SmartShell 1 had disconnected from the Furio, would receive the same session ID from Furio. Joystick control from the joystick panel would not work for SmartShell 2 if the timestamp of the second joystick panel was older than the timestamp of the first joystick panel, causing Furio to reject joystick input for that recycled session ID as out of sequence. Corrected the issue by ensuring session IDs are no longer recycled but assigned sequentially starting from one.

  However, this discovery highlighted a session ID handling flaw in all SmartShell versions prior to version 7.0a. The flaw has been corrected but relies on Furios to have unique serial numbers.
  Upgrade consideration: To avoid problems such as ghost events, ghost presets, or the reappearance of this loss of joystick bug, ensure all Furio devices have unique serial numbers as seen in the Furio web interface main page. (ROB-5960) (ROB-4251)
- When Confirm Control Takeover option was disabled, the confirmation popup still appeared. Corrected logic error and now the option behaves as expected. (ROB-5961)
- Camera selection buttons would alternate between camera name and an amber WARNING label whenever a warning-level notification was logged. Notifications are still logged, but the cameras selection buttons only flash on ERROR now. (ROB-5546)

CAMBOT FIRMWARE

- When entering local control mode, the operator had to wait two seconds for the local stick to calibrate. Touching the stick during the calibration period would result in the pedestal moving when the local control stick was released to its rest position. To reduce the window of opportunity of this problem, calibration only occurs the first time CamBot reads data from the local control box, either on first switch from remote to local mode, or on boot if the local control box is set to local mode. The previous behaviour can be restored by setting config.dat parameter:

  CalibrateOnceForLocalCtrl 0

  (ROB-2661)

KNOWN ISSUES

This section outlines known issues in the latest release. Issues related to SmartShell and the Robotics Server are no longer reported in these release notes – see SmartShell Release Notes.

FURIO FIRMWARE – ARTIMO

- (New) Artimo will gradually lose time so that the timestamps in its logs do not align with the time at which events occurred. (RSW-588)
- (New) There is an inconsistency in the ability to set pan limits in Artimo. They are read-only in the web UI and SmartShell, but can be set from the touchscreen. This can result in confusion when limits are inadvertently set through the touchscreen and can't be cleared. If this happens, use the touchscreen to clear the pan limits. (RSW-506)
- (New) When the pan axis on Artimo is disabled, or has a motor error, Artimo is no longer able to measure pan position. This means that localization will no longer be able to correct for drift in the position of the robot, and lidar collision avoidance will no longer be able to determine whether obstacles detected close to the robot are in its path, which may result in failure to stop at an obstacle, or stopping due to an obstacle that is not in its path. (RSW-599)
- Creating a move with keyframes early in the move which are close together in time can result in a 180 degree rotation of the base when the move is run. (RSW-184)
- Changing the damping level via the slider in SmartShell for the pan, tilt and zoom axes has limited impact on motion. (RSW-38)
- A noticeable image shake can occur at the end of lift homing. (ROG-1353)
- If ESTOP is activated during a preset or move that includes XY motion, upon release of the ESTOP button the XY axis will move forward by up to 30cm. To avoid this movement, turn power off before releasing the ESTOP. (RSW-84)
- Stopping mapping may occasionally fail, leaving the robot in one of several possible inconsistent states, for example where the web interface continuously redirects to "Device is in Mapping Mode" while simultaneously reporting that the robot is not in mapping mode. Workaround: First navigate to the "Status & Logging" page of the Furio web interface, then back to the Localization page. If this doesn't resolve the issue, then to preserve the mapping effort, create a backup, power cycle the robot, and reload the localization map from the backup via the Localization page. (ROG-1729)

- The tracking data output from the Artimo XY-50 does not encode column sway or suspension effects, which may contribute up to +/-1 degree of lean of the column, resulting in up to 35m error in the reported XY position of the virtual camera and up to +/-1 degree of error in the reported Tilt and Roll angles of the camera. (ROG-1568)
- Analog lenses are not yet supported for the Artimo XY-50. (ROG-1350)
- Time Dilation has no effect when used with an Artimo pedestal. (ROB-4059)
- See the CamBot XY Pedestals section below for other issues that may affect Artimo XY-50 pedestals.

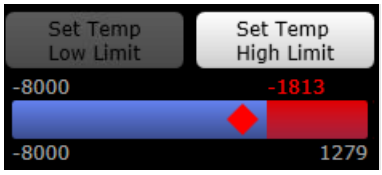
FURIO FIRMWARE – CAMBOT XY PEDESTALS

- (New) Zoom and focus—both real and virtual—may momentarily stutter during preset or move recalls. The root cause is still under investigation. Current analysis shows a correlation between multicast traffic observed by ARM-based heads (VR600, VR100, X300, X350) and stuttered virtual zoom/focus output; however, customer testing indicates that placing heads on a private VLAN does not eliminate the behavior. Currently, the issue appears to affect only Canon lenses. (RSW-520)
- (New) Using OverDrive to run a move on a Furio dolly where the first keyframe is not at time 0 and the cue fails to reach the desired position on the track due to the presence of another dolly will cause the dolly to overrun its final position by an amount equal to the offset from the start position. A similar problem will happen if the move is cued in the SmartShell keyframe view to a keyframe other than the first keyframe in the move. (RSW-565)
- When a move is invalid because the allotted time is insufficient for the XY axis to reach a keyframe, clicking on VERIFY and then ADJUST produces the error message "unknown error between keyframes <A> and <B>". As a workaround, manually increase the time between offending keyframes until the move validates successfully. (ROB-6111)
- Rotation of the pedestal XY base may cause a change in pan. A pedestal rotation of equal magnitude in the opposite direction erases the change in pan. (ROB-5316)
- Pedestal alignment commanded by Forward/Back or Left/Right buttons fails with the notification "The XY axis failed to reach its target position" when the resulting pedestal rotation would place the pan axis within less than 20 degrees of the absolute pan limits. As a workaround, prior to commanding a pedestal alignment, position the pan such that it will be more than 20 degrees away from the absolute pan limit after the alignment. (ROB-5746)

- Pedestal cues in the wrong direction, causing XY moves to fail at run time with the move validation error message that the pedestal turn limit would be exceeded. The issue appears to be that the pedestal chooses to cue in the shortest direction at the expense of selecting the one direction (forward vs reverse) that would allow the move run to succeed. (ROB-5750)
- Time Dilation has no effect when used with an XY pedestal. (ROB-4059)
- When manually moving the pedestal in tank mode, it is common practice to push both joysticks fully in opposite directions to rotate the pedestal in place. The direction of rotation is opposite of what you might expect based on the normal action of the joysticks. As you begin to release one or both joysticks, the rotation will slow and the direction of rotation will reverse. You can release both joysticks to stop the motion, and then drive the pedestal as required. (ROB-2520)

FURIO FIRMWARE

- When recalling a preset or move on a Furio head, the system must first stop movement of all axes to calculate the trajectory. In cases where the head is under active joystick control directly or through an automated system such as Vision[Ai]ry Ft, the head may fail to stop in the required time and the shot recall will fail with a MOVETIMEDOUT error. In addition, the wait time of up to 4s for the head to become stationary may cause controllers connected to the head to declare a timeout and disconnect from the head. This behavior, which also impacts CamBot heads, is intentional, but can have detrimental effects on other systems such as Vision[Ai]ry Ft. It will be reviewed in future releases. (ROB-4804)
- Disabling the track axis while the Furio dolly is in motion results in a hard stop of the dolly, which could result in it becoming unstable and tipping over. it is generally recommended to not expose the controls to disable axes within the SmartShell UI**. If they are enabled, operators should be warned to never disable the track axis while the dolly is in motion**. (ROB-4858)
- LimitBar does not display collision avoidance limits correctly when a temporary limit is set in the same direction. The temporary limit is displayed by the limit bar even though the collision avoidance limit is closer to the dolly. The actual motion limiting behaves correctly. Example:



The dolly is at -2000mm, and the other dolly is at -213mm, with a 1600mm clearance.
The left figure shows the expected behavior for a temporary high limit set at 169mm. The right figure shows the actual behavior. (ROB-3694)

- Move Cue on any keyframe cues to first keyframe. In firmware versions prior to 5.0, a move could be cued to any keyframe using the CUE button located immediately below the keyframe list. (ROB-2056)
- VR600 Pan/Tilt axes may vibrate when slaved into limits. (ROB-2195)
- Driving the lift into upper or lower limit switches at high speeds via joystick slaving may cause the lift to bounce and oscillate until it is moved away from the limit switch. Setting persistent lift limits avoids the issue. (ROB-1958)
- Tracking destinations can be flagged as Multicast destinations, which allows the default Multicast TTL value of 1 to be overridden. Customer reports suggest enabling this feature impacts motion control performance. (ROB-2437)
- After disabling and reenabling an axis, the temporary limits of that axis appear to be reset to the persistent limits, but actual motion remains limited to the temporary limits. This problem is observed on Zoom, Focus, VR100 Pan, and VR100 tilt axes. To workaround the problem, drive the affected axis to the highest position and toggle the high temporary limit twice; once to clear it, and once to set it anew. Repeat for the low limit. (ROB-2163)
- When upgrading from 4.x firmware, a slight increase to preset and move minimum run times is occasionally required. For example, to validate a move, the move duration had to be increased from 10.0s to 10.2s. (ROB-1961)
- Lift periodically drops several millimeters after being driven into upper or lower limit switches. Setting persistent lift limits works around the problem. (ROB-2156)
- Pulling on the track/lift wiredraws such that the axis crosses a limit switch can result in the axis rejecting subsequent preset/move recall commands. To resolve the problem when it occurs, reboot the robot. (ROB-2095)
- Last Recalled Preset – Applying time dilation to a move or preset recall prevents the preset/move button from displaying a blue outline once the motion completes. (ROB-2077)
- A tracking destination IP address located in unreachable network causes motion stutter. This error appears in the logs as "<Error> Net Exception: Network is unreachable." The workaround is to disable or remove the unreachable IP address from the Furio's Tracking page. Note that unreachable tracking destinations on the same network do not cause motion stutter. (ROB-1856)
- Using time dilation to shorten recall duration can cause loss of axis synchronization if one or more axes reach their velocity limits and further time contraction is applied. Because time dilation can speed up a move by only a factor of 2, this problem can only affect recalls that are executed with a duration that is less than twice the minimum recall duration. (ROB-2365)

CAMBOT FIRMWARE

- When recalling a preset or move on a CamBot head, the system must first stop movement of all axes to calculate the trajectory. In cases where the head is under active joystick control directly or through an automated system such as Vision[Ai]ry Ft, the head may fail to stop in the required time and the shot recall will fail with a BUSY error. This behavior, which also impacts Furio heads, is intentional, but can have detrimental effects on other systems such as Vision[Ai]ry Ft. It will be reviewed in future releases. (ROB-4804)
- Using time dilation to make rapid increases or decreases in run time during a recall of a preset on a CamBot can trigger a servo error and cause the head to stop responding. If this happens, a reboot of the CamBot is required to recover control. (ROB-2269)
- If an XY pedestal is driven under joystick control into an XY limit and comes to a stop past the XY limit, in this state it is possible for an Align Pedestal Wheels operation to cause linear movement of the dolly prior to the expected rotational movement. The resulting linear movement can move the XY pedestal several inches further past the limit. (ROB-1874)

GETTING HELP

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel.

During business hours (Eastern time), technical support personnel are available by telephone any time. Emergency after hours calls are answered by an answering service (live person) who will patch your call to the on-call support specialist. In the event that the on-call person is assisting another customer, the answering service will contact the back-up support specialist.

Our team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

Toll-free Technical Support 24/7: 1-844-652-0645 (North America), or +800 1005 0100 (International)

Technical Support: (+1) 613-652-4886

E-mail for Technical Support: techsupport@rossvideo.com

ROSS VIDEO | HELP CENTER: https://support.rossvideo.com/hc/en-us

E-mail for General Information: solutions@rossvideo.com

Ross Video Website: http://www.rossvideo.com