

Troubleshooting: Steering Ring Calibration

Introduction

If performing an Operator Control Unit (OCU) Steering Ring calibration, with the vehicle wheels pointing forward and steering wheel centered, and it does not return the Steering Wheel to a centered position, then the following procedure should be performed.

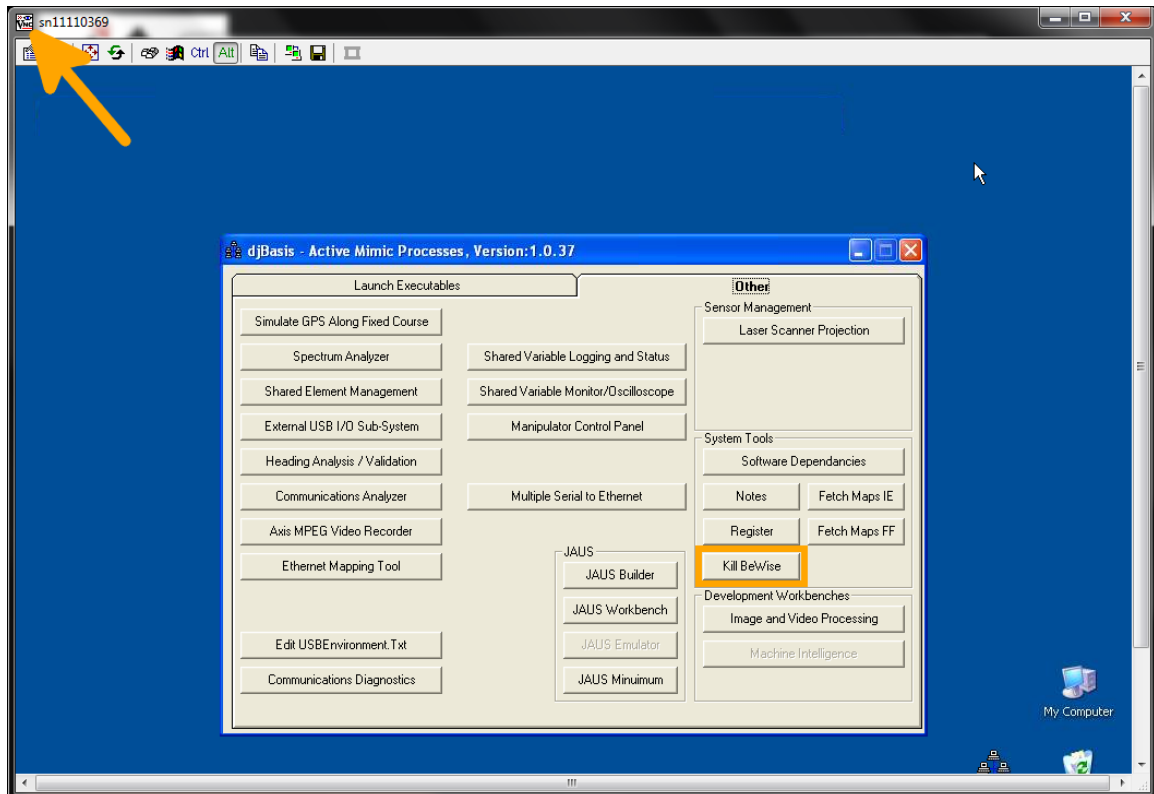
Procedure

1. Ensure the OCU is connected to the Pronto4. This can be done with one of the following methods:
 - a. With Mobius – ensure the OCU is connected to the “Breadcrumb” wireless network.
 - b. With Shepherd:
 - i. Connect a standard Ethernet cable to the radio and OCU.
 - ii. Ensure the OCU’s Local Area Network (LAN) Internet Protocol (IP) address is set to the vehicle’s network and subnet IPs, but with a different final octet for the IP.
Standard Kairos’ systems ship with an IP and subnet scheme of 192.168.200.xxx:255.255.255.0 or 192.168.200.xxx:255.255.0.0, where the final octet is the vehicle number.
For example, if connecting to vehicle 101, the vehicle IP and subnet would be either: 192.168.200.101:255.255.255.0 or 192.168.200.101:255.255.0.0. The OCU’s LAN IP would then need to be set to the same values, with the final octet being any number between 1-255 *other than 101*.
If the system being worked on has a different IP and subnet scheme, use that IP and subnet scheme, ensuring the final octet of the IP is different than the vehicle’s IP.
2. VNC into the Pronto4, as follows:
 - a. In Shepherd:
 - i. Login to the Pronto4.
 - ii. Click the “VNC” button.
 - b. In Mobius:
 - c. Double-click the desktop icon or click the Windows Start Button. Select “All Programs” • “TightVNC” • “TightVNC Viewer”.
 - d. Enter the IP Address of the Pronto4 unit, which is 192.168.200.1xx, where xx is the test vehicle's serial number in the TightVNC Server field and click “Connect”.
 - e. Type “pronto4” in as the Password and click “OK”. This will bring up the desktop of the remote Pronto4 system.

NOTE

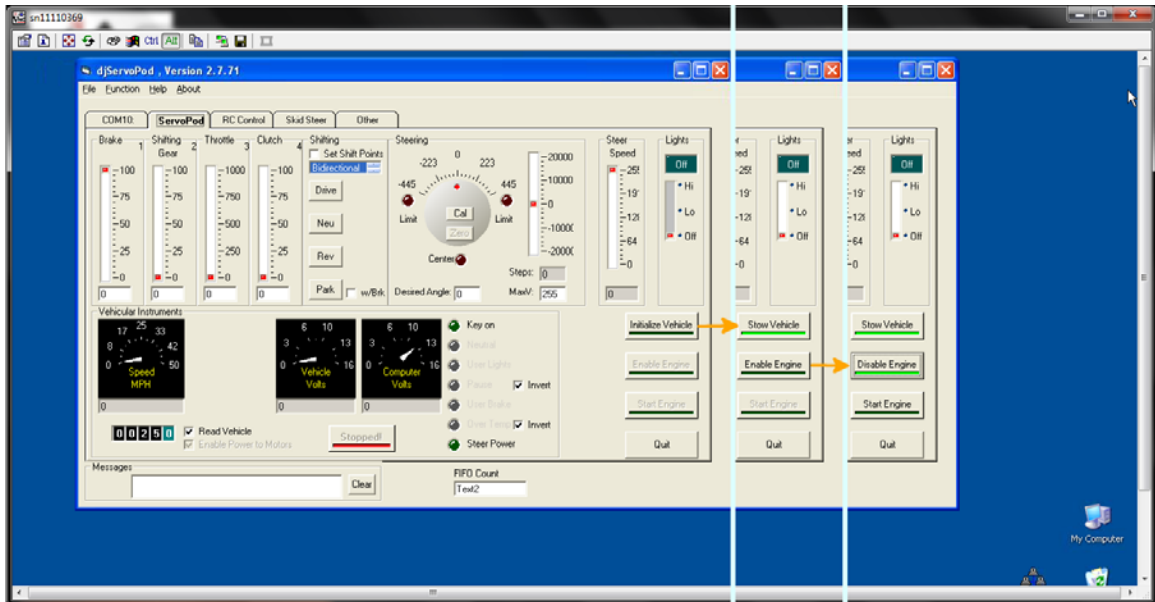
All subsequent steps are performed on the Pronto4 system displayed in the TightVNC window.

3. In djBasis, on the “Other” tab, click the “KillBeWise” button.



4. In Windows, click the “Start” button then select “My Computer”.
5. In “My Computer”, navigate to and double-click C:\GC07\dj_svp.exe. This will open djServoPod.

6. In djServoPod, on the ServoPod tab, click the Initialize Vehicle button. Once the vehicle is initialized, the button text will change to “Stow Vehicle”.
7. Still in djServoPod, on the ServoPod tab, click the Enable Engine button. Once the engine is enabled, the button text will change to “Disable Engine”. By enabling the engine through ServoPod the vehicle engine will not automatically turn off when switching between MAN/AUTO modes.



8. In Windows' File Explorer, navigate to and double-click C:\GC07\djSVMManagement.exe. This will open DJ Shared Element Management. Once DJ Shared Element Management window is open, the File Explorer window may be closed.

QuickTime™ and a decompressor are needed to see this picture.

9. In the DJ Shared Element Management window, note the location and value of the “enc2” field.

Image placeholder

10. Ensure the VIM's AUTO/MAN switch is in the “MAN” position.

NOTE

Unless otherwise indicated, the “Center” and “Limit” indicators may or may not be illuminated.

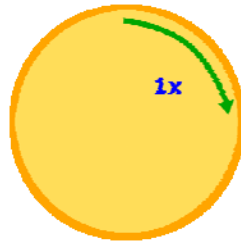
11. Restore djServoPod. On the ServoPod tab, in the Steering area's dial, click the Cal button. This sets the current Steering Ring position as the calibrated center position in the relevant software.

QuickTime™ and a decompressor are needed to see this picture.

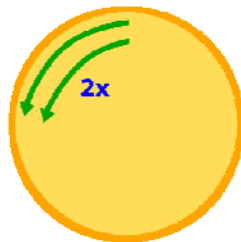
12. Restore the DJ Shared Element Management window. The “enc2” value should be 0.

Image placeholder

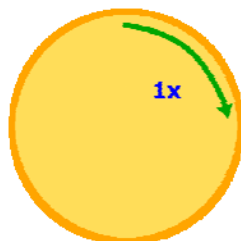
13. Rotate the Steering Ring clockwise one full revolution. Once the revolution is complete, verify the enc2 value is between -5700 and -5800.



14. Rotate the Steering Ring counter-clockwise two full revolutions (the first revolution returns the ring to center, the second revolution turns the wheel one rotation counter-clockwise). Once the revolutions are complete, verify the enc2 value is between 5700 and 5800.



15. Rotate the Steering Ring clockwise one full revolution (i.e. return to center). Once the revolution is complete, verify the enc2 value is 0 ± 10 .



16. Close the DJ Shared Element Management window.
17. If the values identified in steps 12 - 15 were NOT correct, contact Kairos for additional technical support.
18. If the values identified were correct, then continue this procedure.

19. Once the Steering Ring encoder has been validated, the Geneva gear calibration should be validated. When the Steering Ring is properly calibrated and centered, there is a Steering Ring bearing that prevents manual rotation of the Geneva gear. Therefore, to proceed the steering wheel must be rotated at least enough to manually rotate the Geneva gear.

- a. For vehicles with the Steering Post connected to the center floorboard, rotate the steering wheel approximately 165° clockwise.

Quick Time™ and a
Screenshot™
are needed to see this picture.

- b. For vehicles with the Steering Post connected to the driver-side A-pillar, rotate the steering wheel approximately 30° clockwise.

Quick Time™ and a
Screenshot™
are needed to see this picture.

20. Manually rotate or flip the Geneva gear once in each direction.

21. Turn the steering wheel so that tires are pointing forward and the steering wheel is centered.

22. In djServoPod, on the ServoPod tab, in the Steering area, locate the left “Limit”, right “Limit”, and “Center” indicators (see step 11’s screenshot). The right and left “Limit” indicators represent system steering limits. The “Center” indicator represents whether the Steering Ring is clockwise (illuminated) or counter-clockwise (not illuminated) of center.

- a. If both limit indicators are illuminated, there is a chance that the gear has traveled too far past one of the limits. Rotate the Geneva gear up to 5 times in one direction or until one of the limit indicators turns off. If neither indicator goes off after 5 rotations, rotate it up to 10 times in the other direction (i.e. back to center then 5 rotations the other direction) or until one of the limit indicators turns off. If both indicators are still illuminated contact Kairos for additional technical support.

- b. If only one “Limit” indicator is illuminated or neither indicator is illuminated , then continue this procedure.
 - c. If only the left limit indicator is illuminated then rotate the Geneva gear clockwise just until the “Center” indicator turns off.
 - d. If only the right limit indicator is illuminated then rotate the Geneva gear counter-clockwise just until the “Center” indicator turns on.
23. Manually rock the steering wheel between 11 o'clock and 1 o'clock. Verify the “Center” indicator turns on and off as the steering wheel crosses the center point. Leave the steering wheel slightly counter-clockwise from center (i.e., stop turning immediately after the “Center” indicator illuminates.
24. While clear of the controls, the safety operator switches the VIM AUTO/MAN switch to the “AUTO” position.

WARNING

When running ServoPod's Calibrate Steering function, the safety operator shall keep hands away from the steering wheel. Failure to do so can cause injury to the operator's hands and arms.

25. In djServoPod, on the ServoPod tab, in the Steering area, click the “Cal” button. If the steering wheel oscillates more than a few degrees in either direction then calibrate the Geneva gear, *as follows*:
- a. Switch the VIM Auto/Man to Man.
 - b. Turn the Geneva gear once clockwise.
 - c. Switch the VIM to Auto and repeat “Cal”.
 - d. If the steering wheel still rotates more than a few degrees, switch the VIM to Man and continue to step 25.e; otherwise, if the steering wheel oscillates only a few degrees skip to step 26.
 - e. Turn the Geneva gear twice counter-clockwise (i.e., first to center then once counter-clockwise).
 - f. Switch the VIM to Auto and repeat “Cal”.
 - g. If the steering wheel still oscillates more than a few degrees, contact Kairos for additional technical support; otherwise, if the steering wheel oscillates only a few degrees continue to step 26.
26. Ensure the VIM Auto/Man switch is held past the Man position for at least 3 seconds, to ensure all servos are fully return to manual control.
27. After successfully calibrating the steering ring, restore djBasis. On the “Other” tab, click the “Kill BeWise” button.
28. Once all the dj programs have been closed, double-click the “Basis” icon (i.e. restart djBasis on the Pronto4) and close the TightVNC window.
29. If the Steering Ring continues to have calibration related issues, contact Kairos for additional technical support.

Contact Information

Kairos Autonomi
498 West 8360 South
Sandy, Utah 84070 USA

801-255-2950 (office)
801-907-7870 (fax)
www.kairosautonomi.com