

Y-01: Troubleshoot Velocity Loop

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Electrical hazard, moving equipment hazard, or rotating machines hazard exists if troubleshooting requires you to open electrical cabinets with the power still energized.

EQUIPMENT

- basic Electrician hand tools
- CNC machine control
- DVM
- tachometer

RESOURCES

- drive setup manual
- motor nameplate data
- feedback data
- electrical print



Troubleshoot Velocity Loop

1. Communicate with the Operator to find out what has happened and what symptoms the machine displays.

- Ask the Operator if the problem is familiar.
- Check the part for machining marks. A rough finish on the part indicates an incorrect rpm.

2. Check the fault messages on the control panel to help identify the problem.

- Note any listed errors.

Checking Control Panel
for Error Messages



- If the fault occurred in the recent history check documentation to find out what was done to correct the problem.

3. If possible, operate the machine while observing the status screen and verify the velocity loop error.

4. Troubleshoot the motor.

- Follow the Electrician procedure to Troubleshoot Motor.



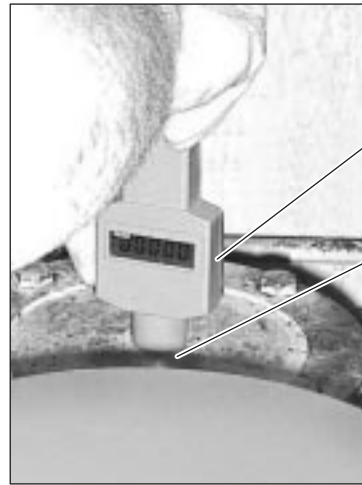
Example of a Motor
Requiring Troubleshooting

- Check the brushes.
- Check the wiring.
- Check resistance between the leads and between the leads to ground.
- Perform any indicated corrective actions.
- Test the machine operation to verify the velocity loop is operating normally.
- Proceed to the next step if the velocity loop still indicates an error.

5. Troubleshoot the feedback device (tachometer or encoder).

- Follow the Electrician procedure U-01e: Troubleshoot Feedback Device (Tachometer).

- Verify the expected speed with a hand held tachometer.



Hand Held Tachometer

Motor Spindle Access

- Verify tachometer output voltage.
- Perform any indicated corrective actions.
- Test the machine operation to verify the velocity loop is operating normally.
- Proceed to the next step if the velocity loop still indicates an error.

Note: Spindle speed and motor RPM are usually not the same.

6. Troubleshoot the drive.

- Follow the procedure T-01: Troubleshoot Drive (a, b, or c).

Example of Drive



- Verify output voltage waveform at the drive with an oscilloscope.
- Perform any indicated corrective actions.
- Test the machine operation to verify the velocity loop is operating normally.
- Proceed to the next step if the velocity loop still indicates an error.

7. Troubleshoot the CNC.

- Replace the CNC feedback board or the Axis control board.



Example of CNC
Feedback Board

- Perform any indicated corrective actions.
- 8. Test the machine operation to verify the velocity loop is operating normally.**
- 9. Perform any step indicated until the velocity loop operates normally.**