U-04b2: Set Up / Adjust Feedback Device (Resolver Feeding Microswinc)

SAFETY FIRST

- ☐ Follow all Caterpillar facility safety standards when performing this task.
- ☐ Failure to phase the resolver could result in "runaway," causing damage to the machine or injuring personnel.
- ☐ Rotating machines hazard and electrical hazard exist any time a machine is worked on when power is not locked out and tagged.

EQUIPMENT

- ☐ Oscilloscope
- ☐ trimpot screwdriver
- ☐ DVM (Beckman DVM or equivalent)
- ☐ extension boards

RESOURCES

- ☐ machine setup manual
- ☐ resolver manufacturer's manual

Note: The data in this task is specific to the Microswinc CNC Control. Setup procedures for resolvers may vary on other machines, and data values are different. This is an amplitude nulling system that sends reference and receives Sine and Cosine.

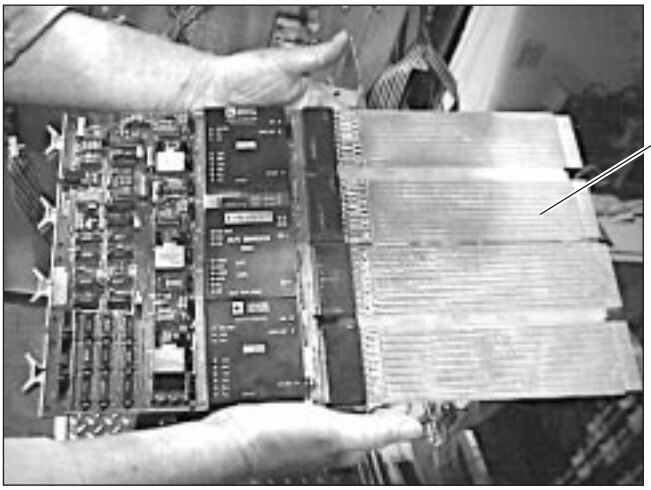
Set Up / Adjust Feedback Device (Resolver Feeding Microswinc)

1. Turn off the control power inside the electrical cabinet.

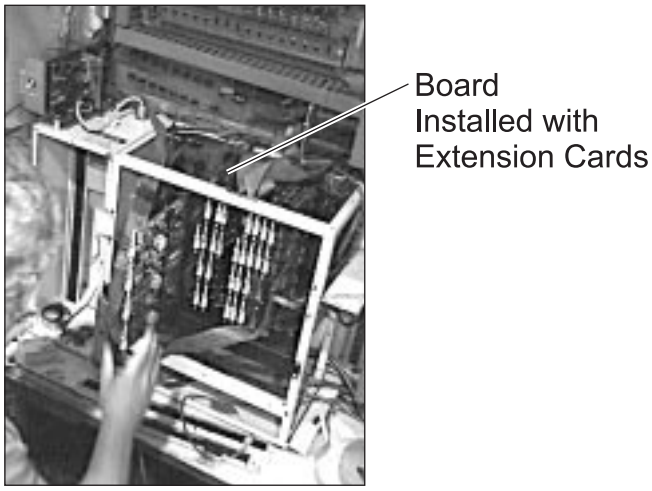
2. If replacing the board, compare the board settings on the new board with the settings on the replaced board.

- ☐ Set jumpers JA, JB, and JC to setting 3 on the board.

3. Attach extension cards to the board.



☐ Install the board, with extensions attached, into the slot.



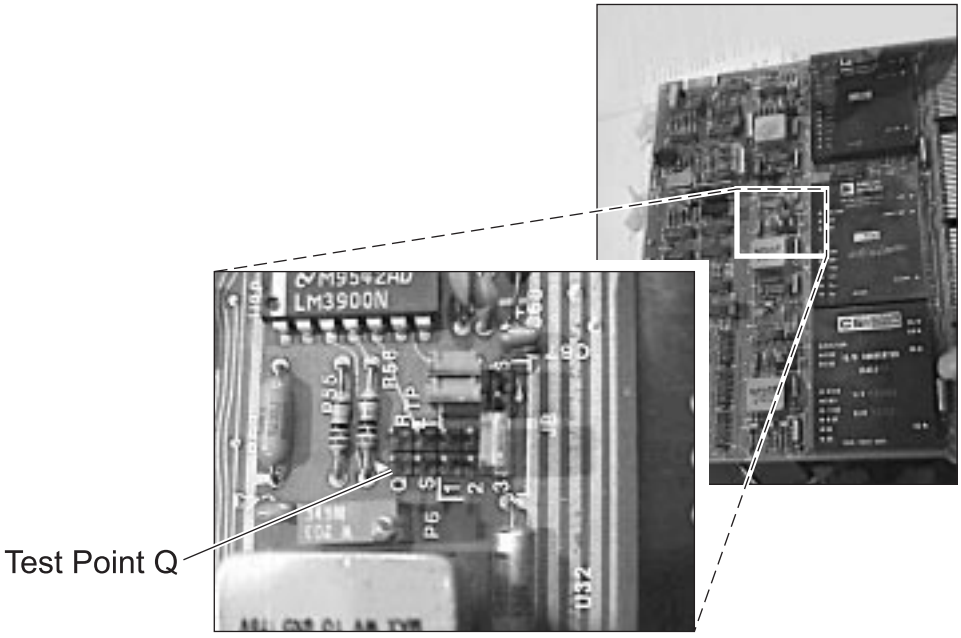
4. Turn on the power and allow the machine to warm up for at least five minutes.

Warning: Be aware that runaway can occur. Be prepared to E-Stop the machine.

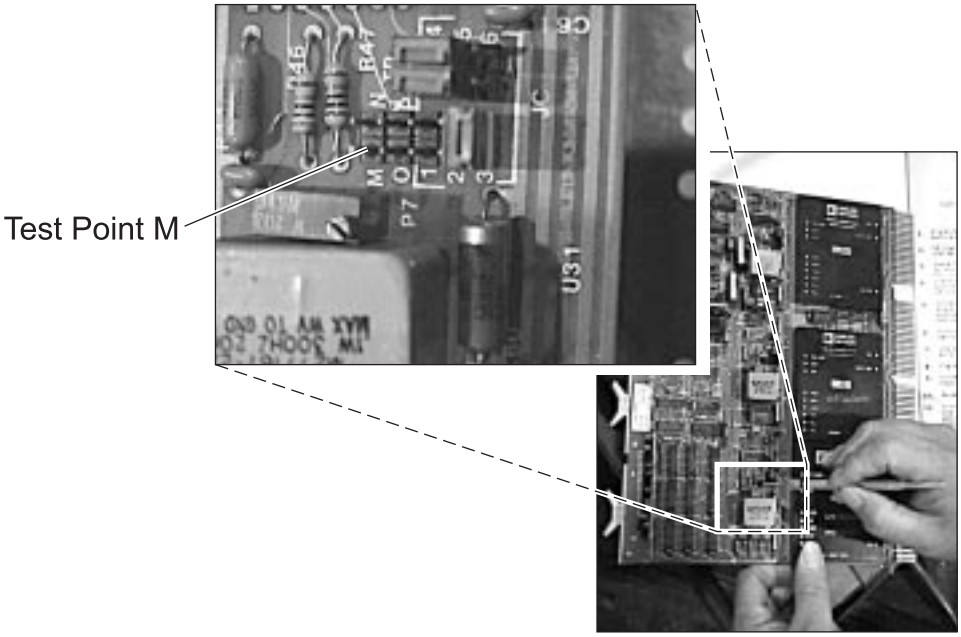
5. Measure AC voltage at test points Q and M.

Caution: Use a DVM capable of maintaining accuracy with a 5Khz signal.

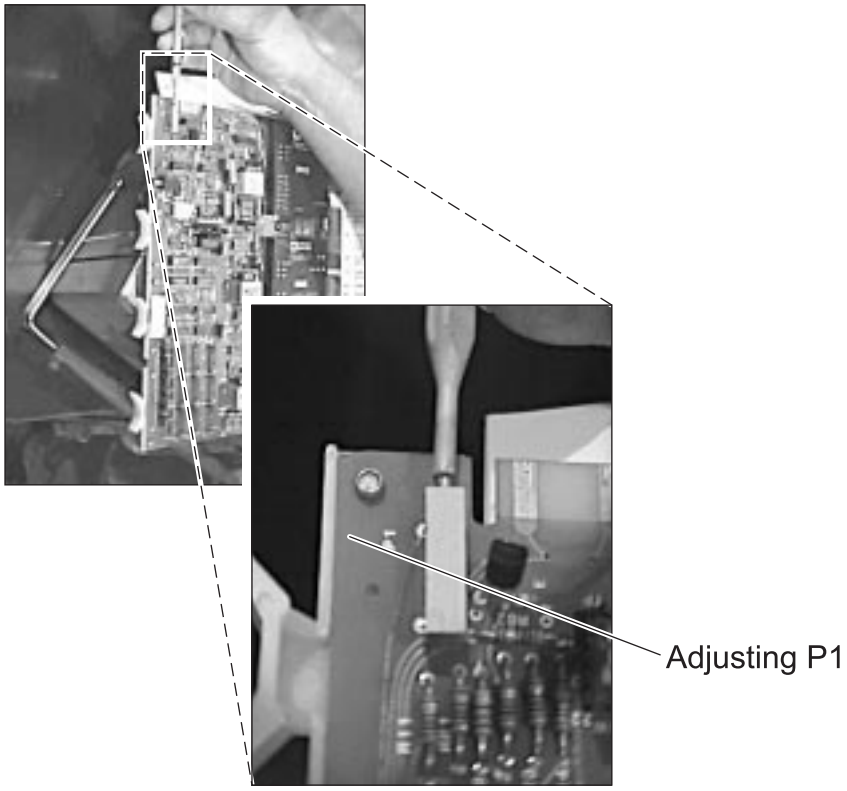
☐ Read voltage between test point Q and ground expecting 3.0 volts (V) root mean squared (RMS).



☐ Read voltage between test point M and ground expecting 3.0V RMS.

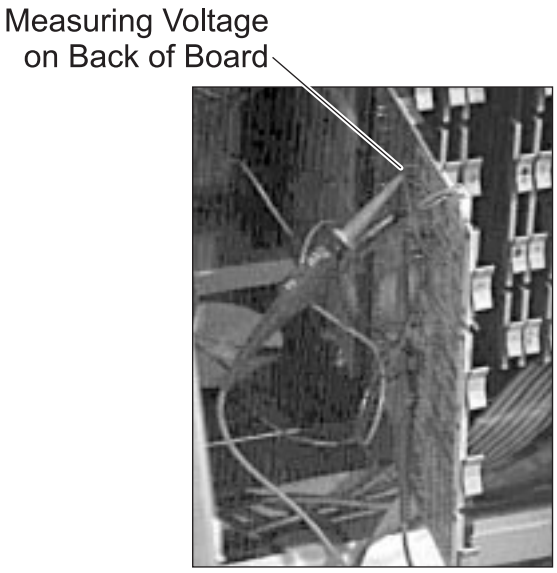


- ☐ Adjust P1 until voltage readings are 3.0V RMS.

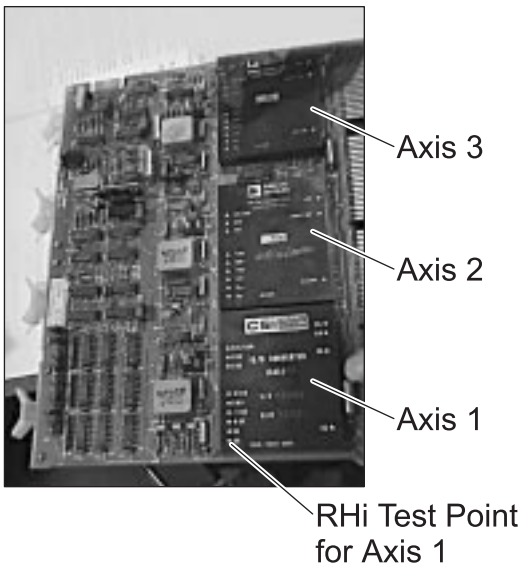


- ☐ Expect to see readings on test point M slightly larger (normally 0.1V) than test point Q.

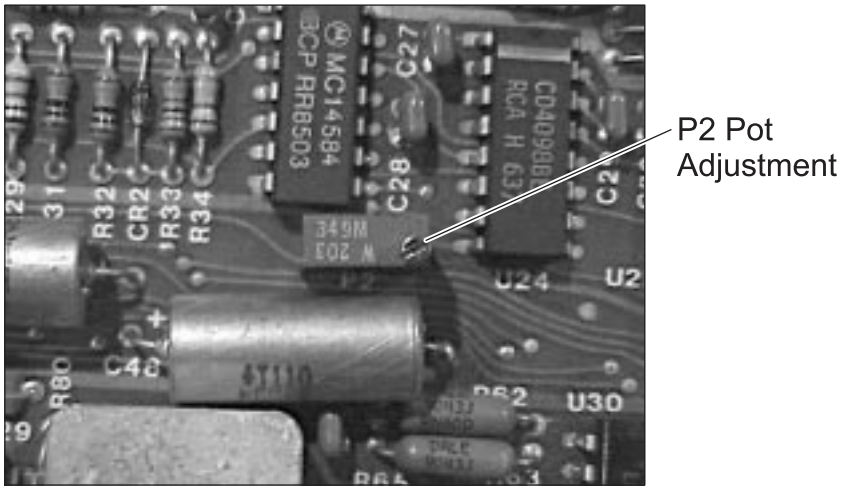
Note: All voltage checks are made from the back of the board from this point forward.



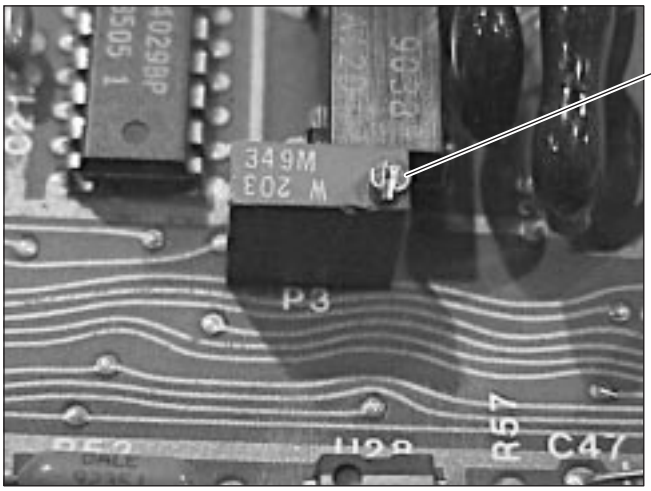
6. Measure and adjust voltage between RHi and ground for each axis.



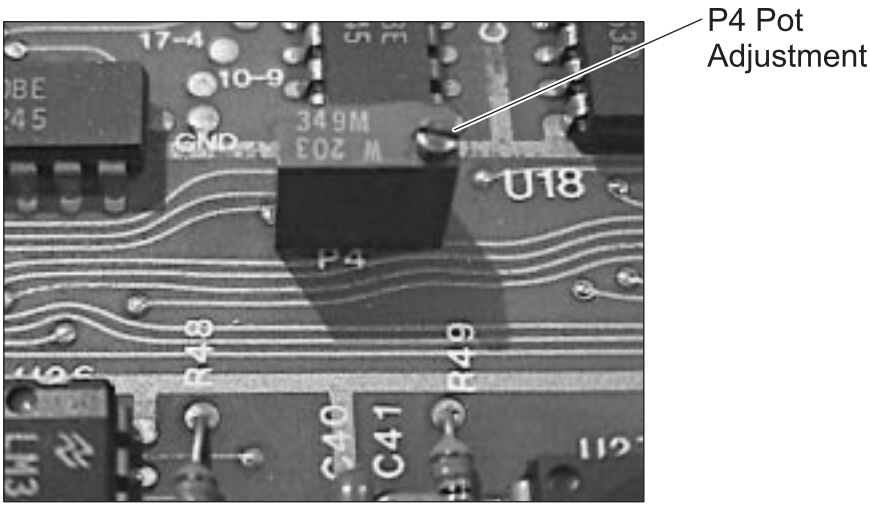
☐ Adjust P2 for Axis 1 until voltage reads 2.5V RMS + \- 1%.



- ☐ Adjust P3 for Axis 2 until voltage reads 2.5V RMS +\- 1%.



- ☐ Adjust P4 for Axis 3 until voltage reads 2.5V RMS +\- 1%.



7. Set up the scope and DVM to measure maximum amplitude for each axis.

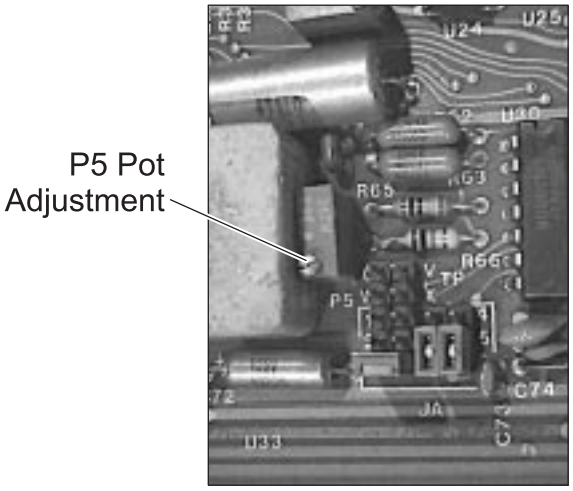
- ☐ Connect the DVM and Scope to the power supply ground.
- ☐ Connect Channel One of the scope to RHi of the current Axis.
- ☐ Connect Channel Two of the scope to COS of the current Axis.
- ☐ Connect the DVM to COS of the current Axis.

8. Set up the machine to find maximum amplitude.

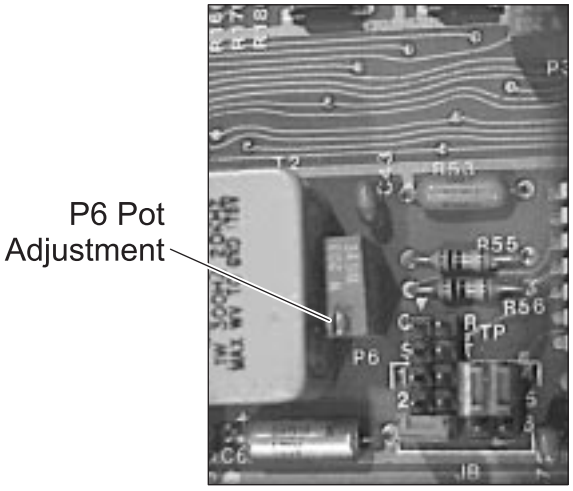
- ☐ Turn on the Axis.
- ☐ Turn the feed rate switch to the lowest setting.
- ☐ Turn the axis jog rate to the slowest setting.
- ☐ Move the axis while watching the scope and DVM.
- ☐ Move the axis until the maximum amplitude is found.

9. Check and adjust maximum amplitude on each axis.

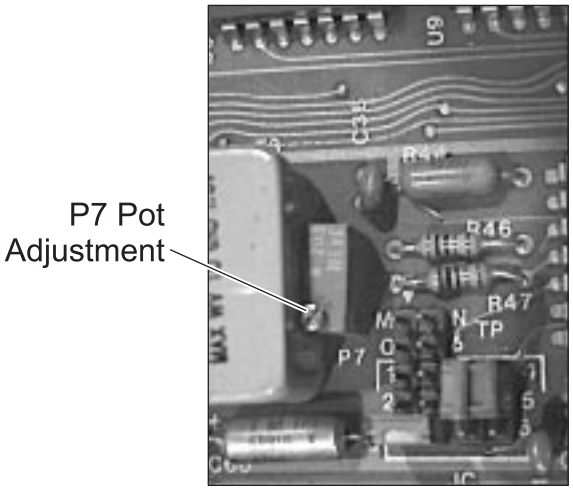
- ☐ Adjust P5 until a maximum amplitude of 2.5V RMS +\-1% is observed on Axis 1.



- ☐ Adjust P6 until a maximum amplitude of 2.5V RMS +\-1% is observed on Axis 2.



- ☐ Adjust P7 until a maximum amplitude of 2.5V RMS +\-1% is observed on Axis 3.



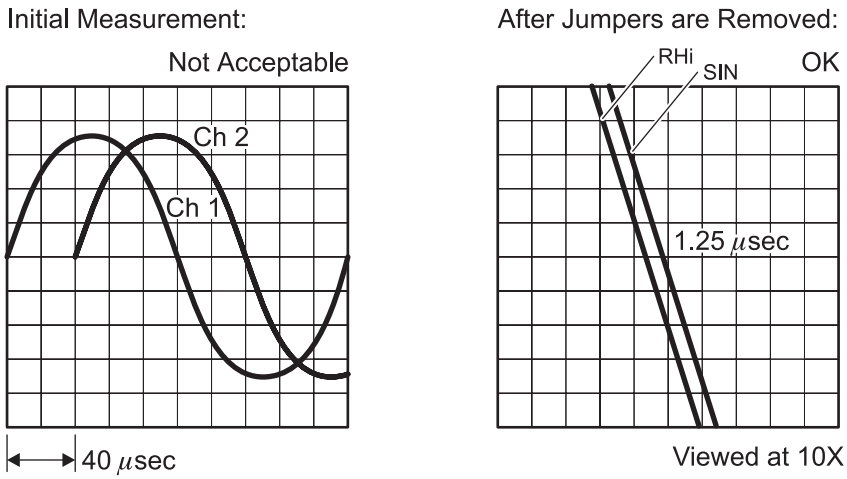
10. Connect Channel Two to SIN and measure maximum amplitude for each axis.

- ☐ Peak the maximum amplitude out for the SIN signal as done in step 8 for COS.
- ☐ Make sure maximum amplitude is 2.5V RMS.

11. Set up the board and test equipment to measure phase shift.

- ☐ Connect Channel One on the scope to RHi for the axis.
- ☐ Connect Channel Two on the scope to SIN.
- ☐ Jog the axis to the maximum amplitude (in phase with RHi).

- The maximum allowable phase shift between RHi and SIN is 2.25 degrees. Set the sweep to X10 to see the phase shift when the jumpers are removed.



Example of Unacceptable and Acceptable Phase Shift

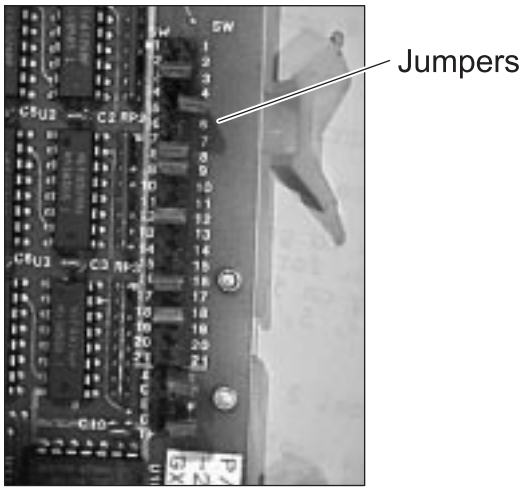
Warning: Turn the Axis off before changing jumpers.

12. Use the following chart to adjust the jumpers to correctly phase each axis.

- ☐ The ideal signal would have the SIN signal on top of the RHi signal; however, the RHi signal should lead the SIN signal if they are not the same.

Binary Weight of Phase Jumpers

Time (μsec)	Binary Weight	First Axis	Second Axis	Third Axis
2.5	1	17	10	3
5	2	19	12	5
10	4	18	11	4
20	8	16	9	2
25	10	20	13	6
50	20	21	14	7
100	40	15	8	1



Phase Jumpers

13. Repeat steps 11 and 12 for all axes.

14. Turn off the control power.

15. Remove all test equipment.

- ☐ Make sure to remove the scope and DVM probes.

16. Remove the extension cards from the board and reinstall the board in the slot.

17. Restore the control power and cycle the machine to verify proper operation.