

The Technical Note is pertinent to the Quantum III/Mentor II Drive Family

Setting Up for Tach Feedback

Introduction

Tachometer feedback provides the drive with actual motor shaft speed information and will provide better overall speed regulation than the standard Armature Voltage Feedback-AVF (assuming the tach is indeed good – not faulty in some manner). When initially starting up a drive and motor that employs tach feedback it is strongly suggested that one performs the initial start-up using the drives built-in armature voltage feedback to prove out the tach voltage and polarity before it is actually used as feedback.

Advantages of this Method

- Armature Voltage Feedback is always available as a back-up for customer
- Calibrating Armature Voltage feedback provides a calibrated back-up feedback for a tach failure (the user would simply change #3.13=1 to run his machine while getting the tach fixed).
- Eliminates runaways due to wrong tach polarity , no tach output or feedback wiring errors
- Verifies tach polarity and allows rough calibration of tach verified at high speeds **before** actual use

One will need to consult the Menu Block Diagrams found in either the Drive manual or MentorSoft in order to follow this article.

Temporary Current Limit Reduction

Upon initially starting up a DC drive we would also strongly suggest that one reduce drive current capability by temporarily reducing the Current Limit value. This is easily accomplished by reducing parameter #4.04 from 1000 which represents 150% to something less like 25% or 160 into #4.04. This temporary setting should be verified that it will be obeyed before the drive is run by looking at #4.03. The Over-riding current limit parameter #4.03, should normally follow your setting in #4.04. If this holds true then both SCR bridges will use this reduced current limit setting for your initial test of the motor.

Armature Voltage Feedback

We would suggest to always run a DC motor/drive for the first time using Armature Voltage Feedback (AVF). Quantum III drives are factory set for AVF. So one could check and set #3.12=0 and #3.13=1 and set #3.15 to the approximate voltage for the required motor speed. For instance, say we have an extruder that has the following motor and scaling:

<u>Given:</u>	Max Screw RPM = 80
	Gear-box Ratio = 20:1
	Motor Voltage = 500vdc
	Motor RPM = 1750 RPM
	DC Tach = 50v/1000RPM

Therefore, the maximum motor RPM would be 1600RPM (20 * 80) at full extruder speed. The max armature voltage setting (parameter #3.15) could be set to $(1600/1750)*500$ or 457v .

The generated tach voltage at 1600 RPM would be $(1600/1000)*50$ or 80v. So you would set the DIP switch SW1-7 to the 50-200v range for this tach voltage for this example.

Running the Motor for the First Time

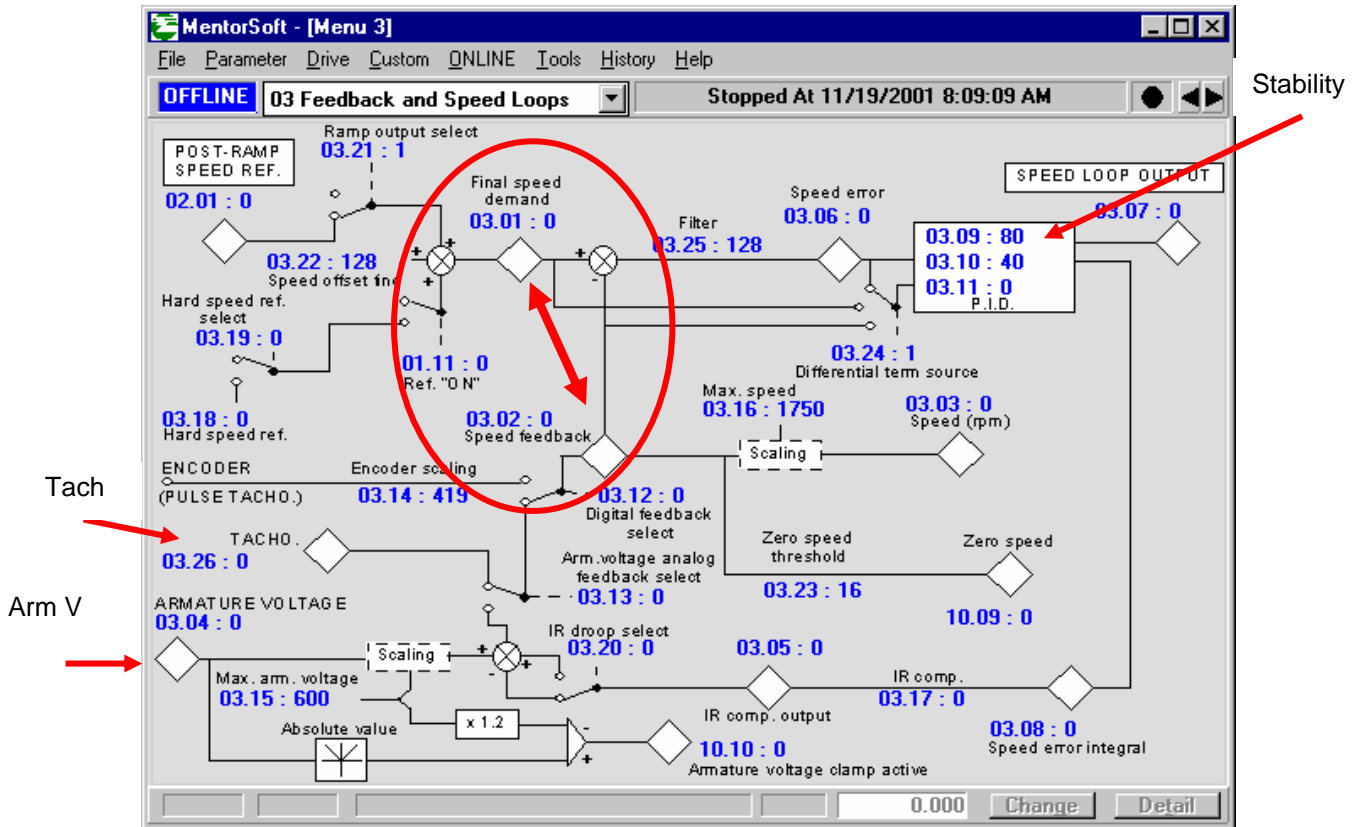
If the drive is to be controlled from a speed pot reference, we could quickly look at parameter #1.01 to see if it follows the speed pot and goes from 0 to 1000 as you rotate it from CCW to CW ensuring correct wiring-before actually running the motor.

Regardless, you could typically elect to control the speed using #1.04(Offset). By setting the speed pot to minimum, #1.01 should indicate 0. Parameter #1.04 can then be used to provide the drive a reference from 0 to 1000 or 100% right from the drive keypad. This can be convenient since the speed pot is usually located out of reach.

Verify #1.02=0 and start the drive. It should not run away due to lack of feedback or polarity reversal since you are running in AVF. Run the speed reference up slowly by increasing the value in #1.04 and verify direction of rotation. If the motor is stalled you may need to increase #4.04 to overcome breakaway torque requirements. If all is well, increase to about 10% speed (#1.04= 100). Verify the armature voltage at parameter #3.04. In the case above it should read about 46v.

Checking Tach Feedback

Once rotation is verified you would increase the speed reference to about 80% speed (by setting #1.04=800). Verify #3.04 (Armature voltage would be about 366v per the example information above if #3.15 was set to 457). So if all is well, parameter #3.02 (Speed Feedback) should match #3.01 (Final Speed Demand).



If there is severe instability, parameter #3.09 and #3.10 may need adjusted. For best speed loop stability, we typically find that the Proportional and Integral Gain parameters, #3.09 and #3.10 respectively, need reduced.

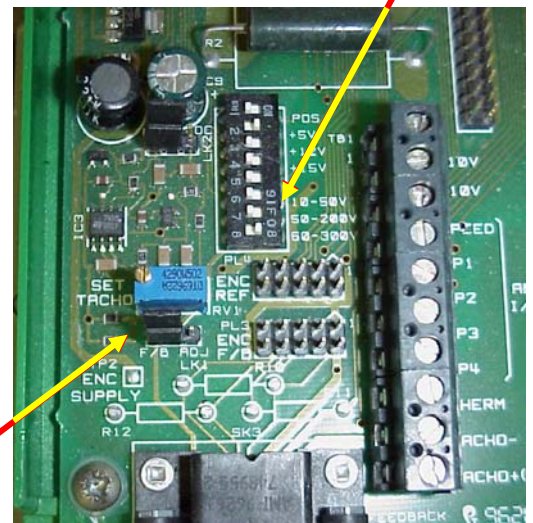
For Speed Feedback we find a starting values should be about:

#3.09	20	ranging	15-30
#3.10	5	ranging	3-10

Pre-Calibration of Tach Feedback

As far as tach calibration, one would look at #3.26 to observe the tach feedback signal. The magnitude and polarity of this number should match parameter #3.02. The magnitude would be adjusted using the SET TACHO trimpot (with jumper LK1 placed in the F/B (feedback position)) to match parameter #3.02. If the polarity is wrong, then the wires on TB1 pins 9 & 10 need to be interchanged or TBA pins 1 & 3 on Quantum III. Once roughly calibrated, you could run the speed reference up to full to verify that #3.26 tracks up to 1000 without breakup. This will reduce any surprise when the tach is actually used.

LK1 of MDA2 Brd



Final Switch Over

Now that you've set the drive up and calibrated it for AVF and performed a rough (but safe) calibration of the tach feedback, you can now stop the drive and select tach feedback. (If the polarity was wrong, now would be a good time to correct this). Tach feedback is selected by setting #3.13= 0. Now, when you run the drive up you should have no surprises. The feedback was calibrated to match what you were doing with AVF. You will need to do a final calibration with a hand tach, strobe or voltage measurement of the tach itself (assuming this is accurate enough) and adjust the SET TACHO trimpot for the final calibration.

Parameter #4.04 could now be reset back to 1000 and parameters stored.

Questions ?? Ask the Author:

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