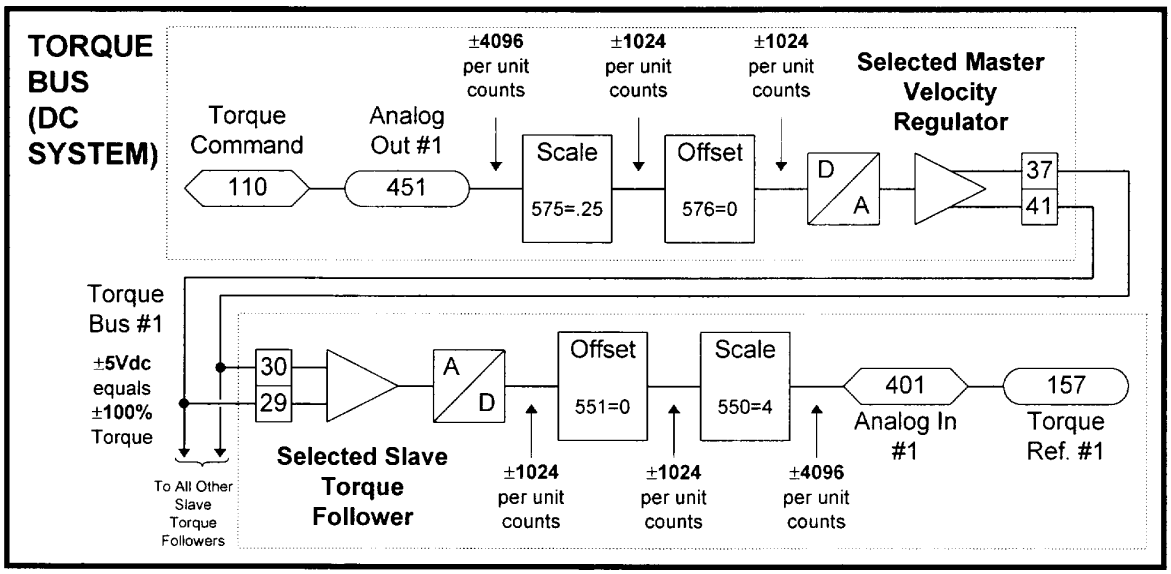
Tuning Instructions for the Double Width Newspaper Digital Drive

Analog Torque Command

Circuit Description

In any one press line-up, as determined by the units feeding paper to a specific folder, there can be only one velocity regulator. This selected master speed regulator will supply a torque reference to all of the other drives that are selected to the same folder. The torque following drives will be re-configured to follow the torque command from that one velocity regulator. The DC drive system uses a "torque" bus that is external to the drive control and is an analog signal. In digital DC drive controlled systems, the drives will be connected to each other through a "torque bus" for the purposes of load sharing. The torque bus carries the analog (+10VDC) torque command that all active torque (slave) drives will follow. Below is an illustration of the signal scaling and offset as it relates to the torque signals. Notice that a +10Vdc signal is representative of a +200% torque command.



The diagram above illustrates the analog signal path for only one torque bus. If the system contains selectable master velocity regulators, a second torque bus will exist. The second torque bus will enter the slave torque follower through the second analog input which will be scaled and offset in an identical manner to the first analog input. The second analog input, drive parameter 402, will be linked to drive parameter 167, Slave Percent 2.

In systems with selectable master velocity regulators, there may be two torque buses. Depending of the current status of the selector switches, associated with this function, each slave will have to be reconfigured to follow one bus or the other. This is accomplished by modifying the "slave percent" parameters in the drive. Examining the link table, it can be seen that there are two links in the drive that allow the slave percent parameters to be modified using words 6 and 7 in the PLC. A simplified signal flow diagram is shown below, that illustrates the functionality of the torque bus selection.

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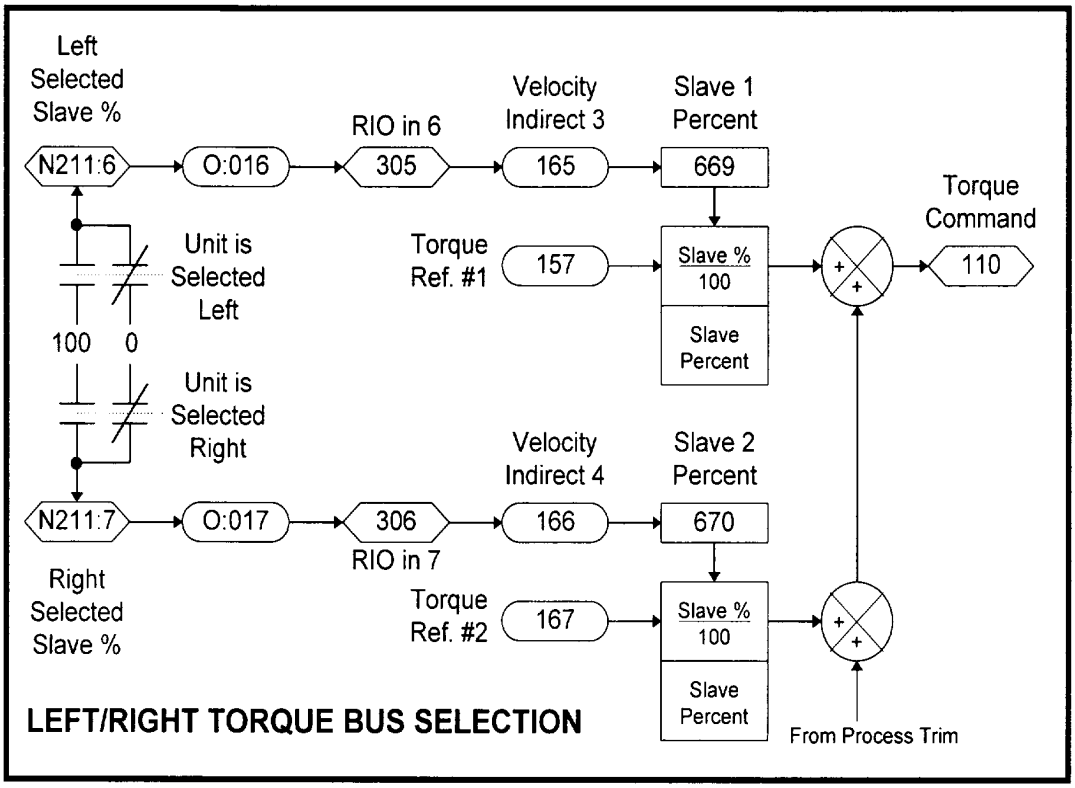


During the tuning process, it will be necessary to select the righ/left selectable units in both directions and adjust the appropriate analog zero and scale parameters.

Required Tools

To complete the tuning process the following tools will be required:

1.) A Digital Volt Meter (DVM) or a Digital Multi-Meter (DMM).

2.) A Digital Hand-held Terminal (DHT) or equivalent programming device or software.

3.) A small screw driver for analog zero and offset adjustments to the signal isolator(s).

Set-Up

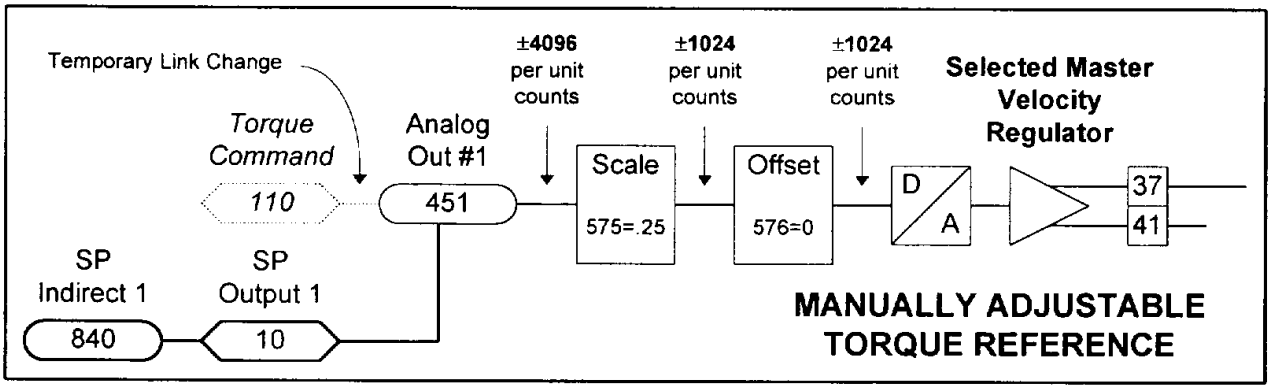
1. Verify all wiring related to the analog signal from the (designated) Speed Regulator DC Drives to be correct.

2. Ensure that the harness that carries the signal from Drive to Drive is connected per the system prints, and that all connects are tight.

3. Select Speed Regulator #1 at the test station.

4. Power up the designated Speed Regulator Drives.

5. Change the Link for Analog Output 1 in the Master Drive from <110> -> (451) to <10> -> (451). NOTE: This will allow manual manipulation of the analog output without enabling the drive. This link must be returned to <110> -> (451) when finished.



6. Connect a DMM to terminals 37 and 41 of TB3 on the Master Drive.

7. Set Parameter [840] to 0 (zero).

8. Adjust Parameter 576 up or down so that the DMM reads Zero (0) volts. NOTE: This value should be a near zero value

9. Set Parameter [840] to a value of 4096.

10. Adjust Parameter 575 up or down so that the DMM reads five (5) volts. NOTE: This value should be close to 0.25.

11. Set Parameter [840] back to zero volts (0).

12. Make sure that there are no forces present in the PLC-5.

13. Make sure that CR3 in the Speed regulator drive is turned on. If necessary, this address can be forced on within the PLC-5. The PLC should be in the "RUN" mode.

14. Connect the DMM to terminals 400 and 401 in the master drive cabinet.

15. Adjust the zero pot on the amplifier/isolator to so that the DMM reads 0 volts.

16. Set Parameter [840] to a value of 4096.

17. Adjust the Span of the amplifier/isolator so that the DMM reads 5 volts.

18. Set Parameter [840] back to zero volts (0).

19. At the designated Speed Regulator #2 Drive, (which at this time should not be selected as master) call up parameter (157), if the drive is selected "LEFT," or parameter (167), if the drive is selected "RIGHT."

20. At Speed Regulator #2 check the value of parameter (157)/(167). If other than zero (0) exists, call up parameter [551] or [553]. [551] would be for the unit if it is "LEFT" selected. [553] would be for the unit if it is "RIGHT" selected.

21. Change the value for the associated parameter to achieve a value of zero(0). This will involve going back and forth from parameter (157)/(167) to the offset parameter [551]/[553].

22. Once the zero is set, go back to the Speed Regulator #1 Drive and change parameter [840] to 4096.

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23. Now at Speed Regulator #2, ensure that 100% value exists at parameter (157)/(167). If other than 100% exists, call up parameter [550] or [552]. [550] would be for the unit if it is "LEFT" selected. [552] would be for the unit if it is "'RIGHT" selected.

24. Change the value for the associated parameter to achieve a value of 100%, at parameter (157)/(167). As was the case with the zero setting, it will be necessary to toggle between the parameter value you are changing and monitor the value.

25. Re-verify the zero and 100% span again. "Save" the changes in the Drive, at the Drive using the DMT.

26. Select Speed Regulator #2 as the Master Regulator at the test station.

27. Repeat the set-up procedure, starting from step one (1), substituting the references to Speed Regulator #1 with Speed Regulator #2, and Speed Regulator #2 with Speed Regulator #1. NOTE: It is extremely important to ensure that the full range voltage of the torque commands, at terminals 400 and 401 in the master drive cabinets, are of an equal magnitude. This will ensure consistent operation of the system regardless of mastership selection.

28. At this time, power up all the remaining follower drives. Ensure that they have a selection input for their appropriate direction .

29. Switch the Speed Regulator selection back to # 1.

30. Set the parameter [840] to zero volts (0) on the Speed Regulator #1 Drive and call up parameter (157)/(167) on all the Drives other than Speed Regulator #1 and #2.

31. Verify that zero (0) exists at all associated Follower Drive units parameter (157)/(167). If not, adjust parameter [551] or [553]. [551] would be for all "LEFT" selected Drive units. [553] would be for all "RIGHT" selected 'Drive units. It will be necessary to toggle from the associated parameter and (157)/(167) to get the desired reading.

32. Go back to Speed Regulator #I Drive and set the parameter [840] value to 4096.

33. At each of the Follower units, verify that 100% exists at parameter (157)/(167). If other than 100% exists, adjust parameter [550] or [552]. [550] would be for "LEFT" selected units. [552] would be for "RIGHT" selected units. It will be necessary to toggle from the associated parameter and (157)/(167) to get the desired reading.

34. Recheck the zero and 100% command from the Speed Regulator #1 Drive and the effect on the Follower units.

35. Save all the changes at the Drives using the DMT "save".

36. Accomplish another Speed Regulator switch at the test station and ensure .that the Follower units and the Speed Regulator # 1 will now follow Speed Regulator #2. If everything looks good, switch back to Speed Regulator #1 and ensure that the system will follow Speed Regulator #1.

37. NOTE: Pay close attention to the polarity of the value you enter into the DAC offsets. The polarity of the values should all be the same. If they are not, you need to go back and recheck the polarity of the input signal to the Dual Signal Isolator Card. If the polarity is opposite of what it should be, the offset values you enter will consistently be different than the others that are correct.

38. The convention we would like to keep is 37(+) with respect to analog common (41).

39. If a drive is Righ/Left selectable, both Torque Reference parameters (157)/(167) must be properly adjusted. Repeat the tuning procedure for the other analog input.