SMCAN Sync Guide

One of the advantages with the SMCAN by Simplex Motion is the simplicity to synchronize the motion of multiple motors. By utilizing the CAN bus, information is sent from master to slaves, and feedback information from the slaves to the master. This allows shutdown of the master motor in case there is an overload condition on a slave motor.
The Master motor continuously sends out its position at 500Hz rate for the slave motors to follow. The slave motors send out their <RegError> register, which shows the difference between actual and target position. The master looks for the largest <RegError> value among the slaves and uses it to control the speed of the master motor. There is an allowed deadband of <RegError> values allowed for normal operation, but when the values are outside of this deadband the master will change its speed to lower the reported error from the slave.
Up to 5 motors (One master and 1-4 slaves) can be synchronized using position or speed mode
.
The syncronization functionality is implemented in firmware with SMCAN:
SH-series: 03.01 and up
SE-series:01.01 and up

The following registers are used to configure the synchronization:

<400> Mode

The master can be run in two different modes, position or speed.
26 - Master position control
This works in the same way as the Position ramp mode. The position is set in <TargetInput>. The mode will automatically configure CAN bus data streaming.
When the <Mode> register is changed into this mode the <MotorPosition> value is set to 0.
36 - Master speed control
This works in the same way as the Speed ramp mode. The target speed is set in <TargetInput>. The mode will automatically configure CAN bus data streaming.
When the <Mode> register is changed into this mode the <MotorPosition> value is set to 0.
The slave mode is the same whether the master is run in position or speed mode, but in order to keep track of the feedback, the slaves have an individual mode.
90 – Slave 1
Sets the slave motor to this mode to configure it to follow the master motor motion.
When the <Mode> register is changed into this mode the <MotorPosition> value is set to 0. This designates the motor as slave number 1.
91 – Slave 2
The same as 90 but designates the motor as slave number 2.
92 – Slave 3
The same as 90 but designates the motor as slave number 3.
93 – Slave 4
The same as 90 but designates the motor as slave number 4.

<450> Target Input

Depending on the mode used, the Target Input is treated as position or speed input.

Position mode:
The unit is positions, where one turn equals 4096 positions

Register value = positions

Speed mode:
The unit is positions / second / 16. Convert an RPM value to the register value using the following formula:

Register value = rpm * 4096 (positions in one revolution of the motor) / 16 (factor) / 60 (seconds)

Notes:

- Since motor position values are sent from Master to Slave they need to use the same <MotorPosition> values, and this is assured by resetting <MotorPosition> to 0 when the synchronous modes are started. Any homing sequences should be handled prior to this, and preferably on all separate motors individually.
- Master and slave motors should be connected together using the CAN bus, and at least one termination resistor of typically 120Ohm.
- The CAN bus data streaming from the slaves to the master are stored in the <SeqTime1..16> registers, thus the sequence control feature is not available.
- The CAN bus streaming occupies the CAN id numbers 1-5, and the CAN streaming is automatically configured and started by the special modes.

Example 1:
Synchronized position setup with two motors.
Master:

- <400> Mode = 26
- <450> TargetInput = rpm * 4096 / 16 / 60

Slave 1:

- <400> Mode = 90

Example 2:
Synchronized speed setup with three motors.
Master:

- <400> Mode = 36
- <450> TargetInput = positions (4096 position / turn)

Slave 1:

- <400> Mode = 90

Slave 2:

- <400> Mode = 91