Synching Motors

There are times when a robot's movement must be perfectly straight. In other words, the wheels need to be moving at the **exact same speed** so that the robot isn't inadvertently turning off its path. To achieve this high level of accuracy the programmer can **synchronize** (sync or synch) the motors so that when the motors are not perfectly aligned, the program makes adjustments to their power to bring them together again.

In ROBOTC, synchronization is accomplished by declaring **pairs of motors** to keep together. One of the two motors is chosen as the **master**, and the second as its **slave**. This does not affect the ability or "willingness" of either motor to stay synchronized with the other, it is merely used to establish the speed relationship between them. The master motor will be assigned a **desired speed**, and the slave motor's speed will be defined as a **percentage of the master motor's speed**. The percentage, known as the **Turn Ratio**, ranges from -100 to 100.

1. To have your slave motor run in the opposite direction, make your Turn Ratio **negative**.

2. The slave motor can be set to any power less than or equal to the master, using the proper Turn Ratio.

3. Because the limit of the Turn Ratio is 100% of the Master Motor's power, the motor which requires the **higher power setting** must always be the Master Motor.

Below are examples of a Slave Motor's speed if the Master Motor had a speed of 100 and 60.

Master Motor Speed	100					60				
Turn Ratio	100%	50%	0%	-25%	-100%	100%	50%	0%	-25%	-100%
Slave Motor Speed	100	50	0	-25	-100	60	30	0	-15	-60

The equation used to calculate the Slave Motor Speed is given below.

> *Slave Motor Power Formula*
> Slave Motor Power = Master Motor Power x Turn Ratio*
>
> * Turn Ratio in this equation is equal to its value in the program divided by 100.

To use Motor Synchronization in ROBOTC, simply type in this command to enable synching:

nSyncedMotors = synchBC;

This enabled B to be the Master motor, and C to be the Slave. You can also use "synchAB", "synchAC", "synchCB", "synchCA", and "synchBA".

Then you must set the ratio:

nSyncedTurnRatio = -100;

This sets the Slave to Follow what the Master's motor speed is by -100%. In other words, it goes the opposite direction of the Master motor.

Now simply set the master motor power, and the slave motor will begin running in exactly the opposite direction.

motor[motorB] = 100;