DevilBotz 2876 Swerve Bring-Up Checklist

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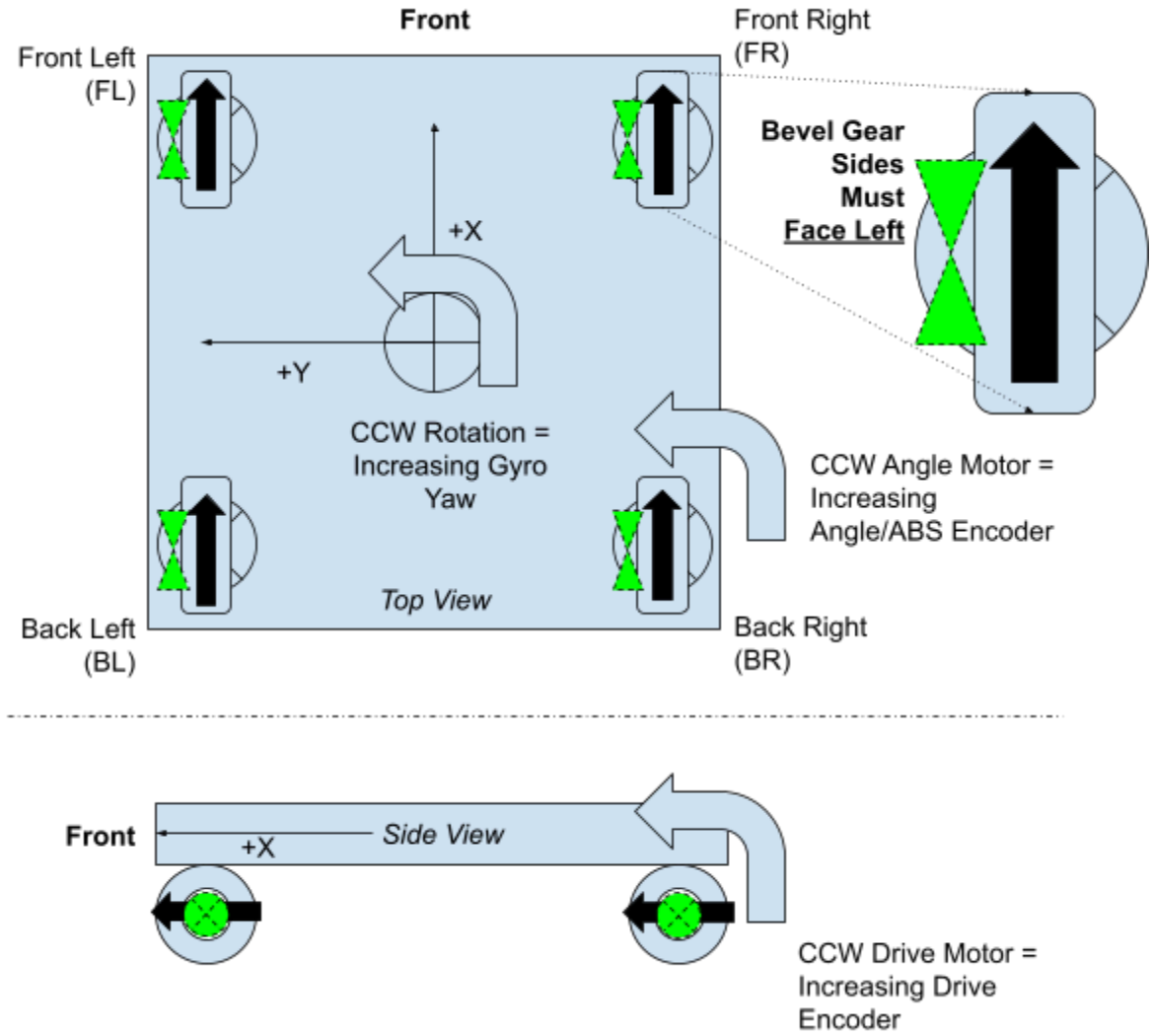
Resources

- YAGSL Wiki - https://yagsl.gitbook.io/yagsl/
- REV Robotics Hardware Client - https://docs.revrobotics.com/rev-hardware-client/
    - *for configuring Spark Max Motor Controllers and other Rev devices*
- Phoenix Tuner X - https://v6.docs.ctr-electronics.com/en/stable/docs/tuner/index.html
    - *for configuring CanCoders and other CTR devices*

Swerve Orientation Diagram



*Note: When viewed from the top, make sure the sides of the wheel with the bevel gear are pointing to the **left***

Step 1: Module Types

	Model, Version, Etc
Motor	
Controller	
Absolute Encoder	
IMU	

Step 2: Build Specific Details

- ☐ Measure the module center relative to the robot center

	Location (Inches)			
Module	**X**		**Y**	
Front Left (FL)	+		+	
Front Right (FR)	+		-	
Back Left (BL)	-		+	
Back Right (BR)	-		-	

- ☐ Measure the wheel diameter
- ☐ Determine the *reported* internal encoder resolution
    - *Note: Most encoders now normalize the reported values to -1 to 1, so the Encoder Resolution when computing the conversion factors should generally be "1". One known exception is the TalonSRX.*
- ☐ Find the drive/angle gear ratio from the swerve module manufacturer specs
- ☐ Calculate the drive/angle conversion factors
    - Drive Motor Conversion Factor (meters/rotation) = (PI * WHEEL DIAMETER IN METERS) / (GEAR RATIO * ENCODER RESOLUTION)
    - Angle Motor Conversion Factor (degrees/rotation) = 360 / (GEAR RATIO * ENCODER RESOLUTION)

*Note: For Absolute Encoders attached **directly** to the dataport on the SparkMAX, the Conversion Factor is **360***

Motor	**Wheel Diameter**	**Encoder Resolution (CPR)**	**Gear Ratio**	**Conversion Factor**
Drive				
Angle				

Step 3: Electrical Characteristics

- ☐ Set/Verify the CAN IDs for each module
- ☐ Check Inversion
    - Rotate the *drive* wheel **CCW** (moving “forward”)
        - ☐ The built-in encoder value should **increase**. If not, invert the drive motor.
    - Rotate the *angle* wheel **CCW** (when viewed from the top)
        - ☐ The built-in encoder value should **increase**. If not, invert the angle motor.
        - ☐ The absolute encoder value should **increase.** If not, invert the absolute encoder.
    - Rotate the entire *robot* **CCW**. The gyro angle (yaw) should **increase**. If not, invert the IMU

*Note: If you are using the hardware utilities for accessing the motors controllers and/or absolute encoders, the RoboRio must **not** be active on the CAN bus. The most reliable way to disable the RoboRio is to temporarily disconnect it from power.*

	Motor/Encoder CAN IDs			**Inverted?**			
Module	**Drive**	**Angle**	**Absolute Encoder**	**Drive**	**Angle**	**Absolute Encoder**	**IMU**
Front Left (FL)							
Front Right (FR)							
Back Left (BL)							
Back Right (BR)							

Step 4: Absolute Encoder Offsets

- ☐ Turn Robot On (Disabled so the wheels can be turned manually)
- ☐ Manually Turn All 4 wheels so that they are all pointing forward and forward rotation results in increasing drive encoder values (see the black arrows in Orientation Diagram).
- ☐ Measure the absolute encoder value for each module (the offset is the **negative** of the value reported)

Module	**Angle Absolute *Offset***	
	(rotations 0-1)	**(degrees 0-360)**
Front Left (FL)		
Front Right (FR)		
Back Left (BL)		
Back Right (BR)		