TB155 (Rev2) - Quick Checks for Servo Motors

Overview

The following quick and easy checks can often detect a bad servomotor and prevent damage to the servo drive electronics.

Windings Check:

1.With the motor cables/wires and shaft completely disconnected, spin the motor shaft with your fingers, it should turn fairly easily.

*If the motor shaft is very difficult to turn, you may have an internally shorted winding or something is physically resisting the shaft's motion such as dirt and debris or worn bearings.

2.Short the windings together. On DC brush servos there are two wires. On AC brushless servos there are three wires.

*There should be a noticeable increase in drag but you should still be able to spin the shaft with your fingers.
*If there is no additional drag, you may have an open winding or bad magnets.
*If the resistance is not smooth but has skip spots, the motor is bad.

Note: If all three windings of AC servos are not shorted together, the motor will appear to cog when turned.

Resistance Check:

1. With a good quality ohm meter set on the lowest possible range, the following are typical motor winding resistances measured at the motor minus the resistance of the meter used:

DC Brush Motors	Resistance	AC Brushless Motors	Resistance
Centroid 17in-lb DC*	11 ohm +/- 5 ohm	Centroid 400W AC**	35.4 ohm +/- 0.1 ohm
Centroid 29in-lb DC*	1.4 ohm +/- 0.3 ohm	Centroid 750W AC**	2.4 ohm +/- 0.1 ohm
Centroid 40in-lb DC*	1.1 ohm +/- 0.2 ohm	Centroid 1kW AC**	0.9 ohm +/- 0.1 ohm
		Centroid 2kW AC**	0.6 ohm +/- 0.1 ohm
		Centroid 3kW AC**	0.8 ohm +/- 0.1 ohm

* Given resistances for DC servos refer to the lowest measurable value at any point in the shafts rotation.

** Given resistances for AC servos refer to the resistance across any "two" windings and are independent of shaft position.

If a motor winding is shorted, the measured resistance will typically be lower than that of a "good" motor. Here a comparison of similar motors can be very useful in diagnosing a problem. For motors with a damaged commutator or an open winding, there will be a lack of continuity. In the case of a damaged

commutator or open winding on a DC brush servo, continuity will be lost when the brush passes over those areas. For an AC brushless servo with an open winding, there will be no continuity at any position.

2. Measure the resistance between the motor chassis and each motor power terminal. The measurement should be greater than 10M ohms.

*A lot of motors will have painted or anodized surfaces which will not give an accurate reading. To minimize the chances of getting an inaccurate reading, measure the resistance between 2 points on the motor's frame. It should be exactly 0 ohms. Then connect 1 of the meter leads to the motor power terminals.

*Measure this resistance both at the motor and with the cables installed prior to connecting motor to drive.

WARNING: Never remove the brushes from a DC motor. They do not wear out and more costly damage may result by removing them unnecessarily.

Avoid Servo Drive Damage!

Complete this Checklist BEFORE applying power

1.) Check servo motors and motor cables for shorts. See TB155 and install manual for details.

2.) Verify resistance between motor chassis and motor power terminals is >10M Ohms during full rotation of motor shaft.

3.) With motors connected to servo drive, confirm continuity between servo drive chassis & each motor chassis.

4.) Verify resistance between motor shield and motor power terminals on servo drive connector is >10M.

5.) Verify VM DC power lead polarity matches servo drive VM connector labeling before connecting.

6.) Check servo motor polarity/phase as per install manual.

7.) Check that all screws are tightened down properly.

8.) Before releasing Estop, Verify VM DC power supply is below the lowest servo motor voltage rating that is connected to the servo drive.

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