

M-Magic Controller Self-Test

This test verifies all M-Magic controller functions. It is the same test that is used to verify all controller functions following assembly. It is important to perform the tests in the order shown. Test steps may be repeated to verify results. Stop the test if any step does not provide the expected result.

Please verify fuse continuity before performing the test. In several cases controllers were returned for repair when the problem was a blown fuse. The fuse can fail such that the failure is not visible. Always use a Multimeter to check fuse continuity.

The post build test normally performs these tests with a one-amp fuse installed instead of the supplied five-amp fuse. Use of a one-amp fuse is not required if a low current output (i.e. wall-wart type) power supply is used.

Required items.

1. M-Magic Controller.
2. 12V to 18V Power Supply.
3. HO Slot Car. (Stock Tyco 440 or 440 X-2, Tomy Super G+, BSRT G3 or Viper V1 preferred)
4. Verify that the car motor bearings are oiled and that the car is operating properly.
5. Miscellaneous wire. (Test leads with alligator clips preferred)
6. Multimeter capable of performing resistance and voltage checks.

Test Lead Connections and Pre-Test Controller Setup.

1. Remove the rear axle assembly from the car. Place the car in such a position that the pickups are accessible and the motor rotates freely with the axle assembly removed.
2. Connect a wire from the DC supply negative (-) to one of the car's pickup shoes. If necessary use the multimeter to identify the power supply positive and negative terminals.
3. Connect a second lead from the DC supply negative (-) for connection to the controller. Identify this wire as RED.
4. Connect a wire to the DC supply positive (+). Identify this wire as WHITE.
5. Connect a wire to the remaining pickup shoe. Identify this wire as BLACK.
6. Using the multimeter verify that the controller's fuse is good. Replace fuse if necessary.
7. Using the multimeter verify that the test lead connections at the car do not short the pickups together.
8. Place the controller's Coast/Brake switch in the center (OFF) position.
9. Place the High-Low range sensitivity switch in the LOW range position.
10. Rotate all dials fully counter clockwise.
11. If equipped, place the Tri-Position Coast switch in the center (0) position.
12. If equipped, place the Dual Polarity Switch in the UP (Positive Gate) position.

The first test connects the controller's reverse polarity protection.

1. Verify that the power supply is on, output voltage is between 12V and 18V and that power supply polarities are correct.
2. Connect the controller's BLACK wire to the power supplies WHITE wire.
3. Connect the controller's WHITE wire to the car's BLACK wire.
4. Check that the car motor is rotating at speed.

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5. Disconnect the controller's WHITE wire from the car's BLACK wire and check that the car's motor coasts to a stop.
6. Connect the controller's WHITE wire to the car's BLACK wire.
7. Check that the car motor is rotating at speed.
8. If the controller is equipped with a dual polarity switch then place the switch in the down (Negative Gate) position and check that the car motor stops and the LED is fully lit.
9. Turn off the power supply.
10. Disconnect the controller from the power supply and car.
11. If equipped, then place the polarity switch in the up (Positive Gate) position.

The second test checks operation of the LED, transistor and the coast circuit.

1. If equipped place the dual polarity switch in the up (Positive Gate) position.
2. Connect the controller's WHITE wire to the power supplies WHITE wire.
3. Connect the controller's BLACK wire to the car's BLACK wire.
4. Leave the RED wires disconnected.
5. With the power supply on and the trigger fully released, check that the LED is fully illuminated and the car motor is not rotating.
6. Place the coast/brake switch in the upper or coast position. With the trigger released slowly rotate the coast knob and check that the speed of the car motor can be controlled by the knob position. Note that with some cars the motor will not rotate when the coast knob is in the minimum speed position.
7. Place the coast/brake knob in a position where the motor is stopped or rotating slowly and then place the coast/brake switch in the center OFF position.
8. Slowly depress the controller trigger. Check that the car motor speed increases and decreases with trigger position.
9. With the trigger at approximately the 50% position place the high/low sensitivity switch in HIGH and check that motor speed increases.
10. Release the controller trigger.
11. Slowly depress the controller trigger. Check that the car motor speed smoothly increases and decreases with trigger position.
12. Check that the LED is bright when the motor is rotating slowly and is dim or off when the trigger is fully depressed and the motor is at speed.
13. Check that there are no dips in speed or dead spots when the trigger is moved from 75% depressed to the fully depressed position.
14. With the trigger at approximately the 50% position rotate the sensitivity knob over its entire range and verify that motor speed can be controlled by knob position. Motor speed will increase and decrease over a wide range but the motor will not stop.

NOTE: If the controller is not equipped with the Third Dial and the Tri-Position Choke switch then mark Steps 15 to 18 as not-applicable (N/A) and proceed to Step 19.

15. With the controller trigger not fully depressed but at approximately the 90% position rotate the third (UVL) knob over its entire range and verify that motor speed can be controlled by the knob position. Motor speed will increase and decrease over a narrow range but the motor will not stop.

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16. Place the third (UVL) knob in the position that results in the slowest motor speed when the trigger is fully depressed.
17. With the controller trigger fully depressed place the tri-position choke switch in the lower or (2) position and verify that motor speed increases. Note that the LED may be dim or off with the switch in this position.
18. With the controller trigger fully depressed and the tri-position choke switch in the lower or (2) position quickly place the tri-position choke switch in the upper or (1) position and verify that motor speed increases. Check that the LED is off with the switch in this position.
19. Release the trigger. Check that the motor coasts to a stop and the LED is fully lit when the motor is stopped.

The third test checks the brake circuit.

1. Connect the controller's RED wire to the power supplies RED wire.
2. Place the coast/brake switch in the down or brake position.
3. With the trigger released check that the motor is stopped and that the LED is fully illuminated.
4. Depress the trigger fully. With the motor at full speed quickly release the trigger and verify that the motor stops more quickly than when the coast/brake switch is in the center OFF position.
5. Rotate the brake/coast knob and repeat Step 4 as many times as necessary. Check that the time for the motor to stop from full speed when the trigger is released can be controlled by the knob's position. The motor's coast down time may range from 1-2 seconds to almost instantaneous depending on the car and the knobs' position.

Test Completion

1. Turn off the power supply.
2. Remove all test leads and disconnect the controller.
3. Reinstall test car's rear axle assembly.
4. Place the Tri-Position Choke and the Coast/Brake Switch in the center (OFF) position.
5. Place the High/Low sensitivity switch in the LOW range position.
6. Verify that the Dual Polarity switch is in the upper (Positive Gate) position.
7. Rotate all knobs fully counter clockwise.

If the controller passes all of the above tests it is operating normally. If it fails any of the above tests then please contact me to arrange for repair or to perform additional tests.