



EDDY CURRENT SYSTEMS TECHNICAL CERTIFICATION TRAINING

Field Engineering | 2009

LifeFitness
WHAT WE LIVE FOR

Course Objectives

- » Model's Overview
- » Eddy Current Brake system
- » Troubleshooting Common Issues

Bikes



R1 - Recumbent



C1 - Upright

Cross-Trainer Line



X1



X3



X5



X7, X8

Eddy Current Systems

- » Permanent magnet eddy current resistance device.
- » Servo Motor resistance control
- » Plugs into the wall.
 - ◆ X7/X8 has a 120 Vac power cord and plugs directly into a wall outlet.
 - ◆ All other products use a 9Vdc transformer

Basic and Advanced Consoles



Consumer consoles

Eddy current system operation

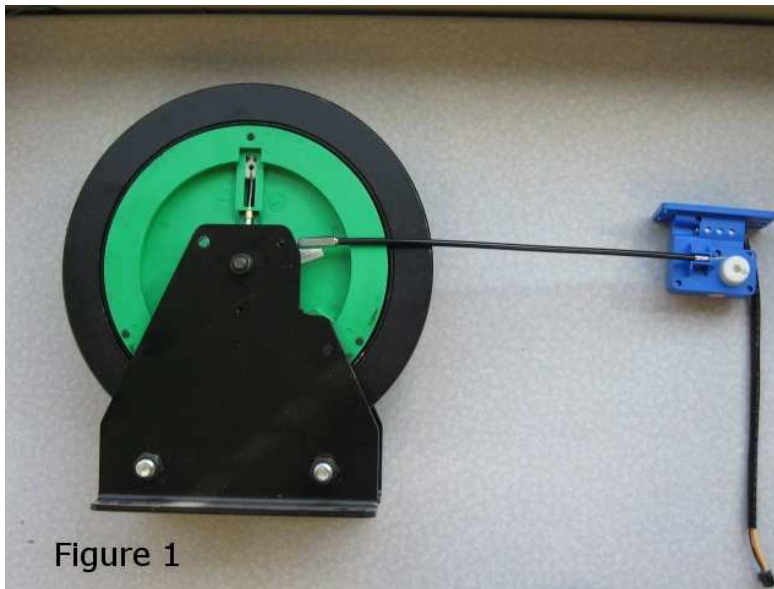
- » Three part control system
 - ◆ Console
 - ◆ Permanent magnet eddy current brake
 - ◆ Servo motor with position feedback
- » Resistance is not actively controlled by console. Magnets positions are fixed based on desired resistance level. No changes based on speed.
- » Power output is speed dependant
- » Not self powered. External power supply is required

Permanent Magnet Eddy Current Brake



- » Works similar to a drum brake system on a car. Permanent magnets mounted to a brake shoe that pivots at the bottom
- » Distance of magnets to flywheel changes resistance
- » Pulling the slide block down pulls brake shoes away from flywheel
- » Common service issue created when internal cable break

Permanent Magnet Eddy Current System Brake System Components



- » Electrical cables are also part of the system.
- » Servo Motor controls the resistance. It also has a Potentiometer to identify position to console.

Servo Motor



- » Servo motor is used to position magnets
- » Servo motor is connected to brake with a mechanical cable
- » Mechanical cable is adjustable and is used to calibrate the system.
- » Servo motor has a potentiometer to provide position feedback to the console
- » Servo motor is turned on and off in either direction of rotation by the console
- » Servo motor operates on 5 Vdc from console

Console I/O in the Eddy Current Brake System

- » Console Inputs for resistance control
 - ◆ 9 Vdc power in
 - ◆ Speed from reed switch. Magnet on main drive pulley actuates reed switch one time per crank revolution.
 - ◆ Position signal from servo motor

- » Console outputs for resistance control
 - ◆ Motor +
 - ◆ Motor -
 - ◆ 5 Vdc for Pot



Calibration – Eddy Current Brake Systems

Calibration of Eddy Current Brake System

- » The System must be calibrated when replacing the servo motor, brake cable, or magnetic brake.
- » Improper adjustment of the Eddy Current System can result in errors such as "High resistance at Level 1", "Clicking noises in the servo motor", "OFF" or "motor Error" displayed in the console. Calibration procedure follows.

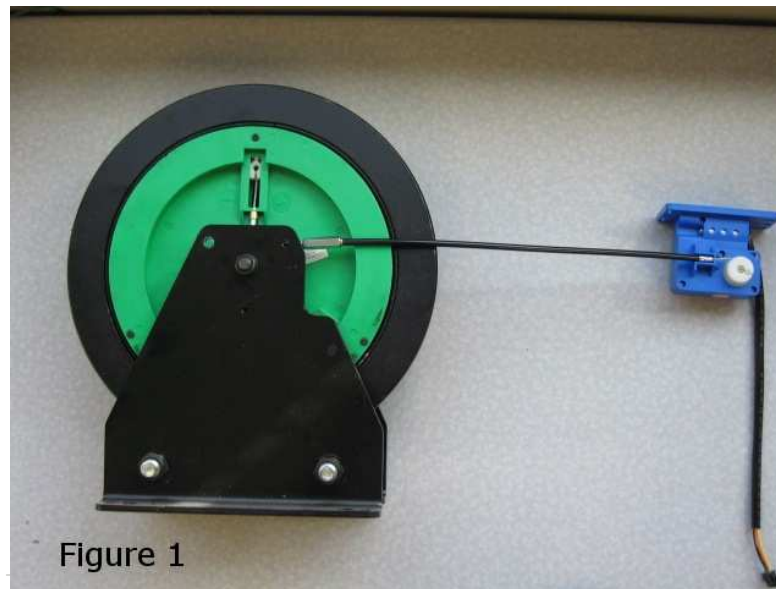
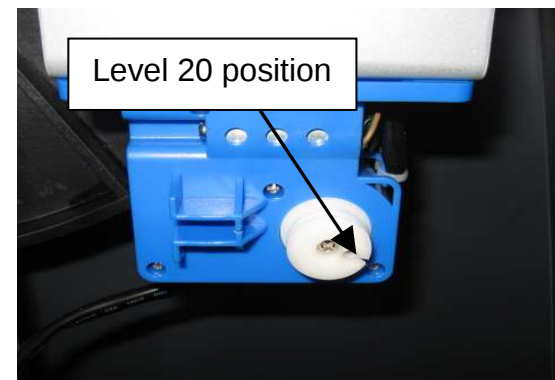
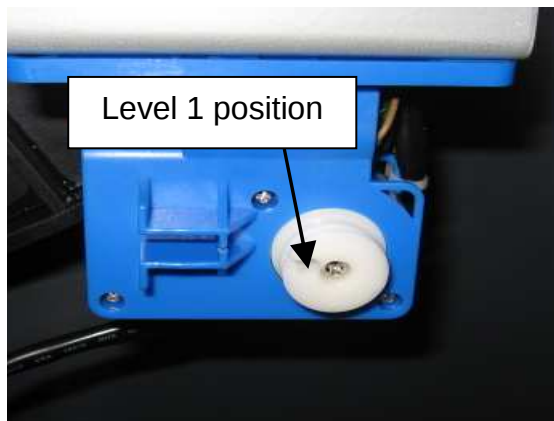


Figure 1

Calibration of Eddy Current Brake System

» Calibration Procedure:

- ◆ Make sure unit is powered OFF when adjusting.
- ◆ Change necessary components
- ◆ With brake cable (mechanical) disconnected, and electrical cable to console connected, turn ON unit.
 - > Servo motor will spin to find Level 1.
 - > Start Manual program and increase to Level 20.

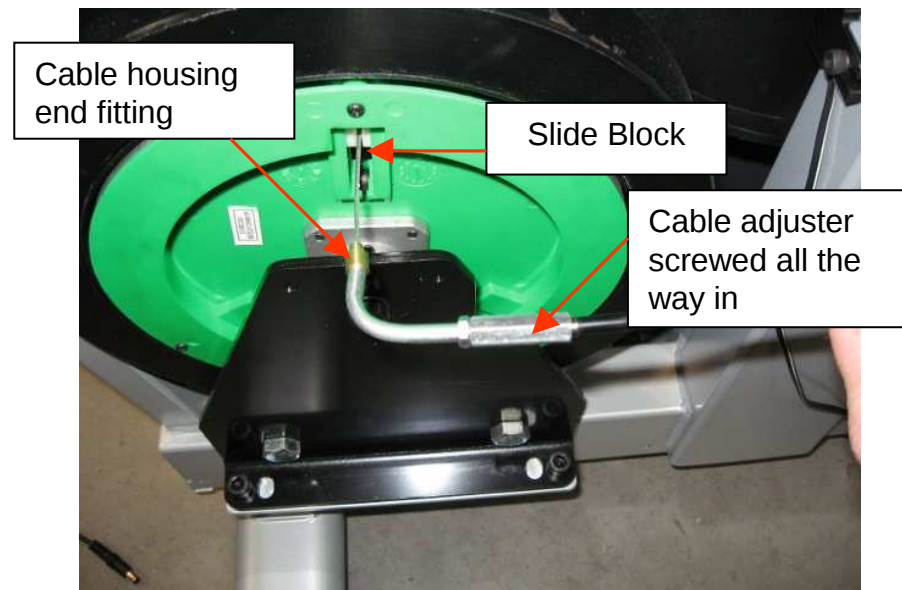


Calibration of Eddy Current Brake System

» Calibration Procedure (cont.):

- ◆ Screw the cable adjuster all the way in. Then install the end of the cable into the slide block of the Eddy Current Brake.

Note: Do not insert the end fitting of the cable housing into the slot at the bottom of the slide block channel yet. See below.



Calibration of Eddy Current Brake System

» Calibration Procedure (cont.):

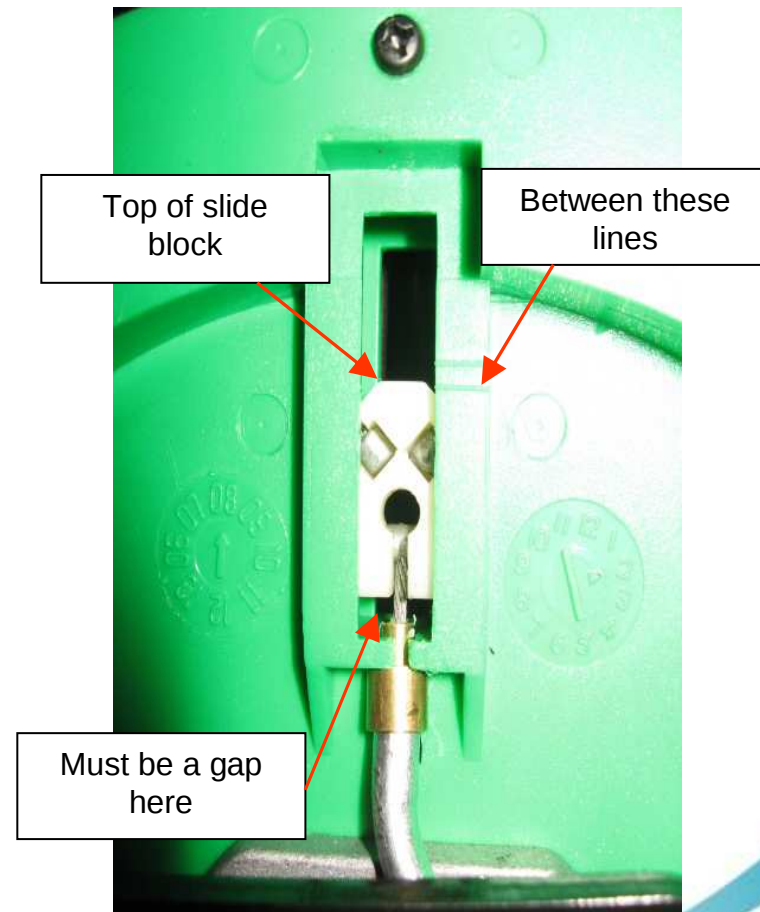
- ◆ Insert the other end of the brake cable into the pulley of the servo motor (still at Level 20 position).
- ◆ Wrap the cable around counter clockwise and then clip the cable into the slot on the servo motor housing. See below.



Calibration of Eddy Current Brake System

» Calibration Procedure (cont.):

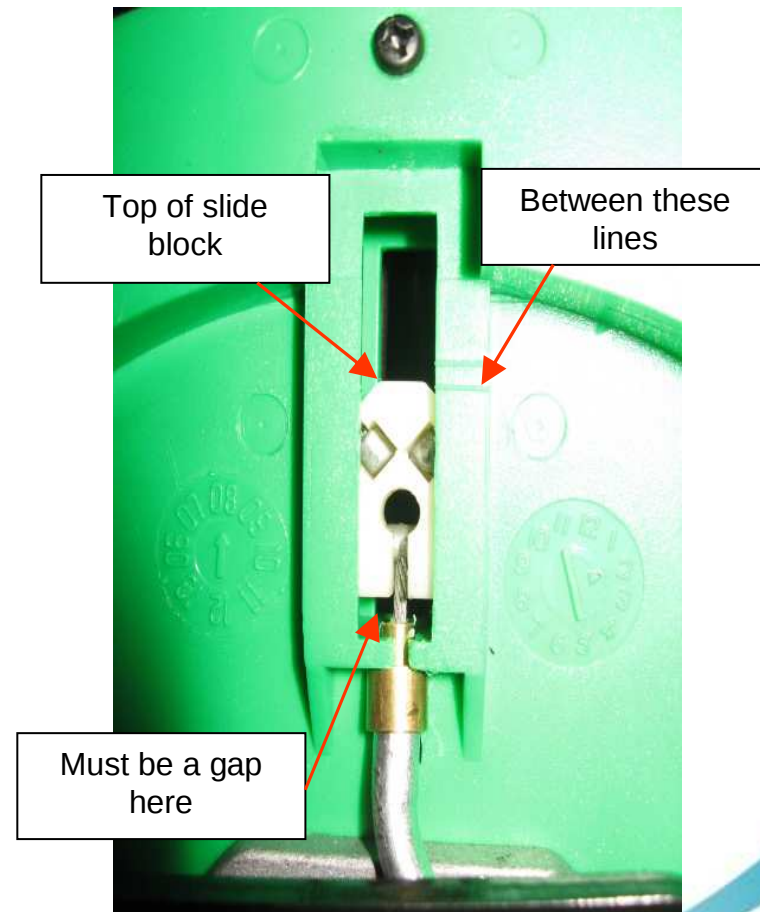
- ◆ Clip the end fitting of the brake cable housing into the slot at the bottom of the slide block channel.
- ◆ Plug the power back into the machine. The servo motor should move to the level 1 resistance position after the console initializes.
- ◆ Turn the cable adjuster nut on the brake cable until the top of the slide block is between the two lines on the brake housing. See Picture.



Calibration of Eddy Current Brake System

» Calibration Procedure (cont.):

- ♦ Run manual program and move resistance from Level 1 to Level 20 and back to Level 1.
- ♦ Confirm top of slide is still between the lines on brake assembly. If not, re-adjust the cable adjuster nut and lock in position with the jam nut.
- ♦ Calibration is now complete.



Common Issues – Eddy Current Systems

Common Issues

» No power:

- ◆ Check the connection where the transformer plugs into base. Tends to get pulled and kicked. Replace connector if needed

» No speed displayed:

- ◆ Check that magnet is in place.
- ◆ Adjust position of reed switch closer to magnet.
- ◆ Check reed switch function with an Ohm meter.
 - > Reed switch should close (0 ohms) when magnet is close.

Common Issues

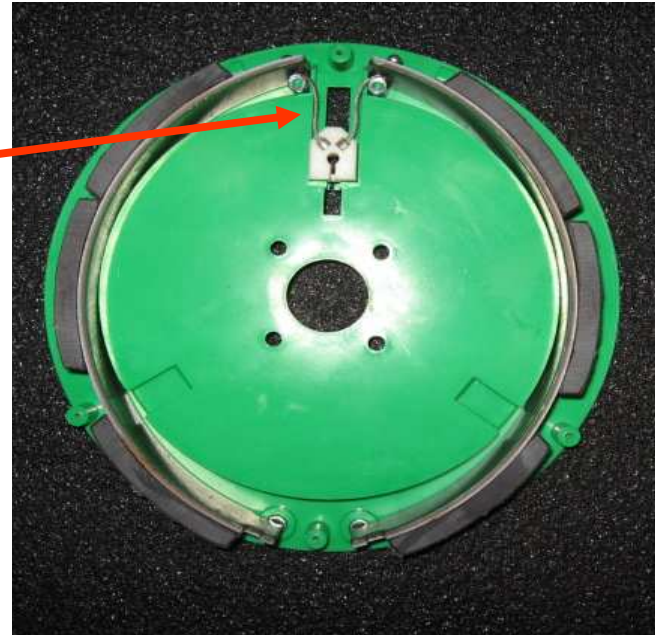
- » Clicking noises from Servo Motor:
 - ♦ Need to Calibrate the Eddy Current Brake system.

- » Console errors like “OFF” in the level window or “motor error” :
 - ♦ Need to Calibrate the Eddy Current Brake system.

Common Issues

» Too High resistance at Start/Level 1:

- ◆ Check internal cable in Eddy Current Brake – broken.
- ◆ Check Main Brake cable broken
- ◆ Need to Calibrate the Eddy current Brake system.



Summary – Eddy Current Systems

- ◆ What commercial products at Life Fitness use the Eddy current systems?
- ◆ What is the purpose of the Eddy current brake?
- ◆ How is RPM determined on these systems?
- ◆ What does calibration accomplish on this system?
- ◆ What is the result if the brake cable breaks?

Questions





THANK YOU!

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