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**DEPARTMENT OF TRANSPORTATION**

**Federal Railroad Administration**

# Safety Advisory 2025-01; Proper Configuration of Grand Master 4000 and 4000A Switch Machines to Prevent Unintended Switch Movement

**AGENCY:** Federal Railroad Administration (FRA), Department of Transportation (DOT).

**ACTION:** Notice of safety advisory.

**SUMMARY:** FRA is issuing Safety Advisory 2025-01 to heighten awareness within the rail industry of the potential for unintended movement of Grand Master 4000 and 4000A switch machines. Improper configuration of these machines could allow power to be present at the switch machine controller when locking is in effect, creating the potential for unintended switch movement underneath or in front of a train.

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*Disclaimer:* This Safety Advisory is considered guidance pursuant to DOT Order 2100.6A (June 7, 2021). Except when referencing laws, regulations, policies, or orders, the information in this Safety Advisory does not have the force and effect of law and is not binding in any way. This document does not review or replace any previously issued guidance.

**SUPPLEMENTARY INFORMATION:**

## Background

The Grand Master 4000 and 4000A is an electric switch machine designed to be used at controlled points, interlockings and derails.

A recent derailment was reported to the FRA that was caused by the unintended movement of a switch underneath a train. The unintended movement of the switch was the result of the improper configuration of a Grand Master 4000A switch machine amplifier. Specifically, the amplifier was configured in the 3 wire position and not the intended 4 wire position. Subsequent investigation has determined that the Grand Master 4000 switch machine amplifier has the same configuration design and is also at risk of causing the unintended movement of the switch when improperly configured.

The Grand Master 4000 and 4000A switch machines have four different motor control wiring configurations that can be selected based on the user's needs and a 3W/4W (3 wire or 4 wire configuration) controller key switch or plug that must be positioned correctly based on the wiring configuration to permit safe operation of the machine. According to the configuration instructions in the manufacturer's manual, all configurations except the 4-wire configuration require the 3W/4W controller key switch or plug to be placed in the 3W position.

Field testing has demonstrated that if the Grand Master 4000 and 4000A is configured in the 4-wire configuration and the 3W/4W controller key switch or plug is placed in the 3W position, power may be present in the switch machine controller when locking is required to be in effect.[1] If power is present in the switch machine controller when locking is required to be in effect, unintended movement of the switch may occur under a train or in front of a train approaching the switch.

*Recommended Railroad Actions:* In light of the above discussion and to ensure the safety of the Nation's railroads, their employees, and the general public, FRA recommends that railroads:

[1] According to the field wiring configurations table on page 3-10 in the manufacturer's manual, the 4-wire configuration is the only configuration that does not have an input to terminal TB1-2. Therefore, if an input wire is present on terminal TB1-2, the Grand Master 4000 or 4000A is not configured in a 4-wire configuration.

1. Ensure the signal circuit plans for each location equipped with a Grand Master 4000 or 4000A switch machine clearly indicate the correct wiring configuration used for the switch machine and the proper position of the 3W/4W controller key switch or plug. This configuration should be consistent with the configuration instructions in the manufacturer's manual.

2. Ensure the wiring configuration of each Grand Master 4000 and 4000A switch machine and the position of the 3W/4W controller key switch or plug match the information on the signal circuit plans.

3. Include in locking test procedures a test to validate that power is removed from the switch machine controller when locking in required. This test may be performed by the placement of a 0.06-ohm shunt in the OS and visual confirmation that all lights on top of the controller are dark.

4. Perform locking tests for each Grand Master 4000 and 4000A switch machine location to ensure power is removed from the switch machine controller when locking is required to be in effect to prevent unintended switch movement.

5. Ensure locking test procedures provide that employees verify that power is removed from the switch machine controller when locking is required to be in effect.

6. Ensure that employees are trained to verify that the wiring configuration of each Grand Master 4000 and 4000A switch machine is correct and the 3W/4W controller key switch or plug is in the proper position when the wiring configuration is changed, or the switch machine controller is replaced.

7. Ensure all lights on top of the switch machine controller are dark before trains are allowed to proceed over the switch under signal indication.

FRA encourages all railroad industry members to take actions consistent with the recommendations of this Safety Advisory. FRA also encourages railroad industry members to seek input from their workforce as the industry prepares to act on the

recommendations of this Safety Advisory. FRA may modify this Safety Advisory, issue additional safety advisories, or take other appropriate action necessary to ensure the highest level of safety on the Nation's railroads, including pursuing other corrective measures under its rail safety authority.

Issued in Washington, DC.

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