This document has been approved by the WG and forwarded to the General Technical Committee for review.

Service Mode Decoder Lock for

Digital Command Control,

All Scales

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This Technical Note describes background information for the Service Mode Decoder Lock instruction documented in Recommended Practice RP-9.2.3 Appendix B.

The Service Mode Decoder Lock instruction is intended to prevent service mode programming of decoders for low-end systems where there is no separate programming track. If all decoders on the layout implement this instruction, this method eliminates the problem of re-programming every decoder on the layout to the same address when the layout is used as the service-mode programming track.

A typical sequence of events to use this instruction is:

1. <User selects an existing locomotive address that they wish to modify>
2. The system broadcasts the 0xF9 Service Mode Decoder Lock instruction along with the address selected by the user in Step 1, and then turns off power to the track.
3. The command station indicates that it is ready for a new locomotive to be placed on the track, or that the existing locomotive selected in Step 1 can be re-programmed.
4. <User places new locomotive on the track if different from the locomotive selected in Step 1.>
5. <User removes from the track all other locomotives containing decoders that do not implement this feature>
6. <User selects CV(s) to be programmed and new contents>
7. The command station sends the normal service mode sequence (per RP-9.2.3) to program the CV(s).
8. (Steps 6 and 7 may be repeated as needed)
9. The command station goes back into normal operation mode, sending packets that cause the decoders on the track to exit service mode and caused locked decoders to exit their locked mode and return to normal operations.
10. <User returns other locomotives to track as desired>

Command stations that implement this instruction should ensure that there is a power off cycle between the time that the Service Mode Decoder Lock instruction is sent and subsequent service mode instructions are sent. This power cycle is required to allow users to place a new locomotive on the track to accept service mode operations.

Compatibility Issues

There are no known compatibility issues when implementing this instruction in a decoder.

Existing decoders that implement the Address Query instruction (0xF9; see RP-9.2.3 Appendix A) will reject the Service Mode Decoder Lock instruction because the length of the instructions are different and because bit 7 of byte 3 within the Service Mode Decoder lock instruction is a 0 guaranteeing that it can not be misinterpreted as a valid error byte of an Address Query instruction.

Before implementing this instruction in a command station, the designer should consider how the command station is going to interact with decoders that do not include this feature. Those decoders will not lock, and will therefore act on the following service mode instructions. This will cause interference with read operations, and unexpected changes in the decoder's CV values during write operations. The user interface and instructions should take this into account.

Note that users may not be aware whether or not the decoders in their locomotives include this feature, in which case they should remove the locomotives from the layout.

Alternate Approaches

Similar functionality can be implemented using ops-mode programming (the Configuration Variable Access instruction).