Speed matching locos with ScaleSync & JMRI DecoderPro

Preparation

Begin by ensuring the track is clean and consistently powered throughout, with no dead spots. Next, test each locomotive you plan to speed match by running it in both directions, at slow and high speeds, for about five minutes. This helps warm up the motor and confirms it's operating properly. If any locomotive runs significantly faster or slower than the rest, it likely needs maintenance before you proceed with speed matching. If a locomotive hesitates intermittently, it's often an indication that the wheels or track need cleaning. For locomotives that struggle to move at low speed settings, try adjusting the starting voltage so the engine begins to move smoothly at speed step 1. The goal is for all units to creep steadily at the lowest speed, reach the desired top speed at full throttle, and exhibit a consistent, linear acceleration curve throughout. This guide will help fine-tune any engines that don't meet those criteria, bringing their performance in line with the others they'll be operating alongside.

ScaleSync and DecoderPro Setup

In DecoderPro, ensure each locomotive you plan to work with is included in the Roster. If not already added, place the locomotive on the programming track and select "New Loco." Follow the setup prompts and assign a unique ID to save its profile. Once a locomotive is in the Roster, retrieving and reusing its configuration becomes simple. To program a locomotive, place it on the track by itself and click "Identify." After it has been recognized, select the "Program" option to bring up the programming interface, then choose the Speed Table tab. At this point, also open a Throttle window—either by clicking the Throttle button in the Roster or selecting "New Throttle" from the Actions menu. Throughout the tuning process, you'll need to switch back and forth between the Throttle (for running the locomotive) and the Speed Table (for making adjustments), so it's helpful to have both windows open simultaneously.

Example

To begin, I'm configuring an N Scale A-B locomotive pair to operate together in a consist. The goal is to limit their maximum speed to 100 scale mph, which is slightly faster than most U.S. prototype trains and also helps with intuitive speed estimation when using various throttle types (e.g., speed step 7 on a 14-step throttle is 50 mph, step 64 on a 128-step table, or step 14 on a 28-step table). When running heavy trains, having extra throttle power is important to actually pull the train, even though it won't run at scale speed in that scenario. During initial testing, both the A and B units exceeded the 100 scale mph mark, even at mid-throttle, so the first task was to bring down the top speed. I began tuning with just the A unit on the track. With both the Throttle and Speed Table views visible, I enabled track power (green indicator in the Throttle window) and used the slider to set the throttle position. The default curve displayed a straight-line configuration, so I lowered the top-end slider to a level that approximated the desired full-speed value of 100 mph.

You don't need to stop the locomotive or cut power to the track when making adjustments. Simply click into the Speed Table tab and move the slider as needed. In this case, only the far-right slider was adjusted downward, which automatically scales the other sliders proportionally in DecoderPro. This maintains a logical progression where higher speed steps result in higher speeds, avoiding irregularities in the curve. After making changes, click the "Write Changes on Sheet" button—this temporarily halts the locomotive, applies the updates, and you'll see the sliders change color as each write completes. Once all the sliders return to their normal color, indicating the update is finished, switch back to the Throttle window and restore track power by clicking the now-red power icon.

As a starting point, I set the top speed slider to 90 out of 255, ran the locomotive, and found it was still too fast. Through trial and error, gradually decreasing the value and re-running the loco on a loop, I found that 72 yielded the target top speed. Next, to set an appropriate midpoint speed, it was necessary to make the curve more linear. Although non-linear curves can be useful in some cases, the flat upper section of this curve (above roughly 30% throttle) wasn't practical.

To fix this, use the "Match Ends" button, which redraws the curve as a straight line between the lowest and highest speed settings, aiming to produce a linear relationship—ideally resulting in 50 scale mph at 50% throttle. Click "Write Changes on Sheet" again. Upon testing, the locomotive still ran too fast at the midpoint, so I fine-tuned the curve without altering the start and end points. This can be done using the small checkboxes beneath each slider. Check the boxes for the first, middle, and last sliders to lock them in place. Now, adjusting the midpoint (e.g., speed step 14) will modify the curve while maintaining a smooth gradient from both ends. Click "Write Changes on Sheet" one final time and verify the new performance.

Once you're satisfied with the results, close the Speed Table pane and save the updated configuration to the Roster. A prompt will appear reminding you to save your changes—click "Save and Close" to finalize everything in the roster entry.