Detlef's TSU Tuning Procedure

A common complaint of Soundtraxx Tsunami decoders, particularly the diesel decoders, is that they have poor slow speed performance. Out of the package, they will tend to 'jerk' a locomotive to a start, say 5 scale MPH. Same for coming to a stop. But that does not mean they cannot run smoothly. With a little tweaking, these babies will let your loco run like they are gliding on silk!

1) Make sure track and wheels are clean. None of this works without good connection between the track and the loco. If you have trouble with this, don't worry about BEMF tuning, get some help and come back when you have reliable trains and track. (What is Back EMF? Click HERE.)

2) Shut off all momentum. CV3 = 0 and CV4 = 0

3) I also start by enabling speed tables now, just with a straight line. This will allow you to do speed trim later without having to come back to this: CV 25 = 2 and CV29 = 50.

4) Probablly different from other's philosophies, I do tweak the motor control sample period and aperture. There are strong opinions on this and it certainly is not necessary. But I have mostly Athearn locos and it seems to do wonders for them for slow speed control. CV 213 = 6 and CV 214 = 9.

Next is setting the decoder's PID control loop for managing the motor. Not sure what a PID control loop is or the associated variables? Click HERE.

5) Be sure CV 212 is set to 255 (default).

6) Now, set CV209 to 0 and CV 210 to 0. The loco will not move.with these settings. Don't worry, we will get there!

7) OK, now the fun starts. Set your speed controller to speed step 1. Increment up CV 209 one step at a time until the unit just starts to move. Admittedly, going by 1's is a bit tedious, so I got to around 60 or 70 by 10's, then went by 5's, and then by 1's.

8) I then added some integral, CV210, until it started moving reliably when going from speed step zero to one. I found all I needed was 2, 3 or 4.

9) When you do this, you may find that speed at step 1 is too fast, so back down on CV209 a bit, say 5 less.

10) Then played with CV210 to get a good reliable start.

11) I found too much integral, CV210, was the main culprit for the 'cogging' effect. Back off and it does OK.

You now should have a very smooth running loco. I have found, however, that a high CV 212 value will not allow locos to play well together. CV 212 'forces' the BEMF control to keep the motor speed locked on a particular speed. If you are MU'ing locos, even a small difference in motor speeds will tend to cause bucking and rough operation. As such, I will typically back off CV212 to allow the motor speed to drift slightly under load, allowing it to let go of load or pick up load if another loco next to it it pushing or pulling more or less. I like a value of between 120 and 150. Generally this will not affect the settings for CV 209 and 210 much, but it may create a lag between when you go to speed step 1 and when the loco starts to move. If this bugs you, go back to the procedure above and play with CV 209 and 210, or increase CV 212 until it is as you like it. It's an iterative process meaning the more times you go through the steps, the better you will be able to tune a particular

loco. Typical values I end up with are:

- CV 209 = 100 - 130
- CV 210 = 5 - 10
- CV 212 = 90-130

Speed tables radically affect these settings, so if you want something other than a straight line speed table, set it up front.

Now set your max forward and reverse speeds with CV 66 and 95. And finally, go back to CV 3 and 4 and add some momentum. If you don't like momentum much, choose a value like 15 or 20. If you like more, well, that is a topic for another page!

ADDENDUM

I have found this works for MOST of my locos. But every so often there are exceptions. There are other procedures that work for tuning. One very popular one is found at "Mr. DCC University" website:

http://www.mrdccu.com/curriculum/soundtraxx/tsunami.htm

Still, there is no magic bullet for this tuning procedure. One I recently did was an Athearn repower that used a Sagami motor. I tried my procedure, as well as the Mr DCC procedure, and neither worked to my satisfaction. Yes, it got much better. But it still had some hesitation on starting. Stay encouraged. It can be a bit frustrating at first, but it is worth it. Just recently I MU'ed 3 locos, each with different decoders and motors, all programmed with a lot of momentum and braking, and they all played well together. It looked, sounded and ran pretty nice!