



**Tsunami® Digital Sound Decoder**

**User's Guide Addendum  
for the Union Pacific Gas-Turbine Electric**

Software Release 1.14

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# Table of Contents

**All Aboard!** ..... **1**  
Overview..... 1

**Operation** ..... **2**  
Using Your Tsunami Gas-Turbine Electric Digital Sound Decoder ..... 2



# All Aboard!

## Overview

Congratulations on the purchase of your SoundTraxx® Tsunami® Digital Sound Decoder™. This **User's Guide Addendum** will provide you with the unique information you need for proper operation of the Tsunami for the **Union Pacific Turbine**. For the power user, the Tsunami **Technical Reference** will provide a list of all the CVs available for use with Tsunami decoders and their exact function and make-up for those who wish to have a complete reference for advanced programming techniques.

Technical Bulletins and Application Notes covering various topics are also published from time to time, and these may be downloaded free of charge from our website at [www.soundtraxx.com](http://www.soundtraxx.com).



# Operation

## Using Your Tsunami Union Pacific Turbine Digital Sound Decoder

Your SoundTraxx Tsunami for the Gas-Turbine Electric, representative of the Union Pacific Turbine, has been shipped with all CVs pre-programmed so you can begin using your locomotive immediately without having to worry about what adjustments to make. However, the software for this decoder is as unique as the prototype, and we have several special features to enhance the experience of running your 'Big Blow'.

These locomotives were truly unique and thus require a sound decoder that is as well! Just like the prototype the decoder has both a diesel prime mover and a turbine. The diesel prime movers found on these locomotives were designed primarily for running the air compressor and hostling the locomotive around the yard, while the turbine supplied the horsepower necessary to pull heavy tonnage trains throughout the Union Pacific system. Using extensive research the operating characteristics of the decoder have been designed to correctly match the operation of the prototype turbines.

### Operation Overview

This decoder has five modes of operation. The following describes these modes and their uses. Additional programming information can be found in the Tsunami Diesel Technical Reference.

#### ***Mode 1 - Full Auto mode (default)***

Setting CV 116 between 1 and 15 enables Automatic Engine Notching Mode. Automatic notching causes the engine RPMs to change in proportion to the throttle setting. Pressing Emergency Stop will cause the diesel engine to shut down. In the Turbine decoder, this mode is identical to other diesel Tsunami decoders, except that it also includes a turbine timeout mode. After the turbine has been idling and no function commands are sent to the decoder for a set period of time, it will automatically shut off, thus returning the locomotive back to an idling diesel. This timeout period is selected by the user with CV 200.

CV 116 sets the number of speed steps per engine notch. With a setting of one, the engine speed will increase one notch for each speed-step. When the engine sound reaches notch 8, no further increases will take place. With a setting of seven (default), the engine speed will increase one notch for every seven speed-steps.

By varying CV 116, the sensitivity of the engine sound to the throttle is changed. If you operate on a small layout or are having trouble keeping the engine sound synchronized to the locomotive speed, you might want to use larger CV values (12-15) to keep the engine from becoming 'over-throttled'.

CV 199 sets the Turbine Start Speed. This CV sets the speed step when the turbine will turn on in automatic mode. The default value is 7 which equates to the turbine starting at speed step 7. You can set a value from 0 to 127 for



# Operation

the Turbine Start Speed. In this mode, the turbine RPM increase value found in CV 116 won't start until you pass the value set in CV 199.

*CV 200 Turbine Timeout* sets the number of seconds before the turbine will turn off in Auto-notching mode.

Setting CV 200 to a value between 1 and 255, equates to the number of seconds it takes before the turbine turns off when using Auto-notching and when a) the locomotive is at speed step 0 and b) no functions are left on. The default setting is 10 seconds.

### **Mode 2 - Semi Auto-notching Mode**

Semi Auto Mode works the same as Auto-notching (see CV 116 above) except that the turbine can now be turned on and off with F9 and F10. There is no limitation on how fast you can run the diesel engine in this mode. To enable this mode, set CV 200 to 0. If your cab does not support functions F9 and F10, these functions can be remapped (see Function Mapping in the Tsunami Diesel User's Guide, or Function Output CVs in the Technical Reference).

*CV 116* can be set between 1 and 15 to enable Automatic Engine Notching Mode.

*CV 200 Turbine Timeout* enables the semi-automatic mode. If CV 200 is set to 0, then the turbine sound can be turned on using Function 9 and turned off using Function 10, but all RPM notching is automatic according your selection in CV 116.

### **Mode 3 - Manual Notching Mode without Speed Limitation**

Manual Notching allows you to control the engine RPMs manually and independently of the throttle setting. Manual Notching allows for more prototypical operating scenarios such as having a heavy train slowly climb a grade while the engines are laboring at full power.

*CV 116* sets the decoder to use Manual Notching when the value is set to 0. Then, the engine RPMs will increase by one notch each time Function 9 is pressed. Similarly, the RPMs can be decreased using Function 10. Unlike Automatic Notching, pressing Emergency Stop will reduce the engine speed to idle. Once the engine is idling, you shut it off by pressing Function 10. When manual engine notching is selected, both the radiator fans and air compressor sound effects will no longer be controlled by F9 and F10. Instead, they can be configured to turn on automatically whenever the engine sound is playing with CV 112. (There is no effect on the speed limitations on the diesel prime mover when this mode is selected.)

**Note:** Operation modes 4 and 5 were designed to allow the most realistic operation of the Turbine decoder by incorporating Speed Limiting on the motor until the turbine sound effect is turned on. The main purpose of the diesel engine on the prototype was to hostle the locomotive around the yard and run the air compressor. By nature then, the diesel would be operating at very slow speeds when the turbine was turned off. By enabling the Speed



# Operation

Limiting feature (Bit 4, CV 116), the speed of the motor in the model will be limited until the turbine has completed its startup sequence. Additionally, the turbine cannot be turned off until the motor drops below the speed limiting step.

## ***Mode 4 - Semi Auto-notching Mode with Speed Limiter***

This mode works like Mode 2 except that when F9 hasn't been selected to turn the turbine on, the decoder will only run as fast as the speed step value assigned to it through CV 199.

CV 116 can be set between 1 and 15 to enable Automatic Engine Notching Mode. Bit 4 in CV 116 must also be turned on.

CV 199 sets the maximum motor speed step while the interlock bit is set (Bit 4, CV 116). The default value is 7 which equates to the being limited to speed step 7 until the turbine is turned on. You can set a value from 0 to 127.

CV 200 *Turbine Timeout* enables the semi-automatic mode. If Bit 0 is set to 0, then the prime mover sound can be turned on using Function 9 and turned off using Function 10, but all RPM notching is automatic according your selection in CV 116.

For example, setting CV 116 to 21, CV 199 to a value of 10, and CV 200 to a value of 0, you will be able to hear the diesel notch up and run the model up to speed step 10. You'll be able to turn the turbine on manually using F9, and each time the throttle is increased by 5 speed steps, the turbine RPMs will increase.

## ***Mode 5 - Manual Notching with Speed Limiter***

This mode works like Mode 3 but uses the interlock bit in 116 and CV 199 like Mode 4. As with Mode 4, the increase in speed will take place once the Turbine is in its RPM notch mode after start up.

## **CVs Unique to the Union Pacific Turbine**

The following CVs serve different purposes than the regular diesel Tsunami or are unique to this decoder.

### **CV 112 Sound Configuration**

CV 112 enables the Air Compressor and Fan as in most other diesel Tsunami models. The Alternate Prime Mover selection bit allows you to choose to have the diesel engine remain on when the turbine is on or to have the diesel shut down during turbine operation, allowing you to represent all versions of Gas-Turbine Electric locomotives found on the Union Pacific. This decoder includes the added sound effect of the engine 'backfire'. For those who either saw these beasts in their heyday or have seen videos of past operations, these backfires were spectacular, though relatively uncommon. It is an impressive effect, however, and no Turbine would be complete without it!

Use the following table to determine your setting for CV 112 with the backfire effect turned OFF. To have the backfire sound effect come on the first time



# Operation

the turbine starts, add 8 to the value in the table. To have the backfire turn on every time the turbine is started, add 16 to the value in the table.

<b>CV 112, Air Compressor, Radiator Fans, Alternate Prime Mover Control with Turbine Backfire Turned OFF</b>			
<b>Air Compressor</b>	<b>Radiator Fans</b>	<b>Alternate Prime Mover</b>	<b>CV Value</b>
F10	F9	Off	0
Auto	F9	Off	1
F10	Auto	Off	2
Auto	Auto	Off	3
F10	F9	On	4
Auto	F9	On	5
F10	Auto	On	6
Auto	Auto	On	7

The default value for this CV is 8, which sets the Air Compressor to be on F10, the Radiator Fans on F9, the Alternate Prime Mover OFF and the backfire effect set to come on at first turbine start.

## **CV 116 Exhaust Control**

### **Auto Engine Notching**

Setting CV 116 between 1 and 15 enables Automatic Engine Notching Mode. Automatic notching causes the engine RPMs to change in proportion to the throttle setting. Pressing Emergency Stop will cause the engine to shut down.

The value in CV 116 sets the number of speed steps per engine notch. With a setting of one, the engine speed will increase one notch for each speed-step. When the engine sound reaches notch 8, no further increases will take place. With a setting of seven, the engine speed will increase one notch for every seven speed-steps. The default setting is 7 speed steps per engine notch.

By varying CV 116, the sensitivity of the engine sound to the throttle is changed. If you operate on a small layout or are having trouble keeping the engine sound synchronized to the locomotive speed, you might want to use larger CV values (12-15) to keep the engine from becoming 'over-throttled'.

### **Manual Notching**

As the name implies, Manual Notching allows you to control the engine RPMs manually and independently of the throttle setting. Manual Notching allows for more prototypical operating scenarios such as having a heavy train slowly climb a grade while the engines are laboring at full power.

To use Manual Notching, set CV 116 to 0. Then, the engine RPMs will increase by one notch each time Function 9 is pressed. Similarly, the RPMs



# Operation

can be decreased using Function 10. Unlike Automatic Notching, pressing Emergency Stop will reduce the engine speed to idle. Once the engine is idling, you shut it off by pressing Function 10.

When manual engine notching is selected, both the radiator fans and air compressor sound effects will no longer be controlled by F9 and F10. Instead, they can be configured to turn on automatically whenever the engine sound is playing with CV 112.

## Engine Interlock

The Engine Interlock feature is designed to work with Manual Notching and helps avoid embarrassing moments like accidentally shutting off your prime mover while cresting a grade!

When enabled, the Engine Interlock prevents the diesel engine from being shut off unless the locomotive is stopped. Similarly, the locomotive will not respond to the throttle until the diesel engine has first been started up. Additionally the motor speed is limited while the turbine prime mover is shut down to the speed step value based on your settings in CV 199 (see next page)

## Engine Auto-Start

When active, the Auto-Start feature starts up the prime mover sound automatically whenever the decoder is powered up regardless of whether or not it is addressed by the user. In this manner, the locomotive will begin producing sound without any user intervention.

To use the Auto-Start feature, first determine the baseline value for CV 116 based on your choice of manual (setting of 0 or 16 - Interlock ON) or automatic engine notching (settings 1 through 15). Then to enable auto-start, add 32 to the setting in CV 116.

## Dynamic Brake Mode

While the Dynamic Brakes are applied, prototype practice usually requires the turbine speed to be lowered to an idle. This decoder allows you to replicate three Dynamic Brake modes. When enabled, turning on the Dynamic Brake function (F4) will cause the dynamics to “engage”. This is the default setting.

<b>CV 116, Interlock, Auto-Start and Dynamic Brake Modes (Values to be added to base CV setting)</b>	
<b>Feature</b>	<b>Add to Base Value</b>
Interlock	Add 16
Auto-Start	Add 32
Dynamics at Notch 2	Add 64
Dynamics at turbine idle	Add 128

When enabled, turning on the Dynamic Brake function (F4) will cause the dynamics to “engage”. This is the default setting.

The second Dynamic Brake mode causes the turbine to shut down and the diesel engine to automatically decrease to notch 2 before the dynamic brake is activated. To use this mode, add a value of 64 to the base value in CV 116.



# Operation

The third mode causes the turbine to drop to idle before the dynamic brakes are activated. To enable this mode, add a value 128 to the base value in CV 116.

**CV 116 Example:** You want to use automatic notching with an increase for every eight speed steps. From the section under 'Engine Control', we determine the base setting for CV 116 to be 8. Then to enable Auto-Start, we add 32. Thus, CV 116 is set to:  $CV\ 116 = 8 + 32 = 40$

If we then determine that we want our Dynamic Brakes to come on at Turbine Idle, add 128, thus making the correct value for  $CV\ 116 = 168$ .

The default value of 39 for CV 116 enables automatic engine notching at speed step 7, Auto-Start enabled and Dynamic Brakes active on Function 4.

## **CV 199 Turbine Start Speed**

Setting CV 199 sets the speed step where the turbine will turn on when using the Automatic Engine Notching mode. It also sets the maximum motor speed step when the Interlock Bit is set (Bit 4, CV 116). The default value is speed step 7 between 0 and 127.

## **CV 200 Turbine Timeout**

Setting CV 200 selects one of two modes of operation. Semi-automatic mode allows the prime mover sound to be manually turned on using Function 9 and turned off using Function 10, though engine notching remains in Automatic Engine Notching mode as set in CV 116. This mode is activated by setting CV 200 to a value of 0.

The second mode of operation sets the number of seconds (from 1 to 255) that it takes before the turbine will turn off in Automatic Engine Notching Mode (CV 116) once the the locomotive reaches speed step 0 and no functions are left turned on. Example: Your engine has Automatic Engine Notching enabled and a value of 25 programmed into CV 200.. Once the locomotive comes to a stop, and all your functions are turned off, it will take 25 seconds for the turbine to shut off.