



**WOWSound**

# Diesel Version 4

## Programming Guide













**11-15-2016**



This manual covers the setup and configuration of the Sound Components of the WOWSound Diesel decoder. All NMRA, Lighting and Motor Control programming are covered in the **TCS Comprehensive Programming Guide** available for download at:



[www.tcsdcc.com](http://www.tcsdcc.com)


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 If the **Audio Assist** logo appears after a title, that function is adjustable using Audio Assist™. It is recommended and easier to adjust these features using  **Audio Assist**.

**NOTE: Please view our instructional video about  on our website.**

## Button Mappings

Below is a table listing the default sound button mapping. The WOWSound has the flexibility to have any sound mapped to any button so you can customize your throttle exactly the way you like it.

To switch between “sound mode” and “light mode” press button 8 twice. In sound mode buttons control sounds in light mode buttons control lights. F0 is active in both modes by default. You can program what sounds/lights are active in both modes by programming the “dual enabled” indexed CV.

Function Button	Sound Feature	Lighting Feature
0	none	Headlight
1	Bell	Reverselight
2	Horn - Long Toot	Constant bright
3	Horn - Short Toot	Constant bright
4	Horn - Pre-Recorded Quill	Constant bright
5	Dynamic Brakes	Constant bright
6	Brake Release	
7	Apply Brakes (20% Per Press)	
8	1x Press: Mute/Unmute	
	2x Presses: Toggle between light and sound mode	
	4x Presses: Enter Audio Assist	
9	Rotate Horn/Bell	
10	Manual Notch +	
11	Manual Notch -	
12	Prime Mover on/off	
13	Coupling uncoupling	Not useable for lights
14		Not useable for lights
15	Momentum switch mainline/switching	Not useable for lights
16	Crew Alert	Not useable for lights
17	Windshield Wipers	Not useable for lights
18	air spitter	Not useable for lights
19-28	Un-assigned	Not useable for lights
Random Sound 1	Air Compressor	Not useable for lights
Random Sound 2	Air Spitter	Not useable for lights
Random Sound 3		Not useable for lights
Random Sound 4		Not useable for lights

# Version Number

The WOWSound Version Number can be found by reading the value in CV 248. This is necessary when looking up information in the TCS WOWSound section of our website.

## Audio Assist™

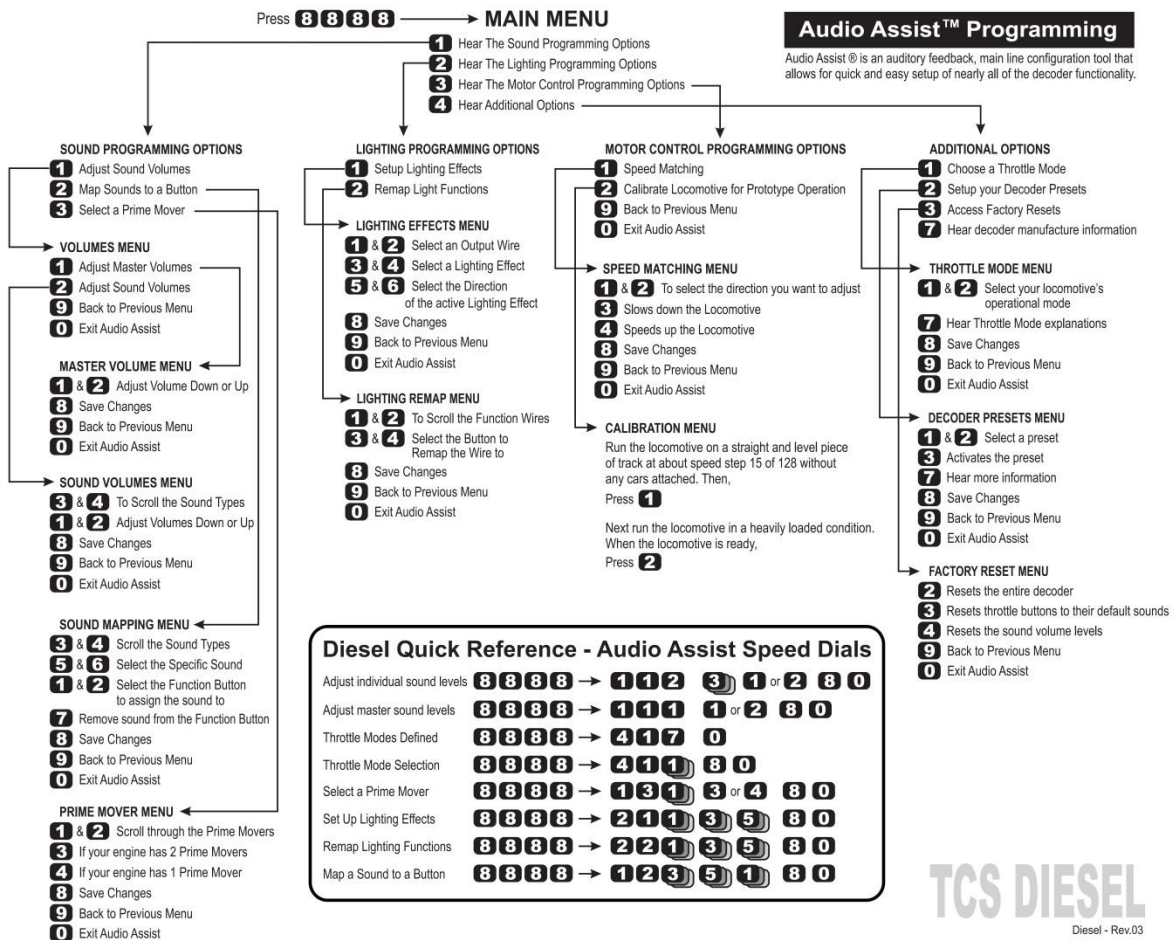


(Patent Pending)

**Audio Assist** is an auditory feedback, main line configuration tool that allows for quick and easy set-up of nearly all the sound functionality.

To enter **Audio Assist**, stop your locomotive on an operational track and press function button 8 in rapid succession 4 times. The decoder will start talking to you giving you a menu similar to a telephone answering machine. Just follow the verbal instructions to adjust or remap many of the sound options. When you have made a selection press 8 to save each selection and then press 0 to get “Goodbye” and exit **Audio Assist**.

**NOTE: Please view our instructional video about **Audio Assist** on our website.**



# Audio Assist™ Detailed explanations

## Sound Programming Options

### Menu 1.1.1 – Master Volume

The master volume controls the volume of the entire decoder and effects all sound effects

### Menu 1.1.2 sound type volumes

Sound type volumes control the volume for just one type of sound, for example all bells, all horns, etc.

### Menu 1.2 Mapping a sound to a button

This menu allows you to quickly customize your throttle. You can assign any sound to any of the 28 NMRA functions. Useful tip: Listen to the lady, don't forget to select the button you want to assign the sound to, just because you are selecting a bell doesn't mean the decoder will automatically assign it to function F1.

### Menu 1.3 Selecting a Prime Mover

On this menu you can choose which prime mover you want to have, in the EMD version you can choose between an EMD567 roots blown, EMD 567 Turbo, EMD 645 Turbo, and EMD710 prime movers. For a list of what prime mover was commonly used in what locomotive check "Prime Mover List" section of this manual. On this menu you can also set the decoder to have dual prime movers active.

## Lighting Menu

### Menu 2.1 Lighting Effects

There are 20 different lighting effects in all TCS decoders and they can be easily programmed in the WOWDiesel. There are also many customization CV's that can be used to tweak the effects, change the brightness, or change the behavior of the feature, see the lighting section for more info.

### Menu 2.2 Light function remapping

Choose which function button controls which lighting effect. Functions 0-12 can be used.

Note – lights are only active in "light mode" (press F8 twice to change between light mode and sound mode). You can also "dual enable" functions so that they are always active using indexed CV14, the "dual enabled functions" CV.

## Motor Control Options

### Menu 3.1 Speed matching

Speed matching is useful when consisting to get the locomotives to play nicely together and not work against each other. On this menu you can speed up or slow down the speed of an engine linearly across its entire speed curve. You can also do it in real time as the engine is running so you can see the changes instantly.

Note: Behind the scenes the decoder is using the "trim" feature to do this by adjusting CV's 66 and 95.

### Menu 3.2 Locomotive Calibration

Calibration is a simple two step process where the decoder adjusts and self programs itself to work best with the mechanics of your locomotive in Prototype throttle mode. A well calibrated locomotive running on a flat at low speed without a train should be in notch one. A locomotive pulling a long train up a

grade should be in notch 8. By calibrating your locomotive you can get your locomotive to behave in that realistic manner.

Note: the effects of calibration your locomotive are only active when the engine is set to prototype throttle mode, in this mode the decoder automatically decides what notch the prime mover should be in based on its speed, work load, and acceleration.

## Other Options

### Menu 4.1 Throttle selection menu

This menu allows you to choose between Traditional Throttle mode, Prototype Throttle mode, and manual notching mode. See the section titled “Throttle operations” for more information on throttle modes

### Menu 4.2 User Presets

User presets are like an alternate factory reset that you can setup. There are three presets to choose from. Each preset saves all decoder settings, including motor settings, sound settings, lighting setup, volumes, all CV's indexed and standard are saved in the preset. A use case would be to keep track of your settings, say you customize your engine and get it the way you like it, but then something goes awry and you need to do a factory reset, well instead of resetting all of the settings to the factory default you can reset it to the setting you had earlier that you had previously setup. Another Use case would be to have one preset for running in a consist, and another when running solo. Another would be having volume settings for club or public settings in one preset, and lower volumes for your home layout on another preset. There are many different ways presets can be useful.

Note: There are also other presets you can use that do not require Audio Assist or indexed CV programming to enable. See the “quick presets” section for more information.

### Menu 4.3 Factory Resets

There are multiple resets available to you, you can reset the entire decoder, or just parts of it you want to keep some of your programming but reset another part you were experimenting with.

Setting CV8=2 will also reset the entire decoder.

### Menu 4.7 Decoder info

This menu reads out the decoder type, version number, and date of manufacture.



# 4 CV Programming Overview

All NMRA, Light and motor control CV are the same as in the TCS Standard line of decoders and can be found in the **TCS Comprehensive Programming Guide** downloadable from the TCS website. TCS uses 4 indexed CV's to program the sound features found in the WOWSound decoder line.

By using CV 201, CV202, CV203 and CV204 to adjust sound features, TCS is able to include thousands of different possibilities with the WOWSound decoders. What each of the 4 CV's represents is described in the following Table 1.

**Table 1**

Action	CV 201	CV 202	CV 203	CV 204
Assign Sounds to Buttons	1	Button #	Sound # High *	Sound # Low *
Individual Volume Change	2	Volume Level ***	Sound # High *	Sound # Low *
Sound CV Change	4	CV#	CV Value High *	CV Value Low *
Factory Reset	5	None	None	Type of Reset (2-10)**
Sound Type Volume	6	Volume Level ***	Type # High *	Type # Low *

\* Found in "List of Sounds" in the WOWSound section on our website

\*\* Found in Factory Resets (see Table 2 below)

\*\*\* Found in "Sound Types" in the WOWSound section on our website

**NOTE: Visit the WOWSound section of the TCS website for instructional videos, calculators and a list of sound CV's.**

**Table 2**

**\*\* Factory Resets**

Value	Reset Actions
2	All Decoder Settings (Motor, Light Sound)
3	Sound Button Mappings
4	Individual Volumes
6	Sound CV's
7	Sound Type Volumes
8	Loads Preset #1
9	Loads Preset #2
10	Loads Preset #3

**NOTE: CV's 201, 202, 203 must be set before CV 204 is written. The Full programming operation takes place ONLY when CV 204 has been programmed.**

## 4 CV Write Operation

1. Determine the type of programming action you wish to perform and enter the corresponding value from Table 1 in CV 201.

(Example: Assigning a sound to a button enter a value of 1 into CV 201)

2. If you are looking to perform any operation besides a factory reset enter the value of the specific field you are operating on into CV 202.

(Example: when mapping a sound to function button 12 enter a value of 12 into CV 202)

3. Enter the “High” or “Course” value (found in the appropriate table on our website) into CV 203

(Example: To assign “Strasburg #475 Air powered bell” enter a value of 0 into CV 203)

4. Enter the “Low” or “Fine” value (found in the appropriate table on our website) into CV 204

(Example: To assign “Strasburg #475 Air powered bell” enter a value of 1 into CV 204)

**The full programming operation takes place ONLY when CV 204 has been programmed.**

## 4 CV Read Operation

1. Simply add 100 to whatever value you would program into CV 201 to perform a write operation.

(Example: Using our example above add 100 to 1 for a value of 101. Program a value of 101 to CV 201)

2. Now enter the value of the specific field you want to read into CV 202.

(Example: Write a value of 12 into CV 202)

3. Now write ANY value to CV 204. (to trigger the read)

(Example: Write a value of 10 (it can be anything) into CV 204)

4. Now you can Read the values of CV’s 202, 203, and 204 on your programming track using CV read back.

## Random Horn Quill

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Horn Quill	4	1	0	0-255	0	7

Allows the user to select which of the 3 Horn Quills for each horn is randomly used when the Horn Quill button is pressed.

If Bit 7 (128) is not selected, Active quills will play in random order.	Short Quill Active	Medium Quill Active	Long Quill Active	Not Used	Not Used	Not Used	Not Used	Play Active Quills in Order
	1	2	4	8	16	32	64	128
	<b>Add values above for CV204</b>							

## Random Sounds

### Random Sound 1 Frequency

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound 1 Frequency	4	2	0	0-255	0	200

This sets how often Random Sound 1 plays. (Default Air Pump) The higher the value in CV 204 the more frequent the sound plays.

### Random Sound 2 Frequency

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound 2 Frequency	4	3	0	0-255	0	200

This sets how often Random Sound 2 plays. (Default Air Spitter) The higher the value in CV 204 the more frequent the sound plays.

## Random Sound 3 Frequency

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound 3 Frequency	4	4	0	0-255	0	64

This sets how often Random Sound 3 plays. (Default Not Used) The higher the value in CV 204 the more frequent the sound plays.

## Random Sound 4 Frequency

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound 1 Frequency	4	5	0	0-255	0	16

This sets how often Random Sound 4 plays. (Default Not Used) The higher the value in CV 204 the more frequent the sound plays.

## Random Sound Overall Timer

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound Overall Timer	4	6	0-255	0-255	3	0

This sets the size of the time block for Random Sounds. The higher the value in CV 203 and CV 204 the larger the block of time for Random Sound calculations.

## Random Sound Cutout Speed

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Random Sound Cutout Speed	4	7	0	0-126	0	15

This sets at what speed step the Random Sounds cutout. The higher the value in CV 204 the higher the speed step that the Random Sounds stop playing.

# Throttle Operations

There are three different throttle modes in the WOWDiesel sound decoder. Throttle modes can be changed using Audio Assist (menu 4, then 1) Or with indexed CV's. CV201 = 4, CV202 = 9, CV203 = 0, CV204 = 0-2, Use 0 for Traditional Throttle mode, 1 for prototype mode (default), and 2 for manual notch mode. Below is a description of the three throttle modes

## Throttle Mode

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Throttle Mode	4	9	0	0-2	0	1

There are 3 different Throttle Operating Modes for the WOWSound Diesel Decoder.  
0 = Traditional Throttle Mode, 1 = Prototype Mode, 2 = Manual Notch Mode

## Traditional Throttle Mode

Traditional Throttle mode is the throttle mode you may be familiar with where the notch the prime mover is in is directly tied to the speed of the throttle. For example at speed steps 1 – 5 the prime mover will be in notch 1, between steps 6 and 10 the prime mover will be in notch 2. The notch set points are programmable using indexed CV's 31 – 38

## Notch 1 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 1 Transition Speed Step	4	31	0	0-128	0	1

At this value and below the next notch set point the Prime Mover will play Notch 1

## Notch 2 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 2 Transition Speed Step	4	32	0	0-128	0	6

At this value and below the next notch set point the Prime Mover will play Notch 2

## Notch 3 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 3 Transition Speed Step	4	33	0	0-128	0	13

At this value and below the next notch set point the Prime Mover will play Notch 3

## Notch 4 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 4 Transition Speed Step	4	34	0	0-128	0	20

At this value and below the next notch set point the Prime Mover will play Notch 4

## Notch 5 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 5 Transition Speed Step	4	35	0	0-128	0	27

At this value and below the next notch set point the Prime Mover will play Notch 5

## Notch 6 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 6 Transition Speed Step	4	36	0	0-128	0	34

At this value and below the next notch set point the Prime Mover will play Notch 6

## Notch 7 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 7 Transition Speed Step	4	37	0	0-128	0	41

At this value and below the next notch set point the Prime Mover will play Notch 7

## Notch 8 Transition Speed Step

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Notch 8 Transition Speed Step	4	38	0	0-128	0	48

At this value the Prime Mover will play Notch 8

## Prototype Mode

Prototype mode is one of the crowning jewels of the WOWSound decoder. In prototype mode the decoder uses TCS industry leading auto adjusting BEMF technology to allow the decoder to automatically choose what notch the engine should be in! For example when the train hits a grade you will hear the prime mover notch up to supply more power to the traction motors, crest the grade and the prime mover will notch down as the train coasts down hill! Starting out with a heavy train? Hear the prime mover notch up into gear, watch the train start to accelerate, and once you are up to speed the

locomotive will notch down to safe fuel and maintain speed. The WOWDiesel is the first and only decoder in the world to have this feature. Prototype mode, combined with TCS realistic braking operations, will bring a whole new dimension of fun to your models!

Prototype mode is enabled by default and can be selected using Audio Assist (menu 4, then 1) Or with indexed CV's. CV201 = 4, CV202 = 9, CV203 = 0, CV204 = 1.

Since every locomotives mechanical specifications are different TCS has implemented a simple two step process that allows users to **calibrate** their locomotive. To **calibrate** your locomotive enter Audio Assist mode, select the motor menu (menu 3) then hit button 2 for the calibration menu.

You can also have fun tinkering and customize the engine to behave exactly how you want to in prototype mode by using the indexed CV's associated with prototype mode. To program the Prototype mode CV's set CV201 = 4, CV202 = the CV you want (See chart below), CV203 = 0, CV204 = value 0-255.

## BEMF Calibration – Low Setting

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
BEMF Calibration – Low Setting	4	17	0-255	0	0	10


For use in “Prototype Throttle Mode”. At approximately this BEMF setting the Prime Mover should be in

Notch 1. TCS recommends using  to calibrate this CV for you (on the motor calibration menu)

## BEMF Calibration – High Setting

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
BEMF Calibration – High Setting	4	18	0-255	0	0	40

For use in “Prototype Throttle Mode”. At approximately this BEMF setting the Prime Mover should be in

Notch 8. TCS recommends using  to calibrate this CV for you (on the motor calibration menu)

## Prototype Mode – Speed to Notch Ratio

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Prototype Mode – Speed Effect	4	25	0	0-255	0	9

For use in “Prototype Throttle Mode”. This variable controls how the speed effects the prime mover, the higher the CV number the greater the notch the prime mover will be in at higher speeds



## Prototype Mode – Momentum Effect

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Prototype Mode – Accel/Decel Effect	4	26	0	0-255	0	20

For use in “Prototype Throttle Mode”. Higher values in this CV will make the prime mover notch up/down more from acceleration and deceleration.

## Prototype Mode – BEMF Adjustment

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Prototype Mode – Load Effect	4	27	0	0-255	0	50

For use in “Prototype Throttle Mode”. This controls how much of an effect load has on the prime mover. Higher values simulate bigger loads.

## Prototype Mode – Notching Sensitivity (Hysteresis)

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Prototype Mode - Sensitivity	4	28	0	0-255	0	80

For use in “Prototype Throttle Mode”. This CV controls how much of a change +/- is needed for the notch to change up or down

## Manual Notching

Manual notching gives direct control of the prime mover to the user. In manual notch mode the engine speed, load, and acceleration have no effect on the prime mover notch. Manual Notching can be enabled in Audio Assist (menu 4, then 1) Or with indexed CV’s. CV201 = 4, CV202 = 9, CV203 = 0, CV204 = 2. By default function F10 will notch the prime mover up and Function F11 will notch it down. (To learn how to remap that see the section on “setting up sounds”) Manual notch mode is also the only throttle mode that is always active, if manual notching is done while Traditional Throttle mode or Prototype mode is active the prime mover will temporarily revert to manual notch mode until a speed change is made on the throttle, at which point Traditional Throttle mode or Prototype Throttle mode will be resumed.

# Automatic Sounds

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Automatic Sounds	4	12	0-15	0-246	3	0

This sets which automatic and random sounds are active. See Below for values

Enable Random Sound #1	Enable Random Sound #2	Enable Random Sound #3	Enable Random Sound #4	Crew Alert	Not Used	Not Used	Not Used	Auto Forward Horn	Auto Reverse Horn	Auto Stop Horn	Auto Direction Change Sound
1	2	4	8	1	2	4	8	16	32	64	128
Add values above for CV 203				Add values above for CV204							

# Dual Mode Functions (Light & Sound Mode)

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Dual Mode Functions (Light & Sound Mode)	4	14	0-255	0-255	2	3

This sets which function buttons work in both Light Mode and Sound Mode. See below for values.

F0F 1	FOR 2	F1 4	F2 8	F3 16	F4 32	F5 64	F6 128
Add values above for CV 204							
F7 1	F8 2	F9 4	F10 8	F11 32	F12 32	F13 64	F14 128
Add values above for CV 203							

## User Options

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
User Options	4	19	0	0-255	18	251

This sets which User Option is activated. See table below for values.

Manual Notching Feedback	Notch Down when Brakes are set	Mute On Start Up	Switch/Mainline Feedback	Rotate Horn/Bell Feedback	Light Mode/Sound Mode Feedback	Audio Shutoff Timer	Using Digitrax Throttle (Func 2 Mom.)	Dual Prime Movers	PM Notches up with Dynamic Brakes	Reverse Direction of Auto Horns	Disables Prime Mover Notch Rate Stair Stepping in Switching Momentum <u>Ver 4 Only</u>	Disables Prime Mover Notch Rate Stair Stepping in Mainline Momentum <u>Ver 4 Only</u>
1	2	4	8	16	32	64	128	1	2	4	8	16
Add Values for CV204								Add Values for CV203				

Note: If **“Mute On Startup”** is activated, Button 12 starts the Prime mover. If your throttle does not have Button 12, remap **“Prime Mover Ignition”** to a button that is available.

## Audio Auto Shutoff Time

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Audio Auto Shutoff Time	4	21	0-255	0-255	10	40

Sets how long the locomotive must sit idle before the sound will shut off. The higher the value in CV’s 203 & 204 the longer it will sit before the sound shuts off. (The default setting is approx. 3 min.)

**NOTE: Audio Auto Shutoff Timer must be activated in “User Options” for this to work.**

## Crew Alert

The “Crew Alert” or dead mans switch is a safety feature required in modern locomotives. If there is no user input in the form of speed changes or function presses after a programmable amount of time the Crew Alert alarm will go off. If no user input is received after 15 seconds of the alarm sounding the locomotive will go into “safety mode” where the prime mover will ramp down to idle and the train brakes will be applied to stop the train. To exit safety mode release the brakes or increase the throttle speed. A light function can optionally be programmed to turn on with the Crew Alert Alarm (TCS suggests the “Flashing Light” feature). To turn on the Crew Alert feature simply turn on the Crew Alert function (function 16 by default). You will hear the alarm momentarily to signify that it has been turned on. To turn off the feature turn off the Crew Alert function. The Crew Alert feature can also be enabled by programming the **“Automatic Sounds CV”**

## Crew Alert Timer

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Crew Alert Timer	4	29	0-255	0-255	0	43

Sets how long the engineer must be idle before the Crew Alert Sounds

## Crew Alert Light Function

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Crew Alert Light Function	4	30	0	0-255	0	13

Determines which Light Function turns on when the Crew Alert Sounds. (Use a value greater than 12 to disable this feature)

## Momentum

### Switch Mode Acceleration Rate

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Switch Mode Acceleration Rate	4	50	0	0-255	0	5

The Value in CV204 is the value loaded into CV3 when Switching Momentum is enabled

### Switch Mode Deceleration Rate

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Switch Mode Deceleration Rate	4	51	0	0-255	0	5

The Value in CV204 is the value loaded into CV4 when Switching Momentum is enabled

## Mainline Mode Acceleration Rate

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Mainline Mode Acceleration Rate	4	52	0	0-255	0	20

The Value in CV204 is the value loaded into CV3 when Mainline Momentum is enabled

## Mainline Mode Deceleration Rate


Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Mainline Mode Deceleration Rate	4	53	0	0-255	0	60

The Value in CV204 is the value loaded into CV4 when Mainline Momentum is enabled

## Resets and Presets

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Individual Sound Volumes	5	0	0	Reset or Preset Type 2 - 10	0	Varies

Allows you to do several different Factory Resets depending on your needs. You can also call up one of 3 User Presets that you may have saved using .

User Presets are available in WOWSound decoders starting with Ver 3. They allow you to save 3 versions of your own sound settings for easy resets to settings other than the factory default values. User presets can only be setup using . Enter the value needed from the chart below into CV 204.

# WOWSound Brake Operation

The WOWSound Diesel sound decoder uses a slightly different type of “Brake” than the TCS Standard decoders. WOWSound uses a separate “Brake” button (default is Button 7) and a separate “Brake Release” (default is Button 6).

Every time you press the “Brake” button there is a 20% brake application as well as a random brake squeal sound. If you continue to press the “Brake” button several more times there is an additional 20% brake application each time you press the button. With 5 presses of the “Brake” button you are in emergency and the loco stops very quickly. Anytime that you press the “Brake Release” button you will hear the air release from the brakes while the brakes release and you can continue. Increasing the throttle setting will also release the brakes.

Pressing the “Brake Button” will apply the brake regardless of the throttle setting. So you can simulate “Power Braking” with passenger trains to keep the train stretched etc.

The “Brake” and “Brake Release” buttons can be re-mapped to any other buttons desired. See “Re-Map Sounds to Function Buttons”. While the default values for the Braking rates work very well for most people; they are adjustable using CV’s. See Chart below.

CV	Default Value	Brake Rate	The Larger the number the longer it will take to come to a complete stop.
CV 183	32	Brake Rate 1 (1 press)	
CV 184	26	Brake Rate 2 (2 presses)	
CV 185	16	Brake Rate 3 (3 presses)	
CV 186	8	Brake Rate 4 (4 presses)	
CV 187	3	Brake Rate 5 (5 presses)	

# Brake Grinding Sound Start Speed

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Brake Grinding Sound Start Speed	4	13	0	0-126	0	15

This sets the speed step that The Brake Grinding Sound is activated. The higher the value in CV 204 the higher the speed step the Grinding Sound will start.

# Dynamic Brake Operation

The WOWSound Diesel decoder is the first sound decoder to have working Dynamic Brakes. To activate the Dynamic Brake press the Dynamic Brake button (Default is button 5)

Dynamic Brake Button Press	Functionality
Button Press #1	<ol style="list-style-type: none"> <li>1. Prime Mover will go to notch 3 (default) or whatever has been preset in (Dynamic Brake Notch Setting)</li> <li>2. The Dynamic Brake Fans come on</li> <li>3. No Locomotive speed change</li> </ol>
Button Press #2	<ol style="list-style-type: none"> <li>1. Dynamic Brake Fans will increase in intensity</li> <li>2. Prime mover will notch up 1 (enabled by default, can be disabled in the "User Options CV")</li> <li>3. Locomotive speed will drop based on settings in CV190 &amp; CV191</li> </ol>
Button Press #3	<ol style="list-style-type: none"> <li>1. Dynamic Brake Fans will increase in intensity again</li> <li>2. Prime mover will notch up 1 (enabled by default, can be disabled in the "User Options CV")</li> <li>3. Locomotive speed will drop based on settings in CV190 &amp; CV191</li> </ol>
Button Press #4 and up	<ol style="list-style-type: none"> <li>1. Locomotive speed will continue to drop based on the settings in CV190 &amp; CV191 until the speed reaches the lower limit set in CV189 (Default is Speed Step 10)</li> </ol>
Press Button #6	<ol style="list-style-type: none"> <li>1. Pressing the Brake Release Button (Default Button 6) turns off the dynamic brake.</li> <li>2. Dynamic Brake fans shut down</li> <li>3. Prime Mover notch is now determined using the active throttle mode</li> <li>4. Locomotive speed returns to the speed set by the throttle.</li> </ol>

## CV's Used To Customize Dynamic Brake Operation

CV #	Functionality	Default
CV 189	Lowest Speed Step(128 SS Mode) Locomotive can go with Dynamic Brakes Turned On	10
CV 190	Deceleration Rate for Dynamic Brakes	50
CV 191	Number of speed steps the locomotive will slow down with every press of the Dynamic Brake button	5

## Dynamic Brake Notch Setting

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Dynamic Brake Notch Setting	4	15	0	0-9	0	3

This sets what notch the Prime Mover will go to when Dynamic Brakes are turned on. If a value of 9 is entered, the decoder will choose its own notch rate based on the current throttle mode.

## Setting up Sounds

Setting up sounds and customizing your engine is easier than ever with the WOWSound. There are two ways to setup sounds, the easiest method being Audio Assist (Menu 1.2). You can assign any sound to any of the 28 NMRA functions. You can also use Audio Assist (Menu 1.1) to adjust the volume of any sound. See the Audio Assist section for more information on how to do that, or try it out for yourself, press function 8 four times in rapid succession on your decoder and the decoder will enter Audio Assist mode and talk to you, walking you through how to program it, It's easy just listen and follow along! The other way to setup sounds is through CV programming. Since the WOWSound can have over 65,000 sounds loaded into it, and each sound has its own individual volume, TCS created "indexed CVs" to be able to program and customize the WOWSound. To keep indexed CV programming simple TCS created a programming tool available on the WOWSound section of our website that calculates and gives CV values based on your input in a simplistic and easy to use way. If you want to know more about indexed CV programming see the "indexed CV programming" section of this manual.

## Re-Map Sounds to Function Buttons

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Re-Map Sounds to Function Buttons	1	Function 0 to 32	Sound # High Byte	Sound # Low Byte	<b>Varies</b>	<b>Varies</b>

You can re-map any sound to any button or the 4 random sound outputs. Function Buttons 0 – 28 with Random Sound 1 = 29, Random Sound 2 = 30, Random Sound 3 = 31, Random Sound 4 = 32. **Sound # High Byte & Low Byte Numbers can be found in the WOWSound section of our website.**

## Rotate Bell and Horn

While it's easy to program sounds using Audio Assist TCS made an even easier way to change your horn or bell, and you can even do it while running down the main line! By default function 9 is the "Rotate" feature. Press F9 and the decoder rotate the horn to the next horn and announce what the new horn is. The rotate feature will rotate all of the active horns on the decoder including the long toot, short toot, quill, and directional horns (directional horns are not enabled by default but can be with the "automatic sounds" indexed CV). If you want to change the bell play the bell, then press F9 and the decoder will rotate the active bell and play a short sample of what it sounds like. If you want to change the horn again press one of the horn buttons then press F9 and the decoder will once again switch to the next active horn and announce the new horn.

Also of note is that you can rotate forwards and backwards through the available bells/horns. Lets say you are rotating through and you just passed the horn you want, well instead of rotating all the way through the horns to get back to the one you want you can simply reverse the direction of the locomotive and now the rotate feature will cycle through the sounds in the other direction.

Note: The horns are in alphabetical order



## Horn Set

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Horn Set	4	8	0	Horn #	0	0

This sets which Horn Set plays in Long, Short and Horn Quill. **Horn Set number can be found in the WOWSound section of our website.**

## Bell Selection

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Bell selection	4	23	0	Bell #	0	0

This selects which Bell is active. **Bell sound number can be found in the WOWSound section of our website.**

## Volume Control

## Global Volume

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Global Volume	4	10	0	0-100	0	100

This sets the Global Volume of the WOWSound decoder. (WOWSound has a range from 0 to 100 with 100 being full volume.)

## Sound Type Volume

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Sound Type Volume	6	Volume Setting	0	Sound Type #	0	Varies

This sets the Volume of a particular Sound Type. Volume range is from 0 to 100 with 100 being full volume. **The sound Type number can be found in the WOWSound section of our webpage.**

# Individual Sound Volumes



Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Individual Sound Volumes	2	Volume Setting	Sound # High Byte	Sound # Low Byte	Varies	Varies

You can set the volume of each sound independently. Volume range is from 0 to 100 with 100 being full volume. **Sound High Byte & Low Byte Numbers can be found in the WOWSound section of our website.**

## Consisting

The WOWDiesel supports both basic and advanced (CV19) consisting. Below are a few tips for consisting the WOWDiesel decoder.

When consisting the WOWDiesel with other model sound decoders you can set the WOWDiesel to Traditional Throttle mode, or manual notch mode, so that the prime mover notches of each decoder stay in sync. It also helps to have each decoders acceleration and deceleration values match.

If consisting a WOWDiesel with other WOWDiesels in prototype throttle mode TCS recommends calibrating the locomotives simultaneously to keep notches in sync. Using Traditional Throttle mode or manual notch mode will also keep the notches in sync.

## Speed Matching

Speed matching can be done most easily by using the speed matching menu of Audio Assist (menu 3, then 1) or by using Trim (CV's 66 and 95) TCS also supports CV's 2, 5, and 6 and user loadable speed tables. TCS also offers a line of "Train Speed" speedometers which can be useful when speed matching locomotives.

## Prime Mover Selection

The available prime movers depends on which WOWSound Diesel decoder you purchased. The WOWDiesel decoders are manufacture specific, so all available EMD prime movers are in one decoder, all available GE Prime movers are in another decoder. Prime movers can be "Dual enabled" for locomotives such as an E8 or "80 tonner" locomotives which had more than one prime mover. The delay time between the prime movers is not normally noticeable in the prototype however in the WOWDiesel decoders you can control the delay time. The prime mover can be turned on and off using the "Prime mover ignition button (on function 12 by default).

# Prime Mover Type

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Prime Mover Type	4	11	0	0-# of Prime Mover	0	0

The Prime Mover number can be found in the WOWSound section of our webpage at [www.tcsdcc.com](http://www.tcsdcc.com)

## Dual Prime Mover Delay

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Dual Prime Mover Delay	4	22	0	0-20	0	5

When Dual Prime Movers is active (User Options or Audio Assist™), this sets the time delay when the two prime movers notch up. Delay Time in Seconds = Value/2

## AUX Input Loop Timer (WOW501 Only)

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Controls How Long a “Looped” Sound plays when Triggered by the AUX Input	5	40	0	0	0	42

This Controls the amount of time a “Looped” sound will play when it is triggered by the Aux Input (Reed Switch Input) A Value of 42 give approx. 3 seconds of loop time

## Smoke Unit “ON” Time Adjustment (WOW501 Only)

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Sets the time the fan is ON in Smoke unit	6	41	0	0	0	0

This adjusts the amount of time that the Smoke Generator Fan is on per PWM Pulse (Chuff). A value GREATER than 128 decreases the time. A value LESS than 128 increases the time

## Smoke Unit (OFF) time Adjustment (WOW501 Only)

Functionality	CV 201 Value	CV 202 Value	CV 203 Value	CV 204 Value	CV 203 Default Value	CV 204 Default Value
Sets the time the fan is OFF in Smoke unit	7	42	0	0	0	0

This adjusts the amount of time that the Smoke Generator Fan is OFF per PWM Pulse (Chuff). A value GREATER than 128 decreases the time. A value LESS than 128 increases the time

## Smoke Unit Turn On and Off (WOW501 Only)

The Smoke unit is turned on and off with a conventional CV. CV58 set to a value of 9 make Button 6 turn the smoke unit on or off. This is only on the WOW501 decoder.

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