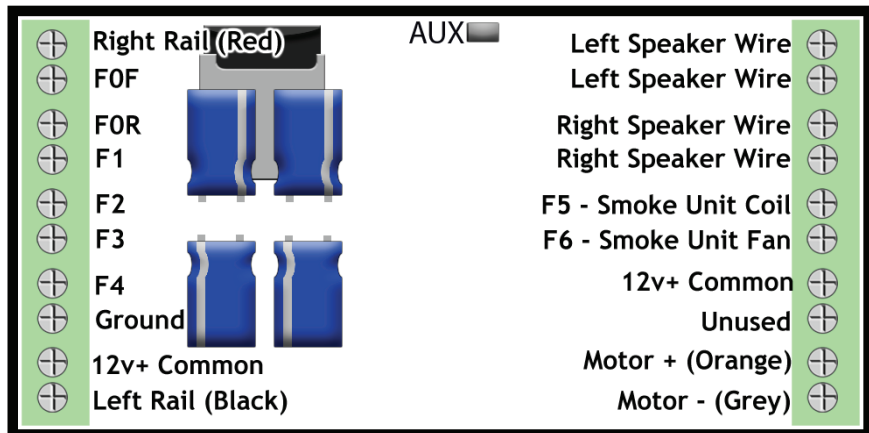


**WARRANTY PROCEDURE:** All decoders are covered by a one year goof proof, no questions asked warranty. **Please return in a small box.**

You **MUST** register the failed decoder on our website at [www.tcsdcc.com](http://www.tcsdcc.com)  
Follow the instructions on the web site before returning any decoders to TCS.

**Important:** For maximum enjoyment of the dynamic auto notching feature of this decoder we highly recommend that you calibrate the decoder using Audio Assist. This is one of the most important features of this decoder! You will love the results. See the video tutorial on the TCS web site!

## WIRING DIAGRAM



## AUX Input Pad

- The AUX input pad can be used to trigger a sound effect.
- Use a reed switch connected to the AUX input and decoder ground.
- Use Audio Assist (Patent Pending) to select a triggered sound to play.

## Video Tutorials

Important! First time users should view our instructional videos in the WOWSound section of the TCS website for a full range of information on using this decoder.

Compatible with NMRA DCC standards.

Made by TCS in the USA.

**Train Control Systems**  
P.O. Box 341  
845 Blooming Glen Rd.  
Blooming Glen, PA 18911



Phone **215-453-9145**  
Fax **215-257-0735**  
Email [tcs@tcsdcc.com](mailto:tcs@tcsdcc.com)  
Web [www.tcsdcc.com](http://www.tcsdcc.com)



**Our Famous GOOF PROOF NO  
Questions Asked Warranty**

# WOW Diesel

1605 **WOW501  
Diesel**

Scale	Functions	Function Rating	Continuous/Peak
S/O/G	8	1A	5/10 Amp

Dimensions: 3" x 1.41" x .54" or 76.2mm x 36.83mm x 13.716mm

## Main Features of this Decoder

- **Includes 13 Prime Movers** This decoder includes the EMD 567 roots blown, 567 turbo, 645 turbo, three different 645 non-turbo's (roots blown), 710 prime mover sounds, as well as two ALCO 251's, ALCO 244, GE FDL16, and two different 7FDL16's.
- **True CD Quality Audio** Enjoy rich, full audio with true to life 16bit 44,100Hz sounds. No one else even comes close.
- **User Calibrated Load-Based Auto-Notching** Auto-notching customized for your layout and locomotive. Hear your loco work prototypically on your layout!
- **5 Amps of Power** This decoder provides a full 5 Amps of total power for motor and lights.
- **Back EMF Load Compensation** for superior slow speed control in excellent synchronization with the auto-notching.
- **Tons of Sounds!** 30+ different bells and 30+ horns plus much more.
- **Audio Assist™** (Patent Pending) With Audio Assist™ the decoder comes alive and talks you through configuring sounds and lights.
- **Two separate, mono, 8 ohm audio outputs**
- **Built in Keep-Alive™**
- **Screw Terminals**
- **12v Regulated output** for consistent lighting circuits.
- **Auxiliary input** for triggered sound effects.
- **Supports Smoke Units** Automatically synced with exhaust sound

Version 4



1605 **WOW501  
Diesel**

## BASIC CONFIGURATION

NOTE: Cells highlighted in grey identify the default value for that CV.

### CV 29 Configuration

A	0	1	Reverse the direction the engine runs.
B	2	2	Use 28/128 speed step mode.
C	0	4	Enable analog ( DC ) operation.
D	0	16	Make the Loadable Speed Tables active.
E	0	32	Make the decoder address 128 or higher.
CV 29	2		← Program the sum of the values you choose into CV 29

### 2 Digit Address

Use if the address is 127 or less.

CV 1	3		← Record your choice here.
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### Consist Address

Add 128 to reverse the loco when in consist.

CV 19	0		Use a 2 digit address when in a consist ( Multiple units ).
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### Decoder Lock

CV 15	0	All unlocked = 0	Decoder to unlock = 1 - 6	All locked = 7			
CV 16	2	Mobile = 1	Sound = 2	Light Only = 3	4	5	6

To unlock a decoder, make CV 15 = 0 or CV 15 = CV 16. To lock a decoder, make CV 15 not equal to CV 16. To lock all same address decoders, make CV 15 = 7.

### Back EMF and Rule 17 Dimming Options

Button braking = 8		Dims when stopped = 16		Opposite light dim = 32	
CV 61	9	BEMF, Brake, and Dimming Control		Dims when stopped+Opposite dim = 48	
CV 64	15	Dimmed Brightness ( 2 - 6 for LEDs, 12 - 18 for Bulbs )			

### Consist Lighting Control

CV 21	255	Extra Functions (F1-F8)	F1 = 1, F2 = 2, F3 = 4, F4 = 8, F5 = 16 F6 = 32, F7 = 64, F8 = 128 (Add together for multiple functions)
CV 22	255	Headlight Functions	White and Yellow Wire = 3

### Sound Set Version

CV 248	4	This is a read only CV with the version number of the sound set.
--------	---	--

## Sound and Light Mode Operation

To maximize the amount of control you have with the limited number of function buttons we have created two distinct control modes:

**Sound Mode** and **Light Mode**. In **Sound Mode** the functions will only operate the mapped sounds. In **Light Mode** the function button will perform any lighting operation that is mapped to it.

For certain applications it may be desirable to play a sound at the same time a lighting function changes. To setup your own dual-mode functions visit the WOWSound section of the TCS website for more information.

For more information on decoder features or programming visit:  
[www.tcsdcc.com](http://www.tcsdcc.com) and check out the **Comprehensive Programming Guide**.

## MOTOR CONTROL

### Speed Graph

CV 2	0	Start Volts -- Set the voltage when the throttle is first applied.
CV 6	0	Mid Volts -- Set the voltage when the throttle is at midpoint.
CV 5	0	Top Volts -- Set the voltage when the throttle is at full speed.

### Momentum

CV 3	32	Acceleration -- Larger values add time to each speed step.
CV 4	96	Deceleration -- Larger values add time to each speed step.
CV 23	0	*Acceleration Adjustment when in Consist
CV 24	0	*Deceleration Adjustment when in Consist

\*Values above 128 increase the adjustment \* Values below 128 decrease the adjustment

### Motor Trim This can be adjusted via Audio Assist™

CV 66	128	Forward Trim	Values above 128 increase speed, values below 128 decrease speed.
CV 95	128	Reverse Trim	

### Brake Rate With each brake application the decoder moves to the next brake rate.

CV 183	32	Brake Rate 1 (1 Press)	The larger the number the longer it will take to come to a complete stop.
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)	

## LIGHTING CONTROL

Lighting Features		Light Effect	fwd	rev	both
Light Function Wires		Constant Bright Light	0	16	32
CV 49	0	Random Flicker (fire box) 1	1	17	33
CV 50	16	Mars Light	2	18	34
CV 51	32	Flashing Light	3	19	35
CV 52	32	Single Pulse Strobe 1	4	20	36
CV 53	32	Double Pulse Strobe 1	5	21	37
CV 54	32	Rotary Beacon	6	22	38
CV 55	32	Gyra Light	7	23	39
CV 58	32	Rule 17 (dimnable light)	8	24	40
		Ditch Light ( Left or Right )	10	26	42
		Ditch Light ( Other side )	11	27	43
		Constant Dim 1	12	28	44
		*Auto-Mars	13	29	45
		Brake Light(s)	14	30	46
		Single Pulse Strobe 2	15	31	47
		Double Pulse Strobe 2	64	80	96
		Random Flicker 2	65	81	97
		Constant Dim 2	66	82	98
		Constant Dim 3	67	83	99
		Constant Dim 4	68	84	100

Set CV58=9 to enable smoke unit with synchronized exhaust output on F5 & F6.

### Rule 17 Dimming Control

Rule 17 Dimming is turned on and off by button 4 as the default, but this value can be remapped via CV 123. See the Function Remapping guide on the literature section of [www.tcsdcc.com](http://www.tcsdcc.com) for more info.

## Sound CV's

Visit [TCSGCC.com](http://TCSGCC.com) for the WOWSound programming tool.

CV 201	CV 202	Action	CV 203 Default Value	CV 204 Default Value
4	1	Active Horn Quill	0	7
4	2	Random Sound 1 Frequency	0	200
4	3	Random Sound 2 Frequency	0	200
4	4	Random Sound 3 Frequency	0	64
4	5	Random Sound 4 Frequency	0	16
4	6	Random Sound Overall Timer	3	0
4	7	Random Sound Cutout Speed	0	15
4	8	Default Horn Set	0	0
4	9	Throttle Type	0	1
4	10	Global Volume	0	100
4	11	Prime Mover Type	0	0
4	12	Automatic Sounds	3	0
4	13	Brake Grinding Noise Start Speed	0	15
4	14	Dual Enabled Functions	2	3
4	15	Dynamic Brake Notching	0	3
4	17	Automatic Notching Calibration LOW	0	10
4	18	Automatic Notching Calibration HIGH	0	40
4	19	User Options CV	2	251
4	21	Audio auto shut-off time	10	40
4	25	Prototype - Speed to Notch	0	9
4	26	Prototype - Momentum Notch	0	20
4	27	Prototype - Load Effect	0	50
4	28	Hysteresis - Change to Notch	0	80
4	29	Crew Alert Timer	0	43
4	30	Crew Alert Light	0	13
4	31	Notch 1 - Speed Step Transition	0	1
4	32	Notch 2 - Speed Step Transition	0	6
4	33	Notch 3 - Speed Step Transition	0	13
4	34	Notch 4 - Speed Step Transition	0	20
4	35	Notch 5 - Speed Step Transition	0	27
4	36	Notch 6 - Speed Step Transition	0	34
4	37	Notch 7 - Speed Step Transition	0	41
4	38	Notch 8 - Speed Step Transition	0	48

## Operation and Button Mappings

In the TCS WOWSound decoders we have reinvented the way we think about model locomotive operation to reflect that of the prototype. Currently, most model trains operate without a brake separate from the throttle speed. We call this kind of operation "**Traditional Mode**" because your locomotive will operate similarly to other decoders you may have. With our new default "**Prototype Mode**" operation users are expected to apply and release brakes separately from adjusting the throttle just like the real thing, though the brakes will automatically release when the throttle is increased.

All of the sounds in this decoder can be remapped to any function except the toggle between light and sound mode and the Audio Assist™ mapping.

Function Button	Feature
1	Bell
2	Horn - Long Toot
3	Horn - Short Toot
4	Horn - Quill
5	Dynamic Brakes
6	Brake Release
7	Train Brake (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 Up
11	Manual Notch Down
12	Prime Mover On/Off
13	Coupling Sound
14	Uncoupling Sound
15	Mainline/Switching Momentum
16	Crew Alert On/Off
17	Windshield Wipers
18	Airpitter

NOTE: Functions 19-28 are supported but there are no features mapped to these functions by default.

**Calibration Note:** Please note that it is highly recommended to perform the motor calibration in Audio Assist™ prior to operating in Prototype mode.

Press **8 8 8 8** → **MAIN MENU**

# Audio Assist™ Programming

Audio Assist® is an auditory feedback, main line configuration tool that allows for quick and easy setup of nearly all of the decoder functionality.

- 1** Hear The Sound Programming Options
- 2** Hear The Lighting Programming Options
- 3** Hear The Motor Control Programming Options
- 4** Hear Additional Options

## SOUND PROGRAMMING OPTIONS

- 1** Adjust Sound Volumes
- 2** Map Sounds to a Button
- 3** Select a Prime Mover

### VOLUMES MENU

- 1** Adjust Master Volumes
- 2** Adjust Sound Volumes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### MASTER VOLUME MENU

- 1 & 2** Adjust Volume Down or Up
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### SOUND VOLUMES MENU

- 3 & 4** To Scroll the Sound Types
- 1 & 2** Adjust Volumes Down or Up
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### SOUND MAPPING MENU

- 3 & 4** Scroll the Sound Types
- 5 & 6** Select the Specific Sound
- 1 & 2** Select the Function Button to assign the sound to
- 7** Remove sound from the Function Button
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### PRIME MOVER MENU

- 1 & 2** Scroll through the Prime Movers
- 3** If your engine has 2 Prime Movers
- 4** If your engine has 1 Prime Mover
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

## LIGHTING PROGRAMMING OPTIONS

- 1** Setup Lighting Effects
- 2** Remap Light Functions

### LIGHTING EFFECTS MENU

- 1 & 2** Select an Output Wire
- 3 & 4** Select a Lighting Effect
- 5 & 6** Select the Direction of the active Lighting Effect
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### LIGHTING REMAP MENU

- 1 & 2** To Scroll the Function Wires
- 3 & 4** Select the Button to Remap the Wire to
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

## MOTOR CONTROL PROGRAMMING OPTIONS

- 1** Speed Matching
- 2** Calibrate Locomotive for Prototype Operation\*  
\*This step is important to maximize your enjoyment of this decoder. Auto-notching makes your loco sound like the real thing when it's working hard or running light. Perform this calibration to optimize the auto-notching feature.
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### SPEED MATCHING MENU

- 1 & 2** To select the direction you want to adjust
- 3** Slows down the Locomotive
- 4** Speeds up the Locomotive
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

## ADDITIONAL OPTIONS

- 1** Choose a Throttle Mode
- 2** Setup your Decoder Presets
- 3** Access Factory Resets
- 7** Hear decoder manufacture information

### THROTTLE MODE MENU

- 1 & 2** Select your locomotive's operational mode
- 7** Hear Throttle Mode explanations
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### DECODER PRESETS MENU

- 1 & 2** Select a preset
- 3** Activates the preset
- 7** Hear more information
- 8** Save Changes
- 9** Back to Previous Menu
- 0** Exit Audio Assist

### FACTORY RESET MENU

- 2** Resets the entire decoder
- 3** Resets throttle buttons to their default sounds
- 4** Resets the sound volume levels
- 9** Back to Previous Menu
- 0** Exit Audio Assist

## Diesel Quick Reference - Audio Assist Speed Dials

Adjust individual sound levels	<b>8 8 8 8</b> → <b>1 1 2</b> <b>3</b> <b>1</b> or <b>2 8 0</b>
Adjust master sound levels	<b>8 8 8 8</b> → <b>1 1 1</b> <b>1</b> or <b>2 8 0</b>
Throttle Modes Defined	<b>8 8 8 8</b> → <b>4 1 7</b> <b>0</b>
Throttle Mode Selection	<b>8 8 8 8</b> → <b>4 1 1</b> <b>8 0</b>
Select a Prime Mover	<b>8 8 8 8</b> → <b>1 3 1</b> <b>3</b> or <b>4 8 0</b>
Set Up Lighting Effects	<b>8 8 8 8</b> → <b>2 1 1</b> <b>3</b> <b>5</b> <b>8 0</b>
Remap Lighting Functions	<b>8 8 8 8</b> → <b>2 2 1</b> <b>3</b> <b>5</b> <b>8 0</b>
Map a Sound to a Button	<b>8 8 8 8</b> → <b>1 2 3</b> <b>5</b> <b>1</b> <b>8 0</b>

# TCS DIESEL