Video Tutorials

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

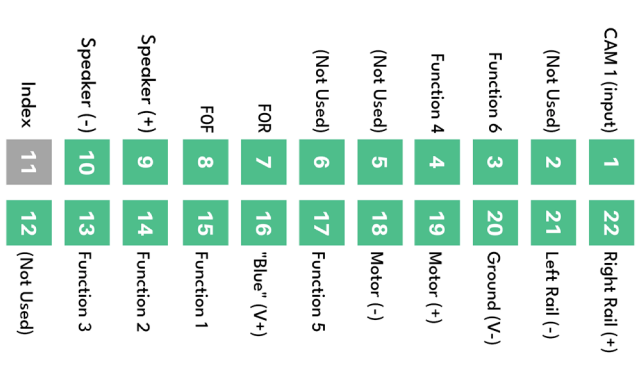
Speaker Selection

- This decoder is optimized for 8Ω impedance speakers | 4Ω minimum
- Speaker enclosures greatly increase volume and frequency response
- Audio output power: 2.2W @ 8Ω Max; ~3.5W @ 4Ω Max

21-Pin Connector

The WOW121 decoder is intended for use with locomotives and motherboards with the 21MTC connector.

WIRING DIAGRAM



Other Features of This Decoder: This decoder has more features than could be listed in this pamphlet. For the complete list of available features, visit our website tcsdcc.com to download the "Comprehensive Programing Guide" found in the Documentation section of our website.

WARRANTY PROCEDURE: This decoder is covered by a one-year manufacturer's warranty which covers manufacturing defects.

- For registration, more details, and disclaimers, please visit tcsdcc.com/warranty
- Print out a copy of the email confirmation and include it in the box
- Return warranties directly to TCS using the P.O. Box listed below **in a small box**

Compatible with NMRA DCC standards

Designed & Built by TCS in the USA

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

Phone **215-453-9145**
Tech Support **267-733-3408**
techsupport@tcsdcc.com
Website www.tcsdcc.com

Train Control Systems Inc.

Manufacturing the highest quality DCC decoders since 1999

21-Pin Connector

WOWDiesel V4.5

1527 WOW121-Diesel

Scale	Functions	Function Rating	Continuous/Peak
HO	8	100 mA (each)	1.5 /2.0 Amp

Dimensions: 1.28" x 0.69" x 0.22" or 32.5mm x 17.5mm x 5.6mm

Main Features of this Decoder

- **Proto Notch** BEMF-based automatic notching produces a realistic throttle response when navigating your layout. Prime sounds never get stale, and will give you that in-the-cab feeling! Choose from a library of 19 distinct diesel prime movers from ALCo, Baldwin, EMD, and GE.
- **Rotate Feature** Use a single button to instantly change Whistle, Bell, or Chuff sounds for quick initial setup, or just to listen through our library.
- **CD-Quality Audio** Enjoy rich, full audio with true-to-life sounds.
- **Lighting Effects** Choose from 20 different user-configurable lighting effects to bring more life and realism to your locomotive and layout.
- **Back EMF Load Compensation** for superior slow speed control in excellent synchronization with the chuffs.
- **Tons of Sounds!** 51 bells and 79 whistles plus much more!
- **Audio Assist®** With Audio Assist, the decoder comes alive and talks you through configuring sounds and volumes. No CV programming needed!
- **Optimized for 8Ω Speakers** Specifically optimized for 8Ω speakers.

INSTALLATION

For detailed installation examples visit our website where we maintain a constantly growing database of a wide range of locomotives and decoders.

8 79508 00481 6

HO

Version 4.5

1527 WOW121-Diesel

Sound Options (Indexed CV's)

For detailed programming information, please visit our online documentation.
To make sound configuration settings, **SET CV 201 = 4** then use this table:

CV 202	Action	CV 203 Default Value	CV 204 Default Value
1	Active Quills	0	7
2	Random Sound 1 Frequency	0	200
3	Random Sound 2 Frequency	0	200
4	Random Sound 3 Frequency	0	64
5	Random Sound 4 Frequency	0	16
6	Random Sound Overall Timer	3	0
7	Random Sound Cutout Speed	0	15
8	Horn Selection	0	0
9	Notching Mechanism	0	1
10	Master Volume	0	80
11	Prime Mover Type	0	18
12	Automatic Sounds	3	0
13	Brake Grinding Noise Start Speed	0	15
14	Dual Enabled Functions	2	3
15	Dynamic Brake Notch	0	3
17	BEMF Low Calibration	0	10
18	BEMF High Calibration	0	40
19	User Options	18	251
21	Audio Auto Shut Off Time	10	40
23	Bell Selection	0	18

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 function buttons will play the sound mapped to them without effecting any lights mapped to the same function button.
In **Light Mode** the function button will perform any lighting operation that is mapped to it, but it won't effect the sounds being played.

For certain applications it may be desirable to play a sound at the same time a lighting function changes (for instance illuminating the headlight when the generator turns on). To setup your own dual-mode functions refer to the ***Dual Enabled Functions*** Indexed CV in the table above, the Guided Programming tool, or the TCS Wiki for more information.

Throttle Modes of Operation

WOWSound decoders have reinvented the ways we think about model locomotive operation to reflect that of the prototype.

In the default **"Prototype"** operation, the prime mover will notch based on the load. 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.

Most decoders from other manufacturers operate *without* a brake separate from the throttle speed. We call this kind of operation **"Traditional"** because your locomotive operates "traditionally" like other manufacturers' decoders, or a slot car, where the speed is directly controlled by throttle.

WOWDiesel decoders also feature a **"Manual Notching"** throttle mode which puts you in complete control of the prime mover notch, separately from the speed! You can read more online at docs.tcsdcc.com

Operation and Button Mappings

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
0	Headlights On/Off
1	Bell
2	Playable Horn
3	Horn - Short Blast
4	Horn - Pre-Recorded Grade Crossing Quill
5	Dynamic Brake
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 Last Sound (Bell/Horn)
10	Manual Notch Up
11	Manual Notch Down
12	Prime Mover Ignition
13	Coupler Close
14	Coupler Open
15	Momentum Mode Selection
16	Crew Alert Enable/Disable
17	Windshield Wipers
18	Air Spit

NOTE: Functions 19-28 are supported but there are no sounds mapped beyond 18 by default.

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.

Press 8 8 8 8 → **MAIN MENU**

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

TCS 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	4	4	Enable analog (DC) operation.
D	0	8	Enable RailCom® Bi-Directional Communication ***(Not Supported)***
E	0	16	Make the Loadable Speed Tables active.
F	0	32	Make the decoder address 128 or higher.
CV 29	6		← **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 short address here

4 Digit Address

Make sure 4-digit Addressing is enabled in CV 29

CV 17	192		← Record your long address here (default is 0000)
CV 18	0		

Consist Address

Add 128 to reverse the loco when in consist.

CV 19	0		**WARNING:** Cannot use a 2 digit address when consisted

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 ≠ CV 16.
To lock all same-address decoders, make CV 15 = 7 or greater.

Brakes, Motor Delay, Keep Alive®, and Rule 17 Dimming Options

CV 61	9		*Brakes and Dimming Control*	Dims when stopped = 17
Button braking = 9		Dims when stopped+Opposite dim = 49		Opposite light dim = 33
CV 64	15		*Rule 17 Brightness*	(2 - 6 for LED's, 12 - 18 for Bulbs)
CV 182	14		*Keep Alive & Motor Delay*	No Motor Delay = 6 | No Keep Alive = 4

Consist Lighting Control

CV 21	255		Extra Functions (F1-F8) (Add together)	F1=1, F2=2, F3=4, F4=8, F5=16 F6=32, F7=64, F8=128 | ALL=255
CV 22	255		Headlight Functions	F0F=1, F0R=2 | Both = 3

Mute On Startup - Program these CV values IN ORDER to delay the ignition

CV 201	4	This selects Sound Options from the 4 CV programmer
CV 202	19	This selects the User Options indexed CV
CV 203	18	This is the high value for enable Mute on Startup
CV 204	255	This is the low value for enabling Mute on Startup

Sound Set Version

CV 248	5	This is a read only CV with the version number of the sound set.

For more information on decoder features or programming visit:
docs.tcsdcc.com

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	20		**Acceleration --** Larger values add time to increase speed.
CV 4	60		**Deceleration --** Larger values add time to decrease speed.
CV 23	0		**‡Acceleration Adjustment when in Consist**
CV 24	0		**‡Deceleration Adjustment when in Consist**

Motor Trim

CV 66	128		**‡Forward Trim**	Use these settings to speed up or slow down the entire speed curve when speed-matching
CV 95	128		**‡Reverse Trim**	

‡ Values above 128 increase the adjustment; Values below 128 decrease the adjustment

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 in each of these CV's, the longer it will take for the decoder 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

Light Function Wires			
CV 49	0	White Wire	F0F
CV 50	16	Yellow Wire	F0R
CV 51	32	Green Wire	F1
CV 52	32	Violet Wire	F2
CV 53	32	Brown Wire	F3
CV 54	32	Pink Wire	F4
CV 55	32	Pink/Purple Wire	F5
CV 58	32	Green/Brown Wire	F6

WOW121 F5/F6

Outputs F5 & F6 on the WOW121 are not programmable to other lighting effects.

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 Rule 17 Guide on docs.tcsdcc.com for more info.

Lighting Effects	fwd	rev	both
Constant Bright Light	0	16	32
Random Flicker 1 (Fire Box)	1	17	33
Mars Light	2	18	34
Flashing Light	3	19	35
Single Pulse Strobe 1	4	20	36
Double Pulse Strobe 1	5	21	37
Rotary Beacon	6	22	38
Gyra Light	7	23	39
Rule 17 (dimmable 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