WARRANTY PROCEDURE: All decoders are covered by a one-year warranty.
This decoder must be returned in a small box.

1. For registration, more details, and disclaimers, visit tcsdcc.com/warranty
2. Print out a copy of the Warranty Registration and include it in the box
3. Return decoder(s) directly to TCS using the address below.

WIRING DIAGRAM

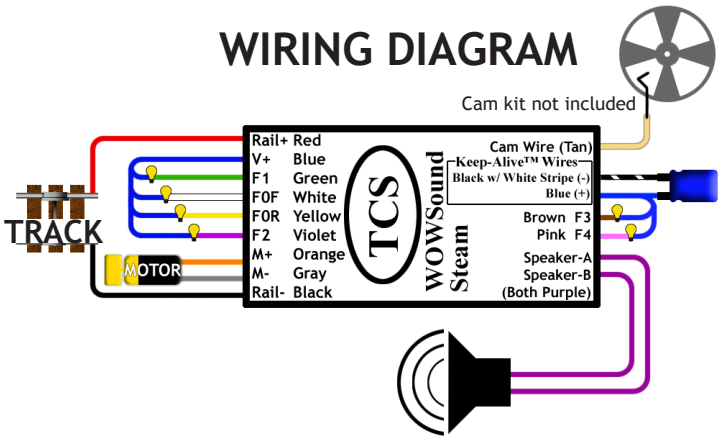

Diagram drawn for clarity - wire decoder per the written wire colors. The wires on your decoder will not be lined up the same as the diagram.

Heat Shrink and Temperature

It is best to mount the decoder on a metal surface with access to cool air to help dissipate heat. It is not recommended to tightly "sandwich" the decoder between plastic parts.

Speaker Selection

- This decoder is optimized for 8Ω speakers (not included)
- 2.2W @ 8Ω Maximum audio output power
- We recommend High Bass Reflex speakers at least .75" x .75" (1.9 cm x 1.9cm) for optimal performance.
- Speaker enclosures greatly increase speaker performance.

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.

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**
Fax **215-257-0735**
Email **tcs@tcsdcc.com**
Web **www.tcsdcc.com**

Backed by our famous "GOOF-PROOF" Warranty

WOWSound

1516 WOW101-Steam

Scale	Functions	Function Rating	Continuous/Peak
HO	6	100 mA	1.3 /2.0 Amp

9-Pin JST Connector

Dimensions: 1.35" x .66" x 0.22" or 34.29mm x 16.72mm x 5.59mm

Main Features of this Decoder

- **Chuffinity** Chuffinity produces a beautiful chorus of chuff sounds without ever producing a looping or predictable pattern. Beautiful, clear, and complex chuffs that never repeat will take you trackside to the days of steam glory! Choose from a library of 13 distinct chuffinity chuffsets.
- **Rotate Feature** Use a single button to instanty change Whistle, Bell, or Chuff sounds for quick initial setup, or just to listen through our library.
- **True CD Quality Audio** Enjoy rich, clean sound with true to life 16-bit 44,100Hz audio. No one else even comes close.
- **Auxiliary Harness** Includes a second haress which includes the cam input wire, wires for Keep-Alive™, and the F3 and F4 light function wires.
- **Back EMF Load Compensation** for superior slow speed control
  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.

Video Tutorials Available! New WOWSound users should view our instructional videos on the TCS website.

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HO

Version 4.6

1516 WOW101-Steam

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.

4 Digit Address

Make sure 4-digit Addressing is enabled in CV29

CV 17	0		← Record your four digit address here
CV 18	0		Your command station will assign the values of CV 17 and CV18

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).

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 136	2		Function button control of BEMF	Bits 0-7 designates buttons 5-12
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

Cam Wire - Program the following CV values IN ORDER to enable cam wire.

CV 201	4	This selects CV programming from the 4 CV programmer
CV 202	19	This selects the cam wire CV
CV 203	56	This is the high value for enable the cam wire
CV 204	249	This is the low value for enabling the cam wire.

Sound Set Version

CV 248	6	This is a read only CV with the version number of the sound set.

For more information on decoder features or programming visit:
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

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

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 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

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 for more info.

Light Effect	fwd	rev	both
Constant Bright Light	0	16	32
Random Flicker (fire box) 1	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

Sound CV's

Please visit the WOWSound section of the TCS website for the WOWSound programming tool. **SET CV 201 = 4** THEN USE TABLE BELOW

CV 202	Action	CV 203 Default Value	CV 204 Default Value
1	Cylinder Cocks Shut Off Speed Step	0	16
2	Random Sound 1 Frequency	0	215
3	Random Sound 2 Frequency	0	96
4	Random Sound 3 Frequency	0	64
5	Random Sound 4 Frequency	0	1
6	Random Sound Overall Timer	3	0
7	Random Sound Cutout Speed	0	15
8	Default Whistle Set	0	0
9	Proto-Chuff Start Speed Step	0	0
10	Global Volume	0	60
11	Steam Locomotive Type	0	0
12	Automatic Sounds	15	135
13	Brake Grinding Noise Start Speed	0	15
14	Dual Enabled Functions	2	3
15	DC Mode Sounds Configuration	0	31
16	Chuff Rate Adjustment Value	0	100
18	Cylinder Cocks Auto Turn On Time	1	0
19	User Options CV	56	248
20	Articulated Chuff Slip Rate	0	240
21	Audio Auto Shut-Off Time	4	176

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*** CV in the table above, or the Guided Programming tool on the TCS website 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.

With our new default **"Prototype"** operation, users are expected to apply and release brakes *seperately* from adjusting the throttle just like the real thing, though the brakes will automatically release when the throttle is increased.

Currently, most model trains operate *without* a brake seperate from the throttle speed. We call this kind of operation **"Traditional"** because your locomotive operates "traditionally" like other manufacturers' decoders or a slot car (directly controlled by throttle).

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	Generator Sound & Headlight On/Off
1	Bell
2	Playable Whistle
3	Whistle - Short Toot
4	Whistle - Pre-Recorded Quill
5	Cylinder Cocks
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 Last Sound (Bell/Whistle/Chuff Set)
10	Johnson Bar Down
11	Johnson Bar Up
12	Injectors
13	Air Pump
14	Blower
15	Momentum Mode Selection
16	Idle Sounds On/Off
17	Coal Shovelling
18	Blow Down
19	Ash Dump
20	Water Fill

NOTE: Functions 21-28 are supported but there are no sounds mapped beyond 20 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 Chuff Set

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

CHUFF SETS MENU

- 1 & 2 Scroll through the Locomotive Types
- 3 If your engine is articulated
- 4 If your engine is not articulated
- 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 To perform an automatic chuff calibration.*
- 3 Adjust Chuff Rate
- 4 To perform a detailed manual chuff calibration.*
- 9 Back to Previous Menu
- 0 Exit Audio Assist

* This step is important to maximize your enjoyment of this decoder. Proto chuff makes your loco sound like the real thing when it's working hard or running light. Perform this calibration to optimize the proto chuff feature.

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

CHUFF RATE MENU

- 1 & 2 Adjust the Chuff Rate Down or Up
- 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

Steam 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 Chuff Set	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

F9 Rotate Feature:

Press Button 9 twice to enter "Rotate Mode"

Once in Rotate Mode, you can press button 9 additional times to change the last-played sound type (Whistle, Bell, or Chuff). Change the Whisle set or Bell while stationary, and the Chuff while moving.

After a few seconds of not pressing F9, Rotate Mode will exit and you will need to enter Rotate Mode again.

TCS STEAM