

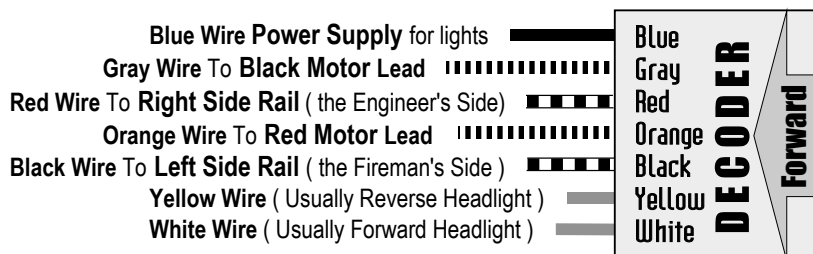
White Wire = 1	Yellow Wire = 2	Record Your Total
17 Headlight wires you want active when engine is in a Consist	CV 22	0

NOTE: You can program a pair of engines so that when in consist, only one light of the front engine lights and only one light of the rear engine lights.

Allows you to reset all of the CVs with a shaded default value. To start the process, enter a value of 2 in either CV 30 or CV 8. When you turn off the power and then restart, the reset will occur.

18 Factory Reset	Record Your Choice
CV 30	0

Identification Numbers	Record Your Choice
19 TCS Decoder Version Identification	CV 7
TCS Manufacturer Identification Number	CV 8 153
User Identification Provided for User	CV 105 0
User Identification Provided for User	CV 106 0



Before installation, check that each motor lead is isolated from each wheel pickup. To avoid phase reversal, hookup the red motor to the orange decoder wire and the black motor to the gray decoder wire.

Suggested Resistance needed for Lights, Power Wire and Track Voltage					
Quantity and Type of Light	Power Wire	12 V. Track	14 V. Track	16 V. Track	
12 V	Full Power DC	(1) 30ma Bulb	Blue 0 to 100	47 to 150	100 to 220
		(2) 30ma Bulbs in Parallel	Blue 0 to 68	33 to 82	56 to 100
		(3) 30ma Bulbs in Parallel	Blue 0 to 68	10 to 68	22 to 68
15 Volt	Full Power DC	(1) 30ma Bulb	Blue 270 to 390	330 to 390	470 to 560
		(2) 30ma Bulbs in Series	Blue 220 to 330	270 to 330	470 to 560
		(4) 30ma Bulbs in Series	Blue 180 to 270	270 to 390	330 to 470
	AC	(1) 30ma Bulb	Red or Black 180 to 270	220 to 330	270 to 390
		(2) 30ma Bulbs in Series	Red or Black 100 to 180	150 to 220	220 to 330
		(4) 30ma Bulbs in Series	Red or Black 10 to 100	47 to 150	85 to 180

If using half power AC, turn those wires off for DC use because the voltage will increase and burn out the bulbs. See Table 16.

Contact TCS at
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Blooming Glen, PA 18911



Phone **215-453-9145**
Fax **215-257-0735**
Email **tcs@ot.com**
Web **www.tcsdcc.com**

Warranty: This decoder is covered by a one year goof proof, no questions asked replacement warranty. Send decoders directly to TCS. Please include your phone number, Email address, and street address when returning any items.

TCS DCC decoders provide the ultimate in control.



This decoder is in # _____

Two Function Micro Decoder
1.0 amp continuous, 2.0 amp peak motor drive
plus two 250 mA function outputs

EXCLUSIVE! Dither creates the ultimate in slow speed.

Quiet Drive creates smooth quiet engine performance.

Small enough for N gauge: .350" wide by .565" long by .145" high.
Powerful enough for HO gauge.

Brake on DC feature allows stopping and starting when a DC section is active, all with your programmed acceleration, deceleration and desired lighting.

Reversing Headlights, Rule 17 dimming, Opposite Dim, Random Flicker, Mars Light, Gyra Light, Rotary Beacon, Single Pulse Strobe, Double Pulse Strobe and Flashing Lights

The Only Two Function Decoders with Lighting Effects

Basic and Advanced Consisting flexibility building trains.

Button Remap Control any button can control any light.

User Loadable Speed Tables for custom speed curves.

Three Program Modes allows use with any controller.

OPSS Mode Programming program on the main track.

128 Speed Step Control for superfine acceleration.

Extended Addressing for over 10,000 addresses.

Compatible with NMRA DCC standards.

Made by TCS in the USA.

EXCLUSIVE! Goof Proof warranty no questions asked.

Factory Reset the fast way back to original settings.

BASIC CONFIGURATION

Make one choice from each row from "A" through "E" and total them on line 1.				Record
A	Normal Direction in Forward = 0	Reverse Direction in Forward = 1		
B	14 Speed Steps = 0	128 Speed steps = 2		
C	Analog (DC) operation disabled = 0	Analog (DC) operation enabled = 4		
D	Loadable Speed Table Inactive = 0	Loadable Speed Table Active = 16		
E	2 Digit Addressing = 0	4 Digit Addressing = 32		
1	Basic Configuration of the Decoder		total "A" thru "E"	CV 29 6

ADDRESSING

Primary 2 Digit Address				Record
2	Primary Loco Address	use when "E" = 0	CV 1	3
Advanced 4 Digit Address				Record
3	First two digits of Extended Address	use when "E" = 32	CV 18	0
	Last two digits of Extended Address	use when "E" = 32	CV 17	0
Consist Address If this is greater than 0, you can't alter the regular address.				Record
4	2 Digit Address when added to a consist (Multiple units).		CV 19	0

NOTE: If you want to maintain some or all engine lighting when in consist, see table 17.

MOTOR CONTROL

Start Volts For most conditions, leave this "0" and use Dither.				Record
5	Start Volts	1 volt = roughly 18	use if "D" = 0	CV 2 0
Speed Graph Using "0" (the default value) produces straight line acceleration.				Record
6	Top Volts	1 volt = roughly 18	use if "D" = 0	CV 5 0
	Mid Volts	1 volt = roughly 18	use if "D" = 0	CV 6 0
Momentum creates the effect of engines pulling and stopping heavy loads.				Record
7	Acceleration	Adds time to each speed step. Practical range is 0-25	CV 3	0
	Deceleration	Adds time to each speed step. Practical range is 0-25	CV 4	0

8 Loadable Speed Tables Use if "D" = 16

CV 67	2	CV 74	30	CV 81	72	CV 88	135
CV 68	5	CV 75	35	CV 82	79	CV 89	147
CV 69	7	CV 76	40	CV 83	84	CV 90	161
CV 70	12	CV 77	47	CV 84	93	CV 91	177
CV 71	16	CV 78	51	CV 85	100	CV 92	196
CV 72	21	CV 79	58	CV 86	112	CV 93	219
CV 73	26	CV 80	65	CV 87	121	CV 94	255

Shaded CVs are the ones used for 14 speed steps (when "B" = 0).

Kick Start A value of "0" in CV 65 nullifies Kick Start. It is superceded by Dither.				Record
9	Burst Duration	Higher values increase duration. 60 = 1 sec.	CV 58	50
	Burst Voltage	Higher values increase voltage. 18 = roughly 1 volt	CV 65	0

Dither, an exclusive of TCS, provides the ultimate in slow speed control. Engines will run as slow or slower than one half MPH. Dither works when the engine is in the lower fifth of the speed range. To start, try CV 56 = 6 and CV 57 = 15.

10	Dither Frequency	The frequency range is 1 (high) to 10 (low)	CV 56	6
	Dither Voltage	The practical range is 5 (low) to 50 (high)	CV 57	15

NOTE: To refine Dither, remove the shell so that you can see the flywheel or some other rotating part. If the flywheel isn't moving with the speed control at minimum speed, make sure CV 56 is greater than 0 then increase CV 57 by 5 until you have some very slow movement of the flywheel. If you want to slow the motor, increase CV 56 by 1 until it is running as desired.

LIGHTING CONTROL

Lighting		Effect + Timing = Total		Choose when the light is on.	
11	White Wire CV 49	0	+	=	0 Light is On going Forward only
	Yellow Wire CV 50	16	+	=	16 Light is On going in Reverse only
					32 Light is On going in Both directions
Put the number in the Timing column for each					
Choose lighting effects.		Put the number in the Effect column for each wire.			
0	Bright Constant Light	4	Single Pulse Strobe	8	Rule 17 (dimmable light)
1	Random Flicker (fire box)	5	Double Pulse Strobe	12	Dim light (50% power)
2	Mars Light	6	Rotary Beacon		for future use
3	Flashing Light	7	Gyra Light		for future use

Dims when loco is stopped = 16		Opposite headlight is on dimmed = 32		Record Your Total	
12	Headlight Dimming Parameters	CV 61	0		

NOTE: This is not used unless you have an 8 in the effect column of table 11.

Gyra or Mars Light Modification. You can use only the Gyra light or Mars light at a particular time. You can't use both at the same time. CV 59 controls total cycle time. Lower values equal a shorter cycle. CV 60 controls time at low power. Lower values equal less time at low power. The default values are for a Gyra light. Set up for a Mars light by trying CV 59 = 46 & CV 60 = 12.

14	Oscillating Light Modulation	CV 59	46		
	Oscillating Light Latency	CV 60	54		

NOTE: This is not used unless you have a 2 or 7 in the effect column of table 11.

Button Control Circle the value under the button numbers you want to control each wire.

15	Button Number	6	5	4	3	2	1	Rr	0	Ft	Total for the Row
	White Wire	128	64	32	16	8	4	2	1	CV 33	1
	Yellow Wire	128	64	32	16	8	4	2	1	CV 34	2
Rule 17 dims when button 4 is pressed											4

NOTE: No changes are required here to operate button control of the motor circuit.

White Wire = 1		Yellow Wire = 2		Record Your Total	
16	Wires you want to use with Analog (DC) Power	CV 13	255		

NOTE: If you are powering one or more of these wires with the red or black wires (AC), do not have that wire active with DC power because the voltage will be higher.