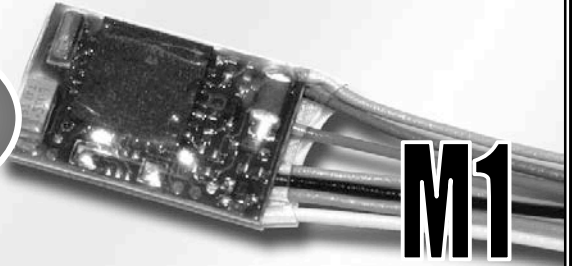


**TRAIN CONTROL
SYSTEMS**



M1

**A small powerful decoder for HO & N scale with 7" hardwired wires
and two 100mA function outputs.**

1.0 amp continuous, 2.0 amp peak motor drive

**Dither creates the ultimate in slow speed control.
Quiet Drive creates smooth quiet engine performance.
Factory Reset is the fast way back to original settings.
Goof Proof no questions asked warranty.**

Autodetect senses DCC or DC power and operates at peak performance on either.

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

Button Remapping lets most buttons control the lights.

**Small enough for N guage: .350"wide by .565"long by .125"high.
Powerful enough for HO guage.**

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

Full Range Dither extends Dither throughout the entire speed range.

Decoder Lock allows changing any decoder with the same address.

All Program Modes are supported allowing use with any controller.

14 or 28 / 128 Speed Step Control operating at 256 speed steps

Basic and Advanced Consisting for use with any controller.

User Loadable Speed Tables for custom speed curves.

OPS Mode Programming allows main track programming

Standard 2 Digit or Extended 4 Digit Addressing

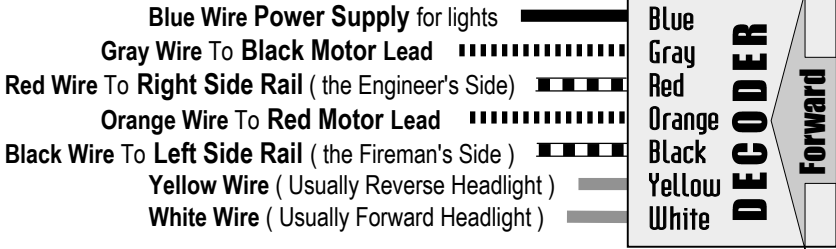
Compatible with NMRA DCC standards.

Made by **TCS** in the USA.

**Contact TCS at: P.O. Box 341, 845 Blooming Glen Rd., Blooming Glen, PA 18911
Phone 215-453-9145 Fax 215-257-0735 Email tcs@ot.com Web www.tcsdcc.com**

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INSTALLATION



When using bulbs rated less than the track voltage, you must use a resistor in series with the bulb.

Light Type and Power Source		Resistor Values in Ohms			
Quantity and Type of Light		Power Wire	12 V. Track	14 V. Track	16 V. Track
12 V	(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
1.5 Volt	(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
50%	(1) 30ma Bulb	Red <u>or</u> Black	180 to 270	220 to 330	270 to 390
	(2) 30ma Bulbs in Series	Red <u>or</u> Black	100 to 180	150 to 220	220 to 330
	(4) 30ma Bulbs in Series	Red <u>or</u> Black	10 to 100	47 to 150	82 to 180

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	OR	Reverse Direction in Forward = 1	
B	14 Speed Steps = 0	OR	28 / 128 Speed steps = 2	
C	Analog (DC) operation disabled = 0	OR	Analog (DC) operation enabled = 4	
D	Loadable Speed Table Inactive = 0	OR	Loadable Speed Table Active = 16	
E	Use if address is 127 or less = 0	OR	Use if address is 128 or more = 32	
1	Basic Configuration of the Decoder		total "A" thru "E"	CV 29 6

ADDRESSING

Primary 2 Digit Address Use if address is 127 or less Record

2	Primary Loco Address	use when "E" = 0	CV 1	3
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4 Digit Address Use the systems procedure if available. Example Your Choice

3	Enter the desired engine number on your calculator.	2147		
	Divide by 256 and enter the whole number in CV 17.	8,3867		
	Multiply the whole number by 256 then subtract it from the engine number and enter the result in CV 18.	2147 - 2048 = 99		
	CV 17	0	CV 18	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
	If you want to maintain some or all engine lighting when in consist, see table 17.		
	Add 128 to reverse the engine when in consist. Some systems only!		

Decoder Lock CV 15 with a value of 0 unlocks all decoders with the same address - - when CV 15 equals CV 16 all decoders are locked except the decoder in CV 16 - - CV 15 with a value of 7 locks them all.

If you have two of any type decoder, give the second one a sub address of 4, 5, or 6 in CV 16. Record

G	All Unlocked = 0	Decoder below you want to unlock = ?	All locked = 7	CV 15	0		
	Mobil = 1	Sound = 2	Light Only = 3	_____ = 4	_____ = 5	_____ = 6	CV 16

MOTOR CONTROL

Start Volts It is superceded by Dither. For most conditions, leave this "0". Record

5	Start Volts	1 volt = roughly 18	use if "D" = 0	CV 2	0	
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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	
	Adjust these to make engines run alike. This is useful in multiple unit operation.					

Momentum creates the effect of engines pulling and stopping heavy loads. Record

7	Acceleration	Adds time to each speed step. Practical range is 0-255	CV 3	0	
	Deceleration	Adds time to each speed step. Practical range is 0-255	CV 4	0	

Loadable Speed Tables

Use if "D" = 16

8	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).								

Dither provides the ultimate in slow speed control. Engines will run slower than one half MPH

NOTE: Both CV 56 and CV 57 must be greater than 0.

Record

10	Dither Frequency	The frequency range is 1 (high) to 10 (low)	CV 56	3	
	Dither Voltage	The practical range is 5 (low) to 50 (high)	CV 57	10	
	If the flywheel isn't moving with the throttle at 1% or 2%, increase CV 57 by 5 until you have some very slow movement of the flywheel. Then if you want to fine tune the motor speed, increase or decrease CV 56 by 1 until it is running as desired.				

LIGHTING CONTROL

Lighting Effects Add the value you choose for the timing to the value you choose for the effect to get the value you need for the CV you are programming.

Lighting CVs

Timing + Effect = Total

11	White Wire	CV 49	0	+	=	
	Yellow Wire	CV 50	16	+	=	

Choose when light is On (timing).

Light is On when running Forward only = 0

Light is On when running in Reverse only = 16

Light is On when running in Both directions = 32

Choice of lighting effects.

Constant Bright Light = 0

Random Flicker (fire box) = 1

Mars Light = 2

Flashing Light = 3

Single Pulse Strobe = 4

Double Pulse Strobe = 5

Rotary Beacon = 6

Gyra Light = 7

Rule 17 (dimmable light) = 8

For future use = 9

Constant Dim light (50% power) = 12

Headlight Dimming

Record Your Total

I	Not Used = 0	Headlight Dims when stopped = 16	Opposite Headlight is dimmed = 32	0	
12	Control Configuration			CV 61	0
	Headlight Dimming (I) is not used unless you have an 8 in the effect column of table 11.				

Gyra or Mars Light Modification. 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.

				Gyra Light	Mars Light
				Record	Record
14	Oscillating Light Modulation			CV 59	46
	Oscillating Light Latency			CV 60	54

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

15	Button Number	6	5	4	3	2	1	Rev 0	Fwd	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		
				4	Rule 17 dims when button 4 is pressed								

Wires you want to use with Analog (DC) Power

Record Your Total

16	White Wire = 1	Yellow Wire = 2	CV 13	255
	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.			

Headlight wires you want active when engine is in a Consist (MU)

Record Your Total

17	White Wire = 1	Yellow Wire = 2	CV 22	0
	NOTE: You can program a pair of engines so that when in consist, only the headlight of the front engine lights and only the reverse headlight of the rear engine lights.			

CONVENIENCE

Factory Reset allows you to reset all of the CVs with a shaded default value back to their factory set value. To start the process, enter a value of 2 in either CV 30 or CV 8.

Then turn off the power and then restart. The reset is now complete.

Record Your Choice

18	Factory Reset	CV 30	0
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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

WARRANTY

This decoder is covered by a one year goof proof, no questions asked replacement warranty. Send decoders in a padded envelope or small box directly to TCS. (If mailing, use the P.O. Box address, all other ways, use the street address.) Please include your phone number, Email address, and street address when returning any items.

WARNING

The interior of this product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.