

Analog (DC) Power Control Turn off Black or Red wire powered functions.

17			White & Yellow = 1	Green = 2	Purple = 4	Brown = 8	Pink = 16
	CV 13	255	Activate power to light functions on DC				
	Brake on DC		Activate by subtracting 4 from CV 29 in table 1.				

CONVENIENCE

Function Remapping Choose the values for the buttons to activate a function.

Buttons	Fwd	0	Rev	1	2	3	4	5	6	7	8	9	10	11	12
Value	1	2	4	8	16	32	64	128	4	8	16	32	64	128	
19	CV 33	1	White Wire												
	CV 34	2	Yellow Wire												
	CV 35	4	Green Wire (0-6)					(7-12)	0	CV 37					
	CV 36	8	Purple Wire (0-6)					(7-12)	0	CV 38					
	CV 39	16	Brown Wire (0-6)					(7-12)	0	CV 41					
	CV 40	32	Pink Wire (0-6)					(7-12)	0	CV 42					
	CV 134	2	Button Control of Motor Circuit (0-6)												
	CV 123	32	On/Off for Rule 17 Dimming (0-6)												
	CV 124	8	On/Off for Ditch Light Blink (0-6)												

When using Ditch Lights, use the same button to turn on both wires.

Factory Reset Sets all CVs with a shaded value back to that value.

20	CV 8	153		As soon as you enter a 2 in either CV 8 or CV 30, The reset is complete.
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Identification Numbers

21	CV 7	??		TCS Version of this decoder.
	CV 8	153		TCS Manufacturer's Identification Number
	CV 105	0		Identification provided for User.
	CV 106	0		Identification provided for User.

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, otherwise 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.

Contact TCS at: P.O. Box 341, 845 Blooming Glen Rd., Blooming Glen, PA 18911
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This is supplemental information for programming next generation decoders. These decoders contain an "X" in their model number.

Programming Advanced "X" Features

WORKSHEET INSTRUCTIONS

- A blank outlined box is provided by each CV number. This is so you can preplan your decoder and have a record of your choices.
- In many cases you are recording a single value such as an address, a rate, or a limit.
- In some cases you are choosing more than one value such as actions, functions, or buttons. Each of these will have a value. Add the values of those you want active and enter that sum in the blank box.
- The other box by the CV number is the factory set value. If it is shaded, it can be reset with Factory Reset.

Resistor values	12 V. Track	14 V. Track	16 V. Track
One 30mA Bulb	0 to 100	47 to 150	100 to 220
Two 30mA Bulbs in Parallel	0 to 68	33 to 82	56 to 100
Three 30mA Bulbs in Parallel	0 to 68	10 to 68	22 to 68

LED require a 560 - 1.2K Ohm resistor to limit current.

ADDRESSING

Decoder Lock Same address decoders need a different sub address in CV 16.

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

MOTOR CONTROL

Variable Momentum Create speed curves more realistic to actual conditions.

Values greater than 0 in all CVs create compound curves.

7	CV 128	0	12	Acceleration Rate 3	
	CV 127	0	130	Rate 3 starting point	
	CV 126	0	20	Acceleration Rate 2	
	CV 125	0	90	Rate 2 starting point	
	CV 3	0	70	Acceleration Rate 1	
	CV 132	0	20	Deceleration Rate 4	
	CV 131	0	150	Rate 4 ending point	
	CV 130	0	40	Deceleration Rate 5	
	CV 129	0	110	Rate 5 ending point	
	CV 4	0	60	Deceleration Rate 6	

Button Control of the Motor Circuit Use the engine for high speed switching or connect a smoke unit or other high power function (1.2A).

Manual Control uses button 2 for forward and button 3 for reverse.
Automatic Control uses button 2 for on/off and engine reverse for direction.

8	CV 61	0		Not Used = 0	Manual Control = 64	Automatic Control = 68
	CV 133	255		Constant Circuit Power	0 = off, 255 = full power	

Add any value in CV 61 to any additional value in Table 13, CV 61.

Loadable Speed Tables

Make sure Table 1 "D" equals 16.

When Table 1 "B" equals 0, use only the Shaded CVs.

9	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	

Dither Dither provides the ultimate in speed control throughout the speed range.

If there isn't movement at 2%, increase CV 57 by 5 until you have movement of the flywheel. To fine tune the speed, change CV 56 by 1 until it is running as desired.

10	CV 56	3		Dither Frequency	(The highest frequency = 1.)
	CV 57	10		Dither Voltage	(The lowest voltage = 1.)

NOTE: Both CV 56 and CV 57 must be greater than 0 for Dither to be active.

LIGHTING CONTROL

11	Light Function Wires			Choose a value.	fwd	rev	both
	CV 49	0	White Wire	Light Effect	←	→	↔
	CV 50	16	Yellow Wire	Constant Bright Light	0	16	32
	CV 51	32	Green Wire	Random Flicker (fire box)	1	17	33
	CV 52	32	Purple Wire	Mars Light	2	18	34
	CV 53	32	Brown Wire	Flashing Light	3	19	35
	CV 54	32	Pink Wire	Single Pulse Strobe	4	20	36
				Double Pulse Strobe	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 light (50%)	12	28	44

Place the value attained from the table by the function wire that will control it.

Headlight Dimming Control

Rule 17

13			Not used = 0	Dims when stopped = 16	Opposite light is dimmed = 32
	CV 61	0		Automatic Dimming Options	Dim stopped + Opposite dim = 48
	CV 64	15		Dimmed Brightness	(2 - 6 for LEDs, 12 - 18 for Bulbs)

Ditch Light Control

14	CV 63	64		Ditch Light Blink Holdover Time (12 = 1 second, 60 = 5 seconds)
	CV 117	3		Ditch Light Blink Rate (1 = slowest, 12 = fastest)

Mars/Gyra Light Control You can't use Mars and Gyra Lights at the same time.

Modify the effects of your light. All values must be greater than 0.

15	CV 113	9		Max. Bright Time	
	CV 116	22		Max. Brightness	
	CV 115	6		Mid Brightness	
	CV 112	1		Min. Brightness	
	CV 114	1		Total Light Cycle	

Rotary Beacon Light Control

Modify the effects of your light. All values must be greater than 0.

16	CV 119	5		Max. Bright Time	
	CV 122	25		Max. Brightness	
	CV 121	15		Mid Brightness	
	CV 118	1		Min. Brightness	
	CV 120	1		Total Light Cycle	