

## Main Features of this Decoder

- **Keep-Alive™** for smooth, uninterrupted operation
- **Back EMF Load Compensation** for superior slow speed control even with heavy loads.
- **Quiet Drive** creates SUPER QUIET engine performance.
- **Autodetect** for realistic throttle response when using DC power.
- **Dimmed Brightness** of bulbs or LEDs is adjustable.
- **Variable Momentum** lets you make custom acceleration curves.
- **Ditch Lights:** control alternating ditch lights with realistic pulsing.
- **Mars, Gyra, and Rotary Beacon** are adjustable.
- **Decoder Lock** for programming same address decoders independently.
- **Function Remapping:** 13 buttons for most lights, 7 buttons for operations.

**Other Features of This Decoder:** This decoder has too many features that could be listed on this page. For the complete list of available features, print out the "Additional Programming Guide" that can be found in the literature section of our website ( [www.tcsdcc.com](http://www.tcsdcc.com) ). Some of the features include: Function Remapping, 3 Point Acceleration/Deceleration Curves, Button Control of the Motor, Loadable Speed Tables, Various lighting effects, decoder lock and many more.

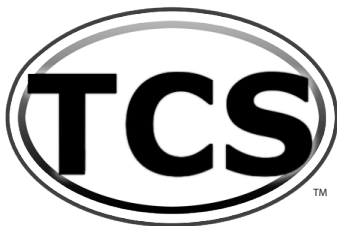
**WARRANTY PROCEDURE:** All decoders are covered by a one year goof proof, no questions asked warranty. **Please return in a small box.**

1. You MUST register the failed decoder on our website at [www.tcsdcc.com](http://www.tcsdcc.com). If you do not have access to a computer you MUST call to register your warranty at: (267) 733-3408
2. Print out a copy of the Warranty Registration and include it in the box with the decoder(s).
3. Return decoder(s) directly to us using the address below.

Compatible with NMRA DCC standards.

Made 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](mailto:tcs@tcsdcc.com)  
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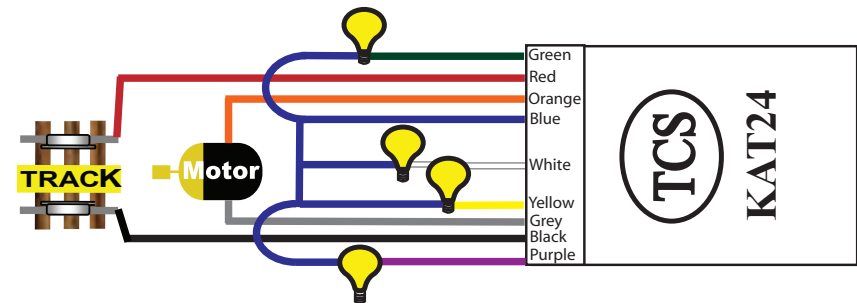
Our Famous GOOF PROOF NO  
Questions Asked Warranty

1465	KAT24	Scale	Functions	Function Rating	Continuous/Peak
		HO	4	100 mA	1.3 /2.0 Amp

Dimensions: 1.31" x 0.65" x 0.35" or 33.4mm x 16.5mm x 8.9mm

This full featured, 4 function, hardwire or harnessed decoder combines the exceptional T4X decoder and KA2 Keep-Alive™ device. The built-in KA2 Keep-Alive™ will keep your locomotive operating for 3-15 seconds without power (dirty track, bad contact, etc.) Included is our auto-adjusting BEMF for outstanding slow speed performance.

## WIRING DIAGRAM



## INSTALLATION

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



## BASIC CONFIGURATION

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	16	Make the Loadable Speed Tables active.
E	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 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	1		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.			
Factory Reset			
CV 8	153		Enter 2 to perform a Factory Reset.
Back EMF and Rule 17 Dimming Options			
Even number OR 0= BEMF OFF Odd number = BEMF ON			
BEMF disabled = 0		BEMF enabled = 1	
Turn on BEMF and button control of it make CV 61 = 3		BEMF button control = 3	
		Dims when stopped = 16	
		Opposite light dim = 32	
CV 61	1		BEMF and Dimming Control BEMF+Stopped + Opposite dim = 49
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 )
CV 10	0		BEMF Cut Out
RailCom®			
CV 178	0		CV address pointer
CV 180	0		RailCom® Transmit Options
CV 181	0		RailCom® Transmit Options
CV 28	0		Broadcast enable
For more information on decoder features or programming visit: <a href="http://www.tcsdcc.com">www.tcsdcc.com</a> and check out the <b>Complete Programming Guide</b> .			

## 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	1		Acceleration -- Larger values add time to each speed step.
CV 4	1		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	0		Forward Trim
CV 95	0		Reverse Trim
Values above 128 increase speed, values below 128 decrease speed.			

## LIGHTING CONTROL

Lighting Features							
Light Function Wires		Light Effect		fwd	rev	both	
CV 49	0	White Wire	F0F	Constant Bright Light	0	16	32
CV 50	16	Yellow Wire	F0R	Random Flicker (fire box) 1	1	17	33
CV 51	32	Green Wire	F1	Mars Light	2	18	34
CV 52	32	Violet Wire	F2	Flashing Light	3	19	35
Rule 17 Dimming Control				Single Pulse Strobe 1	4	20	36
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 <a href="http://www.tcsdcc.com">www.tcsdcc.com</a> for more info.				Double Pulse Strobe 1	5	21	37
				Rotary Beacon	6	22	38
				Gyra Light	7	23	39
				Rule 17 (dimnable 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
Consist Lighting Control							
CV 21	0		Extra Functions	Green and Purple wire = 3			
CV 22	0		Headlight Functions	White and Yellow Wire = 3			
Lighting Quick Presets							
CV 8	10		Program a value of 10 to make violet and green ditch lights. Button 1 turns them on and Button two makes them blink.				
	11		Program a value of 11 for default trolley settings.				
	12		Program a value of 12 for standard trolley settings and tail lights.				
Note: For more information on Quick Presets visit the Comprehensive Programming Guide at <a href="http://www.tcsdcc.com">www.tcsdcc.com</a>							