

Super-Chuffer

Rev. 2

The Super-Chuffer is an add-on electronic module for TMCC controlled steam locomotives to enhance smoke unit and lighting control. It can be installed in factory TMCC locomotives or TMCC upgraded locomotives. This is a microprocessor based design that allows for software updates to accommodate functional changes and possible future enhancements. It provides the following smoke and lighting features.

- Smoke Unit fan motor control for synchronized chuffing with the RailSounds output.
- Dynamic braking of smoke unit motor and chuff duration control enhances the appearance of the smoke chuff output at all speeds.
- Smoke fan motor runs continuously at slow speed when locomotive is stopped.
- Buffering of the chuff switch input to provide an isolated switch output for RailSounds chuff triggering.
- Rule 17 LED light control for headlight, dimming when locomotive is stopped.
- TMCC headlight voltage input to control headlight on/off state from remote.
- Automatic control to turn cab light on when stopped, off when moving.

The unit is fabricated on a printed circuit board with the dimensions of 1.1" x 1.2" in size. The overall height including components is approximately 0.6" tall.

Two connection points totaling 12 wires are provided for connecting the Super-Chuffer into the locomotive. The board is supplied without connectors in the header locations. The intent is the installer will solder the correct length wires required for the particular installation. Optionally, headers or .1" spacing connectors can be soldered here for easy disconnection of the board from the locomotive wiring.

The following table documents the external locomotive connections.

Conn	Pin	Description of Function
H1	1	Track Power (Roller)
H1	2	Track Power Ground (Wheels/Frame)
H1	3	Headlight output voltage from TMCC control board (R2LC)
H1	4	Headlight + output to LED headlight (return to frame ground)
H1	5	Chuff switch input (closure to frame ground)
H1	6	Smoke motor negative pole (switched to +5V to run motor)
H1	7	Ground (common with pin #2)
H1	8	Cab Light Negative (switch to AC or DC voltage to illuminate cab light)
H1	9	+5V DC (200ma MAX total pins 9 & 10)
H1	10	+5V DC (200ma MAX total pins 9 & 10)
H2	1	RailSounds chuff output common (LOW)
H2	2	RailSounds chuff output high (PUP to logic high on external circuit)

Implementation notes on various inputs and outputs.

H1-P1/P2, Track Power: This pair of pins comes directly from the track inputs of roller and wheels.

CAUTION: Do not reverse these connections as several of the inputs and outputs are referenced to frame ground. Reversing these connections will surely destroy the board!

H1-P3, Headlight Input from TMCC: This input is assumed to be the standard input signal from an R2LC-C08 or later TMCC receiver, it a half-wave negative in respect to frame ground signal. Diode protection is included so that a full wave signal (track power) will not damage the circuit. This signal is used to enable/disable the headlight from the board. For LCRU/LCRU2, or R2LC-C07 an earlier, use track power to enable the headlight all of the time.

H1-P4, Headlight Output to LED Headlight: This PWM output directly drives an LED headlight that is returned to frame ground. The circuit is rated to power one white LED rated at 3V operating voltage.

H1-P5, Chuff Switch Input: This input is a logic input that expects a closure to frame ground to trigger a chuff event. This is typically supplied by the mechanical chuff switch or a reed switch and wheel magnet(s). It can also be provided by an optical switch with a compatible rating.

H1-P6, Smoke Motor Negative: This PWM output is an open drain FET to frame ground to control the smoke motor. The positive 5V to the motor is connected from the H1-#9 or H1-#10 outputs. It's strongly advised to insure the fan motor draws no more than 70-80ma during continuous running. Properly working smoke fan motors will draw less than 50ma, typically in the 30-40ma range.

Note: Drawing more than 250ma through this output will damage the output circuit.

H1-P7, Ground: This pin is internally connected to H1-P2, frame ground.

H1-P8, Cab Light Negative: This output is an open drain FET to frame ground to control the cab lights. It also features a series diode to allow the cab light to be powered from track power directly, which is more desirable than using the on-board power. For 18V track power, a 10-12V bulb works well. An external resistor of 470 ohms is required for LED lighting to 18V track power as this output just completes the circuit to ground for the cab lights.

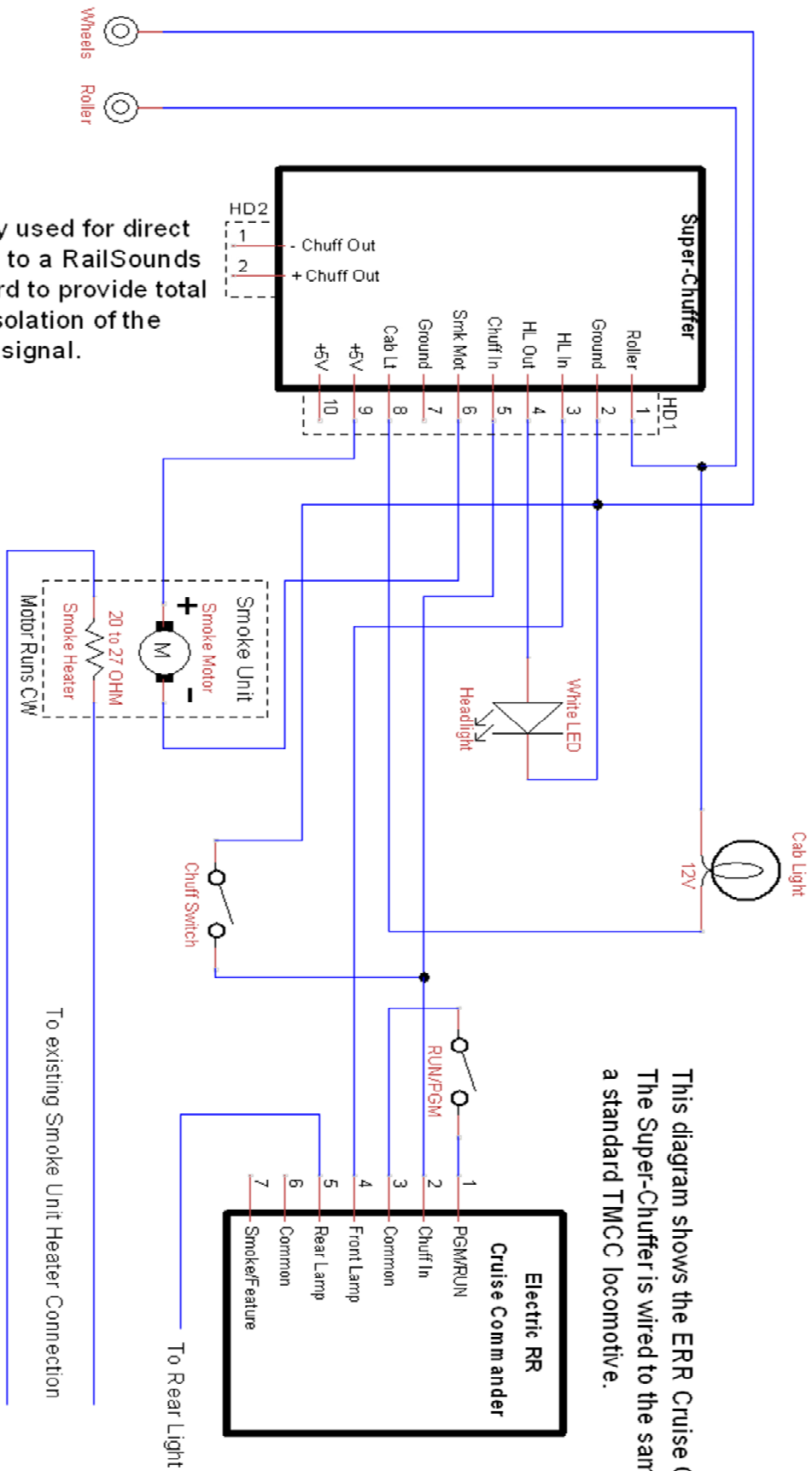
Note: Drawing more than 250ma through this output will damage the output circuit.

H1-P9/10, 5V DC: 5V DC power from internal board supply. This voltage is used for the smoke fan and optionally to power the Chuff-Generator if one is installed.

J2-P1/P2 RailSounds Chuff Switch: These output pins provide an opto-isolated transistor switch to repeat the state of the input chuff switch. Some board chuff inputs, like the newer Electric RR RailSounds Commander, require totally isolated chuff inputs with no common ground, this output is designed to meet that requirement. For most installations, this output will not be used, see circuit diagrams.

J2 is a bare opto-isolator open collector output, the external circuit is expected to provide the pull-up resistor to logic high. No more than 10 ma of current should be drawn through the isolated chuff output.

For additional information or technical support, please contact us at: super-chuffer@will-enterprises.com



HD2 is only used for direct connection to a RailSounds sound board to provide total electrical isolation of the chuff input signal.

This diagram shows the ERR Cruise Commander. The Super-Chuffer is wired to the same signals for a standard TMCC locomotive.

Figure 1: Board Connection Diagram

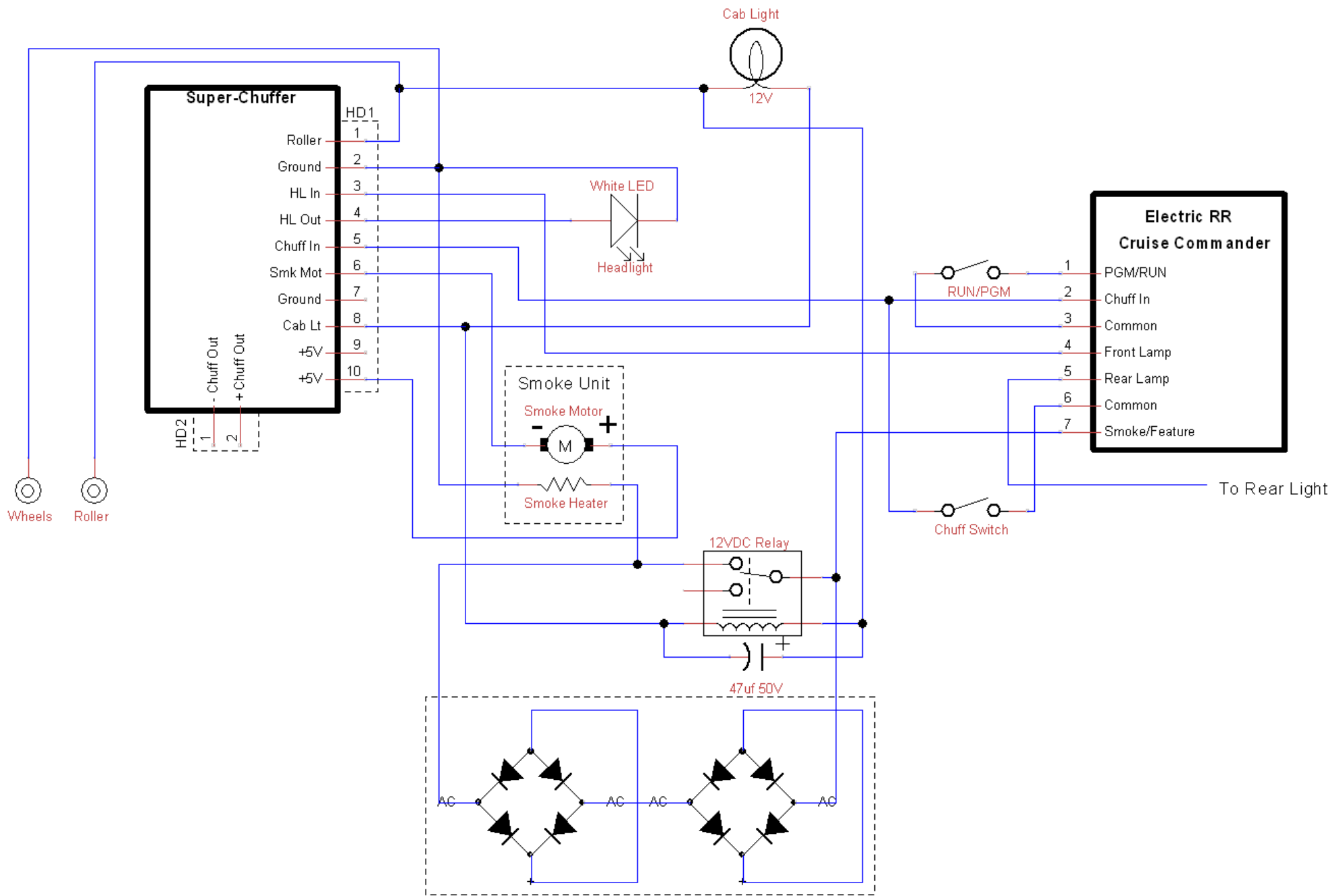


Figure 2: Typical Installation with ERR Cruise Commander & Idle Smoke Intensity Option