

# Super-Chuffer II

The **Super-Chuffer II** 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.
- 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.
- Smoke motor inactive if smoke is turned off.

The unit is fabricated on a very small printed circuit board with the dimensions of 0.9" x 1" in size. The overall height including components is approximately 0.5" tall.

Connection points totaling 10 wires are provided for connecting the Super-Chuffer into the locomotive circuitry. The board is supplied without a connector in the header location. The intent is the installer will solder the correct length wires required for the particular installation. Optionally, a header or .1" pitch connector can be soldered here for easy disconnection of the board from the locomotive wiring.

## **External locomotive connections.**

<u>Conn</u>	<u>Pin</u>	<u>Description of Function</u>
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	Smoke Power from Heater Supply
H1	10	+5V DC (200ma MAX)

## **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 headlight output from a TMCC receiver. It can be from any version of TMCC receiver, it responds to either positive going half-wave or a negative going half-wave. This allows command control of the LED headlight. This pin can also be connected directly to track power to leave the headlight on all 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. Finally, it can be provided by the Chuff-Generator product that generates programmable chuff rates.

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-#10 output. It's strongly advised to insure the fan motor draws no more than 50-60ma 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.

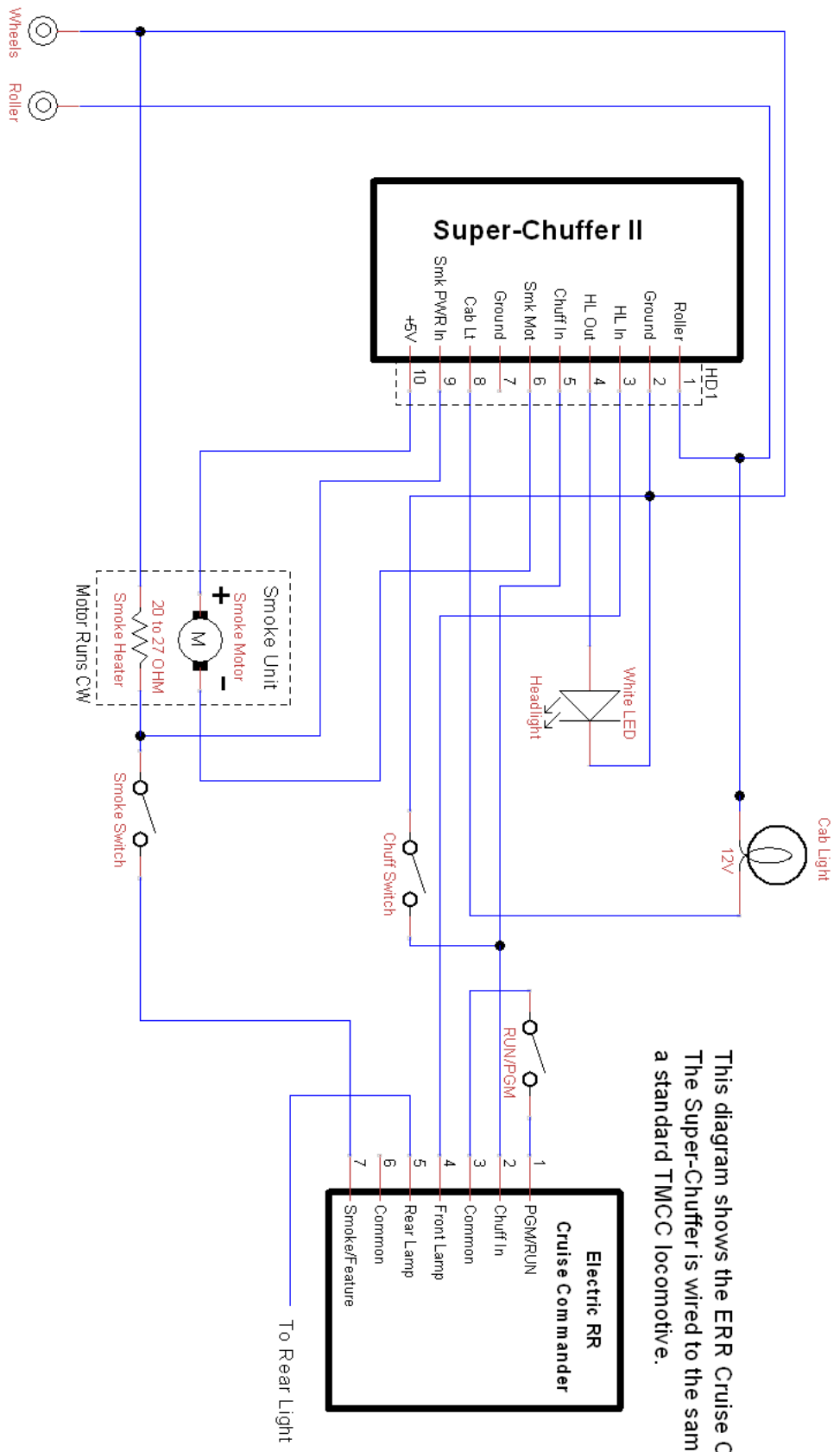
**Note: Drawing more than 250ma through this output will damage the output circuit.**

H1-P9, Smoke Heater Power Input: Input of smoke heater positive power. This voltage is used to determine if the smoke feature is on or off. When smoke is off, the smoke unit motor is deactivated.

H1-P10, 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.

*Lighting inputs and outputs on H1-P3, H1-P4, and H1-P8 are optional; you can simply not wire them if you don't desire those features.*

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



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

Figure 1: Super-Chuffer II Typical Board Connection Diagram

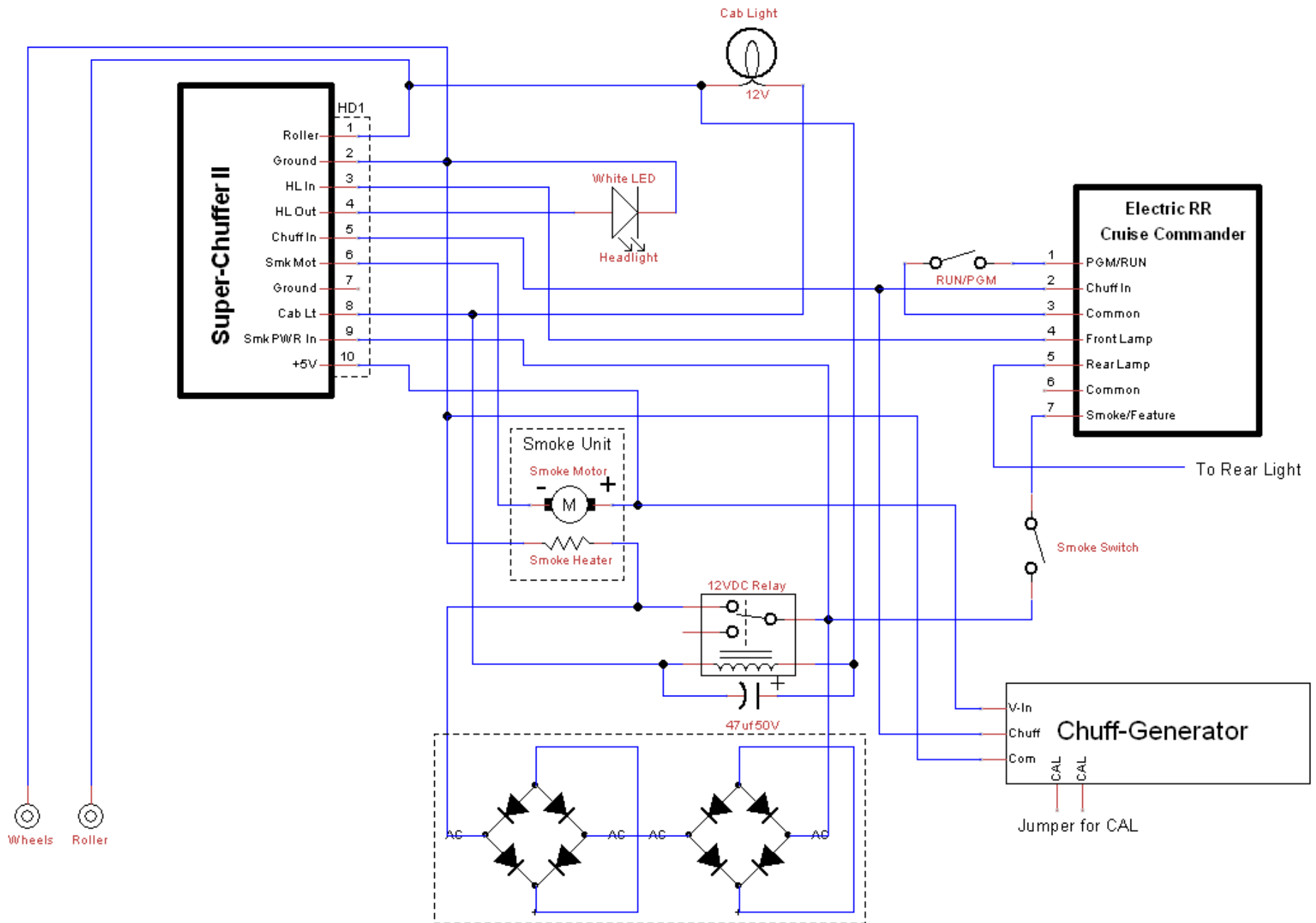


Figure 2: Typical Installation with ERR Cruise Commander, Idle Smoke Intensity, and Chuff-Generator