S-CAB Motherboard – GP NEM version

For use with HO and S-scale diesel locos

S-CAB Motherboards

S-CAB is a set of components for installing battery power and radio control in HO and similar smaller scale locomotives. All S-CAB components are designed and tested to operate as a system, which eliminates risks of selecting components from different sources. However, determining what components are needed, how they can fit in a small space, and how they are wired is a challenge many model railroaders would rather avoid. For example, a larger capacity battery is always desirable, but what size will fit, together with other components, in the shell of a typical HO scale diesel locomotive?

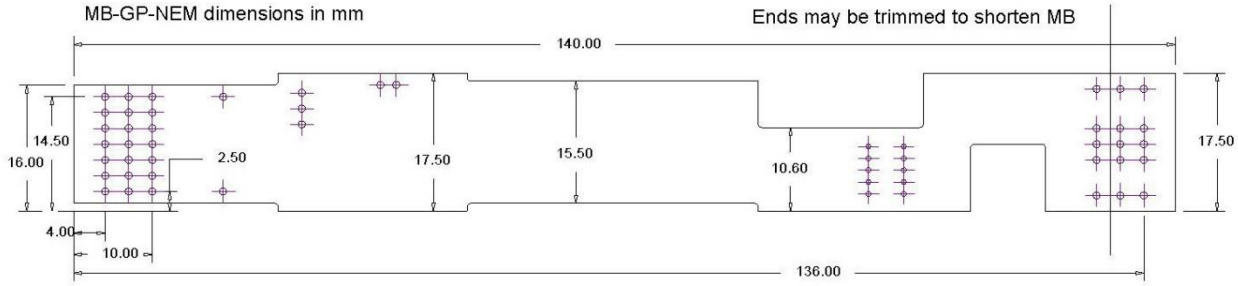
S-CAB motherboards ("MB"s) are intended to facilitate a decision to use battery power and to simplify installation. A potential user is not required to select individual components. The motherboard discussed in this document fits a broad selection of HO scale diesel locomotives. "GP" (meaning general purpose), is an appropriate choice for EMD GP class locos as well as E and F class and popular ALCO models. "NEM version" indicates it is designed for use with decoders using an NEM socket.

Once a user selects a loco model and chooses a decoder, an S-CAB motherboard (if available) defines the project. At present, two members of a planned MB family are available. Both are for GP applications; this NEM version and another for decoders with a 9-pin JST socket (or soldered wire harness).

Description

MB-GP-NEM is a circuit board which assembles battery power and radio-control components into a ready-to-run module that can be bench-tested before installation. Most wiring is replaced by motherboard circuit traces, which provides a neat installation and, more importantly, reduces wiring errors.

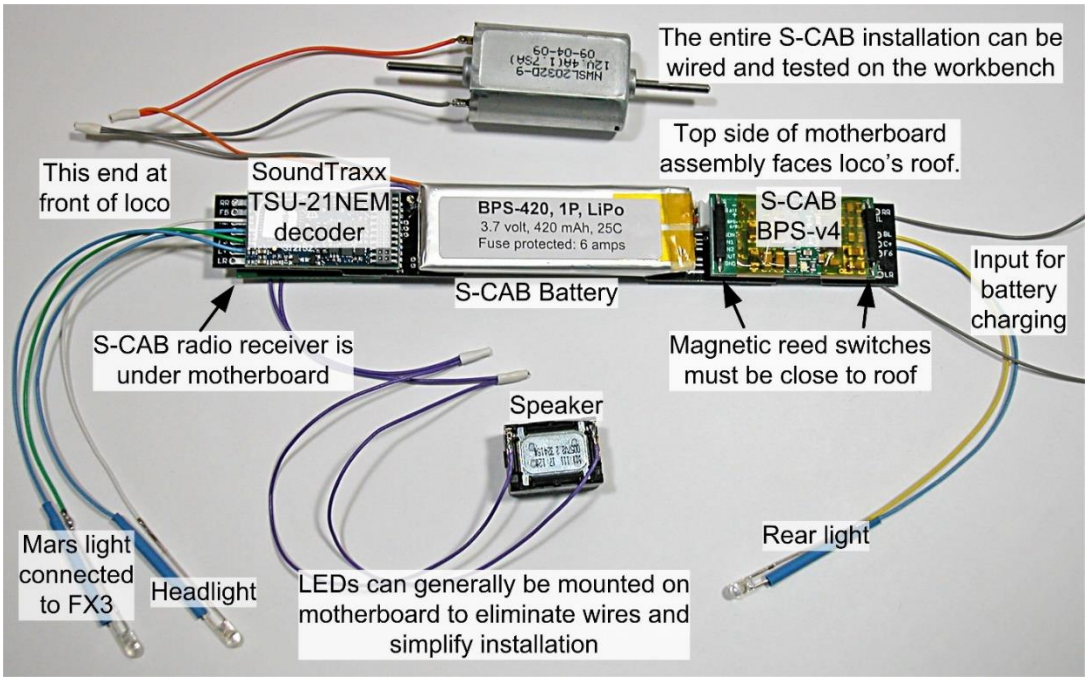
The board measures 0.7" wide, 5.51" long (17.5 x 140 mm).



The board includes terminals for external connections; track power pick-up, motor, LED lights and speaker. Depending on loco, lights can be mounted on the motherboard, which eliminates wiring connected to loco's body shell. Only 6 connections (motor, front and rear power pick-up) are required between the MB and loco chassis/frame. Sound adds 2 wires for a speaker, depending where it is mounted.

MB Assembly

This photo shows a complete system wired for testing. For this delivery the motor is the only item not shipped with the system.

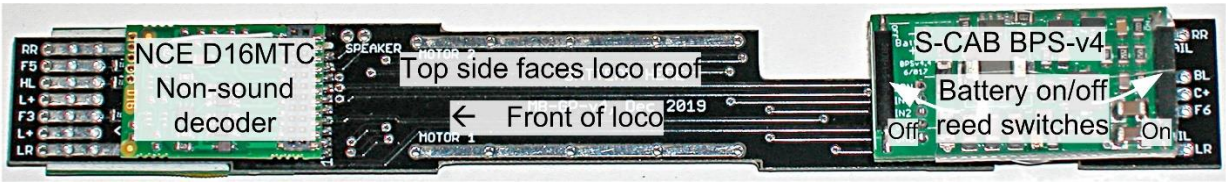


The photo shows wired leads for lights and speaker that are longer than necessary and can be shortened (or eliminated) during installation. It's best to mount LEDs directly on the MB and align them with light bezels in loco shell. Finding a good location for a speaker can be tricky but try to mount it with the MB or loco chassis rather than the loco body shell.

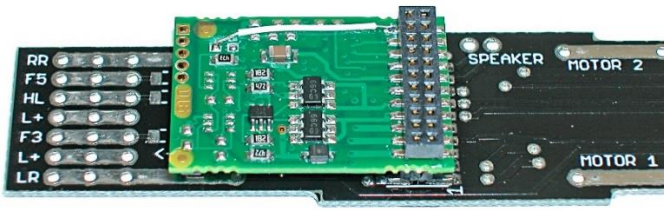
Components

Top Side

This motherboard version requires either a SoundTraxx or NCE decoder[1] with S-CAB direct radio interface plugged into the NEM header. No wiring is required

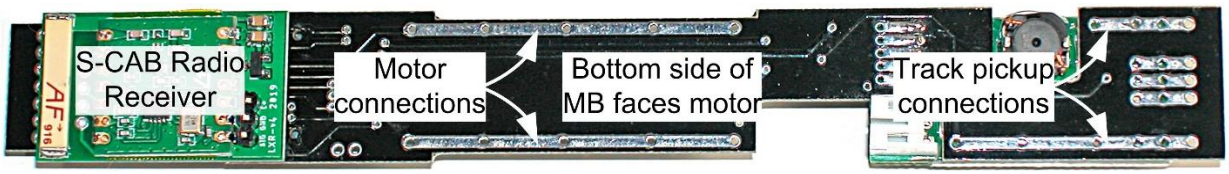


Close-up shows S-CAB direct radio interface connected to an unused pin of the NEM socket through which it is routed to an S-CAB radio receiver mounted on bottom side of MB.



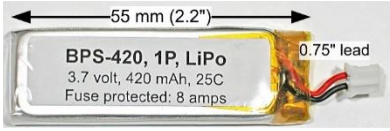
[1] Manufacturers' tradenames, trademarks and other proprietary rights are acknowledged.

Bottom Side



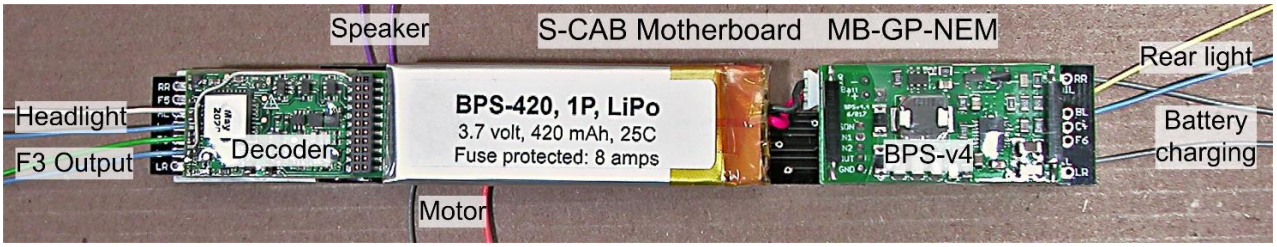
The MB should be oriented with radio at front of a loco away from motor and large metal surfaces. Also important, driver cab window openings significantly improve radio reception in locos with metal bodies.

Battery

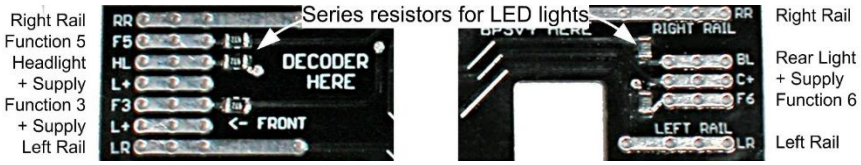


Battery choices are limited by loco body interior width; typically, no more than 18 mm for HO scale GP locos. Maximum battery length is 60 mm. Battery thickness is limited by space between top of motor and roof interior. A 1P-420 battery, which is default choice for HO scale, GP locos, requires at least 8 mm (and preferably 10 mm) between top of motor and roof interior. Locos with full width bodies such as EMD E and F type can generally accommodate battery widths up to 24 mm (approx. 1 inch). Motherboard batteries are provided with 3/4" leads.

MB Connections

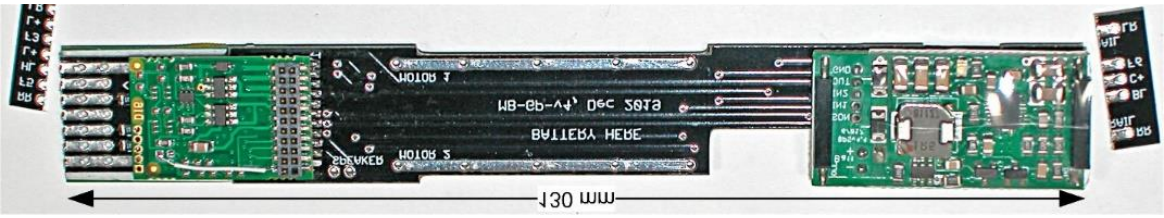


If power for battery charging is from track, wheel wipers on front and rear trucks connect to RR and LR terminals which are provided on both ends of the MB. Both NCE and SoundTraxx decoders provide 4 function outputs (labeled F3, F4, F5, F6) in addition to front and rear lights. With S-CAB BPS, F4 is used to turn off battery power. LEDs should be connected with LED positive to + supply (either L+ and C+) [2] and LED negative to an appropriate function terminal; headlight, for example. Resistors to protect LEDs are included on the MB.



Reducing MB Length

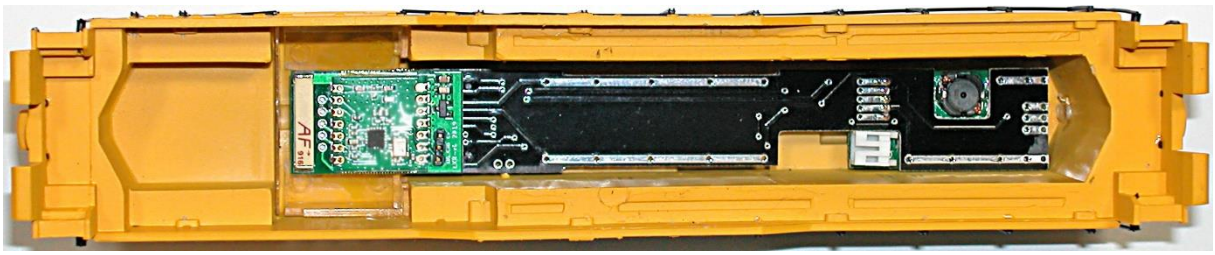
The board can be reduced to a minimum length of 130 mm (5.12 inches). Back end trim is limited by the BPS. Front end trim is limited by S-CAB radio receiver.



[2] L+ meaning light positive and C+ meaning common or shared positive are the same on this motherboard.

Application

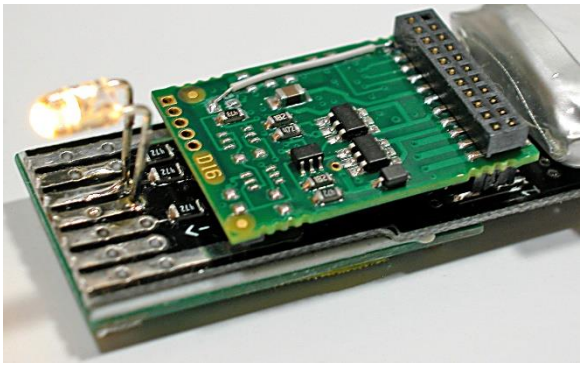
Trimming the MB length to 130 mm makes it a neat fit in a Walters Trainline GP9M loco.

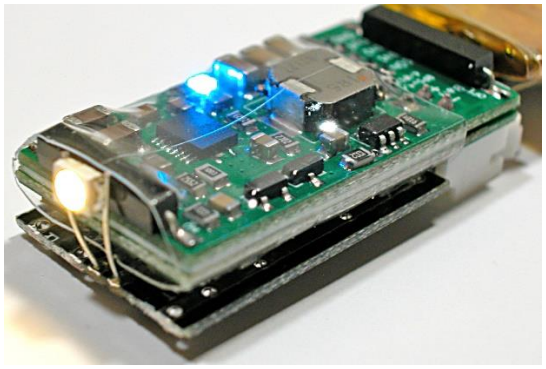


Lights

How lights are installed depends on the model. If possible, mount LEDs on the motherboard so that loco body shell can be removed and replaced without messing with wires. If using sound, mount speaker on the loco frame/chassis; not on the body shell.

The LED arrangement photographed below works nicely for the GP9M.





When using battery power, it's best to conserve energy by replacing incandescent bulbs with LEDs. The MB assumes lights are LEDs and includes 4,700 ohm series resistors which limit LED current to approximately 2 mA. By comparison, a 12 volt incandescent bulb typically consumes 20 mA (or more); 10 times the energy consumption of an LED.