Sound Commander 2
Generic Installation & Operation Manual

Version 2.10
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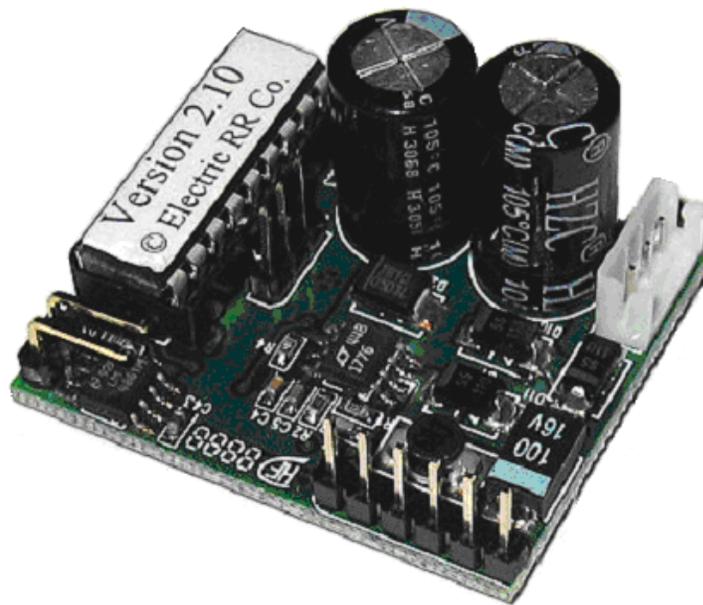
Revised: October, 2008

Sound Commander 2[tm]

Locomotive Sound Upgrade Board Overview

The Sound Commander 2 is a low cost way to add sound to your locomotives. Adding sound to your locos is one of the best ways to enhance the realism of operating your trains. The Sound Commander 2 operates conventionally by horn / bell buttons, or in command mode when interfaced to compliant products. Featured sounds include a Horn, Bell, Coupler Clank, and Prime Mover/ Chuff. The Sound Commander 2 is small, permitting installation into Beeps, Buddy's, switchers, and many PW locos, yet delivers 1 watt of output power.

The Sound Commander 2 enhances conventional mode operation, sequencing the Prime Mover revs with track voltage changes. Additionally two volume levels are provided. A jumper, or accessible switch, is used to select between high volume and low volume settings.

In command mode, Volume may be set from the Cab and is saved until changed. Prime Mover revs are linked to the throttle with 4 speed levels.

Cool Features
- Conventional and Command mode operation
- Volume Control with mute
- Prime Mover revs with 4 rev levels and mute
- Volume of Prime Mover and Warning Sounds individually settable (cmd only)
- Custom Sound Processor for field upgrades or enhancements
- Direct connection to the Beep, AC/DC, and Cruise Commander
- Monitors 32/100 speed step selections for correct RPM level settings
- Only 1.5" L x 1.25" W x 0.82" H

Command & Conventional Mode Sounds
- Horn
- Bell
- Coupler Clank
- Compressor Pops
- Prime Mover Revs

Speed Monitor Selection
Activate   32 speed steps: AUX1 + 0 + AUX1 + 0 + BRAKE
Activate 100 speed steps: AUX1 + 0 + AUX1 + 0 + BOOST

Everything Included
The Sound Commander 2 comes with a matching speaker, baffle, cables, instructions, and mounting hardware. If you require any additional supplies for your installation, please contact support@electricrr.com

Sound Commander 2, connection information
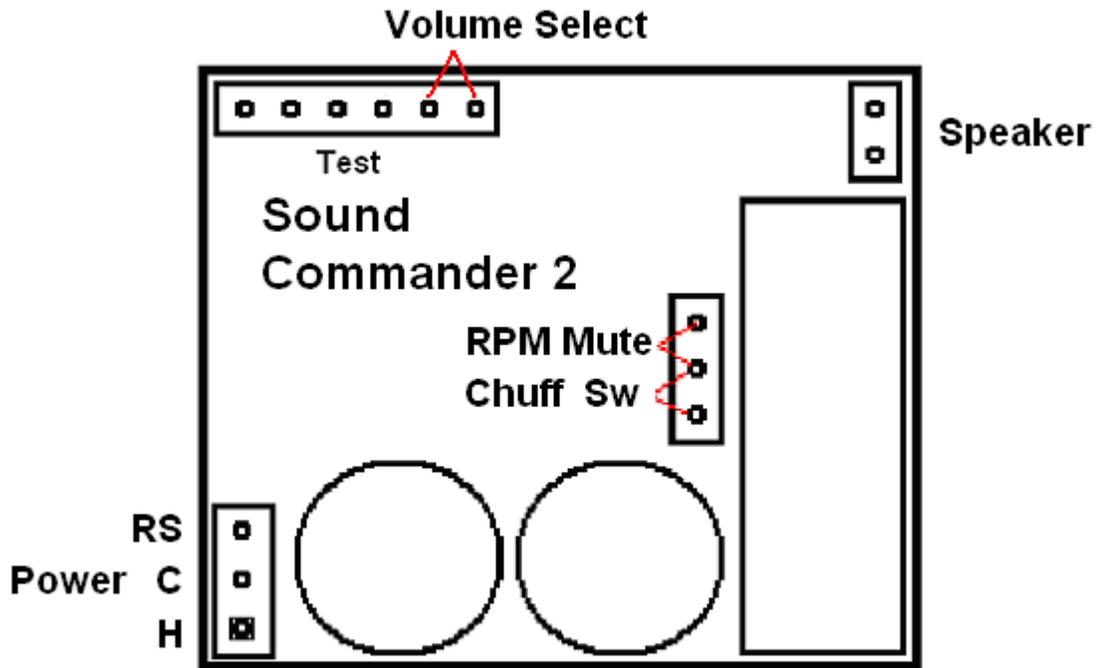
Connector Pin / Description	
H	- Center (3rd) rail power connection
C	- Outer rails power connection
RS	- RailSounds^{tm} Serial Data input
Speaker	- 8 ohm speaker connector
RPM Mute	- Command mode only, Mute Revs or Steam Hiss
Chuff Sw	- Connection to Chuff Switch (required for Steamers)
Volume	- Conventional mode only, volume selection
	- Jumper on = High volume setting
Test	- Factory programming and test connector

Parts Identification

Power Cable (conventional mode only)

Power Cable (command mode only)

Volume Select Jumper (conventional mode only)

Installation Overview

Please take time to plan out your installation. The installation process revolves around finalizing a location for the speaker. It cannot be overstated how important the location of the speaker and the use of a baffle are to the quality of sounds reproduced. Take time to plan the installation, and you will be rewarded with quality sounds.

A speaker baffle is included in the current Sound Commander 2 kits, and is specifically designed to work with the supplied speaker. This baffle may be mounted with double stick tape, or a small hole may be drilled and a self-tapping screw may be used.

Once the speaker is installed, the sound card is mounted with double stick tape. After the sound card is mounted, only the speaker and power need to be connected to the sound card.

An example installation is shown using a Lionel GP-7, an RMT Beep, and a 3rd Rail Steamer. All installs are basically similar to these examples. A baffle is not implemented in all of the sample installations, however adding one when possible will improve the sounds. Note: the Beep window treatment will need to be removed to allow the speaker sounds to be radiated out of the shell.

If you require any additional wires, supplies, or mounting hardware for your install, please contact support@electricrr.com

Baffle Mounting & Speaker Installation

The speaker must be carefully installed in the baffle so as not to pinch the lead wires when exiting the baffle. There is a cut out on the baffle to accommodate the lead wires. Additionally, mounting the baffle may require drilling a hole in the baffle, and this must be done before installing the speaker. Caution: once the speaker is in the baffle, it is very hard to remove without damage to the speaker.

The Baffle can be mounted with double stick tape on the backside. In many cases this is not the optimal mounting position. A flat mounting area is available to mount the baffle upright. A #4 self-tapping screw is provided in the kit for this purpose. Follow the following steps to mount the baffle upright.

Drilling the baffle for mounting upright:
- Using a $^5/_{64}$" drill bit, drill a hole at the center of the "X" as shown, the self-tapping screw can now be used to tap the hole in preparation for mounting.
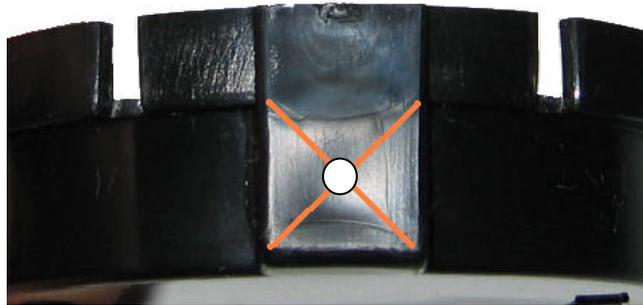
Installing the speaker in the baffle:
- Prepare the speaker wires as shown to exit the baffle. Align the wires with the elongated hole on the side of the baffle and snap the speaker into the baffle, applying pressure on the *rim* of the speaker only. Snap the cover on to secure.

Diesel Installation Example

RMT Beep Locomotive – Conventional Install

*Follow these instructions if adding the Sound Commander2 in a Beep that has **not** been modified with the Beep Commander upgrade kit.*

1. The first step is to remove the shell.   There are two tabs that hold the shell on. These tabs are located under the "fuel" markings on the shell. Pry each side open with a small screwdriver at that point and lift off the shell.

   When the shell is removed, release the electronics board by removing the indicated screw.

Remove This Screw
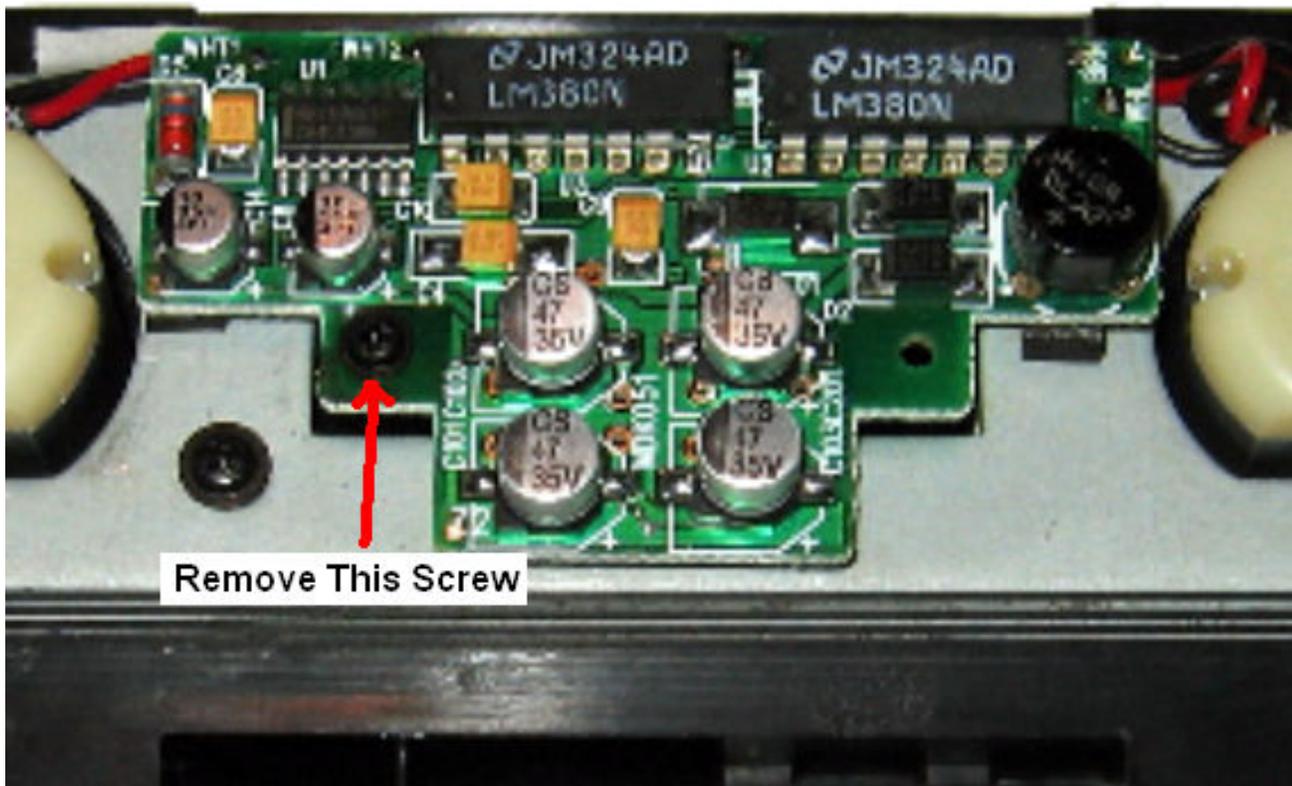
RMT Beep Locomotive – Conventional Install

2. Next fold back the circuit board to expose the wiring to the power connection screws. Use caution not to break any wires off the existing connections.

    After the circuit board is folded back, you will expose the three (3) power connection screws in the "well". The center screw is the "common" connection, and the two outer screws are the hot connection (3rd rail roller pickups).

    The Sound Commander 2 comes with a power cable with spade connectors that slide under the power connection screws that deliver power to the existing circuit board.
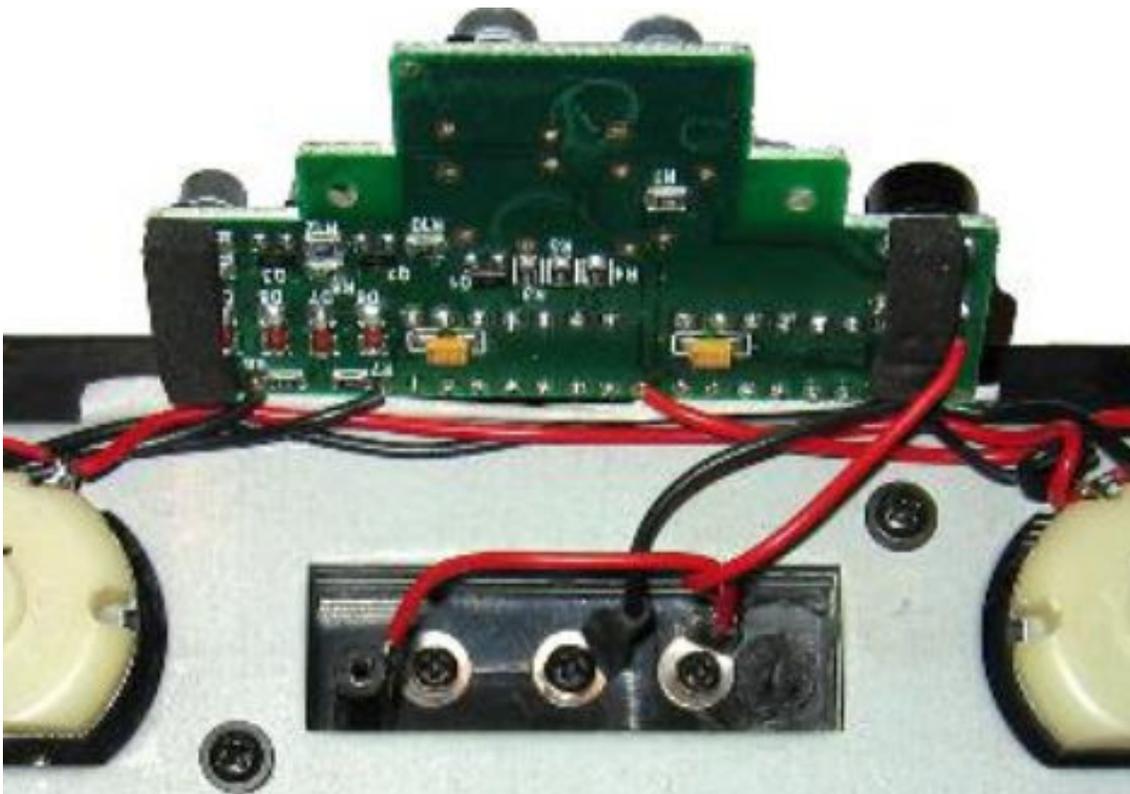
RMT Beep Locomotive – Conventional Install

3. Match the colors, loosen the screw and slip the Sound Commander 2 power cable spade lug under the appropriate screw and then re-tighten the screw. Use caution not to allow the exposed portion of the lug to touch the metal weights around the edge of the cavity.

   You can adjust the location of the existing wiring so the spade lugs slip under easily. Using needle nose pliers will help to move things around in the cavity as needed.

   If you loosen the screws only a few turns, the existing parts will stay together. However, if you happen to loosen the screw too far, simply place the pickup roller back in place and re-attach and tighten the screw with the new wiring.

   When the wires are properly attached the final assembly will look like this.

Added Wiring for Sound Commander
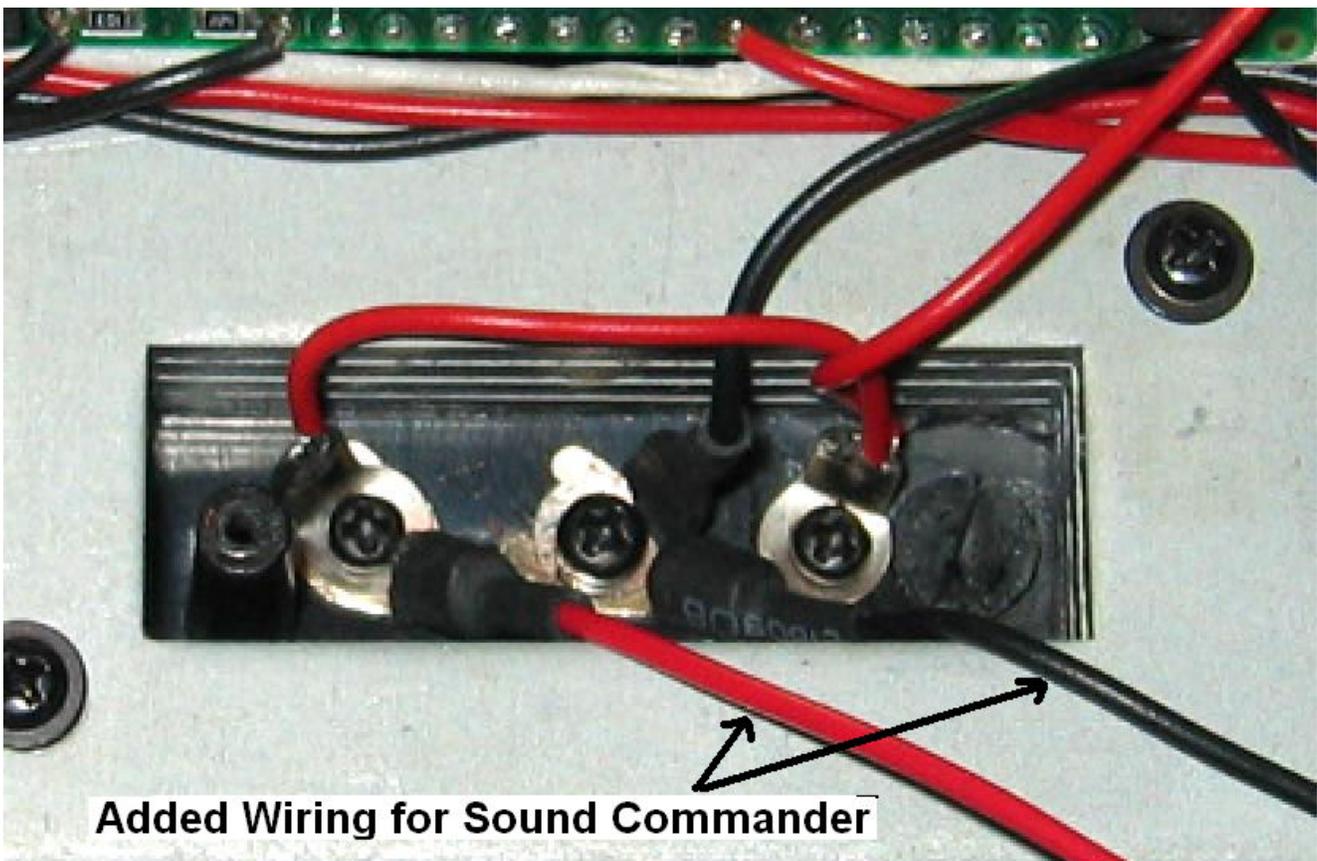
   After attaching the Sound Commander 2 power cable, set the Beep power chassis aside. Proceed to "Installing the Sound Commander 2" on page 11 to finish the installation.

RMT Beep Locomotive – Command Install

*Follow these instructions if adding the Sound Commander 2 in a Beep that **has** the Beep Commander upgrade kit installed.*

1. The first step is to remove the shell.   There are two tabs that hold the shell on. These tabs are located under the "fuel" markings on the shell. Pry each side open with a small screwdriver at that point and lift off the shell.

   When the shell is removed, you will see the 4-pin connector on the Beep Commander that is used to supply power and signals to the Sound Commander 2. You may need to remove the receiver board to easily attach the provided 4-pin cable.
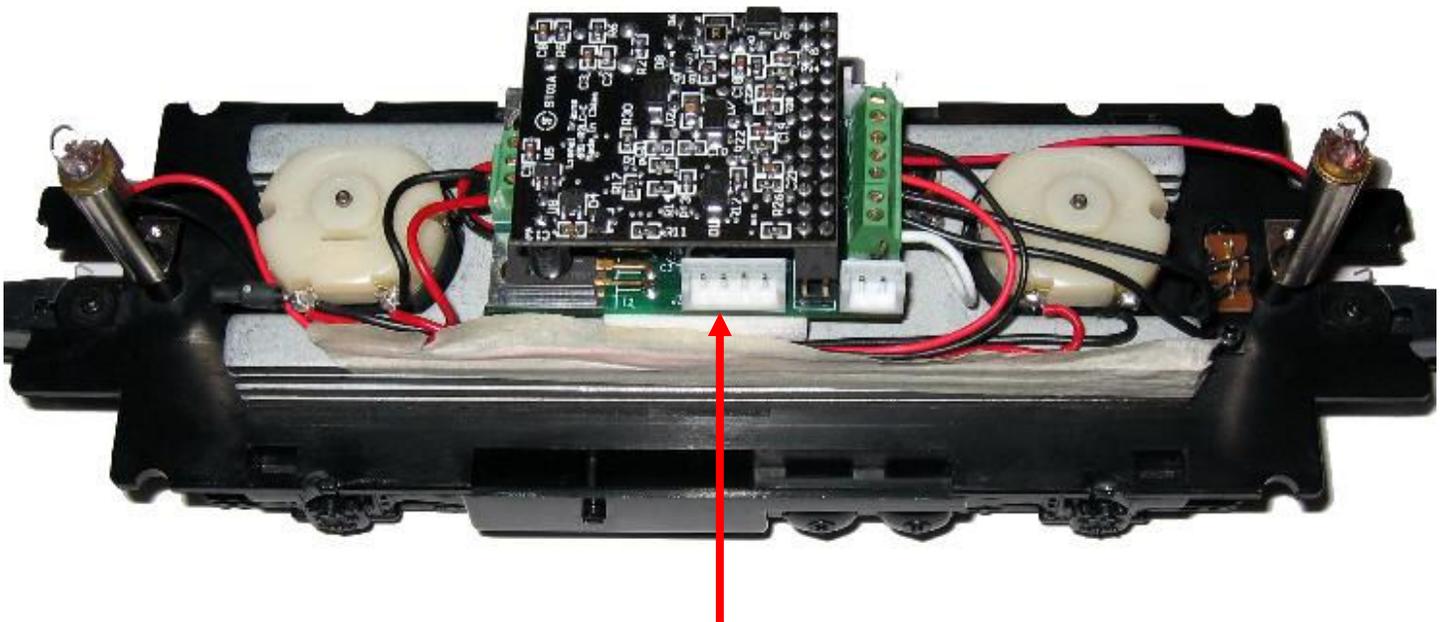
Sound Commander 2 power connector

Attach the Sound Commander 2 power cable to the 4-pin connector on the Beep Commander and set the Beep power chassis aside and proceed to "Installing the Sound Commander 2" on page 11 to finish the installation.

RMT Beep Locomotive – Installing the Sound Commander 2

1. Prepare 2 pieces of double stick tape 0.4" by 1.0" and apply to the speaker as indicated.

2. Remove the window treatment in the Beep's cab shell. Install the speaker as shown. The wires are directed towards the long hood on the Beep shell. Test fit the speaker first with the double stick tape protection on. Once comfortable, fasten the speaker in permanently.

Note: There is no baffle shown on this installation

3. Attach a 0.5 x 0.75" piece of double stick tape to the back of the Sound Commander 2 and mount in the long hood of the Beep as shown. Align the card with the stanchion on the shell as indicated. Test fit the Sound Commander 2 first with the double stick tape protection on. Once comfortable, fasten the Sound Commander 2 in permanently.
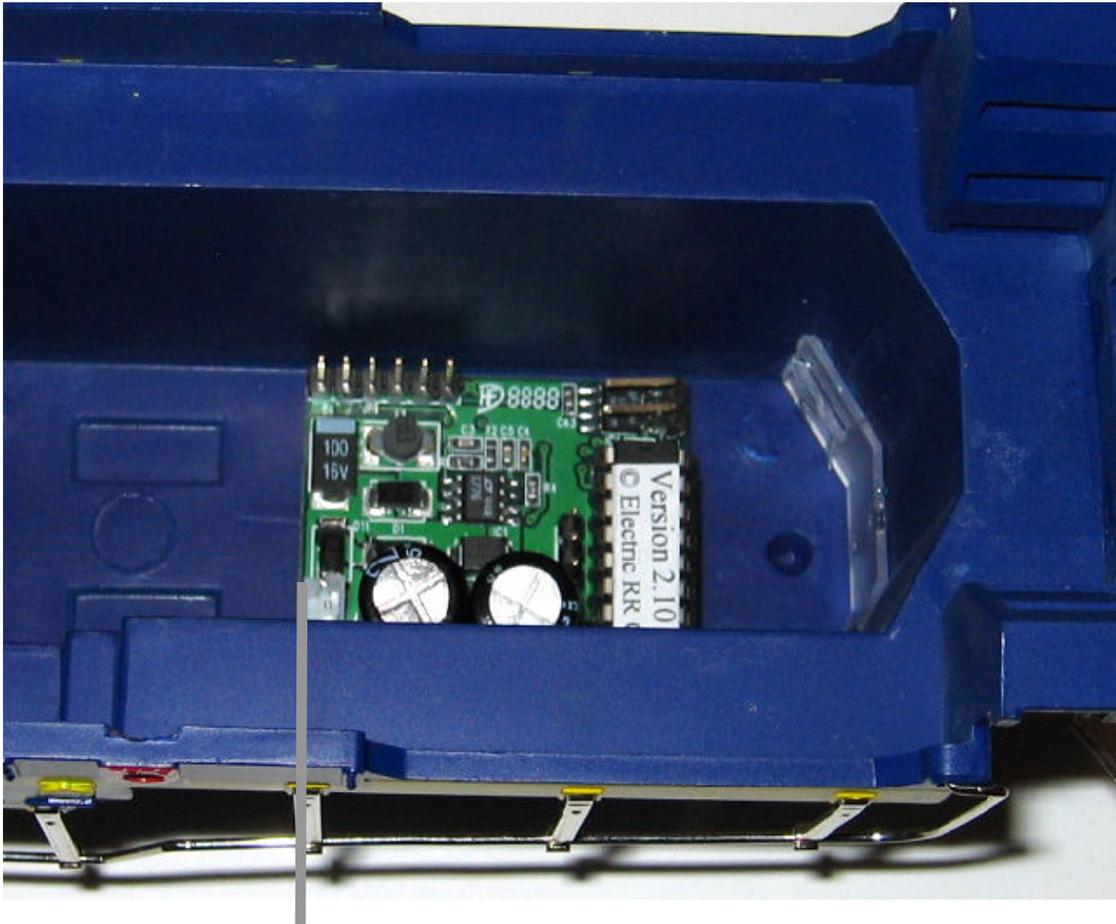
Align and Orient the Sound Commander 2 as shown

4. Attach the speaker wire connector to the 2-pin connector in the upper right of the sound Commander 2; the polarity is not important.

5. Attach the 3-pin power connector from the power chassis into the power connector in the lower left of the Sound Commander 2. This connector is keyed & only plugs in one way.

INSTALLATION COMPLETED!

Diesel Installation Example

Lionel Geep Locomotive – Command Install

This installation shows the Sound Commander 2 installed where the "E" unit normally resides. For conventional only installation mount the Sound Commander 2 forward over the belly tank.

1. The first step is to remove the shell. There are several shell mounting options employed over the years; there may be screws under the chassis, or at each end of the loco.

2. Remove the trailing truck, by releasing the "E" clip. In some locos, the trailing truck may have wires attached for power pickup, in this case use care to protect the wiring while the truck is removed. In this example, the "E" unit and bracket were removed, however the baffle will fit when the "E" unit is present. There are two potential mounting holes for the baffle as indicated below.

Suggested mounting hole for speaker/baffle assembly.

GP-9 Chassis with rear truck and "E" unit removed

Lionel Geep Locomotive – Command Install

3. Prepare the speaker baffle for upright mounting (see page 6), and attach the speaker with the provided mounting screw as shown.

4. When the speaker is installed inside a loco, it is protected and therefore does not require the cover installed. Use one of the methods below to secure the speaker in the baffle:

    - **Without Cover:** Place a small piece of double stick tape (½" x ½") on the speaker magnet and then insert the speaker into the baffle. Using the double stick tape will secure the speaker and prevent vibration. Use care not to damage the cone when pressing the speaker in the baffle

    - **With Cover:** Insert the speaker into the baffle, and secure by placing the speaker cover over the speaker.

Lionel Geep Locomotive – Command Install

5. If you plan to add coil-couplers on the loco, you should attach the coil coupler to the truck. It is best to re-attach the truck prior to mounting the Sound Commander 2, as it may be a bit easier to replace the "E" clip before the Sound Commander 2 is mounted.

6. Mount the Sound Commander 2 next to the speaker baffle, in place of the original "E" unit. Since this installation will have a command upgrade, it is important to use the space very efficiently. (Mount the Sound Commander 2 in front of the "E" unit if you are installing for conventional operation)

Note: the "E" clip used to mount the truck is accessible if the truck needs to be removed.

Lionel Geep Locomotive – Command Install

7. Shown below are the AC/DC Commander after mounting, and all wires before they are attached.

- Additional lighting was added for prototypical directional lighting supported in the command environment.

- **CAUTION:** When the Sound Commander 2 and AC/DC Commander are both installed in this style of loco, the AC/DC Commander will impact the tabs that stabilize the shell. (see below). As a result, some protection must be used to prevent a short circuit, as the tab will touch the bottom of the AC/DC Commander circuitry. It is suggested to raise the AC/DC Commander with a spacer and use a longer mounting screw. The best method is to use a ¼" spacer and a ½" 6-32 mounting screw for this task. These parts are ***not*** supplied in the kit. Be certain the new mounting screw is not too long which could impact the AC/DC Commander circuit board. Double-check this after tightening the mounting screw. Optionally, these shell-stabilizing tabs could be cut off to provide clearance.

- Only 1 (one) coil-coupler was added to the rear of the loco, the front coupler mount did not accept the stock coil-coupler.

- A common connection for the upgrade leverages the solder lug wired to the motor frame at the brush plate mounting screw.

Mounting tab interference (both sides)
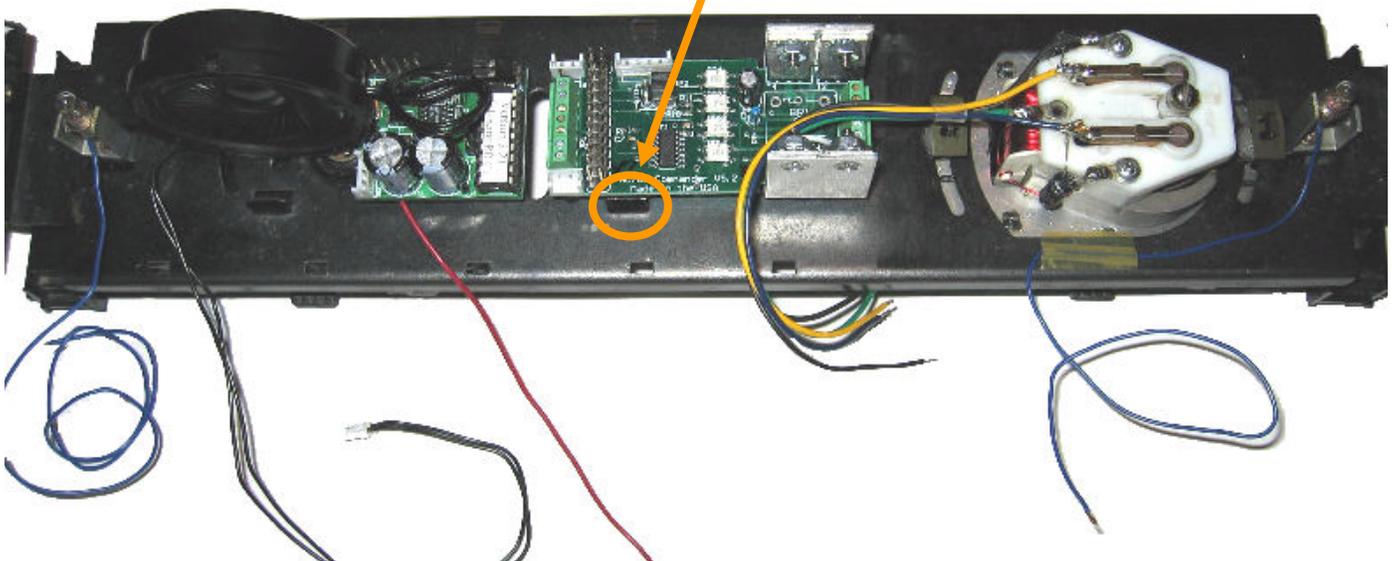
Lionel Geep Locomotive – Command Install

8. Final wiring detail photos. Refer to the AC/DC Commander manual for more information.
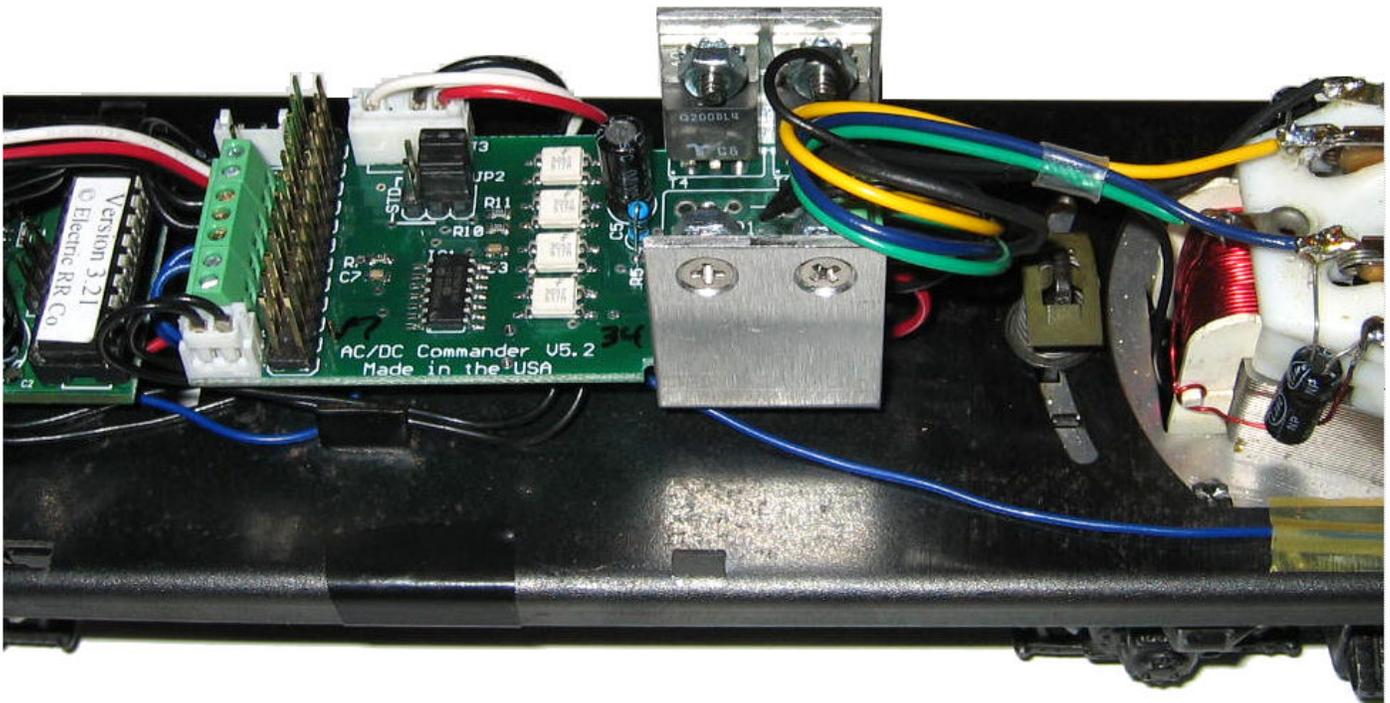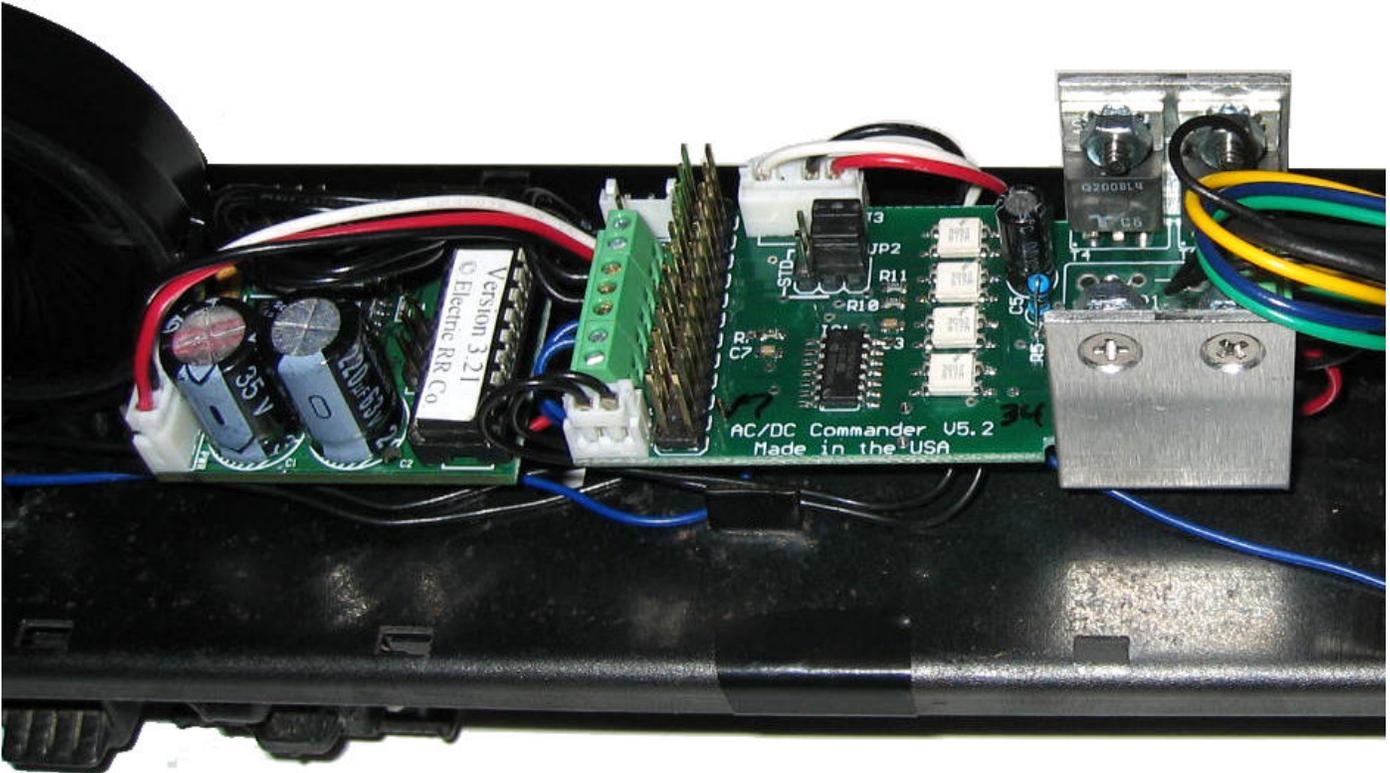
Lionel Geep Locomotive – Command Install

9. The Program / Run switch was installed in the fuel tank with Zap-A-Gap.

INSTALLATION COMPLETED!

Steamer Installation Example

3rd Rail Pennsylvania N1 Locomotive – Command Install

1. The Steamer install will require a chuff sensor switch to trigger the chuff sounds.   When installing the Sound Commander 2 in the tender, normally the chuff sensor is installed on the tender truck.   To have synchronized chuffing, the chuff sensor switch will need to be installed in the Loco, either on a wheel or smoke unit lever on a piston type smoke unit. A tender truck install is shown.

2. Notice the magnet on the wheel is located in from the flange edge to almost touching the axel. The clearance is needed for switches and crossovers. Allow about ¼" for clearance between the magnet and the sensor, as the wheel set has lateral play.   For best results the sensor switch should be positioned slightly off center from the magnets path, otherwise a double chuff may be generated as the magnets north and south poles move past the sensor switch. Use Zap-A-Gap or similar adhesive to mount the sensor and magnet.

Magnet   Reed Switch Sensor
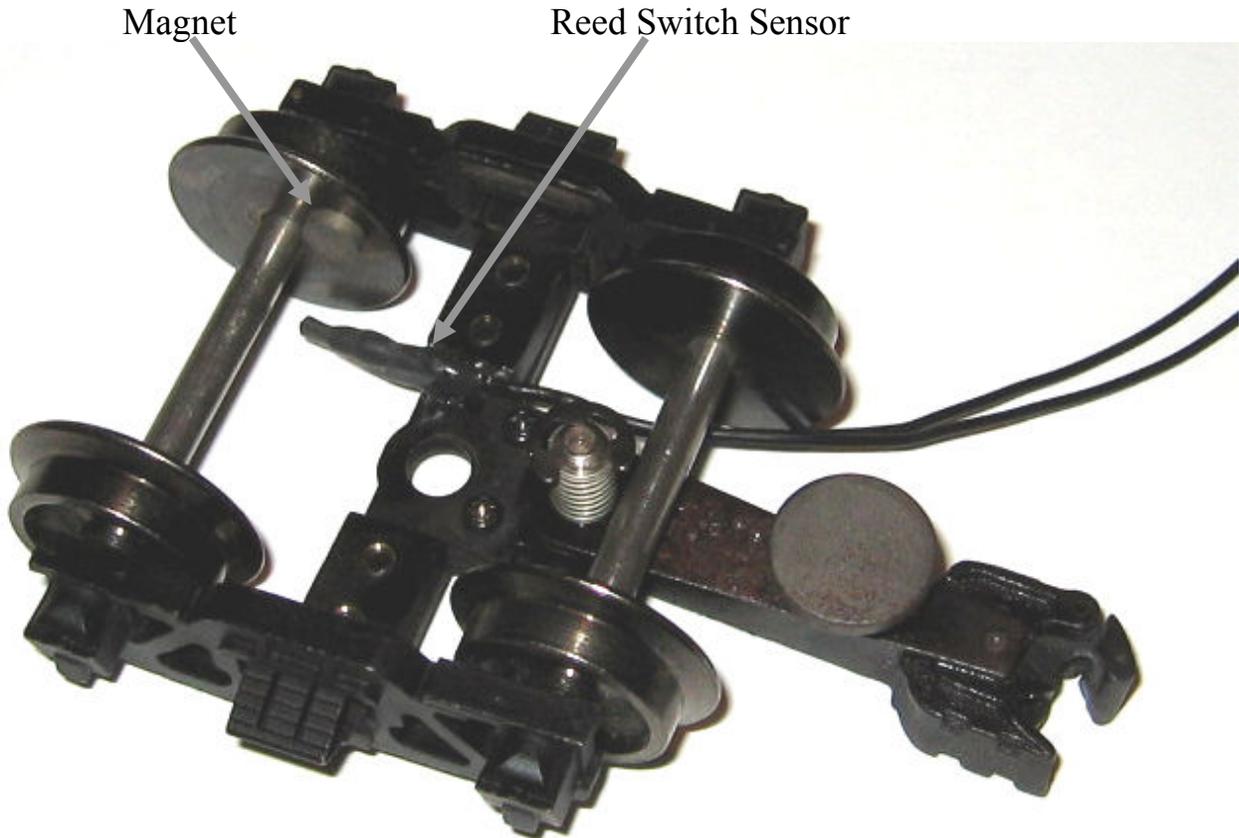
3. If needed, drill about a 1/8" hole in the tender chassis to route the leads up into the tender insides to connect to the "chuff" input on the Sound Commander 2. Do this before mounting the truck back onto the chassis. Protect any installed electronics from metal debris when drilling the hole. De-burr the hole to prevent chaffing the wires from the chuff sensor. Next reattach the truck, routing the chuff sensor wires into the tender.

4. Select a suitable location to mount the Sound Commander 2. The following picture shows a typical installation inside the tender. A typical TMCC driver upgrade board is present in this tender. The driver board has the typical 4-pin sound system connector built in.
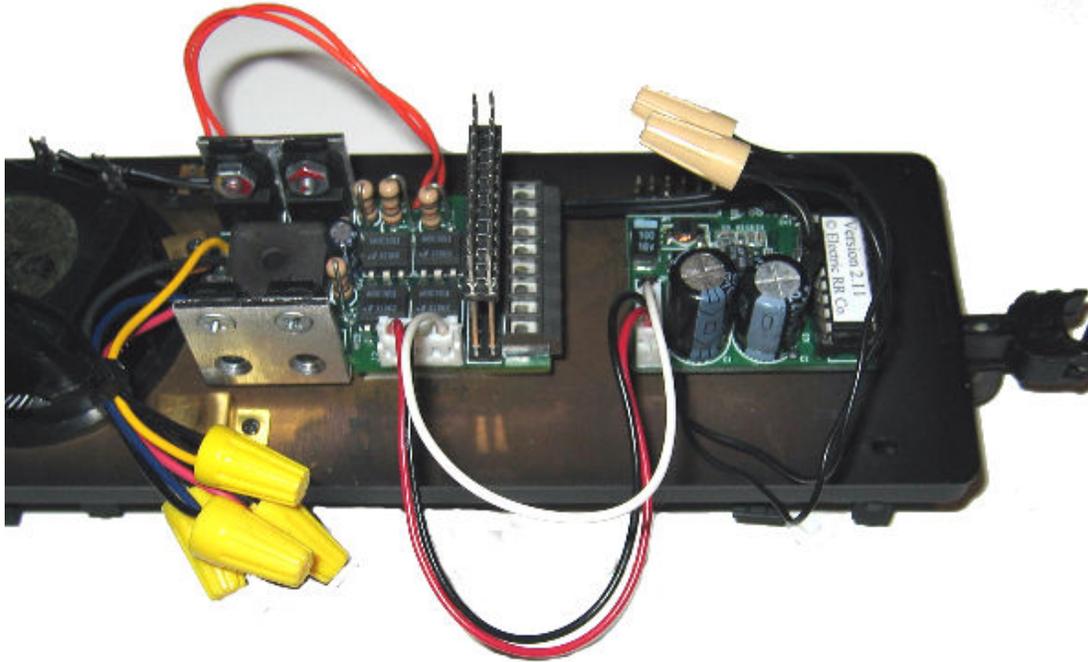
5. Use two (2) layers of a 1.0" x 1.0" piece of double stick tape on the back of the Sound Commander 2 for attachment to a metal tender chassis. Two (2) layers are used to prevent the possibility of any Sound Commander 2 backside components from shorting against the chassis. Test fit the tender shell before affixing the Sound Commander 2 permanently.

6. Attach the power cable as shown between the command upgrade board and the Sound Commander 2. The power cable has a 4-pin connector for attachment to a driver board, and a 3-pin connector for attaching to the Sound Commander 2.

7. Mount the speaker and connect the speaker connector to the Sound Commander 2. If your tender already has a speaker and you prefer to use it, transplant the wiring and connector from the supplied speaker. The speaker used needs to have 8 ohms impedance with at least a 0.5-watt rating.

8. Attach the chuff sensor wires to the 2-pin connector supplied. Use heat shrink tubing to insulate the connections, or optionally you may use wire nuts (not supplied). Plug in the chuff sensor connector into the Sound Commander 2.

I N S T A L L A T I O N   C O M P L E T E D !

Operation - Conventional Mode

The Sound Commander 2 requires a minimum of nine (9) volts AC applied to operate properly. The bell will continue to operate during direction changes as long as the track power interruption is not unusually long.

The horn/whistle and bell buttons on the transformer operate the respective sounds on the Sound Commander 2. The horn/whistle will sound as long as the button is pressed. The bell will stay activated until the bell button is pressed again.

Using an extended press of the Bell button may activate the selection of additional sounds, which vary by sound set. Holding down the bell button for less than 2 seconds will turn the bell on or off. When the Bell button is held down greater then 2 seconds, but less than 3 seconds, the 2nd sound is activated. Holding down the bell button for longer than 3 seconds will activate the 3rd sound.

Note: Sufficient load must be present on the transformer for the offset voltage to be developed. If the horn/whistle or bell does not operate, try adding a lighted caboose to the "consist" and see if that helps. The Electric Railroad Company has checked out the transformers listed below and found them to operate satisfactorily.

Note: If the horn/whistle and bell sounds are reversed from the activation buttons, the track power is reversed. Switch the connections on the transformer power terminals to correct this condition.

Transformer Compatibility List:
>   Lionel 1033
>   Lionel KW
>   Lionel ZW
>   Lionel Sound Activation Button
>   Lionel PM-1
>   Lionel TPC 300/400
>   ** The CW-80 is NOT compatible with the Sound Commander 2

Important Note: *The PM-1 will not develop sound control signals at full throttle, simply back off from full throttle a bit to operate the sounds.*

>   MTH Z750
>   MTH Z1000
>   MTH Z4000 – CAUTION: do not advance the track voltage over 20v !

Important Note: *Excessive track voltage (>20v) will damage the Sound Commander 2, and a protection device will activate. The activation of the protection device will void the warranty on the Sound Commander 2.*

Operation - Command Mode

The Sound Commander 2 should remain silent when power is applied to the track when a solid command signal is present. If the command signal does not get detected within 1/4 second the Sound Commander 2 may "start up" on its own, this is normal. Several additional features are available in the Sound Commander 2 when operating in command mode.

For diesels, the prime mover revs "track" the throttle setting. Since the speed profile is monitored on the Sound Commander 2 (32 or 100 speed steps), the revs will trigger at different throttle settings based on the selected speed step monitoring. A coupler clank is also present when a coupler is activated, and the AUX1+2 will activate sound set specific embellishments.

For Steamers, the chuff, idle steam hiss and brake compressor sounds are enabled. The chuff is a 4-chuff-cadence sequence that operates when an external chuff sensor switch closes. Additionally, AUX1+2 triggers a "blow-off" sound.

Volume may be set on the warning sounds (horn/whistle/bell) independently of the other sounds. The warning sounds volume is controlled by AUX1+1 for up, and AUX1+4 for down. This is the "volume" button in DCS.

The prime mover revs/compressor pops or chuff/idle steam hiss sounds volumes are controlled with AUX1+3 for up, and AUX1+6 for down. This works on DCS with "labor/drift". To shutdown all sounds, press AUX1+5.

On a diesel, the prime mover revs speed monitoring may be changed. The default speed steps monitoring is set at 32 as shipped. This profile matches the default of the Beep Commander and AC/DC Commander upgrade kits. When you change the speed step selection for the Beep Commander or AC/DC Commander, the Sound Commander 2 will follow in kind. You should confirm the speed step selection after the installation of the Sound Commander 2 to be certain the two products are in "sync".

To change the speed step monitoring, do the following:

Activate   32 speed steps monitoring: AUX1 + 0 + AUX1 + 0 + BRAKE
Activate 100 speed steps monitoring: AUX1 + 0 + AUX1 + 0 + BOOST

The speed steps selection and monitoring is stored (on both "Commanders") until changed, and survives power cycling.

Limited Warranty

The Electric Railroad Company warrants to the original consumer purchaser that this product will be free of defects in materials and workmanship for a period of 90 days from the date of original purchase. This warranty does not cover service, repair, or replacement to correct any damage caused by improper installation, improper connection, external electrical fault, accident, disaster, misuse, abuse, or modifications to the product. All other express or implied warranties, including the implied warranty of merchantability and fitness for a particular purpose, are hereby disclaimed. If this product is not in good working order as warranted, the sole and exclusive remedy shall be repair or replacement. In no event shall The Electric Railroad Company, or any dealer, distributor, or authorized installation and/or repair service provider be liable for any damages in excess of the purchase price of the product. This limitation applies to damages of any kind, including but not limited to, direct or indirect damages, lost profits, lost savings or other special, incidental, exemplary or consequential damages whether for breach of contract, tort or otherwise, or whether arising out of the use of or inability to use the product, even if The Electric Railroad Company, or any dealer, distributor, or service provider has been advised of the possibility of such damages or any claim by any other party. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. During this warranty period, the product will either be repaired or replaced (at our option) without charge to the purchaser, when returned either to the dealer with proof of the date of purchase or directly to The Electric Railroad Company when returned prepaid and insured with proof of date of purchase. Some states do not allow limitations on how long an implied warranty lasts, so such limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

Repairs

Each and every product is thoroughly tested before it is shipped. The likelihood that it is not working when it reaches you is very small. However, if after troubleshooting it yourself you cannot get it to work properly, contact us to help determine the problem.

Should your product ever need repair, return it postpaid directly to The Electric Railroad Company. If the product is within the warranty period, it will be repaired or replaced and returned to you free of charge. Units out of warranty will be repaired or replaced for a service charge of $25.00 at our option.

Please email to support@electricrr.com for return authorization before returning any product.

Disclaimer

Improper installation or configuration of the Sound Commander 2 product can cause overheating and fires! Since it is not possible to understand every installation, it is the consumer's responsibility to verify proper operation of the upgrade to prevent malfunction. If you are unsure of your install, please contact us first before taking any risks!