

# STEAM SOUND for AC track power by **DALLEE** ELECTRONICS, Inc.

ACv1.4

**CAUTION:** THIS DEVICE CAN BE DAMAGED BY STATIC DISCHARGE. PLEASE EXERCISE CARE DURING INSTALLATION TO AVOID THIS POSSIBILITY. DISCHARGE YOURSELF TO AN ELECTRICAL GROUND (OUTLET COVER SCREW) BEFORE REMOVING THIS DEVICE FROM ITS ANTI-STATIC BAG. PLEASE READ INSTRUCTION SHEET COMPLETELY BEFORE ATTEMPTING TO INSTALL AND OPERATE THIS PRODUCT.

Save the anti-static bag for possible reuse of storing or shipping the sound unit!

**OVERVIEW:** This device is an electronic sound system for installation in model diesel locomotives that are designed to operate with conventional AC track power with standard Whistle and Bell operation. In addition to conventional control of the Whistle and Bell, this sound system may also use of our LocoMatic™ Controller (Item 755) to operate the horn, bell, force notch 8, and main sounds on/off.

The audio amplifier can produce 1.1 watts of power which is in excess of what most small speakers can handle. The speaker impedance must be 8 ohms or higher. Sound volume is adjustable. Refer to our catalog, web site, or price schedule for available speakers. If space permits, more than one speaker can be utilized as well as an additional 22 watt amplifier (item 672) but these will also need an additional speaker as well as different wiring.

Sounds produced include user controlled Whistle and Bell. Non-user controllable sounds include periodic air system pressure release, air pumps, and automatic chuff (if not using the synchronized input wiring, sound automatically adjusted to speed and load conditions.

**INSTALLATION INSTRUCTIONS:** The sound system consists of two printed circuit boards, two 2-pin jumper cables (already installed), two 2-pin wire harness (item 222) and one 3-pin wire harness. A CHOKE (item 702 or 703 depending on motor power requirements), not included, is required for LocoMatic™ track power installations.

Refer to the drawing on page 2 to familiarize yourself with the connectors and controls on the sound board. Then refer to the specific instruction sheets for the type of installation you intend to make. Before proceeding with the installation read the balance of the instructions on this page carefully so you will be completely familiar with what is required and what sounds you should hear. Page 3 is what most will use for wiring.

The sound circuit board should be mounted so that at minimum, the volume control is accessible either through the frame or via a hatch or a hole in the locomotive body shell. The power board can be mounted anywhere convenient. Be certain that the components on the circuit boards do not come in contact with any metal objects as such contact can destroy them. To mount, degrease the area and then simply remove the coating on the tape and press in place. Once mounted they will be quite difficult to remove after a period of time. The speaker should be mounted as per available space bearing in mind that sound reproduction is enhanced when a speaker is properly enclosed and baffled. Be extra careful to insure that none of the speaker wires come into contact with any other metal or wires!

There is an on-board storage capacitor to keep the sound operational during power sequences. If the sequence time is too long, or if the volume is set high, the storage time will be shorter therefore requiring a fast sequence. Extra capacitors can be added in parallel to the main 6800mfd capacitor to extend this time if desired.

If any connections are not done properly, especially the power connections, you will damage the sound system. This type of damage is not covered under any warranty. The sound system is thoroughly tested and inspected before packing to insure proper function. There is a minimum charge of \$40.00 plus s/h for repair.

## SOUND INFORMATION:

**AIR PUMPS** are needed to maintain air pressure in the train and locomotive braking systems. These pumps must run periodically as pressure drops, due to brake applications or through normal leakage. To simulate this action, AIR PUMP sounds are generated at random intervals when the sound system is on and there is no power to the track / motor. AIR PUMP sounds will also be heard when power is first applied to the sound system. This will give you an indication that the system is in fact functioning.

**BLOWERS** are used on a steam locomotive to maintain fire box draft when the locomotive is not in motion. BLOWER sound will be generated whenever the locomotive has stopped moving and there is no power to the track / motor.

**SAFETY VALVE** will vent if steam pressure in the locomotive boiler becomes excessive. The sound system will produce a SAFETY VALVE release at random intervals whenever the blowers are on and steam is not otherwise being used.

**BELL** sound is controlled by the BELL button on the conventional transformer's remote controller or again by the LocoMatic™ Controller if wired for it. When BELL sound is requested the BELL sound will start to play. When deactivating, the BELL will stop at the end of a ring. For all operators, you depress and release the BELL button to turn on the BELL and then again depress and release the button to turn the BELL off. You do have to pause between requests.

**EXHAUST CHUFF** is the most notable sound of a steam locomotive in motion. The sound is the result of the used steam from the cylinders being vented through the stack. Each cylinder will exhaust twice during each drive wheel revolution and since most steam locomotives have two cylinders, the exhaust should chuff four times for each drive wheel revolution. EXHAUST CHUFF sounds should vary from a very slow chuff rate to an almost continuous roar at high speed. EXHAUST CHUFF should also vary as to the load on the locomotive with a heavy train making a louder exhaust. This sound system will vary the EXHAUST CHUFF sound either by voltage supplied to the track / motor or, as an option synchronized. We offer two types of synchronized input devices. One optical, the other utilizing small magnets and a reed switch. The EXHAUST CHUFF volume will increase above normal during acceleration and will be lower when decelerating.

**SPEAKER MOUNTING:** The speaker generally should be mounted so that the sound can actually "get out" of the locomotive. A hole in the floor of the tender is acceptable but the front of the coal bunker or even through a simulated coal load may be a better choice as the sound can exit forward or upward rather than down toward the track. In some cases, particularly in the larger gauges, mounting a speaker inside the front of the boiler with an open stack can enhance the sound. Enclosing the speaker in a chamber will also enhance sound reproduction. A very simple enclosure can be made with a tube. It is usually best to seal the end of the tube, so there are no air passages to the rear of the speaker, thus creating a sound chamber. By carefully sealing all openings it may be possible to use the entire tender body shell as a sound chamber. A simple wall behind the speaker may be all that is possible or perhaps all that is needed.

Speakers can be attached with double sided tape, with glue or with "hot melt". Enclosures can be made with plastic, wood, card stock or even metal. Film cans or medicine bottles make excellent sound chamber enclosures for small diameter speakers. Attachment with "hot melt" is advantageous as the "hot melt" can be used as a gap filler when creating an enclosure.

A second speaker, wired in series with the main speaker, can also enhance sound quality and will permit a higher volume without damage to the individual speakers.

Speaker enclosure is an art and experimentation is definitely in order for your installation so as to gain the maximum benefit of the superb sound quality available in this sound system.

**GENERAL OPERATING INFORMATION:**

**VOLUME ADJUSTMENT:** should be set as desired for your application. Please remember that the amplifier can produce more power than a small speaker can handle and that the sound will be louder if the speaker is properly enclosed and baffled. If you are using batteries, the louder the volume the shorter the battery life.

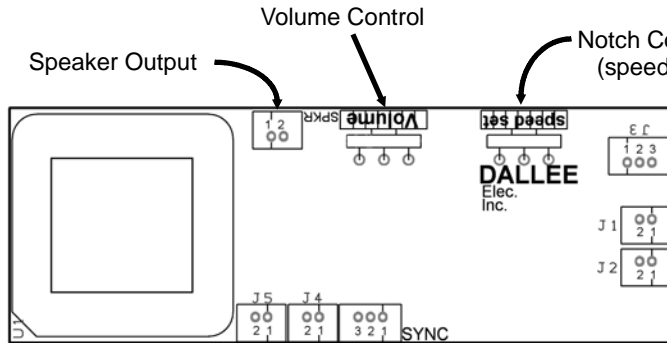
**CHUFF RATE** control adjusts the rate of chuff when in auto-chuff mode. This adjusts the maximum chuff speed for voltage variable automatic exhaust chuff. Rotate the control CCW to increase the voltage required to reach maximum chuff speed. Adjust as desired for a chuff rate to match your locomotive. When using the "SYNC" input, the CHUFF RATE control has no effect..

**Flyer Operators:** For AF mechanical chuff only, connect the white and black wire together from the "SYNC" input. This will prevent the sound system from generating any exhaust chuff's.

**Common Horn signals**

SOUND	INDICATION
short.....	apply brakes, stop
2-long.....	release brakes, proceed
long, 3-short.....	flagman protect rear of train
4 or 5 long.....	recall flagman
2-short.....	acknowledgment
3-short.....	back up movement
4-short.....	call for signals
short, long.....	inspect train line for leak or brakes sticking
2-long, short.....	approaching meet or wait point
2-long, short, long.....	approaching grade crossings
continuous long.....	approaching stations or junctions
successive shorts.....	alarm for something on track

**Connections & Locations**



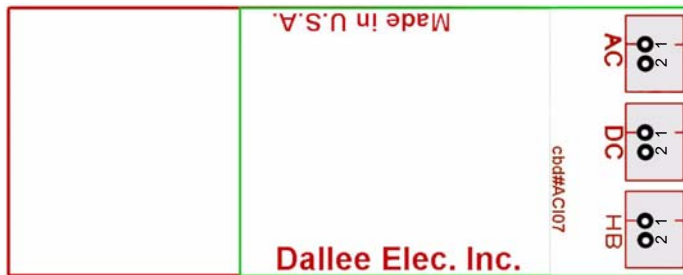
- J3 connections:
- 1 - LocoMatic™ input (RED)
  - 2 - Motor 1 (BLACK)
  - 3 - Motor 2 (WHITE)

- J2 connections: (preconnected to power board)
- 1 - DC power "+" (RED)
  - 2 - DC power "-" (BLACK)

Synchronized chuff input.  
See page 5 for connections.

**SPECIFIC INSTRUCTION SHEETS**

PAGE	INSTALLATION TYPE
3.....	Conventional AC
4.....	using LocoMatic™ Controller
5.....	synchronized operation
6.....	sample speaker installation



- AC-track power input:
- 1 - (RED).....3 rail: Center Rail, 2 rail: right rail
  - 2 - (GRAY).....3 rail: Outside Rail, 2 rail: left rail
- if these are reversed, the Horn/Bell will operate reversed of normal

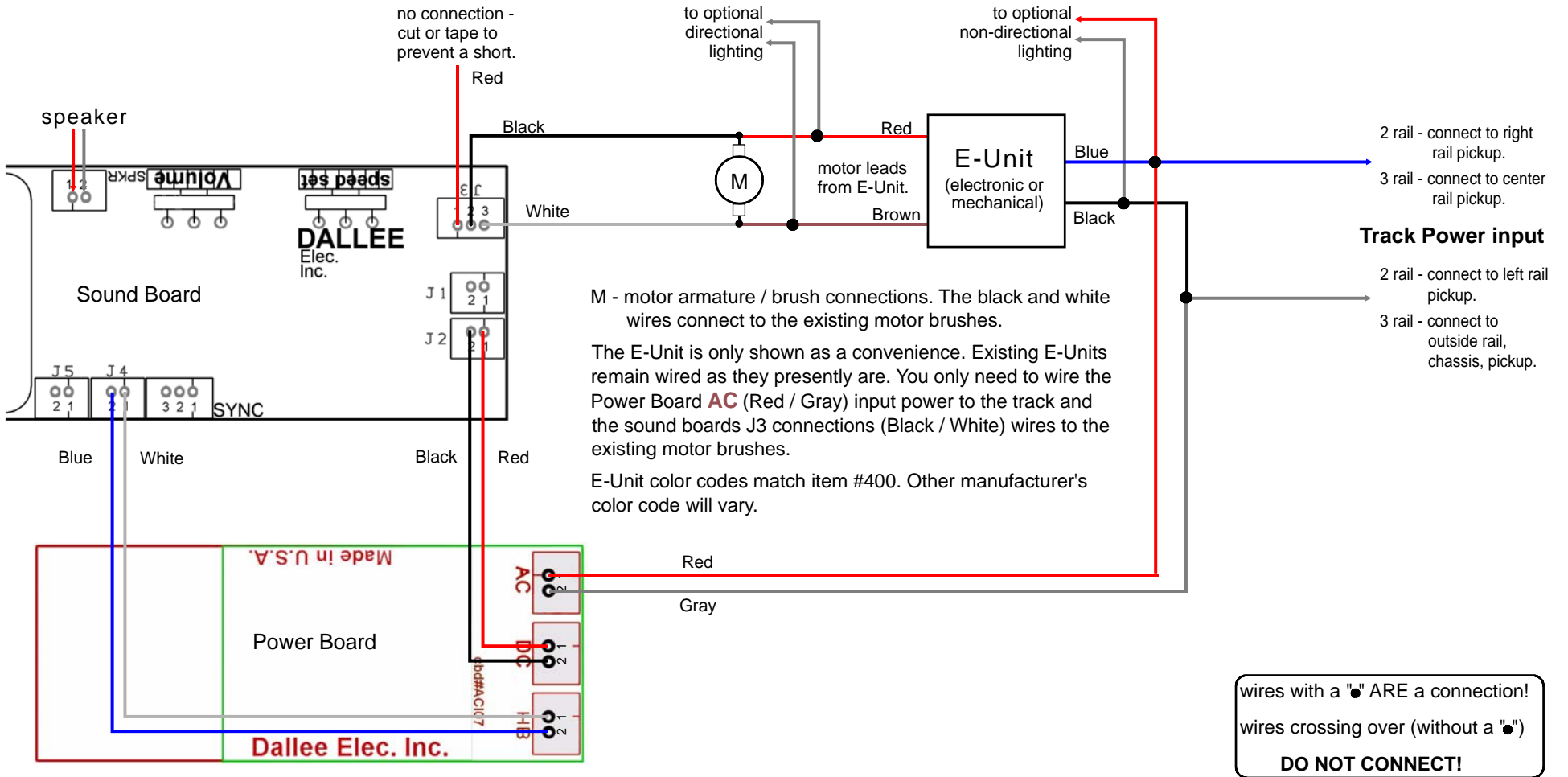
- DC power connections: (preconnected to sound board J2)
- 1 - DC power "+" (RED)
  - 2 - DC power "-" (BLACK)

- HB connections: (preconnected to sound board J4)
- 1 - Whistle Signal (WHITE)
  - 2 - Bell Signal (BLUE)



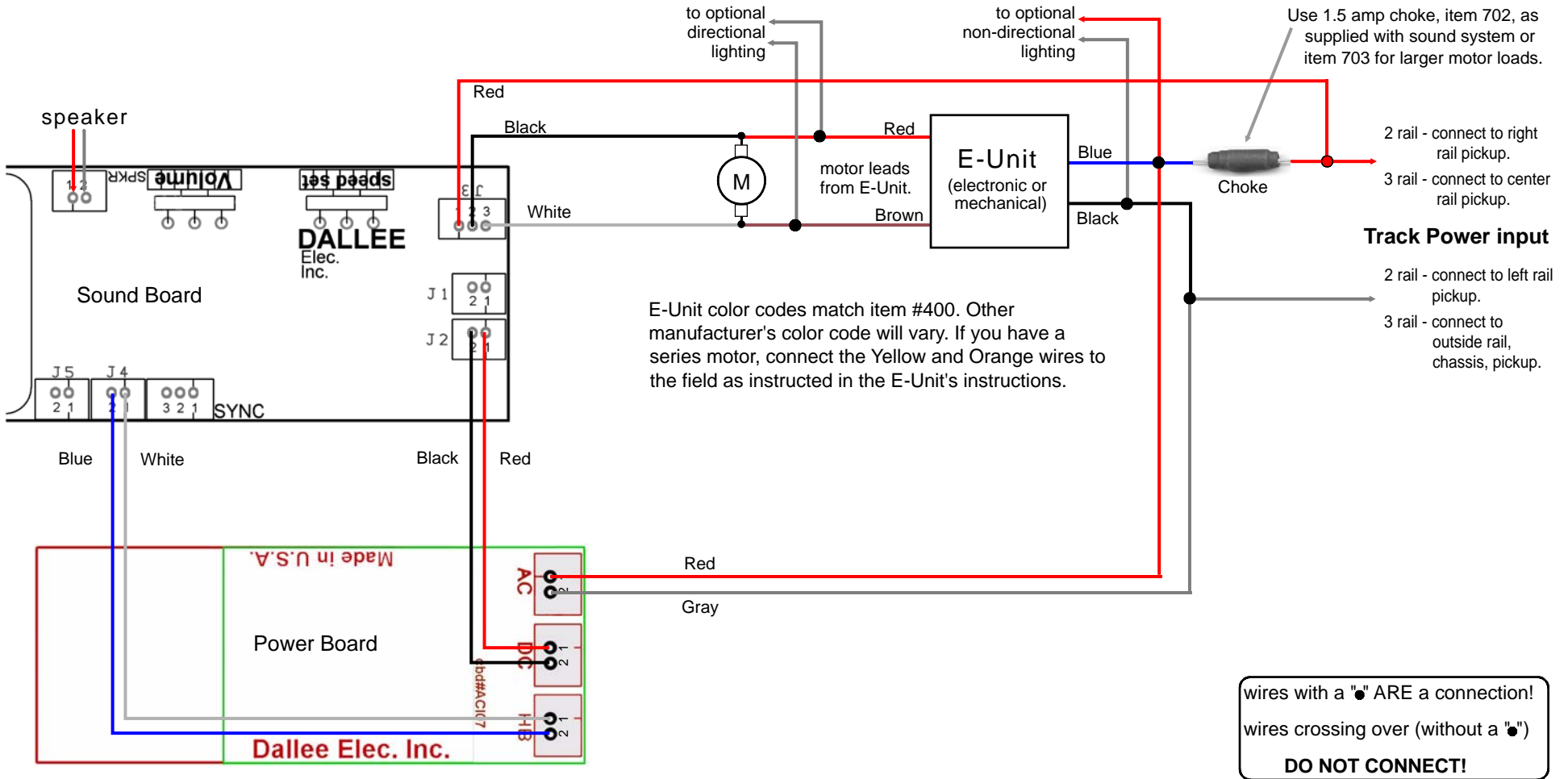
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www.dallee.com

# AC track power installation using standard Horn/Bell operation



Note for **Synchronized chuff operators**: Do not connect anything to J3 as shown!  
Only use the "SYNC" input connections as instructed on page 5.

# AC track power installation using standard Horn/Bell or DALLEE controller #755



If you do not want the sound system to operate from the standard Whistle/Bell signals, then disconnect the HB - J4 wire harness.

Note for **Synchronized chuff operators**: Do not connect anything to J3 as shown! Only use the "SYNC" input connections as instructed on page 5.

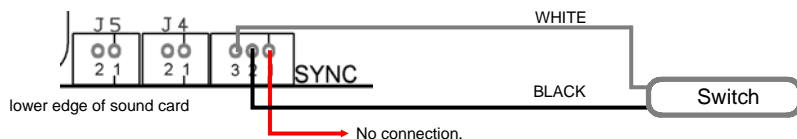
# Optional Synchronization of Exhaust Chuff

These items are not Included with the sound card but are additional items that you can use to enhance operation.

## Switch Synchronization:

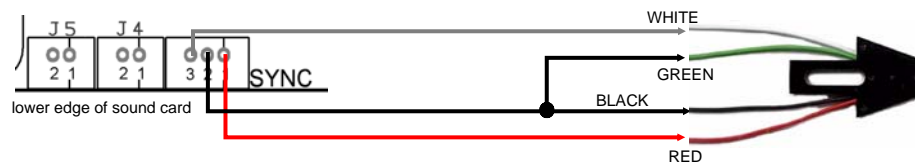
- 1 - connect Common (C) of the switch to the White wire from the SYNC input.
  - 2 - connect Normally Open (NO) of the switch to the Black wire from the SYNC input.
- Switch closure should occur on peaks of quartering lobes. We recommend using optics since they can switch much faster, don't bounce, and do not interfere with the mechanical operation of the axle.

DO NOT use a leaf switch to the chassis (quartering lobe) this will damage the sound unit!



## Optical Coupler (item #583) Synchronization:

- 1.....connect Black and Green optical pickup wires together, this then connects to the Black wire from the SYNC input.
  - 2.....connect Red optical pickup wire to the Red wire from the SYNC input.
  - 3.....connect White optical pickup wire to the White wire from the SYNC input.
- see page 11 for picture of installation.



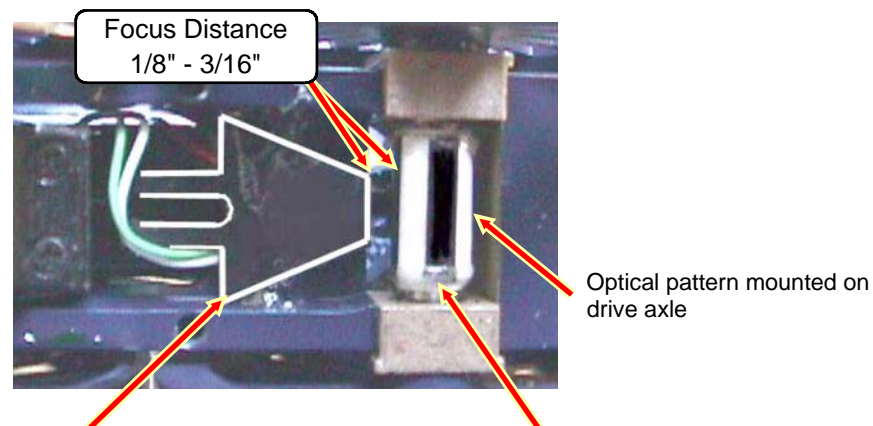
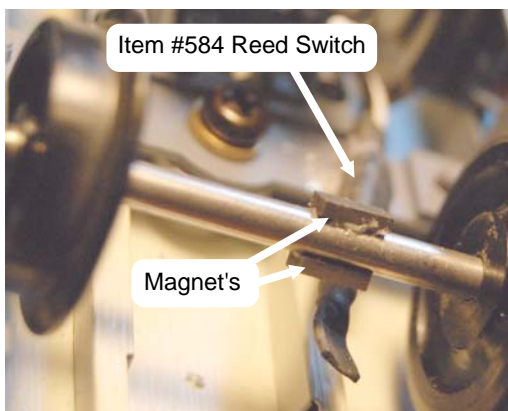
## Reed Switch Synchronization

Axle synchronization can also be accomplished by gluing one or two magnets onto any axle. The reed switch is supplied with two wires and encased in heatshrink tubing. These connect to the White and Black wires from the "SYNC" connector as shown above.

To create one chuff per revolution, which most will find creates the sound effect desired, merely glue one magnet onto the axle. For two chuff's per revolution, the second magnet needs to be glued onto the axle in the opposite position. Most trailing wheel sets are 1/2 the diameter of the main drivers, so two magnets would yield 4 chuffs per revolution of the main drivers.

These magnets are very small and measure only 0.1" wide x 0.2" long x 0.045" thick.

Two magnets and one reed switch assembly are included in this package, item #584.



Optical Coupler, item 583 (hi-lighted for ease of viewing), mounted to frame 3/16" from optical end to pattern. In this installation, the end mounting ears had to be trimmed to obtain clearance to the drive gear box. When doing so care must be used to not damage the optics.

apply a thin layer of glue on each side to prevent oil from contaminating the optical pattern.

## Synchronization Note:

When using a synch input, **DO NOT** connect the black and white wires of J3 to the motor brushes!

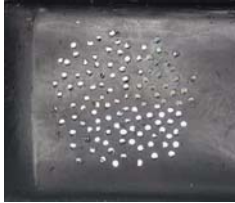


# Sample Speaker Installations

## Closed top Tender

It is best to have the sound projected up instead of down. To do so, locate the highest part of the existing coal pile. Use a small, sharp, drill bit (#60) to open a series of holes within the speaker cone diameter. Always drill slowly so the plastic does not melt.

Mount the speaker with "Hot Melt" or glue. Be sure to cover all sides of the speaker so no air can escape.

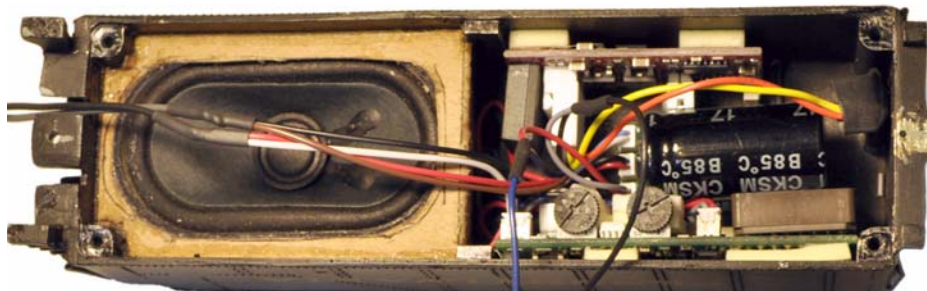


In larger tenders with a lot of air passage between the tender top and frame, it may become necessary to make your own enclosure as shown here. Especially if you don't want to drill the top open (or it's an oil burner).

Installing a large speaker in an American Flyer K4 / K5 tender is quite easy. A Dallee 400 E-Unit and AC sound unit (K4 - item 1005) fit quite nicely!

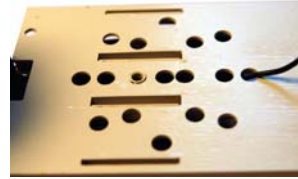
Item 664 is the speaker used. It's 1.6" w x 2.8" l x 1.3" deep and fits very snug. The metal tabs were cut from the corners of the speaker to allow it to clear the cast floor mounts. A 1/8" thick piece of double sided tape was used on the magnet's end to space it beyond the cast coal pile. The speaker was sealed into place, with its baffle, using "Quick Grip" glue. It's important to make it air tight for good sound, so seal it well!

The wires to the engine were run between the speaker face and the top of the chassis as pictured below.



## Chassis Mount

When mounting the sound unit in an open chassis (car or locomotive) area with a power feed entering under the speaker requires raising the speaker from the chassis floor. This is easily accomplished by adding item #388, 1/8" thick double sided tape, to the rim of the speaker. As you can see, only a small amount is needed. This creates an air tightness from the front side of the speaker which is required for a good baffle. In this case, the entire body shell is used for the speaker baffle which is why nothing is required on the back side of the speaker.



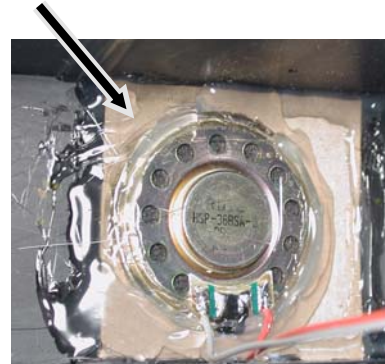
**DO NOT** allow the speaker wires to contact anything else, including the chassis of the engine or the speaker frame.

**Doing so will damage the sound unit and voids the warranty.**

## Open top Tender

Make a cardstock cutout with an opening for the speaker. Mount the cardboard cutout with "Hot Melt" or glue. After the cutout sets, mount the speaker. Be sure to cover all sides of the cutout to the tender and speaker so no air can escape.

If you have other openings, be sure to close them.



top view of completed speaker installation.