

# STEAM CHUFF SOUND

for various track power by



Rev 6

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, self contained, sound system for installation in model steam locomotives that are designed to operate with conventional track power, digital (DCC), or other types of command control systems including radio with either track or battery power. Because of its dimensions (2.5" x 0.9" x approx. 0.5" high) the sound system may be limited to larger gauge models and may also require the use of a trailing car.

An on/off switch (not included) must be used to turn the sound unit on and off in some applications. If there is sufficient input power, the audio amplifier can produce 1.1 watt of audio power which is in excess of what most small speakers can handle. The speaker, not included, impedance must be 8 ohms or higher. Sound volume is adjustable. This unit is designed with the intent of creating exhaust chuff's required for compound engines or continuous exhaust chuff with other sound systems. Since it's intent is for the locomotive to go beyond simple exhaust chuff operation, it will only work with a synchronized input. Our optical synchronizer, #583, is ideal for synchronized operation. Or choose from our reed switch unit, item #584. These are not included with this unit. Sounds produced include user controlled cylinder blow down, ball cocks open / closed when first pulling out, and steam exhaust chuff sound automatically adjusted to speed and load conditions.

This sound system, when used with conventional DC track power, requires the use of our LocoMatic™ Controller (Item 755) to operate the cylinder blow down, ball cock's open (normally closed), and main sounds on/off. In addition to the controller, an appropriate choke is required (see item 702 or 703). If installing dual systems, only one choke is needed. The LocoMatic™ Controller and choke's are not included since they are for specific installations. DCC and other command control operators can use remote functions on their systems to activate these functions.

## INSTALLATION INSTRUCTIONS:

The sound system consists of a printed circuit board, five 2-pin connectors and two 3-pin connector with wires.

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 carefully so you will be completely familiar with what is required and what sounds you should hear.

The circuit board should be mounted, usually in the locomotive tender, so that the volume and other controls are accessible either through the frame or via a hatch or a hole in the tender body shell. Be certain that the components on the circuit board do not come in contact with any metal objects as such contact can destroy the sound system. A speaker should be mounted as per available space bearing in mind that sound reproduction is enhanced when a speaker is properly enclosed and baffled.

If a DC locomotive is not moving, there is no track power, therefore to have sound it is necessary to have a separate power supply for the sound system. For in locomotive use, this separate supply is a battery. We suggest the use of one 9 volt, 6 AA, or 6 AAA batteries in series (7.2 - 25

volts) to maximize volume potential and battery life. Rechargeable batteries can be used. When connecting the battery (DC) power leads be absolutely certain that wires connect to the proper DC input leads.

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:

**CYLINDER BLOW DOWN** is required to remove condensate that accumulates in the cylinders when a locomotive has been at rest. This condensate must be exhausted from the cylinders prior to the pistons being powered by steam or there can be damage to the cylinders. CYLINDER BLOW DOWN sounds will be generated by the sound system when requested. With the LocoMatic™ Controller you depress and release the ALT & F3 button to turn on the CYLINDER BLOW DOWN and then again depress and release the button to turn the CYLINDER BLOW DOWN off. Toggle switch or remote function control does not require the PUSH ON - PUSH OFF sequence. In either case of operation, the CYLINDER BLOW DOWN will automatically turn off when the locomotive starts running (1.5 - 2 volts is required on the motor input terminals, J3 pins 2 and 3, to be sensed). If the input, J5 pin1, is constantly pulled low to J2 pin2 or via a function control with a remote receiver, the sound system will turn off the CYLINDER BLOW DOWN when needed and automatically turn it back on after the locomotive has stopped for a short time.

**BALL COCKS** are controlled with the CLYLINDER BLOW DOWN. When they are open condensate is pushed out of the cylinder heads by steam pressure. When they are left open, a different exhaust chuff is heard. This is that of semi-compressed steam. Steam locomotives must evacuate all condensate before allowing the cylinder head to completely close and fully compress steam or the cylinder heads will explode. By leaving the CYLINDER BLOW DOWN set ON when the locomotive starts pulling out you will hear the air blowing out of the Ball Cocks in synch with each exhaust chuff. After a few revolutions the ball cocks will automatically close or you can manually close them with the ALT & SF3 or function as connected.

**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 with actual movement of the drive wheels or other axles via the optical pickup. Additionally, the EXHAUST CHUFF volume will increase above normal during acceleration and will be lower when decelerating. The pitch of the EXHAUST CHUFF can be hard wired as explained on page 2 for various pitches desired. The selection is from thunderous large cylinder locomotives to that of small cylinders found on switcher type locomotives.

**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.

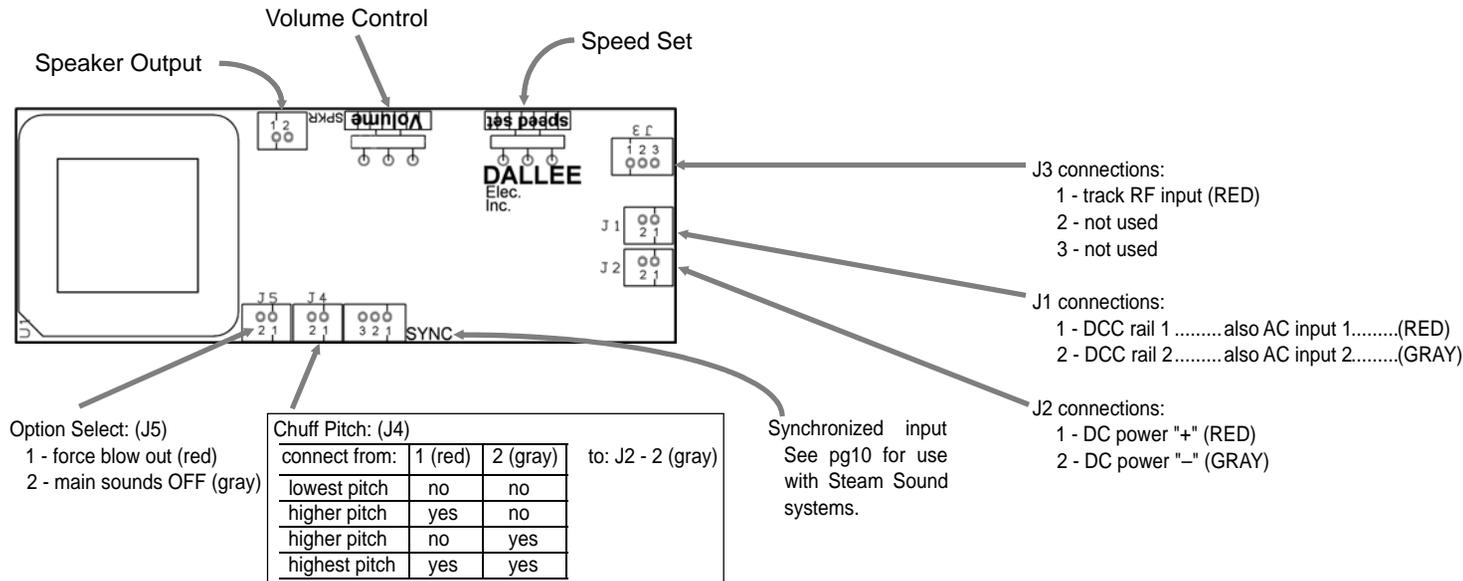
Speaker enclosure is an art and experimentation is definitely in order for your installation so as to gain the maximum benefit of the superb sound quality available in this sound system. Sometimes a cluster of four smaller speakers will fit better and produce very acceptable sound versus a larger speaker that may not fit very well.

**GENERAL OPERATING INFORMATION:**

**VOLUME ADJUSTMENT:** should be set as desired for your application. Please remember 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.

**SOUND FEATURES:** Another feature incorporated in this sound system is the ability to turn all sounds off, leaving only the Whistle and Bell to operate on the main unit and no exhaust chuff from this unit. This can be done with the LocoMatic™ Controller by using the ALT & SF4 button and is a push on / push off function. Other operators can access this with using function / switch inputs.

**DUAL SYSTEMS:** This system can be used with another DC, LocoMatic™, or other AC type sound systems. Wiring for each type of system must be followed to avoid any premature damage. If one speaker is desired, an auxillary amplifier must be used such as item #671 or #672. Wiring for use with one of these amplifiers is contained with the amplifier instructions.



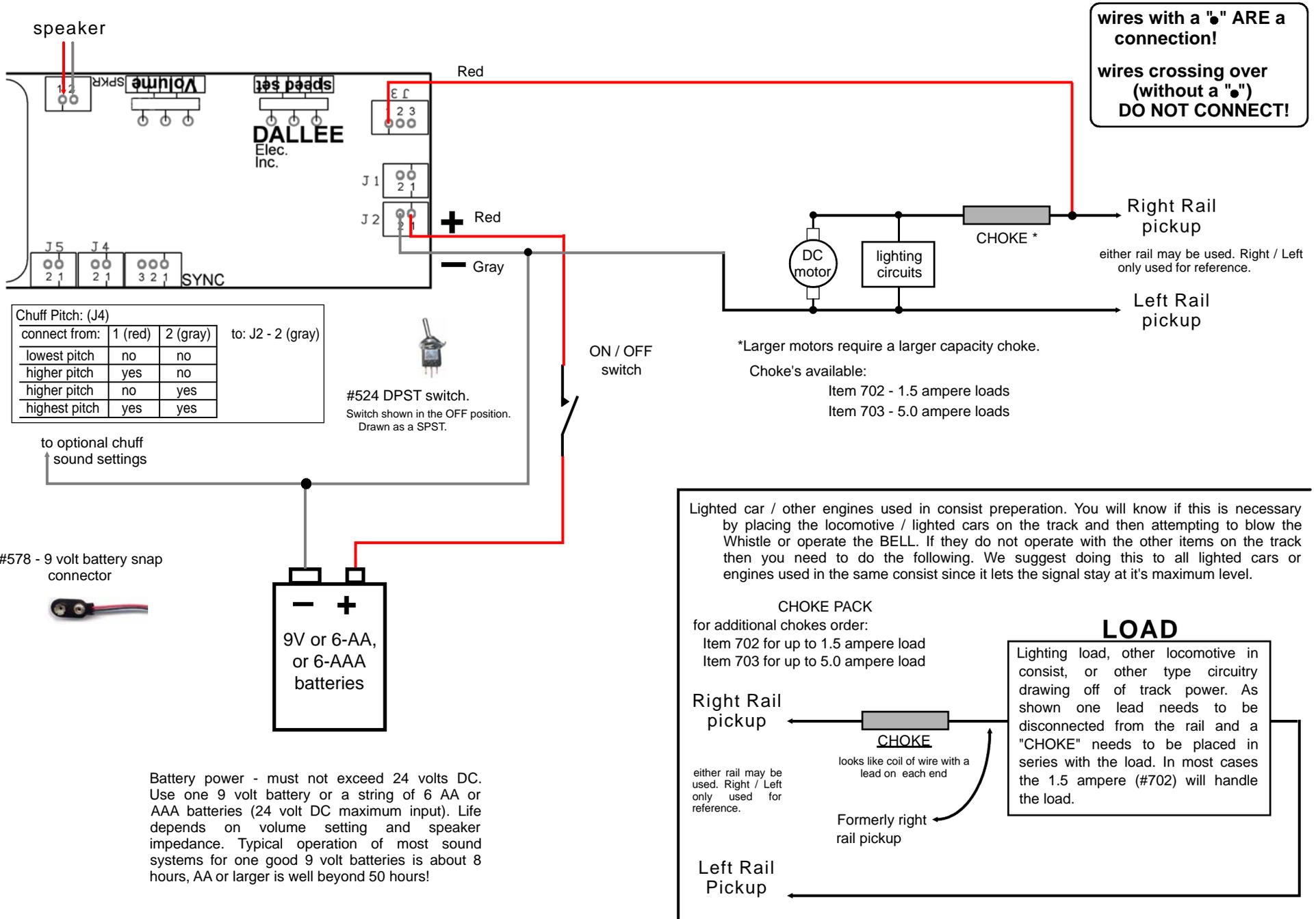
SPECIFIC INSTRUCTION SHEETS	
PAGE	INSTALLATION TYPE
3, 4	Conventional DC
5	DCC & Other receiver
6	dual systems & aux. Amplifier
7	dual systems & aux. Amplifier with LocoMatic™ controller
8	dual systems & aux. Amplifier - 1" + scales
9	dual systems, remote vol, & aux Amplifier
10	Synchronized Exhaust connections and installation picture

NOTE: The speaker impedance should be kept near or above 8 ohms, therefore four 8 ohm speakers in a series/parallel configuration is acceptable since it yields 8 ohms total impedance. If you care to use two 8 ohm speakers you **must** place them in **SERIES**.

When connecting DC power to the sound unit be absolutely sure that the "+" and "-" are connect correctly! If not, you will either burn out the sound unit or the supply feeding it. This is not covered under warranty!

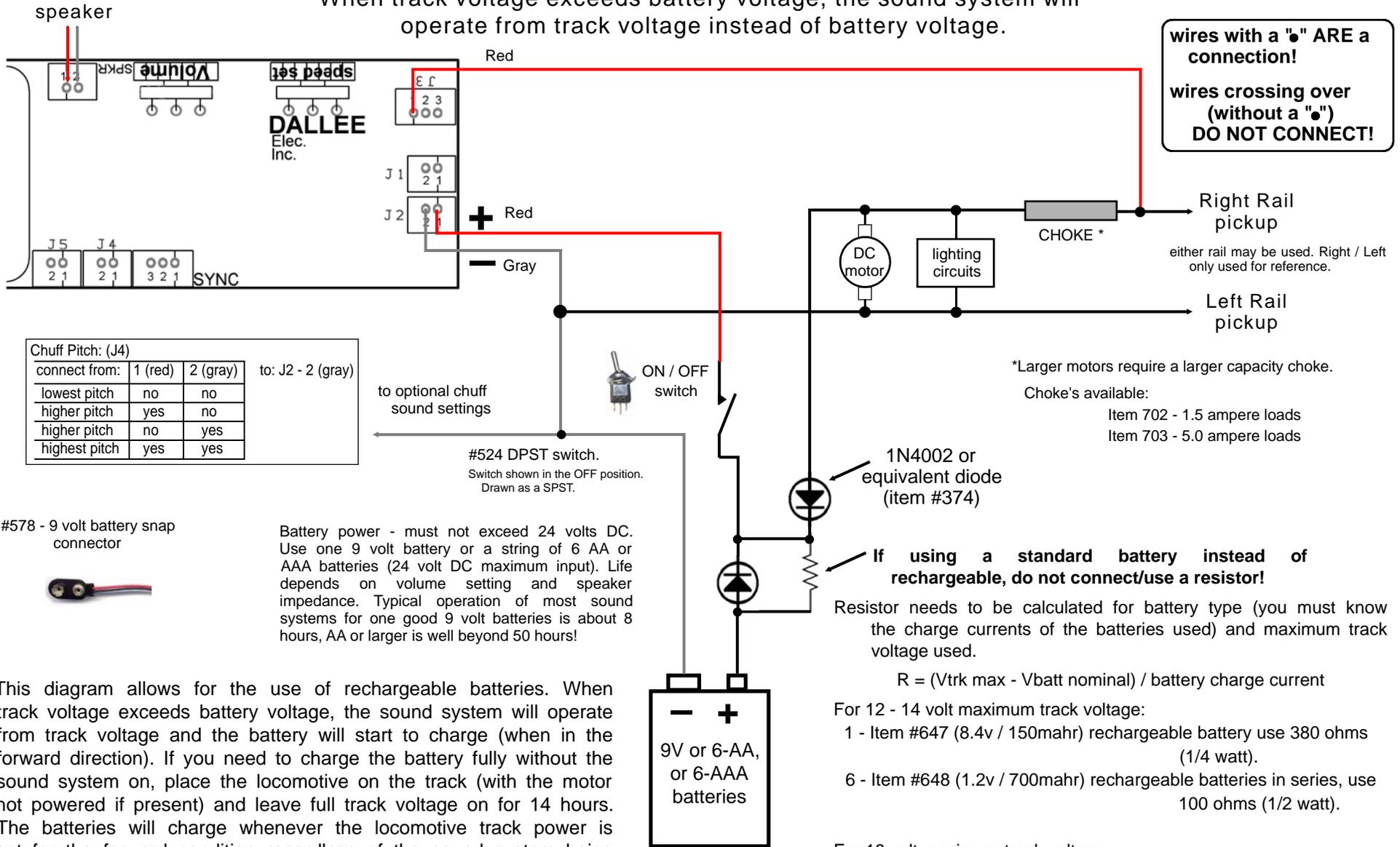
**DALLEE** 246 W. Main St.  
**ELECTRONICS, Inc.** Leola, PA 17540  
 (717) 661-7041  
 www.dallee.com

# DC track power installation using standard batteries & DALLEE controller #755



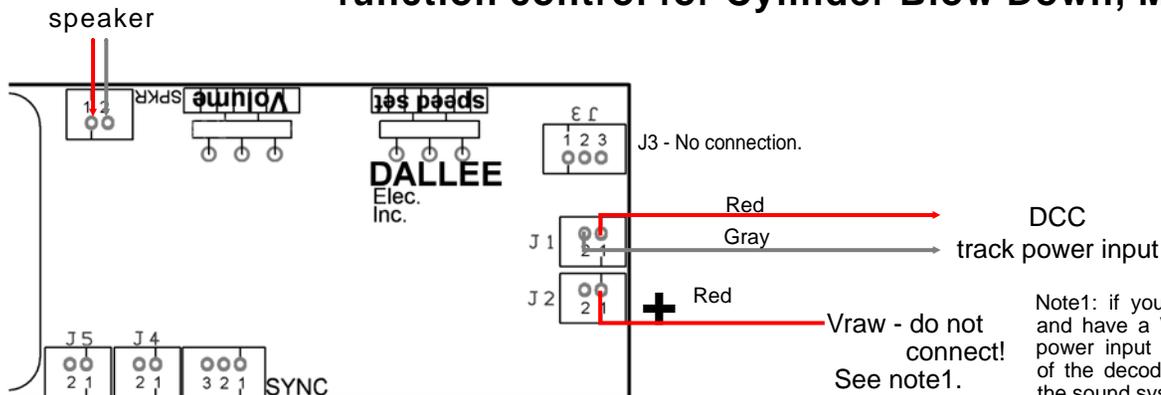
# DC track power installation #2 with DALLEE controller #755. With rechargeable or standard battery.

When track voltage exceeds battery voltage, the sound system will operate from track voltage instead of battery voltage.



This diagram allows for the use of rechargeable batteries. When track voltage exceeds battery voltage, the sound system will operate from track voltage and the battery will start to charge (when in the forward direction). If you need to charge the battery fully without the sound system on, place the locomotive on the track (with the motor not powered if present) and leave full track voltage on for 14 hours. The batteries will charge whenever the locomotive track power is set for the forward condition regardless of the sound system being on or off. They will not charge when the polarity on the track is set in reverse. When running in reverse, the sound system will only operate from the battery. A bridge rectifier could be used instead of a single diode alleviating this potential problem.

## DCC receiver installation using synchronization for chuff and function control for Cylinder Blow Down, Main Sounds ON / OFF



Note1: if you do not desire to use the input rectification provided on the sound board and have a Vraw available from your decoder you may elect to not use the DCC track power input to power the sound system. You then need to connect Vraw to the Vraw of the decode. The decoder rectification circuit must be able to carry enough power for the sound system and motor. Therefore, this is not recommended!

Option Select: (J5) connect SYNC as per page 9. This unit does not have an "auto-chuff" option and will only produce exhaust sounds with a SYNC input.

1 - force blow out (red)

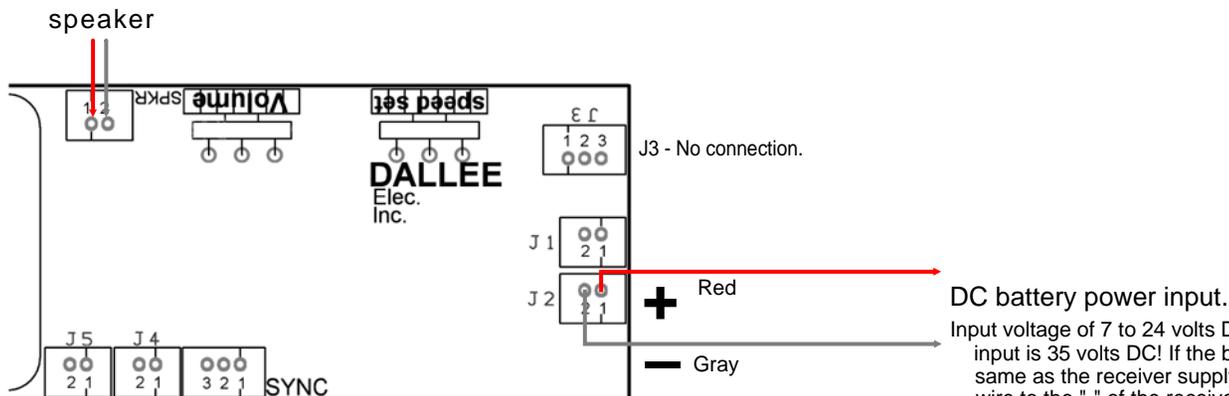
2 - main sounds OFF (gray)

J5 can be to a switch or function. As shown on page 3, a switch would connect this to J2, pin2, for activation. Normal receivers will connect it to this via a function.

**Connect wires from J4 to J2 for Chuff Pitch desired. If you want to change pitches with functions, connect inputs of J4 to functions thus allowing for remote selection.**

Chuff Pitch: (J4)			
connect from:	1 (red)	2 (gray)	to: J2 - 2 (gray)
lowest pitch	no	no	
higher pitch	yes	no	
higher pitch	no	yes	
highest pitch	yes	yes	

## Other receiver or controller installation using synchronization for chuff and function control for Cylinder Blow Down, Main Sounds ON / OFF



Input voltage of 7 to 24 volts DC. Absolute maximum input is 35 volts DC! If the battery supply is not the same as the receiver supply, connect the gray "-" wire to the "-" of the receiver supply.

If you are using a receiver that operates higher than 24 volts, it is necessary to add a 470 ohm, 1/2 watt, resistor in series with one of the inputs to J3 from the motor lead.

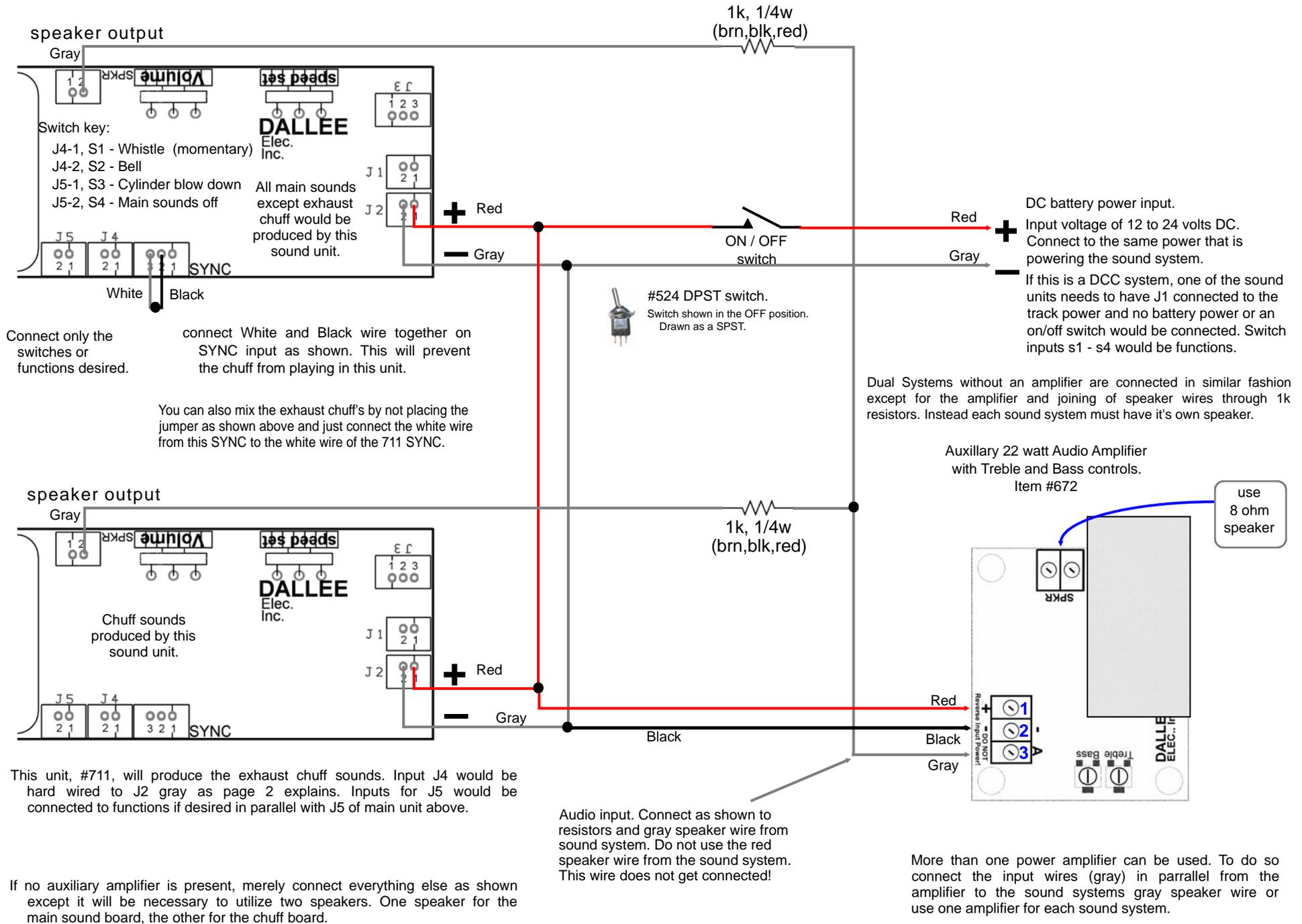
Option Select: (J5) connect SYNC as per page 9. This unit does not have an "auto-chuff" option and will only produce exhaust sounds with a SYNC input.

1 - force blow out (red)

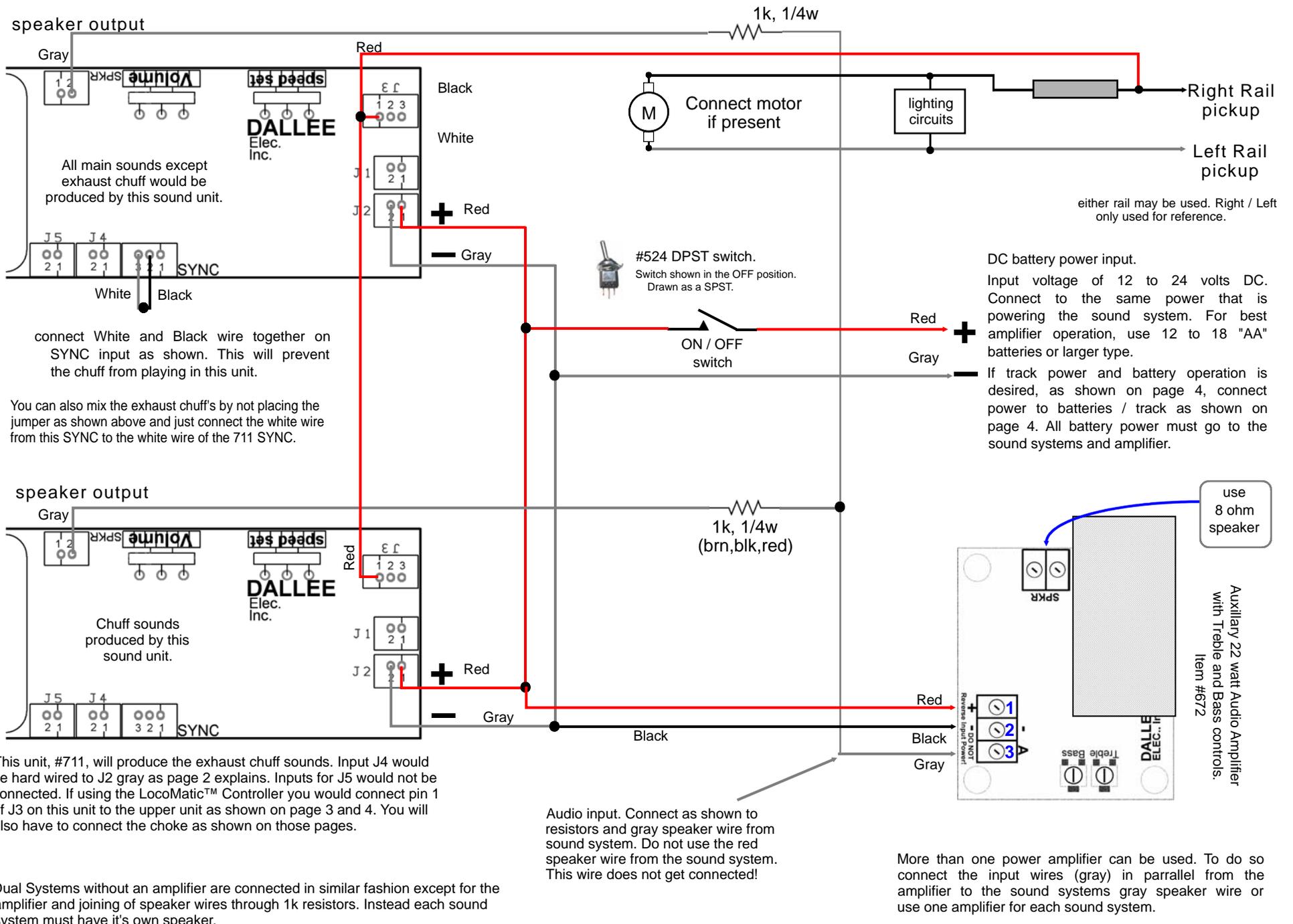
2 - main sounds OFF (gray)

J5 can be to a switch or function. As shown on page 3, a switch would connect this to J2, pin2, for activation. Normal receivers will connect it to this via a function.

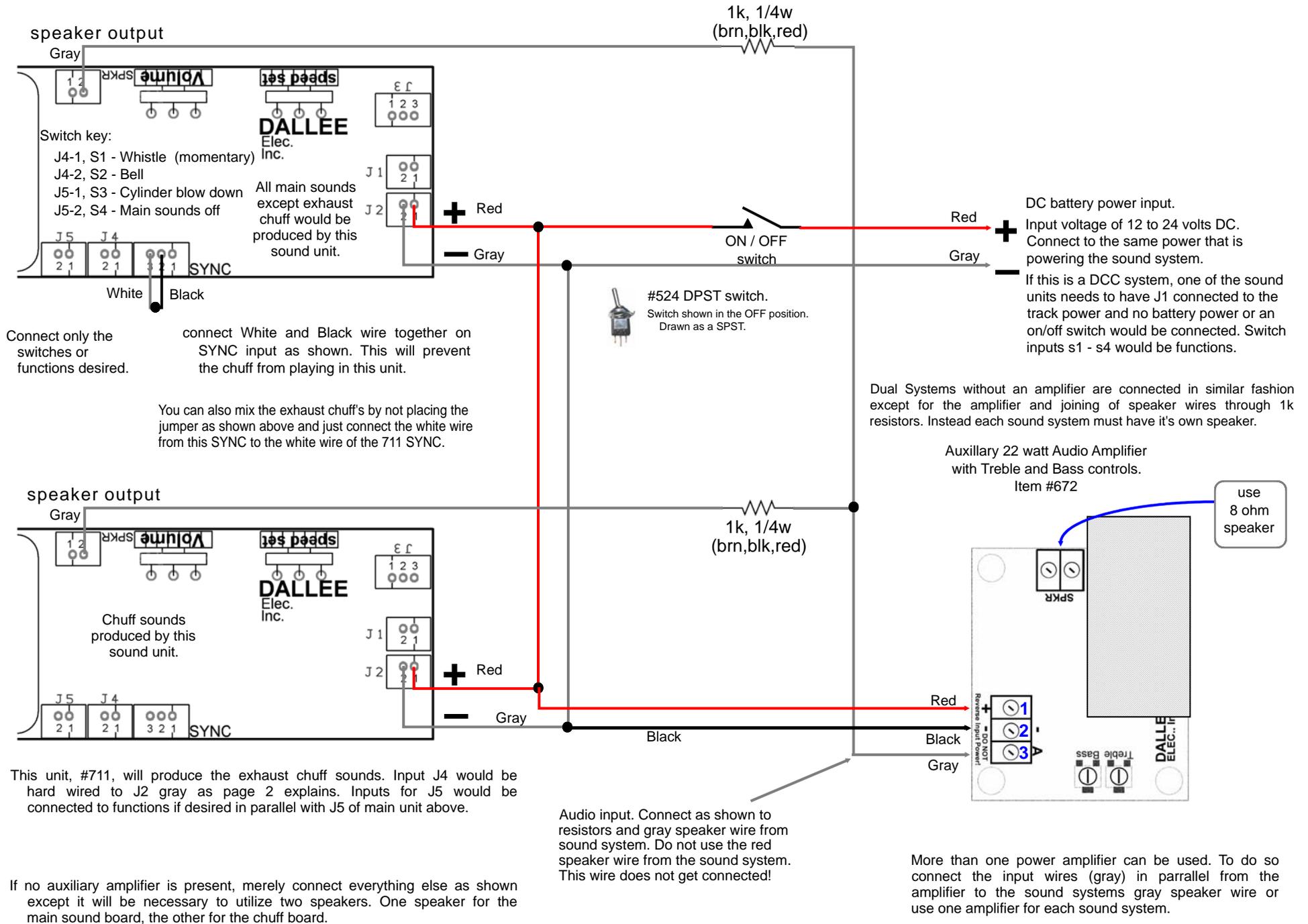
# Using dual sound systems with an auxiliary amplifier.



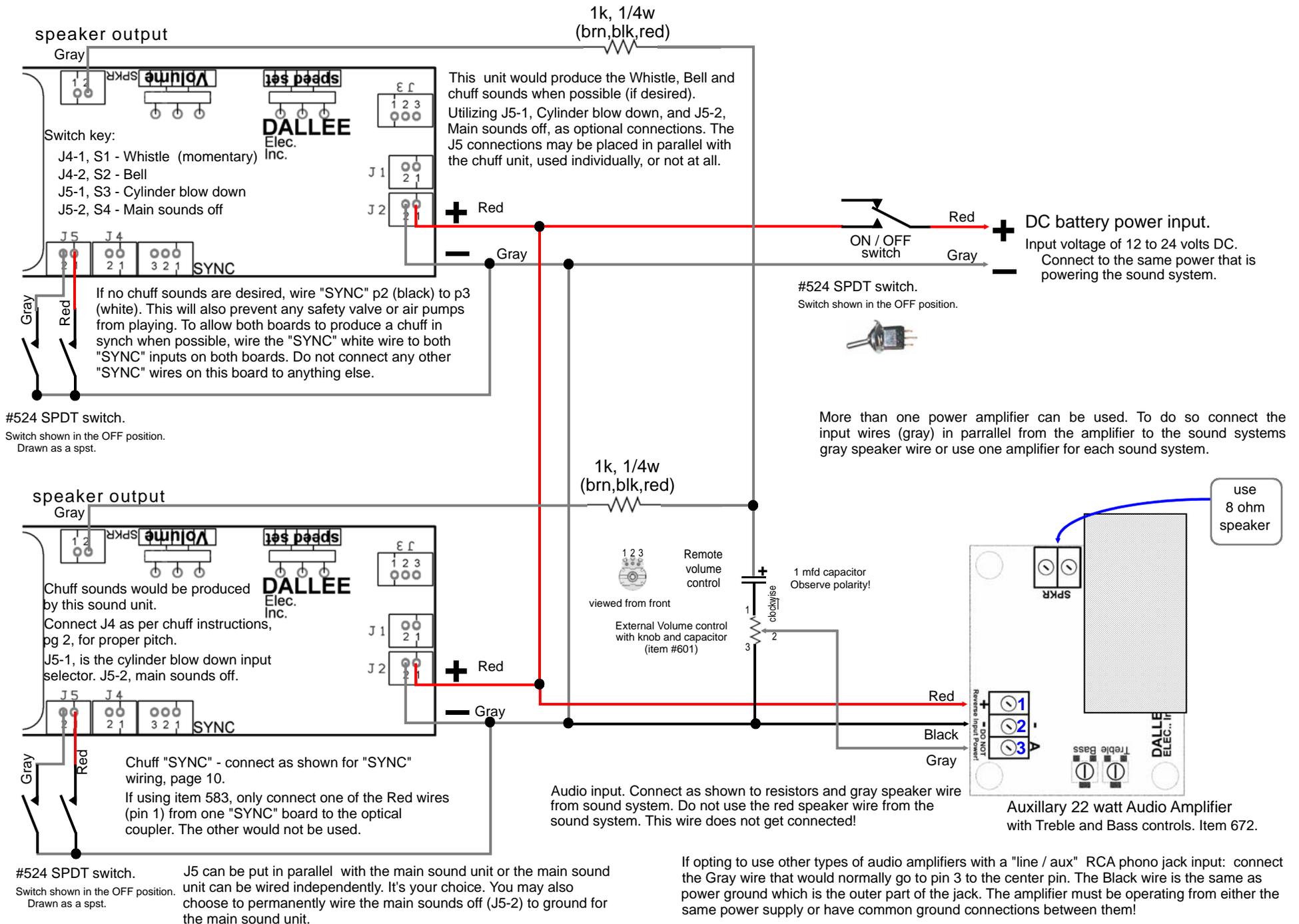
# Using dual sound systems with DC track power, LocoMatic™ controller, and an optional auxiliary amplifier.



# Using dual sound systems with an auxiliary amplifier in larger "ride on" scales.



# Using 711 chuff sound system with a standard sound system and an auxillary amplifier, remote volume control, and synchronized chuff.

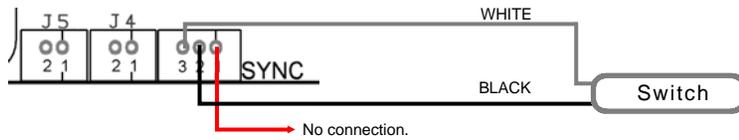


# Synchronization of Exhaust Chuff

## Switch Synchronization:

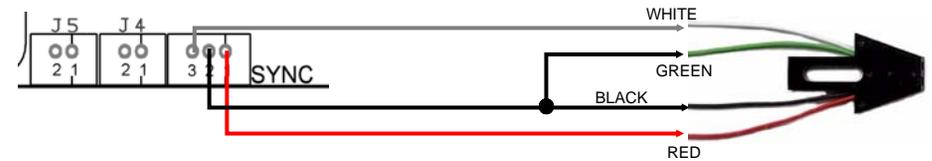
- 1 - connect Common (C) of the switch to the White wire from the SYNC input.
  - 2 - connect Normally Open (NO) of the switch to the Black wire from the SYNC input.
- Switch closure should occur on peaks of quartering lobes. We recommend using optics since they can switch much faster, don't bounce,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



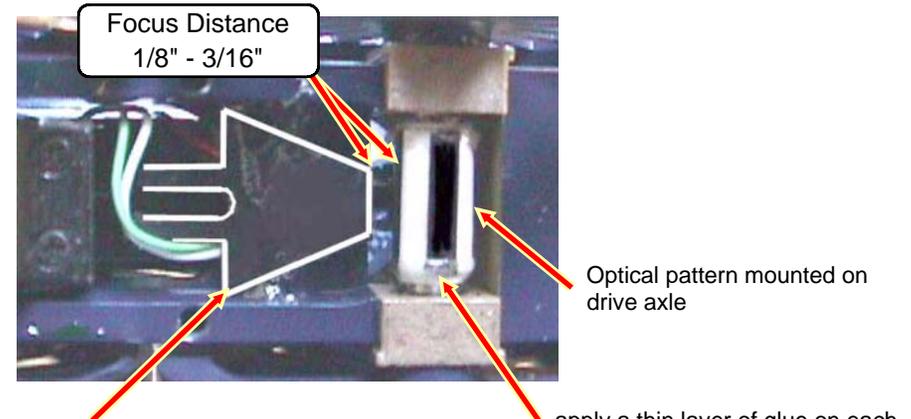
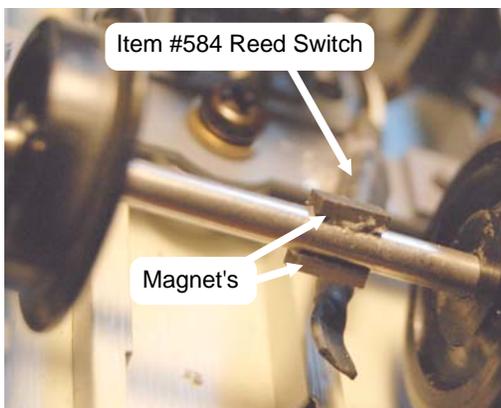
## Reed Switch Synchronization

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. While no harm is done in doing so, it is not necessary.

It is not necessary to use the black / white stripe pattern, anything that will come in and out of focus to the optical reader will work! So, engines with cams installed or a piece of rectangular tubing cut and mounted to the axle may also work with proper alignment. Remember, some paints and other type markers will still reflect the infra-red light. So, just because it's black doesn't guarantee that it will work. The optical coupler comes with laser printed stripes.