

IN LOCOMOTIVE STEAM SOUND

for AC TRACK POWER by



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.

OVERVIEW: This device is an electronic, self contained, sound system for installation in model steam locomotives that are designed to operate with AC track power. This system consists of a Sound Board (dimensions 3.75" l x 1" w x 1" h), and a power supply / decoder board (dimensions 4" l x 1.25" w x 1.25" h). The sound system may be limited to larger gauge models and also may require the use of a trailing freight or passenger car.

Sound volume is adjustable. A 2" speaker is supplied, unless requested otherwise. Other size speakers can be substituted. The audio amplifier is capable of producing several watts of power providing the input power is sufficient. Sounds produced include user controlled Whistle, Bell, Blowers, periodic air system Safety Valve release, Cylinder Blow down and Steam Prime Mover sound (exhaust chuff) that automatically adjusted to track voltage or can be synchronized for exact replication.

This sound system is designed to be operated with standard AC track power Whistle / Horn transformer control and a remote Bell button. Other throttle systems, such as our HOSTLER/AC, have these functions built into the throttle.

INSTALLATION INSTRUCTIONS: The sound system consists of two printed circuit boards, a speaker, and appropriate connectors between the two boards. Also included are one 3 pin and three 2 pin connectors with wires.

The sound circuit board should be mounted so that the controls are accessible either through the frame or via a hatch or a hole in the locomotive body shell. The power supply board can be mounted where all parts clear other objects. Make sure that the components on the sound unit and power supply board do not come in contact with any other metal object. This will destroy them and is not covered under warranty! The speaker is to be mounted as suits your preference and available space.

Refer to the general sheet (page 2) to familiarize yourself with the connectors and controls on the sound and power supply board. Then proceed to the installation pages.

When connecting the DC power leads be absolutely sure that the positive wire connects to terminal #3 of the main header and the negative wire connects to terminal #4 of the sound unit main header (as shipped). Failure to do so will damage the sound unit! This is not covered under any warranty and is obvious to us when returned for repair (tracks are burned off of the board & parts destroyed). Parts destroyed from wires or other metal touching the boards is also not covered under warranty. We inspect these units thoroughly before packing. There is a minimum repair cost of \$30.00 (+ \$6 s/h & s/s tx in PA) so please be careful not to confuse these connections!

SOUND INFORMATION: BLOWERS - With sound unit powered, no motor voltage, blowers are heard. If the locomotive has just moved the blowers will not resume until several seconds later. Blowers are used to keep the fire hot when the locomotive is resting.

BLOW DOWN sounds will be produced when the blowers are on and track & motor voltage reaches a voltage selected via the Run / Stop control. This BLOW DOWN will always precede the motion of the locomotive only if the blowers have turned on and will continue to blow until a higher voltage is obtained. The cylinder blow down is done to remove water buildup in the locomotives cylinder heads. If the locomotive has rested long enough, the condensation has to be blown out to prevent damage to the cylinders.

EXHAUST - CHUFF sounds range from slow exhaust to full speed exhaust. This chuff rate varies with track voltage or optical input (Item

#583) or by switch contacts. The last two are optional, optical input is recommended over switch input since you do not have to contend with switch bounce problems along with a faster non-interfering operation to the drive linkage. If synchronized input of chuffs are selected, remember that the sound unit does not switch over to the synchronized mode until the first switch contact is made (after being initially powered up). Synchronized mode selection will be retained until the sound unit's power has been removed and then switched back on again (the default mode is automatic). Wiring for synchronized chuff operation can be found on the last page of the wiring instructions. When the chuffs are set for automatic track voltage operation, you will find that the chuff rate does not jump to a fixed "set" rate but rather slides up and down. With the locomotive actually in motion, steam sound is varied according to speed (track voltage). The sensitivity can be set so that maximum speed (chuff rate) is achieved at low or high track voltage. This adjustment will vary according to the locomotive used. Some locomotives run very fast at low voltages while others do not.

SAFETY VALVE - With sound unit powered, no motor power (E-UNIT in NEUTRAL), and the blowers ON will set the SAFETY VALVE to start releasing at random. The safety valve is located on top of the steam boiler, when a locomotive sits at rest for a period of time with a good fire too much steam pressure accumulates. The safety valve releases this steam pressure so that the boiler does not blow! This sound system will start to release the safety valve at random when sitting at rest.

WHISTLE sound is controlled by operating the WHISTLE push button on your power transformer or appropriate throttle. The WHISTLE will continue to operate as long as the signal is present. When the WHISTLE sound is not requested simply request it again to obtain the desired effect. Some types of WHISTLES have a gradual opening and decay while others do not. This has to do with the valve opening and closing when playing the Whistle on the real locomotive.

BELL sound is controlled by the BELL control button on your remote control box or appropriate throttle. When the BELL control button is pressed and released, the sound system will lock in the bell request and the bell will ring continuously. To stop the bell cycle you must again depress and release the BELL control button - do not wait for the bell to stop ringing (a pause is needed between start and stop). The bell ring will stop at the end of a ring. When the bell is requested the other sounds (except for the Whistle) will not operate. To obtain simultaneous sound operation you will have to use two sound units with the one wired as a "SLAVE". If you desire this type of operation, contact the factory for connections and price (you do not need another power supply board, the sound unit will operate from the existing power supply).

GENERAL OPERATING INFO: The chuff rate control is pre set @ 3:00 o'clock (full CW). This adjusts automatic chuffs for the fastest chuff when the appropriate track voltage relating to this speed is applied. By rotating this control CCW you increase the voltage required for obtaining faster chuffs. Full CCW will prevent any "running" sounds from occurring.

The RUN / STOP control sets the sensitivity for when the sound system produces sounds of a running locomotive or that of a stopped locomotive. By rotating the control CW a higher track voltage would be required, allowing an engine with higher startup voltages to be compensated for. If this control is turned too far CCW you will never indicate a stopped condition, even if the E-UNIT is in neutral, thereby never obtaining blowers and all other stopped type sounds. The control is generally located at noon when shipped.

The VOLUME control should be set to that desired. Please remember that more output power is available than any small speaker can handle so you should not set the volume very high with a low wattage speaker. To obtain "louder" sound, you should consider mounting an additional speaker and / or baffling the speaker better. Any sound level beyond 1/2 way on the volume control far exceeds the power rating of small speakers. If you have the room, you might want to consider one of the oval speakers shown in our catalog.

SPEAKER MOUNTING: It is necessary to mount the speaker in a location that the sound can actually "get out" of the locomotive. Some engine shells have metal or plastic grills that are excellent locations. Mounting through a hole placed in the floor or close to the end of the chassis allows the sound to exit the speaker. In some steam locomotives it is possible to mount the speaker pointing out of the coal pile or bunker doors. It is best to place the speaker in the locomotive or at best facing the locomotive since you want the sound to appear as though it is emanating from the locomotive. Once the location has been established, the speaker has to be secured in place. This can be accomplished by either glue or HOT MELT. For flush mounting glue is just fine otherwise HOT MELT is recommended since it can be used as a filler for creating a sound chamber.

Various methods can be tried to enhance the low frequency response and output volume of the speaker system. One simple method of enhancement is to place a tube around the speaker, the longer the tube the better the lows. The end of the tube should also be sealed making a sound chamber. Placing a tube about the speaker is not necessary when you use the entire engine / car body as the sound chamber.

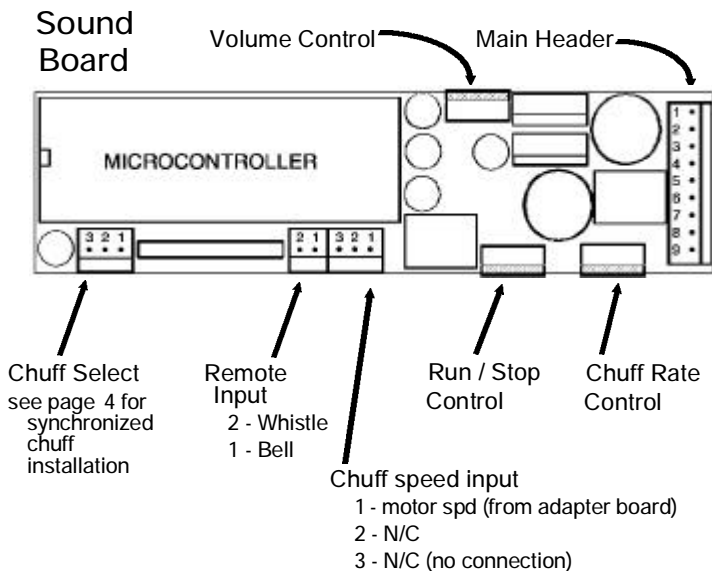
Another method is to use the casing (engine or car body) that you are mounting the speaker in as the chamber. To do this you should ensure that the speaker does not have any air passages to the rear of the speaker (you may find that sometimes leaving one isn't all that

bad - it depends on the size of the engine shell used). The easiest way of sealing air passages is to cut thick card stock into the shape needed and then simply HOT MELT it in place.

Experimentation is definitely in order for your installation. Another suggestion is to add a second speaker in series to the main speaker or several in a series / parallel arrangement. If you have the room, you might want to consider one, or more, of the oval speakers shown in our catalog.

WHISTLE 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 |

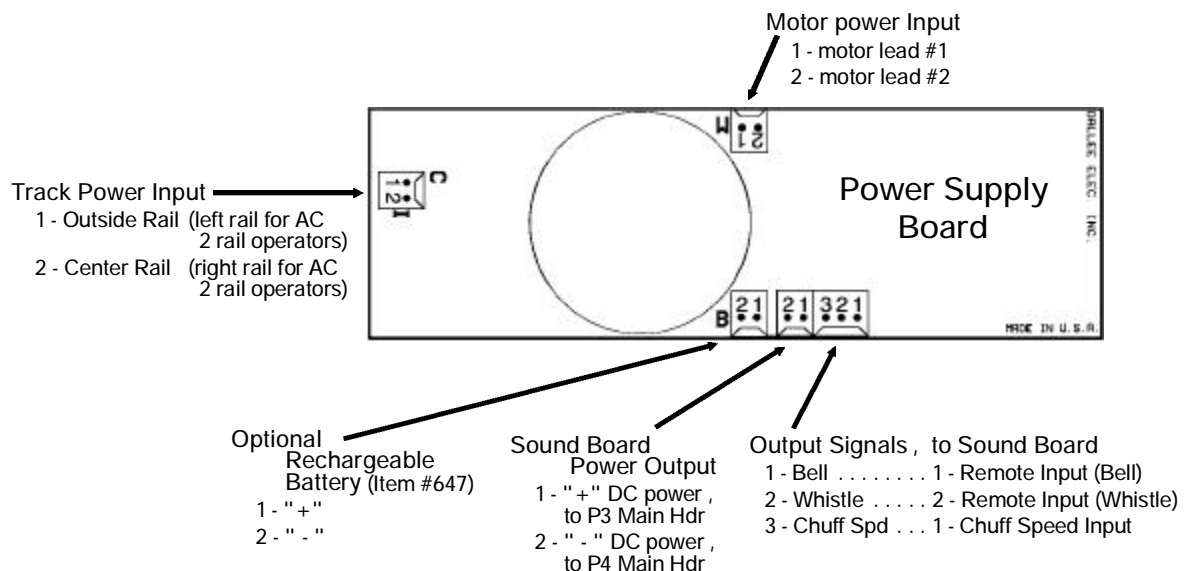


- 1 - Speaker . . . " - " . . . (to speaker " - ")
- 2 - Speaker . . . " + " . . . (to speaker " + ")
- 3 - DC power . . . " + " . . . (from Power Supply Bd " + ")
- 4 - DC power . . . " - " . . . (from Power Supply Bd " - ")
- 5 - N/C
- 6 - N/C
- 7 - N/C
- 8 - N/C
- 9 - N/C

note: Main Header pin 2 connects to Main Header pin 3 on the printed circuit board. They also connect, on the printed circuit board, to the Motor Select header pin 2. This information is useful when you wish to run a wire differently than shown on the wiring diagrams .

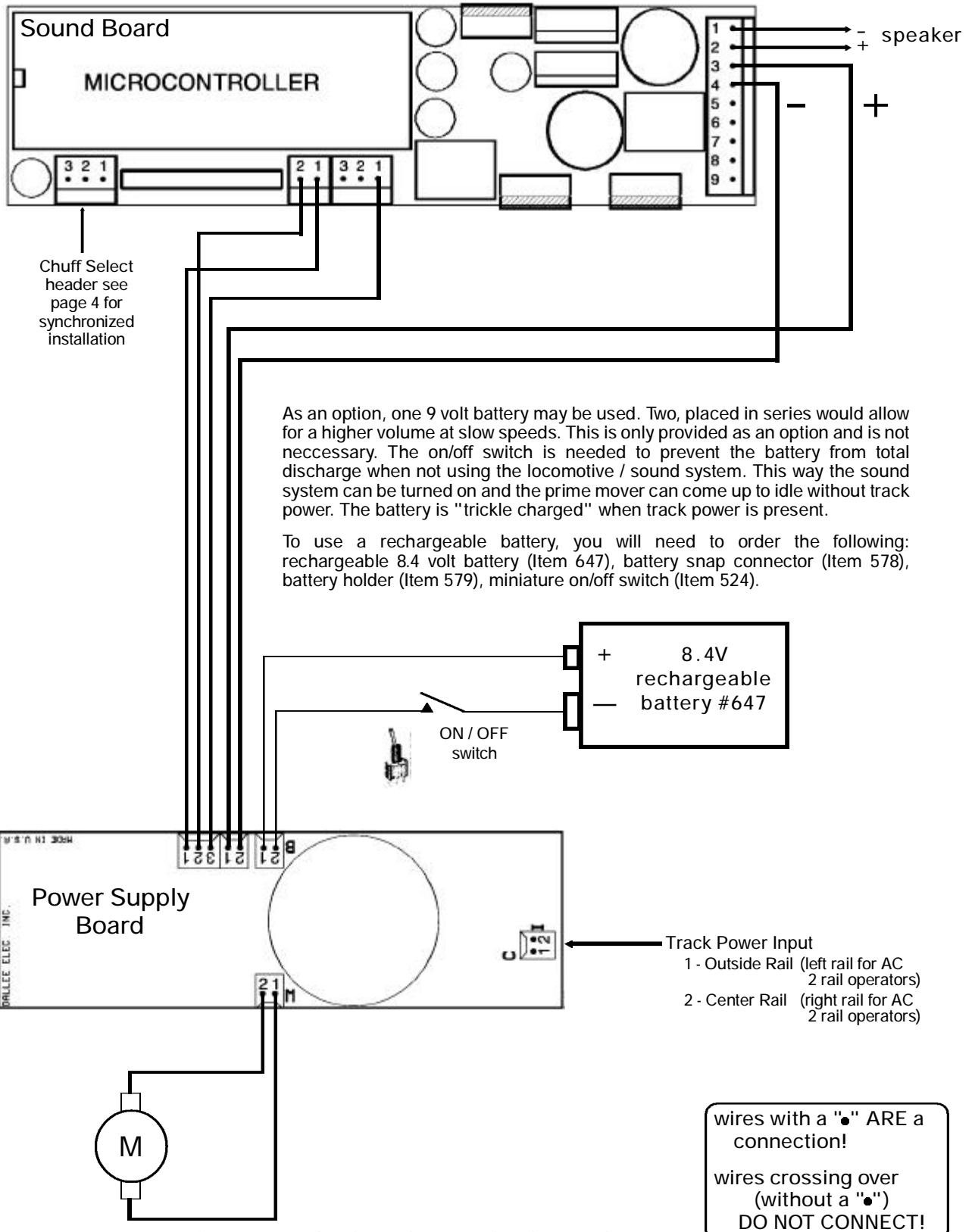
When connecting DC power to the sound unit be absolutely sure that the "+" and "-" are connect correctly !! If not, you will either burn out the sound unit or the supply feeding it . This is not covered under warranty!

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 it is suggested to place them in SERIES. Diagrams for these different types of configurations are supplied with the speaker instructions .



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AC track power installation



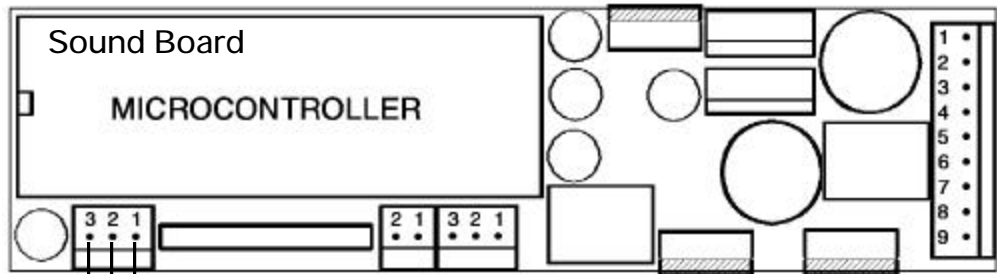
As an option, one 9 volt battery may be used. Two, placed in series would allow for a higher volume at slow speeds. This is only provided as an option and is not necessary. The on/off switch is needed to prevent the battery from total discharge when not using the locomotive / sound system. This way the sound system can be turned on and the prime mover can come up to idle without track power. The battery is "trickle charged" when track power is present.

To use a rechargeable battery, you will need to order the following: rechargeable 8.4 volt battery (Item 647), battery snap connector (Item 578), battery holder (Item 579), miniature on/off switch (Item 524).

wires with a "•" ARE a connection!
wires crossing over (without a "•") DO NOT CONNECT!

The "M" motor input connects to the two motor brushes. This is so that the sound unit can distinguish between forward, reverse and neutral. If you do not care about the sound unit remaining at IDLE during neutral, you can connect these to the track input power. If you are installing this unit in a "dummy" locomotive or trailing car, you might also want to consider using a second "E" unit (such as our Item #386) so that the sound unit can sync up with the locomotive for forward / neutral / reverse / neutral / forward instead of running a set of wires between them. These wires can be very light in gauge since they do not carry any significant current. If running wires between a "dummy" unit and power unit, you should consider using connectors see item's 520 (2 pin pack), 521 (3 pin pack), and 611 (4 pin pack).

AC track power installation



Chuff Select header

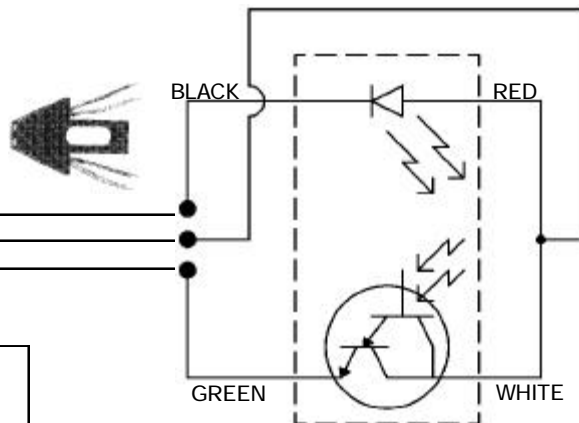
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SYNCHRONIZED CHUFF CONNECTIONS

Pertinent to all installations

if synchronized CHUFF's are desired either connect optics as shown or a axle operated switch as shown.



Switch 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.

Connect Normally Open (NO) to pin 3 of Chuff Select header above.

Connect Common (C) to pin 2 of Chuff Select header above.

Item #707 is a subminiature micro switch for this purpose, in lieu of using optics (0.32" L X 0.1" W X 0.26" H).

DO NOT use a leaf switch to the chassis (quartering lobe).

SOUND UNIT reflective optical coupler (Item# 666) - mounts parallel to axle, can read reflective tips of installed square cam (factory installed on some engines) or mount (or paint) a black / white stripe quartered to drivers. Focus is 1/8" or more from end - up to almost 1/4".

Shown close to actual size.

Measures 0.1" thick X 0.25w @ front, 0.5" deep & 0.6" wide @ main optical rear - before mounting slot, mounting slot is 0.5" long X 0.25" wide.

