

**Phoenix Sound Systems, Inc.**




**BIG Sound™ MODEL 97**

# DIESEL SOUND INSTALLATION GUIDE

January 2000



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To YOU, our much appreciated customer:



Thank you for your purchase of our BIG Sound™ diesel system! We trust you will enjoy many hours of listening pleasure as you operate your favorite locomotive with Phoenix Sound installed. If we can be of service to you, please don't hesitate to give us a call.

.....  
C A U T I O N !  
.....

- Beware of static electricity
- Be sure to follow the wiring instructions and diagrams.
- Make sure the sound chips are oriented correctly in their sockets.
- Be sure the battery is installed in terminal block P1, red wire in position 4 and blue wire in position 5 and that it is fully charged to 6.2 volts.
- Do not apply any voltage to the terminal block marked P2.
- Do not exceed 24 volts of input power to the BIG Sound™ board.

Even though your BIG Sound™ 97 has built-in protection against incorrect wiring, prevent damage to the CPU and other components by guarding against static conditions and taking a moment to review the wiring diagram and installation instructions before you begin work.

.....  
STATIC ELECTRICITY IS THE ENEMY!  
.....

You are dealing with sensitive  electronic components and sound chips. Avoid exposing your BIG Sound™ board  to static electricity that may interfere or damage the chips and components. There's no need to buy special equipment or supplies. Simply be sure you are not "charged"; touch something metal before you handle your BIG Sound™ and let your finger take the ZAP instead of your sound board! If you have a piece of antistatic foam or bubble wrap, you should use it as a working surface for additional protection. Your BIG Sound™ board is packed in a static bag and the box is lined with antistatic foam. You can use the packing foam or storage bag as a working surface to guard against static electricity. You don't need elaborate precautions.

If you need to return your board for evaluation or upgrading, protect your warranty by using the packing box we provided. It has antistatic foam padding that will protect against static electricity and also cushion your unit so it will arrive at Phoenix Sound without shipping damage. We cannot be responsible for damage due to inadequate packing.

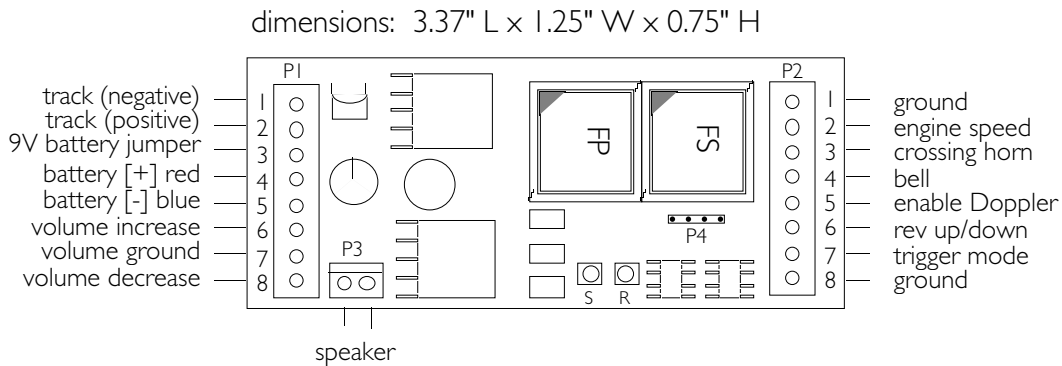
Our warranty is packed in the box with your system. Our goal is to provide you with outstanding, realistic sound for your model railroad layout, and we welcome your comments, suggestions, and even your disappointment (if any!). HAPPY LISTENING!



## SECTION I: THE SOUND BOARD AND ITS COMPONENTS

The Phoenix Big Sound™ board is depicted below to help you correctly wire your unit. Be sure to study the appropriate schematic wiring diagram carefully to avoid unwanted results. You will find more detail in the following pages of this booklet.

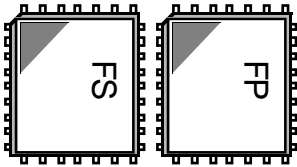
For diesel sound:



On each end of the electronic board is a series of 8 screw-down terminals arranged vertically and numbered 1 through 8. The eight positions on the left side of the board comprise the P1 Block; the eight positions on the right side of the board comprise the P2 Block. Another small terminal block located next to P1 at the bottom of the board is the Speaker Block with terminals marked 1 and 2. Each terminal controls a specific function or feature of the BIG Sound™. Most of the wire ends of the kit components have been tinned to make sure you get a good contact when you screw the wires into the terminals. For any wires that are not tinned, we suggest twisting the strands together firmly before inserting the wire into the terminal.

The table that follows shows where you should wire each of the diesel kit components:

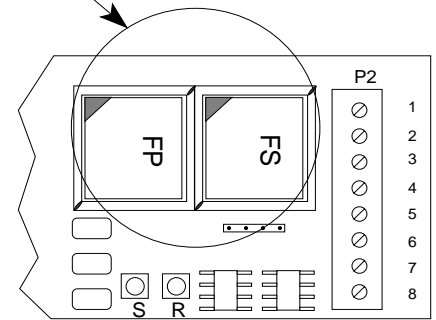
LEFT SIDE - P1		RIGHT SIDE - P2	
Position 1	track (negative)	Position 1	ground: choose one wire from each reed switch
Position 2	track (positive)	Position 2	reed switch for rev up
Position 3	jumper for 9V battery (connect to 5)	Position 3	reed switch for horn (independent call out)
Position 4	battery - positive lead (red)	Position 4	reed switch for bell (independent call out)
Position 5	battery - negative lead (blue)	Position 5	reed switch for enabling Doppler
Position 6	volume increase switch outside wire	Position 6	remote control of rev up/rev down
Position 7	volume control switch center wire	Position 7	connect to ground to select trigger mode
Position 8	volume decrease switch outside wire	Position 8	ground



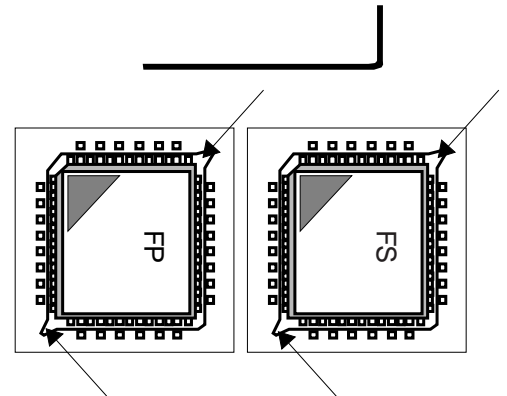
## THE SOUND CHIPS

Your Phoenix kit comes with one set of sound chips installed on the sound board. These chips are found on the right, upper side of the board next to the P2 terminal block. Typed on each chip is the abbreviation for the railroad sound you requested and the version number. One chip is labelled "FS" and the other "FP." It takes both chips to produce the desired railroad sound.

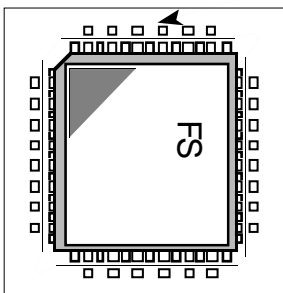
the sound chips of your choice



The installed chips do not require any action on your part. The only time you would remove them is if you order chips for a different railroad sound. Across one corner of the chip label is a small color triangle to help you orient chip placement when you are installing new chips. To remove the chips, use the small Allen wrench found in your kit, insert it into the small recesses (shown by arrows in the sketch), and gently and carefully pry the chips loose. You do not have to get underneath the chip, simply use the wrench as a lever. Pry one side a little and then move to the other corner. Usually one pry on each corner is all you need to pop the chip loose from its setting. **BE SURE YOU ARE NOT PRYING THE ENTIRE BROWN SOCKET OFF THE BOARD!**

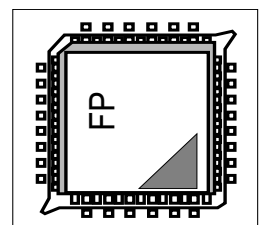
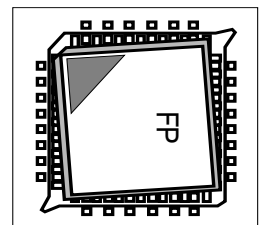


socket pins  
extend into socket recess



CORRECT ALIGNMENT

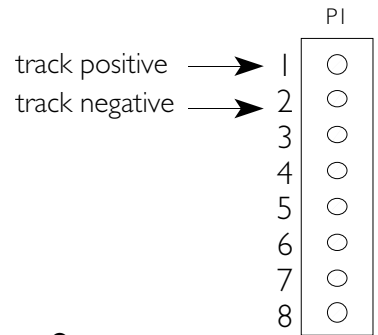
The pins on the edges of the chips mesh with the pins on the inside edges of the socket. To install the new chips, place the sound board on a solid, flat surface and align the chips over the socket. Refer to the sketch. Make sure the chips are not turned at an angle because the pins along the inside edge of the socket could be irreparable bent or dislodged. Gently press straight downward until the chip is firmly seated. When properly seated, the chips are flat and flush with the top of the socket. Press gently on all corners to insure a secure fit.



INCORRECT

and flush with the top of the socket. Press gently on all corners to insure a secure fit.

To achieve the correct 3-toot signal, you must be sure to wire your track power leads as follows: With the engine set in forward motion, place the positive track power wire into terminal block P1 Position 1, on your sound board. Place the negative track power wire into terminal block P1 Position 2.



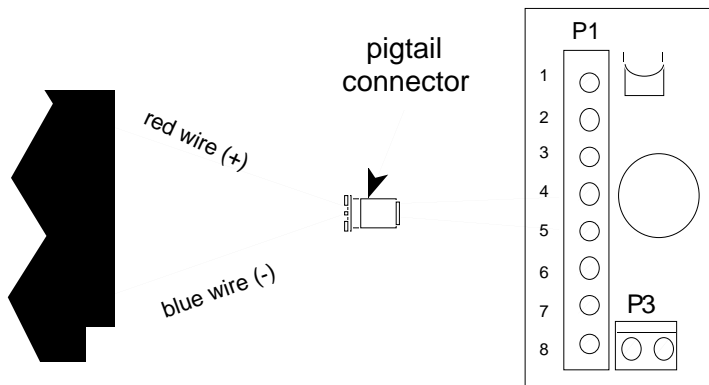
To turn off the bell and/or whistle, place a jumper wire or on-off switch, as follows:

- |      |                  |                              |
|------|------------------|------------------------------|
| Bell | P2 side of board | between pin 4 and pin 1 or 8 |
| Horn | P2 side of board | between pin 3 and pin 1 or 8 |

The jumper or on-off switch replaces the reed switch in its normal position on the board and prevents activation of the feature.



A 6-volt gel-cell type battery (2" x 2.25" x 0.5") is included in your kit to power the board functions. The small, beige battery plug connects to the receptacle on the "pigtail," which is installed in your sound board when you receive it. Simply match each color wire on the battery with its color mate on the pigtail and insert the plug. (Terminal block P1, position 4 is positive [red] and position 5 is negative [blue].) When you want to disconnect the battery, the pigtail connector should be left in place and the battery unplugged from the receptacle.



Under regular running operation, the sound board's built-in charger keeps the battery in good operating condition. When you run your train at slow speed nearly all the time or if you have not run your train in some time, you may need to charge the battery to its full capacity.

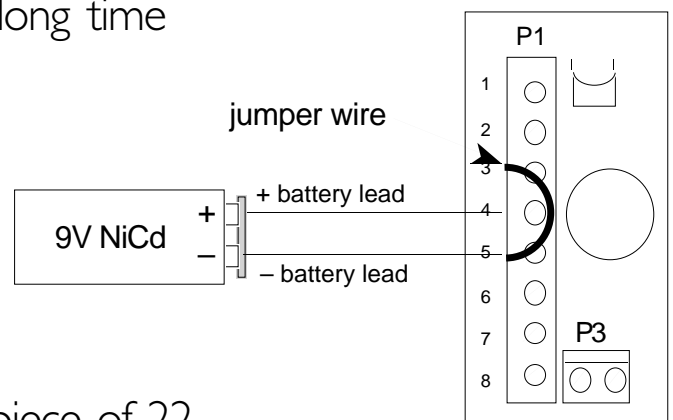
The battery charge should read 6.2 volts or more on a voltmeter. A tiny amount of battery power can be lost during storage so your kit battery may be under the necessary threshold level. If the charge measures less than 6.2 volts, you need to charge the battery first before running your train. An inadequately charged battery leads to odd, inconsistent sound patterns. For instance, if you hear the sound for awhile and it suddenly stops and starts, the first suspect is a battery with less than a full charge. During continuous slow speed operation, the system draws current from the battery. If you notice the volume decreasing below your chosen setting, this is an indication of a low battery charge. If you increase the track voltage to 8 volts or more and run the train at higher speed for awhile, the volume will return to the chosen setpoint as the battery recharges. Or you can let your sound car stand on a side track while under power. We recommend charging the battery through the system rather than with a battery charger. You could also wire your transformer directly into terminals 1 and 2 on terminal block P1 at 10–12 volts. (Caution: be sure you do not install power to the P2 terminal block.) If you are charging through the track and wheels to the board, use 15 volts from the transformer; power is lost through the rails and wheels. If you do not hear any sound at start up or if you hear a "click-click" noise from the speaker, the most likely culprit is a dead or very low battery. If you plan to store your system for an extended time, we suggest unplugging the battery.

For Model 97, you may use a 9-volt nickel cadmium battery if you choose. We prefer the 6-volt battery included with our kit because, like a car battery, it can be charged over and over for a long time

without losing its effectiveness. The same cannot be said for 9-volt NiCd batteries. When using a 9-volt NiCd battery, install the battery leads in positions 4 (positive) and 5 (negative) on terminal block P1. In addition, you must place a jumper wire between positions 3 and 5 in order for the

9V NiCd battery to work. Simply use a short piece of 22 AWG wire, bend it to form a curve, and install one end in

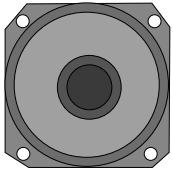
position 3 and the opposite end in position 5 on top of the negative battery lead. Be sure the jumper does not touch the positive battery lead. If you requested a 9-volt battery when you ordered your kit, a blue jumper wire is installed on the board for you.



If your BIG Sound is not performing as you expected or if there is no sound at start-up, please consider the following suggestions before you send back your unit. Very often the "problems" we hear about are nothing more than a battery that is not charged.

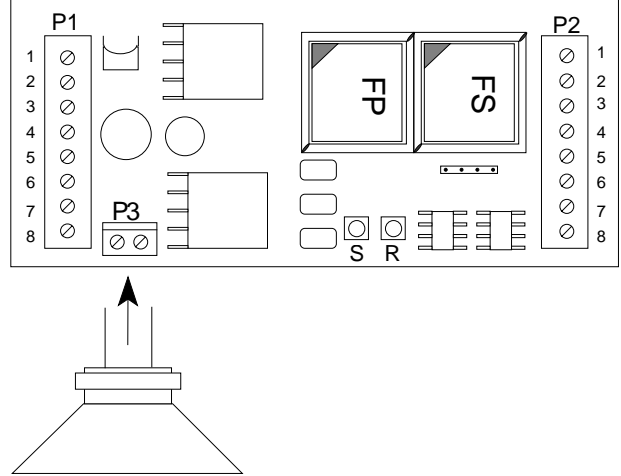
- The purchase of an inexpensive voltmeter is a good investment. Radio Shack stores carry models that work very well. You will be able to get reliable readings of your battery's level.
- Make sure that the pigtail connector and the battery leads are correctly installed in terminal block P1: the red (positive) wire in position 4 and the blue (negative) lead in position 5.
- Check the voltage of the battery while it is connected to the BIG Sound™ board. Make sure it is charged to 6.2 volts.
- If your system is not performing correctly and the voltmeter reads between 6.0 and 6.2 volts, charge the battery for 2 hours or so. However, if the reading is lower than 6 volts, charge the battery for 8–10 hours at 12 volts of power to the board. If you charge the battery while the car is on the track, make sure the track power is 15 volts because there is voltage loss through the wheels and brushes to the board. You may want to turn down the volume during the charging process, but it's a good idea to have some volume so you can be sure power is reaching the battery through the board. If you are charging directly from the transformer to the board, use 10–12 volts of power.
- The kit's lead-acid battery usually can be rejuvenated by charging, but you need to be sure the battery gets a full charge. Right after charging, the voltage reading will be 6.3 or higher. If you interrupt the charging process before a full charge is obtained, the meter reading may be about 6 volts, but this level will drop dramatically when the board is drawing power to produce the sound sequence, especially when the locomotive is pulling a load.
- If your BIG Sound™ has been idle for awhile, the battery may discharge to the point where you hear only faint sound, or low volume, or a clicking sound from the speaker. These symptoms usually indicate that the battery was not fully charged prior to storage. In this case, you must fully charge the battery (8–10 hours under 12 volts of power).
- Always have power pick up from at least two axles. Power pick up from only one axle is not sufficient to keep the battery at its optimum performance level.



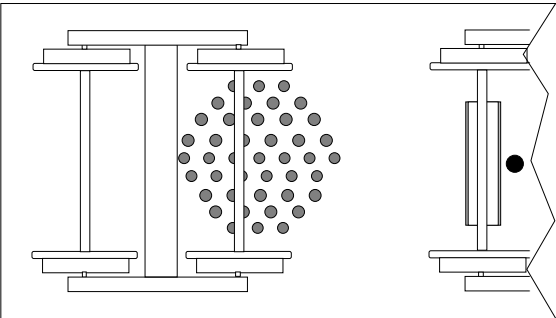


## THE SPEAKER

The speaker has its own little terminal block, labeled P3, situated perpendicular to block P1 at the bottom of the board. Connect the speaker by placing one of the speaker wire leads in each of the speaker terminals.



To prepare your engine or car for installation, you need to locate a place to mount the speaker and then drill holes in the floor of the car to allow sound to escape from the sound enclosure. You might use an arrangement of holes as shown here. Be sure you drill a sufficient number of holes to allow the sound to emit from the car. If in doubt, drill a couple more!



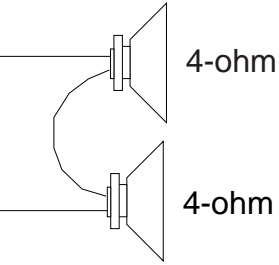
bottom of car

Put some clear, silicone adhesive (available at any hardware store) around the rim of the speaker and position it over the holes in the floor of the car. Or you can drill holes for the mounting

"ears" on the speaker and bolt it to the car floor. You may even opt to combine the two for extra protection against vibration. Installation may require minor modifications to the sound car. If speaker you received in your kit will not fit in your installation, simply give us a call and we will swap it for another one.

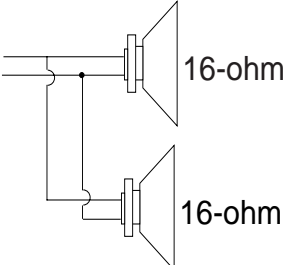
For most applications we do not recommend using more than one speaker; however, if you decide that you must use more than one speaker with your BIG Sound™ system, be sure the combined impedance value remains at 8 ohms. Two wiring examples follow for your reference.

If you are using 4-ohm speakers, connect them in series (as shown) to achieve 8-ohm impedance.



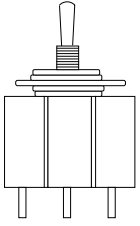
Series

If you are using 16-ohm speakers, connect them in parallel (as shown) to achieve 8-ohm impedance.



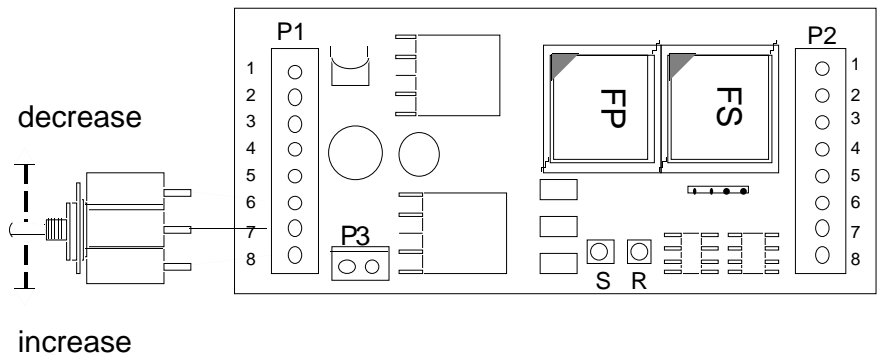
Parallel

## THE SWITCHES IN YOUR KIT



### Volume Control Switch

The blue, 3-position toggle switch in your kit controls the volume of your BIG Sound™ board. It is wired on the P1 terminal block in positions 6, 7, and 8 with the switch's center wire in position 7. Moving the toggle lever up toward terminal 6 connects 7 and 8 and lowers the volume; moving the lever down toward position 8 connects 6 and 7 and raises the volume. Simply press the lever in one direction or the other and hold until the volume you hear is what you prefer and then release; the lever returns to center position. The default volume level is about 50% of maximum; once you set the level to your liking, it will hold each time you start up your system. If the volume level begins to decrease from your desired setpoint during operation, it's time to charge the battery.



A word of caution: the wire that is soldered to the volume switch is a very good quality, but if it is moved back and forth many times or twisted back and forth, the solder joint may fail and the wire break. In this case, you would need to strip back the coating and resolder the wires to the switch. Breakage can be avoided simply by using care when handling the switch.

There are nearly as many ways and locations to mount the volume control switch as there are train enthusiasts! Each installer has his/her favorite way of mounting control switches, such as the volume switch. Look for a location on your engine, tender, or other sound car that is easily accessible. Here is one suggestion for your consideration:

Choose a location that is convenient. Drill a hole in the car floor using an "A" drill or a 15/64" bit so that the switch is inside the car and the toggle lever extends downward through the car floor.

## Reed Switches

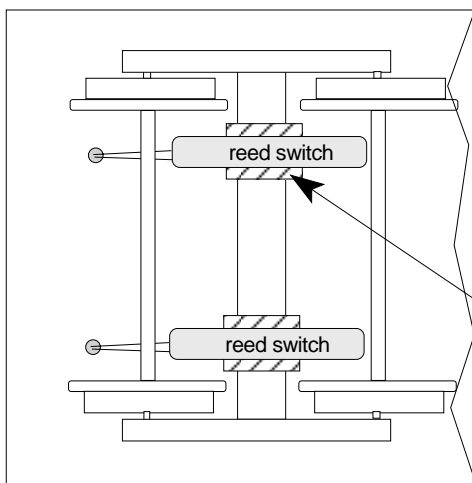


Your kit contains two brown, cylindrical reed switches with two long connecting wires. The ends of the wire leads have not been tinned because each must be cut to the specific length required for your particular application. You may tin the ends yourself or simply be sure they are securely twisted to insure a good contact when connecting them to the board. Note: position 8, like position 1, on block P2 is ground. Either may be used for the reed switches. If all reed switches are used, it may be more practical to use position 8 to be sure a good contact is made when the terminal screw is tightened.

The reed switches are for activating features **ONLY** if you do not want to use the programmed sound sequence that is the standard mode. The horn and bell will sound without the need of an external track magnet triggering a reed switch. This is accomplished simply by increasing the speed of the engine. If you wish to sound the horn and/or the bell only at specific locations on your layout, you need the reed switches for your particular installation. The programmed sequence is overridden if you decide to use track magnets.

If you wish to have the option of using either method, install the reed switches along with other components. As you run your train, if the reed switch detects track magnets, the programmed sequence is silenced. To return to the programmed mode, simply power down, remove the magnets from your track, and then restart.

When you use "real time" sound chips with a remote controller, the reed switches are not used at all.

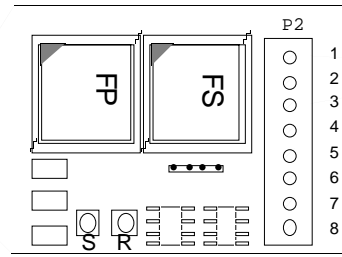


bottom of car

Placement of the reed switches is largely a matter of personal preference. It is important to make sure each reed switch is far enough away from other reed switches so that only the feature desired is triggered as the train passes by the magnet at your chosen site(s). Avoid mounting the reed switches too close to the speaker and axle magnets (if used) because they, too, may interfere with proper activation.

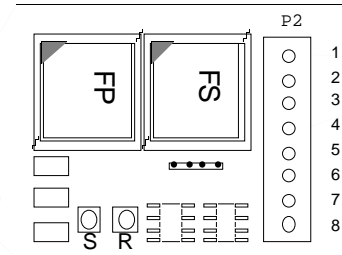
The sketch shows one possible installation: brackets of wood, plastic, or other suitable material you may have in your workshop can be mounted to the truck of the rear wheels and the reed switches mounted to the brackets, parallel to the wheels.

For track magnet activation of the horn, connect a reed switch to positions 1 and 3 on the P2 terminal block. Be sure the wire ends are twisted and securely screwed down.



horn for diesel  
1 & 3

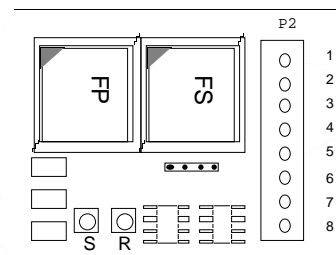
For track magnet activation of the bell, connect a reed switch to positions 1 and 4 on the P2 terminal block. Twist wire ends and screw down in place.



bell for diesel  
1 & 4

You may also enable the optional Doppler feature for our diesel sounds by using an additional (third) reed switch and magnet. Your kit comes with two reed switches, so depending on how many features you intend to activate, you may need an additional switches. If so, just give us a call and we will provide them at no cost.

The Doppler enable switch is connected at P2 positions 1 and 5. If you are already using horn and bell track magnets, you will need to use a pole, building, or other detail alongside the track to mount the magnet and put the reed switch on the side of the engine or car:



enable diesel Doppler  
1 & 5

As your train passes the Doppler magnet, the system remembers that the next time the horn plays, it should use the Doppler effect. The distinctive frequency shift that occurs as a moving object passes by an observer and then moves off into the distance can be heard toward the end of the horn blowing segment. The impact of the Doppler effect varies with the train's speed. If you are slowly creeping along, there would not be any noticeable "sound stretching" just as would be true in real life, too. But when the train is moving along at a good clip, the sound system mimics the unmistakable Doppler sound.

To disengage Doppler, simply remove the trigger magnet.

## Installation and Mounting Considerations

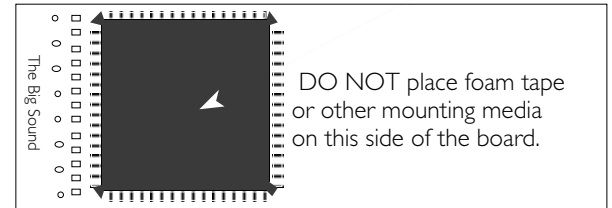
A boxcar or other enclosed trailing car generally gives better sound than mounting in an engine. It is a much simpler installation than taking the engine apart.

Small squares of foam tape are enclosed in your kit for mounting the BIG Sound™ board and the battery. This mounting foam is available readily at hardware stores, hobby shops, and general home supply centers. Hook and loop tape (Velcro®) is another popular mounting medium that allows easy extraction of the components from the car. If your hardware store doesn't stock hook and loop tape, you can find it at fabric stores in strips, circles, or squares.

The foam tape is attached to the back of the board on the black square (microprocessor) behind the sound chip sockets. **DO NOT** apply the foam tape on top of the delicate components of the board itself. This could cause damage to your board. Hook and loop tape can be used instead of the foam tape, but this also should be placed only on the microprocessor. You may choose to mount the board on your battery with foam tape and use hook and loop tape to fasten the battery to the car floor. The mounting method that you find most effective is the one to use.

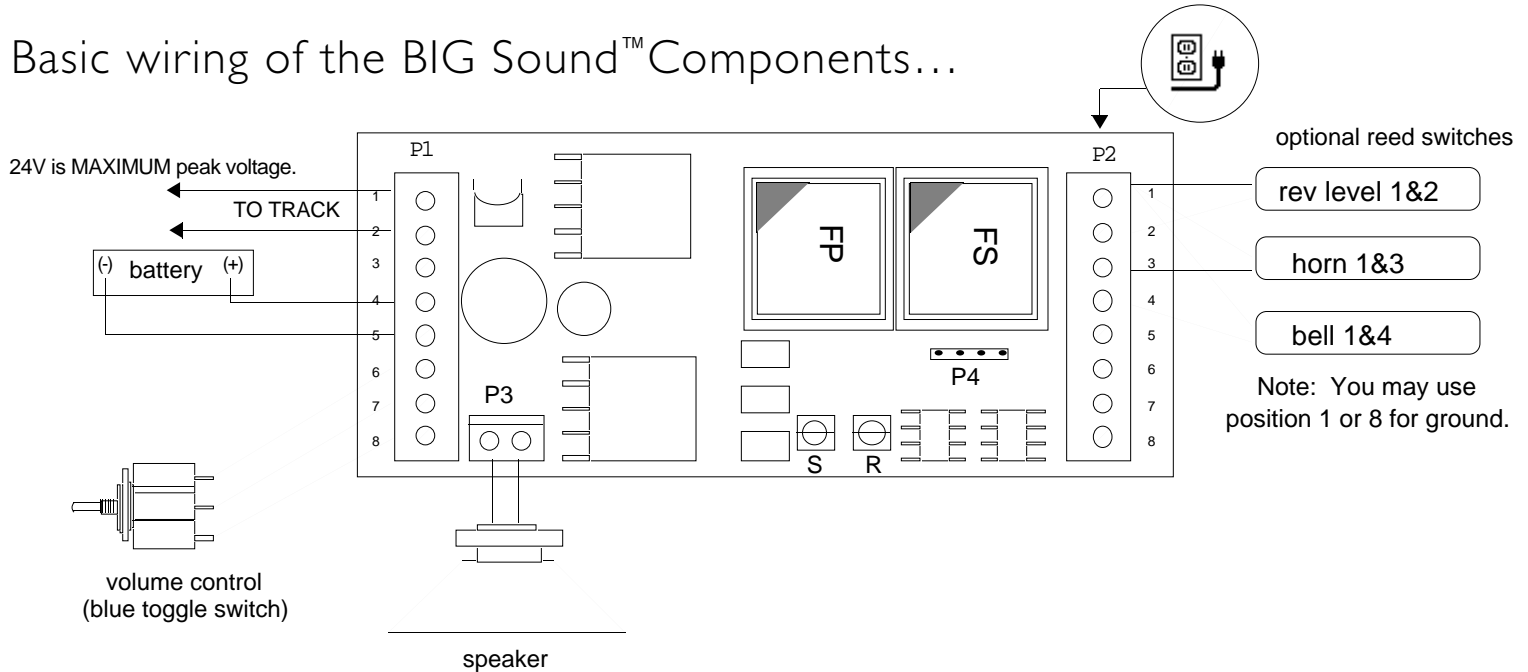
To avoid the distraction of noise caused by excess speaker vibration at continuous full volume, you may want to reinforce the thinner car walls of some cars to give them added support. Thin sheets of stiff foam (such as Styrofoam™) could be used to line the interior walls of the sound car. Also, the use of silicone sealant around the rim of the speaker, which we mentioned earlier, combined with bolting the speaker to the car floor will help keep vibration noise from becoming a nuisance and detracting from your listening pleasure.

Place mounting pad or Velcro® here \_\_\_\_\_



Back Side of the Sound Board

## Basic wiring of the BIG Sound™ Components...

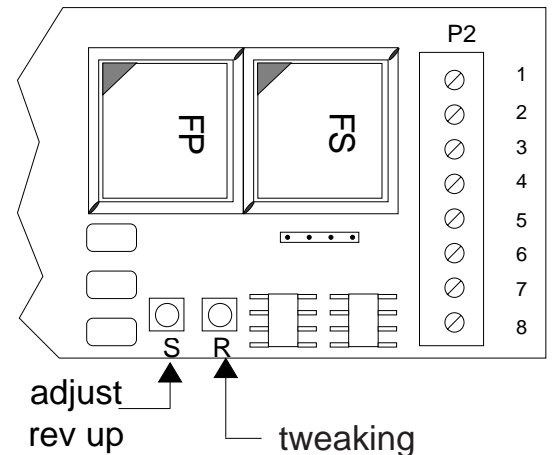
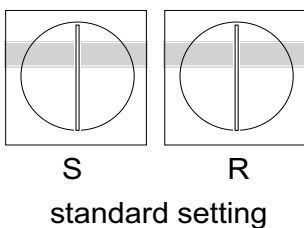


## SECTION 2: SYNCHRONIZING THE REV UP RATE

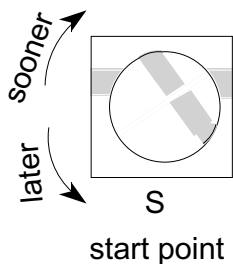
### Operating in Auto Chuff™ Mode

Unlike the steam sound board, your diesel sound board is automatically in AutoChuff™ when you fire up. In most installations it is not necessary to install a reed switch and axle magnets in order to synchronize the rev up levels, and this is our preferred method of controlling rev up. At least, we try this easy method first, and if the results are not what we want, then we turn to the reed switch-magnets combination.

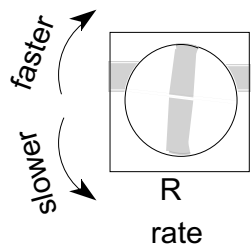
In Auto Chuff™ mode, the two potentiometers on the sound board labelled "S" and "R" are used to adjust the train starting point and the different rev levels. These pots turn one full circle and then return to the starting position.



If you choose to adjust the pots, turn them by placing a small screwdriver in the slot. Be sure to use a small screwdriver (such as those found in electronic sets) to make sure the pot turns without damage. Make tiny adjustments each time and then test the results. Continue turning the



For the "S" pot, turning clockwise makes the sound start sooner. Counterclockwise movement results in later sound start up.



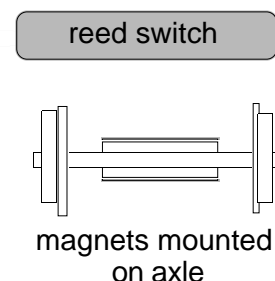
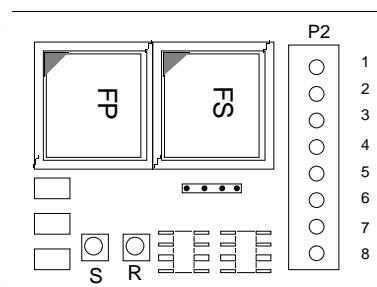
For the "R" pot, clockwise turning causes the rev levels to come closer together while the opposite movement results in wider-spaced rev levels.

With diesel AutoChuff™ you may be able to make adjustments so that rev up begins prior to actual train movement. This is easier if your diesel engine has a higher starting or threshold voltage before moving. Turn the "S" pot slightly until you achieve the desired setting.

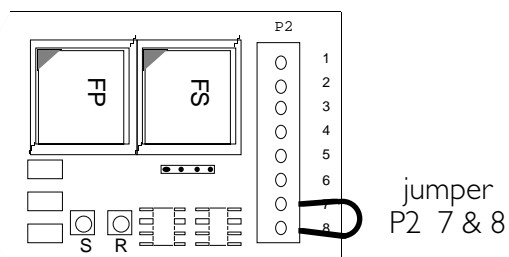
Although adjusting the right pot is not critical, you may want to tweak the position to fine tune your particular locomotive. Finding just the right spot is largely a matter of experimentation

## Using the Reed Switch and Axle Magnet Combination

If you are not completely satisfied with the Auto Chuff™ mode, you may want to install a reed switch and two axle magnets. You must also install a jumper between P2 7 and 8 for this option to work. If you choose to do this, please call Phoenix Sound and request a pair of bar magnets, an additional reed switch, and a jumper at no charge to you. The standard



diesel kit does not include these items.

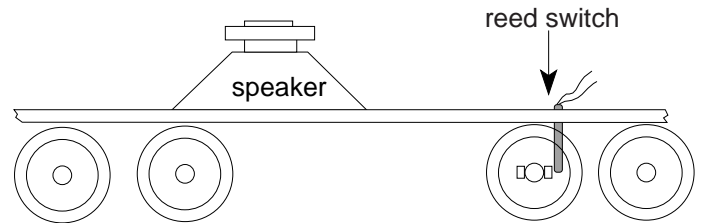


Installing in the diesel follows the same ideas as for a boxcar, but it will be much more difficult to mount the magnets on the axle (or wheel rim) and find a place for the reed switch.



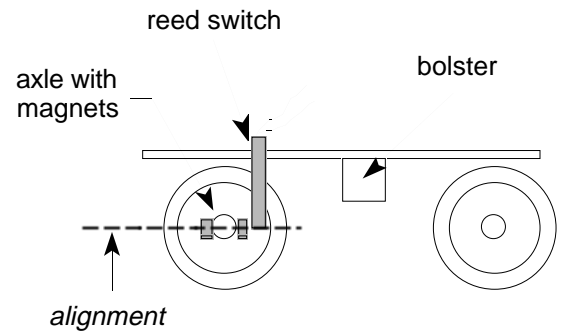
The key to obtaining the correct rev up response is careful attention to the positioning of the reed switch relative to the magnets on the axle. Before you permanently glue the reed switch into place, experiment with its distance from the axle magnets until the diesel reliably revs up when the magnet passes the switch. This initial step is very important, so take time to get it just right.

The rev up reed switch must be connected to the P2 terminal block at positions 1 (ground) and 2. The switch should be mounted as far away from the speaker magnet as possible. If it is placed directly beneath the speaker holes, the speaker magnet may interfere.



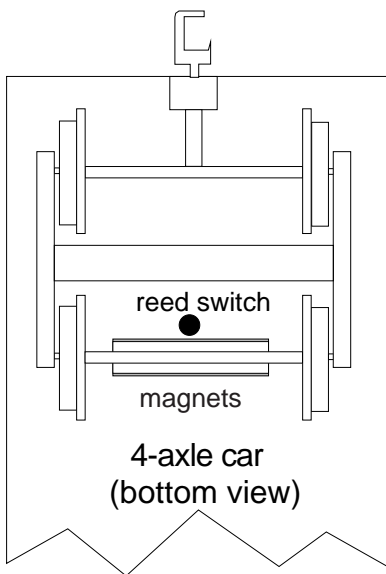
Usually, when the bottom of the reed switch is even with the center of the axle, the correct chuff is obtained, but a little experimentation may be necessary. Move the reed switch up or down as you experiment to find the best position.

The rev up reed switch must be connected to the P2 terminal block at positions 1 (ground) and 2. The switch should be mounted as far away from the speaker magnet as possible. If it is placed directly beneath the speaker holes, the speaker magnet may interfere.



Be sure to use only two magnets on the axle or wheel rim; otherwise, the magnetic field saturates the reed switch, and you will not have success in synchronizing the rev level with the engine's speed. Attach the magnets to the axle with Goo<sup>®</sup> or another suitable adhesive. Be sure the magnets are 180° apart with both red marked sides facing outward, away from the axle.

To install the rev up reed switch vertically, drill a 1/4-inch hole through the car floor in the space between the truck bolster and the axle. Position the hole so the reed switch is about 1/8-inch (or a little less) from the axle magnets. Insert the reed switch through the hole, perpendicular to the car floor (vertical placement).

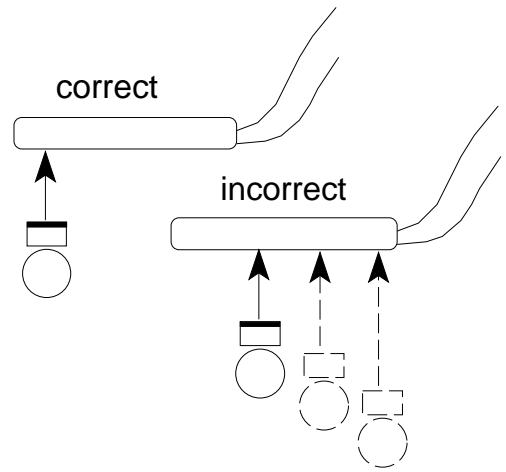


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The hole should be positioned so that the truck does not hit the reed switch when it swivels. When mounted in this way, correct rev up is obtained when the truck switch stays constant. In a 2-axle car you may have to cut an opening to allow for the swivel of the wheel base, as shown by the shaded area around the reed switch in the sketch. Once you find the best reed switch position, set the switch in place with Goo® or other adhesive and connect the lead wires to the BIG Sound™ board terminal P2, positions 1 and 2.



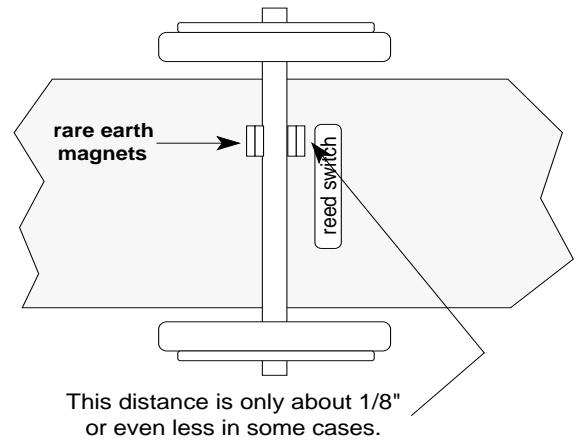
### Horizontal Placement of the Reed Switch

If you choose to mount the switch horizontally on the underside of the car rather than vertically through the floor of the car, we suggest making a bracket from plastic or wood so that the reed switch is positioned about 1/8-inch (or a little less) from the switch's closest approach to the magnets. If you position the switch further away than 1/8-inch, you may not be successful in synchronizing the rev up.

When using a horizontal placement for the reed switch, it is more difficult to trigger the reed switch uniformly if the magnets swing by the center of the switch. The magnet should swing by that portion of the switch between the center and the end (tip) of the switch.

**DO NOT MOUNT THE REED SWITCH PARALLEL TO THE AXLE WHEN USING OUR STANDARD BAR MAGNETS.**

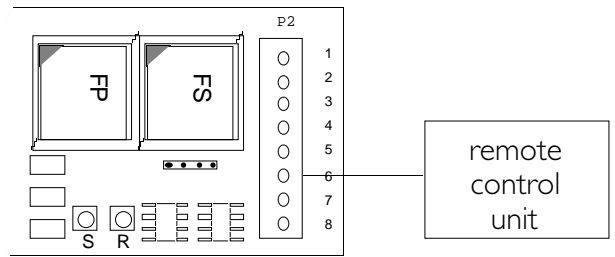
If the horizontal mounting is necessary, we suggest using four (4) tiny Radio Shack rare earth magnets instead of the two supplied magnets and position them as shown in the sketch. Glue each pair of magnets together (with Goo®) and then glue each bonded pair to either side of the axle at 180° apart. The magnetic force should be attracting all four magnets together.



Although it is sometimes challenging to get the correct synchronized rev level when using magnets and a reed switch, when properly done, this method is effective.

## Controlling Early Rev Up With Remote Control

The Phoenix sound sequence begins when the train begins to move. If you are using a remote controller with sufficient function switches, you can assign one of them to rev up the engine before it begins to move. Connect the wire for the controller function switch to P2 position 6, securing the connection by tightening the terminal screw. The ground position is handled through the controller. When the switch is active on the controller, you can play the rev up sequence before the train starts to roll.



### SECTION 3: A FEW TROUBLESHOOTING TIPS

Use a transformer with enough power to drive your train with BIG Sound™ on board and pulling a load. If you are using a small unit from a starter kit (such as the little, red transformer that LGB includes with its starter kits), you may find that your train runs around the track with the appropriate bells and horn for awhile, then stops, and then starts up again with the beginning sound sequence. If this unplanned pattern is occurring with your setup, try using a more powerful transformer. We recommend a controller with a minimum output of 2 amps (30VA) for optimal performance.

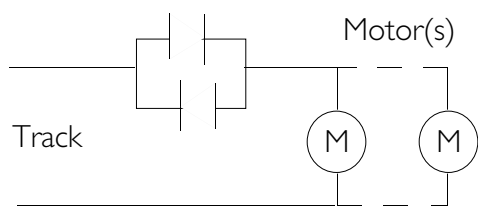
Electrical pickup from the track varies from car to car. We recommend at least two sources of electrical input; e.g., two axles with metal wheels and brush pickups. Some manufacturers install plugs with track power in their cars and these plugs can be used with the Phoenix system as a second source of electrical pickup. As a matter of fact, our GP9, GP38, and Turbo diesel kits come standard with a pigtail connector for track power already installed in the sound board. If your car or tender seems to have poor pickup through the engine, try using two metal wheel sets instead. This is our preferred method.

If your Phoenix board is not getting consistent power pick up, your sound sequence may sputter or reset unexpectedly, or perhaps your train will move a short distance with no sound and then suddenly burst into full sound. The problem may be something as

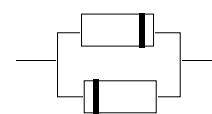
simple as dirty wheels or track, coating on the brushes, or poor pick up from your particular sound car. A little alcohol on a cotton ball will remove debris from the wheels or track and give your sound car the boost it needs to get a good source of power to the sound board.

If your diesel locomotive starts (or stops) moving before the appropriate sounds occur, try the fix described below. These suggestions apply to engines that begin to move at 2.5 volts or lower:

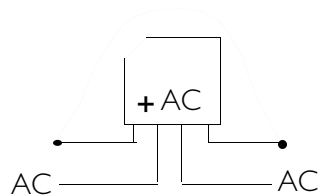
Below one volt, the sound board is "off" or will soon turn off. From one volt to the "start" voltage, the system produces the idle engine sounds. The start voltage is adjustable; however, setting it below 2.5 volts may prevent the sound from getting to the idle state. The Phoenix board will not shut down unless the engine is idling.



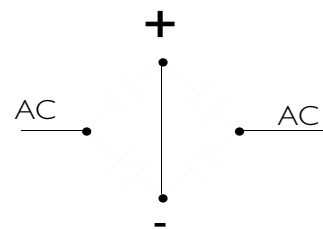
To solve this problem, you can raise the locomotive starting voltage by inserting pairs of diodes (one for each direction) in series with one of the motor leads. Each diode will lower the voltage reaching the motor by 0.7 volts. You can use a very common Radio Shack full wave bridge rectifier to easily get two diode pairs in series. (The diagram at the right shows correct "+" and "-".) One rectifier package will raise the starting voltage by 1.4 volts and usually get you into a good working range.



Diodes have a band near one end to indicate polarity.

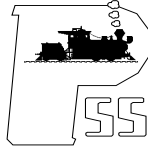


When selecting diodes and/or rectifiers, go bigger on voltage and current than you anticipate needing. They will cost a little more and be a little bigger but will perform the same. Radio Shack part #276-1146 is a 4-amp 50-volt rectifier that should work fine for most applications.



Your kit contains our "Troubleshooting Guide" for extra help with other problems that may occur:

We wish you many hours of listening pleasure with your Phoenix Big Sound™!



## **Phoenix Sound Systems, Inc.**

3502 West Liberty Road  
Ann Arbor MI 48103 USA

We sincerely appreciate your interest in and support of our products!  
We invite you to visit our WEB site...

[www.phoenixsound.com](http://www.phoenixsound.com)

Our E-mail address is...  
[bigsound@phoenixsound.com](mailto:bigsound@phoenixsound.com)

Or reach us by telephone or fax...

Monday–Friday 8:30 AM to 5:00 PM EST  
(Also, we have a message service that is active 24 hours each day.)

Order & Tech Support line (toll free): 800 651-2444

Main Telephone Line: 734 662-6405

Fax Line: 734 662-0809