BigSound™ P14 Handbook

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Introduction

Dear Model Railroading Friends,

Thank you for choosing Phoenix Sound Systems to fill your railroad with sound. The P14 will run on DCC and Battery.

The P14 system, like all of our systems from the 2K2 onward, can be loaded and customized using a PC. You will need to upgrade your PC software to version *1.2.96* and ROM library files to version *<filename>-r8.ROM* or newer to load and save P14 compatible files. Please note that the P14 requires programming through the USB port on a PC; you may use an older DB9 serial cable with a USB to serial adapter.

We know you're eager to do some listening, so continue through the initial checkout. The board is protected against incorrect wiring and over-voltage gremlins. However, if you notice static electric sparks when you touch things you should ground yourself by touching something conductive before handling your board. Also be careful not to put the board on metal surfaces or model parts when powered. Basic electrical component handling precautions are always a good idea.

Happy Listening!

Getting Acquainted

The Sound Board Connectors

The P14 utilizes a pair of JST wire to board connectors. The primary connector, located on the end of the longer lower circuit board, is 5 positions and contains the connections for power, DCC and loudspeaker. The second connector, located on the underside of the upper circuit board, is a 4 position connector for the computer interface and is similar to other interface connectors but only works through USB.

IF YOU APPLY POWER TO THE SPEAKER TERMINALS THE AMPLIFIER WILL BE DAMAGED AND OTHER COMPONENTS MAY BE EFFECTED AS WELL. THIS IS A BAD THING TO ALLOW TO HAPPEN. THIS IS **NOT** COVERED UNDER WARRANTY.

Connector Pin Out Chart

Connector: Pin	Purpose	Color	Termination
P1:1	Power/DCC [Right Rail]	Red	Bare Lead
P1:2	Power/DCC [Left Rail]	Black	Bare Lead
P1:3	Low power DCC	Green	Bare Lead
P1:4	Loudspeaker	Brown	Bare Lead
P1:5	Loudspeaker	Brown	Bare Lead
P2:1	Ground	Black	2.5MM Jack [Sleeve]
P2:2	Expansion	White	*<empty>*
P2:3	Data	Yellow	2.5MM Jack [Ring]
P2:4	+3.3V	Red	2.5MM Jack [Tip]

Lower Board Connections
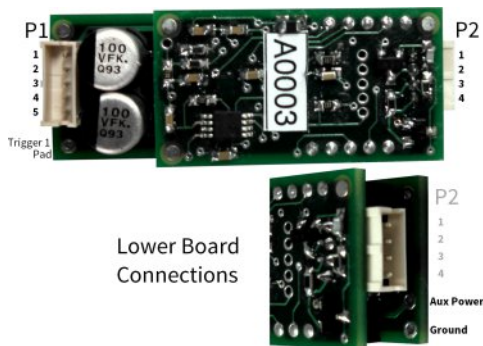
Initial Checkout

Each system is tested before shipping but we recommend that you hook things up on your workbench, play with the system and get comfortable with the components before installation.

Connect P1:1 and P1:2 to a DCC source and connect a speaker to the appropriate leads.

Locomotives will speed up and down as you adjust the DCC speed setting.

Locomotives can also be configured to look for wheel rotation. See page 8 for the DCC CV values to set the speed mode.

DCC Checkout

The sound board default address is 3. Turn the speed up and down, sounds should play in coordination with the changing speed commands. Test the function buttons, the default function assignments are listed in the chart below.

DCC Function Defaults

Address: 3

Function	Diesel	Steam
F1	Bell	Bell
F2	Manual Horn	Manual Whistle
F3	Coupler Clank	Coupler Clank
F4	Crossing Horn	Crossing Whistle
F5	Detector	Coal Loading
F6	Rev Up	Water Fill
F7	Volume Up	Volume Up
F8	Volume Down	Volume Down
F9	Rev Down	Blow Down
F10	Station Announcement	Station Announcement
F11	Chatter	Chatter
F12	Shutdown	Shutdown

Speed by Trigger Checkout

In order to use a trigger for speed you will need to solder a wire to the sound board Trigger Input and change the configuration. Whenever the trigger is connected to the trigger ground the system sees motion. The first closure should play the start toots and the starting bell as well as produce the first chuff.

Standard Sounds and Effects

Most sounds play automatically based on train speed. Many sounds can also be set to play using designated functions. The standard sound system configuration follows.

All Systems

Whistle/Horn: Toots when starting (2 forward, 3 reverse) and stopping (one toot). Crossing whistle sequence plays when you reach the Whistle/Horn play speed. You must slow down to at least 75% of the play speed in order to have it play again when you speed back up.

Bell: Plays when you first start moving and just before stopping. You must reach twice the bell stopping speed in order to replay the bell when stopping. The automatic bell will not replay unless 30 seconds have elapsed since the last time it played, this can be adjusted with the computer interface.

Coupler Clank: Plays when you come to a stop in reverse after traveling forward; will not replay until you go forward and back up again.

Brake Screech: Plays just before stopping.

Diesel Systems

Air Pop: Plays periodically during idle. Also plays while moving in SFX.

Brake Release: Plays as the engine starts moving.

Compressor: Plays periodically during idle.

Steam Systems

Blow Down: A longer and heavier steam release that clears out the ashes/clinkers.

Steam Release: Plays after you come to a stop.

Generator: Basically runs all the time but the engineer will shut it down if the engine sits in idle for awhile. Comes back on when voltage approaches the start voltage.

Air-Pump: Plays in idle to maintain air pressure.

Air-Pump 2: A sustained compressor run that restores depleted air pressure.

Rod clank: Plays at slow speed.

Hiss: Plays at low speed, clears the cylinders of condensation from the steam.

Coal Shoveling: Plays periodically while engine sits at idle.

Injector: Forces water into the boiler. Plays periodically while in idle.

Triggered Sounds and Effects

The P14 board has one trigger input. The following section describes sounds which may be assigned to the trigger or DCC functions. Any sound can be assigned to the trigger or a DCC Function. See the table on page 5 for factory default DCC Function assignments.

All Systems

Tunnel Fade: This trigger causes the volume to fade down to a lower setting. When the input is triggered again, the volume will come back to the prefade setting.

Doppler: In diesel, when triggered, the next time the crossing horn plays it will go thorough the pitch shift that you hear as a train is speeding toward and then away from you. Doppler is speed sensitive. In steam, triggering this effect will cause the pitch of the chuff to shift as the engine approaches and a second triggering will cause the pitch to shift back to normal.

Working/Drifting: An effect that makes the locomotive sound like it is struggling with a heavy train or coasting into a station.

Diesel Only

Dynamic Brake: A triggered only sound. It is almost a tone which results from using diesel drive motors as generators.

Rev Up/Down: Causes the prime mover sound to go to the next/previous rev. The sound will return to the corresponding rev based upon speed changes.

Radio Defect (Hotbox) Detector: Plays a detector radio announcement randomly selected from a list. Can be triggered or set to play automatically.

Steam Only

Water Fill: In programmed mode the sound plays 10 seconds after trigger if the loco is stopped; in manual mode the sound plays when triggered.

Coal Loading: In programmed mode the sound plays 10 seconds after trigger if the loco is stopped; in manual mode the sound plays when triggered.

Mallet Mode: Plays a second set of chuffs, moving in and out of phase with the main chuff.

Control Variables (DCC CV)

The P14 firmware supports the following Control Variables. These can be programmed on the program track (service mode) or on the main (ops mode – see note below).

OPS MODE ("PROGRAMMING ON THE MAIN") IS NOT RECOMMENDED FOR ADDRESS CHANGE COMMANDS.

CV	Description	Default Value
1	Short Address	3
17	Long Address	0
18	Long Address	3
49	Speed from DCC 0 = Disabled; ≠ 0, Enabled	1
50	The DCC Value where motion starts.	2
51	The DCC Rate (Speed vs. Throttle)	100
52	Seconds to simulate DCC if DCC signal is lost. 0 = Forever	0
53	Seconds in idle before shutdown. 0 = Never shutdown	0

Troubleshooting

No Throttle or Function Response – Start by making sure you have the correct address selected on the throttle and the sound board has not had its address changed.

No Sound – Start by rechecking the wiring to the speaker and power connector. A connection may have been missed or become loose. It may be the volume has been turned down, try raising the volume.

Low Volume – If the volume is lower than your chosen setting the board may not be receiving full power.

Erratic Chuffing – The axle magnets may not be mounted symmetrically. Also, if the reed switch is not mounted to the truck, the distance to the magnet might change during curves. The wires coming from the reed switch might be broken or loose. Engines with built-in contacts may require cleaning or oiling of the contacts. Contact Problems are the normal cause for faster than normal chuff rate

Whistle too frequent – The whistle plays based upon reaching the whistle play speed . If the train slows down in curves or at grades this may cause additional whistle triggering. Slightly adjusting speed may help.

Installation Guidelines

Components

Speaker – Use the largest speaker that can reasonably fit your available space. For best acoustics, the speaker should be sealed to the surface so that sound going out the front of the speaker cannot easily get to the back side.

Access Jack – Unobtrusive but accessible. Typically in the floor of tenders and boxcars and on the fuel tanks of diesels. Many models have removable pieces, doors, etc. where you can mount these hidden from view. A 9/32" hole is appropriate for our standard access jack.

Mounting the Sound Board – Make sure that the sound board will not touch anything metal. Use the foam tape provided with the kit; many modelers prefer hook and loop tape. The sound board may get warm enough to soften hot melt glue so we do not recommend it; do not use conductive silicon adhesive either.

Speed Sensor – You may need to experiment to get reliable triggering from a rotating axle with magnets on it. After mounting the magnets on the axle, hold the reed switch in various positions and hook something to the reed so you can tell when the switch is closed. An ohm meter with a beeper works great. You can point the reed switch directly at the axle/magnets but there will be less motion tolerance. With the magnets sweeping the side of the reed switch as shown a clearance of about 3/16" is usually right. If you are too close you may get extra closures—one as the magnet approaches, and one as it leaves.
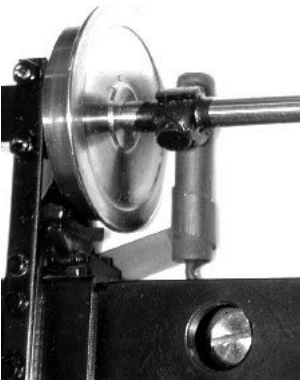
Technical Specifications

Length – 1.65 in; 42 mm
Width – 0.63 in; 16 mm
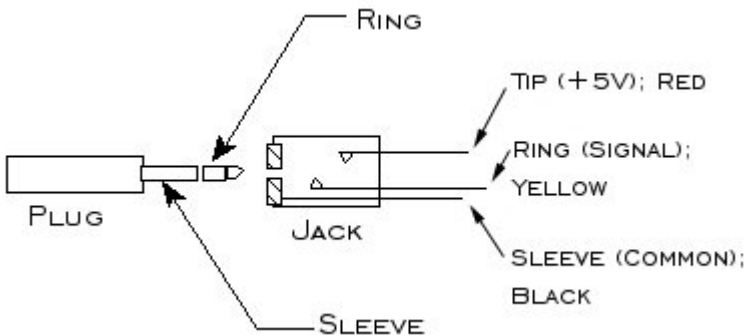**Height** – 0.51 in ; 13 mm
Maximum Track Volts – 30V.
Power Consumption – Varies with volume; can go as high as 150mA if at max volume; typical is less than 100mA - medium volume.
Amplifier – 1.3 Watts maximum.
Speaker Load – 8 Ohms or greater.

Access Jack Diagram

THE PLUG IS A STANDARD 2.5MM STEREO (TRS) PLUG. THE SUPPLIED JACK IS FULLY INSULATED FROM THE MOUNTING HOLE. OTHER 2.5MM JACKS MAY BE SUBSTITUTED - BUT MAKE SURE THAT THERE IS NO GROUND PATH BETWEEN THE COMMON TO ANY OF THE POWER INPUTS (P1:1 AND P1:2).

Low Power DCC Option

With some battery powered DCC receivers, like Airwire, it is possible to separate the power and DCC signals to reduce the load on the receiver's DCC output. By default the P14 is set to derive DCC and power from the same source, i.e. the track.
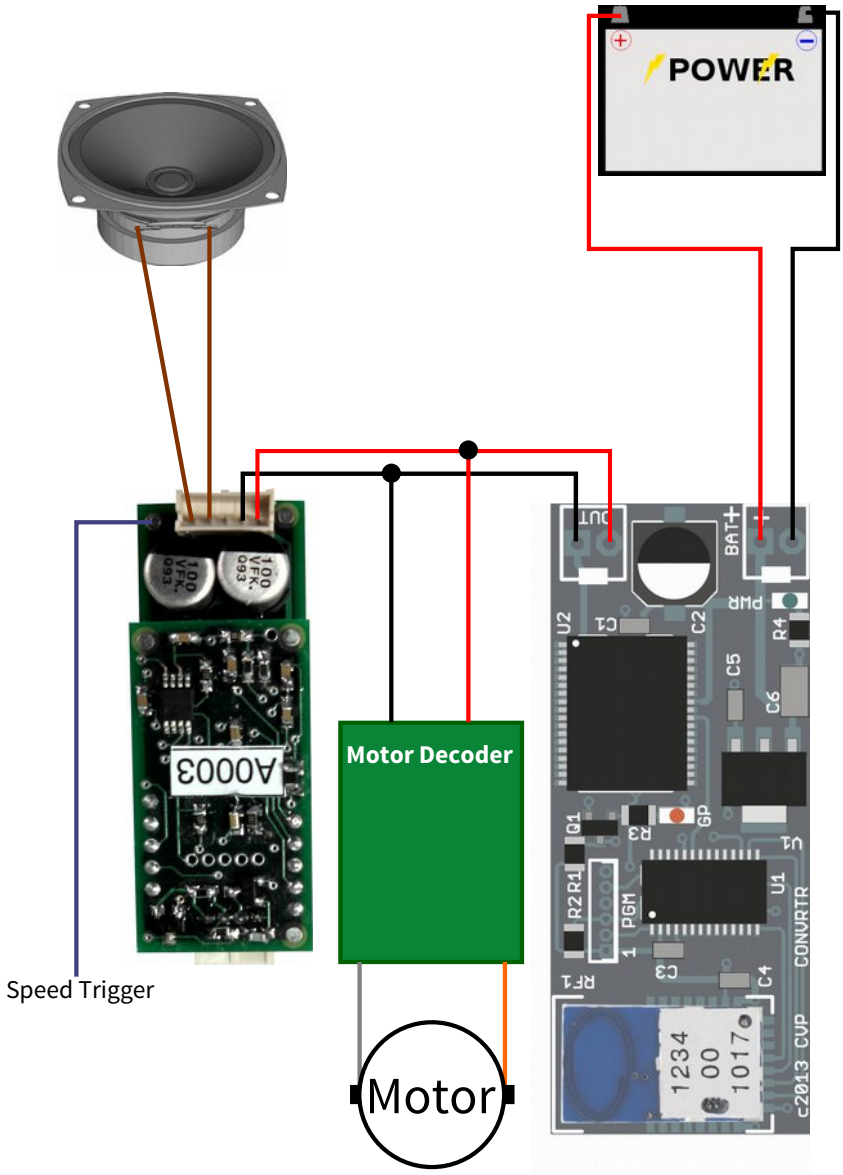
To separate the DCC feed from the power feed please see the P14 Low Power DCC supplement.

Appendix A: Wiring Diagrams

Basic DCC

Left Rail

Right Rail

Speed Trigger
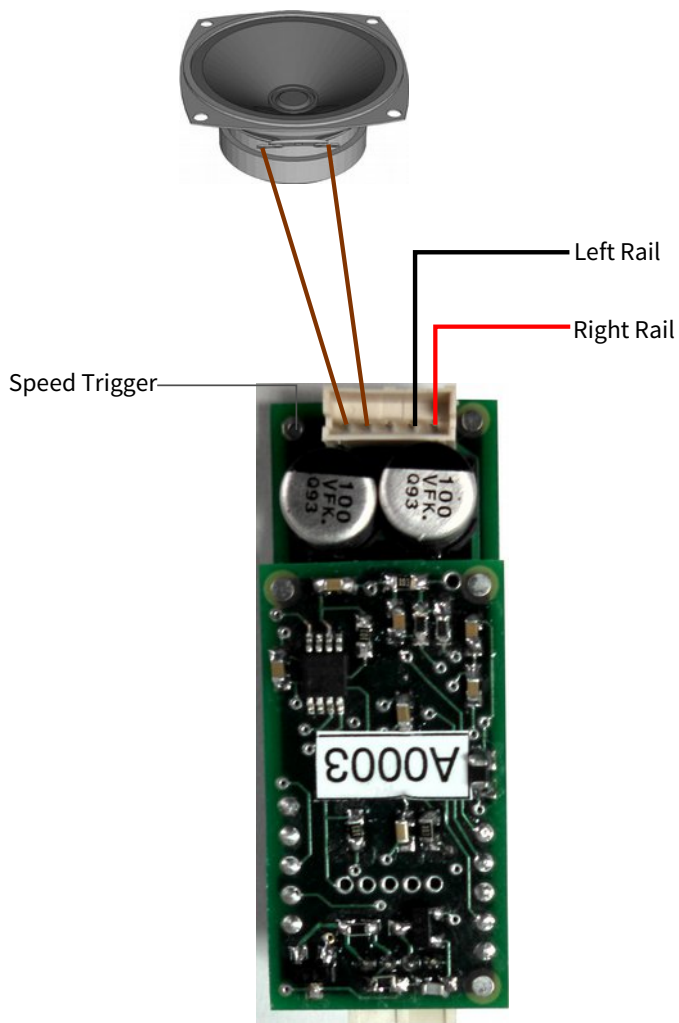
CVP miniAirWire900™ Convrtr

Speed Trigger

Motor Decoder

Motor

Appendix B: The Computer Interface

The Computer Interface is an optional accessory that enables complete customization of all sounds.

The Computer Interface consists of a CD and USB Interface for use with Windows 2000, Vista, 7 & 8. The CD contains software to customize sounds from the Phoenix Sound library. Connecting the USB interface to the board through the access jack allows you to download sounds for different engines and change the following:

- Individual sound volumes
- Manual vs. Programmed response for bells and whistles (horns)
- Assign sounds to terminals and DCC functions
- Adjust how often a sound plays
- Change shutdown time
- Change and modify chuff rhythm, compression and tone
- Configure and fine tune for various control systems such as: AC, DC, DCC, MTS, Locolinc®, Train Engineer, RCS, Reeds and Airwire 900
- plus many other features you will discover as you familiarize yourself with the system

All adjustments, upgrades and sound loading can be made through the Access Jack. You will not need to take the model apart after installation is complete.

PLEASE NOTE: THIS SOUND BOARD REQUIRES THE USB INTERFACE. THE OLDER INTERFACE UTILIZING THE DIRECT DB9 SERIAL CONNECTION CAN NOT COMMUNICATE WITH THIS SOUND BOARD; YOU CAN USE AN OLDER SERIAL CABLE WITH A USB TO SERIAL ADAPTER.

Warranty

The BigSound™ electronic board is manufactured to the highest standards using the latest assembly technology and quality, conservatively rated parts. We are dedicated to producing the world's finest sound system for years of railroading enjoyment.

The materials and operation of the BigSound™ electronic board and associated system kit components supplied by Phoenix are guaranteed to perform correctly for one year when installed and operated according to the instruction manual. In the unlikely event that your BigSound™ system fails, please call or email us so that we may evaluate the situation and save any unnecessary shipping. We prefer to pre-evaluate returns because frequently there is a simple explanation for any perceived problem you may be experiencing. Repairs and or replacements covered by this warranty are at no cost. However return shipping may be charged, especially if you return your system in an engine, tender, box car or the like. A service fee may be assessed if it is determined that the failure was not due to any Phoenix supplied components.

Phoenix Sound Systems, Inc. cannot be liable for damage to the system during shipping to our facilities due to mishandling, inadequate packaging or similar circumstances beyond our control. Please be sure to package the BigSound™ in a secure, static safe manner.

When returning your sound board to Phoenix for service please be sure to include your contact information (name, address and phone or email) and a brief description of the trouble. Please be specific, "Does not work" or "Just quit" does not provide any useful information and will not assist in determining what has happened and appropriate corrective actions.

Please read the handbook and any included installation notes prior to installation and operation of your BigSound™ system. Contact us if you have questions or are unsure about any aspect of installation or operation.

Physical modification of the sound board in any fashion voids this warranty. Physical modifications include but are not limited to:

- Drilling of holes in, or trimming, the printed circuit board for any purpose. Altering the circuit board may cause damage to internal layers which would not be visible to the naked eye yet render the board inoperable.
- Removal, replacement or modification of any connectors or individual component pieces.