

QS-3000

**Sound and Train Control
for 3 Rail Engines**

user guide

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Introduction

QS-3000 is the most sophisticated on-board digital sound and train control system available. Add QS-3000 to your locomotive and you have incredibly realistic sound, the hottest train features on the market, and complete control of your engine, all from your 3-Rail transformer. With QS-3000 you have compatibility with all popular three-rail transformers. In the future you will be able to easily upgrade QS-3000 to add new sounds and train running features.

This manual shows you how to enjoy all the QS-3000 sounds and train control features. You'll find everything from basic wiring advice, to full descriptions of QS-3000 sounds, to the nuts and bolts of using ID numbers to run your engines. A large section of the manual fully describes the unique QS-3000 train control features, with step-by-step directions. At the end of the manual are the Appendixes, with a troubleshooting guide, glossary, and information about special uses of QS-3000.

Use this manual with your engine on the track in front of you. You'll learn and understand the sounds and control features quickly as you use them. Sooner than you think, you'll be a master at running the extraordinary QS-3000!

1 Setting Up

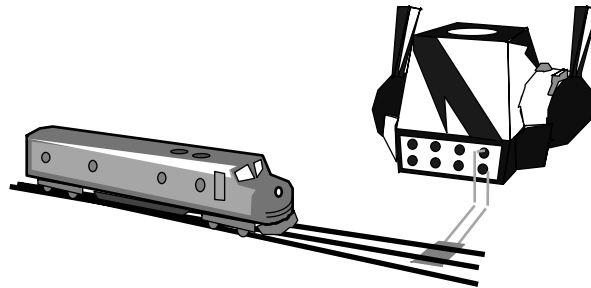
This section describes the equipment you need to operate QS-3000.

The **MORE** sections in this manual give additional information and explain how to get even better performance from your QS-3000.

Equipment List

You need—

- A layout or a long length of straight track
- An engine with the QS-3000 system installed
- A transformer with a Horn (or Whistle) Button and a Bell Button, or an accessory Bell Button



The basic operation of QS-1®, QS-2®, QS-2+™, QS-3000™, MTH® ProtoSound®, Weaver®, and 3rd Rail® engines with QSI designed sound systems is the same. If you have not used a QSI designed system before, please read on before starting your engine.

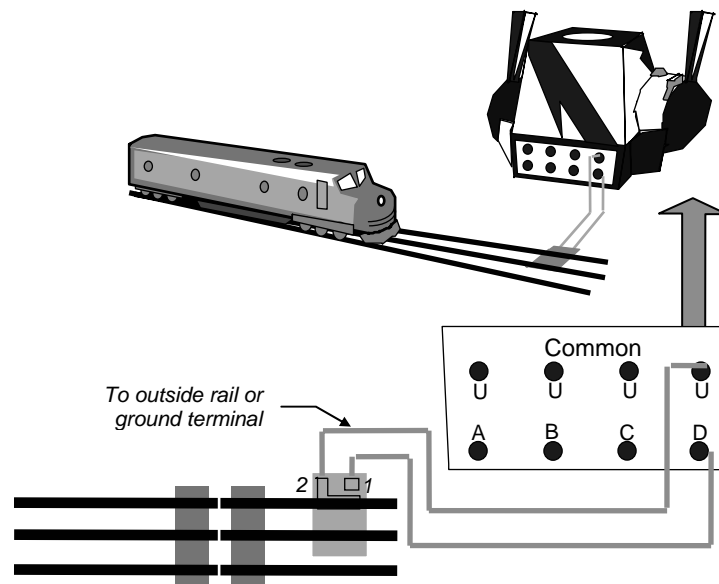
How To Wire the Transformer

Note: If you already operate Lionel® Rail Sounds™, or MTH® ProtoSounds®, and the bell and horn button work properly, skip this section.

Follow the manufacturer's directions for wiring your transformer. If the bell rings when you press the horn button* while the engine is running, swap the two wires from the transformer outputs.

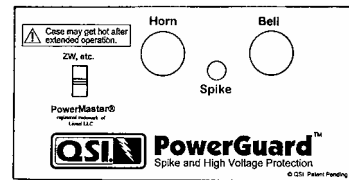
This illustration shows the wiring for a ZW transformer.

If you are not using a ZW, check Appendix II for wiring information for other transformers.



*For the horn button to work correctly,
wire the Common terminal to the outside rail*

*This manual uses horn button to stand for either the horn or the whistle button on your transformer.

MORE:**QSI PowerGuard**

PowerGuard is designed to do three things:

First, PowerGuard detects any quick jumps in voltage, and suppresses the voltage to a safe level so damaging spikes cannot develop. Any transformer can put out spikes that exceed the voltage limits of any 3-Rail electronic equipment. These spikes can damage or burn out the components, shortening the life of the system. Using PowerGuard is like using a surge suppressor to prevent excess voltage from damaging a home computer. In a similar way, PowerGuard protects expensive 3-Rail electronic components from damage. A small red bulb flashes each time a voltage jump is detected, telling you PowerGuard is on the job.

Second, PowerGuard monitors the voltage on your layout. The brightness of the two large bulbs shows the total amount of voltage going to the track. When you press the horn or bell button on your transformer, one light will become brighter than the other, showing you the horn or bell signal strength. And PowerGuard is much easier to use than a volt meter, since the lights are visible from anywhere in a room.

Third, PowerGuard helps solve compatibility problems between MTH ProtoSound, or Weaver ProtoSound engines, and Lionel's Cab-1 walk-around throttle with PowerMaster set for conventional use. ProtoSound engines and the Lionel system are incompatible in two ways. First there are software problems, which are solved when you convert your ProtoSound engines to QS-3000. This conversion can be done through QSI or any QSI dealer (call for details). Second, there are hardware problems, which are solved when you add PowerGuard to your layout. A switch on PowerGuard puts a resistive load on the output of your Lionel PowerMaster. This load produces a waveform that QS-3000 converted ProtoSound engines can understand. Also, since the Cab-1 walk-around throttle does not have stops or voltage marks on the red throttle knob, PowerGuard helps you find the high/ low voltage settings you need to run QS-3000.

PowerGuard also helps older transformers with weak horn signals. These weak signals often can't be understood by QS-3000. The extra resistive load PowerGuard puts on the track makes the horn signal stronger, often solving the problem. If PowerGuard doesn't solve your horn button problems, it's time to have the transformer repaired.

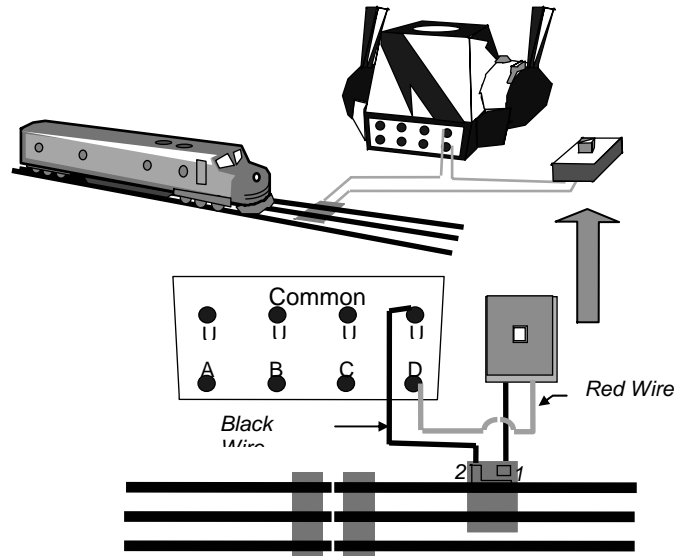
Finally, PowerGuard uses very little power. Using PowerGuard will not change the speed, dim the lights, or affect the sounds of your engines.

Connecting A Lionel Bell Button

With QS-3000, having a bell button is highly recommended. A bell button makes operating some of the sound effects much easier, and is required to program some engine sound effects.

If your transformer does not have a bell button, attach a Lionel bell button (like the Lionel Railsounds No. 5906 bell activation button), or QSI SideKick II to the transformer. SideKick II includes bell and horn buttons designed specifically for running QSI designed sound and train control systems. See the next page for more information on SideKick II.

To connect a Lionel bell button, follow the instructions shown below. The instructions that come with the Lionel bell button show the same wiring.



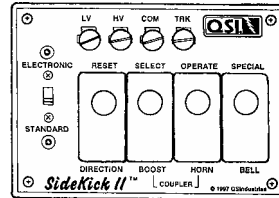
Wiring the Lionel Bell Button to a ZW Transformer

Tip: If your transformer does not have a horn button, or the horn button is not operating correctly, wire a Lionel bell button to blow the horn or whistle by reversing the connections. You can also add two Lionel bell buttons to the track, one to run the horn and one to run the bell. See Appendix II for a wiring diagram.

Tip: If you are using an electronic transformer (for example, an All-Trol, or a Lionel MW or RS-1), a Lionel accessory bell button will not work reliably. Connect a QSI SideKick II controller to the transformer.

MORE:**Lionel Horn and Bell Buttons**

When you press the Lionel horn button, it applies **positive** DC to the track and tells the whistle to blow. When you press the Lionel bell button, **negative** DC voltage is applied to the track, operating the bell. If you have wired the bell or horn button backwards, pressing the bell button will blow the horn, instead of turning on the bell. You may have noticed that older Lionel engines using the mechanical horn relay don't care which way the transformer, horn, or bell button is wired, since either the horn or the bell button will cause the horn to blow.

**MORE:****QSI SideKick II**

Run your engines effortlessly with QSI SideKick II. SideKick II is a simple, easy-to-use controller. It attaches between your transformer and the track. SideKick II sends strong and reliable signals. No more missed messages between your transformer and engine. You can use the buttons on SideKick II in place of the transformer buttons, eliminating problems with worn, faulty horn buttons or missing bell buttons. The horn button operates older 1950's horns and whistles as well as newer ones.

Three buttons control your engine's horn, bell and direction. The fourth button gives the boost needed to select RESET Features and program QSI and MTH ProtoSound locomotives quickly. Using this button to find the RESET Position you want is much, much faster and more reliable than using the throttle arm on your transformer. SideKick II also makes it much easier to arm and fire ProtoSound and QSI coil couplers, or to lock and unlock ProtoSound and QSI equipped engines.

SideKick II performs flawlessly with any transformer. Many electronic transformers use a chopped waveform to send signals to the track, which does not work well with most accessory horn and bell buttons. The switch on SideKick II provides a stronger horn and bell DC signal, giving reliable operation.

Once you try SideKick II, you'll wonder how you ever operated your engines without it.

Information about SideKick II is added to this manual any time that using SideKick II makes running your engines considerably easier than using transformer controls. Look for this symbol:

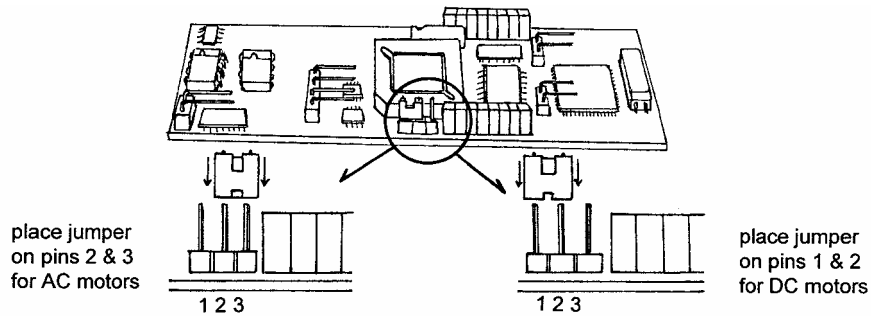


AC or DC Motor Operation

AC Universal motors are the type used in early Lionel locomotives and many, but not all, of the newer Lionel locomotives. AC motors are characterized by an additional winding called the field winding, and the motors are open frame (you can see the armature). Pulmore™ is a common name for them.

DC Can motors are the type used by Williams, Weaver, Right-Of-Way, Mike's Train House, 3rd Rail trains and some Lionel locomotives (such as the less expensive traditional engines and newer collector engines such as the MU's, the Alco PA's and Southern Mikado).

QS-3000 has a different way of measuring motor speed for AC Universal motors compared to DC Can motors. If the jumper is placed on the wrong pins, the electronics will not be harmed, but the chuff rate will not sound right and it will be very difficult to set a new rate.



The Back-up Battery

The battery keeps the sounds from shutting off abruptly and unrealistically when there are momentary interruptions in track power from dirty track or faulty switches.

Sounds usually continue for five to ten seconds after the transformer is turned off. This is normal. After about 15 seconds the battery power is shut off automatically. The computer and sounds will start up automatically when power is reapplied.

The battery is a rechargeable NiCad (Nickel Cadmium) which is continually charged from the track whenever the power is on. Unlike the old D batteries often used for older Lionel horns, NiCad batteries are dry batteries and should not leak or cause any damage to your locomotive. NiCad's last up to five years. The NiCad battery we use for QS-3000 is a special 7-cell, 8.4v battery, not the more common 6 cell, 7.2 volt. Using a fresh, standard 9 volt alkaline battery temporarily will not harm the system, and can be used while waiting for a replacement battery. But 9 volt alkaline batteries cannot be re-charged by QS-3000 and will run down. QSI and some specialty electronic parts stores carry replacement 7-cell NiCad batteries.

For more information on batteries, read the section about batteries in Appendix IV. If you decide to operate your engine without a battery for any reason, read the instructions in Appendix V first.

2 Starting Up

Remove all other engines from the powered track section. Place your QS-3000 equipped locomotive on the track and **turn the power on about halfway (below 10 volts)**. You will hear a triple "ding" telling you QS-3000 is up and running. You will also hear either steam compressor sounds, electric cooling fans or a diesel motor starting up.

The engine is in a special state called RESET. The engine always enters RESET after the power has been off three seconds (or more) and then turned on again.

Anytime you turn the power off, you will hear a time-out "ding" after three seconds have passed. When you turn the power back on after hearing the "ding," the engine is in RESET.

If the power is off for more than 15 seconds, the electronics automatically shut down completely. When you turn the power back on you will hear "ding, ding, ding." The engine is in RESET and the three "dings" tell you QS-3000 is up and running correctly. This is called a Hard RESET. Hard RESET is useful if the QS-3000 computer gets stuck and will not respond to commands. The Quick Exit Guide in Appendix I gives more commands you can use any time you have problems running QS-3000.

Leaving RESET

With The Throttle:

- Interrupt the power



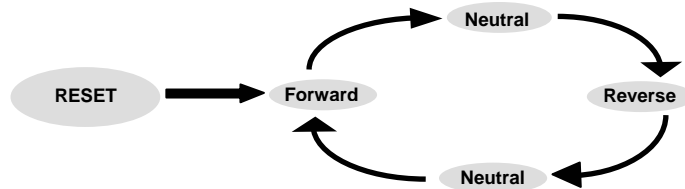
With The Direction Button:

- Turn the power to a *low* setting (below 10 volts)
- Press the direction button to interrupt the power



Changing Engine Direction

After interrupting the power, the engine leaves RESET and goes into forward. You are hearing the steam chuff, electric locomotive fans, turbine or diesel motor sounds of your engine. Increase or decrease engine speed as you like. Interrupt the power and the engine will sequence from forward to neutral, to reverse, to neutral, and then back to forward, just like engines with mechanical E-units.

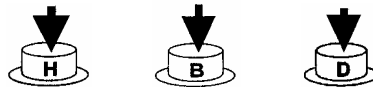


QS-3000 has five states. These include the four usual direction states (forward, neutral-then-reverse, reverse, neutral-then-forward), plus a special RESET state. When your engine is in RESET, you can change or program individual QS-3000 features using the throttle, horn and bell button. **Section 4** of this guide describes how to program features in RESET.

The Horn Button Has Many Uses

In addition to blowing the horn, the horn button also programs QS-3000 features in RESET and operates QS-3000 neutral sounds. These special uses will be described in the following sections. For now, blow the horn only when the engine is moving in forward and reverse, and not when the engine is in RESET.

What the Symbols Mean



Press the horn button...bell button...direction button



throttle up



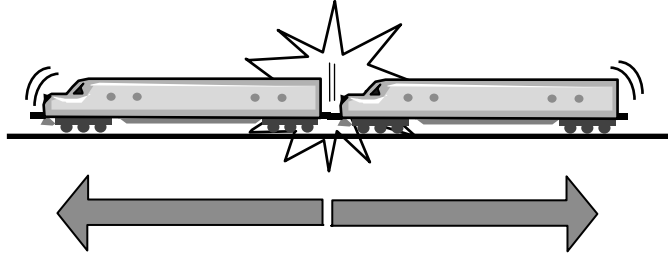
throttle down



interrupt the power



in RESET, go from high to low voltage

MORE:**Multiple-Heading and QSI Reverse Units**

Engines without QSI Reverse Units in multiple-headed trains tend to fight each other

Powered engines with e-units running together can easily go out of sequence with one another. For example, going across dirty track, one engine would sequence into neutral while the other engines stayed in forward. This caused a lot of wear and tear on all the engines.

Engines with QSI reverse units are easy to keep operating in sequence. First, QSI reverse units are designed to ignore quick power interrupts caused by dirty track or faulty switches. Once these engines are in sequence and working together, they stay that way. If the engines do manage to get out of sequence, simply **reset all the engines by turning the power off for three seconds or more and then turning the power back on**. All engines will come up in RESET. Now, when you interrupt the power, the engines will start out in forward and operate together.

Since QSI Reverse Units are designed to ignore short power interruptions, you need to interrupt the power deliberately to change direction.

3 Sound

This section explains how to operate all the different QS-3000 sounds. Many other sounds occur automatically when the engine is in neutral, forward or reverse. QS-3000 sounds are described in detail at the end of this section.

The engine can be programmed so many sounds work differently than described here. These different ways are noted, and described fully in **Section 5, RESET Feature Guide**.

Horn or Whistle

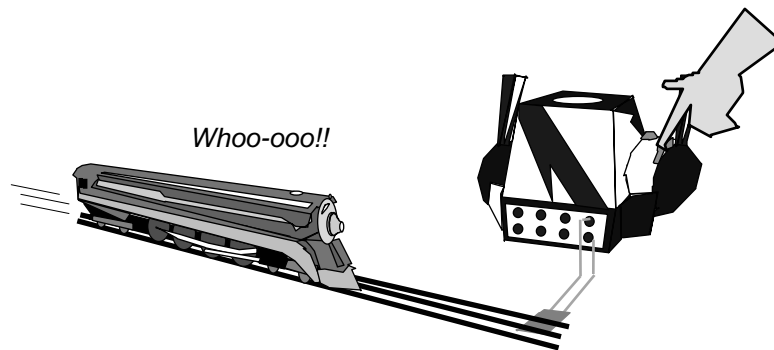
- **When the engine is in forward or reverse, blow the whistle or horn whenever you like**
- **When the engine is in neutral, first set the throttle to a low voltage, then blow the horn**



The throttle must be at low voltage because pressing the horn button in neutral with the throttle set at high voltage arms the coupler instead of blowing the horn.

Pressing the horn button when the engine is in RESET causes QS-3000 to perform special commands. The horn will not blow.

If the whistle or horn does not blow when you press the horn button, try pressing the button slowly and only halfway.



*Blow the horn or whistle any time in **forward or reverse***

Doppler Run-by

Doppler shift is that dramatic change in pitch you hear as a train goes by. With just a little practice, you will quickly learn where to begin the Doppler Run-by sequence so the pitch change happens at the exact point you want on your layout.

Doppler Run-by is an exclusive, QSI patented sound effect, designed to change with speed for greater realism. At high speed, the pitch change is very dramatic, from very high to very low. At low speeds, the pitch change is more moderate.

▶ To Hear Doppler Run-by

- **While the engine is moving, hold the horn button down for 3 seconds or more**
- **Release the Horn Button. Within 1 second *Reapply* the horn button**



The horn continues to blow as you release and reapply the horn button. The pitch change happens when you reapply the horn button. After the pitch change, you can:



Continue to press the horn button to hear the horn, *or*

Press the horn button quickly and repeatedly to hear a series of hoots, *or*

Release the horn button to turn off the horn.

- **To return to normal sounds, release the horn button for 3 seconds**
If the bell is ringing, it will stop automatically 2 seconds after the end of the Doppler Run-by sequence.

Bell

If your transformer does not have a bell button, wire an accessory bell button to the track, or wire SideKick II between your transformer and track.

You can program QS-3000 to turn the bell on and off using the horn button. See **Section 5: RESET Position #25, "Horn in Neutral."**

▶ To Hear the Bell

- **Press the Bell Button in forward, reverse or neutral**

Press the Bell Button again to stop the bell. If you put the engine in RESET while the bell is ringing, it will stop automatically.



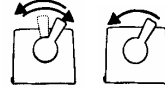
In RESET, the bell button operates some feature settings. These are described in Sections 5 and 6.

Coupler

QSI systems use a unique, patented method of controlling couplers by remote control, from the transformer. You can program QS-3000 to work the couplers in several different ways. See **Section 5: RESET Position #10, "Coupler."**

▶ To Arm the Coupler

- **Interrupt the power to put the engine in neutral**
- **Move the throttle to its *highest* voltage setting**



If you are using an electronic transformer, like an All-Trol, you may have to bring the throttle down a little from the very highest setting.

- **With the throttle still at the highest voltage setting, press and release the Horn Button**



You will hear the sound of the coupler drawbar lifting. The coupler is now armed and ready to fire.

Leave the engine in neutral or interrupt the power and run the engine in any direction. Change direction or enter and leave RESET as often as you like, and the coupler will stay armed.

▶ To Fire the Coupler

- **Press and release the Horn Button**



The coupler will fire. The horn will not blow.

You can press the horn button to fire the coupler in any direction. Pressing the horn button in RESET will not fire the coupler. The coupler will remain armed until you fire it, even if you enter and leave RESET. If the power is off for more than 15 seconds, and the computer shuts down, arm the coupler again.



▶ To Arm and Fire the Coupler with SideKick II

- **Make sure the boost voltage on the transformer is turned all the way up**
- **Put the engine in neutral**
- **Press the Boost Button**

- **While holding the Boost Button down, press the Horn Button**
You will hear the "clang" of the lift bar, telling you the coupler is armed.
- **Release the Horn Button, then release the Boost Button**
- **Leave the engine in neutral or interrupt the power and run the engine**
- **Press and release the Horn Button**

The coupler will fire.

Note: If you have trouble getting the coupler to fire when the engine is in neutral, press the boost button as you press the horn button. This extra power helps open the coupler.

Coupler Slack Action

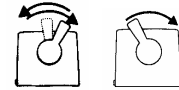
Coupler Slack Action sounds are heard when a train moves forward or backs up, and the couplers on the cars hit against each other.

These sounds are triggered using prototypical railroad horn signals. Two horn blasts are the warning signal given before an engine moves forward. Three blasts are the warning for an engine reversing.

► To Hear Coupler Slack Action

- **Put the engine in neutral**

Be sure the engine is not in RESET.



- **Move the throttle to a low setting**
- **Press the Horn Button:
two or three short horn blasts arms Slack Action**



Listen for a "pssht." Slack Action is now armed.

- **Change direction to forward or reverse, going dead slow**

As the engine slowly moves forward, listen to the coupler slack action sounds.



- **Turn up the speed to end Coupler Slack Action**



MORE:**QSI Coil Couplers**

If you install a QSI Single or Dual Coil Coupler Kit on your engines, the coupler (or couplers) will actually open when you fire them. You will be able to uncouple the engine anywhere on your layout, even on the fly, by remote control. Covered by a patent, and exclusive to QSI systems, only QSI offers you the ability to control couplers from your transformer.

The kits consist of a special coupler (or couplers), and a small circuit board that attaches with wires to the top QS-3000 board. The QSI coil coupler is similar in design to the Lionel electromagnetic coupler used in the late 1940's. In fact, if your engine has the Lionel coupler, connect it directly to the QSI Coil Coupler circuit board.

Dual couplers can be installed in any engine with QS-3000, including ProtoSound.

With a QSI Dual Coil Coupler Kit, both couplers can be operated by remote control. RESET Feature #10 lets you program how the two couplers work. Both couplers can be operational, or you can choose between the front or back coupler.

Once you install a Coil Coupler Kit, you can use the coupler in the following fun ways:

Uncoupling in neutral: This is the most prototypical way to uncouple cars from an engine. Pull to a gentle stop, leaving a slight tension in the drawbar. Pulling the slack out of the drawbar allows room for the knuckle to open. On the other hand, when pulling heavy trains, the tension can be so great that it binds the knuckle and prevents the coupler from opening. This is the same problem that prototype railroads have and they will adjust the pull on the drawbar to allow easy operation. So if the drawbar is pulled tight and the coupler will not open, try backing up a little to relieve the tension. Also, leave the throttle at the highest voltage. This sends more power to the coupler circuit.

If the engine is moving only a few cars, the coupler will probably open if the draw bar is not pulled tight. This allows you to position operating cars precisely in front of loaders and unloaders and uncouple the car. Again, it's best to leave the throttle at the highest setting when opening the coupler to provide the most power.

Uncoupling on the fly: After the QSI coupler is armed in neutral, the coupler can be fired in any direction. Three-rail operators are familiar with opening the coupler while the engine is moving as it passes over a remote control track section. The QSI coupler can also be operated while the engine is moving but a remote control track section is no longer needed. Once it's armed, the coupler can be opened anywhere on the layout by pressing the horn button.

When pulling cars, the drawbar will be pulled tight so the coupler knuckle should have room to open. When pulling heavy loads, the coupler may have too much tension and will not open. The QSI coupler circuit board stores energy in a capacitor to use when the throttle is at a low setting, but this may not be enough power if there is a lot of force on the drawbar. Running the engine at a higher throttle sometimes helps since it provides more power to the coupler circuit.

Pushing uncouple: Another way to use the QSI coupler is to open it while pushing cars and allowing them to coast onto a siding. This requires some skill and the right kind of engine and cars. The trick is to open the coupler at the same time you lower the throttle to slow the engine. This allows the cars to put tension in the drawbar and pull away from the engine. The cars should be easy rollers and the engine should have the ability to slow down faster than the cars. Prototype railroads use this technique quite often. The engineer controls the engine speed and the brakeman rides next to the engine coupler to open the knuckle at the right time. Since the model train operator needs to do both operations at the same time, it requires some quick thinking and fast reflexes, but the result is well worth the effort.

Contact QSI to order either the Single or Dual Coil Coupler Kit.

Brakes

The factory setting is for the brakes to always be on. You can program QS-3000 to operate the brakes only after they have been armed. See **Section 5: RESET Position #34, "Squealing Brakes."**

▶ To Hear the Brakes:

- **While the engine is running, turn the throttle up to a high speed**
- **Turn the throttle back down to bring the engine to a slow stop**



Listen to the squeal of the brakes as the engine comes to a stop.

Pull Cord

Trains have emergency pull cords so anyone can instantly stop the train. The pull cord for QS-3000 is the transformer direction button.

▶ To Use Pull Cord:

- **Run the engine at high speed**
- **Press and release the direction button**



The engine authentically screeches to a stop, and the sound effects begin.

Flange Sounds

As trains go around tight corners, the flanges on the wheels often squeal as they rub against the sides of the rails.

The factory setting for this sound effect is "Flanges Off." To hear the flange sound, go to **Section 5, RESET Feature #35**, and program your engine for "**Flanges Arm Enabled**" or "**Flanges Always.**"

Steam Cocks

- **Do a Hard RESET
or Keep the engine in neutral for more than 25 seconds**
- **Run the engine in forward or reverse**



Listen to the steam cock sounds as the engine starts out.

PFA (Passenger or Freight Announcement)

The factory setting for PFA is to arm and then operate each part of the PFA sequence. You can program QS-3000 to automatically go through the PFA sequence. See **Section 5: RESET Position #28, "PFA," Choice 4: Station Stop**

► To Arm PFA:

- **While the engine is running in forward or reverse, hold down the bell button for about three seconds**
- **Listen for a single "hoot"**
- **Release the bell button**



Turn the bell off any time by using the bell button.

You can continue to run the engine *in the same direction* as long as you like. The engine stays armed for PFA.

► To Hear PFA:

- **Bring the engine to a stop and interrupt the power to put the engine in neutral**

If the bell is on, it goes off automatically after about 3 seconds. The engine has entered PFA and the arrival announcement will begin. Stay here as long as you like.



- **Interrupt the power to move to the next part of the sequence**

You may hear two short air let-offs ("pssht, pssht"). The engine will not move. Listen to passengers arriving. Stay here as long as you like.



- **Interrupt the power to move to the next part of the sequence**

You may hear two short air let-offs ("pssht, pssht"). Listen to baggage handling sounds. Stay here as long as you like.



- **Interrupt the power to put the engine in forward or reverse**

Your engine will not move right away. If the engine has passenger station announcement, you will hear "All Abroad!" and the sounds of passenger car doors shutting.



The engine horn will "hoot" two times and the bell will come on.

After about 12 seconds, the engine will move out automatically. Turn the bell off any time. At about 20 seconds, the bell will shut off automatically and the PFA sequence is over.

Note: If you interrupt the power after first entering neutral, and before the announcements begin, PFA is canceled and the engine will move out. To leave PFA at any time in the sequence, turn off the power for three seconds and go into RESET. Interrupt the power and the train will run normally.

How to Use Horn Signals

With QS-3000, many sound effects are triggered with authentic railroad horn signal codes. The use of horn signal codes is patented by QSI and exclusive to QS-3000.

The actual meanings for these authentic railroad signals are given at the end of this section on sound, under **More: QS-3000 Sounds, Horn Signals**.

— = a long horn blast. Press the horn button for more than 2 seconds

● = a short horn blast. Press the horn button for less than 1½ seconds

Water Scoop

This is the sound of a steam tender filling itself from a trough between the rails.

▶ To Hear Water Scoop:

- Run the engine in forward
- Use this horn signal to hear Water Scoop:

— ● ● ●

Sounds for Engines in Neutral: Engine Maintenance

When a train is stopped, often a lot of activity is going on. The engine may be taking on fuel and water, or people may be doing maintenance. Eventually, the engine is shut down.

With QS-3000, these sound effects are triggered with authentic railroad horn signal codes while the engine is in neutral and the throttle is at a low setting.

— = a long horn blast. Press the horn button for more than 2 seconds

● = a short horn blast. Press the horn button for less than 1½ seconds

▶ To Hear Water Filling:

- **Be sure the engine is in neutral and not RESET**
- **Move the throttle to a low setting**
- **Use this horn signal: — ● ● ●**

▶ To Hear Fuel Loading:

The fuel loading sounds are timed to work with Lionel fueling stations (1955 Diesel Fueling Station #415, 1993 Illuminated Fueling Station #6-12835 and 1994-95 Illuminated Fueling Station #6-12877).

- **Be sure the engine is in neutral and not RESET**
- **Move the throttle to a low setting**
- **Use this horn signal: ● ● —**

▶ To Hear Lubrication and Maintenance:

- **Be sure the engine is in neutral and not RESET**
- **Move the throttle to a low setting**
- **Use this horn signal: ● —**

On Diesel engines, after hearing the fireman yell "OK, run 'er up," you can run the motor up and down with the throttle.

- **To continue, do not move the throttle for 5 seconds**

If the throttle is not moved for five seconds, the engineer says "That'll do it!" and the Lubrication and Maintenance sound effects continue.

▶ To Hear Engine Shut Down:

- **Be sure the engine is in neutral and not RESET**
- **Move the throttle to a low setting**
- **Use this horn signal: ● ● ● ●**

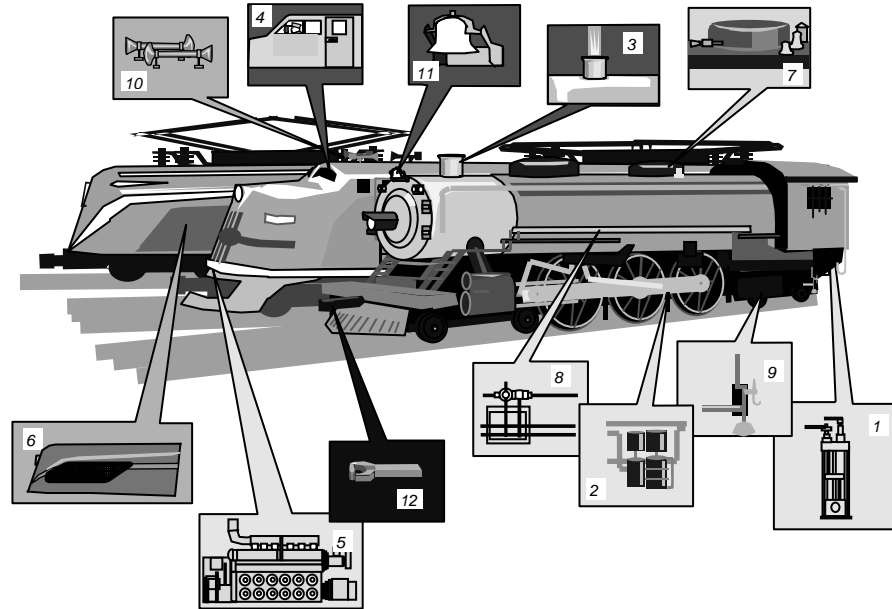
If the engine has an assigned ID number, the engine is automatically de-selected when Engine Shut Down ends and all sounds stop. The engine must be selected with its ID number before it will run again.

If the engine does not have an assigned ID number, after Engine Shut Down ends, the normal neutral sounds will start up. To actually shut the engine down, turn off the power at the end of the sound effect, after hearing "that's it" or "shutting down."

You can program QS-3000 so these neutral sounds work in the neutral that is before reverse only, instead of both neutral-before-reverse and neutral-before-forward. See **Section 5: RESET Position #51, "Horn Selected Neutral Features."**

MORE:**QS-3000 Sounds Described**

QS-3000 has many sounds that occur in forward, reverse and neutral either automatically or on command. This is a description of these sounds.

**Automatic Sounds in Neutral**

To hear these sounds, put the engine in neutral (not RESET) and wait for the sounds to occur. Since many of these sounds occur randomly, they will not necessarily happen in the same order or for the same length of time. Also the amount of time between each sound occurring is random and you may have to wait some time to hear each sound. With steam engines, these special neutral sounds will occur less frequently as time goes on, just like the real engines.

1. Air Let-Off: This sound occurs for steam, diesel and electric engines about 1 second after entering neutral and represents the final application of the brakes to be sure the engines is stopped. On prototype railroads, brakes are applied by releasing air from the air lines.

2. Diesel, Electric or Steam Air Pumps: After an air let-off, you will hear the diesel, electric or steam engine pumps start up to replenish the air lost from the air let-off. The pumps will sound continuously until the pressure is brought up and then will sound less and less often until the pressure reaches a maintenance level where only an occasional pump is heard. With diesels, since the diesel motor in the prototype drives the pumps, the pump sounds are heard along with the diesel motor sound. Electric pumps are powered electrically and are heard independently from any motor sounds. Steam pumps can be either compound with a double pump action sound, or simple with only a single pump sound. QS-3000 comes with two Steam Air Pumps on for double pump action, perfect with larger engines. With smaller engines, one pump can be turned off. The two Steam Air Pump sounds effects are the same, but the timing is different to give the double pump effect. Air Pump sounds are turned on or off in RESET Feature #9.

3. Electric Locomotive Cooling Fans: The electric traction motors get hot so all electric locomotives have cooling fans. These powerful fans can create so much draft that access panel doors cannot be opened. It is not surprising that these fans can easily be heard in idling engines. The fan volume can be changed in RESET Feature #6.

4. Diesel and Electric Cab Chatter: These are the sounds of radio transmissions between the engineer, dispatcher, switchman and hostlers. If you have ever been in a busy freight yard, cab chatter can often be heard right from the open windows of idling engines. With QS-3000 you will hear real radio messages recorded from actual train yards complete with radio squelch and beeps. Cab chatter occurs randomly. These sounds can be turned on or off in RESET Feature #25.

5. Diesel Low Idle in Neutral-Then-Reverse: This special low idle sound occurs after the engine has been in neutral-then-reverse for about 15 seconds and represents a special low idle condition for diesels. This more soothing sound is included to allow the operator to place his engine on a siding or to run different accessories without the distraction of the normal loud diesel motor sounds. If you want to hear the loud diesel motor idle sounds in neutral, put the engine in neutral-then-forward.

6. Steam Engine Hiss: An air draft for the fire box is normally created in a running engine when steam from the steam chest is vented through the smoke stack. This rush of steam pulls air through the fire box to maintain a healthy fire. When the engine is sitting idle on the tracks, the fire could go out because there is no air draft. This is why steam engines have steam "blowers" that can be turned on to vent steam continually through the smoke box to create the necessary draft in a stationary engine. The blower sounds like a continual steam hissing sound.

7. Steam Pop-Off Sounds: If a steam engine builds up too much pressure in the boiler, special pop-off valves on the top of the engine will release the excess pressure in a fury of steam and sound until the pressure is brought back to normal. This happens most often in neutral when the fire continues to build up steam but the engine is not using any of this steam energy to do its normal work. This sound has random lengths and comes on at random times.

8. Steam Water Injector: Steam engines need to replenish the water in the boiler that is lost as steam escapes through the smoke stack. Water injectors accelerate the water from the tender with steam pressure to a high rate of speed to overcome the elevated pressure in the boiler. QS-3000 water injectors sound like high-speed rushing water and steam with a distinctive valve shut off. This sound has random lengths and comes on at random times.

9. Steam Boiler Blow-Down: As water is evaporated into steam, mineral and other residues naturally in the water are left behind to settle to the bottom of the boiler. When the accumulation becomes large enough, the fireman will open a valve to vent this solid material through a large pipe under the side of the cab directly to the ground. QS-3000 blow-down sounds like water, steam hiss and solid material leaving a large pipe. This sound has random lengths and comes on at random times.

10. Steam Consuming Fuel: Steam engine sounds include the sound of the engine taking in either oil or coal. These sounds occur randomly when the engine is in neutral. With coal, some engines come with the sound of coal being shoveled into the firebox; others have the grinding noise of the coal auger delivering coal to the firebox. Steam engines loading oil include the sound of erratic hissing or sputtering as the oil is sprayed into the firebox.

User Operated Sounds in Neutral

11. Horn in Neutral: If the horn is set to operate in neutral (see RESET Feature #25), using the horn will not interrupt any other neutral sounds.

12. Bell in Neutral: If the horn is set to operate the bell in neutral (see RESET Feature #25), turning on the bell in neutral will not interrupt any of the other neutral sounds.

13. Coupler Sounds: QS-3000 uses two sounds to model the coupler opening. The first is the sound of the coupler pin chain being pulled taut as the coupler lift bar is being raised. This sound tells you the coupler is armed. The second sound, which happens when the coupler is fired, is a combination sound of the coupler pin being lifted, the knuckle opening and the air release of the brake lines as they part. Coupler Sounds are armed and fired following the directions in the first part of this Section. The coupler that operates is chosen in RESET Position #10.

14. Water Filling: On diesels, gas turbines and electrics, the filler nozzle connects to the filler pipe on the engine, and water rushes into the tank. When it's full, the filler cap is replaced.

On steam engines, the hatch on top of the tender is pulled open and the water pipe is swung into place. The wheel valve is opened and the water rushes into the tender. When the tender is full, the water valve is turned off, the waterspout is pushed back toward the water tower, and the hatch cover is lowered into place.

Water Filling is turned on with one long and three short horn blasts while the engine is in neutral (see Section 3: Sounds, "Sounds for Engines in Neutral" for complete directions).

15. Refueling: With diesels, electrics and gas turbine engines, a hose nozzle is inserted in the filler pipe after the cap is removed. As the fuel goes into the engine, a meter "ding" records the amount of fuel being loaded. Then the nozzle is removed and the cap replaced.

Steam engines come with oil or coal loads. **Oil:** The oil hatch is opened, the oil pump comes on, and then the oil rushes into the tender. After the oil is loaded, the hatch is closed. **Coal:** Coal is loaded into the open tender from a loading chute. The doors behind the engine cab are closed when the tender is full.

The refueling sounds are timed to work with Lionel fueling stations.

Refueling is turned on with two short and one long horn blast while the engine is in neutral (see Section 3: Sounds, "Sounds for Engines in Neutral" for complete directions).

16. Lubrication and Maintenance: With diesel engines, the engineer may discover one of the engines "isn't loading right" (or not pulling its fair share of the load). The fireman opens a hatch, the fans are turned off, and he checks out the problem. The engineer revs up the motor again, and when he stops, the fireman closes the hatch. Actually the operator controls the length of motor revving. See Section 3: Sound, "Sounds for Engines in Neutral" for complete directions.

A steam engine has large metal rods that connect the wheels to each other. Lubricating the rods is called "shooting the rods." Blue flags are placed on the sides of the engine, a warning that the engine is stopped. A pneumatic lubricator connected to the engine's airline is used to force lube, which comes in sticks, into the joints. After the rods on both sides of the engine are lubricated, the air hose is pulled off the airline, and the steam blow-down effect ends the maintenance.

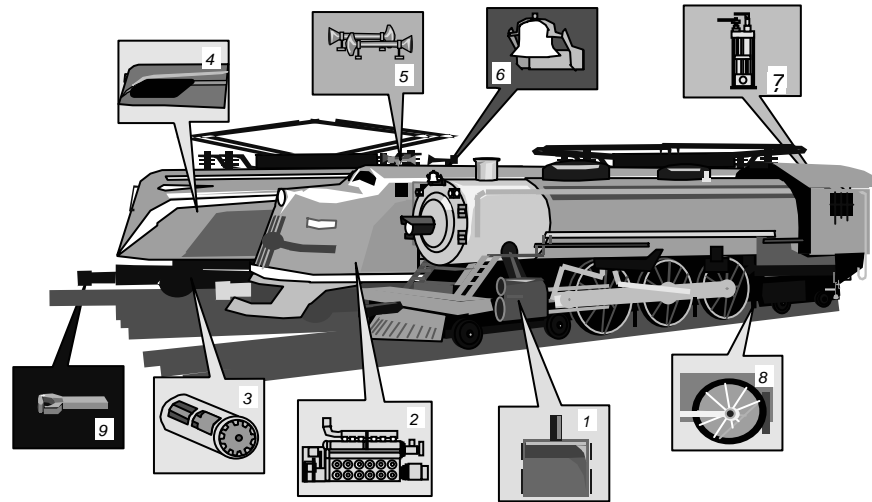
Lubrication and Maintenance is turned on with one short and one long horn blast while the engine is in neutral (see Section 3: Sounds, "Sounds for Engines in Neutral" for complete directions).

17. Engine Shut Down: Diesel, electrics and gas turbines begin engine shut down with the engineer announcing "we're going to tie them down here," meaning the engine will be shut down and locked up. A hatch is opened and closed, then the motor sounds end.

Steam engines take more work to shut down. First the engine is checked for leaks, then air release sounds show the turret valve and air pumps are being shut down. The blower shuts off, and steam is vented through the pop-off valves.

If the engine has an ID number, the engine is automatically de-selected (turned off), and must be selected again using its ID number before it will run. If the engine does not have an assigned ID number, the engine returns to normal neutral sounds and is ready to run after the Engine Shut Down effects are finished. To actually shut down the engine, turn off the power.

Engine Shut Down is turned on with four short horn blasts while the engine is in neutral (see Section 3: Sounds, "Sounds for Engines in Neutral" for complete directions).



Automatic Sounds in Forward and Reverse

1. Steam Chuff: When the QS-3000 equipped steam engine starts out, the chuff sounds are long with a slow trail off. This is typical for steam engines where steam is applied for the entire stroke of the steam piston to provide the most amount of starting force possible. After the engine starts moving, the engineer will increase the "cut off" which only allows steam into the steam chest for a portion of the piston stroke. This is more efficient but provides less low speed torque. In QS-3000 you will hear this effect as the engine gains speed.

Steam engines produce four chuffs per wheel revolution, which is close to what you will hear from your QS-3000 engine at low speeds. When you increase the speed, the chuff rate gradually shifts to two per wheel revolution. At high speed if the chuff stayed at four, the sound would become a blur. You can set the engine to have a faster chuff rate in Section 5, RESET Feature #27.

QS-3000 produces four distinct chuff sounds per revolution, which give the distinctive four chuff cadence familiar to most rail fans. A properly tuned prototype engine does not have this cadence and all chuffs sound very similar. Since most operating prototype engines were out of tune, we have included this familiar four chuff cadence in our sound system.

Mallet or compound locomotives have two steam engines mounted to a single engine body. The two engines have their individual sets of chuffs and can be heard to go gradually in and out of synchrony. This was usually due to one set of drivers not having as much weight over the axles so it would slip slightly. The QS-3000 sound system uses two sets of chuff sounds to model this effect and at low speeds you can hear the two engines change with respect to each other.

2. Steam Drift Chuff: When steam engines slow down, very little steam power is needed. Instead of opening the throttle, the engineer opens a drift valve, which allows a small amount of steam to enter the steam chest. The sound is almost wispy, very different from the normal chuff sounds. This sound can be turned on or off in RESET Feature #9.

3. Steam Cocks: Steam Cocks are opened on steam locomotives starting up from a dead stop. The distinctive sound comes from venting condensed water in the steam chest. Normal chuffing begins in a few seconds, after the steam chest is cleared. This sound can be turned on or off in RESET Feature #9.

4. Water Scoop Sounds: Both New York Central and Pennsy steam engines had a unique way to pick up water on the fly. A scoop would lower from the bottom of the tender to pick up water from a trough between the rails. An empty tender would fill in less than minute this way. The only way the engineer or fireman would know if the tender was full was to watch the water blow out of special overflow pipes on the side of the tender. When the engineer could no longer see the end of the train because of all the water shooting out, the tender was full.

5. Diesel Roar: Diesels also make different sounds as they start up or accelerate. QS-3000 equipped diesels are equipped with eight levels of diesel motor revving for the most prototypical sound. When the engine starts up, the diesel motor will rev up at a loud volume, which continues as the engine accelerates. After the engine reaches a steady speed, the revs drop to a constant roar at a slightly lower volume. If the throttle is again turned up, the diesel roar ramps up to a higher notch and then levels off again. If the throttle is turned down, the diesel roar drops slowly to one of the lower rev settings.

6. Diesel Turbo: Turbo appliances are used to improve the engine's horsepower by pumping air into the intake manifold under pressure. The power to activate the turbo motor comes from the engine exhaust pressure. The turbo sound is a high whine. All QS-3000 diesels come with turbo. This sound can be turned on or off in RESET Feature #9.

7. Electric Locomotive Traction Motors: Electric locomotives normally run quieter than diesels allowing the whine of the traction motor to be heard. When the engine starts out from a complete stop, you will hear the whine of this motor increase in RPM's until it fades out at a higher speed. You will hear the traction motors again as the engine comes to a stop. The traction motor sound is proportional to speed and not voltage. So if you change the throttle setting the motor whine will not change abruptly. Instead it will change only when the engine speeds up or slows down. The traction motor sound effect is quieter than most other sounds and will be easier to hear if the volume of the cooling fans is turned down (see RESET Feature #6).

8. Electric Locomotive Cooling Fans: Although there is no prime mover to keep cool (as there is with a diesel motor), electric locomotives nevertheless produce a lot of heat from the traction motors. Large fans are installed in these engines to force air across the motors to keep the temperature down when they are under load. The draft from these fans is so powerful that service hatches often cannot be opened without turning the fans off. In QS-3000 electric locomotives, you can hear the sound of these fans whenever the engine is running. The volume of the fan sounds can be turned down or off from RESET Feature #6.

9. Atmospheric Effects: If you listen to a real train running through the countryside, you may notice the sounds you hear varying in pitch. This is because wind and air currents, as well as trees and solid objects, cause the sounds to change. It's a subtle effect, but it adds the realistic sound variations that bring an engine to life. All the running and neutral sounds include Atmospheric Effects, adding a rich dimension to all QS-3000 sounds. Atmospheric Effects can be turned on or off in RESET Feature #24.

User Operated Sounds in Forward and Reverse

10. Diesel and Electric Locomotive Horns and Steam Whistles: QS-3000 uses actual recordings for our steam and diesel horns and whistles. When you press the horn or whistle button, QS-3000 starts with the beginning sound of the horn or whistle coming on, followed by a sustained loop of steady sounds, and then an ending sound effect that occurs immediately when you release the horn button. This amazing responsiveness from the QSI horn and whistle is a patented sound effect exclusive to QSI. If you press the horn button very briefly, only the beginning and ending sounds will occur. If you hold the horn button down for a long time, the horn will sound continuously until the button is released.

The number of chimes or tones characterizes both horn and whistle sounds. Larger steam engines usually have more chimes since they have the steam to spare. The multi-chime whistles usually have a deeper and richer sound. Small engines usually have whistles that are shriller with fewer chimes, and small switchers usually have only a single chime-piercing whistle.

Diesel horns can have any number of chimes regardless of the size of the locomotive. Usually, early engines (like the early EMD F units) have only one or two chimes. Modern engines usually have five chime horns.

11. Steam, Diesel and Electric Locomotive Bells: Diesel and Electric Locomotives usually have mechanically or pneumatically operated bells. These bells have a distinctively fast mechanical sound without much character. Steam bells, on the other hand, come in two types: mechanical or pull bells. The mechanical bell for steam is similar to diesel but usually has more presence since it is mounted up high on the locomotive. The pull bell has the most character as it swings back and forth, producing distinctively different sounds for each swing. The bell type depends on the type of engine and individual railroads. Most larger and newer steam engines have mechanical bells. Small switchers and older, lighter engines have pull bells.

12. Brake Sounds: Brakes on prototype engines are held in the off position by air pressure. In other words, unless the brake air lines are pumped up to a certain pressure, the brakes are always being applied. This is why there is a distinctive air release sound when the QS-3000 engine arms the brake sounds. After the brakes on prototypical engines are applied, there is often no squealing sound until the wheels almost stop. This is why QS-3000 brake sounds occur only when the engine has reached a low speed.

13. Wheel Flange Sounds: When trains enter a curve, the wheel flanges tend to ride up against and scrape the inside of the rails. This binding causes squealing and adds resistance to the pulling the train. Prototype railroads often add special lubricators to oil the flanges to reduce friction. You can create this squealing sound after programming the engine for RESET Feature #46, "Flanges Arm Enabled" or "Flanges Always."

14. Coupler Sounds: QS-3000 uses two sounds to model the coupler opening. The first is the sound of the coupler pin chain being pulled taut as the coupler lift bar is being raised. This sound only comes on in neutral, and tells you the coupler is armed. The second sound, which happens when the coupler is fired, is a combination sound of the coupler pin being lifted, the knuckle opening, and the air release of the brake lines as they come apart.

A new coupler sound effect has been added to QS-3000, called Coupler Slack Action. When a train pulls forward or goes into reverse, the couplers on all the cars bang into each other. Coupler Slack Action can be enabled or disabled in RESET Feature #30.

15. Doppler: Everyone instantly recognizes this sound. Doppler shift is the apparent change in signal frequency when the source is in motion compared to the observer. The air carrying the engine sounds actually compresses as the engine approaches, then stretches out as the train recedes. What you hear are the sounds from the engine getting higher and louder, then quickly changing to a much lower and softer sound as the train runs by. On QS-3000, QSI's exclusive, patented Doppler Run-By sounds respond to engine speed, resulting in stunningly realistic sound. Doppler Run-By can be enabled or disabled in RESET Feature #15.

Railroad Horn Signals

Engineers use long and short horn blasts to communicate over the roar of the engine or over long distances. QS-3000 uses authentic railroad horn signals to initiate many sound effects. This technique is patented by QSI and used only with QS-3000.

1 long, 3 short (Water Scoop in forward or reverse, Water Filling in neutral): A standard signal for the brakeman to protect the rear of the train. Since the train is stalled on the mainline while it takes on water, the rear would need to be protected.

2 short, 1 long (Fuel Loading): An answer to a flagman's stop signal. Imagine a flagman indicating to the engineer that the engine is properly placed to stop and take on fuel, and the engineer acknowledges with this signal.

1 short, 1 long (Lubrication and Maintenance): Tells the brakeman to inspect the brake lines for leaks or sticky brakes.

4 short (Engine Stop): The engineer is signaling for additional instructions. If none are given, the engine would shut down since the work day is over.

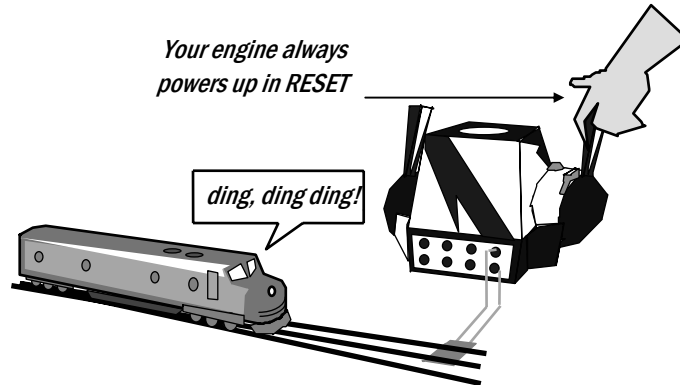
4

Reset Features

What is RESET

Special QS-3000 Commands Are Available In RESET

When it is in RESET, the engine is ready to accept programming instructions. These instructions include engine selection, turning sound effects on or off, volume settings, transformer type, steam chuff rate, and much more.



If you don't want to program any of the features, leave RESET by simply interrupting the power to put the engine in forward. After you leave RESET, your engine will operate normally in all directions (forward, neutral and reverse).

To enter RESET, turn off the power for three seconds or more, listen for the bell "ding," and turn the power back on.



"ding"

Note: Certain choices in RESET Features #5, #39 and #40 can change how you enter RESET. How to enter RESET in these special cases is described in Section 6, under the full description for these RESET Features.



The fast 3-second response is an exclusive, patented QSI design.

How to Select the RESET Feature You Want

Each RESET Feature is assigned a RESET Position number. You find a RESET Feature in QS-3000's computer by its RESET Position number. For example, if you want to change the chuff volume on your steam engine, go to RESET Position #6 to enter the Engine Volume RESET Feature.

The RESET Features are set up like a menu. Each RESET Feature has two or more choices. You select the RESET Feature you want by throttling to a high voltage (3/4 of the way up), then to a low voltage (1/4 of the way up), up and down, a set number of times. When you reach the RESET Position you want, you select your choice by pressing the horn button. Once you've made your choice, moving to a new RESET Feature or interrupting the power sets the choice you have made. Simple!

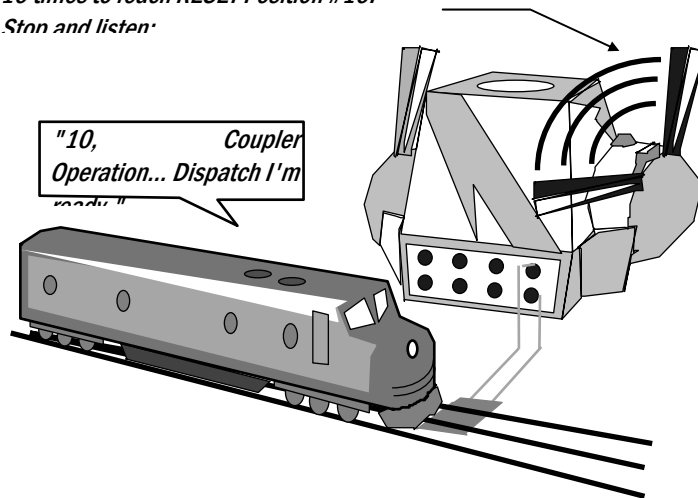
- **SELECT** the RESET Feature you want by moving the throttle up and down a certain number of times while the engine is in RESET
- **SELECT** the Choice you want by pressing the Horn Button
- **SET** the Choice you have made by moving to another RESET Feature, or interrupting the power and operating the engine

How to Locate RESET Positions

Each time you move the throttle up to high voltage and back down to a low voltage while you are in RESET, you will hear a "pssht" air let-off sound. Each time you hear "pssht" you know you have advanced one RESET Position. So the "pssht" sound helps you count.

When you stop moving the throttle, QS-3000 announces the RESET Feature you have entered by number and name. For example, if you have entered RESET Feature 10, you will hear "10, Coupler Operation...Dispatch I'm ready."

*Push the throttle up and down (but not off)
10 times to reach RESET Position #10.
Stop and listen.*



Step by Step Description of Moving through RESET Features

- **Put the engine in RESET**



Turn off the power and wait three seconds for the single "ding". Turn the power back on. You are now in RESET.

- **Push the throttle all the way up as far as it will go and back down to a low setting, *but not off***



You will hear a "pssht" sound from the air let-off, followed by the announcement "*1, Engine Select. Dispatch, I'm ready.*" You are now in RESET Position #1.

Note: If the throttle is turned down so low that the power goes off, the engine is no longer in RESET and will move. Just do another RESET and start again.

- **Again push the throttle all the way up and back down to a low setting**



You will hear the "pssht" sound, followed by the announcement "*2, Train Number Set. Dispatch, I'm ready.*" You are now in RESET Position #2.

Note: When you are using RESET Positions, the engine sounds automatically turn off after RESET Position #3 so you can hear the "pssht" sound more easily.

You do not have to listen to the announcement each time you enter a new RESET Position. Try moving the throttle up and down quickly, using the "pssht" to help you keep count. Then stop occasionally and listen to the announcement to see if you have counted correctly.

If you wish to return to an earlier RESET Position, do a RESET and start over.

Note: If you have problems using a Lionel Cab-1/PowerMaster™ to move through RESET Positions, see Appendix I, "Troubles in RESET," and Appendix VI, "Using the Lionel Cab-1/PowerMaster with QS-3000" for more information.



▶ To Select the RESET Feature You Want with SideKick II

- **Put engine in RESET**
- **Set the throttle to a low voltage (below 10 volts)**
- **Press the Select Button**

You will hear an air let-off "psst" sound each time you press the Select Button. If you do not hear this sound, the throttle is set too high or the HV terminal voltage is too low. Set the HV terminal voltage to 16-20 volts.

You can press the Select Button quickly and SideKick II will keep up. You'll find using the button much faster and more reliable compared to using the transformer throttle arm.

MORE:

Selecting RESET Positions with the Transformer Direction Button

Another way to rapidly advance through RESET Positions is to turn the throttle up to its highest setting and press the direction button *briefly* to interrupt the power. (QS-3000 is designed not to leave RESET at a high throttle setting, but be ready to turn down the throttle quickly in case the engine suddenly enters forward.) Use the "psst" sounds to count. Stop and listen to the announcements to check what position you have entered.

When you are ready to leave RESET, bring the throttle down about half-way (below 10v.). Then interrupt the power with the direction button for a direction change.

How to Set RESET Feature Choices

When the engine is in the RESET Position you want to change, move through the Choices using the horn button.

The first time you press the horn button, you will hear one or more "dings." These "dings" tell you the *current choice* for this Feature.

Example: Go to RESET Position #23. Press the horn button. If you hear two "dings," this Feature was set to have special cab chatter and steam engine sounds in neutral turned on. Press the horn button again, and you will hear one "ding." You have just turned these special sounds off. Run the engine, put the engine in neutral, and notice the sounds are off. Then return to RESET Position #23. Now when you press the horn button, you will hear one "ding," telling you this QS-3000 feature is set for the first choice, or in this case, the sounds turned off. Press the horn button again, and you will hear two "dings," and QS-3000 will cycle back to the second choice, which is diesel cab chatter or steam engine sounds on.

Note: With ID Numbers, Operation Clear, Engine Threshold and Rate, and Brakes Sound Threshold, the "dings" are used differently. These special cases are described under their RESET Feature names in **Section 5, the RESET Feature Guide**.

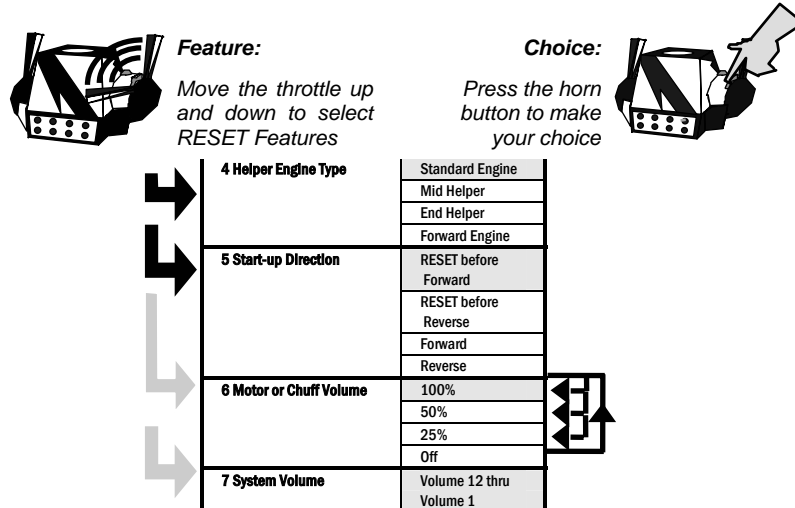
MORE:

Transformer Horn Buttons

Older Lionel horn buttons actually go through two positions when they are pressed, one at the half-way point, and the second when the button is pressed all the way down. Pressing the horn button in all the way sends lots of track power but the horn signal is weak, so the engine may not pick up the message you are trying to send it. Pressing the horn button in halfway sends a strong horn signal, so the engine responds to the command quickly. If you have problems operating RESET choices, experiment with pressing the horn button on your transformer halfway. If this doesn't help, consider adding a QSI SideKick II to your transformer. See Appendix I, "Troubles with Transformers," for more information.

A complete list of the RESET Features and Choices is in the Quick Start flip chart that came with QS-3000 and in Appendix III of this User Guide. Shaded squares show the factory settings.

To move from one RESET Position to the next, use the throttle. Once QS-3000 is in a RESET Feature, move from one choice box to the next by pressing the horn button.



For example, move the throttle up and down to advance to RESET Position #6. Use the horn button to choose the volume setting.

MORE:

How to Find Out Which RESET Feature Choice is Set

You can find out which choice is currently set for most RESET Features. (The exceptions are ID Number Features, Operation Clear in RESET Position #18, Brakes Sound Threshold in RESET Position #26, and Engine Threshold and Rate in RESET Position #27.)

- Do a RESET
- Go to the RESET Position you want to check
- Press and release the Horn Button
- Listen to the number of "dings"

One "ding" means QS-3000 is set for the first choice in that RESET Feature. Two "dings" mean it's set for the second choice and so on. You can change the setting by pressing the horn button. Or you can leave the RESET Feature without making any changes by interrupting the power.

5 RESET Feature Guide

In Order by RESET Position Number

The RESET Features are arranged with the ones used most frequently in low RESET Positions, and those used less frequently in higher Positions.

Feel free to use any of the Features that interest you, in any order you like. We suggest trying RESET Position #6, "Engine Volume" first. This RESET Position gives you a clear example of how RESET Features operate.

If you change several RESET Features, and discover you don't like the changes, you can always return QS-3000 to the factory settings by using RESET Position #18, Operation Clear. The directions for Operation Clear are also in the "Quick Exit Guide" in Appendix I of this User Guide.

RESET Positions That Have Been Changed

In QS-3000, the position of some RESET Features has changed compared to ProtoSound and earlier QSI designed systems. The chart below lists the features that have been moved.

RESET Feature	Original Position	New Position
Engine ID# Set	16	44
Road/Engine ID Clear	17	45
System Type	20	39
Diesel Warning Light Choices	30	58 and 59
Feedback in RESET	32	42
Factory Test	35	74
All De-Select	44	72
Squealing Brakes Enable	45	34
Flange Sounds Enable	46	35

Note: A RESET Feature choice is applied to all selected engines at the same time. If you assign ID numbers to the engines, you can select a single engine or group of engines and apply your new choice to them alone, even when all the engines are on the same powered track.

If you have not assigned ID numbers, use block control to power only the engine or group of engines you want to program.

#0: Train Select and All Select

Engines without assigned ID numbers are always selected and will come on in RESET Position #0.

Engines with assigned Train Numbers can be selected and run *individually* using this RESET Position. First assign each engine a Train Number in RESET Position #2.

Do not press the horn button in this RESET Position unless you want to select a specific engine.

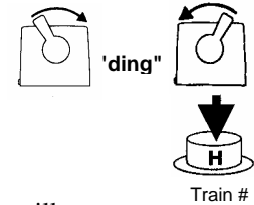
There is no factory setting for this RESET Position.

► To Select (Turn On) And Run Engines with Assigned Train Numbers

- **Do a RESET**

The engine is in RESET Position #0.

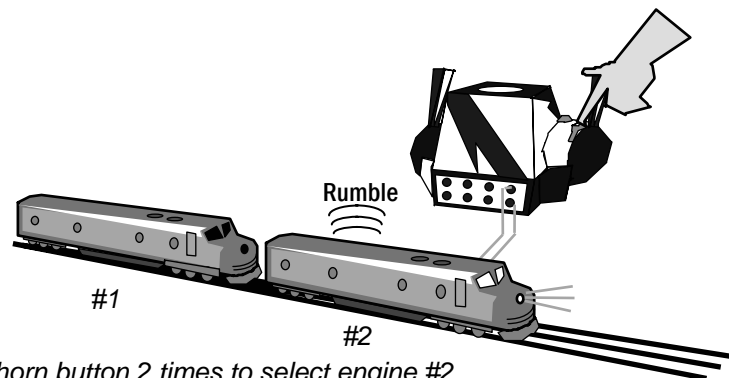
- **Press the Horn Button the number of times equal to the Train Number assigned to the engine you want to run**



Press the horn button, and any engine assigned that number will turn on.

Example: Press the horn button once. The engine assigned Train #1 is selected, and the start-up sounds come on. Press the horn button again, and Train #2 is selected while Train #1 is de-selected. Continue until you reach the engine you want.

When you interrupt the power to leave RESET and go into forward, the selected engine will operate while the other engines sit silent and motionless. You can operate all the sound and direction commands and only the selected engine will respond. Also, once you have selected an engine, you can change RESET Feature settings and only the selected engine will accept the change.



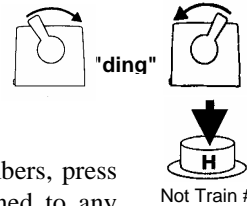
*Press horn button 2 times to select engine #2
Engine #1 is de-selected and turned off*

Note: When a diesel is selected, you will hear a short air let-off ("pssht"), followed by the engine motor starting and building up to a full idle. When a steam engine is selected, you will hear a short air let-off ("pssht"), and the sound of the air pump coming on.

► To De-Select (Turn Off) Selected Engines

- **Do a RESET**

- **While in RESET, press the Horn Button any number of times except the Train Number of the selected engine**



If you want to de-select all the engines with Train Numbers, press the horn button for a number that has not been assigned to any engine. You may want to save a low number for this purpose.

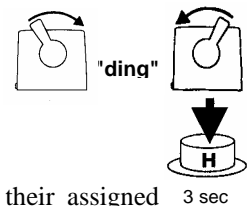
► All Select: Selecting and Running All Engines

Select all QSI equipped engines with assigned ID numbers without selecting them one at a time. With All-Select, you do not have to assign a common Train Number to all the engines being used in a multiple-headed consist. Also, if you forget an engine's Number, you can still select it using All Select.

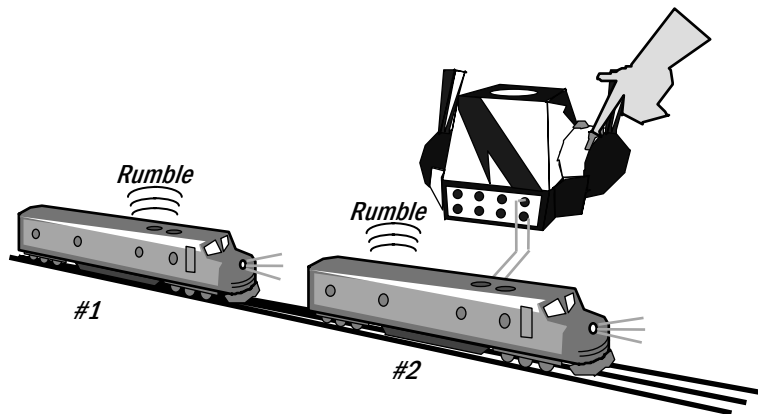
- **Do a RESET**

The engine is in RESET Position #0.

- **Press the Horn Button and hold it for three seconds**



All the QS-3000 engines are selected no matter what their assigned numbers are.



Hold the horn button down for 3 seconds to select all engines

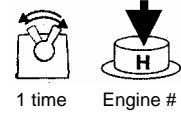
#1: Engine Select

To select and run one engine individually using this RESET Position, you must first assign it an Engine Number in RESET Position #44.

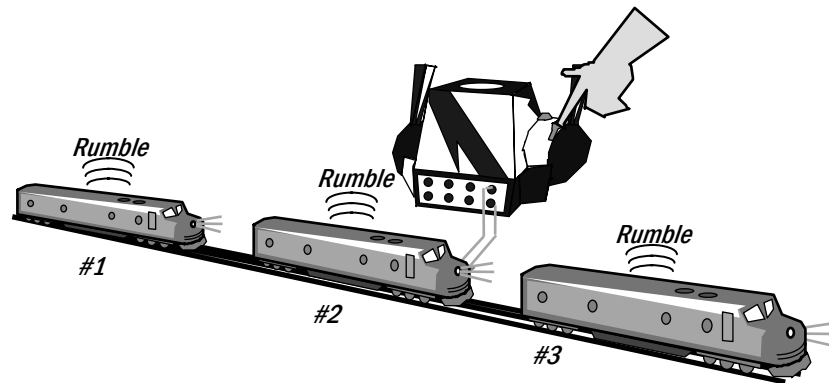
There is no factory setting for this RESET Position.

► To Select (Turn on) And Run A Locomotive Using an Engine Number

- Go to RESET Position #1
- Press the Horn Button the number of times equal to the Engine Number assigned to the engine you want to run



The selected engine will power up and the other engines will go silent. You can now run this engine anywhere on your layout and none of the other QS-3000 engines will respond.

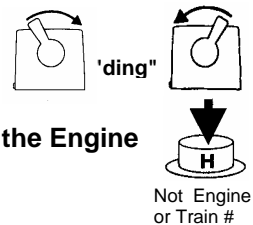


Note: When a diesel is selected, you will hear a short air let-off ("psht"), followed by the engine motor starting and building up to a full idle. When a steam engine is selected, you will hear a short air let-off ("psht"), and the sound of the air pump coming on.

▶ To De-select (Turn Off) Selected Engines

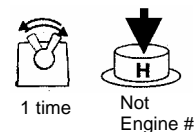
There are two ways to De-select selected engines:

- **Do a RESET**
- **While in RESET, press the Horn Button any number of times *except* the number of times for the Engine or Train Number assigned to the engine**



OR

- **Go to RESET Position #1**
- **Press the Horn Button any number of times *except* the number of times for the Engine Number assigned to the engine**



If you want to de-select all the engines with Engine Numbers, press the horn button for a number that has not been assigned to any engine. You might want to save a low number for this purpose.

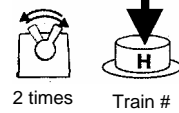
#2: Train Number Set

Train Numbers can be assigned and used by themselves or in combination with Engine Numbers. See **Section 6: "Independent Train Control"** for a complete description of using Train Numbers.

The factory setting is no Train Number assigned.

► To Set the Train Number on One or More Engines

- Place each engine, one at a time, on the powered track. Or select the engine using its assigned Engine Number
- Do a RESET and go to RESET Position #2
- Assign the Train Number by pressing the Horn Button the number of times equal to the number you want

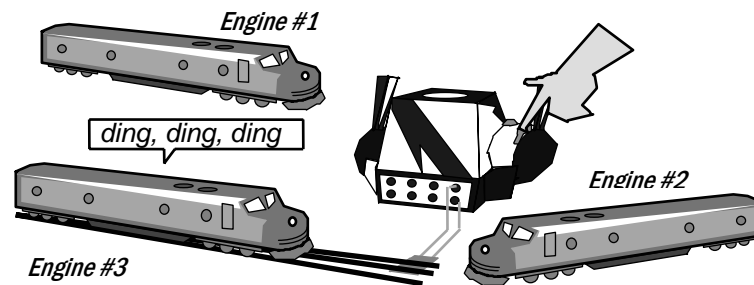


For example, if you want one engine to be Train #3, press the horn button three times.

After you have set the Train Number, the engine will still be on and in RESET. Interrupt the power to run the engine.

► To De-Select an Engine Using the Train Number

To de-select (turn off) this engine, do a RESET. The engine is in RESET Position #0, "Train Select and All Select." Press the horn button any number of times other than the assigned number. For example, if you want to de-select engine #3, do a RESET. Press the horn button any number of times except three. The engine assigned the number you press is selected and will run, while engine #3 remains silent and motionless.



Press horn button 3 times to set #3

► To Change the Engine's Train Number

- Go to RESET Position #2

Assign the new Train Number with the horn button as described above. You have just replaced the old number with a new number.

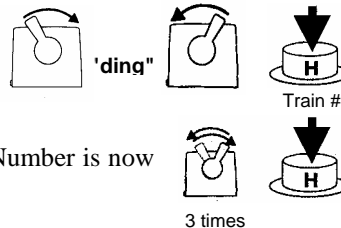
#3: Train Number Clear

This Feature clears Train Numbers only. It does not clear Engine Numbers.

There is no factory setting for this RESET Position.

▶ To Clear the Train Number

- **Do a RESET and select the engine**
- **Go to RESET Position #3**
- **Press and release the Horn Button**

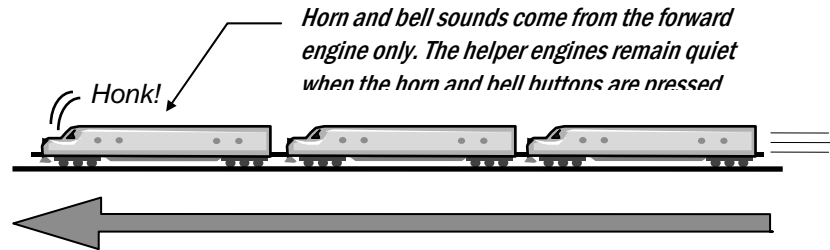


You will hear "diin-ng," telling you the Train Number is now clear.

#4: Helper Type

QS-3000 gives you a choice of two different helper engines plus a way to create a forward or lead engine.

Helper engines are used in multiple consists. When running a multiple-headed train, all the engines are powered, but only the forward or lead engine has a working horn and bell, cab chatter and warning lights.



Helper engines have air compressor, brake, motor, or steam sounds. The helper engine also responds to all direction changes with the forward or standard engine. But the helper's horn, bell, cab chatter and diesel warning light are turned off, and the couplers and PFA work differently depending on the kind of helper. When an engine becomes a helper engine, it automatically switches to enabled for QSM (QSI Station Master). In QSM, the helper engine follows the forward or standard engine through the PFA sequence, but the helper engine will not make an announcement. A helper engine will make the air let-off sound ("pssht") when it is armed for PFA.

Settings Changed by Helper Choices

Helper Setting	Horn/Bell	Cab Chatter	Warning Lights	Couplers	PFA (if not disabled)
Standard Engine	on	on	on	both on	enabled for PFA
Mid Helper Engine	off	off	off	both off	enabled for QSM
End Helper Engine	off	off	off	rear only	enabled for QSM
Forward Engine	on	on	on	front only	enabled for PFA

This table is for engines that start in Forward or RESET before Forward. If the engine is programmed to start in Reverse or RESET before Reverse, the coupler setting for the End Helper changes to front only, and for Forward Engine changes to rear only.

Standard Engine: The engine is *not* a helper or forward engine. All sounds and RESET Features affected by being a helper or forward engine return to their factory settings. The engine is ready to run normally.

Mid Helper Engine: The middle engine in a consist. Both couplers on a Mid Helper Engine are deactivated, so the consist cannot break up when you uncouple cars from other engines.

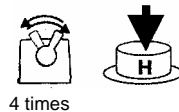
End Helper Engine: The engine at the end of a consist. The front coupler on a End Helper Engine is deactivated, but the rear coupler is enabled so cars can be uncoupled or added to the consist.

Forward Engine: The lead engine in a consist. All the sounds on a Forward engine operate. The rear coupler is disabled, so the consist stays together. The front coupler operates, so the train can move cars around or couple to another engine or consist.

The factory setting is "Standard."

► To Create a Forward or Helper Engine

- **Go to RESET Position #4**
- **Press the Horn Button**



4 times

Each time you press the horn button you will hear one to four "dings."

- 1 "ding" = Standard Engine
- 2 "dings" = Mid Helper Engine
- 3 "dings" = End Helper Engine
- 4 "dings" = Forward Engine

Note: The engine RESET Feature settings changed by becoming a helper can be reprogrammed. After the type of helper is chosen, go to the RESET Feature you want to change and make your choice.

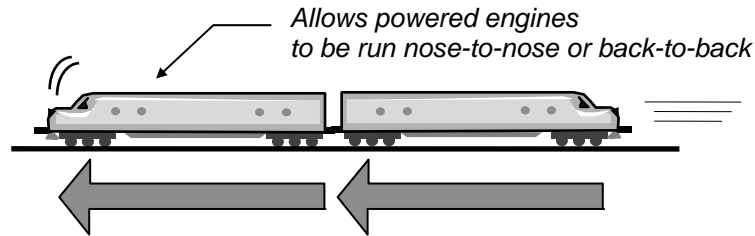
Example 1: Choosing helper turns off the diesel warning light. You can turn the warning light back on using RESET Position #8 and choosing "Diesel Warning Light On."

Example 2: If the announcement in your helper engine is the one you want to hear, enable PFA for the helper engine and enable QSM for the Forward engine in RESET Position #28. The helper engine will now make the announcement, and the Forward engine will be silent.

#5: Start-up Direction

By changing the Start-up Direction, you can program the engine to start up in Forward, like Lionel engines; or start up in RESET before Forward, like MTH engines.

There are two more options. Often, locomotives in multiple consists run back-to-back or nose-to-nose. The two engines must run together in the same direction, even though they are facing opposite ways. So program one engine to start up in Reverse or RESET before Reverse, and run multiple consists with either Lionel or MTH engines.



RESET before Forward (like MTH engines): After the power is off three seconds or more, and turned back on, the engine will be in RESET. Interrupt the power, and the engine will go forward.

RESET before Reverse: After the power is off three seconds or more, and turned back on, the engine will be in RESET. Interrupt the power, and the engine will go in reverse. Use this setting if you are running a multiple consist with MTH or QSI equipped engines and want the engine to run backwards compared to the other engines.

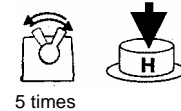
Forward (like Lionel engines): After the power is off for three seconds or more, and turned back on, the engine will immediately start out in forward.

Reverse: After the power is off for three seconds or more, and turned back on, the engine will immediately start out in reverse. Use this setting if you are running a multiple consist with Lionel engines and want the engine to run backwards compared to the other engines.

The factory setting is "RESET before Forward," like MTH engines.

► To Change Start-up Direction

- **Go to RESET Position #5**
- **Press the Horn Button**



Each time you press the horn button, you will hear one to four "dings."

- 1 "ding" = RESET before Forward (like MTH engines)
- 2 "dings" = RESET before Reverse
- 3 "dings" = Forward (like Lionel engines)
- 4 "dings" = Reverse

Starting out in Forward or Reverse presents a problem: how to enter RESET when the engine always starts running immediately? To enter RESET with these engines, follow the directions for Engine Unlock:

▶ **To Unlock Engines Starting in Forward or Reverse, and Go Into RESET**

- **While the engine is running, Press the Horn Button and release**
- **Within 1 second, turn off the power for about 3 seconds**



Listen for the "ding."



- **Turn the power back on**

The engine is now in RESET, and you can program the engine.

If you interrupt the power, the engine will start-up in Forward or Reverse again.

Unlocking the engine does not change the Start-up Direction choice you made.

Engine Unlock directions can also be found in the Quick Exit Guide at the beginning of Appendix I, or under "Solutions to Problems" in the Quick Start flip chart.

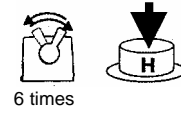
#6: Engine Volume

Use this RESET Feature to change the volume of the diesel motor, the steam chuff, the electric locomotive cooling fan and motor sounds, or the gas/steam turbine, without affecting the volume of the rest of the system. To change the volume of all engine sounds, including these sounds, go to **RESET Position #7**.

The factory setting has the volume at its loudest.

► To Adjust the Motor/Chuff/Fan/Turbine Volume

- **Go to RESET Position #6**
- **First press the Horn Button**



When you press the horn button, you will hear the current volume setting (your engine will not move).
Now you can change the volume setting.

- **To lower the volume, press the Horn Button**
- **To raise the volume, press the Bell Button**



There are four steps from the highest volume setting to the lowest, which is volume off. The volume changes as you press the bell or horn button.

Each time you press the horn button, the volume goes down one step. If you press the horn button after it reaches the lowest volume, the volume stays at that lowest setting.

Each time you press the bell button, the volume goes up one step. If you press the bell button after it reaches maximum volume, the volume stays at that highest setting.

Note: The horn button only lowers the volume. Without a bell button, you cannot raise the volume. The only way to return the volume to the highest setting without a bell button is to do an Operation Clear and return QS-3000 to the factory setting, which is the loudest volume. If you find yourself in this predicament see **Appendix 1: Quick Start, "Operation Clear"** for directions.

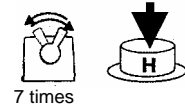
#7: System Volume

Use this RESET Feature to change the volume of all the sounds. To change the volume of the diesel motor, steam chuff or electric fan only, go to RESET #6.

The factory setting has the volume at its loudest.

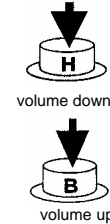
► To Adjust the System Volume

- **Go to RESET Position #7**
- **First press the Horn Button**



When you press the horn button, you will hear the current volume setting (your engine will not move). Now you can change the volume setting.

- **To lower the volume, press the Horn Button**
- **To raise the volume, press the Bell Button**



There are 8 steps from the highest volume setting to the lowest. The volume changes as you press the bell or horn button.

Each time you press the horn button, the volume goes down one step. If you press the horn button after it reaches the lowest volume, the volume stays at that lowest setting.

Each time you press the bell button, the volume goes up one step. If you press the bell button after it reaches maximum volume, the volume stays at that highest setting.

Note: The horn button only lowers the volume. Without a bell button, you cannot raise the volume. The only way to return the volume to the highest setting without a bell button is to do an Operation Clear and return QS-3000 to the factory setting, which is the loudest volume. If you find yourself in this predicament see **Appendix 1: Quick Start, "Operation Clear"** for directions.

#8: Engine Lights

This RESET Feature allows you to turn a diesel warning light on or off. You must have a QSI light kit connected to QS-3000 to use this feature. See **Appendix IV: System Description and Hardware Adjustments, "Connecting the Diesel Warning Light"** for more information on adding lights.

The factory setting for this feature is "On."

► To Change the Engine Lights

- **Go to RESET Position #8**
- **Press the Horn Button**



Each time you press the horn button you will hear one to three "dings."

8 times

1 "ding" = Diesel Warning Light On/Off

Press the bell button once to review the current setting.



Press the bell button again to change the setting (from on to off, or off to on).



You will hear a sound each time the bell button is pressed. The on sound is an electrical buzzing; the off sound is a tick, followed by a voice saying "off."

2 "dings" = Light 2 (for future use)

3 "dings" = Light 3 (for future use)

#9: Appliance

Appliances include turbo, vents, fans, air pumps and dynamic brakes. All appliance sounds come on or turn off automatically at appropriate times while the engine is running. In this RESET Feature, the sounds can be toggled on or off with the bell button.

Appliance sound effects are described in **Section 3: Sound, More, "QS-3000 Sounds."**

The factory setting for all appliances is "On"

► To Turn an Appliance On or Off

- **Go to RESET Position #9**
- **Press the Horn Button**



Each time you press the horn button you will hear one to four "dings."

9 times

Steam:

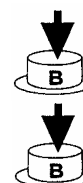
- 1 "ding" = Cocks Toggle*
- 2 "dings" = Drift Chuff Toggle
- 3 "dings" = Air Pump 1 Toggle
- 4 "dings" = Air Pump 2 Toggle

Diesel:

- 1 "ding" = Turbo Toggle
- 2 "dings" = Choice 2 (for future use)
- 3 "dings" = Air Pump Toggle

Electric:

- 1 "ding" = Fans Toggle
- 2 "dings" = Vents Toggle
- 3 "dings" = Air Pump Toggle



Press the bell button once to review the current setting.

Press the bell button again to change the setting (from on to off, or off to on).

You will hear a sound each time the bell button is pressed. The on sound is an electrical buzzing; the off sound is a tick, followed by a voice saying "off."

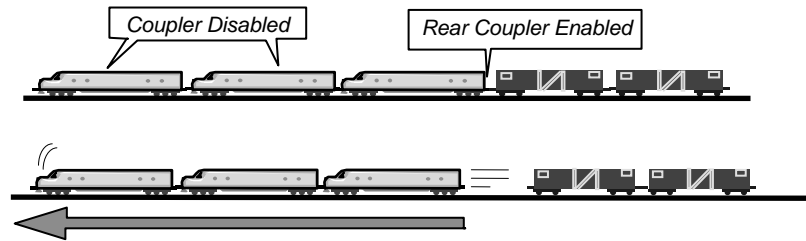
**Note:* After toggling Steam Cocks on, the sound effect will not start immediately. To hear Steam Cocks, interrupt the power, put the engine in neutral and wait 25 seconds; or do a Hard RESET. When power is re-applied and the engine starts to move, the Steam Cocks sound effect will come on.

#10: Coupler Enable

For the couplers to work, a Single or Dual Coil Coupler Kit must first be installed in your engine. If there is room for the small circuit board, Coil Coupler Kits can be added to all engines with QS-3000, including ProtoSound engines.

This RESET Feature gives you a number of ways to use the dual couplers on your engines. If your engine has a single coil coupler kit installed, you can use Choice 2, "Both Enabled"; or choice 5, "Rear Only Enabled."

Example: When running multiple-headed trains, you may want to disable the coupler on some engines. For example, you can leave the rear coupler operating on only the last engine in a multiple-headed train. Now you can uncouple the cars from the engine consist without uncoupling the engines from each other.



Both Disabled: The coupler or couplers will not work, and the coupler sounds are turned off.

Both Enabled: The coupler or couplers will work.

Trailing Arm Enabled: Instead of changing RESET Feature choices, engine direction determines which coupler will work. Trailing couplers and how they work are fully described on the next page.

Front Only Enabled: Only the front coupler will work when the coupler is armed and fired.

Rear Only Enabled: Only the rear coupler will work when the coupler is armed and fired.

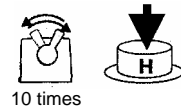
To operate the coupler, see **Section 3: Sound, "Coupler."**

The factory setting for this feature is "Both Enabled."

► To Enable or Disable the Coupler

- **Go to RESET Position #10**
- **Press the Horn Button**

Each time you press the horn button you will hear one to five "dings."



10 times

- 1 "ding" = Both Disabled
- 2 "dings" = Both Enabled
- 3 "dings" = Trailing Arm Enabled
- 4 "dings" = Front Only Enabled
- 5 "dings" = Rear Only Enabled

Note: When you arm and fire both couplers, the available electrical power to operate the couplers is split between the front and rear couplers. You may not have sufficient power to open the knuckles against the drag of a long train. See **Section 3: Sounds, More, "Coil Couplers"** for solutions to this problem.

A Trailing Coupler and How It is Used

In "Trailing Arm Enabled," engine direction determines which coupler will work.

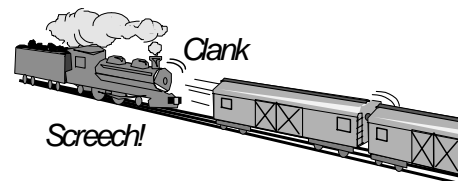
The trailing coupler is either the front or rear coupler, depending on which direction the engine *was* traveling. For example, the trailing coupler on an engine that was going forward, and is now in neutral, is the rear coupler. The trailing coupler on an engine that was going in reverse, and is now in neutral, is the front coupler. (The rear coupler is at the back of an engine. On steam engines the rear coupler is on the tender, and on most diesels it is at the hood end of the body. The front coupler is at the nose of an engine. On diesels the front coupler is at the cab end, and on steam engines it is at the boiler end.)

Example: Say you want to arm and fire the rear coupler on the engine. Run the engine in *forward*, stop, and put the engine in neutral. When you arm the coupler, only the *rear* coupler will accept the command and only the rear coupler will fire.

Now run the engine in *reverse*, stop, and put the engine in neutral. Now the trailing coupler is the front coupler. When you arm the coupler, only the *front* coupler will accept the command and only the front coupler will fire.

There are advantages to being able to quickly choose the coupler you want. With most engines, rear couplers are used the most. But some engines, like switchers, change between using front and rear couplers frequently.

When using trailing couplers, you can arm the front coupler, push the train, and open the coupler as you slow down, to allow the cars to coast onto a siding. Then quickly switch to the rear coupler to pick up another group of waiting cars.



Also, with trailing couplers, all the firing power goes to the coupler you have armed, which makes the coupler more likely to open when pulling long trains.

#11: Automatic Operation

QS-3000 engines can operate automatically with a variety of sounds and behaviors. There are three different automatic operation programs.

Grade Crossing or Milk Run: Gives your layout extra drama when used with a train on a closed loop of track.

Display Box: You operate the engine normally, but the motor doesn't work, so the engine is motionless (perfect when demonstrating QS-3000 sounds with an engine in a display box!).

Sales Demo: The engine does not move, and it automatically goes through a demo of all its sounds.

After selecting a program, interrupt the power and the engine will operate on its own.

The factory setting is for "Normal Operation."

► To Put An Engine In Automatic Operation

- **Go to RESET Position #11**
- **Press the Horn Button**

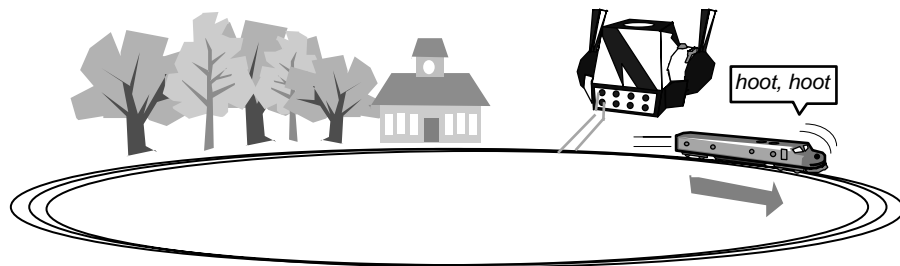


11 times

Each time you press the horn button you will hear one to five "dings".

- 1 "ding" = Normal Operation
- 2 "dings" = Grade Crossing
- 3 "dings" = Display Box
- 4 "dings" = Milk Run
- 5 "dings" = Sales Demo

- **Interrupt the power to start the engine in automatic operation**



▶ To Change Demos

- **Do a RESET and go to RESET Position #11**



- **Press the Horn Button**

Each time you press the horn button, you will hear one to five "dings."

11 times

Choose the number corresponding to the demo you want to hear.

- **Interrupt the Power**



The new demo will begin.

▶ To End Automatic Operation and Return to Normal Operation

- **Do a RESET and go to RESET Position #11**



- **Press the Horn Button until you hear only one bell "ding"**

11 times

"ding"

- **Interrupt the Power**



Your engine will operate normally.

#14: High Speed Horn

Some big steam engines, like the PRR Articulated and Gs-4, use both whistles and horns. The prototype engines used the whistle when the train was going slow, and the horn when the train was running fast.

Whistle Only: Press the horn button and only the whistle blows, regardless of engine speed.

Horn Only: Press the horn button and only the horn blows, regardless of speed.

Both: Press the horn button at slow speed, and the whistle blows. Press the horn button at high speed, and the horn blows.

The factory setting is "Both."

▶ To Change the Whistle/Horn Options:

- **Go to RESET Position #14**
- **Press the Horn Button**



Each time you press the horn button you will hear one to three "dings."

- 1 "ding" = Whistle Only
- 2 "dings" = Horn Only
- 3 "dings" = Both

#15: Doppler Run-by

Doppler is that change in pitch you hear when an engine runs by in front of you.

To operate this feature, see **Section 3: Sound, "Doppler Run-by."**

The factory setting is "Enabled."

▶ To Enable or Disable Doppler Run-by:

- **Go to RESET Position #15**
- **Press the Horn Button**



15 times

Each time you press the horn button you will hear one or two "dings."

1 "ding" = Disabled

2 "dings" = Enabled

#18: Operation Clear

The first choice in this RESET Feature returns Features 4-17 to their factory settings. The second choice returns Features 19-50 to their factory settings. The third choice returns Features 51-74 to their factory settings.

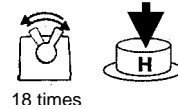
The features are cleared in order. For example, to clear 51-74, first 4-17 and then 19-50 are cleared.

Train and Engine Numbers are not affected by Operation Clear. Train Numbers are cleared using RESET Position #3 and Engine Numbers are cleared using RESET Position #45.

There is no factory setting for Operation Clear.

► To Do An Operation Clear

- **Go to RESET Position #18**



- **Press and release the Horn Button**

You will hear "riiing." RESET Features 4-17 are now clear.

You can interrupt the power to leave this RESET Feature and return to normal operation, or you can continue clearing Features by going on to the next step.

- **Press and release the Horn Button again**



You will hear "riiing, riiing." RESET Features 19-50 are now clear. If the throttle is at a low enough setting, you will also hear two air let-off "pssht, pssht" sounds telling you the transformer has been identified.

You can interrupt the power to leave this RESET Feature and return to normal operation, or you can continue clearing Features by going on to the next step.

- **Press and release the Horn Button again**



You will hear "riiing, riiing, riiing." RESET Features 51-74 are now clear.

If you press the horn button again, you will hear a "ding" but nothing more will happen.

#19: Transformer Type

In Auto-Select, the factory setting, QS-3000 automatically identifies the transformer being used when the engine is powered up. If you use one transformer exclusively, you can assign QS-3000 to that transformer.

Popular transformers are listed below. Transformers not listed here can still be assigned under one of the listed transformers. See **Appendix II, "Connecting Transformer and Horn/Bell Controllers to Your Track"** for a list of approved transformers and the transformer choice QSI recommends.

If you use a transformer different from the one you chose in this RESET Feature, you may notice erratic horn or bell button operation, irregular chuffing, or difficulty moving through RESET Positions. If this happens, return to this RESET Position and choose "Auto Select," or choose the correct transformer type from the five possibilities.

MTH Z-4000™ cannot be Auto Selected. If you are using a Z-4000, you will get the best performance by assigning QS-3000 to Choice 6, "Z-4000."

The factory setting is "Auto Select."

► To Identify the Transformer Type

- **Go to RESET Position #19**
- **Press the Horn Button**



19 times

The first time you press the horn button you will hear either two to seven horn blasts or two to seven "dings."

If QS-3000 is in Auto Select, the horn blasts tell you which transformer QS-3000 chose the last time it identified the transformer.

If you hear two blasts, QS-3000 made choice #2, which is a ZW Type
(includes Dallee®)

If you hear three blasts, QS-3000 made choice #3 which is a Lionel® Cab-1® transformer

If you hear four blasts, QS-3000 made choice #4, which is MRC™
(includes All-Trol™)

If you hear five blasts, QS-3000 made choice #5, which is RS-1

If you do not hear horn blasts, you are not in Auto Select. Instead, you will hear bell "dings," telling you which transformer type you assigned to QS-3000 the last time you were in this RESET Position.

► To Choose the Transformer Type

To choose a transformer other than Auto-Select, press the horn button again to cycle through the choices until you reach the transformer type you want.

The choices are:

1 "ding" = Auto Select

2 "dings" = ZW Type

Includes Lionel Standard transformers, like the KW, 1033, etc.; and Dallee

3 "dings" = Cab-1

4 "dings" = MRC

Includes All Trol

5 "dings" = RS-1

6 "dings" = MTH® Z-4000™

7 "dings" = Train America™ UCUB™

If you choose a transformer other than Auto Select, the new transformer choice becomes effective when you leave RESET.

Note: Z-4000 and UCUB cannot be detected in Auto Select. For the best performance, set the transformer type in this RESET Feature when using these products.

UCUB is automatically selected when System Type 5 is selected in RESET Position #39, "System Type." Since System Type 5 must be selected to operate UCUB, program your engine in RESET Position #39 and allow QS-3000 to program this RESET Feature for you.

More:**About Auto Select**

At full throttle settings, all transformer types have a similar type of track voltage waveform, called a sine wave. Depending on how each of the transformers control track power, the voltage waveforms all look different at lower throttle settings. It is at these lower voltages that QS-3000 can distinguish the different types of transformers and make its selection. This is why you need to lower the throttle before you leave RESET so QS-3000 can identify the transformer.

To get the best performance in "Auto Select," QS-3000 identifies the transformer, monitors the waveform going to the track, and adjusts to the waveform it is receiving. It does all this in less than a second. When the engine is in RESET and you lower the throttle, the double air let-off "pssht, pssht" sound tells you QS-3000 has identified the transformer.

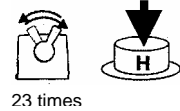
#23: Automatic Neutral Sounds

This feature turns special neutral sounds on or off. Diesel, electric and gas turbine engines come with fan sounds and actual recordings of radio Cab Chatter between a dispatcher and the engine crew. Cab Chatter occurs randomly when the engine is in neutral. Steam engines have special sounds in neutral, including blow-down, fuel sounds, pop-off and injector sounds.

The factory setting is sounds "Enabled."

► To Enable or Disable Automatic Neutral Sounds

- **Go to RESET Position #23**
- **Press the Horn Button**



Each time you press the horn button you will hear one or two "dings."

1 "ding" = Disabled

2 "dings" = Enabled

#24: Atmospheric Effects

As you listen to a train running through the countryside, you may notice the sounds you hear vary in pitch. This is because wind and air currents, as well as trees and solid objects, cause the sounds to change. It's a subtle effect, but it adds tremendous realism to all the neutral and running sounds of QS-3000.

The factory setting is Atmospheric Effects "Enabled."

▶ To Enable or Disable Atmospheric Effects

- **Go to RESET Position #24**
- **Press the Horn Button**



24 times

Each time you press the horn button you will hear one or two "dings."

1 "ding" = Disabled

2 "dings" = Enabled

#25: Horn In Neutral

With QS-3000, having a bell button is highly recommended. A bell button makes operating some sound effects much easier, and is required to program some engine sound effects, as well as Engine or System Volume. However, you can use the horn button to operate the bell and PFA if necessary.

Enabled: If you have a bell button, set QS-3000 to "Enabled." Now you can blow the diesel horn or steam whistle in neutral as well as forward and reverse. When you blow the horn in neutral, be sure the throttle is at a low voltage (below 10volts). Blowing the horn in neutral at a high voltage arms the coupler.

Disabled: If your transformer does not have a bell button, programming this RESET Feature to "Disabled" lets you use the horn button to turn the bell on or off and arm PFA when the engine is in neutral. To operate the bell and PFA with the horn button, see the instructions below.

The factory setting is "Enabled."

► To Enable or Disable the Horn in Neutral

- **Go to RESET Position #25**
- **Press the Horn Button**



Each time you press the horn button you will hear one or two "dings".

25 times

1 "ding" = Disabled

2 "dings" = Enabled

► To Turn the Bell On or Off with the Horn Button

If your transformer does not have a bell button, choose "Disabled." Leave RESET and run the engine. When you want to ring the bell, do this:

- **Interrupt the power until the engine is in neutral**

Be sure the engine is not in RESET.

- **Put the throttle at a low voltage setting (below 10volts)**
- **Press and release the Horn Button**

The bell will stay on in all directions.



- **To turn the bell off, interrupt the power to put the engine in neutral again**
- **Put the throttle at a *low* voltage setting (below 10v.)**
- **Press and release the Horn Button**



In other words, each time you press the horn button when you are in neutral and the throttle is at a low setting, you will toggle the bell.

After pressing the horn button, the bell may continue to ring for a few seconds before stopping; this is normal.

► **To Enter PFA with the Horn Button**

If your transformer does not have a bell button, choose "Disabled" in this RESET Feature. Leave RESET and run the engine. When you want to arm the engine for PFA, do this:

- **Interrupt the power until the engine is in neutral**
- **Put the throttle at a *low* voltage setting (below 10volts)**
- **Press the Horn Button for at least 3 seconds**



Be sure the engine is not in RESET.

The bell will come on and you will hear a horn blast.

- **Release the Horn Button**

Turn off the bell button if you like. The engine is armed for PFA. You can continue to run the engine *in the same direction* as long as you like.

3 sec

To hear the PFA announcement, follow the instructions under **Section 3: Sounds, PFA, "To Hear PFA."**

#26: Brakes Sound Threshold

If the brake sounds do not come on soon enough, or come on too late, you can change the point where the brake sounds begin. **Brakes Sound Threshold is the speed the engine has to exceed before the brakes will trigger the next time the engine slows down.**

Each engine's electric motor and gearing is different, and each type of transformer applies power to the engine differently. QS-3000 is designed to give excellent brake sounds under a wide range of conditions. However, you can adjust the threshold to suit your locomotive.

Changing #27 Engine Threshold and Rate will affect the brake threshold, so if you plan to change the Engine Threshold and Rate, make that adjustment first.

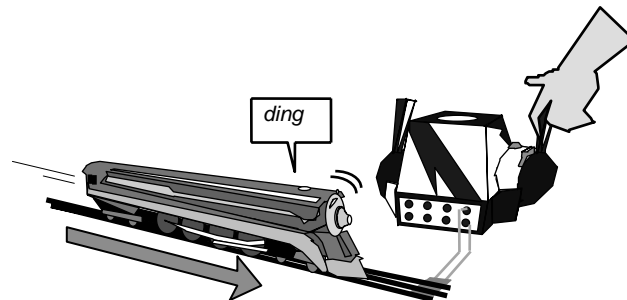
The QSI Brakes Sound Threshold changes depending on the transformer QS-3000 identifies during RESET. QS-3000 will remember settings for individual transformers, either in Auto Select or under individual transformer types. But to be sure the new setting is stored under your particular transformer in QS-3000's memory, wait until the transformer is Auto Selected (the first time you bring the throttle to a low setting after the power has been off, you will hear "pssht, pssht" as QS-3000 selects the transformer). Or lock in the transformer you are using in RESET Position #19 before setting the Brake Sound Threshold.

► To Set the Brakes Sound Threshold

- Go to RESET Position #26 and leave the throttle at a low setting
- Press and release the Horn Button



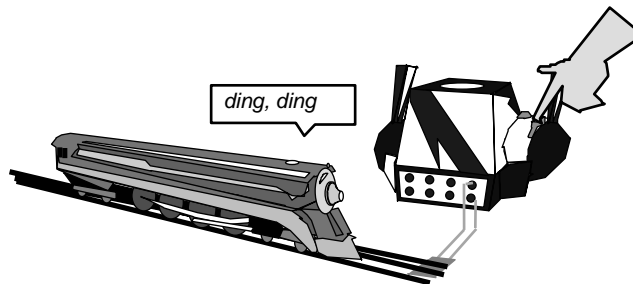
You will hear a "ding." The engine will start to move out in forward.



- **Run the engines at the speed where you want to first hear the brakes (probably a slow speed)**
- **Press and release the Horn Button again**



You will hear two "dings." The brake trigger, which is the speed where the brake sound first comes on, is locked in.



Press the horn button to set the trigger

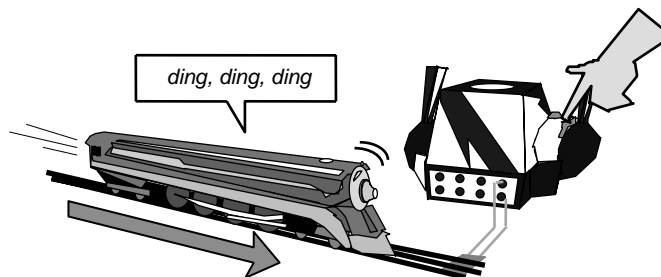
- **Turn up the throttle to the speed where you want the brakes to arm (the threshold)**
- **Press and release the Horn Button**



You will hear three "dings." The threshold setting is locked in.

To review the setting, run the engine faster than the threshold speed, then slow down and listen to the brakes.

If you interrupt the power, the engine will not change direction. If you decide to turn the power off, do not leave it off for more than a few seconds (see the Note below).

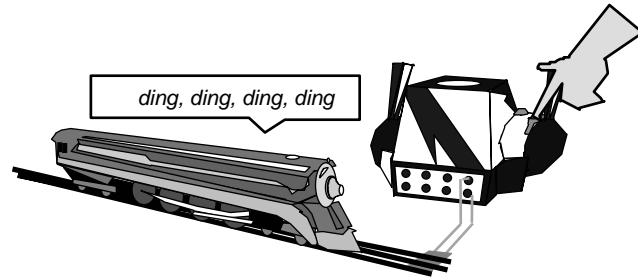


Press the horn button again to set the threshold

- **Press and release the Horn Button to stop the engine**



You will hear four "dings." The engine will stop. If you liked the settings you heard, lock the settings in by moving to the next RESET Feature, or interrupting the power and leaving RESET. If you did not like the settings, press the horn button again. You will hear one "ding" and you can now start over with the first setting.



Press the horn button to stop engine

Note: If you decide to leave this RESET Position before completing the setting changes, do a Hard RESET: turn the power off for 15 seconds or more, then power up again. The engine will return to the original settings.

#27: Engine Threshold and Rate

Steam Engine Threshold is the throttle setting at which the steam engine begins to chuff. Rate is the number of chuffs per revolution of the wheels.

The directions for setting the Steam Engine Threshold and Rate work with steam, steam turbine, and electric engines. With electric engines, threshold is the point at which the motor whine begins, and rate is the point at which the motor whine is about half speed.

Diesel Engine Threshold is the throttle setting at which the diesel engine begins to rev up.

Use the directions for setting the Diesel Engine Threshold with diesel and gas turbine engines.

Each engine's electric motor and gearing is different, and each type of transformer applies power to the engine differently. QS-3000 is designed to give excellent chuff and motor sounds under a wide range of conditions. However, you can adjust the threshold and rate to suit your locomotive.

The Engine Threshold and Rate change depending on the transformer QS-3000 identifies during RESET. QS-3000 will remember settings for individual transformers, either in Auto Select or under individual transformer types. But to be sure the new setting is stored under your particular transformer in QS-3000's memory, wait until the transformer is Auto Selected (the first time you bring the throttle to a low setting after the power has been off, you will hear "pssht, pssht" as QS-3000 selects the transformer). Or lock in the transformer you are using in RESET Position #19 before setting the Threshold and Rate.

Note: While setting the threshold and rate, all sounds are automatically turned off. The chuff or motor sounds will come on when you review the new settings, and all sounds will return to normal as soon as you leave this RESET Feature.

MORE:

QS-3000 Eliminates Cams

Normally model railroad locomotives use a mechanical cam to detect how fast the wheel is rotating. For steam engines, this information is translated into a chuff sound that synchronizes with the speed of the locomotive. Adding a cam to an engine requires modifying the engine, an expensive and often difficult process. And cams lock your engines into a specific number of chuffs per wheel revolution, regardless of speed. QS-3000 is designed to electrically detect engine speed directly from the electric motor. This method of measuring speed from the motor allows the chuffs per wheel revolution to vary depending on speed. At slow speeds the number of chuffs is set at a realistic four chuffs per wheel revolution. But the chuffs gradually decrease to about two per wheel revolution as the engine runs faster. This is ideal for three-rail engines, whose top speed is unrealistically high. If the chuff rate did not decrease, the chuff sounds would blur into a single sound.

1. Setting the Steam Chuff Threshold and Chuff Rate (use with Steam, Steam Turbines and Electrics)

If you apply power to the track and notice the engine starting out without chuffing, or chuffing before it even moves, you can adjust the chuff *threshold* to more accurately fit your engine. Also, if your engine is chuffing too slowly at high speeds, or chuffing too fast at low speeds, you can adjust the chuff *rate*.

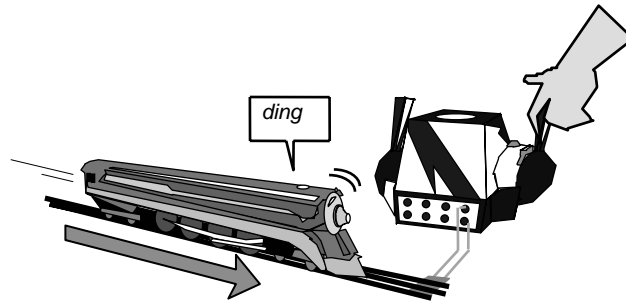
► To Set the Chuff Threshold and Rate

- Go to RESET Position #27 and leave the throttle at a low setting



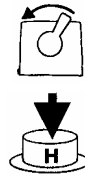
- Press and release the Horn Button

You will hear a "ding." The engine will start to move out in forward. Bring the engine to a track in front of you and lower the throttle until the engine just stops moving.

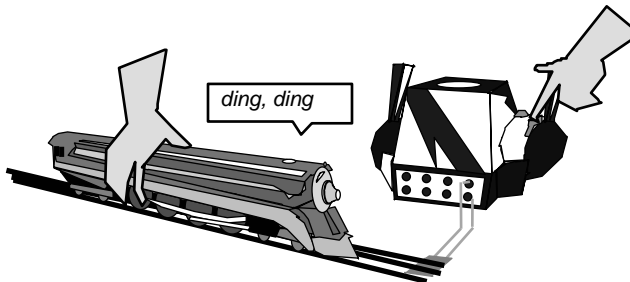


Lower throttle until engine stops moving

- While holding the engine to prevent the wheels from moving, move throttle to half power.
- Press and release the Horn Button again



You will hear two "dings." The low chuff threshold setting is locked in. Let the engine go. The engine is still in forward.



Press the horn button to set the threshold

- Turn up the throttle until the engine moves at the speed at which you want to hear the mid chuff rate (about eight chuffs/second; the maximum rate is 16 chuffs/second)



You will *not* hear any chuff sounds yet.

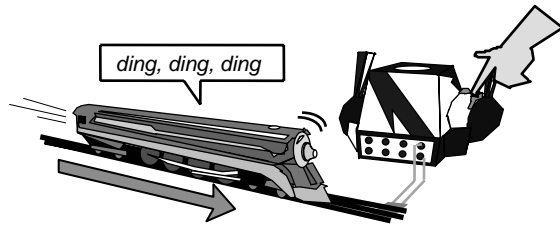
- Press and release the Horn Button



You will hear three "dings" and the engine will start to chuff. The chuff rate is now locked in.

Review the new chuff threshold and chuff rate by running the engine in forward at low and high speeds, using the throttle.

If you interrupt the power, the engine will not change direction. If you decide to turn the power off, do not leave it off for more than a few seconds or the threshold and rate will return to the original setting (see the Note below).



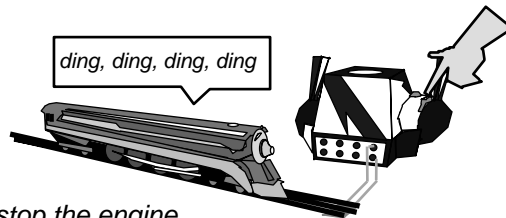
Press the horn button again to set the high chuff rate

- Press and release the Horn Button to stop the engine



You will hear four "dings." The engine will stop.

If you liked the chuff settings you heard, lock in the settings by moving to the next RESET Feature, or interrupting the power and leaving RESET. If you did not like the chuff settings, press the horn button again. You will hear one "ding" and you can now start over with the first setting.



Press the horn button to stop the engine

Note: If you decide to leave this RESET Position before completing the setting changes, do a Hard RESET: turn the power off for 15 seconds or more, then power up again. The engine will return to the original setting.

2. Setting the Diesel Motor Threshold

If you apply power to the track and notice your diesel engine moving before the motor starts to rev up, you can adjust the threshold for the motor. Real diesel engines usually rev up before the engine actually moves. If your transformer goes to a very low voltage, so the engine is on but not moving, you can set the threshold to begin before the engine moves. Or you can set the threshold at the stall point.

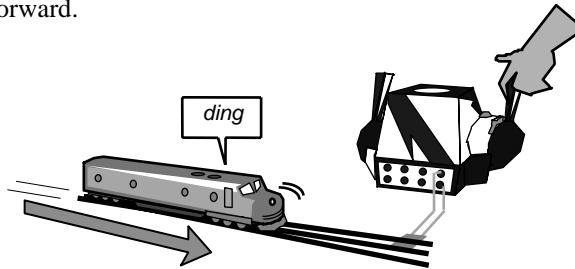
Note: There is no setting for the motor rev. rate, like there is for the steam chuff rate. Motor revs will increase at the same rate as the throttle goes up, regardless of the threshold setting.

► To Set the Motor Threshold

- **Go to RESET Position #27**
- **Press and release the Horn Button**



You will hear a "ding" and the engine will start to move out in forward.



Lower throttle until engine stops, or a few notches below

- **Reduce voltage to the point where you want the engine to start to rev up**



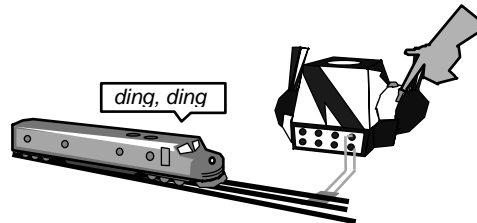
This can be a few notches lower than the voltage at which the engine actually stalls

You will *not* hear the usual rumbling motor sounds.

- **Press and release the Horn Button again**



You will hear two "dings". You have locked in the throttle setting or track voltage where the diesel motor sounds will begin. The engine is still in forward.

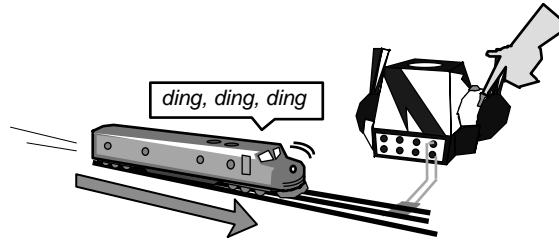


Press the horn button to set the diesel motor

- **Press and release the Horn Button again**



You will hear three "dings." Review the motor sounds by running the engine at low and high speeds, using the throttle. If you interrupt the power, the engine will not change direction. If you decide to turn the power off, do not leave it off for more than a few seconds or the engine will return to the original settings. (see the Note below).



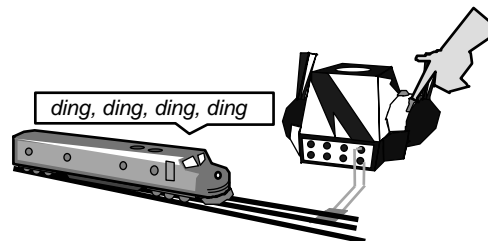
Press the horn button again to set the motor threshold

- **Press and release the Horn Button to stop the engine**



You will hear four "dings." The engine will stop.

If you liked the motor setting you heard, lock in the setting by moving to the next RESET Feature, or interrupting the power and leaving RESET. If you did not like the motor setting, press the horn button again. You will hear one "ding" and you can now start over with the first setting.



Press horn button to stop engine

Note: If you decide to leave this RESET Position before completing the setting changes, do a Hard RESET: turn the power off for 15 seconds or more, then power up again. The engine will return to the original setting.

#28: PFA, QSM, or Station Stop

PFA (Passenger/Freight Announcement) or QSM (QSI Station Master) are sounds and engine behaviors that can be run from your transformer whenever the train comes to a stop. All QS-3000 sound sets include a choice between Freight Yard sounds and "The Central Limited" station announcement. When ProtoSound systems are converted to QS-3000, you can choose to either keep the original Passenger Proto-Effects™ or Freight Yard Proto-Effects™ sounds, or you can switch to any QSI sound title with QSI's "The Central Limited" or Freight Yard sounds.

Passenger Announcement: Includes arrival and departure messages ("Now arriving from Springfield on track one, The Central Limited...Watch your step...Baggage to the right...Now departing on track one...") and ends with the traditional "All Aboard!" as the train departs. The PFA announcement has four parts. The length of each part is controlled by power interrupts.

Freight Yard: Sounds include freight loading and unloading. The locomotive goes through a series of typical engine sounds and behaviors. Freight Yard has four parts. The length of each part is controlled by power interrupts.

Station Stop: A quick and easy way to run PFA. When enabled for Station Stop, the engine goes through the complete announcement automatically and the power interrupts are not necessary.

QSM: When enabled for QSM, the engine goes through all the engine sounds and behaviors it makes when it is in PFA, but the freight or passenger announcement is not heard. This lets you run the engine with other MTH or QS-3000 equipped engines that are programmed to make a station or freight yard announcement, and not have both engines "talking" at once. Both PFA and Station Stop have a QSM version.

To operate the PFA, see **Section 3: Sound, "PFA."**

The factory setting is "Enabled for PFA."

► To Enable or Disable PFA

- **Go to RESET Position #28**
- **Press the Horn Button**



Each time you press the horn button you will hear one to three "dings."

28 times

- 1 "ding" = Disabled
- 2 "dings" = PFA Enabled
- 3 "dings" = QSM Enabled
- 4 "dings" = Station Stop Enabled
- 5 "dings" = Station Stop QSM Enabled

► To Hear the Announcement using Station Stop:

- **Program the engine for "Station Stop," Choice 4**
- **Interrupt the power and run the engine**
- **Hold down the Bell Button for 3 seconds or more while the engine is running in forward or reverse**



The bell will come on and you will hear a horn blast.



- **Release the Bell Button**

The engine will immediately stop and go through the complete PFA sequence in about 1½ minutes, then move out again. To go through the sequence faster, interrupt the power to move quickly from one part of the announcement to the next.

#29: Engine Sound Set

Some QS-3000's come with multiple sound sets. You can switch between sound sets to adapt to different layouts.

When this guide was printed, only QS3-314, "Toy Train for Steam Plus Mid Steam II," comes with more than one sound set. The sounds sets available for this sound title are:

Sound Set One: Toy Train with E-unit Sounds

Sound Set Two: Toy Train with E-unit Sounds Only During Direction Changes

Sound Set Three: Mid-Steam II Sounds

If you enter this RESET Feature with an engine that does not have multiple sound sets, and try to move to a different Choice, nothing will happen.

The factory setting for this feature is "Sound Set 1."

▶ To Change Sound Sets

- **Go to RESET Position #29**
- **Press the Horn Button**



Each time you press the horn button you will hear one to five "dings."

29 times

The choices are:

- 1 "ding" = Sound Set 1**
- 2 "dings" = Sound Set 2**
- 3 "dings" = Sound Set 3**
- 4 "dings" = Sound Set 4 (for future use)**
- 5 "dings" = Sound Set 5 (for future use)**

#30: Slack Action

Slack Action, the sound of couplers banging into each other as the train starts to move, is enabled or disabled in this RESET Feature.

To operate this effect, see **Section 3: Sound, "Slack Action."**

The factory setting for this feature is "Enabled."

▶ To Enable or Disable Coupler Sound Effects

- **Go to RESET Position #30**
- **Press the Horn Button**



Each time you press the horn button you will hear one or two "dings." 30 times

The choices are:

- 1 "ding" = Disabled
- 2 "dings" = Enabled

#32: Pull Cord

Pull Cord is an emergency stop sound effect. When the cord is pulled, the brakes are applied immediately, usually to the surprise of everyone on board, including the engineer. Then the train screeches to a halt.

QSI's patented Random Sequence Sound is added to Pull Cord, so the sounds are different every time you use it.

To operate this effect, see **Section 3: Sound, "Pull Cord."**

The factory setting is "Enabled."

▶ To Enable or Disable Pull Cord

- **Go to RESET Position #32**
- **Press the Horn Button**



Each time you press the horn button you will hear one or two "dings."

32 times

The choices are:

- **1 "ding" = Disabled**
- **2 "dings" = Enabled**

#34: Squealing Brakes

There are three ways to operate Squealing Brakes.

Brakes Off: Turn off the brake sounds completely

Brake Arm Enabled: After being armed with the bell button, the brakes will sound the next time you slow the engine. See the directions below.

Brakes Always: After having the engine up at a high speed (about 14 volts), the brake sounds always come on as you bring the engine down to a low speed.

To operate brakes in Choice 3, see **Section 3: Sound, "Brakes"**

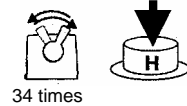
The factory setting is "Brakes Always."

► To Enable/Disable, or Turn On/Off Squealing Brakes

- **Go to RESET Position #34**

- **Press the Horn Button**

Each time you press the horn button you will hear one to three "dings."



1 "ding" = Brakes Off

2 "dings" = Brakes Arm Enabled

3 "dings" = Brakes Always

► To Use Brakes Arm Enabled

Choose "Brakes Arm Enabled." Leave RESET and run the engine. When you want to hear the brakes, do this:

- **While the engine is running, hold down the bell button for three seconds or more**

The brakes are armed when you hear a single horn or whistle hoot. (If the engine is a helper engine, you will hear an air let-off "psst" sound instead. Listen carefully; this may be hard to hear over the other engine sounds.)



- **Release the bell button**

Turn the bell off with the bell button if you like.

- **Turn the throttle up to a high speed (about 14 volts)**
- **Slowly turn the throttle down to a low speed**



As the engine stops, you will hear the Squealing Brake sounds.

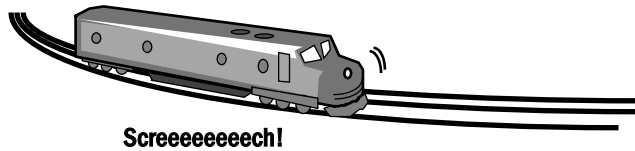
When the engine is in Brakes Arm Enabled, and you interrupt the power after running your engine, you also disarm the brake sounds. To hear the sounds again, repeat the steps with the bell button and throttle.

Brakes and PFA are Both Armed

After holding the bell button for 3 seconds, both the brakes and PFA are armed. If you do not want to hear PFA after the engine is stopped, interrupt the power again and PFA will not come on. If you want to hear PFA, wait a few seconds after the engine is stopped, and PFA will begin.

#35: Flange Sound

Flanges are the rims on engine wheels that extend below the rail to prevent the wheels from slipping off the track. When moving through tight curves, these flanges often squeal as they rub against the sides of the rails.



There are two ways to operate and hear the flange sounds.

Disabled: Turns off the flange sounds completely

Flange Arm Enabled: Decide when to hear the flanges by arming them with the bell or horn button. Once the flanges are armed, they will sound the next time you use the Horn Button as described below.

Flange Always: Arming is unnecessary. The flange sounds will come on when you use the Horn Button as described on the next page, under "To Hear the Flange Sounds."

The factory setting is "Flanges Off."

► To Enable/Disable, or Turn On/Off Flange Sounds

- Go to RESET Position #35
- Press the Horn Button



Each time you press the horn button you will hear one or three "dings."

35 times

- 1 "ding" = Disabled
- 2 "dings" = Flange Arm Enabled
- 3 "dings" = Flange Always

► To Arm the Flange Sounds:

- Go to RESET Feature #35, and choose "Flange Arm Enabled"
- While the engine is running, press the bell button for about 3 seconds
- Listen for a "hoot." Release the bell button



3 sec

The engine is armed for flange sounds. Turn the bell off with the bell button if you like.

▶ To Hear the Flange Sounds:

- **While the engine is running, press the horn button briefly, but not long enough to blow the horn**



Once the flange sound begins, you can draw the sound out by quickly and repeatedly pressing the horn button

#37: "I think I can"

The "I think I Can" chuff can be found in steam engines using QS3-300 Small Steam I, QS3-301 Small Steam II, or QS3-306 PRR Small Steam. When the engine is enabled for this feature, and after you put the engine through the correct series of maneuvers, you'll hear the engine talk like *The Little Engine That Could*.

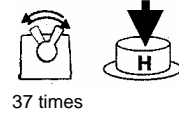
The factory setting is "Enabled."

► To Enable or Disable "I Think I Can"

- **Go to RESET Position #37**
- **Press the Horn Button**

Each time you press the horn button you will hear one or two "dings."

- 1 "ding" = Disabled
- 2 "dings" = Enabled



When this feature was first developed, our engineers wanted it to be a fun surprise. So they designed it to come on only after the engine runs through this sequence:

1. **run the engine in reverse and blow the horn three times**
2. **run the engine in forward and blow the horn two times**
listen to the "I think I can" message
3. **run the engine in forward and blow the horn two times**
listen to the new message!

Between step 1 and 2, you can run the engine however you like. In other words, after running in reverse and blowing the horn three times, you can go into forward, back to reverse, into neutral, back to forward, and then blow the horn two times to hear the message.

Going to RESET will interrupt the sequence and return the engine to normal chuffing.

To hear "I Think I Can" again, go through the sequence described above again.

#39: System Type

System Type refers to how signals are sent to the engine.

System 1: There is no difference between using the horn or bell button to operate QS-3000. The software interprets either the positive horn signal or the negative bell signal as a positive signal. This is the familiar Lionel way of blowing horns on engines from the 1940's through the 1960's, before electronic horns came along. Some train control features that require a bell button are not operable in System 1, and when the power is turned off, you will not hear the normal RESET time-out "ding." System 1 is not recommended.

System 2: Distinguishes between the horn and bell button signals, so you can use the horn and bell buttons as described in this manual.

System 3: Instead of always stating up in RESET, an engine only goes into RESET with an Engine Unlock. See the Quick Exit Guide in Appendix I for instructions on how to do an Engine Unlock.

System 5: Choose this System if you are using Train America's UCUB with a QS-3000-converted MTH ProtoSound engine, and are running it with Lionel's TMCC. When System 5 is chosen, QS-3000 automatically selects UCUB in RESET Position #19 "Transformer Type." **Contact Train America before running the engine.** Special instructions on running engines with UCUB are available from Train America Studios, 970 Windham Court, Suite #9, Youngstown, OH 44512, (330) 629-7625. Train America covers all questions and warranty issues on QS-3000 run with UCUB.

Systems 4 and 6 have been added for future use and are not operational at this time. If an engine is placed in one of these choices by mistake, the horn and bell buttons will not work. To regain control of your engine, first do an Engine Unlock (see Appendix I, or the Quick Start guide). Then return to this RESET Position and choose either System 1, 2, 3 or 5.

The factory setting for this Feature is "System 2."

► To Select the System Type

- **Go to RESET Position #39**
- **Press the Horn Button**

Each time you press the horn button you will hear one to six "dings."

- 1 "ding" = System 1
- 2 "dings" = System 2
- 3 "dings" = System 3
- 4 "dings" = System 4 (not operational—do not use)
- 5 "dings" = System 5
- 6 "dings" = System 6 (not operational—do not use)



39 times

#40: Lock-out Enable

With QSI's exclusive, patented Lock-out method, instead of using a mechanical switch (like the lever on an E-unit), you can now lock-out your engine by remote control.

Lock-out locks the reverse unit in one direction (forward, neutral or reverse), so the engine can be used with block signals or stop stations that would normally cycle the engine into neutral. The bell, whistle, squealing brakes and coupler still work. When Lock-out is enabled, you can lock and unlock the engine any time during normal operation.

Enabled: All engines can be unlocked. They must be programmed for Choice 2, "Enabled," before they can be locked out.

Disabled: Engines can be accidentally locked-out. To prevent this from happening until running QS-3000 becomes familiar, Disabled is the safe choice.

The factory setting is "Disabled."

▶ To Enable or Disable Lock-out

- **Go to RESET Position #40**
- **Press the Horn Button**



40 times

Each time you press the horn button you will hear one or two "dings."

- **1 "ding" = Disabled**
- **2 "dings" = Enabled**

▶ To Lock-Out the Engine

First enable the engine for Lock-out in this RESET Feature.

- **While the engine is in the desired direction, press and hold the Horn Button**
- **Turn off the power and release the Horn Button**



Listen for a short horn hoot.

- **Immediately turn the power back on**



The engine is locked into the desired direction.

If you wait too long after the short whistle or horn blast, you will hear a "ding," and the engine returns to RESET. Put the engine back into the desired direction and try again. Also, if you have locked out your engine in neutral, the bell may be on. You can use the bell button to shut it off.

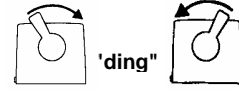
When the engine is locked out, and power is turned off, you will not hear the normal RESET time-out "ding."

▶ To Unlock the Engine

- While the locked-out engine is operating, press and release the Horn Button
- Within 1 second, turn off the power. Keep the power off for about 3 seconds



Listen for a "ding."



- Immediately turn the power back on

You will hear a double air let-off "pssht, pssht." The engine is now unlocked. The engine is back in RESET and will operate normally.


▶ To Lock and Unlock the Engine with SideKick II

- Hold the Horn Button down and press the Direction Button.
- Release the Horn Button. When you hear a short "hoot," *immediately* release the Direction Button

The engine is locked into its present direction. If you locked the engine in neutral, the bell may be on. Use the bell button to turn the bell off. To Unlock the engine, repeat these steps. You will hear a "ding" after you release the horn button, telling you the engine has been unlocked and is in RESET.

#42: Feedback in RESET

Feedback are the sounds you hear as you move through Reset Features, including the air let-off "pssht" sounds, voice announcements, and "dings" There are three Feedback choices:

Normal Feedback: Can be used any time, with any transformer. You will hear all the feedback sounds in this choice. Background engine sounds only continue through RESET Position #2.

No Air Release: Turns off the air let-off "pssht" sounds and adds in background engine sounds in all RESET Positions for more realistic operation. All other feedback sounds (voice announcements and "dings") are still present. For steam engines, the background sounds include steam hiss and an occasional air pump. For diesels, the normal engine idle continues through RESET Position #2, and then drops into the low idle sound with occasional air pump sounds through the remaining RESET positions. This choice is ideal if you are using SideKick II. SideKick II is so reliable moving from one RESET Position to the next that you no longer need the air let-off "pssht" sounds to help you count.

Special: Turns off or delays feedback sounds. Air let-off "pssht" sounds are eliminated. When the engine is in a RESET Feature, you will hear only the first "ding" as you press the horn button to move from choice to choice, and none after that. When you select a RESET Feature choice, QS-3000 will always start out at the first choice no matter where that Feature choice was set before. Voice announcements come on normally. "Special" is designed for use with future train controllers. QSI strongly recommends you do not use this choice now.

The factory setting is "Normal Feedback."

► To Turn on or Shut Off Feedback Sounds

- **Go to RESET Position #42**
- **Press the Horn Button**



Each time you press the horn button you will hear one to three "dings."

The choices are:

- 1 "ding" = **Normal Feedback**
- 2 "dings" = **No Air Release** Air let-off "pssht" sounds are canceled.
Use with SideKick II.
- 3 "dings" = **Special** Use with future controllers only

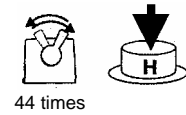
#44: Engine Number Set

Use Engine Numbers to select and operate individual engines. See **Section 6: "Independent Train Control"** for a complete description of using Engine Numbers.

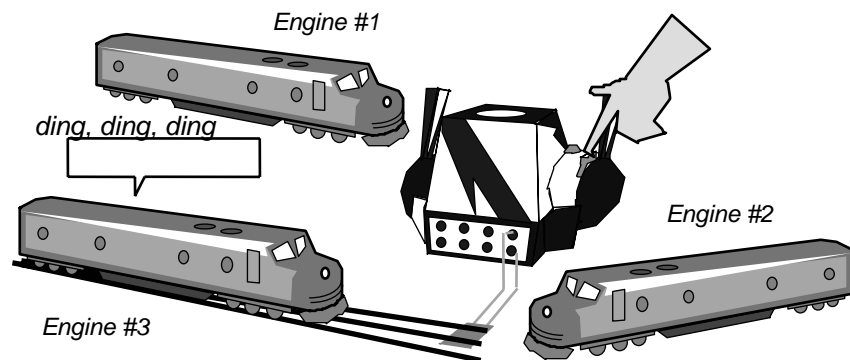
The factory setting is no Engine Number assigned.

► To Assign an Engine Number

- Place one engine on the powered track
- Go to RESET Position #44
- Assign the Engine Number by pressing the Horn Button the number of times equal to the number you want



For example, if you want one engine to be Engine #3, press the horn button three times.



Press horn button 3 times to set Engine Number to #3

► To Change the Engine Number

- Go to RESET Position #44

Assign the new Engine Number with the horn button as described above. In other words, you just write over the old Engine Number with a new one.

#45: Engine Number Clear

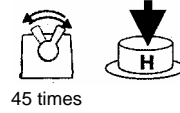
This Feature clears Engine Numbers only. It does not clear Train Numbers.

After clearing the Engine Number, if the engine sounds do not come on, the engine may have an assigned Train Number and be de-selected. To run the engine, select it using its Train Number.

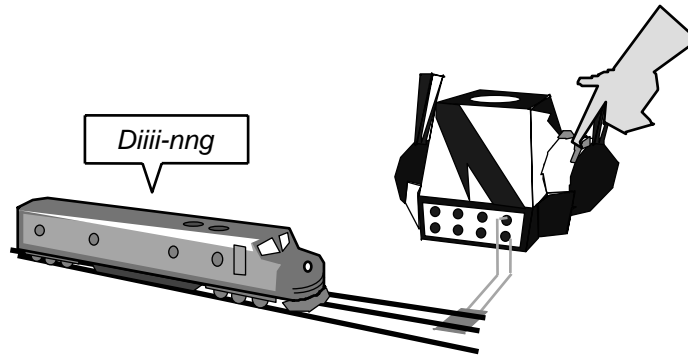
There is no factory setting for this RESET Feature.

► To Clear Engine Numbers

- **Place any engines with Engine Numbers you wish to clear on the powered track**
- **Go to RESET Position #45**
- **Press and release the Horn Button**



You will hear a distorted “diiii-nng,” telling you the Engine Number has been cleared.



Press the horn button once to clear the Engine Number

#48: Water Scoop Sound

Both New York Central and Pennsy steam engines had a unique way to pick up water on the fly. A scoop would lower from the bottom of the tender to pick up water from a trough between the rails. An empty tender would fill in less than a minute this way. The only way the engineer or fireman would know if the tender was full was to watch the water blow out of special overfill pipes on the side of the tender. When the engineer could no longer see the end of the train because of all the water shooting out, the tender was full.

To operate this effect, see **Section 3: Sound, "Water Scoop."**

The factory setting in "Enabled."

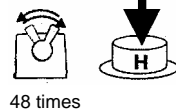
► To Turn Water Scoop Sound On or Off

- **Go to RESET Position #48**
- **Press the Horn Button**

Each time you press the horn button you will hear one to three "dings."

The choices are:

- 1 "ding" = Disabled
- 2 "dings" = Enabled



48 times

#58: Warning Light Type

Different lights on an engine behave in special ways. In this RESET Feature, choose the type of light connected to QS-3000, and the light will behave appropriately.

Steady: The light is always on

Overhead: The Overhead light blinks on and off quickly, and is designed to go in the light on top of the cab.

Mars: The Mars light stays on and goes off over a longer period of time, and is designed to go into the headlight.

Ditch: The Ditch light is on steady.

Strobe: The Strobe light flashes on and off very quickly.

Reverse: The light is on only when the engine is going in reverse.

The factory setting for this feature is "Overhead."

► To Choose the Warning Lights Type

- **Go to RESET Position #58**

- **Press the Horn Button**



58 times

Each time you press the horn button you will hear one to five "dings."

The choices are:

- 1 "ding" = **Steady**
- 2 "dings" = **Overhead**
- 3 "dings" = **Mars**
- 4 "dings" = **Ditch**
- 5 "dings" = **Strobe**
- 6 "dings" = **Reverse**

#59: Warning Lights Operation

RESET Position #8 turns engine lights, like the diesel warning light, on and off. RESET Position #58 determines the behavior of the light. This QS-3000 feature allows you to decide when the light will be on.

Operate if Selected: The lights will operate when the engine is on (or has been selected with its assigned Train or Engine Number) and is running normally.

Operate Always: The lights are always on.

The factory setting for this feature is "Operate If Selected."

► To Change the Warning Lights Operation

- **Go to RESET Position #59**
- **Press the Horn Button**



Each time you press the horn button you will hear one or two "dings."

59 times

The choices are:

- 1 "ding" = Operate if Selected
- 2 "dings" = Operate Always

#72: All De-Select

This option lets you de-select (turn off) all QS-3000 engines, including those without assigned Train or Engine Numbers.

With All De-Select, you can quickly turn off all QS-3000 engines, and run an engine not equipped with QS-3000 on the same track.

If you are using all QSI equipped engines with assigned Train or Engine Numbers, and you want to select one engine to run, it's easier to simply select the engine in RESET Position #0 than use All De-Select. When you select one engine with its Train or Engine Number, all other QSI equipped engines with assigned numbers are automatically de-selected.

You must have a bell button, and be using System 2 from RESET Position #39, for All De-Select to work.

Note: Some QS-1 and all QS-2+ equipped engines will also accept the De-Select command.

Disabled: All QS-3000 engines cannot be de-selected at one time.

Enabled: All QS-3000 engines can be de-selected at one time.

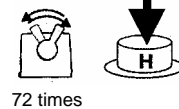
The factory setting is " Disabled."

▶ To Enable or Disable De-Select

- **Go to RESET Position #72**
- **Press the Horn Button**

Each time you press the horn button you will hear one or two "dings."

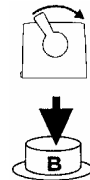
- **1 "ding" = Disabled**
- **2 "dings" = Enabled**



▶ To De-Select QS-3000 Engines

- **Place engines in RESET**
- **Turn the throttle to a low power setting (below 10v.)**
- **Press the Bell Button for three seconds**

All the engines will go silent.



▶ To Select one De-Selected QS-3000 Engine

- Enter the engine's assigned Train or Engine Number using the Horn Button in RESET Position #0 or #1



▶ To Select an All De-Selected Engine or Engines (Also called "All Select")

- Enter RESET
- Press and hold the Horn Button down. Listen for a "ding," and continue to press the button
- Three seconds after the "ding," all the engines will start up
- Release the Horn Button



#74: Factory Test

This RESET Position is reversed for factory use only. You will not harm you engine if you enter this Position by mistake. You will also not hear any sounds.

6 Independent Train Control

Running engines with ID numbers is a quick and easy way to select each engine, and run it anywhere on your layout, *without using blocks*.

QS-3000 has two types of ID numbers, Train Numbers and Engine Numbers. You can use Train Numbers by themselves with any small layout to easily select and run engines or multiple-headed trains. Engine Numbers are designed for large layouts with many engines. Train Numbers and Engine Numbers can be used together to run engines and make up consists on large layouts.

Note: Compared to earlier QSI Sound and Train Control Systems, ID numbers in QS-3000 have been simplified. Train Number takes the place of Temporary ID#, Engine Number remains the same, and Road ID# has been eliminated.

Running 1 to 10 Engines Using Train Numbers

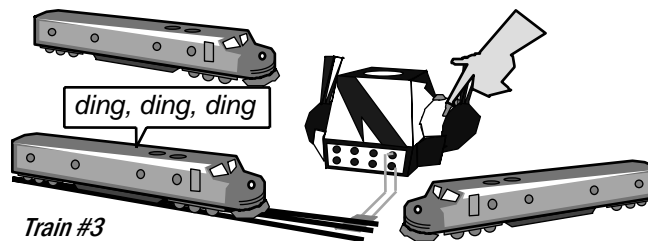
With a few engines, Train Numbers are the easiest way to go. You can give a different number to each of your QS-3000 engines. Now you can select one engine at a time, and run it, while all the other QSI equipped engines remain silent and motionless.

Or you can make up a train using several QSI equipped engines, give them all the same Train Number, and run them together. The more engines with QSI systems you have, the more ways you can combine and run them.

Even if you're running only one QSI equipped engine, assigning it a Train Number will let you de-select it without having to park it on a separate powered track block or lock its reverse unit into neutral.

Step 1: Assign a Train Number

Assign Train Numbers in RESET Position #2 by pressing the horn button the number of times equal to the number you want to assign. For a full description on how to assign Train Numbers, go to **Section 5: RESET Position #2, "Train Number Set."**



Give each engine its own Train Number

Note: Use any number you like, but we suggest using a low number since you will be pressing the horn button that number of times to select that engine.

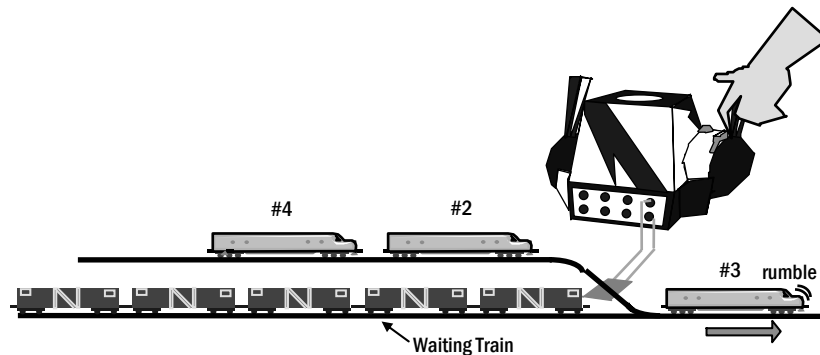
Step 2: Select and Run the Engine by Using Its Train Number

Once an engine has an assigned Train Number, select it from RESET Position #0. Every time you do a RESET your engine always comes up in RESET Position #0. So when you first enter RESET, select your engine by pressing the horn button the same number of times as the number you assigned (three times in this example).

Step 3: De-Select the Engine

When you are finished running the engines, do a RESET. While in RESET, press the horn button any number of times except the Train Number of your engine.

Example: Let's say you have three QSI equipped engines on your layout and you have assigned each a Train Number: #2, #3 and #4. To run Train #3, do a RESET. As soon as you hear the "ding" telling you three seconds have gone by, turn the power up and the engine is in RESET. Press the horn button three times. Train #3 will come to life, ready to run, while Train #2 and Train #4 remain silent and motionless.



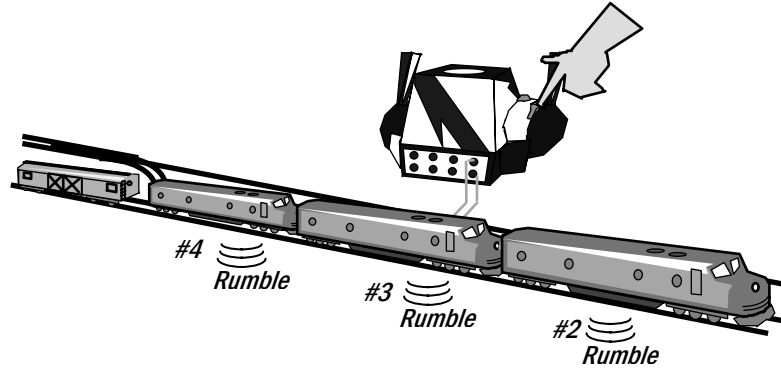
Use the horn button to run one engine at a time

Step 4: Clearing a Train Number

When you assign an engine a Train Number, the engine will remember that number indefinitely, until you clear it or assign the engine a new number. Train numbers are cleared using RESET Position #3. Once the Train Number is cleared, the engine will power up whenever the engine enters RESET and will remain turned on even when you are selecting other engines by their Train or Engine Number.

All Select: Making Up and Breaking Up Consists

All Select works well if all the engines on a powered track block will be part of the consist because All Select turns on all QSI equipped engines. "Engine Plus," described on the next page, is a way to select a group of engines without selecting all the engines on the powered track.



Use the horn button to select all the engines at once

Step1: Select Engines and Couple Them Together Using Train Numbers

From RESET, use Train Numbers to select and group the engines.

Example: (Using engines #2, #3, and #4 from the example above)

- **Do a RESET**
- **Select Train #2** (Selecting Train #2 de-selects Train #3 and #4)
Bring it out to the main line.
- **Do a RESET**
- **Select Train #3** (Selecting Train #3 de-selects Trains #2 and #4)
Bring it out and couple it with #2.
- **Do a RESET**
- **Select Train #4** (Selecting Train #4 de-selects Trains #2 and #3)
Bring it out and couple it with Trains #2 and #3. Your engines are in place and ready to run.

Step2: Select All the Engines

- **Do a RESET**
- **Do an All Select: Press the horn button for three seconds**

All the engines turn on. You are ready to back your engines up to the waiting cars!

When you are making up trains, you can also assign helper and start-up direction changes to any of the engines for more realism and fun. See **Section 5: RESET Positions #4 and #5** of this guide.

Step3: Breaking Up the Consist

Breaking up the train works the same as making it up.

When you want to break the train up, stop your engines and do a RESET. Select the lead engine using its Train Number and uncouple it from the other engines. Put this engine away in your yard. Repeat this process, one at a time, with the other two engines.

Engine Plus: Another Easy Way to Make Up and Break Up Consists

Engine Plus is another way to make up and break up trains, using several engines, to create multiple-headed consists. Engine Plus allows you to easily make up groups of engines for your train consist, and select and run that group only, while the unused engines on your layout remain de-selected. Engines selected and run this way are called an Engine Plus Group.

First assign either a Train or Engine Number to all the engines in your yard.

Step1: Arm Engines for Engine Plus and Make Up the Consist

- **Do a RESET**
- **As you select one of the engines using its ID number, continue to hold the Horn Button down for 1.5 seconds**

You will hear a coupler "clank," telling you this engine is armed for Engine Plus.

Note: If you accidentally put the wrong engine into Engine Plus, press the bell button for 1.5 seconds again, and the engine will be disarmed for the Engine Plus group. When you disarm this engine, you will not hear any feedback sounds. Now continue to press and release the horn button until you reach the engine you wanted, and hold the horn button down 1.5 seconds to arm it for Engine Plus.

- **Interrupt the power, move this engine into position with your train**
- **Do a RESET**
- **As you select another engine using its ID number, continue to hold the Horn Button down for 1.5 seconds**

This engine is also armed for Engine Plus.

- **Interrupt the power, move this engine into position with your train**

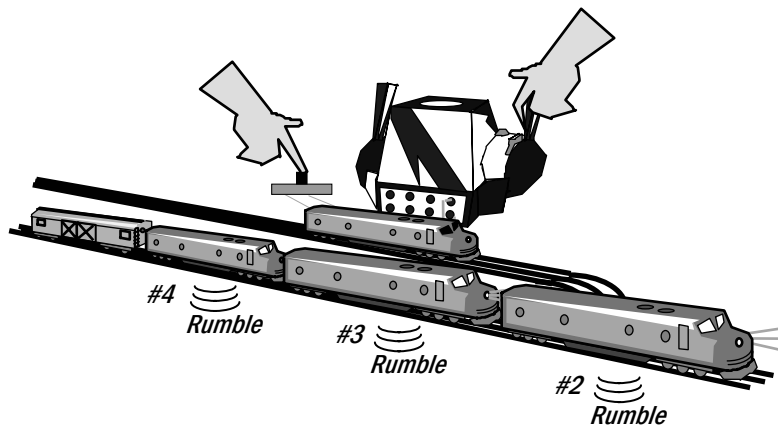
Continue until you have armed and positioned all the engines in your consist.

Note: If you change your mind, a Hard RESET (turn off the power for 15 seconds or more, then turn the power back on), will disarm all Engine Plus armed engines at the same time.

Step2: Select the Engine Plus Group

- **Do another RESET**
- **Press the Bell Button for 1.5 seconds**

The Engine Plus Group is selected, and any engines you had not selected for the Engine Plus Group are de-selected and will remain silent and motionless. Interrupt the power and all the engines in the Engine Plus Group will start up and run together.



Select an Engine Plus Group with the bell button

Once any engine is armed for Engine Plus, you can choose to make it a helper or forward engine in RESET Position #4. The engine will not behave like a helper until it is added to the consist and the bell button is pressed 1.5 seconds, selecting the Engine Plus Group.

Step3: Breaking Up the Engine Plus Group

- **Do a RESET**

The Engine Plus Group is turned off.

- **Select one engine using its ID number**

Move each engine where you like. Repeat with the rest of the engines.

Engine Plus Operating Tips

How To Select and Move Groups of Engines from a Consist

You can also use Engine Plus to break off groups of engines from your consist. For example, if you had been using extra engines to help your train over a grade, you can break these engines off as a group and move this helper group off to a storage track.

Example: Let's say the two lead engines are helpers on your five engine consist. Select the first two engines using their ID numbers and make both of them Engine Plus locomotives. Press the Bell Button for 3 seconds in RESET to select these two engines, disconnect them from the consist, and move them off to the storage track.

Go back and do another RESET. Select the remaining three engines using their ID numbers and make them Engine Plus locomotives. Press the Bell Button for three seconds in RESET to select this group of three engines and pull your train away. The previously stored helper engines will De-Select when the Bell Button is pressed, since they are no longer armed for Engine Plus.

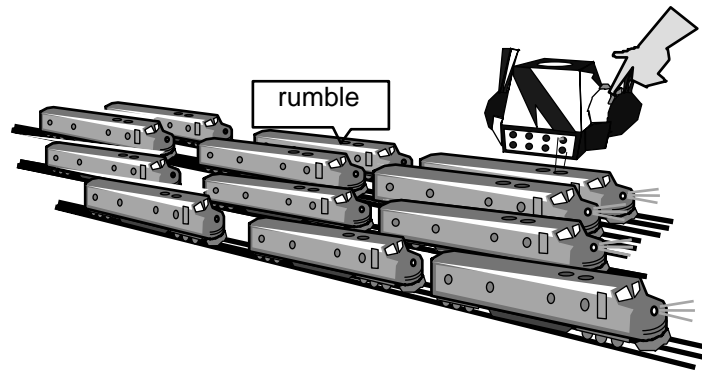
How To Arm Several Engines During a Single RESET

You can arm all the engines in a group with only *one* RESET by selecting the lowest ID number first while holding the horn down for 1.5 seconds, selecting the second lowest ID number while holding the horn button down for 1.5 seconds, and so on. When all engines have been armed for Engine Plus, press the Bell Button for three seconds to select this group of engines.

Example: To select engines 7, 2 and 5 during a single RESET, select, in turn, engine #2 *plus* engine #5 *plus* engine #7 to create this Engine Plus group.

Using Train Numbers and Engine Numbers on Large Layouts

Engine Numbers were designed to help you select engines on large layouts quickly and easily. When you have many engines, selecting engines with high Train Numbers is very slow. Imagine having to press the horn button 25 times to select and run engine #25. It would take a lot of time.



On large layouts, select engines using Train and Engine Numbers

Using Train and Engine Numbers together allows you to split your engines into groups, and then select and run engines within that group.

You can set up groups any way you want. Perhaps you want all your steam engines in one group, diesels in another. Or you can create groups by road names.

Example: Say you have three New York Central engines, three Santa Fe engines and four Union Pacific engines. Give each group a Train Number, (like Train #3 for NY Central, Train #4 for Santa Fe and Train #5 for Union Pacific). Then assign each engine an Engine Number (#1-#3 for NY Central and Santa Fe, and #1-#4 for Union Pacific).

It's a good idea to make up a table so you can keep track of the numbers you assign to each engine in each Train. For example:

Train #3 NY Central	Train #4 Santa Fe	Train #5 Union Pacific
#1. Lionel 2354 A and B units	#1. Lionel 2343 Super Chief	#1. MTH 1452 F-3
#2. MTH 8324 Switcher	#2. Lionel 208 Alco	#2. Williams 372 SD-45
#3. Lionel 773 Hudson	#3. MTH 2903	#3. Williams 4020 Big Boy
		#4. Lionel 8002 Berkshire

Actually, make two lists and keep one in a safe place. Once you assign Train and Engine Numbers, your engine will remember those numbers until you change or erase them.

You can also attach a label to the bottom of each locomotive with its Train and Engine Number written on it like this: (4,2).

Step 1: Assign Both a Train Number and an Engine Number to Each Engine

Assign each engine a Train Number and Engine Number. Follow the instructions for assigning the Train Number given in **Section 5: RESET Position #2, "Train Number Set."** To assign the Engine Number, follow the instructions given in **Section 5: RESET Position #44, "Engine Number Set."**

Step 2: Select and Run an Engine Using a Train and Engine Number

Select the engine you want to run using both RESET Position #0 and #1. You select the group by the Train Number using RESET Position #0, and each engine by its Engine Number in RESET Position #1.

Example: Say you decide to run your Lionel 208 Alco from the list above.

- **Do a RESET**

You are in Position #0.

- **Press the horn button 4 times to select Train #4, Santa Fe**

All the engines assigned this Train Number will now turn on.

If you interrupted the power now, all the Train #4 Santa Fe engines would run. All the other engines in Train #3 and #5 would remain silent and motionless.

- **Advance one RESET Position using the throttle, and press the horn button two more times to select the second engine**

Only the Lionel 208 Alco will stay on. All the other Train #4 Santa Fe engines will go silent.

Try it; it's easy!

Appendix I: Troubleshooting

Appendix I has four sections:

1. Quick Exit Guide
2. Troubles with Direction States
3. Troubles with Sound
4. Troubles with Older Transformers

1. Quick Exit Guide

QS-3000 has five commands you can use if your engine misbehaves.

Hard RESET (QS-3000 Computer Restart)

If your engine is misbehaving (refuses to take commands, or does something unexpected), first try restarting the QS-3000 computer.

► To Do A Hard RESET

- Turn the power off for 15 seconds or more
- Turn the power back on



When you turn the power back on, you should hear three "dings," telling you the QS-3000 computer has restarted successfully and the engine is now in RESET. If you do not hear the triple "ding," do another Hard RESET, but this time leave the power off for **10 minutes**. If you still do not hear a triple "ding," try Engine Unlock (see the next page).

All Select

If you hear a triple "ding" when you turn the power on, but the engine is silent and unresponsive, it may be de-selected. Use ALL SELECT to start the engine.

► To Do All Select

- Do a RESET: turn off the power, wait for the "ding" after three seconds, turn the power back on



The engine is now in RESET Position #0.

- Press and hold the Horn Button. You will hear a "ding." Continue to hold the Horn Button down for at least three seconds



You will hear the Air Compressor start up.

- Release the Horn Button

You can now operate the engine.

Engine Unlock

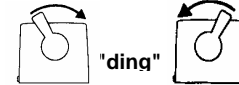
If the engine is making sounds, but refuses to change direction or go into RESET, the engine may be locked out.

► To Unlock the Engine

- **While the engine is operating, press the Horn Button and release**



- **Within 1 second, turn off the power for about 3 seconds**



Listen for the "ding."

- **Turn the power back on**

The engine is now in RESET, and you can operate the engine normally. If the engine still does not respond, try a new battery.

Operation Clear

If the engine behaves unexpectedly, you may have changed a RESET Feature without meaning to, or forgotten past changes. If so, this command returns all RESET Features back to factory settings, including Engine and System Volume. Only assigned ID numbers are not affected.

► To do Operation Clear

- **Go to RESET Position #18**
- **Press and release the Horn Button**



You will hear "riing." RESET Features 4-17 are now clear.

18 times

- **Press and release the Horn Button again**

You will hear "riing, riing." RESET Features 19-50 are now clear. If the throttle is set low enough, you will also hear two air let-off "pssht, pssht" sounds telling you the transformer has been identified.



- **Press and release the Horn Button again**

You will hear "riing, riing, riing." RESET Features 51-74 are now clear.



If you press the horn button again, you will hear a "ding" but nothing will happen.

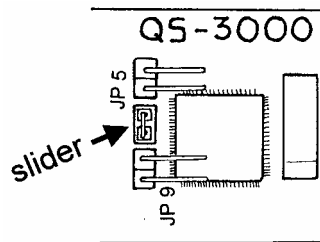
Interrupt the power to run the engine.

Full System Restore

This is the quick exit of last resort. Try Full System Restore after all the solutions listed above, including all three parts of Operation Clear, have been tried and the battery has been replaced. If the engine still misbehaves, is silent, or refuses to run, follow these directions. After a Full System Restore, all RESET Features are returned to their factory settings and assigned ID numbers are cleared. If Full System Restore does not return the engine to normal operation, call QSI and ask for technical help.

► To do a Full System Restore

- **TURN OFF THE POWER**
- **Take the cab or tender body off the chassis**
- **Take the slider off the pins on the blue QS-3000 top board**



- **Turn on the power**
- After 2 seconds, you will hear "hoot ding, hoot ding, hoot ding..."
- **Turn off the power**

The "hoot ding, hoot ding..." will continue.

- **Wait until the "hoot ding, hoot ding..." sounds stop**
- **Replace the slider**
- **Turn on the power**

The engine will be silent for several seconds while the memory is restored.

- **Wait for the normal start-up triple "ding"**

The engine has been restored to the factory settings and is ready to run.

Troubles In Direction States

This section of the guide is divided into four categories: 1) Troubles in RESET, 2) Troubles in Forward or Reverse, 3) Troubles in Neutral, and 4) Troubles with Sound. When you have an unexpected response using the horn button, bell button, or the throttle, you probably know whether the engine was in RESET, Forward, Reverse, or Neutral when the problem occurred. Check the questions and answers under the direction state your engine was in when the trouble started. Troubles with Sounds covers sound problems specifically.

Troubles in RESET		
Problem	Cause	Solution
<p>With Specific Transformers:</p> <p>1. With Cab-1: Using the throttle knob does not advance the engine through the RESET Positions.</p>	<p>With no definite stops or markings on the throttle knob to show voltage levels, it is hard to find the high and low voltages needed to move through the RESET Positions.</p> <p>If the momentum setting is too high, the throttle will be very slow to respond, making it more difficult to tell what voltage is being applied.</p> <p>If the stall voltage is set too high, the lowest voltage may not be low enough to sequence to the next RESET position.</p> <p>PowerMaster takes some of the voltage going to the track, so the high voltage is not high enough to sequence to the next RESET Position.</p> <p>The engine may be in neutral instead of RESET</p>	<p>To estimate the voltage, check the brightness of any light wired directly to the track, such as a lighted car or track clip light. Or use the green voltage signal lights on PowerGuard to find the high and low voltage levels.</p> <p>Set Cab-1 at a low momentum setting (see the Lionel Cab-1 instruction manual).</p> <p>Set Cab-1 at a low stall voltage (see the Lionel Cab-1 instruction manual).</p> <p>Use a more powerful transformer, like the ZW or the Lionel PowerHouse™, and make sure the transformer is turned up all the way.</p> <p>Make sure the engine is in RESET by turning off the engine, waiting for the "ding," then turning the engine back on.</p> <p>Read Appendix VI for alternate ways to run QS-3000 equipped engines with the Lionel Cab-1/PowerMaster system.</p>
<p>2. With Cab-1: Using the boost button does not advance the engine through the RESET Positions.</p>	<p>The boost button provides high voltage, but it responds slowly.</p>	<p>Use the throttle knob or direction button instead.</p>
<p>3. With Cab-1: Double "dings" are heard when pressing the horn button while in RESET.</p>	<p>The Cab-1 battery is weak.</p>	<p>Replace the battery.</p>
<p>4. With All-Trol: Using the direction button does not advance the engine through the RESET Positions.</p>	<p>The momentum setting is too high</p>	<p>Reduce the All-Trol momentum setting to zero.</p>

Troubles in RESET continued		
Problem	Cause	Solution
<p>With Any Transformer:</p> <p>5. The engine will not leave RESET. When the power is interrupted with the direction button, the engine sounds like it is moving through RESET Positions, making air let-off sounds.</p>	<p>The throttle setting is too high to change direction using the direction button. QS-3000 will not leave RESET until the throttle setting is below 14 volts.</p>	<p>Reduce the throttle to less than half before interrupting the power. A double "phsst" sound as the throttle is lowered shows QS-3000 has identified the transformer; this sound is normal.</p>
<p>6. When the horn button is pressed in RESET nothing happens.</p>	<p>Some RESET Positions have no choices assigned, and will not respond to horn signals.</p> <p>The engine is de-selected.</p> <p>The horn button is not wired correctly.</p> <p>The wrong transformer was selected in RESET Position #19.</p>	<p>This is normal.</p> <p>Select the engine using its assigned Train or Engine Number. If the engine does not have an assigned number, do an All Select (see the Quick Exit Guide) and the engine will come on.</p> <p>Make sure the common terminal from the transformer is wired to the outside rail.</p> <p>See Section 5, RESET Position #19 for more information.</p>
<p>7. The engine acts dead, with lights on but no sound or control.</p>	<p>The engine is de-selected.</p>	<p>Do an All Select (see the Quick Exit Guide).</p>
<p>8. The engine makes sounds, but will not leave RESET and go forward.</p>	<p>The engine is locked in neutral</p> <p>The transformer is not shutting off completely when the throttle is down, so there has not been an actual interruption of power.</p>	<p>Unlock the engine (see the Quick Exit Guide). To disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled."</p> <p>The track voltage must drop below 1.9v. Try using the direction control button to leave RESET.</p>
<p>9. The engine will not go into RESET, but it still makes sounds.</p>	<p>The engine is locked in neutral</p> <p>The transformer is not shutting off completely when the throttle is down, so there has not been an actual interruption of power.</p>	<p>Unlock the engine (see the Quick Exit Guide). To disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled."</p> <p>The track voltage must drop below 1.9v. Try leaving the throttle at a low setting and using the direction control button to leave RESET.</p>
<p>10. After changing some RESET Features, the engine will not respond to the bell or horn buttons in any direction or in RESET.</p>	<p>The engine is in Choice 4 or 6 from RESET Position #39.</p>	<p>Unlock the engine (see the Quick Exit Guide). Use the throttle and horn button to enter RESET Position #39 and choose a different system.</p>

Troubles in RESET continued		
Problem	Cause	Solution
11. All engine sounds stop past RESET Position #2.	QSI designed the sounds to stop so they would not interfere with feedback sounds.	This is normal.
12. In RESET, while trying to select an engine, there is a "ding" when the horn button is pressed and another "ding" when it is released.	The horn button is defective	See this Appendix, "Troubles with Transformers."
13. QS-3000 does not always respond to the horn button.	The horn button is defective. The wrong transformer was selected in RESET Position #19.	See this Appendix, "Troubles with Transformers." See Section 5, RESET Position #19, and Appendix II for directions on choosing and setting the correct transformer choice.
14. When the horn button on a standard Lionel transformer is pressed in RESET, the engine moves forward.	The horn button is defective	See this Appendix, "Troubles with Transformers."
15. The Engine is always on, whether it is Selected or De-Selected with the horn button.	Train or Engine Numbers have not been assigned, or they have been cleared. Any engine without an assigned number is always Selected when the power comes on.	Assign each engine a Train or Engine Number, or use a block system on the layout.
16. The engine goes forward while using the throttle to select a new RESET Position.	Bringing the throttle down too far will interrupt the power and put the engine in forward.	When advancing through RESET Positions, the voltage on the track must go up to a high voltage and down to a low voltage, but not off. For more reliable advancing, leave the throttle at its maximum setting and use the direction button to advance through the RESET Features, or use a QSI SideKick II.
17. The engine does not advance past RESET Position #0.	The throttle is not going to a high enough voltage (14v or greater) to trigger a RESET Position advance. The transformer may be overloaded, worn out, or an accessory controller (such as an Ott Horn Controller) between the transformer and track is taking too much power.	Remove accessories or use a more powerful transformer with higher voltage output. (See the table in Appendix II.)
18. There are no air let-off "pssht" sounds.	The feedback sounds were switched off in RESET Position #42.	Go to RESET Position #42 and choose "Normal Feedback" (choice 1).

Troubles in RESET continued		
Problem	Cause	Solution
19. An engine with an assigned Engine Number stays de-selected.	The correct Engine Number is not being used.	Assigned Engine Numbers can be written on a list, or on a label and attached to the bottom of the engine. Go to RESET Position #1. Press the horn button, counting how many presses it takes before the engine powers up. This is the assigned Engine Number. OR: write over the Engine Number with a new number: do an All-Select to start the engine (see the Quick Exit Guide), then go to RESET Position #44 to set a new Engine Number.
20. RESET Feature changes are not saved.	A weak or missing battery.	Replace the battery. OR: save the choice by advancing to the next RESET Position with the throttle before leaving RESET.
21. The engine goes dead when the Bell Button is pressed.	The "All De-Select" feature is enabled.	Do not use the bell button when the engine first enters RESET. OR: Go to RESET Position #72 and choose "Disabled."
22. The engine goes dead when the Horn Button is pressed.	The engine has an assigned Train Number. Pressing the Horn Button while the engine is in RESET Position #0 de-selects any engine except the one with a number equal to the number of times the Horn Button is pressed. The transformer is wired incorrectly, so the Horn Button actually sent a Bell Button signal and the "All De-Select" feature is enabled.	Press the Horn Button the number of times equal to the assigned Train Number. OR: write over the Train Number with a new number: do an All-Select to start the engine (see the Quick Exit Guide), then go to RESET Position #2 to set a new Train Number. Swap the leads to the track. If you wish, go to RESET Position #72 and choose "Disabled."
23. QS-3000 makes popping sounds, low volume motor sounds, garbled motor sounds, and engine and will not go into RESET.	The track and/or rollers are dirty or corroded. The battery is dead.	Clean the track and replace the rollers if necessary. See Appendix IV, "Replacing the Battery."
24. The bell was on, but after a RESET the engine powered up with the bell off.	When the engine is in RESET, the bell is automatically turned off.	This is normal.

Troubles in Forward or Reverse		
Problem	Cause	Solution
25. When the power is interrupted to leave RESET, the engine goes backward instead of forward when	The "Start-up Direction" RESET Feature is set to "RESET before Reverse".	Go to RESET Position #5 and choose "RESET before Forward."
26. After a three second power down, the engine starts right out without ever going into RESET.	The engine is locked in forward or reverse. The "Start-up Direction" RESET Feature is set to "Forward" or "Reverse."	Unlock the engine (see the Quick Exit Guide). Follow the Engine Unlock instructions in the Quick Exit Guide to return to RESET. Go to RESET Position # 5 and choose "RESET before Forward" or "RESET before Reverse."
27. In forward or reverse, the bell comes on when the horn button is pressed and the horn comes on when the bell button is pressed.	The track connections from the transformer are reversed and System 2 is selected.	Switch the transformer connections. Or, go to RESET Position #39 and select "System 1," but you must first swap the transformer or track connections, at least temporarily, to allow you to use the RESET features.
28. The horn (or whistle) comes on when either the horn or bell button is pressed.	System 1 is selected.	Go to RESET Position #39 and choose "System 2."
29. The chuff sound is irregular or the engine stops and RESETS automatically. Also, the horn sometimes blows by itself or there is a delay in the horn shutting off after releasing the horn button.	The track and/or rollers are dirty or corroded. The wrong transformer was selected in RESET Position #19.	Clean the track and replace the rollers if necessary. Check to see if QS-3000 is set for the correct transformer or is set for "Auto Select". (see Section 5, RESET Position #19).
30. The engine will go into RESET but will not go forward when the power is interrupted. A soft "tick" from the relays is heard, but the motor does not turn.	One or both motor wires are not connected to the QSI reverse unit or the ProtoSound bottom board. One or two brushes on the Lionel AC motor are hung up in the brush guides and are not making contact to the copper commutator on the armature.	Check the connections and re-solder if necessary. Remove the top brush plate and clean the guide with WD-40 and pipe cleaner rod or Q-Tips.
31. The engine only goes in one direction.	The engine is in Lock-out. The engine may be in Automatic Operation. The Direction Button is pressed too quickly, not giving QS-3000 time to change to the next direction. The Direction Button is faulty or the transformer is not shutting off the track voltage completely during direction changes.	Unlock the engine (see the Quick Exit Guide). If you want to disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled." Go to RESET Position #11 and choose the first choice, "Normal Operation." Press the Direction Button more slowly. Have the transformer serviced, or try a different transformer.

Troubles in Forward or Reverse continued		
Problem	Cause	Solution
32. After running the engine in Automatic Operation, doing a RESET and interrupting the power, the engine will not return to automatic operation.	The high throttle setting needed to run automatic operation keeps the engine from leaving RESET.	Move the throttle to a low setting before interrupting the power with the direction button.
33. There is a slight delay before the horn or whistle comes on after the Horn Button is pressed.	The horn signal may be too weak. If the horn signal is weak, QS-3000 delays blowing the horn or whistle, in order to determine if the horn signal is real. This keeps the horn or whistle from going off accidentally.	If you have an older Lionel "standard" transformer, press the horn button slowly. See this Appendix: "Troubles with Transformers." OR, the wrong transformer was selected in RESET Position #19. Check to see if QS-3000 is set for the correct transformer or is set for "Auto Select." (see Section 5, RESET Position #19).
34. The engine starts normally, but the horn or whistle blows, the bell comes on and goes off, and the engine starts and stops on its own.	The engine is in Automatic Operation. If Cab-1/PowerMaster is being used to run a ProtoSound based system, there are hardware incompatibility problems between the two systems.	Go to RESET Position #11 and choose "Normal Operation." Add a QSI PowerGuard to the PowerMaster output for reliable operation. See Appendix II.
35. With Cab-1, QS-3000 engines run at full speed and will not respond to Cab-1 controls.	The Lionel TMCC digital command control system puts high voltage on the track at all times. If engines are not equipped with a Lionel TMCC receiver, they will run at full speed.	QS-3000 equipped engines do not have TMCC receivers. If you want to use the Cab-1 walk-around throttle with QS-3000, use a Lionel PowerMaster controller set to conventional operation to power the track.
36. The chuff sound on an AC motored steam engine works in forward, but in reverse it is slow to start or does not work at all.	The speed detection on AC motors counts the spikes that come from the motor and if the motor is not carrying sufficient current, the spikes are small and not easily detected.	Try increasing the load on the engine by adding cars.

Troubles in Forward or Reverse continued		
Problem	Cause	Solution
<p>37. The horn continues to blow when the horn button is no longer pressed.</p> <p>Or the horn, whistle or bell will go on and off when no buttons are being pressed.</p> <p>When entering RESET from a cold start, three dings are heard instead of two. Or with a RESET, a "ding" is heard after three seconds without power, and another "ding" when power is re-applied.</p> <p>It is difficult to select engines using their ID number.</p> <p>When selecting RESET choices, there is no "ding" after the horn button is pressed.</p>	<p>An accessory, faulty transformer, powered car or some problem with the engine is putting a DC horn or bell signal on the track.</p> <p>The following may cause this problem:</p> <ol style="list-style-type: none"> 1) Right-Of-Way brass cabooses can be a source of DC on the track since their lighting system draws power unevenly from the track. 2) Faulty smoke generators in some new brass engines can cause uneven power loading on the track. 3) Dirty AC motor commutators can be a source of DC because of carbon build up. 4) Rollers are a source of DC on some engines (Weaver RS-3's and FA ALCO's) because the metal that is used makes them take power unevenly, or because of carbon buildup. 5) Faulty track connectors and dirty track can sometimes (but rarely) puts DC on the track. 6) Some electronic products in engines or cars use a half wave rectifier. This will put DC on the track. 	<ol style="list-style-type: none"> 1) Remove the caboose and see if this solves the problem. 2) Turn the smoke generator off and see if this solves the problem. If so, replace the smoke generator. 3) Spray the commutator with TV tuner cleaner and running the motor about a minute. 4) Clean the rollers thoroughly before replacing them. 5) Clean the track and run extra power leads to different locations on the layout. 6) Turn off or remove all other electronic products and see if this solves the problem.

Troubles in Neutral		
Problem	Cause	Solution
<p>38. Pressing the horn button to turn on the bell or arm the coupler causes the engine to go dead and it refuses to respond to direction changes.</p>	<p>The engine is not in neutral, it is in RESET. If the power has been off for three seconds or more QS-3000 will automatically be in RESET when the power is turned back on.</p> <p>An engine has an ID number may be de-selected when the horn button is pressed.</p>	<p>Interrupt the power and run through the directions until the engine is in neutral.</p> <p>Go to RESET Position #0 and do an All Select (see Quick Exit Guide).</p>
<p>39. Pressing the bell button to turn on the bell causes the engine to go dead and it refuses to respond to direction changes.</p>	<p>The engine is not in neutral, it is in RESET and in System 1.</p> <p>The engine is not in neutral, it is in RESET, and the engine has been De-Selected (turned off).</p> <p>The engine is not in neutral, it is in RESET and in System 2; and the wires from the bell button are backwards or the wires from the transformer are swapped.</p>	<p>Do an All Select to get your engine started (see Quick Exit Guide above). Go to RESET Position # 39 and choose "System 2."</p> <p>Go to RESET Position #0 and do an All Select (see Quick Exit Guide).</p> <p>Check the wiring. Go to RESET Position #0 and do an All Select to get your engine started again (see Quick Exit Guide).</p>

Troubles in Neutral continued		
Problem	Cause	Solution
40. While pressing the horn button in neutral to arm the coupler the bell comes on instead.	<p>The transformer may not have enough high voltage to arm the coupler (at least 14 volts are needed).</p> <p>The wires between the track and transformer are swapped.</p>	<p>See this Appendix: "Troubles with Transformers."</p> <p>If you press the horn button at high voltage to arm the coupler, you are actually turning on the bell. Check this by running the engine in forward and blowing the horn. If the horn button still turns on the bell, swap the wires.</p>
41. While pressing the horn button in neutral to turn on the bell, the horn blows instead. (The horn button operates properly in forward and reverse, so the transformer leads are connected correctly.)	The "Horn in Neutral" RESET Feature is set for the horn to come on by being "Enabled."	Go to RESET Position #25 and choose "Disabled."
42. Pressing the horn button in neutral causes the bell to come on, and the horn or whistle does not blow.	<p>The "Horn in Neutral" RESET Feature is set for the bell to come on in neutral when the horn button is pressed by being "Disabled."</p> <p>The wires from the transformer to the track are switched.</p>	<p>If your transformer has a bell button you can program the horn or whistle blow in neutral. Go to RESET Position #25 and choose "Enabled."</p> <p>Swap the leads to the track.</p>
43. All the coupler sounds come on when operating the coupler, but the coupler does not open.	<p>The QSI Coil Coupler Kit (sold separately) has not been installed.</p> <p>The QSI Coil Coupler Kit was not installed correctly</p> <p>Changing to a helper or forward engine in RESET position #4 will affect coupler operation.</p> <p>The couplers were turned off or changed in RESET Position #10.</p> <p>On a ProtoSound engine converted to QS-3000, the switch on the bottom of the engine may have been moved.</p>	<p>Install the remote QSI Coil Coupler Kit.</p> <p>Make sure the coupler coil is connected to the coil coupler board and the plug from the coupler is connected with the proper polarity to the QS-3000 board (see Appendix V).</p> <p>Go to RESET Position #4 and choose "Standard Engine." If you want the engine to be a helper, go to RESET Position #10 and choose the coupler setting you want.</p> <p>Go to RESET Position #10 and select a different Choice.</p> <p>Slide the switch back.</p>

Troubles in Neutral continued		
Problem	Cause	Solution
44. With a QS-3000 converted ProtoSound engine, when selecting different coupler options in RESET Position #10, the coupler operation either does not change or it shuts off both couplers even though the coupler sounds are still on.	On ProtoSound, the coupler activator is on the bottom board and only the front coupler output works. ProtoSound engines usually wire both couplers to this single front coupler output and use a switch on the bottom of the engine to choose between the front or rear coupler. Different coupler options selected in RESET position #10 will operate the single coupler output on those RESET choices that include the front coupler.	Go to RESET position #10 and select either "Both Enabled" or "Front Only Enabled." OR To operate both couplers as described in this guide, install the QSI Dual Coupler Kit.
45. When pressing the horn button to turn on the bell, the bell goes on when the button is pressed in, but then turns back off when the button is released.	The horn button is faulty.	See this Appendix: "Troubles with Transformers"
46. The engine does not change direction when the throttle is used.	The throttle may not be turning off all the way. The voltage needs to be below 1.9 volts before QS-3000 recognizes a direction change command. The Lionel Cab-1 throttle may not completely shut the power off. The engine may be in Lock-Out.	Use the direction button since it usually produces a more consistent power interruption than the throttle. Check your Lionel instruction book for more information, or see Troubles in RESET, Question #1, on how to accurately estimate voltage. Unlock the engine (see the Quick Exit Guide). If you want to disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled."
47. When trying to Lock-out the engine in neutral, all the sounds turn off and the engine will not respond to any commands.	The engine is not in neutral, it is in RESET and has just been de-selected.	Go to RESET Position #0 and do an All Select (see Quick Exit Guide). Run the engine, going through direction changes until the engine reaches neutral. Now Lock-out the engine.
48. The engine is stuck in Lock-Out and the engine sounds stutter or stop when power is interrupted to change direction.	The battery is dead, worn out, or disconnected.	QS-3000 needs battery back-up to activate Lock-out. Recharge or replace the battery (see Appendix IV, System Description and Hardware Adjustments, "Replacing the Battery" and "Recharging the Battery.")

Troubles with Sound		
Problems	Cause	Solution
49. When operating the horn, the sound seems to turn on very slowly or not at all, the horn may sound distorted at low throttle settings, or there is a dead zone when the horn button is released.	<p>If the engine is consistently operated at high sound volume and low throttle settings, the battery can be quickly discharged.</p> <p>The battery is disconnected.</p> <p>The battery is dead.</p>	<p>Let the engine sit with the power on half way for about 15 minutes to recharge the battery enough to get the engine going. If this works, lock the engine in neutral, turn the power up to half throttle and let it change for 24 hours. Or remove the battery and recharge it on a commercial charger.</p> <p>Check the wires between the battery and the blue QS-3000 top board.</p> <p>Replace the battery with a QSI NiCad 7 cell 8.4 volt battery (see Appendix IV, System Description and Hardware Adjustments, "Replacing the Battery.")</p>
50. When trying to blow the horn while the engine is in neutral, the coupler drawbar sound is heard.	The voltage is too high.	Lower the throttle. Pressing the horn button when the voltage is high arms the coupler. Pressing the horn button when the voltage is low blows the horn.
51. The Doppler effect does not come on.	The horn button was not reapplied quickly enough.	After holding the horn button 3 seconds or more, release and reapply the horn button <i>before the horn stops blowing</i> .
52. The horn will blow for long blasts, but not short blasts.	<p>The horn signal is weak.</p> <p>The wrong transformer was selected in RESET Position #19.</p> <p>The "Flange Always Enabled" choice has been selected in RESET Position #35. Since a short horn signal is used to turn on the flange sound, the horn sound is delayed to prevent flanges and the horn from coming on at the same time.</p>	<p>See ZW information in Question 49 above.</p> <p>Check to see if QS-3000 is set for the correct transformer or for "Auto Select." (see Section 5, RESET Position #19).</p> <p>Go to RESET Position #35 and select "Disabled" to turn the flange effect off, or "Flange Arm Enabled" to hear the sounds only when you arm the effect.</p>
53. The flange sound effects will not turn on with the horn button.	<p>The Flange effect has not been enabled.</p> <p>If "Flanges Arm Enable" is selected, the engine must be armed before the sounds can be heard.</p> <p>The horn signal is weak.</p>	<p>Go to RESET Position #35 and select "Flanges Arm Enabled" or "Flanges Always Enabled".</p> <p>See RESET Feature #35 for details.</p> <p>ZW's usually have a poor horn signal if the button is held down all the way. Press the horn button down only half way for short periods; it should operate the flange sound consistently.</p>
54. The squealing brakes don't come on after pressing the horn button, even though they are enabled in RESET Position #45.	The engine was not going fast enough to trigger the Squealing Brakes effect.	Turn the throttle up at least $\frac{3}{4}$ of the way (approximately 14 volts). Then press the horn button to activate the sounds.

Troubles with Sound continued		
Problem	Cause	Solution
55. After arming PFA, nothing happens.	The engine is not in neutral. PFA is not enabled.	After arming PFA, put the engine in neutral for the announcement to begin. Interrupt the power to move from one part of the announcement to the next. Go to RESET Position #28 and chose "PFA Enabled."
56. After arming PFA, putting the engine in neutral, and interrupting the power to move through all the PFA states, there are no announcements.	The engine is in QSM instead of PFA.	Go to RESET Position #28 and chose "PFA Enabled."
57. When operating PFA with double-headed engines, either the trailing engines operate out of sequence with the lead engine, or multiple PFA announcements come from all the engines.	All the engines are in PFA.	Set all the trailing engines to "QSM Enabled" in RESET Position #28. The engines will not produce the PFA sounds but will sequence with the lead engine.
58. When engines become helpers in RESET Position #4, a lot of sounds and other features go away.	This is normal. When you create helpers for multiple-headed consists, the horn and bell are muted, and the diesel warning light (RESET #8), diesel or steam neutral sounds (RESET #23), coupler operation (RESET #10), and PFA (RESET #28) features are changed for realistic helper effects.	After you make an engine a helper, you can go back to these various RESET Features and change them to suit you.
59. QS-3000 works when the tender cab is off, but when the cab is back on, there are no sounds and/or it does not work.	The tender cab is not insulated and the unit is shorting to the sides of the metal tender. When screwing the cab to the chassis floor, wires were pinched	Insulate the inside of the tender cab with electrical tape where it can contact the QS-3000 boards. Remove the cab carefully and check the wires.
60. When power is turned off, the sounds cut off immediately rather than lasting through brief power interruptions.	The battery is discharged. The battery is disconnected. The battery is dead.	Let the engine sit on the track with the power on half way for about 15 minutes to recharge the battery. Or, remove the battery and recharge it on a commercial charger. If this does not help, the battery is dead. Check the wires between the battery and the blue QS-3000 top board. Replace the battery with a QSI NiCad 7 cell 8.4 volt battery (see Appendix IV, System Description and Hardware Adjustments, "Replacing the Battery.")

Troubles with Sound continued		
Problem	Cause	Solution
61. The battery has been replaced a number of times and it keeps discharging.	<p>The wrong battery is being used.</p> <p>With electronic transformers, often there is not enough power at low throttle settings to keep the battery charged.</p> <p>Using "Automatic Operation" (RESET POSITION #11) quite often with the throttle set low can discharge the battery.</p> <p>The Power Supply is defective.</p>	<p>Use a QSI 7-cell 8.4 volt NiCad battery, not the common 9 volt alkaline battery or 6-cell, 7.2 volt NiCad battery. Alkaline batteries will eventually discharge. NiCad 6-cell batteries can be damaged or overheated by the QSI system; DO NOT USE THEM.</p> <p>In neutral or RESET keep the throttle at a high setting whenever possible. Or follow the directions for recharging the battery in Appendix IV.</p> <p>Follow the directions for recharging the battery in Appendix IV.</p> <p>Send both the top and middle boards to QSI for repair.</p>
62. The sounds are distorted at high volume.	The small speaker used with O-Gauge locomotives is being overdriven by high power output.	Go to RESET Position #7 and lower the volume.
63. The sounds are distorted and/or scratchy even at low volume settings.	The speaker installation.	Check that no wires or other objects are touching the cone. Make sure the motor wires are not bundled together with the speaker wires (this can cause static sounds from the motor). Make sure there is no glue, double sticky tape, or other adhesive touching any part of the movable speaker cone. Examine the speaker for any evidence of a tear. If the speaker is damaged, replace it with a new 8 ohm 2" speaker from QSI.
64. The engine works fine but there are no sounds at all of any kind, except for the "ding" when entering RESET.	The motor or chuff volume is turned down all the way and the engine is a helper engine.	Go to RESET Position #4, choose "Standard Engine," then go to RESET Position #6 and choose any volume except "Off."
65. The engine works fine but there are no sounds at all of any kind, including no RESET "ding."	The speaker is disconnected, defective, or has a broken wire.	Check to be sure the speaker is plugged into the top board pins (see Appendix IV), and that both wires are soldered to the two speaker terminals.
66. The engine runs fine but there is no steam chuff, diesel motor, electric engine cooling fan or gas/steam turbine sounds.	The Engine Volume is set to Volume 1, which is off.	Go to RESET Position #6, and re-set the volume.

Troubles with Sound continued		
Problem	Cause	Solution
67. The engine runs fine but the chuff starts only when the engine is moving fairly fast. There is no chuff at lower speeds.	The chuff threshold is set too high.	Go to RESET Position #27 and adjust the threshold to a lower setting.
68. The engine runs fine but the chuff sounds occur even when the engine is stalled.	The chuff threshold is set too low.	Go to RESET Position #27 and adjust the threshold to a higher setting.
69. The engine runs fine, but neither the bell nor the horn (or whistle) works.	The horn button is not working properly. The engine is programmed to be a helper.	See this Appendix, "Troubles with Transformers." Go to RESET Position #4 and choose "Standard Engine"
70. When power is off, the sounds keep going for about 10 seconds.	This is normal.	QS-3000 has a battery back-up that allows the sound to continue up to 10 seconds after the power has been turned off. There is no switch to turn the battery off; the computer does it automatically.

Troubles with Older Transformers

Older Lionel transformers (ZW, KW, 1033, etc.) are well-designed power supplies that work reliably for many years. However, some of these old workhorses are getting tired and the horn button in particular may need some repair. If QS-3000 is not responding correctly to the horn button, the problem is probably with the transformer.

Does your engine have one or more of these problems when you press the Horn Button?

- **When the Horn Button is pressed to blow the horn, the engine moves a little faster or slows down.**
- **When the Horn Button is pressed to blow the horn, there is a pause before the horn blows.**
- **When the Horn Button is pressed in neutral to ring the bell, the bell does not come on unless the Horn Button is pressed slowly.**
- **When the Horn Button is pressed slowly to turn on the bell (or arm the coupler), the bell comes on but goes back off when the Button is released.**
- **There is a "ding" when the Horn Button is pressed but there is another "ding" when it is released. Or there are no "dings" at all.**
- **When the Horn Button is pressed down slowly, the engine changes direction.**

Defective transformer horn buttons cause all of these problems.

Horn buttons on transformers like the ZW actually go through two positions when pressed, one at the halfway point, and the second when the button is pressed all the way down. Pressing the horn button in all the way sends lots of power to the track, but the horn signal is weak, so the engine may not pick up the message you are trying to send. Pressing the horn button in halfway sends a strong horn signal, so the engine responds quickly to the command. But this halfway position leaves your engine with less power, so the engine slows down when you blow the whistle. Also, pressing the horn button down halfway sometimes causes a power interrupt if the horn button contacts are worn.

Here are some things you can do to improve matters:

- 1) **Press the Horn Button down slowly so it reliably goes through the first horn position before it goes to the second position.**
- 2) **Press the Horn Button in all the way and wait. When QS-3000 gets a weak signal, it will wait about 1/2 second before it responds. This delay was built into QS-3000 to ignore false signals that might cause the horn to go off accidentally.**
- 3) **Press the Horn Button in part way and release it so it never reaches the second position. This will be a reliable signal, but it will cause the engine to slow down momentarily. Pressing the Horn Button partway also prevents QS-3000 from responding twice; once when the horn is pressed in and once when it is released.**
- 4) **Try changing sides on your ZW transformer. Sometimes the Horn Button on one side is defective or weak but the one on the other side still works well.**
- 5) **Add QSI PowerTrak or PowerGuard to the track. Either one will put a load on the track. This load improves the DC horn signal being sent so the engine behaves reliably and predictably, and you can use your transformer in a normal manner.**

- 6) **Clean the Horn Button contacts and adjust the spring tension to prevent power interrupts.**
- 7) **Replace the rectifier disk in the transformer.**
- 8) **The best solution is adding a SideKick II, QSI's push-button controller, to your transformer. It's an inexpensive and extremely reliable way to send commands to your engine anytime, especially in RESET. People who use SideKick II wonder how they ever operated their engines without it. It is a very useful tool. For more information about SideKick II, see Section 1, "MORE: SideKick II."**

Troubles with New Transformers

QSI originally designed their products to work with the powerful Lionel ZW transformer. Over the years, new transformers and power packs have become available. Most work fine with QSI systems, but a few do not.

QS-3000 contains new software that automatically identifies and selects the transformer being used when the engines are powered up. All transformers listed in "Appendix II: Connecting Transformer and Horn/Bell Controllers to Your Track" have been tested and are safe to use with QS-3000 unless otherwise stated. We cannot guarantee that every future transformer will be safe to use with QS-3000 until we have had a chance to test it with our system. Please contact QSI before using a transformer not listed in Appendix II to see if it has been approved.

Sometimes the new electronic transformers do not have a strong horn signal at the highest throttle setting, so the horn button does not work reliably. Also, electronic transformers apply power to the track in different ways, which can cause a variety of problems. If the engine is experiencing problems and you suspect your transformer, please call us and we will try to help you solve the problem.

If you are using a Lionel Cab-1 Walk Around Throttle and PowerMaster with an engine converted from ProtoSound to QS-3000, and the horn or bell goes off erratically in forward or reverse, or extra "dings" occur in RESET, hardware compatibility problems are probably to blame. These problems are caused by a distorted waveform from the Lionel system that allows an unwanted horn signal at lower voltages.

Adding a QSI PowerGuard to PowerMaster solves these problems. In addition to detecting and suppressing potentially damaging power spikes from transformers, PowerGuard corrects the distortion of the voltage waveform so ProtoSound engines converted to QS-3000 can read the PowerMaster signals accurately. See Section 1: "MORE: QSI PowerGuard" for more information on PowerGuard. Appendix IV: "Add PowerGuard to Your Layout" shows how PowerGuard is connected to the track.

Appendix II: Connecting Transformer & Horn/Bell Controllers To The Track

Connecting the Transformer to the Track

The chart on the next page lists popular transformers, and shows the transformer and track wire connections that work with QS-3000. References to left or right terminals are made when looking at the back of the transformer.

Some older transformers send a negative DC signal when the horn button is pressed, instead of the positive DC signal QS-3000 requires. For these transformers, the wires to the inside and outside tracks should be switched compared to the instructions that came from the transformer manufacturer.

Your transformer has to have a horn and bell button to send commands to QS-3000. Some transformers, like the Lionel V or Z, do not have horn buttons. Others, like the Lionel 1033 or ZW, do not have a bell button. Use a QSI SideKick II or other accessory horn and bell buttons with these transformers.

The Lionel MW is not recommended for use with QS-3000 because the MW direction button will not always work properly and the horn button does not respond the same at different throttle settings.

The last column in the chart lists the type of transformer and the choice to make in RESET Position #19, if you wish to assign QS-3000 to this specific transformer. "Standard" transformers are variable amplitude transformers, like the ZW. The new chopped waveform transformers are called "Electronic" transformers. A few of the new electronic transformers provide a smooth waveform, and these are called "Smooth Electronic."

Some transformers are more likely than others to produce damaging spikes. However, all transformers are capable of creating voltage spikes that can damage the components on 3-Rail electronics. PowerGuard detects sharp increases in voltage and holds the voltage to a safe level.

QSI does not guarantee any QSI designed sound and train control system against damage caused by excessive transformer voltage or power spikes unless PowerGuard is connected to the transformer outputs, even if the transformer is on the approved transformer list.

Using QSI systems with transformers not recommended or not listed here may void the QSI warranty.

Note: If you are in Europe, QS-3000 is designed to work at 50hz, but not below 49hz or above 51hz.

Transformer Model	Center Rail	Outside Rail	Min-Max Voltage	Power Rating	Transformer Type/Choice
All-Trol™ ³	left terminal	right terminal	0-24v	300 watt	Electronic/4
Dallee@Hostler™ ³	left terminal	right terminal	2-16	160 V.A. ¹	Smooth Electronic/2
Lionel:					
1032	U	A	5-16v ²	90 watt	Standard/2
1032M	U	A	5-16v ²	90 watt	Standard/2
1033	U	A	5-16v ²	90 watt	Standard/2
1043	U	A	5-16v ²	90 watt	Standard/2
1043M	U	A	5-16v ²	90 watt	Standard/2
1044	U	A	5-16v ²	90 watt	Standard/2
1053	U	A	8-17v	60 watt	Standard/2
1063	U	A	8-17v	60 watt	Standard/2
Cab-1/ PowerMaster™	A	U	0-18v	135 V.A. ¹	Electronic/3
LW	A	U	8-18v	125 watt	Standard/2
KW	A or B	U	6-20v	190 watt	Standard/2
MW (Not Recommended) ³	outside track terminal	inside track terminal	5-16v ²	50 V.A. ¹	Electronic/4
RS-1® ³	Red Terminal	Black Terminal	0-18v	50 V.A. ¹	Electronic/5
RW	U	A	9-19v	110 watt	Standard/2
SW	U	A	8-19v	130 watt	Standard/2
TW	U	A	8-18v	175 watt	Standard/2
V ^{6,7}	A or D	U	6-24v	150 watt	Standard/2
VW	A or D	U	8-20v	150 watt	Standard/2
Z ^{6,7}	A or D	U	6-24v	250 watt	Standard/2
ZW	A or D	U	8-20v	275 watt	Standard/2
MRC:					
MRC Tech II™	left terminal	2 nd from left	0-15v ²	40 V.A. ¹	Electronic/4
MRC Dual Power 027™ (Not Recommended) ³	2 or 7	3,4,5 or 6	0-16v	270 watt	Electronic/4
MTH:					
MTH Z-4000™ ⁵ (with PowerGuard)	Red	Black	5-21.5v	360 watt	Smooth Electronic/5
MTH Z-750™, yellow box (Not Recommended) ^{3,4}	Red	Black	2-13v	75 watt	Electronic/4
MTH Z-750™ red box ^{3,4}	Red	Black	2-13v	75 watt	Electronic/4
R.O.W® ⁶	Red Terminal	Black Terminal	0-24v	384 watt	Standard/2
Troller	right connector on terminal	left connector on terminal	.5-18v	150 V.A. ¹	Electronic/4

¹ A V.A. (Volt Amp) rating is similar to a wattage rating.

² QS-3000 needs more than 14 volts of power to work properly. Over-loading the transformer or using in-line accessories can bring peak volt-age below QS-3000's requirements.

³ An accessory horn or bell button does not work reliably with this transformer. Use a SideKick II if the horn or bell button is missing or doesn't work.

⁴ Early Z-750's packed in yellow boxes produce damaging voltage spikes and overvoltages, and are not recom-mended. Later Z-750's packed in red boxes deliver a lower voltage and are safe to use. To determine which Z-750 you have, attach a PowerGuard to the transformer and turn up the power. If the red light on PowerGuard stays on steadily, you have the early Z-750 that is not recommended. Damage to QSI sound systems and reverse units from these early transformers is not covered under any QSI warranty.

⁵ Because the MTH Z-4000 is a very powerful transformer, it can create very powerful and very damaging voltage spikes. So Z-4000 is approved only when used with QSI PowerGuard.

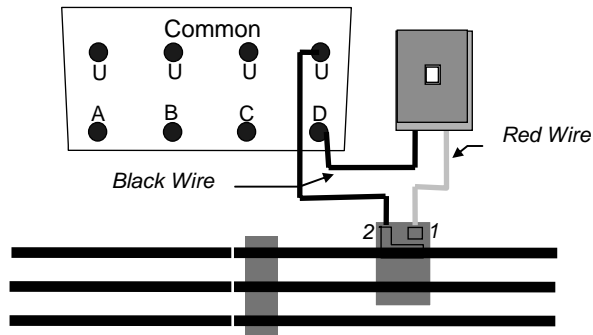
QS-3000 cannot detect Z-4000 in Auto-Select. For the best performance, program your engine for Choice 5 in RESET Position #19.

⁶ These transformers have an output voltage above our recommended limit for QS-3000. However, we have not received any failure reports from people using these transformers over the last 9 years. Therefore these transformers are approved.

⁷ The Z and V transformers do not have horn or bell buttons. In order to use these transformers with QSI sound systems, connect a QSI SideKick II to each operating throttle.

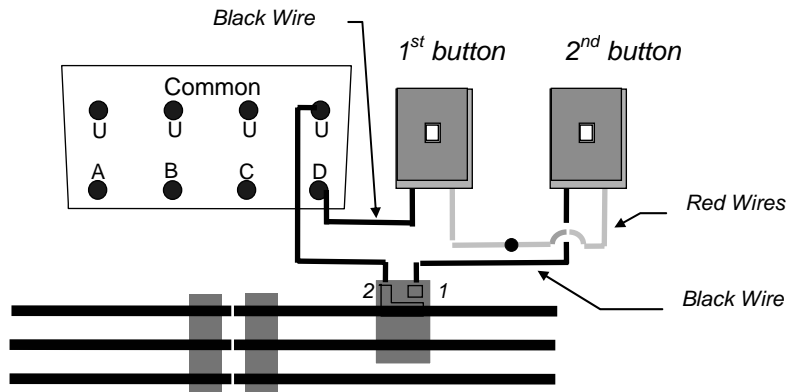
Connecting the Lionel Bell Button to Use in Place of the Transformer Horn Button

If you have a transformer with no horn button (like the Lionel Z) or a faulty horn button, you can wire the Lionel bell button to take its place. *Note that this wiring is the reverse of the wiring for normal bell button operation.*



Connecting the bell button to blow the whistle

You can also wire two bell buttons to your transformer, and use one as a normal bell button and the other in place of the horn button.

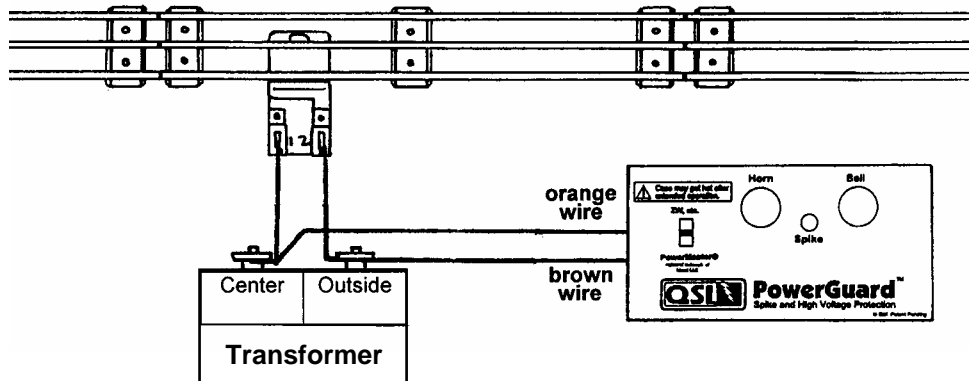


Connecting two Bell Buttons

The first button will blow the horn or whistle, and the second will turn the bell on and off.

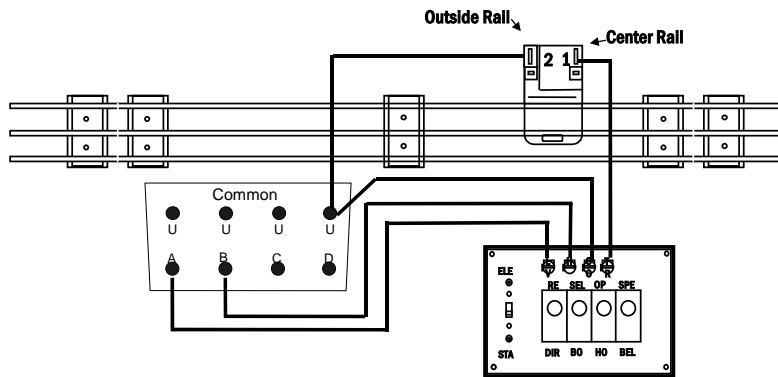
Add PowerGuard to Your Layout

PowerGuard is designed to detect and stop high voltage transformer spikes that can damage 3-Rail electronics, fix problems with newer transformers, and visually monitor track voltage. For information on using PowerGuard, see **Section 1: "MORE: QSI PowerGuard."**



Add SideKick II to Your Layout

SideKick II is an easier way to select and operate RESET Features and run your engine. For information on using SideKick II, see **Section 1: "MORE: QSI SideKick II."**



Appendix III: RESET Feature Quick Reference

each low-high-low throttle = next RESET Feature
 each "choice" box = 1 press of horn button
 first horn button press = current setting

shaded square = factory setting
 engines with no ID #'s are always on

RESET Position and Feature	Choice
0 Train Select and All Select Engines without assigned numbers are always selected. If a Train Number is assigned, press the horn button the same number of times to select the engine	Select Train 1
	Select Train 2, etc.
1 Engine Select If an Engine Number is assigned, press the horn button the same number of times to select the engine	Select Engine 1
	Select Engine 2, etc.
2 Train Number Set Press the horn button to reach the desired number.	Number 1
	Number 2, etc.
3 Train Number Clear	Clear
4 Helper Type Choices may affect cab chatter, diesel warning lights, couplers and PFA.	Standard Engine
	Mid Helper Engine
	End Helper Engine
	Forward Engine
5 Start-up Direction Choices 1 and 2 are like MTH Choices 3 and 4 are like Lionel	RESET before Forward
	RESET before Reverse
	Forward
	Reverse
6 Engine Volume Press the horn button to begin Press the horn button to lower volume Press the bell button to raise volume	Volume 4 (highest) thru Volume 1 (off)
	Volume 8 (highest) thru Volume 1 (off)
7 System Volume Press the horn button to begin Press the horn button to lower volume Press the bell button to raise volume	Volume 8 (highest) thru Volume 1 (off)
	Warning Lights Toggle
	Light 2 (for future use) Light 3 (for future use)
8 Engine Lights See #58 & #59 below for Diesel Warning Light choices. Press the horn button to choose light Press the bell button to toggle light on or off	Warning Lights Toggle
	Light 2 (for future use)
	Light 3 (for future use)
9 Appliances on Steam Engines Press the horn button to choose appliance Press the bell button to toggle appliances on or off	Cocks Toggle
	Drift Chuff Toggle
	Air Pump Toggle
9 Appliances on Diesel Engines Press the horn button to choose appliance Press the bell button to toggle appliances on or off	Turbo Toggle
	Choice 2 (for future use)
	Air Pump Toggle

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each low-high-low throttle = next RESET Feature
 each "choice" box = 1 press of horn button
 first horn button press = current setting

shaded square = factory setting
 engines with no ID #'s are always on

RESET Position and Feature	Choice
9 Appliances on Electric Engines Press horn button to choose appliance Press bell button to toggle appliances on or off	Fans Toggle
	Vents Toggle
	Air Pump Toggle
10 Coupler Operation	Forward and Reverse Disabled
	Forward and Reverse Enabled
	Trailing Arm Enabled
	Front Only Enabled
	Rear Only Enabled
11 Automatic Operation Select a program, interrupt the power to begin. To exit, do a RESET, return to this feature, and choose Standard Operation	Standard Operation
	Grade Crossing
	Display Box
	Milk Run
	Sales Demo
14 High Speed Horn	Whistle Only
	Horn Only
	Whistle at Low Speed
	Horn at High Speed
15 Doppler Run-by	Disabled
	Enabled
18 Operation Clear Does not clear ID Numbers. Use RESET Positions 3 and 45 to clear ID Numbers.	Clear 4-17
	Clear 19-50
	Clear 51-74
19 Transformer Type	Auto Select
	ZW Type
	Cab-1
	MRC
	RS-1
	Z-4000
	UCUB
23 Neutral Sounds	Disabled
	Enabled
24 Atmospheric Effects	Disabled
	Enabled
25 Horn in Neutral	Disabled
	Enabled
26 Brakes Sound Threshold	Engine Start
	Set Trigger
	Set Threshold and Review
	Engine Stop

each low-high-low throttle = next RESET Feature
 each "choice" box = 1 press of horn button
 first horn button press = current setting

shaded square = factory setting
 engines with no ID #'s are always on

RESET Position and Feature	Choice
27 Engine Threshold and Rate	Engine Start
	Engine Threshold Set
	Engine Rate Set and Review
	Engine Stop
28 PFA (Passenger or Freight Announcement)	Disabled
	PFA Enabled
	QSM Enabled
	Station Stop Enabled
	Station Stop QSM Enabled
29 Engine Sound Set	Sound Set 1
	Sound Set 2
	Sound Set 3, etc.
30 Slack Action	Disabled
	Enabled
32 Pull Cord	Disabled
	Enabled
34 Squealing Brakes	Disabled
	Brakes Arm Enabled
	Brakes Always Enabled
35 Flange Sound	Disabled
	Flange Arm Enabled
	Flange Always Enabled
37 I Think I Can	Disabled
	Enabled
39 System Type System 1 is Horn Button operation only. System 2 is Horn or Bell Button operation. System 3 is for future use. System 5 is used with Train America's UCUB. Systems 4 and 6 are not operational; do not use.	System 1
	System 2
	System 3
	System 4
	System 5
	System 6
40 Lock-out	Disabled
	Enabled
42 Feedback	Feedback 1
	Feedback 2
	Feedback 3
44 Engine Number Set Press horn button to reach desired number	Number 1
	Number 2, etc.
45 Engine Number Clear	Clear
48 Water Scoop Sound	Disabled
	Enabled

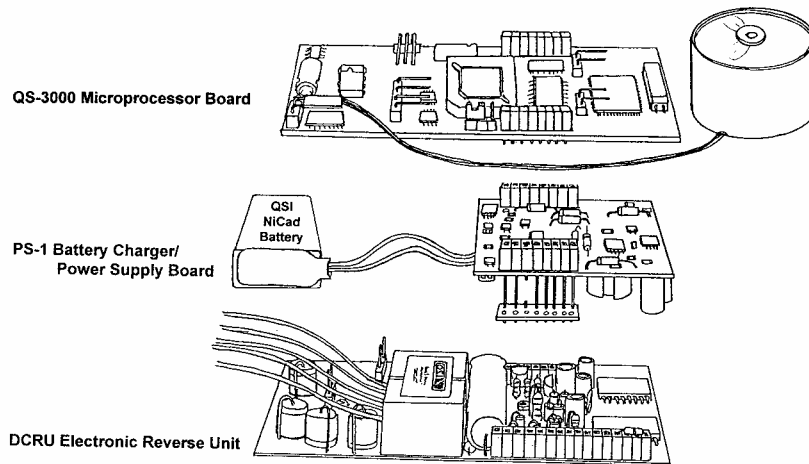
128 ♦ Appendix III QS-3000 RESET Features

each low-high-low throttle = next RESET Feature
 each "choice" box = 1 press of horn button
 first horn button press = current setting

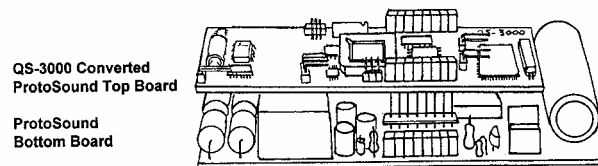
shaded square = factory setting
 engines with no ID #'s are always on

RESET Position and Feature	Choice
51 Horn Selected Neutral Features	Disabled
	Both Neutrals
	Neutral Before Reverse Only
58 Warning Light Type	Steady
	Overhead
	MARS
	Ditch
	Strobe
	Reverse
59 Warning Light Operation	Operate if Selected
	Operate Always
72 All De-Select	Disabled
	Enabled

Appendix IV: System Description & Hardware Adjustments



QS-3000 consists of three circuit boards that plug into each other. The bottom board is the QSI reverse unit (either an ACRU or DCRU). The small, middle board, called the PS-1C Board, provides power for the system. The top board, called the QS-3000 Microprocessor Board, controls the system. It contains the computer and memory chip with software, along with the audio amplifier to produce the sound. Together, these boards provide the realistic CD-like 16 bit digital sound as well as computer and train control features.

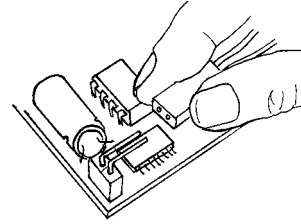


If you own a ProtoSound system converted to QS-3000, you have a two-board system. A converted ProtoSound system works like QS-3000, but may not accept all future QSI-designed accessories.

A coupler board is included on the ProtoSound Bottom Board. With QS-3000, a QSI Dual Coupler Kit can be added to the converted ProtoSound system for working couplers at the front and rear of the engine.

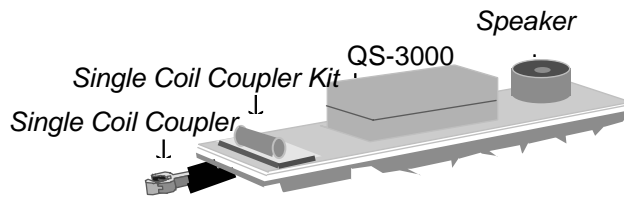
Connecting the Speaker

The speaker wires come with a special two-wire connector that plugs onto the connecting pin on the circuit board as shown. It does not matter which way the plug is placed on the pins.



Connecting the Coil Coupler

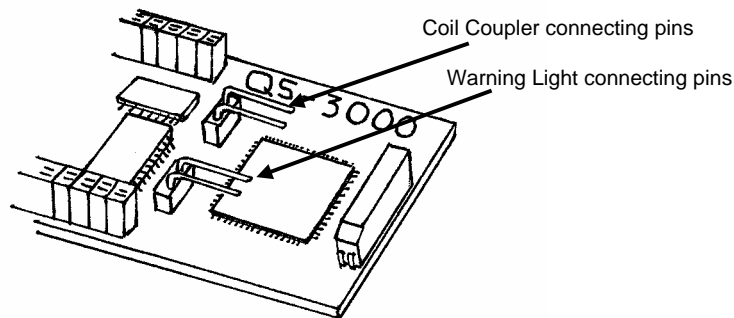
The optional Dual or Single Coil Coupler Kit must be installed for the coupler to actually operate. A plug connects the Coil Coupler Board to the pins on QS-3000 (see illustration at the bottom of the page). With a QS-3000 upgrade, Dual Coil Couplers can be installed on any system, including ProtoSound systems.



Connecting the Diesel Warning Light

An Overhead Blinking Light Kit must be installed before the light will work. The two-pin connector for the diesel warning light is shown here. Other diesel warning light kits are planned for the future.

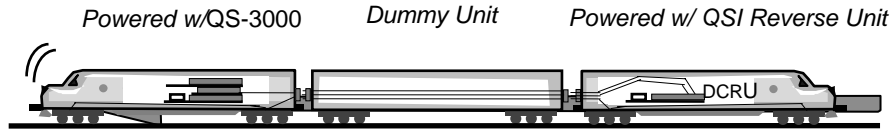
If the warning light or coil coupler does not work correctly, try removing the plug, turning it over, and plugging it in again.



Using Cables To Connect Powered Diesels

The cable and plug assembly allows you to connect a powered engine equipped with QS-3000 to another powered engine that has a QSI reverse unit. Cabling from or to ProtoSound equipped engines, even if they are converted to QS-3000, will not work because of hardware differences.

Cabling makes it possible to call up, or select, both engines as a single two-engine set using only one QS-3000. The plastic plug and socket can be disconnected easily for engine storage or for running the lead engine separately. If you are using a dummy unit, you can pass the QSI 3-Wire Cable Set directly through the dummy.



This cable assembly is designed to connect the QS-3000 engine to one other powered engine only; it is not recommended to cable up more than two powered engines.

If you are interested in cabling two of your engines together, please call your dealer or QSI to order a Cable and Plug Assembly Kit and full instructions.

Replacing the Battery

The QS-3000 system recharges the battery whenever the power is on. After a few years, the NiCad rechargeable battery may wear out.

Signs of a Weak or Dead Battery:

- Sounds stop suddenly, seem distorted or garbled with power interrupts.
- Sounds are distorted at low transformer settings
- Sounds stop before the 3-second "ding" when the power is shut off
- While running, the engine jerks or cuts off when the whistle is blown
- Engine will not leave neutral
- The triple "ding" at first power-up is missing

Before replacing the battery, try recharging it (see the next page).

The QS-3000 NiCad battery is a special 7-cell, 8.4volt battery—not the common 9 Volt alkaline battery or 6 cell, 7.2 volt NiCad battery. The rechargeable NiCad battery is connected to the PS-1C Board (the middle board) with a two-wire cable and terminal Snap-On connector. When replacing the battery, remove the terminal connector from the old battery and snap the terminal connector onto the new battery.

The battery is usually held in place with double sticky foam tape. This tape should be replaced when installing a new battery so the battery does not come loose.

Recharging the Battery

Put your engine on a powered track in neutral and turn the throttle up to 12 volts for about fifteen minutes. If the battery comes back to life, the battery is still able to take a charge. Give the battery a full charge by leaving your engine powered up in neutral for not less than 12 hours or more than 24 hours. Lock-out the engine in neutral or de-select it so the engine does not start running while the battery is being charged.

You can also remove the battery from the engine and recharge it using a commercial battery charger.

If the battery does not take a charge, it is worn out. You can substitute a standard 9v alkaline battery as a *temporary* fix. Since alkaline batteries will not take a charge, it will eventually wear down but you should have anywhere from a week to a couple of months of use. Run the engine with this temporary back-up while ordering another NiCad battery from QSI.

<p>Note: Do not store your engine with an alkaline battery installed since the battery may leak and cause damage to your engine. NiCad batteries are dry batteries and should not leak corrosive chemicals.</p>
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Replacement 7-cell, 8.4 volt NiCad batteries are available from QSI and some electronic parts stores.

Appendix V: Operating Without a Battery

QSI sound and train control systems, including ProtoSound systems converted to QS-3000, are not designed to run without a battery.

When the battery is removed from the QS-3000 system, the on-board computer shuts down for any power interruption, including direction changes, dirty track, and RESET. Because the computer is off, the timing for RESET and direction changes must come from an auxiliary timing circuit, which is not quite as accurate as the QS-3000 computer timer. The engine sound effects will turn off as soon as the power goes off, and abruptly turn on again when power is re-applied, sometimes with an audible "pop." The sound may be distorted at low throttle settings. You may need to leave the power off a little longer to get a RESET.

In addition, there are some features that *do not work* without a battery.

1. There is no three-second time-out "ding" telling you to turn the power back on for a RESET. You will need to estimate when three seconds have gone by.
2. Engine Lock-Out will not work at all since it depends on the computer running while power is shut down. Also, if you removed the battery when the engine was locked out, you will not be able to unlock the engine. To get your engine going again, see **Appendix I, Quick Exit Guide, "Engine Unlock."**
3. When selecting engines or making Feature choices, your selection will not be set until you move to the next RESET Position with the throttle. If you turn off the power before you move to the next RESET Position, the RESET Feature will revert back to the last setting.

<p>Note: If you intend to operate your engine without the battery, cover the battery terminal connector with electrical tape. Contact with the chassis, other parts of the engine, or the electronic components on the circuit boards could damage the QS-3000 system.</p>

Appendix VI: Using the Lionel Cab-1/PowerMaster with QS-3000

The instructions given here will not work with Train America Studio's UCUB. If you plan to use QS-3000 with UCUB so you can run QS-3000 equipped engines using Lionel's Train Master Command Control, please contact Train America Studios, 970 Windham Court, Suite #9, Youngstown, OH 44512 (330) 629-7625 for special installation instructions, operating instructions and warranty information.

QS-3000 responds quickly and accurately to commands from your Lionel® Cab-1 Walk-around Throttle™ when PowerMaster™ is set for conventional operation.

QS-3000 is a conventional control system. With conventional control, you change engine speed by changing the voltage going to the track with your transformer throttle. Also, conventional control uses DC signals from the horn and bell buttons to give operating instructions to the engine. Command Control applies a fixed 18 volts of power to the track and uses digital commands to control speed and send messages to the engine. These two ways of controlling engines are so different that conventional engines cannot be run using Command Control, and Command Control engines cannot be run using conventional control.

On the side of the PowerMaster unit, you will see a switch marked "CMD/CONV," or Command (CMD) and Conventional (CONV) track voltage settings. Set the switch to "CONV" when running QS-3000 engines. Your QS-3000 engines will run on the same track with other conventional engines, including Weaver, Right-of-Way, K-Line, Williams, MTH and all Lionel engines.

You can use any QSI approved transformer or power pack with your Cab-1 walk-around throttle and PowerMaster, including ZW and the new Lionel PowerHouse™. Do not use the Lionel Command Control Base™.

Since Cab-1 doesn't have stops or voltage marks on the throttle knob, it's hard to tell just what it's doing. To operate QS-3000 you need to know when high or low voltage is being sent to the track, and PowerGuard gives you that information accurately and reliably. Its two lights are a visual volt meter for Cab-1 throttle settings. If you don't have PowerGuard, you can watch the lights on passenger cars or any lighted accessories connected to the track to estimate the amount of voltage Cab-1 is sending. Many new engines have constant voltage lighting, so you can't estimate power from their lights.

How to Use the Cab-1 Walk-around Throttle With QS-3000

You can use the Cab-1 Throttle, Direction, Horn, Bell, Boost, Brake, Halt, AUX 1 and momentum settings buttons. The other Cab-1 buttons are designed for use with Command Control engines and will not work with conventional systems. In general, follow Lionel's Cab-1 operating instructions, with these changes:

Throttle knob:

Use the throttle knob to control engine speed. Do not try to change direction with the throttle knob. Since the Cab-1 throttle does not have a stop, it is difficult to find "off." So use the Cab-1 direction button to change direction instead.

Use the throttle knob to move through RESET Features. Put the engine in RESET. Use the lights on PowerGuard to find a high throttle setting, and set the Cab-1 stall voltage at a high enough value to prevent direction changes when the throttle is used. QS-3000 will not leave RESET and change direction so long as the throttle is at a high setting. Now you can move the throttle knob up and down to advance through RESET positions. Listen for the air let-off "pssht" sound with each RESET Feature advance.

Direction Button:

Use the direction button to change direction. The throttle must be at a low setting (about 10 volts) before your engine will leave RESET. Watch the lights on PowerGuard as you move the Cab-1 throttle knob. When the throttle reaches a low power level, the PowerGuard lights will noticeably dim and you can press the direction button to leave RESET.

Use the direction button to put your QS-3000 engine in RESET. Hold the direction button down for about three seconds, until you hear the RESET "ding." Release the button. Your engine is in RESET.

Use the direction button to advance through RESET Features. While in RESET, turn the throttle all the way up to the highest voltage (watch the PowerGuard lights brighten). Press the direction button and listen for the "pssht" sounds to help you count as you advance through RESET Positions. If you press the button too quickly, the power will stay off and you will not move through the RESET Positions. Push the button deliberately. Watch the lights on PowerGuard turn on and off to help you count.

Whistle/Horn and Bell Button:

Use normally. The bell button on Cab-1 has a built-in delay. So when using the bell button in RESET, pause one second each time you release the bell button to get your message through.

Brake Button:

The brake button may stop the engine too suddenly for the QS-3000 brake sounds to come on at the right time. Try it, and if you don't like the timing, use the throttle to slow the engine gently. Setting the proper Cab-1/PowerMaster stall voltage for your engine may improve brake sound timing also.

Halt, Boost, Momentum, AUX 1 and TR Buttons:

Use these buttons as instructed by Lionel in the PowerMaster instructions.

Appendix VII: Glossary

TERM	DEFINITION
ACRU	The QSI reverse unit used in Lionel engines that have AC or Universal motors.
All De-Select	An easy way to turn off all powered engines using a bell button. Available with QS-1, QS-2+ and QS-3000, but not QS-2.
All Select	A way to turn all QS-1, QS-2, QS-2+ and QS-3000 equipped engines on. All Select only applies to engines with assigned ID numbers.
Appliance	A part of an engine that performs a specific task. For example, steam cocks and air pumps are appliances.
Arm	Prepare the engine to operate a feature at a later time. For example, couplers are "armed" while the engine is in neutral. Once they are armed, the couplers can be fired any time while the engine is in neutral or while it is running.
Back-Up Battery	Connected to the PS-1C circuit board, the back-up battery supplies power to the on-board computer and sound system whenever track power is interrupted.
Bell Button	A button connected to the transformer and track that puts negative DC on the track to turn the bell on and off and run various QS-3000 features. The Lionel Railsounds No. 5906 bell activation button is one example. SideKick II and some transformers already have Bell Buttons.
Cab Chatter	Actual radio transmissions complete with radio squelch and beeps, between engineers and dispatchers. Cab chatter occurs randomly in diesel and electric engines. RESET Position #23 allows you to turn off these sounds.
Choice	The RESET Feature settings that can be programmed into the QS-3000 computer.
Clear	Erases a previously assigned ID Number.
Coil Coupler	The QSI Coil Coupler is very similar to the Teledyne coupler introduced by Lionel in the 1940's and contains a solenoid coil plus plunger to open the coupler knuckle. Single and dual couplers can be used with the QS-3000 system to control the coupler or couplers by remote control anywhere on the layout. Coil Couplers eliminate special coupler control tracks.
Computer Restart	A way to restart the QS-3000 computer. Turning the power off for more than 15 seconds shuts down the QS-3000 electronics and allows the computer to reset itself. Also called "Hard RESET."
DCRU	A QSI reverse unit used in engines that have DC or "Can" motors.

De-Select	Engines are de-selected when you select another engine using its ID number. A de-selected engine remains silent and motionless while selected engine is running. See All De-Select also.
Direction State	Forward, Neutral and Reverse are direction states. RESET is a special programming state, not a direction state.
Disable	To make a feature inoperable.
Doppler	Technically, Doppler is the apparent change in signal frequency when the source and observer are in relative motion, the change being an increase in frequency as the source approaches the observer, and a downward shift as the source and observer separate. Simply, Doppler is that dramatic drop in pitch you hear as a train goes roaring by.
Dual Coil Coupler Kit	With the QSI Dual Coil Coupler Kit, engines have working couplers at the front and rear. Both couplers can be controlled independently without using special control track sections. See RESET Position #10.
E-Unit	The mechanical reverse unit used by Lionel since the early 1930's and still used today.
Enable	To make a feature operable. Usually another series of commands are needed before the engine actually operates the feature. For example, when couplers are Enabled, you still need to arm and fire them before they actually operate.
Engine Number	One of two ways to assign ID numbers to your locomotive. Engine Numbers are most useful on layouts with a large number of engines. The Engine Number is used to distinguish engines within a group or Train, such as Engine #4 in Union Pacific Train #5.
Engine Plus	An easy way to select and operate groups of engines with Train or Engine Numbers.
Factory Settings	Your QS-3000 has been pre-set at the factory to sound and operate in a certain way. In Section 5 and on the RESET Feature Quick Reference list in Appendix III the factory setting is given for each RESET Position. Use RESET Position #18 to return QS-3000 to the factory settings.
Feature	A RESET Feature allows you to choose how your engine will sound and operate.
Feature Choices	The RESET Feature settings that can be programmed into the QS-3000 computer.
Feedback	QS-3000 makes special sounds as you move through the RESET Positions so you know which RESET Position you have entered. These Feedback sounds include voice announcements, "dings," and the air let-off "pssht" sound. RESET Position #32 changes or turns off feedback sounds.
Fire	Operating a feature that was armed earlier. For example, couplers are armed while the engine is in neutral. Once they are armed, the couplers can be "fired" any time while the engine is in neutral or while it is running.

Hard RESET	A way to restart the QS-3000 computer. Turning the power off for more than 15 seconds shuts down the QS-3000 electronics and allows the computer to reset itself. Also called "Computer Restart."
Hardware	An industry name for the physical parts of a computer system. The QS-3000 system hardware consists of three circuit boards: the QS-3000 Microprocessor Board, the PS-1C Power Supply Board and the QSI reverse unit. The QS-3000 Converted ProtoSound hardware consists of two circuit boards: the QS-3000 Converted ProtoSound Top Board and the ProtoSound Bottom Board.
Horn Button	Another name for the whistle button. The horn button puts positive DC on the track to operate the horn or whistle. The horn button is also used to send signals and commands to the QS-3000 on-board computer.
Horn Signals	Engineers use a variety of horn signals to communicate with the other railroad workers. Horn signals are used to trigger various QS-3000 sound effects. The meanings of the different signals QS-3000 uses are explained at the end of Section 3: Sound, More: QS-3000 Sounds, Horn Signals.
ID number	An Identification (ID) number given to any QSI locomotive. Either Train or Engine Numbers can be assigned to QS-3000.
Lock-Out	A way to lock your engine in forward, neutral, or reverse by remote control. Lock-Out takes the place of mechanical lock-out switches.
Memory Sound Chips	Used in the QS-3000 system to store all the sounds and QS-3000 commands and programs. Because they are exchangeable, QS-3000 owners will be able to inexpensively upgrade their systems.
Multiple Headed Consists	Trains pulled with more than one engine. Also trains that use mid-train helpers and pushers.
NiCad Battery	A special, 7-cell, 8.4v rechargeable back-up battery used in the QS-3000 system. NiCad is short for Nickel Cadmium.
Operation Clear	A RESET Feature that returns RESET Positions 4-17, 19-50, and 51-74 to their original factory settings.
PFA	An acronym for Passenger or Freight Announcement. All QS-3000 engines use the same "Central Limited" announcement. ProtoSound and QS-3000 Converted ProtoSound engines use various MTH passenger station announcements and freight yard sounds.
Position	The number assigned to a RESET Feature. This number is used to locate the feature in the QS-3000 on-board computer.
PowerGuard	Detects and suppresses quick jumps in transformer voltages that can produce damaging voltage spikes. Includes all the features of PowerTrak (see next entry). Available from QSI.
PowerTrak	Monitors track power and relative signal strength of the horn and bell signals using two lights. Includes a switch to add a resistive load to the track, producing a waveform QS-3000 converted ProtoSound systems understand. Works as a visible voltmeter. Available from QSI.

ProtoSound	<p>The ProtoSound® system was designed by QSI and is factory installed in many MTH® (Mike's Train House) engines. MTH also sold ProtoSound systems to Weaver Models from 1995 through 1996.</p> <p>ProtoSound systems are not the same as QS-3000 systems. ProtoSound does not have as many sounds, sound effects, or features as QS-3000.</p> <p>ProtoDeluxe-2®, Proto-One®, and ProtoPlus® are QSI designed systems that used to be sold through MTH for installation in engines without sound. ProtoDeluxe-2 is equivalent to the QSI QS-2 sound and train control system.</p>
ProtoSound Conversion	<p>ProtoSound systems can be converted to QS-3000 by replacing the old top board with the QS-3000 top board. This converted system has all the sounds and features of QS-3000.</p>
PS-1C Power Supply Board	<p>The circuit board that contains the power supply, battery back-up and battery charger circuitry for QS-3000.</p>
Pull Cord	<p>Trains have an emergency pull cord that cause the brakes to come on quickly when pulled. On QS-3000, the direction button is the pull cord.</p>
QS-1, QS-2 and QS-2+	<p>Earlier QSI sound and train control systems.</p>
QS-3000 Microprocessor Board	<p>The circuit board that contains the computer chip, the IC memory and the audio amplifier. The microprocessor board produces the sounds and controls the entire system.</p>
QSM	<p>An acronym for QSI Station Master, and part of RESET Feature #28. Engines in QSM mimic the sounds and behaviors of PFA engines, but do not make the passenger station announcement or freight yard sounds.</p>
RESET	<p>The special state your QSI reverse unit or QS-3000 system is in after the power has been interrupted for 3 seconds or more. In RESET, your QS-3000 system is ready to access the computer and accept programming commands.</p>
RESET Feature	<p>A RESET Feature allows you to choose how your engine will sound and operate.</p>
RESET Position	<p>The number assigned to a RESET Feature. This number is used to locate the feature in the QS-3000 on-board computer.</p>

Select	<p>Select has two meanings. In RESET, you Select a RESET Feature to program how your engine will operate.</p> <p>You can also Select engines using ID numbers. When an engine is selected, it can be run while engines not selected (de-selected) remain silent and motionless.</p>
SideKick II	<p>A controller that sends clear, strong signals to your engine. Four buttons control direction, horn, bell and boost. Boost takes the place of moving the throttle arm to high and low throttle settings, letting you move quickly and confidently through RESET Positions. Available from QSI.</p>
Slack Action	<p>The name for couplers banging into each other as a train goes forward or backs up, and the slack between them is taken out.</p>
Software	<p>The program that controls QS-3000. The software is stored in the IC memory chip on the QS-3000 Microprocessor Board.</p>
Start-up Direction	<p>Necessary when building consists with nose-to-nose or end-to-end engines. See RESET Position #5.</p> <p>This RESET Feature was called "Reversal" with QS-1 and QS-2.</p>
System Type	<p>QS-3000 has different Systems that determine how your transformer, horn and bell buttons affect the QS-3000 controls. See RESET Position #39.</p>
Train Control	<p>QS-3000 equipped engines can be assigned ID numbers and controlled without using blocks. Engines can be selected and run one at a time or in groups using ID numbers.</p>
Threshold	<p>The speed or throttle setting at which certain sound effects begin or are armed. Brakes Sound Threshold is the speed you have to exceed before the brakes will trigger the next time the engine slows down. Steam Engine Threshold is the throttle setting at which the steam engine begins to chuff. Diesel Engine Threshold is the throttle setting at which the diesel engine begins to rev up.</p>
Trailing Coupler	<p>On engines with working QSI Dual Couplers, the coupler that works depends on engine direction. See Section 5, RESET Position #10.</p>
Train Number	<p>Engines are quickly selected and operated, without using blocks, using assigned Train Numbers. Also Train Numbers take precedence over Engine Numbers, so you can put together consists and operate the whole train with one Train Number.</p> <p>In QS-1, QS-2 and QS-2+, Train Numbers were called Temporary ID Numbers.</p>
Transformer Type	<p>QS-3000 supports six different types of transformers. See Section 5, RESET Position #19.</p>
Whistle Button	<p>Another name for the horn button.</p>

Warranty

QSINDUSTRIES, INC. WARRANTY FOR QS-3000

Limited warranty: The QS-3000 hardware, except the NiCad battery, will be free from defects in materials and workmanship for a period of one year from the date of receipt. We reserve the right to either repair or replace the unit at our discretion. Our obligation is limited to the replacement cost of the QSI product. Any implied warranties on hardware and software are limited to one (1) year and 90 days, respectively. The NiCad battery has a 90 day warranty from the day of purchase. This limited warranty gives you specific legal rights. You may have others which vary from state to state.

The limited warranty does not apply to any QS-3000: a) damaged by accident, misuse, transformer power spikes or improper installation, b) altered or repaired by anyone other than QSI Industries, Inc. or one of its authorized service centers, c) used with altered or copied software, d) used with transformers, power supplies or other equipment not approved by QSI or not designed within the limits specified in the QSI document entitled, *Three-Rail Electrical Operating Specifications* (T.R.E.O.S.), e) used with the Train America Studio's UCUB board. Warranty issues on QS-3000 used with UCUB are the responsibility of Train America Studios, 970 Windham Court, Suite #9, Youngstown, OH 44512, (330) 629-7625.

Limited Warranty service may be obtained by mailing the product during the warranty period to QSI Industries, Inc., postage prepaid, using the original shipping container or equivalent to prevent damage to the product.

ALL EXPRESSED AND IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION AS STATED ABOVE AND NO WARRANTIES, WHETHER EXPRESSED OR IMPLIED, WILL APPLY AFTER THIS PERIOD.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER AS WARRANTED ABOVE, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. IN NO EVENT WILL THE COMPANY BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE SUCH PRODUCT, EVEN IF THE COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

NOTE: ALWAYS CHECK YOUR QS-3000 FOR PROPER OPERATION AND COMPATIBILITY WITH YOUR EQUIPMENT BEFORE USING. UNDER NO CIRCUMSTANCES WILL QSINDUSTRIES, INC. BE LIABLE FOR DAMAGE TO OTHER PRODUCTS OR EQUIPMENT.

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