QS-2plus!

Sound and Control

for **3** Rail

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Congratulations!

You are the proud owner of a QS-2+ — the most sophisticated on-board digital sound and train control system available. Add QS-2+ 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 standard or electronic transformer. With QS-2+ you have compatibility with all popular three-rail transformers. In the future you will be able to easily upgrade QS-2+ to add new sounds and train running features.

QSI is a pioneer in the area of on-board electronic sound and control and we are committed to bringing you the best that technology has to offer.

This manual shows you how to enjoy all the QS-2+ sounds and train control features. You'll find everything from basic wiring advice, to full descriptions of QS-2+ 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-2+ 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-2+.

Use this manual with your engine on the track in front of you. You'll learn and understand the sounds and control features much faster by using them as you read the manual. Sooner than you think, you'll be a master at running the extraordinary QS-2+!

1 Setting Up

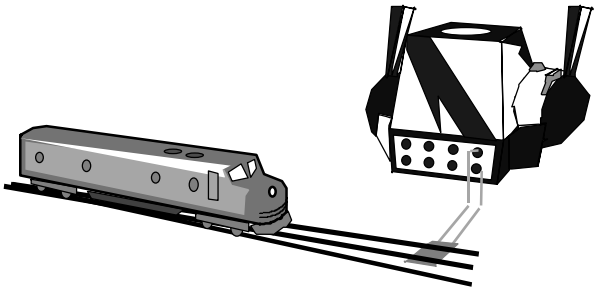
This section describes the equipment you need for faultless operation of QS-2+.

The MORE sections throughout this manual explain how to get even better performance from your QS-2+. It is not required that you read these sections, but we thought many of you would appreciate the additional information.

Equipment List

You will need—

- **A layout or a long length of straight track in front of you**
- **An engine with the QS-2+ system installed**
- **A transformer with a Horn or Whistle Button**
- **A Bell Button is necessary for Passenger/Freight Announcement, Engine Plus, turning the diesel warning light on and off, and some Brake and Flange sound operations.**



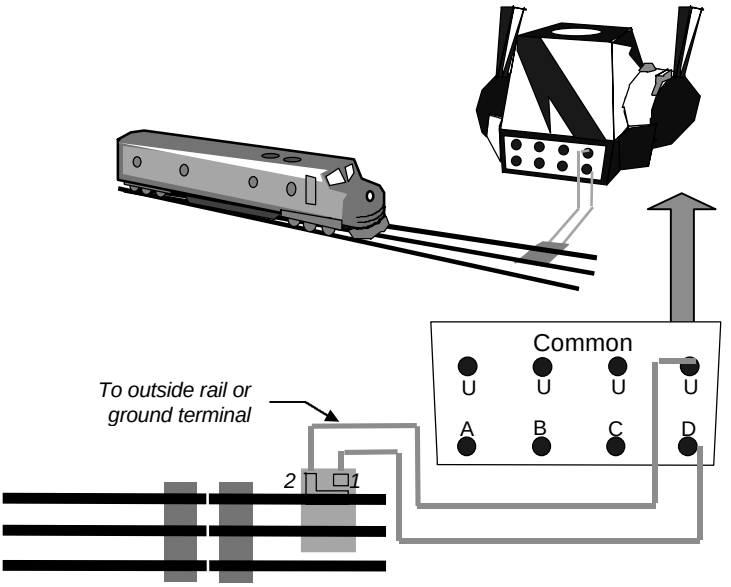
Note: If you are familiar with running QS-1®, QS-2® or MTH® ProtoSound®, you can operate your QS-2+™ equipped engine as you would these other systems. If you are not familiar with QSI products, please read on before starting your engine.

How To Wire Your Transformer

Note: If you already operate Lionel® Rail Sounds™, or MTH® ProtoSounds®, and the bell and horn button work properly, you can skip this section on wiring and go directly to the next section.

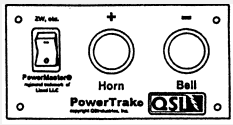
For your horn button (or whistle button) to work correctly, wire your transformer to the track as shown. This illustration shows the wiring for a ZW transformer. You can connect the wire from the center rail to either the A or D terminal, depending on which side of the transformer you like to use.

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



Wiring the Lionel ZW Transformer to a CTC Lock-On Chip

Note: In this manual, the words "horn button" stand for either the horn or whistle button on your transformer.



MORE: QSI PowerTrak

PowerTrak is designed by QSI to do two things:

First, PowerTrak monitors the voltage on your layout. The brightness of the two bulbs shows the amount of voltage. 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. This is very useful information with any transformer. And PowerTrak is much easier to use than a volt meter, since the lights are visible from anywhere in a room.

Second, PowerTrak helps solve compatibility problems between MTH ProtoSound or Weaver ProtoSound engines and Lionel's Cab-1 walk-around throttle and PowerMaster. 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-2+. This conversion can be done through QSI (call for details). Second, there are hardware problems, which are solved when you add PowerTrak to your layout. A switch on PowerTrak puts a resistive load on the output of your Lionel PowerMaster. This load produces a waveform that QS-2+ 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, PowerTrak helps you find the high/ low voltage settings you need to run QS-2+.

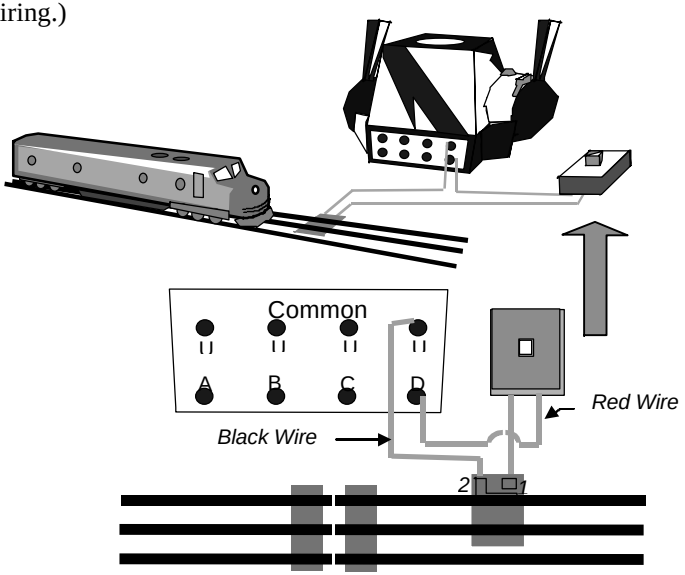
PowerTrak is also useful with older transformers that have weak horn signals. These weak signals often can't be understood by QS-2+. The extra resistive load PowerTrak puts on the track makes the horn signal stronger, often solving the problem. If PowerTrak doesn't solve your horn button problems, it's time to have the transformer repaired.

Connecting A Lionel Bell Button

A bell button is necessary for activating many QS-2+ train control commands. You can also use the bell button to turn the bell on or off in any direction except RESET.

If you do not have a bell button, attach a QSI SideKick II to your transformer. SideKick II includes bell and horn buttons designed specifically for QS-2+. See the next page for more information on SideKick II.

To connect the Lionel bell button, also called a Sound Activation Button, follow the instructions shown below. (Your Lionel bell button instructions show the same wiring.)



Wiring the Lionel Bell Button to a ZW

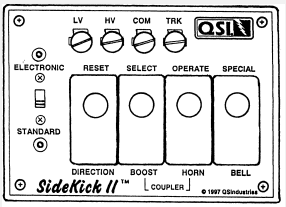
Note: If your transformer does not have a horn button, or the horn button is not operating correctly, you can wire a Lionel bell button to blow the horn or whistle by reversing the connections. You can also add two Lionel bell buttons, one to run the horn and one to run the bell. See Appendix II.

Note: If you are using an electronic transformer (for example, an All-Trol, or a Lionel MW or RS-1), the Lionel accessory bell button does not work reliably. If you need a separate bell or horn button, connect a QSI SideKick II controller to your 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, instead of turning on the bell, pressing the bell button may cause the horn to blow. 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 track. You can use the buttons on SideKick II in place of your 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.

SideKick II sends strong and reliable signals. No more missed messages between your transformer and engine. Three buttons control your engine's horn, bell and direction. The fourth button gives the boost your need to select RESET Features and program your 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 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.

And 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 using SideKick II makes running your engines considerably easier than using transformer controls. Look for this symbol:

The Back-up Battery

An on-board battery supplies continuous power to the QS-2+ computer and sound system during power loss from direction changes, entering RESET, or dirty track and faulty switches. The battery keeps the sound from shutting off abruptly and unrealistically when there are momentary interruptions in track power.

The sound will 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 by the QS-2+ computer. The computer and sound 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 a dry battery 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-2+ 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-2+ and will run down. QSI and some specialty electronic parts stores carry replacement 7-cell NiCad batteries.

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

2 Starting Up

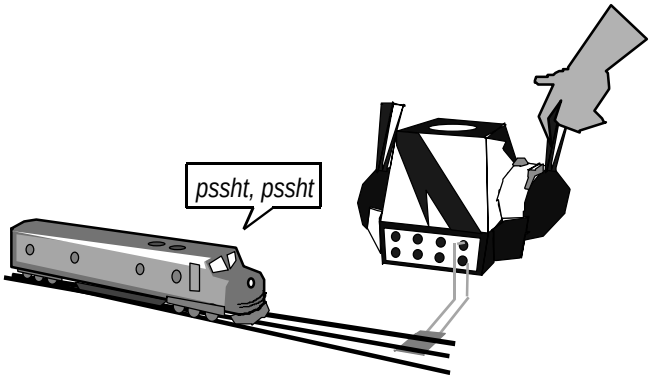
Remove all other engines from the powered track. Place your QS-2+ equipped locomotive on the track and **turn the power on about halfway (below 10 volts).** You will hear a double "ding" telling you QS-2+ is up and running. You will also hear either steam compressor sounds, electric cooling fans or a diesel motor starting up. **You are in a special state called RESET. Your engine will always enter RESET after the power has been off three seconds (or more) and then powered up again.**

Anytime you turn the power off, you will hear a time-out "ding" to let you know three seconds have passed. When you turn the power back on you are in RESET.

If the power is off for more than 15 seconds, the electronics shut down completely. Now when you turn the power back on you will hear a double "ding, ding." You are in RESET and the two "dings" tell you QS-2+ is up and running correctly. This is called a "Hard RESET." Hard RESET is useful if your QS-2+ computer gets stuck and will not respond to commands. "The Quick Exit Guide" in Appendix I gives three more commands you can use any time you find yourself in trouble with QS-2+.

Transformer Identification

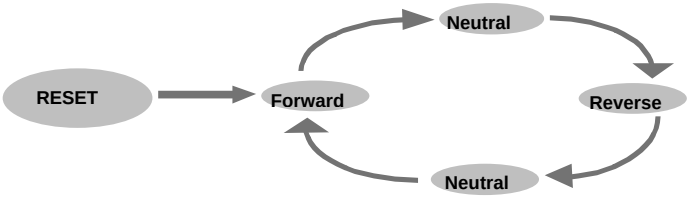
With the throttle still at a low voltage setting (around 10 volts), pause for about one second and listen for two brief air let-off sounds (“pssht-pssht”). QS-2+ uses this time to automatically identify your transformer. You can leave RESET any time you like, but if you wait until your transformer is identified, the horn and bell buttons will respond more quickly to your commands.



Wait one second for QS-2+ to identify your transformer. Then interrupt the power to leave RESET.

Changing Engine Direction

You cannot leave RESET until the power is turned to a low setting (below 10 volts). When the power is turned down, use the direction button or the throttle on your transformer to interrupt the power and change direction as usual. You are now in forward and have left RESET. You are hearing the steam chuff, electric locomotive fans, turbine or diesel motor sounds of your engine. Each time the power is interrupted the engine will sequence from forward to neutral to reverse to neutral and then back to forward, just like engines with mechanical E-units.

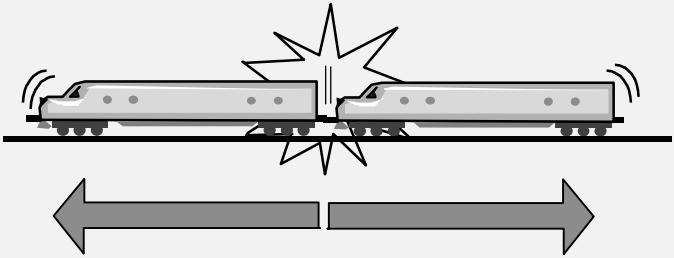


QS-2+ has five states. These include the four usual direction states (forward, neutral-before-reverse, reverse, neutral-before-forward), plus our special RESET state. When your engine is in RESET, you can change or program individual features of your QS-2+ using your throttle, horn and bell button. RESET will be described thoroughly in Section 4.

The Horn Button Has Many Uses

The horn button will blow the horn in ***forward*** and ***reverse***, as it always has. However, the horn button has other uses in RESET and neutral, since the horn button is also used to operate QS-2+ features. These special uses will be described in the following sections.

MORE: Multiple-Heading



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

Engines with QSI reverse units are easy to keep operating in sequence. To get out-of-sequence engines back into sequence, **reset your engines by simply turning the power off for <u>three seconds</u> or more and then turning the power back on**. All engines will come up in RESET. Now, when you interrupt the power, the engines start out in forward and operate together.

Power Interrupt Delay Keeps Your Engines Working Together

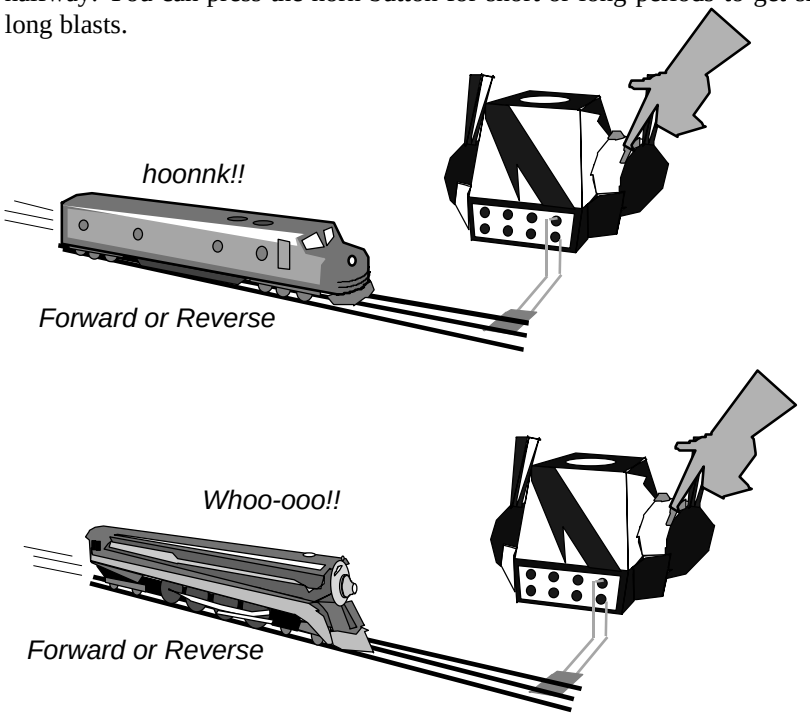
A delay feature built into the electronics of QSI reverse units prevents your reverse units from 'dropping out' or easily changing direction because of faulty switches and dirty track. Once these engines are in sequence and working together, they will stay that way. Since QSI Reverse Units are designed to ignore short power interruptions, you need to interrupt the power deliberately to change direction.

3 Sound

The following section explains how to operate all the different QS-2+ sounds. Many other sounds occur automatically when you are in neutral, forward or reverse. These automatic sounds are described at the end of this section.

Horn or Whistle

Blow the whistle or horn as often as you like ***as long as the engine is in forward or reverse, but not while the engine is in neutral or RESET***. (In neutral and RESET pressing the horn button causes QS-2+ to perform special commands.) If the whistle or horn does not blow, try pressing the horn button slowly and only halfway. You can press the horn button for short or long periods to get short or long blasts.



*Blow the horn or whistle in **forward or reverse only***

Bell

▶ To Turn the Bell On Or Off with the Bell Button

You must have an accessory bell button or SideKick II wired between your transformer and track.

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

If you go into RESET when the bell is on, it will stop ringing. (In RESET, the bell button operates other features, described in Sections 5 and 6.)

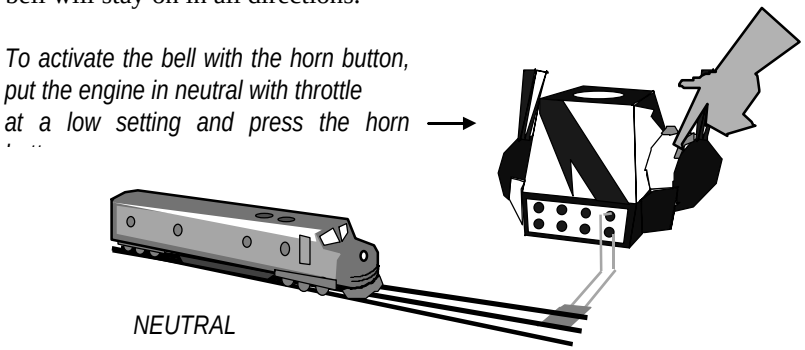
▶ To Turn the Bell On with the Horn Button

- **Interrupt the power to put the engine in neutral**

Be sure you are not in RESET. If you are in RESET, interrupt the power until you reach either of the two neutrals: *neutral before forward* or *neutral before reverse*.

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

Your bell will stay on in all directions.



▶ To Turn the Bell Off with the Horn Button

- **Interrupt the power to put the engine in neutral**

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.

Your bell may continue to ring for a few seconds before stopping; this is normal.

Coupler

▶ To Arm and Fire the Coupler

- **Put the engine in neutral (not RESET)**
- **Move the throttle to its highest voltage setting**

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

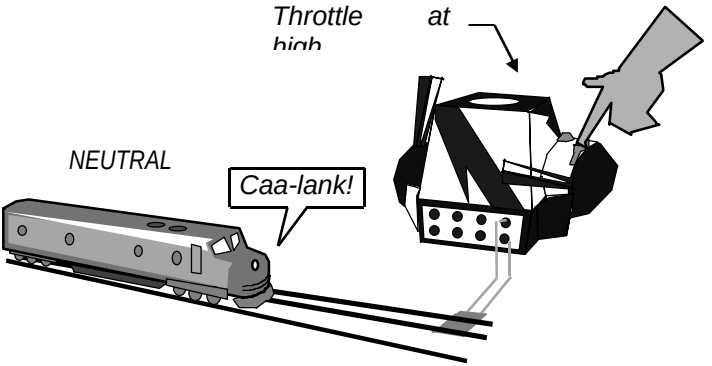
- **With the throttle still *at the highest voltage setting,* press and release the Horn Button. The coupler is armed**

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**
- **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, but not in RESET. 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, the coupler needs to be armed again.



To arm the coupler, put the engine in neutral, keep the throttle at high and push the horn button

Note: The difference between turning the bell on and off or arming and firing the coupler is the position of the throttle. You need a low throttle setting (below 10 volts) to operate the bell, and the highest voltage setting to arm the coupler.

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 and then 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 fire the coupler in neutral, you can continue to press the boost button as you press the horn button. This extra power helps open the coupler.

MORE: QSI Coil Coupler

If you install a QSI Single or Dual Coil Coupler Kit on you engines, the coupler (or couplers) will actually open when you fire them. You will be able to uncouple anywhere on your layout, even on the fly, by remote control.

The kits consist of a special coupler (or couplers), and a small circuit board that attaches with wires to the top QS-2+ 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, you can connect it directly to the QSI Coil Coupler circuit board.

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.

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

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. When the slack is pulled out of the drawbar, it 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 since this gives more power to the coupler circuit.

If you are 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 an remote control track section. The QSI coupler can also be operated while the engine is moving and does not require a remote control track section. 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. Running the engine at a higher throttle sometimes helps since it provides more power to the coupler circuit. The QSI coupler circuit board stores energy in a capacitor to use when the throttle is at a low setting, but occasionally this is not enough power when there is a lot of force on the drawbar.

Pushing uncouple: Another way to use the QSI coupler is to open it when pushing cars to allow 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.

PFA (Passenger/Freight Announcement)

Passenger train station announcements or freight yard loading and unloading sounds can be heard whenever you arm them from your transformer. The sounds are fully described in Section 6, RESET Feature #28.

▶ To Arm and Use PFA:

- **While the engine is running in forward or reverse, hold down the bell button for about three seconds**

PFA is armed when you hear a single horn or whistle hoot. When you hear the horn, release the bell button. Turn the bell off any time you like 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.

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

If you left the bell on, it now shuts off automatically. You have entered PFA and the announcement will begin. You will also hear engine sounds appropriate to your type of engine. You can stay in neutral as long as you like.

Continuing the PFA or QSM sequence:

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

You may hear two short air let-offs ("pssht, pssht"). Normally, your engine would move, but in PFA, your engine will not move. You can stay here as long as you like.

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

You will hear "pssht, pssht" and background engine sounds. The departure announcement begins. You can stay here as long as you like.

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

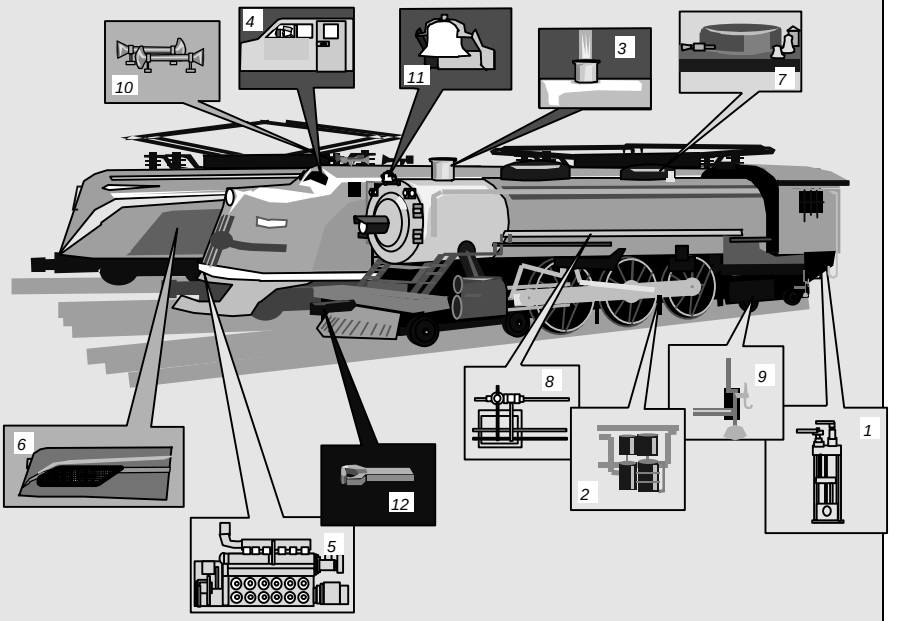
Your engine does not move right away. If your engine has passenger station announcement, you will hear "All Abroad!" and the sounds of passenger car doors shutting. The engine horn will "hoot" two times and the bell will come on. Turn the bell off any time you like using the bell button.

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

Note: If you interrupt the power after you first enter neutral, and before the announcements begin, PFA is canceled and your 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 your train will run normally.

More: QS-2+ Sounds

QS-2+'s have a number of sounds that occur in forward, reverse and neutral automatically. This is a description of these sounds.



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. Diesel pumps sound like bongo drums; since the pumps are driven by the diesel motor in the prototype locomotives, 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.

3. 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 non-moving engine. The blower sounds like a continual steam hissing sound.

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-2+ you will hear real radio messages recorded from actual train yards complete with radio squelch and beeps. Cab chatter occurs randomly. RESET Position #25 allows you to turn off these sounds.

5. Diesel "Low Idle" in Neutral-Before-Reverse: This special low idle sound occurs after the engine has been in neutral before 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 usual loud diesel motor sounds. If you want to hear the loud diesel motor idle sounds in neutral, put the engine in Neutral-before-Forward.

6. Electric locomotive cooling fans: The electric traction motors get hot and all electric locomotives have cooling fans to help keep the temperature down. These powerful fans can create enough 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 Position #6.

7. Steam "Pop-off" sounds: If a steam engine builds up too much pressure in the boiler, special pop-off values 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.

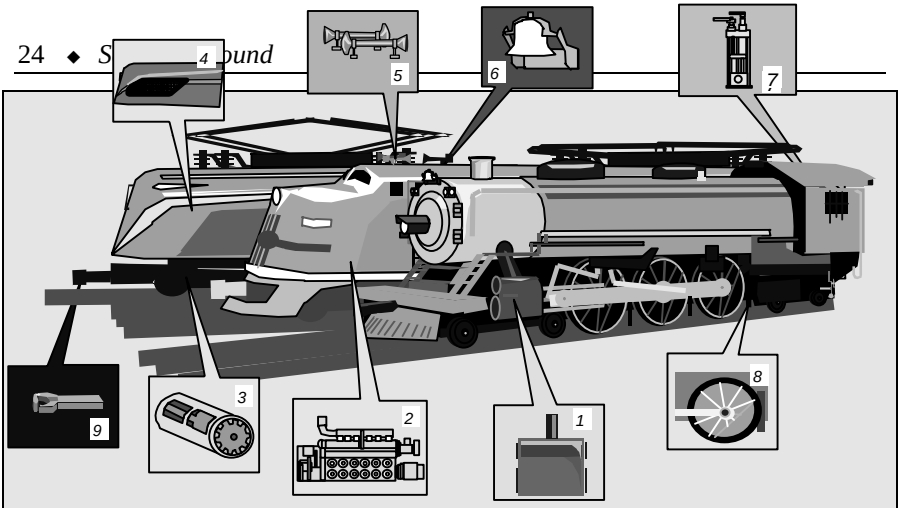
8. Steam water injector: Steam engines need to replenish the water in the boiler that is lost as steam escapes through the smoke stack. Water injectors accelerate the water from the tender with steam pressure to a high rate of speed to overcome the elevated pressure in the boiler. QS-2+ water injectors sound like high speed rushing water and steam with a distinctive value 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-2+ 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. Horn in Neutral: If the horn is set to operate in neutral (see RESET Position #25), the horn will not interrupt any other neutral sounds.

11. Bell in Neutral: Using the bell in neutral will not interrupt any of the other neutral sounds.

12. Coupler Sounds: QS-2+ 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 operation 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.



Sounds in Forward and Reverse

1. Steam Chuff: When the QS-2+ 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-2+ 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-2+ 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 your engine to have a faster chuff rate (See Section 6, RESET Position #27).

QS-2+ 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-2+ 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. Diesel Roar: Diesels also make different sounds as they start up or accelerate. QS-2+ equipped diesels are equipped with eight levels of diesel motor setting just like the prototype. When the engine starts up, the diesel motor will rev up with a louder volume which will usually continue through the acceleration period. After the engine has reached a steady speed, the diesel motor will taper off to a constant roar at a slightly lower volume. If the throttle is again turned up, the diesel roar increases in volume, will ramp up to a higher notch and then level off again. If the throttle is turned down, the diesel roar will drop off slowly to one of the lower notch settings.

3. Electric Locomotive Traction Motors: Electric locomotives normally run quieter than diesels allowing the whine of the traction motor to be heard. When you start 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 you come 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 Position #6).

4. 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-2+ 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 Position #6.

5. Diesel and Electric Locomotive Horns and Steam Whistles: QS-2+ uses actual recordings for our steam and diesel horns and whistles. When you press the horn or whistle button, QS-2+ 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 when you release the horn button. 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.

Both horn and whistle sounds are characterized by the number of chimes or tones that are present. 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 engine whistles are usually more shrill with fewer chimes and small switchers usually only have 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.

6. Steam, Diesel and Electric Locomotive Bells: Diesel and Electric Locomotives usually have mechanically or pneumatically operated bells. These bells has a distinctively fast mechanical sound without much character. Steam bells, on the other hand, come it 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.

7. 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-2+ 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-2+ brake sounds occur only when the engine has reached a certain low speed.

8. 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 effect causes a squealing effect 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 (see RESET Feature #46).

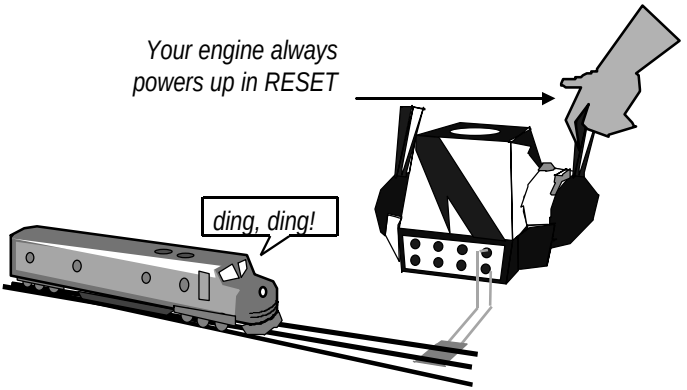
9. Coupler Sounds: QS-2+ uses two sounds to model the coupler opening. The first is the sound of the coupler pin chain being pulled taut as the coupler lift bar is being raised. This sound only comes on in neutral, and tells you the coupler operation is armed. The second sound, which happens when the 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.

4 Reset Features

What is RESET

Special QS-2+ Commands Are Available In RESET

Your engine enters RESET whenever you turn the power off for three seconds or more, and then turn the power back on. When it is in RESET, your engine is ready to accept your programming instructions. These instructions include engine selection, volume settings, selecting transformer type, setting steam chuff rate, and much more.



If you don't want to operate 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).

Anytime you turn the power off, you will hear one "ding" after three seconds have gone by. When you turn the power back on you are in RESET.

Remember: When you want to enter RESET, simply turn off the power for three seconds or more, listen for the bell and turn the power back on.

Note: Certain choices in RESET Positions #5, #20 and #40 can change how you enter RESET. These special cases are described in Section 6, under the full description of each RESET Feature.

How to Select the RESET Feature You Want

Each RESET Feature is assigned a RESET Position number. You find a RESET Feature in QS-2+'s computer by its RESET Position number. For example, if you want to change the volume of the chuff on your steam engine, you will need to select RESET Position #6 to enter the chuff 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 *operate* your choice by pressing the horn button. Simple!

➲ You **SELECT** the RESET Feature you want by moving the throttle up and down a certain number of times while the engine is in RESET.

➲ You **OPERATE** the CHOICE by pressing the Horn Button.

▶ To Select the RESET Feature You Want with SideKick

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

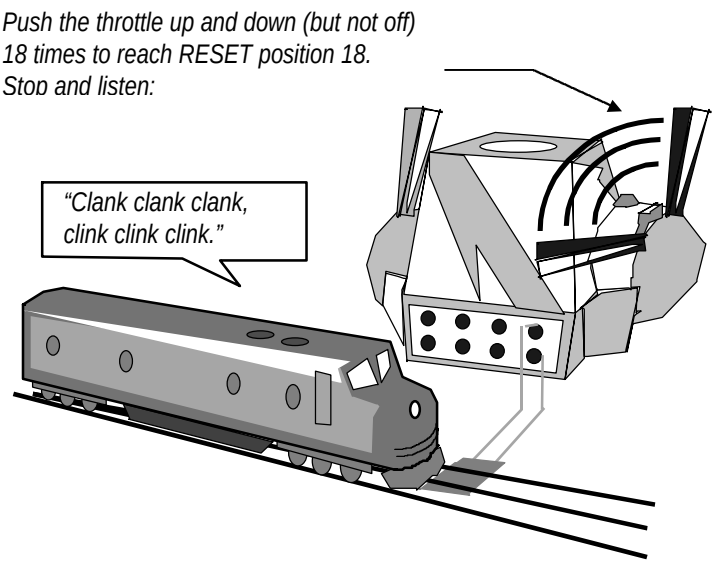
You will hear an air let-off "pssht" sound each time you press the Select Button. If you do not hear this sound, the throttle is set too high or the HV terminal voltage is too low. Set the HV terminal voltage to 16-20 volts.

You can press the Select Button as quickly as you want. You'll find using the button much faster and more reliable when compared to using the throttle arm.

How to Locate RESET Positions with "Pssht," "Clink" & "Clank" Sounds

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 "pssht" helps you count.

When you stop moving the throttle, QS-2+ uses two special sounds to tell you which RESET Position you are in. A "clink" means you have advanced one RESET Position, and a "clank" means you have advanced five RESET positions. For example, at RESET Position 18 you would hear three "clanks" and three "clinks" (5+5+5+1+1+1=18).



Step by Step Description of Moving through RESET Features, and "Clinks" and "Clanks"

- **Put your 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 a single "clink". You are now in RESET Position #1.

> ***Note:*** If you accidentally turned the throttle down so low that the power went off, then your engine is no longer in RESET and will go forward. Just do another RESET and start again.

- **Now push the throttle all the way up and back down, but not off**

You will hear the "pssht" sound, followed by two "clinks". You are now in RESET Position #2.

When you are using RESET Positions, the engine sounds automatically turn off after RESET Position #1 so you can hear the "pssht" sound more easily.

- **Push the throttle up and down three more times (five times total)**

You will hear "pssht" followed by one "clank". A "clink" equals one up and down movement of the throttle, and a "clank" equals five movements.

At RESET Position six you will hear another "pssht", then "clank, clink" or five plus one to equal RESET Position #6.

Try moving the throttle up and down quickly, using the "pssht" to help you keep count. Then stop occasionally and listen to the "clanks" and "clinks" to see if you counted correctly.

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

> ***Note:*** If you are using a Lionel Cab-1/PowerMaster™, you may have problems with voltage levels or response time. See Appendix I, "Troubles in RESET," and Appendix VI, "Using the Lionel Cab-1/PowerMaster with QS-2+" for more information.

MORE: Selecting with the Direction Button on Your Transformer

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-2+ 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 "pssht" sounds to count; stop and listen to the "clinks" and "clanks" to check what position you are in. When you are ready to leave RESET, bring the throttle down about half-way (below 10v.) and hesitate one or two seconds before interrupting the power for a direction change. This pause gives QS-2+ time to identify the transformer before you leave RESET.

How to Operate RESET Feature Choices

Once you reach the RESET Position you want, you can operate (move through) the choices for that RESET Feature using the horn button.

The first time you press the horn button, you will hear one or more "dings." For most of the RESET Features, these "dings" tell you which choice was last set for this Feature. (With ID Numbers and Chuff/ Diesel Motor Threshold RESET Features, the "dings" are used differently. These special cases are described under their RESET Feature names in Section 6, the RESET Feature Reference Guide.)

For example, if you enter RESET Position #23 (four "clanks," three "clinks") and press the horn button, you will hear two "dings," telling you this Feature was set to have special sounds in neutral turned on. These special sounds are diesel cab chatter or extra steam neutral sounds. Press the horn button again, and you will hear one "ding." You have just turned these special sounds off. Run your engine for a while, and notice the sounds are off. Then return to RESET Position #23. Now when you press the horn button, you will hear "ding," telling you this QS-2+ 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-2+ will cycle back to the second choice, which is diesel cab chatter or extra steam sounds on.

MORE: Transformer Horn Buttons

The 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 gives you lots of track power but a weak horn signal, so your engine may not pick up the message you are trying to send it. Pressing the horn button in half-way gives you a strong horn signal, so your engine responds to the command quickly. If you have problems operating RESET choices, experiment with pressing the horn button on your transformer half-way when operating RESET Features. See Appendix I, "Troubles with Transformers," for more information.

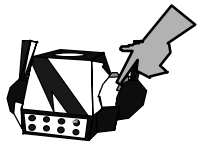
A Quick Reference Card comes with your engine to help you keep track of the RESET Features and choices. This is a good time to look it over (See Appendix III for a copy of the card.) All the RESET Position numbers, RESET Feature names, and the choices available in each Feature are listed on the card. Shaded squares show the factory default settings. To move from one RESET Position to the next, use the throttle. Once you are in a selected RESET Feature, move from one choice box to the next by pressing the horn button.

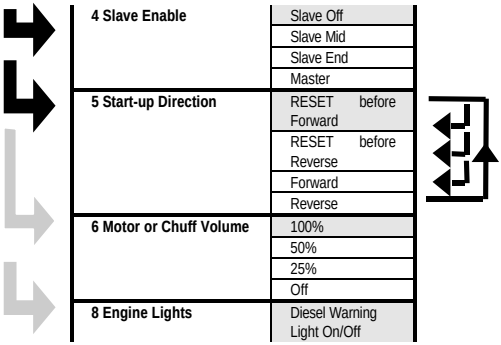
Select:

Move the throttle up and down to select RESET Features

Operate:

Press the horn button to operate your choice





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 check to see which choice is currently set for many RESET Features. (This works with all RESET Features except ID Number Features, Operational Clear in RESET Position #18, and Chuff/Diesel Motor Threshold 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-2+ 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 Assigning and Using ID Numbers

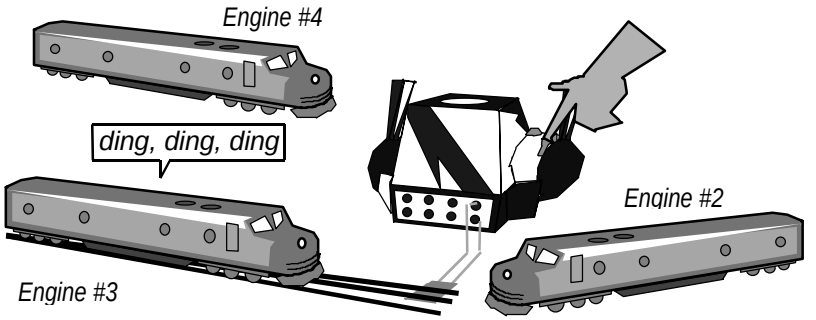
ID numbers are a quick and simple way to select (turn on) each engine, run it, or de-select it (turn it off), anywhere on your layout. With ID numbers you can do this from your transformer *without using blocks*.

QSI has three types of ID numbers: Temporary ID, Road ID and Engine ID. You can use Temporary ID numbers by themselves with any small layout to easily select and run engines or multiple-headed trains. Road ID and Engine ID are designed for large layouts with many engines. Temporary ID numbers are also used along with Road and Engine ID numbers for more complex operations.

Running 1 to 10 Engines with Temporary ID Numbers

You do not need to learn how to use all of these different types of ID numbers to do simple engine selection. If you intend to run a few engines, Temporary ID numbers are the easiest way to go. With Temporary ID you can give different numbers to each of your QS-1, QS-2 and/or QS-2+ engines. Now you can select one engine at a time, and run it on your track, 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 Temporary ID Number, and run all of them together. Obviously, the more QS-1, QS-2 and QS-2+ engines you have, the more ways you can combine and run them and the more you will want to know about Road and Engine ID numbers.

Even if you're only running one QS-1, QS-2 or QS-2+ engine, assigning it a Temporary ID Number will let you de-select it without having to park it on a separate powered track block.

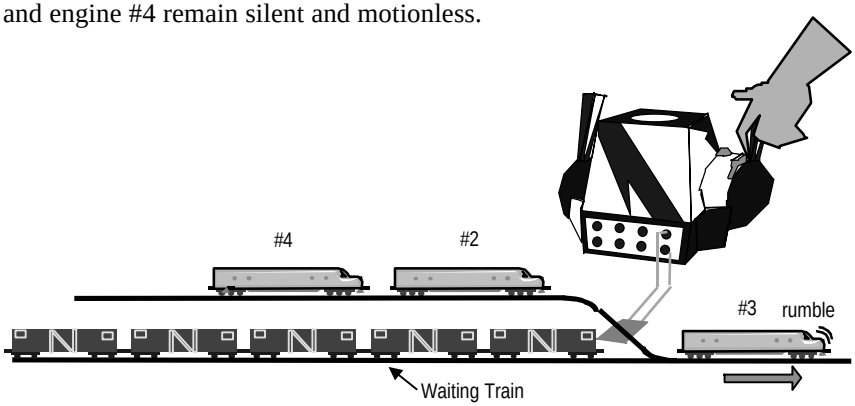


Give each engine its own ID number

You assign a Temporary ID Number in RESET Position #2 by pressing the horn button the number of times equal to the number you want to assign. For example, if you want to assign the number 3 to your engine, go to RESET

Position #2, and press the horn button three times. (You can make your ID number 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 the engine.) Once an engine has a Temporary ID Number assigned you will be able to select it from RESET Position #0. Every time you do a RESET you engine always comes up in RESET Position #0. So when you first enter RESET, you can select your engine by pressing the horn button the same number of times as the number you assigned (three times with this example).

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



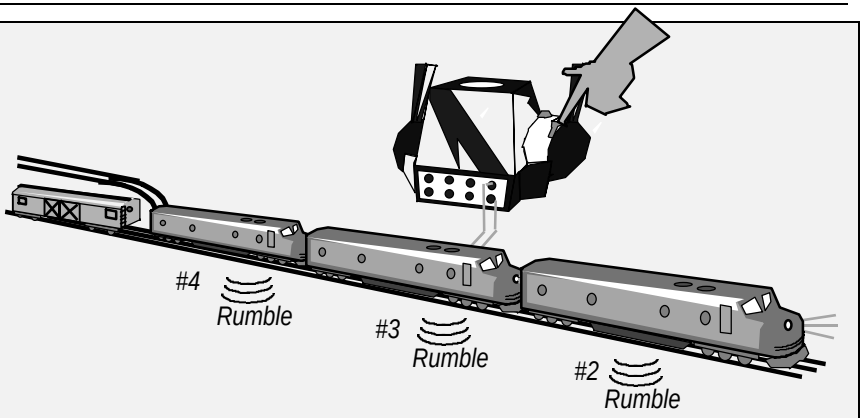
Use the horn button to run one engine at a time

When you assign an engine a Temporary ID Number, the engine will remember that number indefinitely, until you clear it or assign the engine a new number. Temporary means the number is easy to assign and erase, not that it disappears when the power is shut off. Temporary ID numbers are cleared using RESET Position #3. Once the Temporary ID number is cleared, the engine will power up whenever you enter RESET.

MORE: Making up and Breaking up Trains

This approach works well if there are no other engines on your powered track block except the engines in your consist. Otherwise, the use of the All Select command will select all the engines, even the ones on side tracks that are not part of your consist. The next approach, "Engine Plus," solves this problem.

Using the three engines in the example above, do a RESET and select engine #2. Bring it out to the main line (engines #3 and #4 are de-selected). Now do a RESET and select engine #3. Bring it out and couple it with #2 (engines #2 and #4 are de-selected). Next do a RESET and select engine #4 (engines #2 and #3 are de-selected). Bring it out and couple it with engines #2 and #3. Your engines are in place and ready to run. (continued on the next page)



Use the horn button to select all the engines at once

Now do a RESET. Then do an All Select by pressing the horn button for three seconds, which turns on all the engines (see Section 6, RESET Position #0). You are ready to back your engines up to the waiting cars!

When you want to break the train up, stop your engines and do a RESET. Select the lead engine using its Temporary ID 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.

When you are making up trains, you can also assign slave and start-up direction changes to any of the engines for even more realism and fun. See RESET Positions #4 and #5 in Section 6.

Engine Plus: An Easy Way to Make Up and Break Up Trains

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 the group while the unused engines on your layout remain de-selected. Engines selected and run this way are called an Engine Plus Group.

Be sure all the engines in your yard have assigned ID numbers. The engine's Road, Engine or Temporary ID numbers can be used, but most of the time, Temporary ID numbers are all you need. (For more information about using Road and Engine ID numbers, see the next part of this section: "Using Road and Engine ID Numbers on Large Layouts.")

To arm engines for Engine Plus and make up an Engine Plus Group:

- **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 did want, and hold the bell button down 1.5 seconds to arm it for Engine Plus.

- **Interrupt the power and 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.

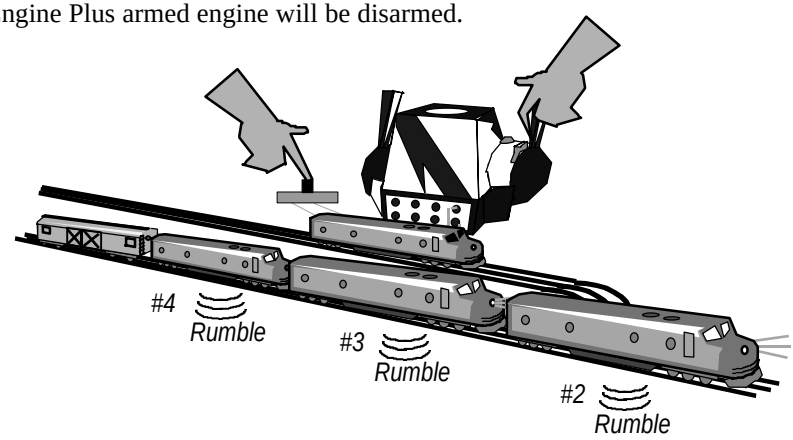
- **Interrupt the power and move this engine into position with your train**

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

- **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 the Engine Plus Group will start up and run together.

If you do a Hard RESET (turn off the power for 15 seconds or more), all Engine Plus armed engine will be disarmed.



Select an Engine Plus Group with the bell button

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

To break up your Engine Plus Group:

- **Do a RESET**
- **Select each engine using its ID number**

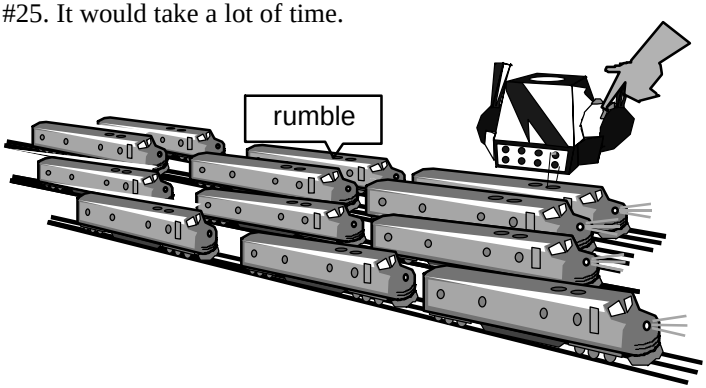
Move the engine where you like. You break up your trains the same way you did using Temporary ID's, as described above. Engine Plus was actually turned off when you grouped your engines using the bell button.

You can also use Engine Pus to break off groups of engines from your consist. For instance, 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. For example, let's say your two lead engines are helpers on you five engine consist. Simply select the first two engines using their ID numbers and make both of them Engine Plus locomotives. Use 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 and select the remaining three engines using their ID numbers and make them Engine Plus locomotives. Use the Bell Button for three seconds 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.

You can arm all engines in a group with only *one* RESET by selecting the lowest ID first while holding the horn down for 1.5 seconds, selecting the second lowest ID 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.

Using Road and Engine ID Numbers on Large Layouts

Road and Engine ID numbers were designed to help you select engines on large layouts quickly and easily. When you have many engines, selecting engines with high ID numbers by the process described under Temporary ID numbers is very slow. Imagine having to press your horn button 25 times to select and run engine #25. It would take a lot of time.



On large layouts, select engines using Road and Engine ID Numbers

Road and Engine ID numbers allow you to split your engines into groups, and then select and run engines within that group. It is a faster and more logical way to select an engine.

You can set up groups or "Roads" any way you want. Perhaps you want all your steam engines in one group, diesels in another. Or you may want all your Lionel engines in one group, MTH engines in a second, and Weaver engines in a third. Or you can use actual road names.

For example, say you have three New York Central engines, three Santa Fe engines and four Union Pacific engines. Give each group a Road ID Number, (like Road ID 3. for NY Central, Road ID 4. for Santa Fe and Road ID 5. for Union Pacific), and each engine an Engine ID Number (#1-#3 for NYC and SF and #1-#4 for UP).

> ***Note:*** We suggest you save Road ID numbers 1 and 2 for future use as Temporary ID numbers. We will explain why later in this section.

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 Road. For example:

Road ID 3. NY Central	Road ID 4. Santa Fe	Road ID 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 a Road and Engine ID Number, your engine will remember those numbers indefinitely, until you change or erase them. You can also attach a label to the bottom of each locomotive with its Road and Engine ID number written on it like this: (4,2). The first number is the Road ID number, and the second number is the Engine ID number.

To actually assign Road and Engine ID numbers, follow the instructions given in Section 6, RESET Positions #15 (Road ID Set) and #16 (Engine ID Set). Before selecting and running these engines using the Road and Engine ID numbers, be sure all Temporary ID numbers are clear using RESET Position #3.

Selecting the engine you want to run is very similar to selecting engines with Temporary ID numbers, except that both RESET Position #0 and #1 are used. You select the Road number using RESET Position #0, and the engine itself in RESET Position #1. For example, say you decide to run your Lionel 208 Alco from the list above. After doing a RESET, you are in Position #0. Press the horn button 4 times to select Road ID #4, Santa Fe. All the engines under this Road ID number will now turn on. (If you interrupted the power now, all the

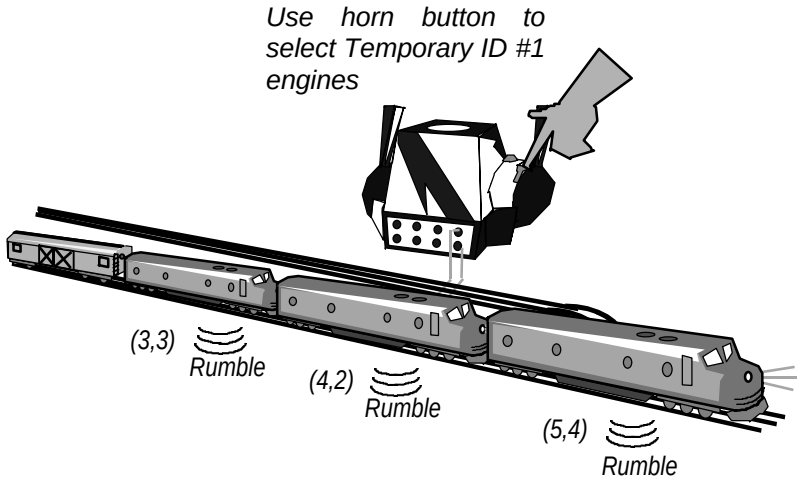
Road ID #4 Santa Fe engines would run. All your other engines in Road ID 3 and 5 would remain silent and motionless.) Now advance one RESET Position using the throttle (you will hear one "clink"), and press the horn button two more times to select the second engine. Only the Lionel 208 Alco will stay on, and all the other Road ID #4 Santa Fe engines will go silent. Try it; it's easy!

Using Road, Engine and Temporary ID Numbers Together

Since RESET Position #0 is used to select either a Road or a Temporary ID numbered engine, Road and Temporary ID seem like the same thing. So why have Temporary ID numbers and what do they really do?

Temporary ID numbers are used to give all the engines in a multiple-headed train one common ID number. Imagine you want to make up an engine consist using three different engines, each with its own unique Road and Engine ID number. When you select each engine you want for the consist, assign it a Temporary ID Number in RESET Position #2. The Temporary ID writes over, but does not erase, the Road and Engine ID numbers already assigned. Now you can select and operate the entire train using the one Temporary ID number. When you are finished running the three engine consist train, clear the Temporary ID. Now use each engine's unique Road and Engine ID Number to operate each engine individually.

For example, say you have three engines, one assigned Road ID number 3 and Engine ID number 3 (3,3); one assigned Road ID number 4 and Engine ID number 2 (4,2) and the last one assigned Road ID number 5 and Engine ID number 4 (5,4). In RESET Position #0, press the horn button three times to select Road ID number 3. Advance to RESET Position #1 and press the horn button three times to select engine (3,3). Now advance to RESET Position 2 and give this engine Temporary ID #1. Run this engine up to your train of waiting cars and couple up. Select engine (4,2), assign it Temporary ID #1 also, and run it to the waiting train. (Notice that when you select engine (4,2), engines (3,3) and (5,4) remain silent and motionless) Do the same with engine (5,4). Now you have three engines, all with the common Temporary ID #1, in one multiple-headed train. Now you can select this entire train using Temporary ID #1 in RESET Position #0 and run it on your layout. All other engines are de-selected and sit silent and motionless in your yard or siding.



All engines assigned the same Temporary ID number run together

When you are finished, clear the Temporary ID numbers using RESET Position #3. This allows all the engines to return to their original Road and Engine ID numbers. Now put away each engine using its Road and Engine ID numbers. Simply do a RESET, select engine (5,4) by its Road and Engine ID number, and move it to the storage yard. All the other engines will remain silent. Repeat with the last two engines.

Note: Remember we suggested reserving Road ID numbers 1 and 2 for use as Temporary ID numbers? By reserving numbers 1 and 2, you can use these as Temporary ID numbers whenever you want and have two low numbers that will allow you to select each of your multiple-headed trains very quickly.

6 RESET Feature Guide
In Order By RESET Position Number

RESET Features fall into four basic categories: (1) Sound Features (brakes, cab chatter, etc.), (2) Engine Features (reversal, slave, etc.), (3) System Features (transformer type, operational clear, etc.) and (4) Engine or Train ID numbers and running selected engines (engine select, temporary ID set, etc.).

The Features are arranged so the ones we think you will use most often are in low RESET Positions. Those used less frequently are in higher Positions.

Feel free to use any of the Features that interest you, in any order you like. We suggest you try using RESET Position #6, "Diesel Motor/Steam Chuff Volume/Electric Fan/Turbine Volume" first. This RESET Position is a clear example of how RESET Features are operated. Then try using the RESET Features in this order:

Group A:	Group B:
#6 Motor or Chuff Volume #8 Diesel Warning Light #10 Uncoupler Enable #23 Cab Chatter or Steam Neutral Sounds #25 Horn/Whistle in Neutral with Horn Button #45 Brake Sounds Enable #18 Operational Clear	#0 Temp/Road ID#, All Select #2 Temp ID Set #3 Temp ID Clear #30 Diesel Warning Light Choices

Group C:	Group D:
#4 Slave Enable #11 Automatic Operation #19 Transformer Type #37 "I Think I Can" for small steam engines #28 PFA Enable #8 Engine Lights #46 Flange Sounds Enable #32 Feedback in RESET #40 Lock-out Engine Enable	#5 Start-up Direction #27 Chuff/Diesel Motor Threshold #15 Road ID Set #16 Engine ID Set #17 Road/Engine ID Clear #1 Engine Select #20 System Type #44 All De-Select

RESET Features in Group A are the easiest to use. Group B includes simple ID numbers and the exciting things you can do with them. Check out "Engine Plus" in Section 5 "Assigning and Using ID Numbers," and see how it works with the ID numbers described in this group. Group C features advance your operating skills. Group D includes advanced train operating features for more control over ID numbers, plus features like "start up direction," which expand the ways to run multiple consists.

If you change RESET Features, and discover you don't like the changes, you can always go back to the factory default settings by using RESET Position #18, Operational Clear. Or see Operational Clear in the "Quick Exit Guide" in Appendix I and on the QS-2+ Quick Reference Card.

Note: A RESET Feature choice is applied to all powered up engines at the same time. If you use ID numbers, you can select a single engine or group of engines and apply your choice to them alone, even when all the engines are on the same powered track. If you not using ID numbers, use your block control to power only the engine or group of engines you want to talk to.

#0: Temporary/ Road ID Select, All Select

To select and run engines individually using this RESET Position, you must already have set a Temporary ID number in RESET Position #2 or a Road ID number in Position #15.

A Temporary ID number will write over any Road ID number that had been assigned to the engine. The Road ID number comes back when the Temporary ID number is cleared in RESET Position #3.

There is no factory default setting for this RESET Position.

▶ To Select (Turn On) And Run One Engine with an assigned Temporary ID Number

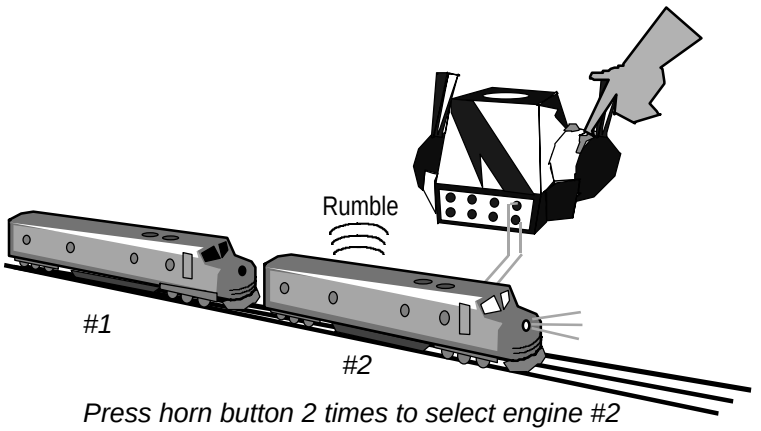
- **Do a RESET**

You are in RESET Position #0.

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

Each time you press the horn button, the engine assigned that number will turn on (see note below). For example, press the horn button once and engine #1 is selected. Press it again, and engine #2 is selected while engine #1 is de-selected. Continue until you reach the engine you want to run.

If 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, you can change RESET Feature settings and only the selected engine will change.



Press horn button 2 times to select engine #2
Engine #1 is de-selected and remains 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 Select And Run Engines with an assigned Road ID Number (RESET Position #15)

Temporary ID Numbers must be cleared before you can run engines using Road ID Numbers.

- **Do a RESET**

You are in RESET Position #0.

- **Press the Horn Button the number of times equal to the Road ID Number assigned to the engine(s) you want to run**

This is the same as selecting engines with Temporary ID Numbers. Each time you press the horn button, the engines assigned that Road number will be selected. For example, press the horn button once and engines with Road ID Number 1 are selected. Press it again, and engines with Road ID Number 2 are selected while engines with Road Number 1 are de-selected. Continue until you reach the group of engines you want to run.

If you interrupt the power, all of the selected engines will operate while the other QS-1 or QS-2+ engines sit silent and motionless. If you wish to operate one engine in this group, you need to select the engine using Engine Select (RESET Position #1).

▶ To De-Select (Turn Off) Your Selected Engine

- **Do a RESET**
- **While in RESET, press the Horn Button any number of times except the Temporary/Road ID Number of your engine**

If you want all your engines de-selected, press the horn button for an ID number that has not been assigned to any engine. You might want to save a low number for this purpose.

▶ All Select: Selecting and Running All Engines

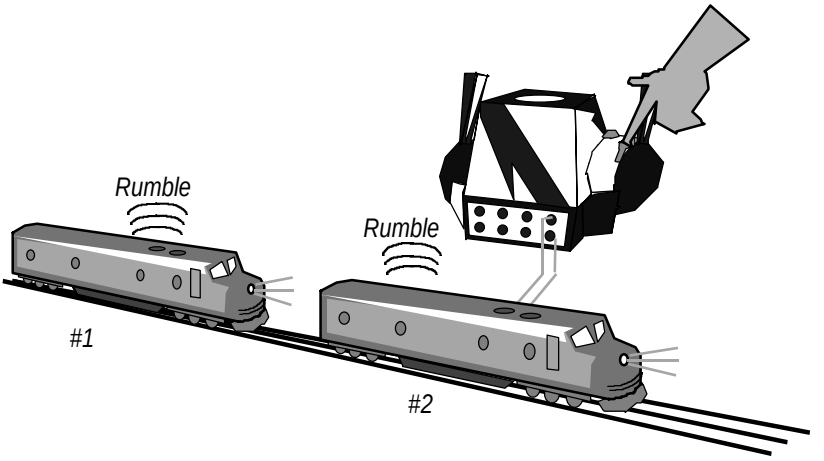
Select all your QSI equipped engines without selecting them one at a time. With All-Select, you do not have to assign them a common Temporary ID number to all the engines being used in a multiple-headed consist. Also, if you forget your engine's Road and Engine ID numbers, you can still select it using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

- **Do a RESET**

You are in RESET Position 0.

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

All the QS-2+ engines are selected no matter what their ID numbers are.



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

MORE: How to Run Multiple-Headed Trains

This is an easy way to make up multiple-headed trains when all the engines on the layout have assigned Road and Engine ID numbers. Assign the same Temporary ID Number to several engines using RESET Position #2. This train can now be run while all other engines remain shut down. (See Section 5 for more ideas on making up and running multiple-headed trains.)

- **Make up the train you want to run and assign the same Temporary ID Number (RESET Position #2) to each engine**
- **Do a RESET**
- **While in RESET, press the Horn Button the number of times equal to the Temporary ID Number of your train**

The engines with the assigned Temporary ID Number are selected and will run. All other engines and trains with different ID numbers will remain silent and motionless.

#1: Engine Select

To select and run engine individually using this RESET Position, you must already have set an Engine ID Number in RESET Position #16 and a Road ID Number in RESET Position #15.

After you have selected your Road group, you can select an engine with an assigned Engine ID Number within this road.

There is no factory default setting for this RESET Position.

▶ To Select (Turn on) And Run A Locomotive with Road ID and Engine ID Numbers

- **Do a RESET**

All engines are in RESET and you are in RESET Position #0.

- **Select your Road ID (RID) Number**

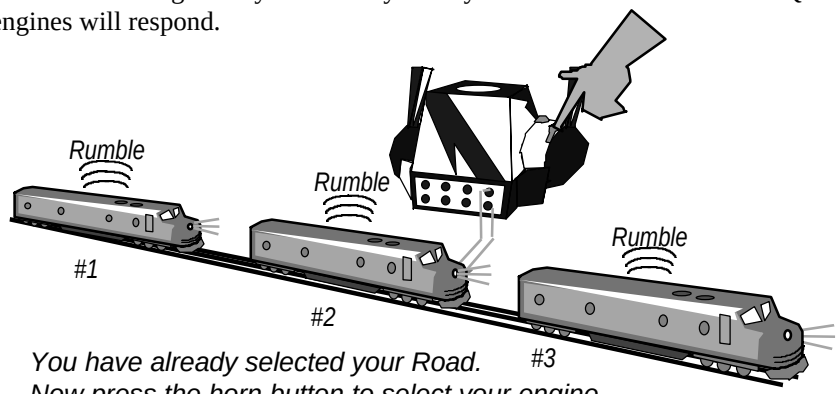
All the engines assigned that Road ID Number are selected (see note below). If you do the next step quickly, you will not hear the engine sounds described in the note.

- **Advance to RESET Position 1 with the Throttle**

You will hear one "clink."

- **Press the Horn Button the number of times corresponding to the Engine ID Number you want to select**

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-2+ engines will respond.



You have already selected your Road.
Now press the horn button to select your engine.

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) Your Selected Engine

There are two ways to De-select your selected engine:

- **Do a RESET**
- **While in RESET, press the Horn Button any number of times except the Road or Temporary ID number assigned to your engine**

OR

- **Do a RESET**
- **Press and release the Horn Button once to enter RESET Position #1**
- **Press the Horn Button any number of times except the Engine ID number of your engine**

If you want all your engines de-selected, press the horn button for an ID number that has not been assigned to any engine. You might want to save a low number for this purpose.

#2: Temporary ID Set

Temporary ID numbers can be assigned by themselves or in combination with Road and Engine ID numbers. Temporary ID numbers will write over, but not erase, any previously assigned Road ID numbers (RESET Position #15).

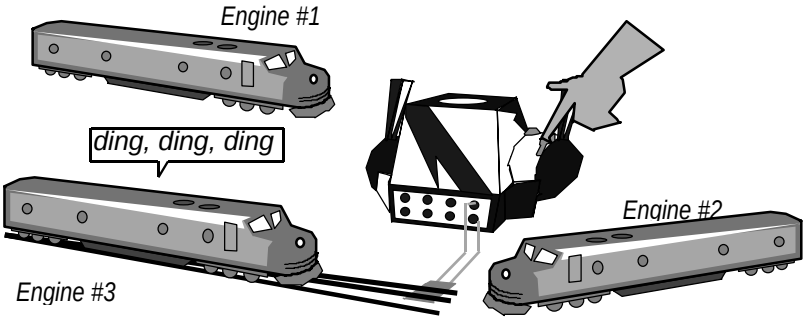
The factory default setting is no ID Number assigned.

▶ To Set The Temporary ID Number on One or More Engines

- **Place each engine one at a time on the powered track or select the engine using its assigned Road and Engine ID numbers**
- **Do a RESET and find RESET Position #2**
- **Assign each engine its Temporary ID number by pressing the Horn Button the number of times you want for each of the engines' ID numbers**

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

After you have set the Temporary ID number, the engine will still be on and in RESET. Interrupt the power to run the engine. To de-select (turn off) this engine, do a RESET. You are in RESET Position #0, Temporary/Road ID# 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 ID to #3

▶ To Change An Engine's ID Number

- **Find RESET Position #2**

Assign the new Temporary ID Number with the horn button as described above. You just replace the old ID number.

#3: Temporary ID Clear

Clearing the Temporary ID number means the engine will power up whenever voltage is applied to the track.

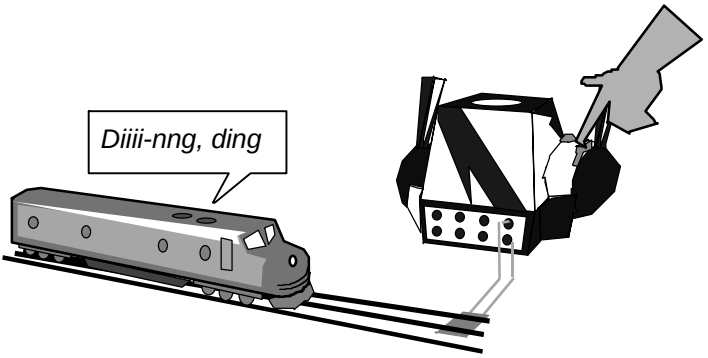
If it doesn't power up, it may have an assigned Road and Engine ID Number and be de-selected. An engine assigned Road and Engine ID numbers returns to these ID numbers after the Temporary ID Number is cleared. Now the engine must be selected with the Road and Engine ID numbers before it will power up.

There is no factory default setting for this RESET Position.

▶ To Clear The Temporary ID Number

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

You will hear "diiin-ng," telling you the temporary ID Number is now clear.



Press horn button once to clear Temporary ID

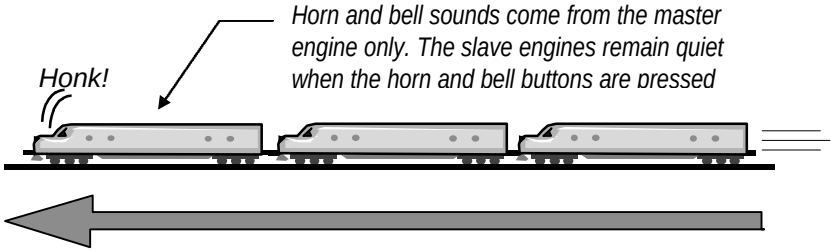
#4: Slave Engine

Slave engines are used in multiple consists. When running a multiple-headed train, you want all the engines powered. But only the lead or master engine should have a working horn and bell, cab chatter and warning lights. You will hear the slave engine's air compressor, motor/steam sounds. Also the slave engine will have operating brake sounds, and will respond to all direction changes with the lead engine. But the slave's horn, bell, cab chatter and diesel warning light will be turned off, and the couplers will work differently.

If PFA (Passenger/Freight Announcement) is disabled before slave is selected, PFA will remain disabled. But if an engine enabled for PFA becomes a slave engine, it will switch to enabled for QSM (QSI Station Master). In QSM, a slave engine follows the lead engine through the PFA sequence, but the slave engine will not make an announcement. A slave engine will make the air let-off sound ("pssht") when it is armed for PFA. Normal and Master engines remain enabled and make the announcement after they've been armed.

Slave Setting	Horn/Bell	Cab Chatter	Warning Lights	Couplers	PFA (if not disabled)
Normal	on	on	on	both on	enabled for PFA
Slave Mid	off	off	off	both off	enabled for QSM
Slave End	off	off	off	rear only	enabled for QSM
Master	on	on	on	front only	enabled for PFA

Settings Changed by Slave Choices



QS-2+ gives you a choice of two different slave engines plus a way to create a lead or master engine.

The factory default setting is "Normal."

▶ To Slave or Master An Engine

- **Find RESET Position #4**
- **Press the Horn Button**

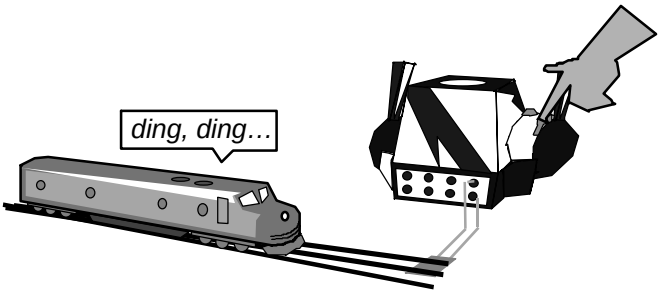
Each time you press the horn button you will hear one to four "dings."

1 "ding" = "Normal": Your engine is ***not*** in slave or master. All sounds work normally. All RESET Features affected by being in slave will return to their factory default settings.

2 "dings" = "Slave Mid" (Middle): Slave for a middle engine in a consist. Both couplers on a Slave Mid engine are deactivated, so the consist cannot break up when you uncoupler cars from other engines.

3 "dings" = "Slave End": Slave for an engine at the end of a consist. The front coupler on a Slave End engine is deactivated, but the rear coupler is enabled so cars can be uncoupled or added to the consist.

4 "dings" = "Master": The engine that is the lead engine in a consist. All the sounds on a Master engine will operate. The rear coupler is disabled, so the consist stays together. The front coupler operates, so the train can move cars around or be added to another engine or consist.



Press horn button to Slave

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

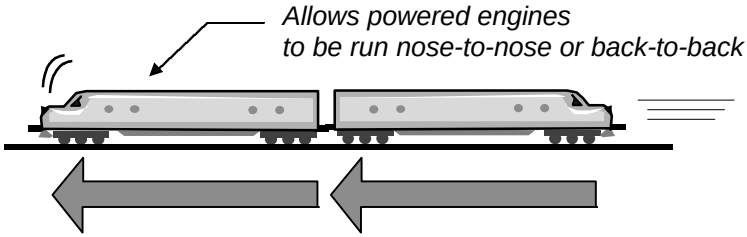
For example: Choosing slave turns off the diesel warning light. You can turn the warning light back on using RESET Position #8 and choosing "Diesel Warning Light On."

Another example: If the announcement in your slave engine is the one you want to hear, you can choose to enable PFA for the slave engine and enable QSM for the Master engine. The slave engine will now make the announcement, and the Master engine will not.

#5: Start-up Direction

By changing the Start-up Direction, you can program you 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. You want the two engines to run together in the same direction, even though they are facing opposite ways. So program your engine to start up in Reverse or RESET before Reverse, and run multiple consists with either Lionel or MTH engines.



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

▶ To Change Start-up Direction

- **Find RESET Position #5**
- **Press the Horn Button**

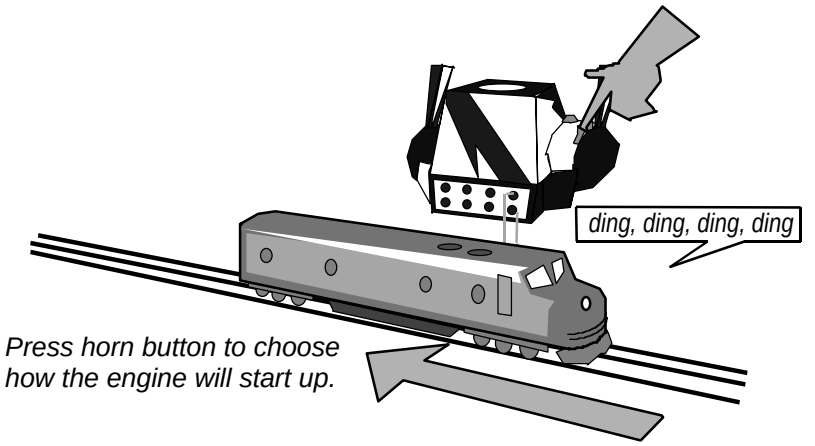
Each time you press the horn button, you will hear one to four "dings."

1 "ding" = "RESET before Forward" (like MTH engines): 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.

2 "dings" = "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.

3 "dings" = "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.

4 "dings" = "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 multiple consists with Lionel engines and want the engine to run backwards compared to the other engines.



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

▶ To Unlock Your Engine

- **Press the Horn Button**
- **While holding the Horn Button down, turn off the power**
- **Release the Horn Button**

You should hear the RESET time-out "ding."

- **Turn the power back on**

You are now in RESET, and you can program your 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 on the Quick Reference Card.

#6: Diesel Motor/Steam Chuff/Electric Fan/ Turbine 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 other engine sounds. To change the volume of all the engine sounds, including these sounds, use the volume adjustment on the QS-2+ circuit board. (See Appendix IV: "Adjusting the Volume.")

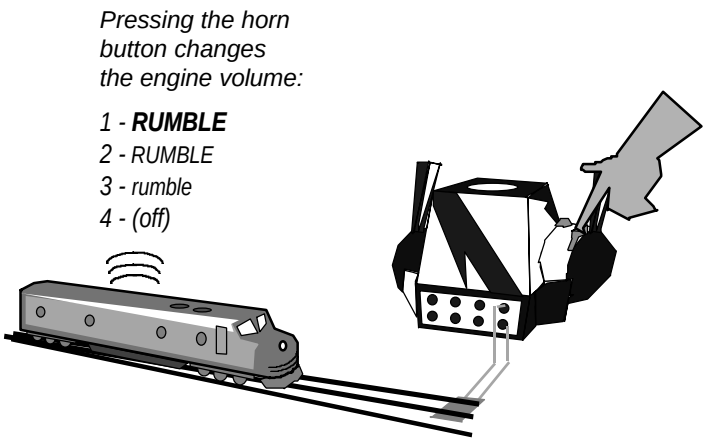
The factory default setting has the volume at its highest setting.

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

- **Find RESET Position #6**
- **Press the Horn Button**

The first time you press the horn button, you will hear the engine chuffing or running at the currently selected volume setting, although your engine will not be moving. Each time you press the horn button, you will hear one "ding" and a change in volume. The volume will decrease by one half until you reach no volume at the lowest setting (i.e. 100%, 50%, 25% and off). Press the horn button once more and you will return to the highest volume setting and start the cycle over again.

If you continue to press the horn button you will keep cycling through the choices. At the lowest setting, or no volume, there are no pump or motor sounds during normal operation. You will continue to hear the background steam hiss on steam engines.



#8: Engine Lights

This RESET Feature allows you to turn a diesel warning light (the overhead blinking light or ditch lights) on or off, and creates two spaces for future engine light options. You must have the QSI Overhead Blinking Light connected to QS-2+ to use this feature (Appendix IV).

The factory default setting for this feature is "Diesel Warning Light On."

▶ To Change the Engine Lights

- **Find RESET Position #8**
- **Press the Horn Button**

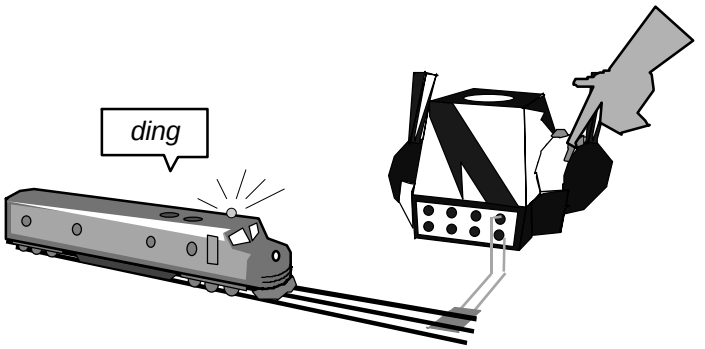
Each time you press the horn button you will hear one to three "dings."

1 "ding" = "Diesel Warning Light On/Off": Choose to turn the diesel warning light on or 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 toggle switch sound each time the bell button is pressed.

If you hear two or three "dings," you have entered choices you cannot change at this time. These choices are reserved for future engine lights.



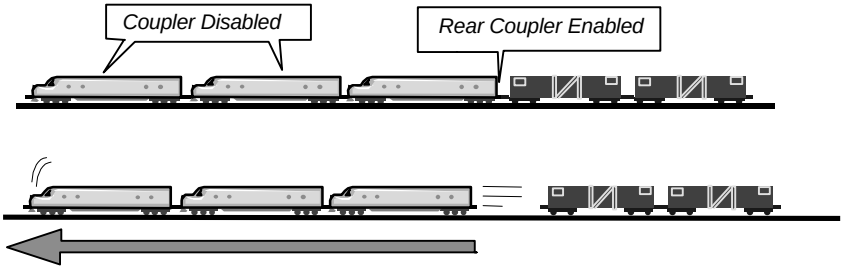
Press horn button to choose light and bell button to change it

#10: Coupler Enable

A Single or Dual Coil Coupler Kit must first be installed in your engine.

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."

Here's an example of how you can use this Feature. 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.



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

▶ To Enable or Disable the Coupler

- **Find RESET Position #10**
- **Press the Horn Button**

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

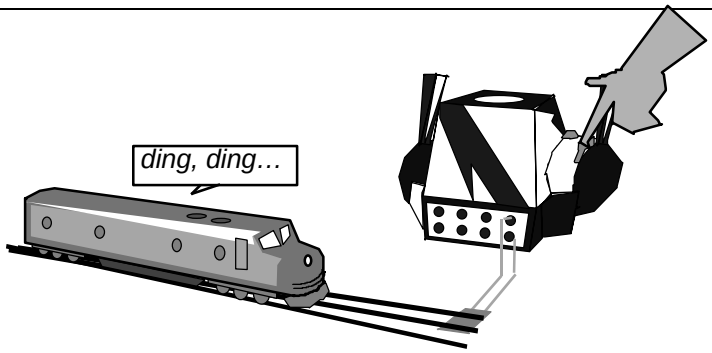
1 "ding" = "Both Disabled": The coupler or couplers will not work.

2 "dings" = "Both Enabled": The coupler or couplers will work.

3 "dings" = "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.

4 "dings" = "Front Only Enabled": Only the front coupler will work when the coupler is armed and fired.

5 "dings" = "Rear Only Enabled": Only the rear coupler will work when the coupler is armed and fired.



Press horn button to enable or disable coupler

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.

What Is a Trailing Coupler and How Is It Used?

The trailing coupler is either the front or rear coupler, depending on the 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.)

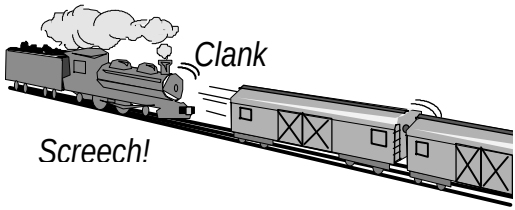
With Trailing Arm Enabled, engine direction determines which coupler will work. You do not have to return to this RESET Feature to change between front and rear couplers.

For example, let's say you want to arm and fire the rear coupler on your 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 choose the coupler you want without going back to RESET. With most engines, rear couplers are used the most, but some engines change between using front and rear couplers frequently. For example, switchers use both couplers and you want to choose between the front and rear couplers quickly and easily.

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.

Once you have enabled the coupler with any of these RESET Feature choices, you must still arm and fire the coupler before it will work. To arm and fire a coupler, follow these directions:

▶ To Arm and Fire the Coupler

- **Put the engine in neutral (not RESET)**
- **Move the throttle to its highest voltage setting**

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

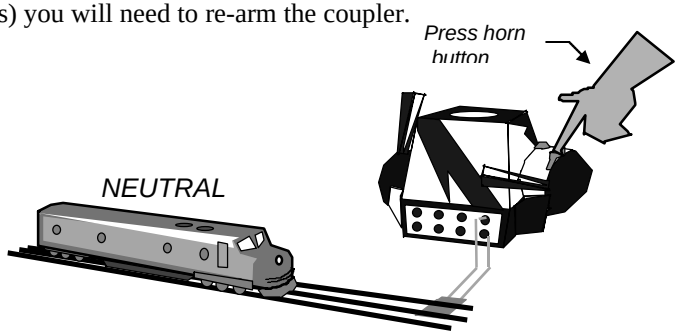
- **With the throttle still *at the highest voltage setting,* press and release the Horn Button. You have armed the coupler**

Hear the lifting of the drawbar. 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**
- **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, but not in RESET. The coupler will remain armed until you fire it, even if you enter and leave RESET. If the power is turned off until the computer shuts down (about 15 seconds) you will need to re-arm the coupler.



To arm the coupler, put the engine in neutral, keep the throttle at high and press the horn button. To fire the coupler, press the horn button again while the engine in any direction.

#11: Automatic Operation

Your engine can operate automatically with a variety of sounds and behaviors. There are three different automatic operation programs available. To give your layout extra drama, Grade Crossing and Milk Run can be used by a train on a closed loop of track. Display Box lets you operate the engine normally, but the motor doesn't work, so the engine is motionless (perfect when demonstrating QS-2+ sounds with an engine in a display box!). An engine in Sales Demo also will not move, but will automatically go through a demo of all of its sounds.

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

The factory default setting is for normal operation.

▶ To Put An Engine In Automatic Operation

- **Find RESET Position #11**
- **Press the Horn Button**

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

1 "ding" = Normal Operation

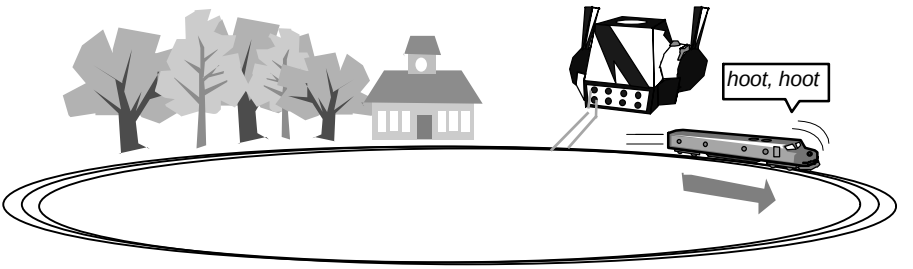
2 "dings" = Grade Crossing

3 "dings" = Display Box

4 "dings" = Milk Run

5 "dings" = Sales Demo

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



▶ To Change Demos

- **Do a RESET and find RESET Position #11**
- **Press the Horn Button**

Each time you press the horn button, you will hear one to five "dings." Choose the number corresponding to the demo you want to hear.

- **Interrupt the Power**

The new demo will begin.

▶ To End Automatic Operation

- **Do a RESET and Find RESET Position #11**
- **Press the Horn Button until you hear only one bell "ding"**
- **Interrupt the Power**

Your engine will return to normal operation.

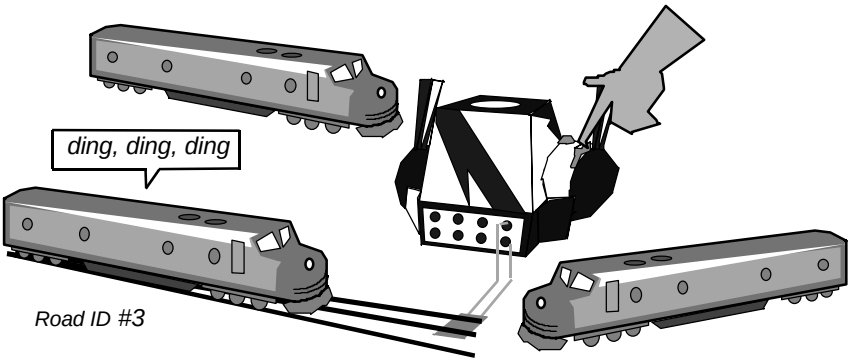
#15: Road ID Set

Road ID numbers can be assigned to groups of engines. They are used with Engine ID numbers to select and operate your trains.

The factory default setting is no ID Number assigned.

▶ To Assign Road ID Numbers

- **Place one engine on the track**
- **Find RESET Position #15**
- **Press the Horn Button the number of times corresponding to the number you want to assign to this group of engines**
- **Before removing this engine from the track, you can assign its Engine ID Number as well, using RESET Position #16 (see next page)**

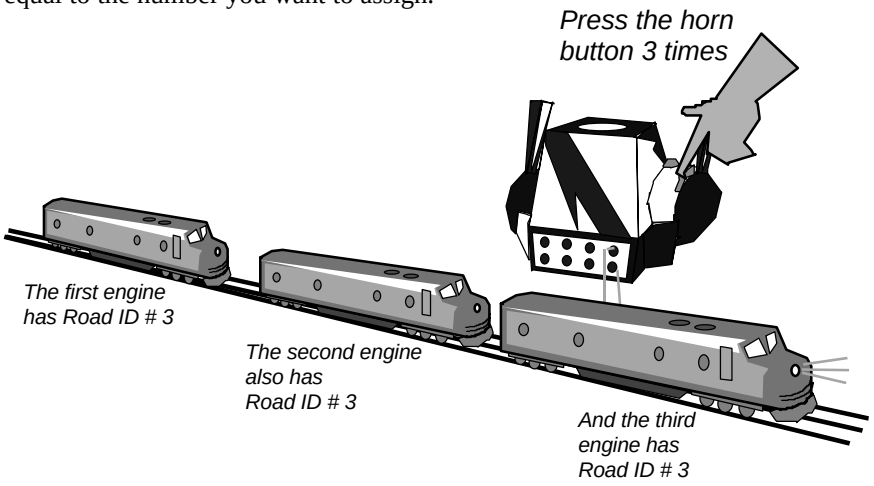


Press horn button 3 times to set Road ID to #3

Note: If the engine has assigned Temporary ID numbers, the engine will continue to be selected with the Temporary ID number and not the Road ID number you just assigned. To select the engine with the Road ID number, clear the Temporary ID number in RESET Position #3.

If you have several engines with Temporary ID's, they can all be cleared at once by placing them all on the powered track together, doing an All-Select in RESET Position #0 and then going to RESET Position #3 and doing a Temporary ID clear on all the engines.

Note: You can also assign Road ID numbers to several engines at once. Place the engines on the track, find RESET Position #15 and press the horn button equal to the number you want to assign.



▶ To Change the Road ID Number

- **Place one engine on the track**
- **Find RESET Position #15**
- **Press the Horn Button the number of times corresponding to the new number you want to assign to this group of engines**

In other words, you just replace the old Road ID number.

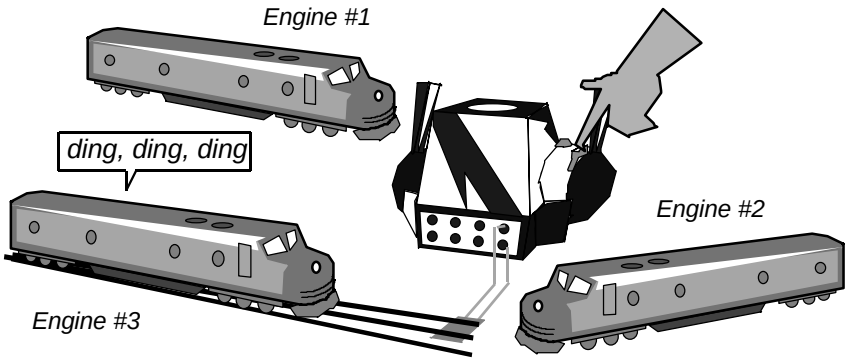
#16: Engine ID Set

You can use Engine ID's with Road ID's to select and operate your trains.

The factory default setting is no ID Number assigned.

▶ To Assign an Engine ID Number

- **Place one engine on the powered track**
- **Find RESET Position #16**
- **Press the Horn Button the number of times corresponding to the engine number you want to assign your engine**



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

▶ To Change An Engine's ID Number

- **Find RESET Position #16**

Assign the new Engine ID number with the horn button as described above. You just replace the old Engine ID number.

#17: Road And Engine ID Clear

Even though Road and Engine ID numbers will be remembered permanently once they have been entered into the QS-2+ computer, they can easily be cleared or changed.

This Feature clears Road and Engine ID numbers only. It will not clear Temporary ID numbers.

There is no factory default setting for this RESET Position.

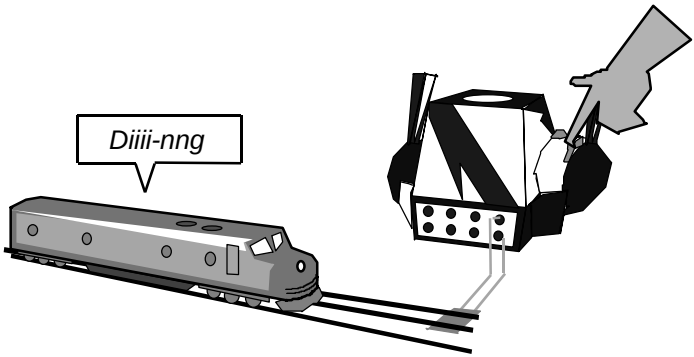
▶ To Clear Engine And Road ID Numbers

- **Place any engines you wish to clear on the powered track**
- **Find RESET Position #17**
- **Press and release the Horn Button**

You will hear a distorted “diiii-nng,” telling you the Road ID number has been cleared. If you only wish to clear the Road ID number, stop now.

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

You will hear "di-ii-inng, di-ii-inng" telling you the Engine ID number is also clear.



Press the horn button once to clear the Road ID number
Press the horn button twice to clear the Engine ID number

#18: Operational Clear

The first choice in this RESET Feature returns Features 4 through 14 to their factory default settings. For QS-2+, this includes features 4,5,6,8,10 and 11. The second choice returns Features 19 through 46 to their factory default settings. This includes features 19,20,23,25,27,28,30,32,37,40,44,45 and 46.

ID numbers are not affected by Operational Clear. ID numbers are cleared using RESET Positions #3 and #17.

Please see the "Quick Reference Card" or Appendix III for all the RESET Features factory default settings.

There is no factory default setting for Operational Clear.

▶ To Do An Operational Clear

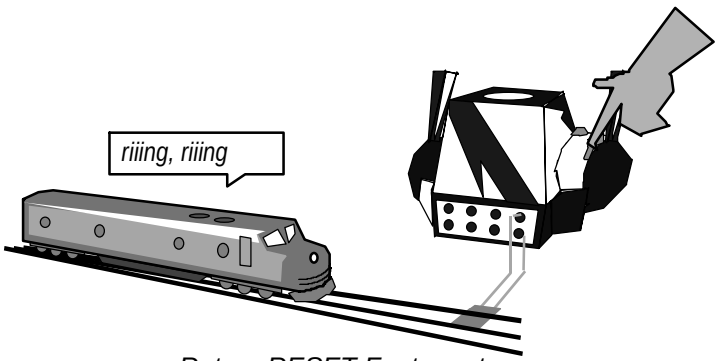
- **Find RESET Position #18**
- **Press and release the Horn Button**

You will hear "riiing." RESET Features 4-11 are now clear.

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

You will hear "riiing, riiing." RESET Features 19-46 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.

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



Return RESET Features to their original factory default settings

#19: Transformer Type

In Auto-Select, QS-2+ automatically identifies your transformer. If you use one transformer exclusively, you can assign QS-2+ to that transformer.

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

If you chose the wrong type of transformer, 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 four possibilities.

The factory default setting is "Auto Select."

▶ To Choose your Transformer Type

- **Find RESET Position #19**
- **Press the Horn Button**

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

If QS-2+ is in Auto Select, the horn blasts tell you which transformer QS-2+ chose the last time it identified the transformer.

If you hear two blasts, QS-2+ made choice #2, which is a ZW or Dallee®.

If you hear three blasts, QS-2+ made choice #3 which is a Lionel® Cab-1® transformer.

If you hear four blasts, QS-2+ made choice #4, which is MRC™ or All-Trol™.

If you hear five blasts, QS-2+ 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-2+ the last time you were in this RESET Position.

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": QS-2+ identifies the transformer during each RESET. When you are in RESET and lower the throttle, the air let-off "pssht, pssht" sound tells you QSl-2+ has identified the transformer.

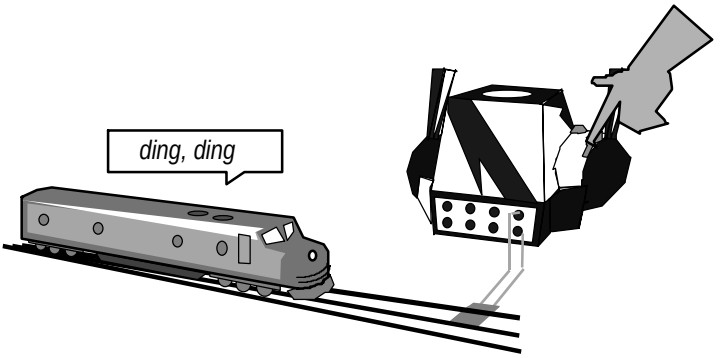
2 "dings" = "ZW or Dallee": ZW includes Lionel Standard transformers, like the KW, 1033, etc.

3 "dings" = "Lionel Cab-1"

4 "dings" = "MRC/All-Trol"

5 "dings" = "RS-1"

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



QS-2+ is assigned to a Lionel ZW or Dallee transformer

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-2+ can distinguish the different types of transformers and make its selection. This is why you need to lower the throttle so QS-2+ can identify the transformer.

To get the best performance in "Auto Select," QS-2+ 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 you are in RESET and lower the throttle, the air let-off "pssht, pssht" sound tells you QS-2+ has identified the transformer.

#20: System Type

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

With System 1, there is no difference between using your horn button or bell button to operate all QS-2+ features. In other words, your bell button will act exactly like a horn button. Also, swapping the wires from the transformer to the track makes no difference. This is the familiar Lionel method used for blowing horns on engines from the 1940's through the 1960's, before electronic horns came along. Some train control features will not be operable in System 1, since they require the use of a Bell Button.

System 2 distinguishes between the horn and bell button signals, so you can use the horn button as we describe in this manual, and the bell button to operate the bell in any direction state.

Choices for Systems 3 through 6 have been added for future use. Systems 3-6 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 Reference Card). Then return to this RESET Position and choose either System 1 or 2.

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

▶ To Select your System Type

- **Find RESET Position #20**
- **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

If you hear three to six "dings," continue pressing the horn button to cycle back to the beginning. Do not leave RESET with the engine in Systems 3-6 at this time.

When your engine is in system 1, and power is turned off, you will not hear the normal RESET time-out "ding."

#23: Diesel/Electric/Gas Turbine Cab Chatter or Steam Neutral Sounds

This features turns special sounds in neutral on or off. Diesel, electric and gas turbine engines come with 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, pop-off and injector sounds.

The factory default setting is sounds "On."

▶ To Turn Cab Chatter or Steam Neutral Sounds On or Off

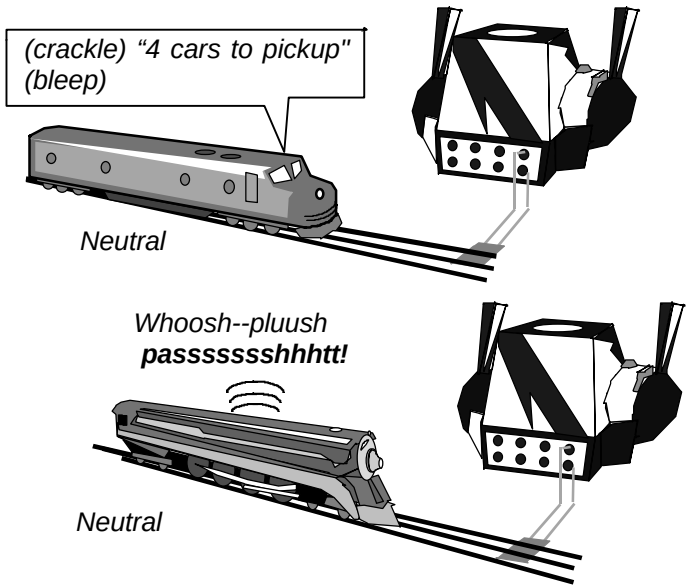
- **Find RESET Position #23**
- **Press the Horn Button**

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

1 "ding" = Cab Chatter or Neutral Sounds are "Off"

2 "dings" = Cab Chatter or Neutral Sounds are "On"

If you turned on the sounds, the next time you are in neutral-before-forward or neutral-before-reverse, wait and listen for these special sounds.



When turned on, special sounds are heard in neutral-before-forward or neutral-before-reverse.

#25: Diesel Horn or Steam Whistle In Neutral

You have two choices in this RESET Feature, called "Bell" and "Whistle." Bell allows you to use the horn button to turn the bell on or off when you are in neutral. But if you plan to use a bell button to operate the bell, you do not need to use the horn button to turn the bell on or off. So you can set QS-2+ to Whistle, which lets you 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 10v.). Blowing the horn in neutral at a high voltage arms the coupler.

The factory default setting is "Bell."

▶ To Use the Horn Button to Operate the Bell or Whistle in Neutral

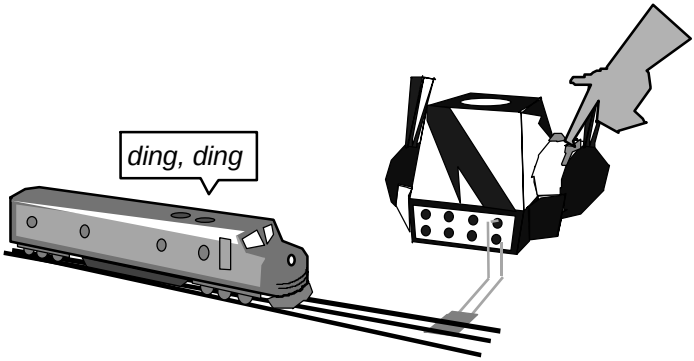
- **Find RESET Position #25**
- **Press the Horn Button**

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

1 "ding" = "Bell": QS-2+ is set to turn the bell on or off in neutral with the horn button.

2 "dings" = "Whistle": The horn or whistle will blow when you press the horn button in forward or reverse, or in neutral when the throttle is at a low setting.

For directions on using the bell, see Section 3: "Bell."



Press the horn button to enable the horn to blow in neutral along with forward and reverse

#27: Steam Chuff Threshold and Chuff Rate or Diesel Motor Threshold

Chuff Threshold is the throttle setting where your steam engine begins to chuff. Chuff Rate is the number of chuffs per revolution of the wheels. Motor Threshold is the throttle setting where your diesel engine begins to rev up.

Each engine's electric motor and gearing is different, and each type of transformer applies power to the engine differently. QS-2+ is designed to give you excellent sound effects under a wide range of conditions. However, if you do not like QSI's settings you can adjust the threshold and rate to suit your individual locomotive.

The QSI chuff and motor settings change depending on the transformer QS-2+ identifies during RESET. QS-2+ 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-2+ memory, it's a good idea to 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-2+ selects the transformer), or lock in the transformer type you are using with RESET Position #19 before continuing with this RESET Feature.

MORE: QS-2+ Eliminates Cams

Normally model railroad locomotives use a mechanical cam to detect how fast the wheel is rotating, and 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-2+ 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 per wheel revolution is set at a realistic four chuffs. 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 chuffs would blur into a single sound.

1. Setting Steam Chuff Threshold and Chuff Rate

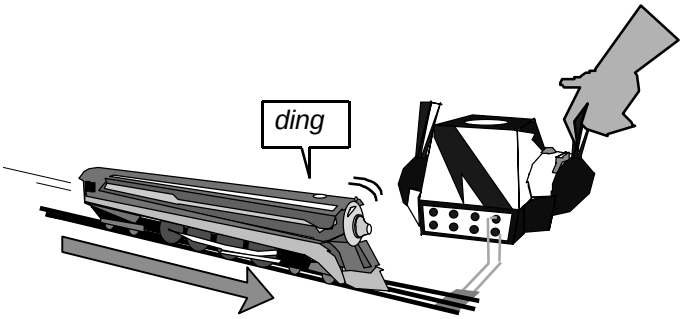
If you apply power and notice your engine starting out without chuffing, or chuffing before it even moves, you can adjust the chuff *threshold* to more accurately fit your engine. Also, if your engine is chuffing too slow at high speeds, or chuffing too fast at low speeds, you can adjust the chuff *rate*.

Note: While setting the threshold and rate, the chuff or motor sound volume will be at maximum. If you lowered the volume using RESET Position #6, the volume will return to this lowered setting as soon as you leave this RESET Feature.

▶ To Set the Chuff Threshold

- **Find RESET Position #27 and leave the throttle at a low setting**
- **Press and release the Horn Button**

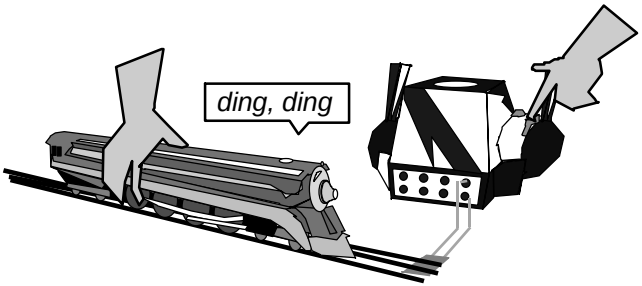
You will hear a "ding" and your engine will start to move out in forward. Bring the engine to a track in front of you and lower the throttle.



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." You have locked in the threshold setting. Let the engine go. Your engine is still in forward.



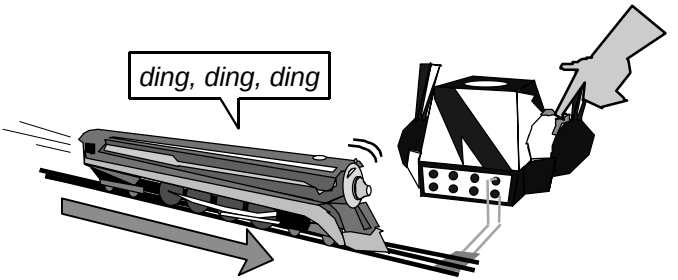
Press the horn button to set the low chuff threshold

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

You will ***not*** hear any chuff sounds yet.

- **Press and release the Horn Button**

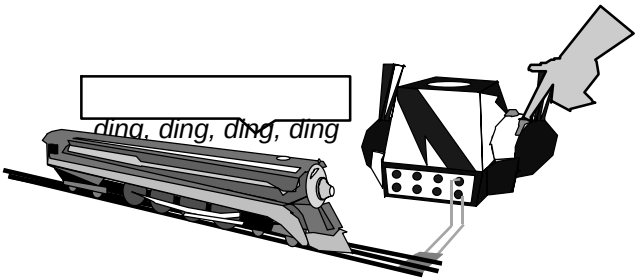
You will hear three "dings" and your engine will start to chuff. You have now set the chuff rate. You can review the new chuff threshold and chuff rate by running your engine in forward at low and high speeds, using the throttle. If you interrupt the power, the engine will not change direction. If you decide to turn the power off, do not leave it off for more than a few seconds (see 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." 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 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.

2. Setting Diesel Motor Threshold

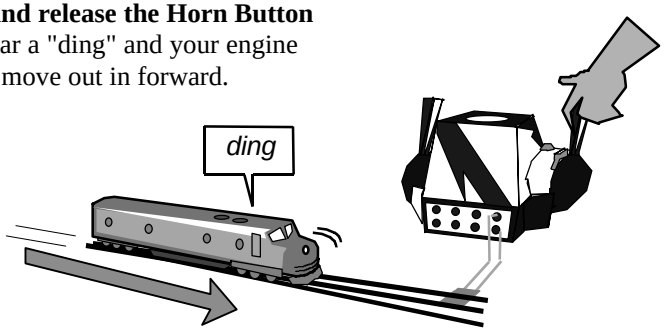
If you apply power and notice your diesel engine moving before the motor starts to rev up, you can adjust the threshold for the motor. Real diesel engines usually rev up before the engine actually moves. If your transformer goes to a very low voltage, so the engine is on but not moving, you can set the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

Note: There is no setting for motor rev. rate, like there is for 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

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

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



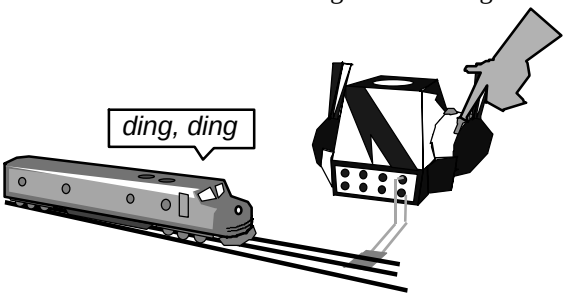
Lower throttle until engine stops, or a few notches below

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

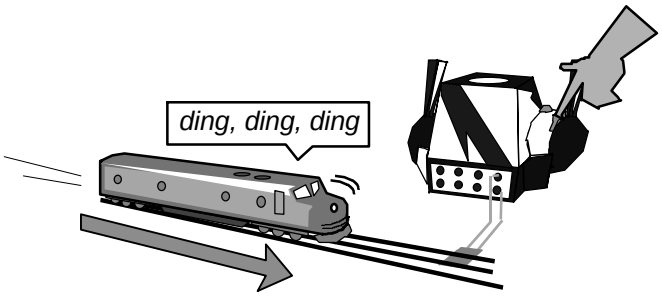
You will hear two "dings". You have set the throttle setting or track voltage where the diesel "rumble" sounds will begin. Your engine will still be in forward.



Press the horn button to set the diesel motor threshold

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

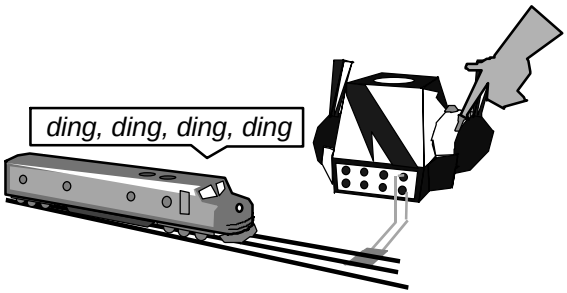
You will hear three "dings." Review the motor sounds by running your engine at low and high speeds, using the throttle. If you interrupt the power, the engine will not change direction. If you decide to turn the power off, do not leave it off for more than a few seconds (see note below).



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." 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 settings.

#28: Passenger or Freight Announcement (PFA) or QSI Station Master (QSM) Enable

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-2+ sound sets include "The Northbound Express" station announcement. ProtoSound systems converted to QS-2+ keep their original Passenger Proto-Effects™ or Freight Yard Proto-Effects™ sounds.

In stations, PFA includes arrival and departure messages ("Now arriving on track one, The Northbound Express…Watch your step…Baggage to the right…Now departing on track one…") and ends with the traditional "All Aboard!" as the train departs. In yards, ProtoSound engines with Freight Yard Proto-Effects use freight yard loading and unloading sounds. As either announcement is being made, the locomotive goes through a series of typical engine sounds and behaviors.

When enabled for QSM, the engine goes through all the engine sounds and behaviors it makes when it is in PFA, but the passenger station or freight yard announcement is not heard. This lets you run the engine with another MTH or QS-2+ equipped engine that is programmed to make a station or freight yard announcement, and not have both engines "talking" at once. QSM is also used with passenger sets equipped with QSI Station Announcement.

The factory default setting is "Enabled for PFA."

▶ To Enable or Disable PFA

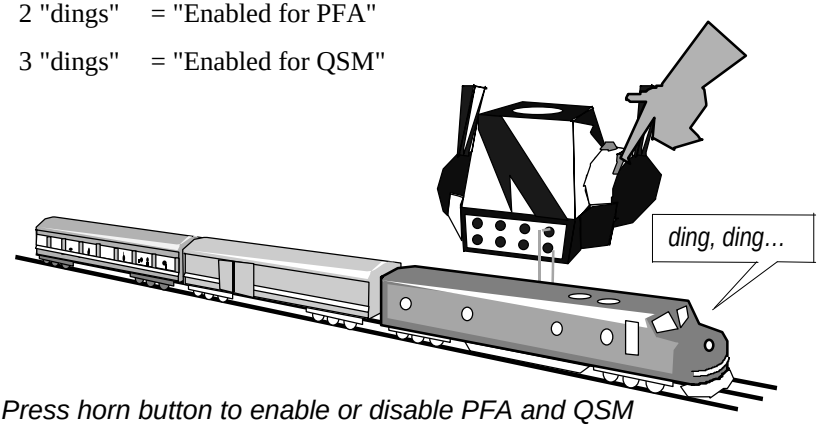
- **Find RESET Position #28**
- **Press the Horn Button**

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

1 "ding" = "Disabled"

2 "dings" = "Enabled for PFA"

3 "dings" = "Enabled for QSM"



Press horn button to enable or disable PFA and QSM

▶ To Arm and Use PFA or QSM:

- **First choose "Enabled for PFA" or "Enabled for QSM"**
- **While the engine is running in forward or reverse, hold down the bell button for about three seconds**

PFA or QSM is armed when you hear a single horn or whistle hoot. (If the engine is a slave engine, you will hear an air let-off "pssht" sound instead. Listen carefully; the "pssht" may be hard to hear over the other engine sounds.) When you hear either the horn or air let-off, release the bell button. Turn the bell off any time you like using the bell button.

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

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

If the brakes have been enabled in RESET Position #45, you may hear brake sounds.

If you left the bell on, it now shuts off automatically. You have entered PFA or QSM. You will hear sounds appropriate to your type of engine. If your engine is enabled for PFA, the passenger station or freight yard announcement will begin. You can stay in neutral as long as you like.

Continuing the PFA or QSM sequence:

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

You may hear two short air let-offs ("pssht, pssht"). Normally, your engine would move, but in PFA or QSM, your engine does not move. The engine sounds are for a yard unloading area, or a station where people are moving on and off the train. You can stay here as long as you like.

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

You will hear "pssht, pssht" and background engine sounds. If you have passenger station announcement, the departure message begins after about 5 seconds. You can stay here as long as you like.

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

Your engine does not move right away. If your engine has passenger station announcement, you will hear "All Abroad!" and the sounds of passenger car doors shutting. The engine horn "hoots" two times. Then the bell comes on. Turn the bell off any time you like using the bell button.

After about 12 seconds, the engine moves out. At about 20 seconds, the bell shuts off automatically and the PFA or QSM sequence is over.

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

#30: Warning Light Options

RESET Position #8 turns engine lights, like the diesel warning light, on and off. This QS-2+ feature allows you to decide how the diesel warning light behaves when it's on.

The factory default setting for this feature is "Blinking if Engine is Selected" (choice 3).

▶ To Select or De-select Your Warning Light Feature

- **Find RESET Position #30**
- **Press the Horn Button**

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

The choices are:

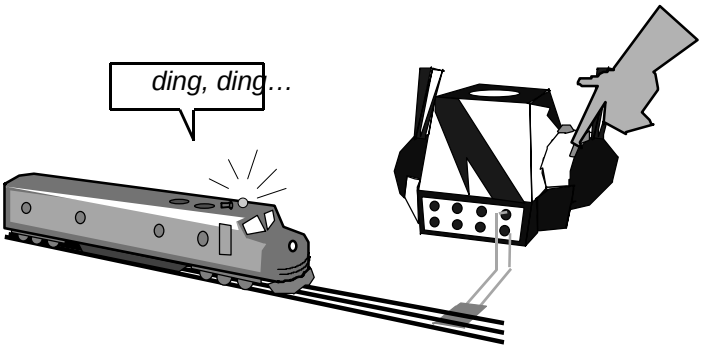
1 "ding" = "On if Engine is Selected"

2 "dings" = "Always On"

3 "dings" = "Blinking if Engine is Selected"

4 "dings" = "Always Blinking"

"…if selected" means the engine is on or selected with its assigned ID number, and can be run through direction changes and features normally.



Press the horn button one to four times for different warning light choices

#32: Feedback in RESET

Feedback are the sounds you hear as you move through Reset Features, including the air let-off "pssht" sounds, "clinks" and "clanks," 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 ("clinks," "clanks" 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 you are 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. And when you operate a RESET Feature, you will always start out at the first choice no matter where that Feature choice was set before. "Clinks" and "clanks" behave normally. "Special" is designed for possible future train controllers. QSI strongly recommends you do not use this choice now.

The factory default setting is "Normal Feedback."

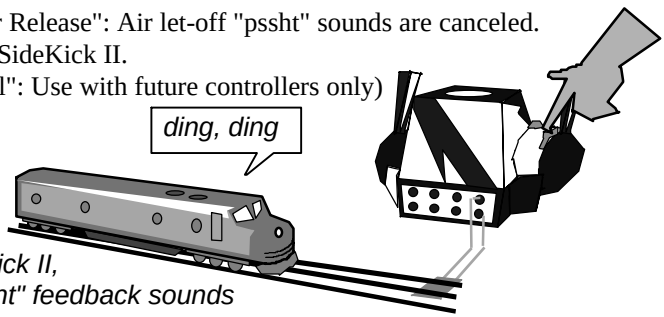
▶ To Turn on or Shut Off Feedback Sounds

- **Find RESET Position #32**
- **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)



When using SideKick II, try turning off "pssht" feedback sounds

#35: 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.

#37: "I think I can" for Small Steam Engines

The “I think I Can” chuff can be found in small steam engines using a QS2-300, QS2-301 or QS2-306 sound set only. It is turned on using your transformer and horn button.

The factory default setting is "Enabled."

▶ To Enable or Disable "I Think I Can"

- **Find RESET Position #37**
- **Press the Horn Button**

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

1 "ding" = "Disabled": You will hear normal chuffing at all times.

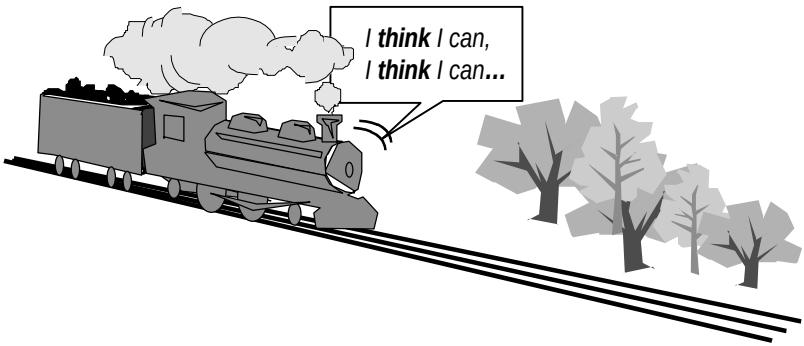
2 "dings" = "Enabled": When you put the engine through the correct series of maneuvers you’ll hear your engine talk like *The Little Engine That Could*.

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 when through a certain sequence of operations. Rumor has it for QS-2+ engines this sequence is:

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 described sequence again.



#40: Lock-out Enable

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 your engine in one direction (forward, neutral or reverse), so it 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.

The QS-2+ engine can be locked out and returned to normal operation any time you are running your engine, but before you can use lock-out, you must first *enable* lock-out using this RESET Feature.

The factory default setting is "Disabled."

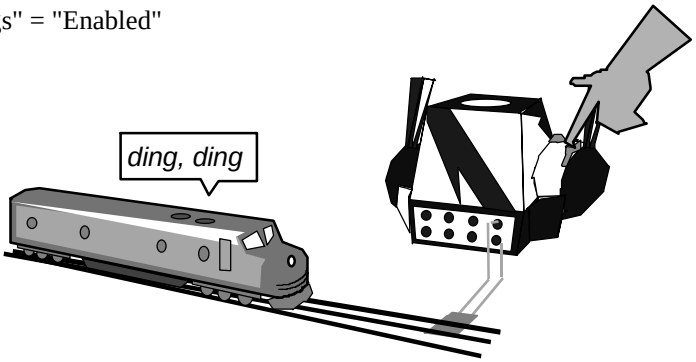
▶ To Enable or Disable Lock-out

- **Find RESET Position #40**
- **Press the Horn Button**

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

1 "ding" = "Disabled"

2 "dings" = "Enabled"



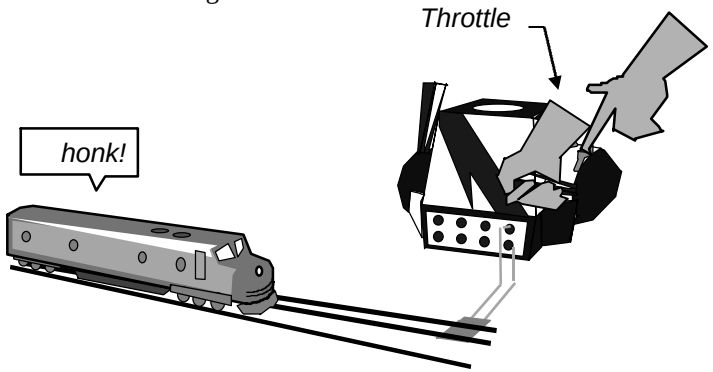
Press the horn button to enable Lock-out

▶ To Lock-Out Your Engine

- **While your engine is running in the desired direction, press the Horn Button and turn off the power with the throttle *while holding the Horn Button down***
- **Release the Horn Button**
- **After a short period (1 to 2 seconds) you will hear a short whistle or horn blast. Turn the power back on *immediately.* Your engine is now locked out** (continued on the next page.)

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

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



While pressing the horn button, turn off the power with the throttle and wait for "honk"

▶ To Unlock Your Engine

- **While your locked-out engine is operating, press the Horn Button and turn off the power *while holding the Horn Button down.* Release the Horn Button**
- **Leave the power off for 3 seconds. You will hear a single "ding." Your engine is now unlocked. You are back in RESET and your engine will operate normally**

You can lock and unlock your engine at any time during normal operation as long as Lock-out is enabled. If you wish to prevent locking your engine out, return to this RESET Feature and disable lock-out.

▶ To Lock and Unlock Your Engine with SideKick II

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

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

#44: All De-Select

This option lets you de-select (turn off) all your QS-1 and QS-2+ engines, including those without assigned ID numbers.QS-2 engines do not accept the All De-Select command.

With All De-Select, you can quickly turn off all your QS-1 and QS-2+ engines, and run an engine not equipped with QS-1 or QS-2+ on the same track.

If you're using all QSI equipped engines with assigned ID 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 an ID number, all other QSI equipped engines with ID's are automatically de-selected.

You must have a bell button, and be using System 2 from RESET Position #20.

The factory default setting is " Disabled."

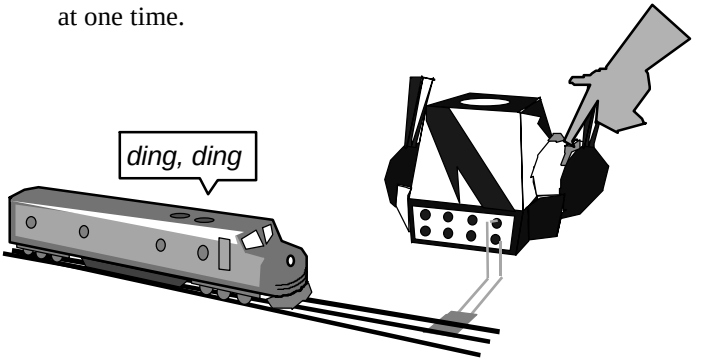
▶ To Enable or Disable De-Select

- **Find RESET Position #44.**
- **Press the Horn Button.**

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

1 "ding" = "Disabled": you *will not* be able to de-select all your QS-2+ engines at one time.

2 "dings" = "Enabled": you *will* be able to de-select all your QS-2+ engines at one time.



You can now de-select all QS-1 and QS-2+ engines at once.

▶ To De-Select Your QS-2+ Engines

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

All QS-2+ engines will go silent.

▶ To Select one De-Selected Engine

- **Enter the engine's ID number using the Horn Button in RESET Position #0 or #1**

▶ To Select All De-Selected 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 your engines should start up.

- **Release the Horn Button**

If an engine did not start up, it may be locked out. Do an Engine Unlock (see the Quick Exit Guide on your *QS-2+ Quick Reference Card*, or in Appendix 1), and then repeat these three steps for selecting All De-Selected engines.

#45: Squealing Brakes Enable

There are three ways to operate Squealing Brakes. You can choose to turn off the brake sounds completely ("Brakes Off"). Or you can decide when to hear the brakes by arming them with the bell button. Once the brakes are armed, they will sound the next time you stop. This choice is called "Brakes Arm Enabled." The third choice is to always have brake sounds whenever you stop after bringing the engine up to running speed (about 14v.). This choice is called "Brakes Always."

The factory default setting is "Brakes Always."

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

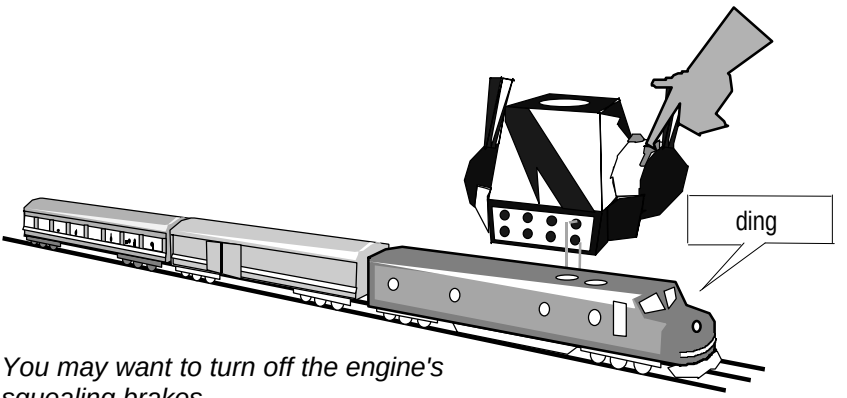
- **Find RESET Position #45**
- **Press the Horn Button**

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

1 "ding" = "Brakes Off": Turns off the Squealing Brakes completely.

2 "dings" = "Brakes Arm Enabled": Squealing Brakes are enabled. You can arm and hear the brakes when you follow the steps on the next page.

3 "dings" = "Brakes Always": Squealing Brakes will sound every time your engine reaches running speed (about 14v.) and then comes to a stop.



You may want to turn off the engine's squealing brakes

▶ To Use Brake Arm Enabled

- **First Choose "Brakes Arm Enabled"**
- **While the engine is running, hold down the bell button for about three seconds**

The brakes are armed when you hear a single horn or whistle hoot. (If the engine is a slave engine, you will hear an air let-off "pssht" sound instead. Listen carefully; this may be hard to hear over the other engine sounds.) When you hear the sound (after about three seconds), release the bell button. Turn the bell off with the bell button if you like.

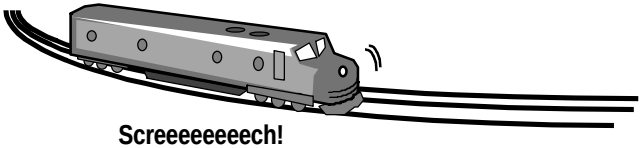
- **Turn your throttle up to running speed (about 14 volts) and slowly turn the throttle back down to bring your engine to a slow stop**

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

When you are in Brakes Arm Enabled, and you interrupt the power after running your engine, you also disarm the brake sounds. To hear the sounds again, do not return to this RESET Feature. Just repeat the steps with the bell button and throttle and you will hear the squealing brakes again.

#46: Flange Sounds Enable

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. You can get the same effect .



Screeeeeeeech!

There are three ways to operate the flange sounds. You can choose to turn off the flange sounds completely ("Flanges Off"). Or you can choose "Flanges Arm Enabled." When using Flanges Arm Enabled, you 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. The third choice is to always have flange sounds when you use the Horn Button as described below; arming is unnecessary. This choice is called "Flanges Always."

The factory default setting is "Flanges Off."

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

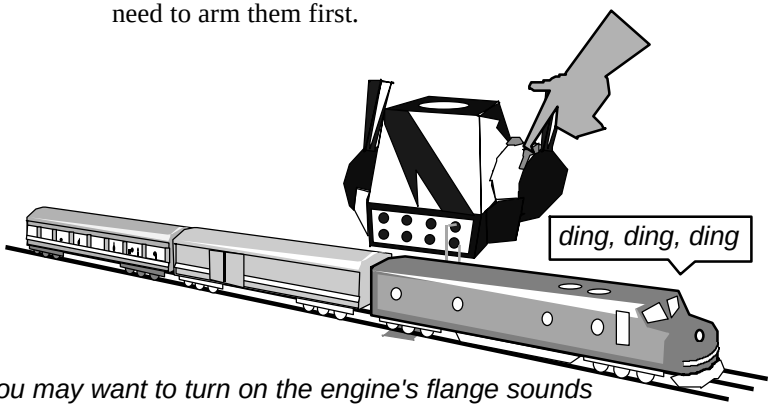
- **Find RESET Position #46**
- **Press the Horn Button**

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

1 "ding" = "Flanges Off:" Turns off the Flange Sounds completely.

2 "dings" = "Flanges Arm Enabled:" Flanges are enabled. You can arm and hear the flanges when you follow the steps on the next page.

3 "dings" = "Flanges Always:" Flanges will sound every time you press the horn button as described in step 3 on the next page. You do not need to arm them first.



You may want to turn on the engine's flange sounds

▶ To Use Flange Sounds

- **First choose "Flanges Arm Enabled"**
- **While the engine is running, hold down the bell button for about three seconds**

The flanges are armed when you hear a single horn or whistle hoot. (If the engine is a slave engine, you will hear an air let-off "pssht" sound instead. Listen carefully; this may be hard to hear over the other engine sounds.) When you hear the sound (after about three seconds), release the bell button. Turn the bell off with the bell button if you like.

- **While running your engine, press the Horn Button briefly, but not long enough to blow the horn**

This will trigger the flange sounds. If you do not hear the flanges, press the horn button a little longer, about ½ second. If you hear the horn, you have pressed the horn button too long. Continue pressing the horn button until flange sounds come on.

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

This produces a long, continuous squealing sound, perfect for flanges.

When you are in Flanges Arm Enabled, and you interrupt the power after running your engine, you also disarm the squealing flange sounds. To hear the sounds again, do not return to this RESET Feature. Just repeat the arming steps with the bell or horn button and throttle, and you will hear the flange sounds again.

Appendix I: Troubleshooting

Appendix I has four sections:

- Quick Exit Guide
- Troubles with Direction States
- Troubles with Sound
- Troubles with Older Transformers

Quick Exit Guide

QS-2+ has four commands you can use should your engine misbehave. These commands are called ***Hard RESET***, ***All Select, Engine Unlock*** and ***Operational Clear.***

Hard RESET (or QS-2+ Computer Restart)

If your engine is misbehaving (it doesn't take commands, or does something you didn't expect) you should first try to RESET your QS-2+ 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 "ding, ding," telling you the QS-2+ computer has restarted successfully and you are now in RESET. If you do not hear the double "ding," leave the power off for 30 seconds. If you still do not hear a double "ding," try Engine Unlock (see next page).

All Select

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

▶ To Do An All Select

- **Do a normal three second RESET**

You are 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**

If your engine was dead, you will now hear the Air Compressor start up.

- **Release the Horn Button**

You can now operate your engine.

Engine Unlock

Your engine may be making sounds, but you are unable to change its direction or put it in RESET. If so, your engine may be locked out.

▶ To Unlock Your Engine

- **Press the Horn Button**
- **While holding the Horn Button down, turn off the power**

You should hear one "ding," telling you to turn the power back on. You are now in RESET, and you can operate your engine normally.

Operational Clear

You may have entered a RESET Position and changed a RESET Feature without meaning to, or you may have forgotten past changes. If so, this command returns all RESET Features back to the factory default settings, including all the assigned ID Numbers, as well as Motor/Chuff/Fan/Turbine Volume.

▶ To do Operational Clear

- **Find RESET Position #18 (three "clanks", three "clinks")**
- **Press and release the Horn Button**

You will hear "riiing." RESET Features 4-11 are now clear.

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

You will hear "riiing, riing." RESET Features 19-46 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.

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

Interrupt the power to run the engine.

Troubles In Direction States

When you have an unexpected response using the horn button, bell button, or the throttle, you probably knew you were in RESET, Forward, Reverse, or Neutral when the problem occurred. Since the direction state affects how QS-2+ behaves, we have divided this section of the troubleshooting guide into four categories: RESET, Forward and Reverse, Neutral, and Sounds. Check the questions and answers under the direction state your engine was in when the trouble started.

Problem	Solution
Troubles In RESET	
1. When using a Lionel Cab-1™ and PowerMaster, I cannot advance through the RESET Positions by turning the throttle up and down.	The Cab-1 throttle does not have a definite stop or markings on the knob to indicate the voltage level so it is hard to tell when the throttle is at a high enough or low enough value to operate QS-2+. Try checking the brightness of any light that is wired directly to the track such as a lighted car or track clip light, to estimate voltage. Or use the lights on the QSI PowerTrak to monitor the voltage. Also, make sure the Cab-1 is set at low momentum (see Lionel Cab-1 instruction manual). If the engine is at any other momentum setting, the throttle will be very slow to respond, making it more difficult to tell what voltage is being applied. Check the stall voltage on your Cab-1. If this voltage is too high, you will not be able to drop down to a sufficiently low voltage to sequence to the next RESET position. The PowerMaster unit uses up some of the available voltage before it gets to the track. Make sure you use the PowerMaster with a sufficiently powerful transformer, like a ZW, and make sure the transformer is turned up all the way. Or you can use a high power rated source like the Lionel PowerHouse.™ OR, you may be in neutral and just think you are in RESET. Read Appendix VI for alternative ways to run your QS-2+ equipped engines with the Lionel Cab-1/PowerMaster system.
2. When using Cab-1/PowerMaster, I sometimes get double dings when pressing the horn button in RESET.	Your Cab-1 battery is weak and needs replacing.
3. When using my All-Trol, and I try to leave RESET using the direction button, the engine will not change direction. Instead, I'm still in RESET.	Reduce the All-Trol momentum setting to zero.

4. Interrupting the power does not take the engine out of RESET. Every time the power is interrupted, I hear an air let-off and clinks and clanks like I'm moving through RESET positions.	The QS-2+ will not let your leave RESET when your throttle is over 14 volts. Reduce the throttle to less than half before interrupting the power to go forward. (You may hear a double "phsst" short air let-off sound when you bring the throttle down. This sound indicates that your transformer has been identified.)
5. When the horn button is pressed in RESET nothing happens.	Some RESET Positions have no choices assigned and will not respond to a horn signal. OR, your engine is De-Selected. OR, there is a problem with the horn button. Leads to the track may need to be swapped. See Appendix II on connecting your transformer, and the next troubleshooting section: "Troubles with Transformers." OR, the wrong transformer was selected in RESET Position #19. Check to see if your QS-2+ is set for the correct transformer or that it is set to Auto Select. (see Section 6, RESET Position #19).
6. The boost button on Cab-1 will not advance the RESET positions	This button will provide a high voltage but it is slow to increase and decrease in value. Use the throttle on the Cab-1, or use the Cab-1direction button as described in Appendix VI; it is much faster.
7. Engine acts dead, with lights on but no sound or control.	Engine may be De-Selected. Follow the steps for All Select in the Quick Exit Guide.
8. Engine makes sounds, but will not go forward.	Engine may be locked in Neutral. Unlock your engines (see Quick Exit Guide above). If you want to disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled." OR, the transformer may not be shutting all the way off when the throttle is down. The track voltage must drop below 1.9v. Try using the direction control button to change states.
9. Engine will not go into RESET, but makes sounds.	Engine may be locked in Neutral. Unlock your engines (see Quick Exit Guide above). If you want to disable the Lock-out Feature, go to RESET Position #40 and choose "Disabled." OR, the transformer may not be shutting all the way off when the throttle is down. Track voltage must drop below 1.9v. Try using the direction control button to change states.
10. I had been making some changes to my RESET options and now I cannot get my engine to respond to either my bell button or horn button in any directional state, including RESET.	You may have selected system 3, 4, 5 or 6 in RESET Position #20. These systems will not respond to either horn or bell button operation. To go back to RESET Position #20, first do an Unlock (see Quick Exit Guide above). This will allow you to use your throttle and horn button. Enter RESET Position #20 and choose system 1 or 2.

11. All engine sounds stop past RESET Position #2 except for clinks and clanks.	This is normal. QSI does not want engine sounds interfering with QS-2+ feedback sounds.
12. In RESET, when trying to select an engine, there is a "ding" when the horn button is pressed and another when it is released.	There is a problem with the horn button on your transformer. See this Appendix: "Troubles with Transformers."
13. QS-2+ does not always respond to the horn button.	There is a problem with the horn button on your transformer or you have the wrong transformer selected in RESET Position #19. See this Appendix: "Troubles with Transformers." Or check to see if your QS-2+ is set for the correct transformer, or is set for "Auto Select". (see Section 6, RESET Position #19).
14. When horn button is pressed in RESET on my standard Lionel transformer the engine moves forward.	There is a problem with the horn button on your Lionel transformer. See this Appendix: "Troubles with Transformers."
15. Engine is always on whether it is Selected or De-Selected with the horn button.	The locomotive ID numbers have not been assigned or the ID numbers have been cleared so the engine is always Selected.
16. The engine goes forward when using the throttle to select a new RESET Position.	When using the throttle to advance through the RESET positions, the voltage on the track must go up to a high value and back down, but not off. Bringing the throttle down too far will interrupt the track power and put the engine in forward. A better method is to set the throttle at its maximum setting and use the direction button to advance through RESET Features.
17. When I use a standard Lionel transformer (like a ZW), the engine does not advance past RESET position #0, and there are no air let-off "pssht" sounds.	The throttle is not going to a high enough voltage (14v or greater) to trigger the voltage setting on QS-2+. Your transformer may be overloaded, it may be worn out, or an accessory controller (such as an Ott Horn Controller) between the transformer and track is taking too much power. You can remove accessories or use a more powerful transformer with higher voltage output. (See the table in Appendix II.) OR, you may not hear any air let-off sounds because the feedback sounds may be switched off. Go to RESET Position #32 and choose "Normal Feedback" (choice 1).

18. Engine is De-Selected and I cannot remember the Engine or Roads ID numbers and want to find out what they are.	Use All-Select to start engine (See Quick Exit Guide), and go to RESET Position #3. Press horn button to any clear Temp ID. Then do another RESET and press horn button in RESET Position #0. Count how many presses it takes for the engine to power up. This is the Road ID. If the engine is alive for all presses of the horn button, the Road ID is 0 (not assigned). Now go to RESET Position #1. Press the horn button and count how many presses it takes for the engine to power up. That is the Engine ID#. OR, write over old ID #'s: do an All-Select to start engine (See Quick Exit Guide), then go to RESET Positions #15 & #16 to set new ID #'s.
19. RESET Feature changes that I make are not saved.	If you are operating without a battery, or your battery is weak or discharged, you can save the RESET choice you have just made to the QS-2+ computer memory by advancing to the next RESET Position with your throttle. See Appendix V on "Operating without a Battery."
20. Pressing the Bell Button causes the engine to go dead.	You have the "All De-select" feature enabled. Do not use your bell button when you first enter RESET, or go to Reset Position #44 and chose "Disabled".
21. Pressing the Horn Button causes the engine to go dead.	You engine has ID numbers installed and your have de-selected the engine by pressing the horn button. Or you have the wires swapped to the track, your horn button actually sent a bell signal, and you have the "All-Deselect" feature enabled. Swap the leads to your track.
22. QS-2+ makes popping sounds, motor sounds are low volume and garbled, and engine and will not go into RESET.	The track and/or rollers are dirty or corroded. Clean the track and replace rollers if necessary. OR, the battery may be dead. See Appendix IV, "Replacing the Battery."
23. The bell was on in Neutral, but when I did a RESET the engine powered up with the bell off.	This is normal. When you do a RESET, the bell is turned off.

Troubles In Forward and/or Reverse

24. After RESET, the engine goes backward instead of forward when the power is interrupted.	The "Start-up Direction" RESET Feature is set to "RESET before Reverse". Go to RESET Position #5 and choose " RESET before Forward."
25. After a three second power down, the engine starts right out without ever going into RESET.	The engine is locked in forward or reverse (Unlock your engine as described in the Quick Exit Guide). OR, the "Start-up Direction" RESET Feature is set to "Forward" or "Reverse". Go to RESET Position #5 and choose " RESET before Forward." Follow the Engine Unlock instructions in the Quick Exit Guide to return to a normal RESET. Go to RESET Position # 5, "Start-up Direction," and change to choice 1 or choice 2.
26. 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. You can also go to RESET Position #20 and select "System 1" but you must swap

	the transformer or track connections, at least temporally, to allow you to use the RESET features.
27. The horn or whistle comes on when either the horn or bell button is pressed.	System 1 is selected. Go to RESET Position #20 and select "System 2."
28. The chuff sound is irregular or the engine stops and RESETS automatically. The horn or whistle sometimes blows by itself or there is a delay in the whistle or horn shutting off after I release the horn button.	The track and/or rollers are dirty or corroded. Clean the track and replace rollers if necessary. OR, the wrong transformer was selected in RESET Position #19. Check to see if your QS-2+ is set for the correct transformer or is set for "Auto Select". (see Section 6, RESET Position #19).
29. The engine will RESET but will not go when I interrupt the power. I hear the soft tick of the relays when I interrupt the power but the motor does not turn.	One or both Motor wires are not connected to the QSI reverse unit or the ProtoSound bottom board. Check the connections and re-solder if necessary. OR, one or two brushes on your Lionel AC motor are hung up in the brush guides and are not making contact to the copper commutator on the armature. Remove the top brush plate and clean the guide with WD-40 and pipe cleaner rod or Q-Tips.
30. The engine only goes in one direction.	The engine is in Lock-out. 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." OR, you may be in Automatic Operation. Go to RESET Position #11 and choose the first choice, "Normal Operation." OR, you may be pressing the Direction Button too quickly and not giving the QS-2+ system time to change to the next direction. OR, you may have a faulty direction button or your transformer that is not completely shutting off the track voltage during direction changes.
31. After running my engine in Automatic Operation, and doing a RESET and interrupting the power, my engine will not return to automatic operation.	You need a high throttle setting to run automatic operation, but the high throttle setting keeps your engine from leaving RESET. Move the throttle to a low setting before interrupting the power. Your engine will return to the automatic operation you selected.

32. There is a slight delay before the horn or whistle comes on after I press the Horn Button.	The horn signal may be too weak. If the horn signal is weak, QS-2+ 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, the best advise is to 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 your QS-2+ is set for the correct transformer or is set for "Auto Select." (see Section 6, RESET Position #19).
33. The engine starts normally, but then the horn or whistle blows, the bell comes on and goes off, and the engine starts and stops on its own.	Your engine is in Automatic Operation. Go to RESET Position #11 and choose "Normal Operation." OR, if you are using a Cab-1/PowerMaster controller with a ProtoSound System or a QS-2+ converted ProtoSound board, you need to add a QSI PowerTrak to your PowerMaster output for reliable operation. See Appendix II.
34. When I use my Cab-1 system, my QS-2+ engines run at full speed and will not respond to Cab-1 controls.	You are running your layout under Lionel’s TMCC digital command control system. This system requires the track voltage be maintained at a high value. If your engines are not equipped with a Lionel TMCC receiver, they will run at full speed. QS-2+ equipped engines do not have TMCC receivers. If you want to use the Cab-1 walk-around throttle with QS-2+, use a Lionel PowerMaster controller set to conventional operation to power the track.
35. The chuff sound on my 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 can be small and not easily detected. Try increasing the load on your engine by adding cars.

36. The horn or whistle continues to blow when the horn button is no longer pressed. Or the horn, whistle or bell will go on and off when no buttons are being pressed. Also, when I enter RESET from a cold start, I hear three dings instead of two. Or if I do a normal three-second power down RESET, I hear a "ding" after three seconds without power and an additional "ding" when I re-apply power. Also, I am having difficulty selecting my engines or other RESET choices and do not hear the "ding" when I press the horn button.	An accessory, faulty transformer, powered car or some problem with the engine is putting a DC horn or bell signal on the track. The following may cause this problem: 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. Turn the smoke generator off to see if this solves the problem. If so, replace the smoke generator. 3) Dirty AC motor commutators can be a source of DC because of carbon build up. Try spraying the commutator with TV tuner cleaner or and running the motor for a minute or so. 4) Rollers are a source of DC on some engines (Weaver RS-3, and FA Alcos) because the metal that is used makes them take power unevenly, or because of carbon buildup. Try cleaning the rollers before replacing them. 5) Faulty track connectors and dirty track can sometimes (but rarely) cause DC on the track. Try cleaning the track and run extra power leads to different locations on the layout. 6) Some electronic products that you may use in engines or cars use a half wave rectifier. This will cause DC on the track. Try turning them off or removing them and see if this solves the problem.

Troubles in Neutral

37. Pressing the horn button to turn on the bell or arm the coupler causes the engine to go dead and it will not respond to direction changes.	You are not in neutral, you are in RESET. If the power has been off for three seconds or more QS-2+ will automatically be in RESET when the power is turned back on. If the engine has an ID #, it may be de-selected when the horn button is pressed. Go to RESET Position #0 and do an All Select (see Quick Exit Guide above).

38. Pressing the bell button to turn on the bell causes the engine to go dead and it will not respond to direction changes.	You are not in neutral, you are in RESET and you are in System 1. Do an All Select to get your engine started (see Quick Exit Guide above). OR you are not in neutral, you are in RESET, and you have operated All De-Select and have turned off your engine. Do an All Select to get your engine started (see Quick Exit Guide). OR you are not in neutral, you are in RESET, and you are in System 2, and the wires from the bell button are backwards or the wires from your transformer are swapped. Check your wiring. Do an All Select to get your engine started again (see Quick Exit Guide above).
39. I pressed the horn button to arm the coupler but the bell came on instead.	Your transformer may not have enough high voltage to use the coupler selection feature (you need at least 14 volts). See this Appendix: "Troubles with Transformers." OR, the wires between the track and transformer are swapped. If you press the horn button at high voltage to arm the coupler, you will actually be 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, you have the track connections reversed.
40. Pressing the horn button in neutral at a low throttle voltage to turn on the bell causes the horn or whistle to come on. The horn button operates properly in forward and reverse, therefore the transformer leads are connected correctly.	The "Diesel Horn/Steam Whistle in Neutral" RESET Feature is set for horn or whistle. Go to RESET Position #25 and choose "Bell."
41.All the coupler sounds come on when operating the coupler but the coupler does not open.	QS-2+ needs the remote QSI Coil Coupler kit which is sold separately. If this kit is installed, 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-2+ board (see Appendix V). OR you may have set “Slave” in RESET position #4 which will affect coupler operation. OR you have the couplers turned off, or have selected a coupler option which does not have the coupler activated. Go to RESET position # 10 and select the coupler option you want. If you are using a QS-2+ converted ProtoSound board, and may have set the switch on the bottom of the engine to the other coupler.

42. When I use RESET Position #10 to select different coupler options with my QS-2+ converted ProtoSound engine, the coupler operation either does not change or it shuts off both couplers even though the coupler sounds are present.	On ProtoSounds, the coupler activator is on the bottom board and only the front coupler output is available. ProtoSound engines usually wire both couplers to this single front coupler output and use a switch on the bottom of the engine to select the front or rear coil coupler. If you select different coupler options in RESET position #10, it 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" to make sure your ProtoSound engine will reliably activate your couplers. Or buy a new bottom board from QSI that has both coupler outputs available. Note: QS-2+ uses a coupler kit that connects to the top board. The couplers on ProtoSound bottom boards are activated through the pins that connect the boards together. There is no cable connection from the top board to the couplers.
43. 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 I let the button out.	The horn button is faulty. See this Appendix: "Troubles with Transformers"
44. Pressing the horn button in neutral causes the bell to come on, and the horn or whistle does not blow.	This is normal. QS-2+ turns the bell on and off in neutral with the horn button. If you are using a bell button you can have the horn or whistle blow in neutral. Go to RESET Position #25 and choose "Whistle." OR, the wires from the transformer to the track are switched. You need to swap them either at the transformer or at the track.
45. Turning the throttle up and down to change direction does not make the engine go into the next direction.	The throttle may not be turning all the way off. The QS-2+ unit needs to have the voltage below 1.9v before it recognizes a direction change command. The transformer throttle may be out of adjustment and the throttle will no longer go all the way off. Use the direction button since this usually produces a much better off condition than the throttle. The Lionel Cab-1 throttle may not completely shut the power off. Check your Lionel instruction book for more information. If the throttle is working properly, the engine may be in Lock-Out. 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."
46. 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.

47. 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-2+ needs the battery back-up to activate Lock-out. If there is a NiCad battery connected to QS-2+, try recharging it by leaving your engine powered up at half throttle or more for fifteen minutes. Or remove the battery and recharge it on a commercial charger. If the battery is dead, a common 9v battery can be used to get your engine operating again but it will eventually wear down since it cannot be recharged. Replacement NiCad 7-cell, 8.4 volt batteries are available from QSI and some electronics stores.

Troubles With Sound

48. When operating the horn or whistle, the sound seems to turn on very slowly or not at all, the horn or whistle may sound distorted at low throttle settings or there is a dead zone when I release the horn button.	The battery is dead, worn out, or disconnected. NiCad batteries normally last about 5 years. If the engine is consistently operated at high sound volume and low throttle settings, the battery can be discharged. Try allowing the engine to 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. If this does not help, replace with a QSI NiCad 7 cell 8.4 volt battery.
49. I cannot get the flange sound effects to turn on with the horn button.	Your horn signal may be weak. In order to operate the flange sound reliably, you need a strong horn signal. ZW's usually have a poor horn signal if you hold the button down all the way. Try pressing the horn button down only half way for short periods; it should operate the flange sound consistently. OR the Flange effect has not been enabled. Go to RESET position # 46 and select "Flanges Arm Enabled" or "Flanges Always". OR you may have selected "Flanges Arm Enabled" and are not arming the Flange effect with the Bell Button. See RESET feature #46 for more details.

50. I cannot get short horn blasts with my whistle button.	You horn signal may be weak, OR, the wrong transformer was selected in RESET Position #19. Check to see if your QS-2+ is set for the correct transformer or that it is set for "Auto Select." (see Section 6, RESET Position #19). OR, you have enabled Flange Sound effects. Since a short horn signal is used to turn on the flange sound, the horn sound is delayed to prevent both happening at the same time. Go to RESET position #46 and select "Flanges Off". OR, the trail off and lead-in to your horn or whistle may be longer than normal for your particular QS-2+ sound set.
51. When I put my tender cab back on, the QS-2+ system or QS-2+ converted ProtoSound system does not make any sound and/or does not work.	You have not insulated the tender cab and the unit is shorting to the sides of the metal tender. Insulate the inside of the tender cab with electrical tape where it can contact the QS-2+ boards. OR, you are pinching a wire(s) when you screw the cab down to the chassis floor.
52. When I arm PFA, nothing happens.	You must put your engine in neutral after arming PFA to have the feature operate. OR, you have not enabled PFA. Go to RESET position #28 and chose "Enabled for PFA".
53. After I arm PFA, I can make the engine sequence through all the PFA states, but there is no announcements.	You are not in PFA, you are in QSM. It has all the effects including bells, engine hoots, but no announcements.
54. When I operate PFA on double-headed engines, I either get the trailing engines operating out of sequence with the lead engine or I get multiple PFA announce-ments from all the engines.	Set all your trailing engines to "Enabled for QSM" in RESET Position #28. The engines will not produce the PFA sounds but will sequence with the lead engine.
55. When I put my engines in slave, I loose a lot of sounds and other features.	When you use RESET feature #4 to slave trailing engines in a multiple-headed consist, not only are the horn and bell muted, but 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 the most realistic slave effects. After you select slave, you can go to these various RESET Features and change them if you wish.

56. When power is turned off, the sounds cut off immediately rather than lasting through brief power interruptions or the three-second RESET time.	The battery is dead, worn out, or disconnected. NiCad batteries normally last about 5 years. In some very unusual operating circumstances, the battery can be discharged. Try allowing the engine to sit 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, replace with a new QSI battery.
57. I have replaced my battery a number of times and it keeps discharging.	Are you using 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. If you are using an electronic transformer, there is often not enough power at low throttle settings to keep the battery charged. In neutral or RESET keep the throttle at a high setting whenever possible. Or follow the directions for recharging your battery in Appendix IV. Using "Automatic Operation" (RESET POSITION #11) quite often with the throttle set low can discharge your battery. You may have a defective power supply. Send in your QSI sound boards for repair.
58. The sound is turned up all the way but the sounds are distorted.	The small speaker used with O-Gauge locomotives is being overdriven by the high power output. Adjust the volume on the top QS-2+ circuit board with a small screw driver as shown in Appendix IV, "Adjusting the Volume."
59. The sounds are distorted and/or scratchy even at low volume settings.	The most likely cause is the speaker installation. Check that no wires or other objects are touching the cone. Make sure motor wires are not bundled together with the speaker wires (this can cause static sounds from the motor). Also check that 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.
60. 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 engines is in slave. Go to RESET Position #4 and choose "Slave Off," and go to RESET Position #6 and choose any volume except "Off."
61. 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 it is plugged into the top board pins (see Appendix IV) or that both wires are soldered to the two speaker terminals. OR, the volume is turned down all the way. See Appendix IV, "Adjusting the Volume."

62. The engine runs fine but there are no steam chuff, diesel motor, electric engine cooling fan or gas/steam turbine sounds.	The Motor or Chuff Volume is set to 'Off'. Go to RESET Position #6, and re-set the volume.
63. 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.
64. 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.
65. The engine runs fine, but neither the bell nor the horn (or whistle) works.	Assuming the horn button works properly, the engine is in Slave. Go to RESET Position #4 and choose "Slave Off."
66. When power is off, the sounds from the locomotive keep going for 10 seconds or so.	This is normal. QS-2+ has a battery back-up that allows the sound to continue for 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.
67. The squealing brakes won't come on when I press the horn button even though they are enabled in RESET Position #45 and I have armed them by holding down the bell button for three seconds.	You must have your engine go at a reasonably fast speed and then decrease to a slow speed. After this is done, pressing the horn button will activate the squealing sound.

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 work horses are getting tired and the horn button in particular may need some repair. If your QS-2+ is not responding correctly to the horn button, there are probably not any problems with the QS-2+ unit or how you are operating the controls; the problem is likely to be with your transformer.

Do you have one or more of the following problems when you press the Horn Button?

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

All these problems are caused by these older transformer horn buttons.

The horn button actually goes through two positions when it is 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 gives you lots of track power but a weak horn signal, so your engine may not pick up the message you are trying to send it. Pressing the horn button in half-way gives you a strong horn signal, so your engine responds to the command quickly. But this half-way position leaves your engine with less power, so the engine slows down when you blow the whistle. Also, pressing the horn button down half-way can sometimes cause 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) Or press the Horn Button in all the way and wait. When QS-2+ gets a weak signal, it will wait about 1/2 second before it responds. This delay was built into QS-2+ 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 does not ever reach the second position. This will be a reliable signal, but will cause the engine to slow down momentarily. Pressing the Horn Button part way also prevents QS-2+ 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 to your track. PowerTrak puts 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 QSI SideKick II, a push-button controller, to your transformer. It's an inexpensive, easy, fast, 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 some do not. QS-2+ contains new software that automatically identifies and selects the transformer being used when the engines powers 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-2+. We cannot guarantee that every future transformer will be safe to use with QS-2+ until we have had a chance to test it with our system. Please contact QSI before using a transformer not listed here to see if it has been approved.

The new electronic transformers sometimes do not have a strong horn signal at the highest throttle setting, so the horn button does not work reliably. And these electronic transformers are all different and unique in how they apply power to the track, which can cause a variety of problems. If you are experiencing problems and you suspect your transformer, please call us and we will try to help you solve your problem.

If you are using a Lionel Cab-1 Walk Around Throttle and PowerMaster with an engine converted from ProtoSound to QS-2+, and the horn or bell goes off erratically in forward or reverse, or extra "dings" occur in RESET, you are probably having hardware compatibility problems. These problems are caused by a distorted waveform that allows an unwanted horn signal at lower voltages.

Adding a QSI PowerTrak to your PowerMaster solves these problems. PowerTrak corrects the distortion of the voltage waveform so the converted ProtoSound engine can read the PowerMaster signals accurately. See "MORE: QSI PowerTrak" and Appendix IV: "Adding PowerTrak or SideKick II to Your Layout" for more information on PowerTrak.

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

Connecting the Transformer to Your Track

The chart on the next page shows the correct wire attachments from the transformer to the track. References to left or right terminals are when viewed from 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-2+ requires. For these transformers, the wires to the inside and outside tracks are switched compared to the instructions that came with the transformer.

Your transformer has to have a horn button to send commands to QS-2+. Some transformers, like the Lionel Type V or Z, do not have horn buttons and will need a QSI SideKick II or other accessory horn and/or bell buttons to operate QSI features. The Lionel MW is not recommended for use with QS-2+ 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-2+ 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."

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

Note: If you are in Europe, QS-2+ 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
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
All-Trol™ [3]	left terminal	right terminal	0-24v	300 watt	Electronic/4
Cab-1/ PowerMaster™	A	U	0-18v	135 V.A.[1]	Electronic/3
Dallee®Hostler™ [3]	left terminal	right terminal	2-16	160 V.A.[1]	Smooth Electronic/2
LW	A	U	8-18v	75 watt	Standard/2
KW	A or B	U	6-20v	190 watt	Standard/2
MRC Tech II™	left terminal	2nd from left	0-15v [2]	40 V.A.[1]	Electronic/4
MRC Dual Power 027 [3]	2 or 7	3,4,5 or 6	0-16v	270 watt	Electronic/4
MW (Not Recommended) [3]	outside track terminal	inside track terminal	5-16v [2]	50 V.A. [1]	Electronic/4
R.O.W ® [6]	Red Terminal	Black Terminal	0-24v	384 watt	Standard/2
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
Troller	right connector on terminal	left connector on terminal	.5-18v	150 V.A. [1]	Electronic/4
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-4000 [5]	Red	Black	5-21.5v	360 watt	Smooth Electronic/2
Z-750 [3] (Not Recommended) [4]	Red	Black	2-13v	75 watt	Electronic/4
Z [6, 7]	A or D	U	6-24v	250 watt	Standard/2
ZW	A or D	U	8-20v	275 watt	Standard/2

[1] A "V.A." or Volt Amp rating is similar to a wattage rating.

[2] QS-2+ needs over 14 volts of power to work properly. Overloading the transformer or using in-line accessories with this transformer may lower the peak voltage below QS-2+'s requirements.

[3] An add-on 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] Damage to QSI sound systems and reverse units used with the RailKing model Z-750 Hobby Transformer is not covered under any QSI warranty.

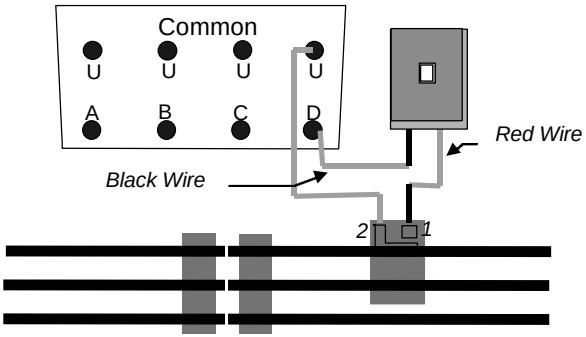
[5] Before approving a new transformer, QSI tests the transformer with all QSI sound systems and reverse units. The Z-4000 was not on the market at the time this book was published. Preliminary reports from MTH indicate that the Z-4000 will not damage QSI products. But until QSI can run complete tests, damage to QSI sound systems and reverse units used with the Z-4000 is not covered under any QSI warranty.

[6] These transformers have an output voltage above our recommended limit for QS-2+. However, we have not received any field failure reports from people using these transformers over the last seven years. These transformers are accepted for use with QSI sound systems.

[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.

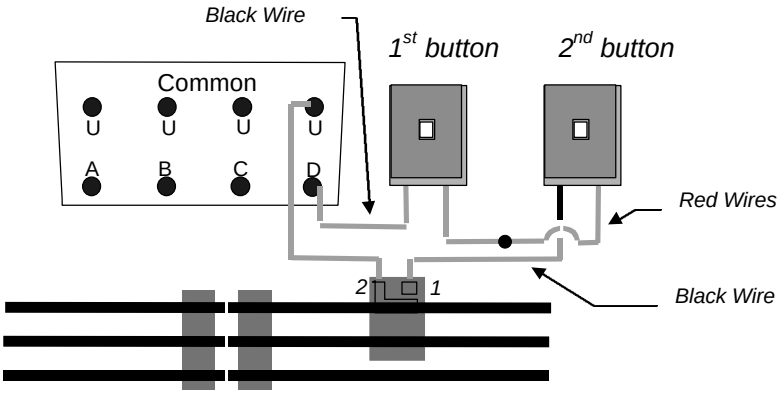
Connecting the Lionel Bell Button to Use in Place of the Transformer Horn Button

If you have a transformer with no horn button (like the 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.

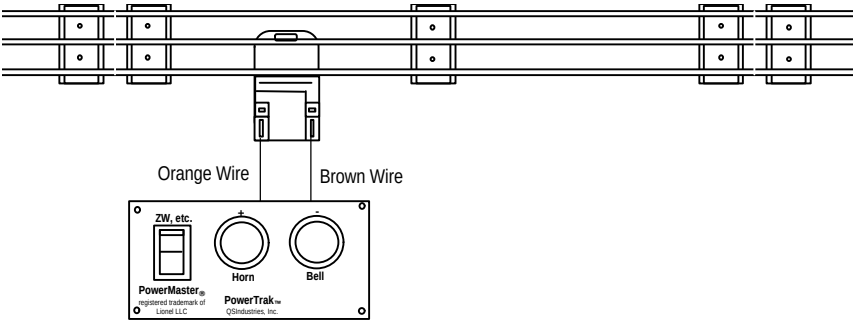


Connecting two Bell Buttons

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

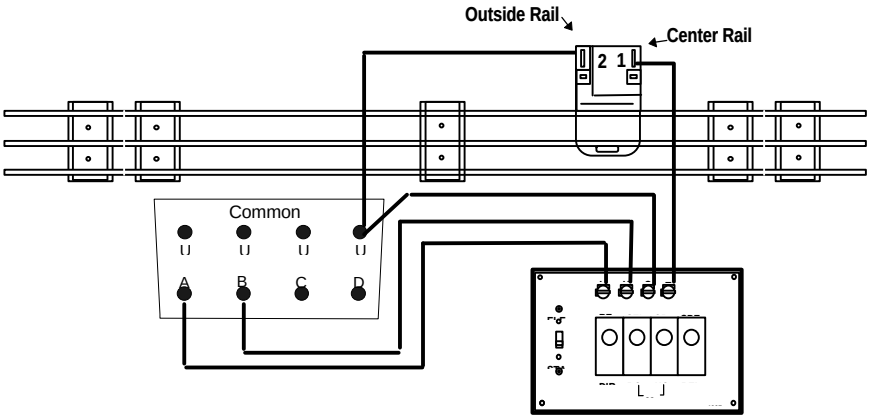
Adding PowerTrak to Your Layout

PowerTrak is designed to fix problems with newer transformers and visually monitor track voltage. For information on using PowerTrak, see Section 1: "MORE: QSI PowerTrak."



Adding 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: Quick Reference Card

each low-high-low throttle = next RESET Feature shaded square = factory default setting
each "choice" box = 1 press of horn button engines with no ID #'s are always on
first horn button press = current setting

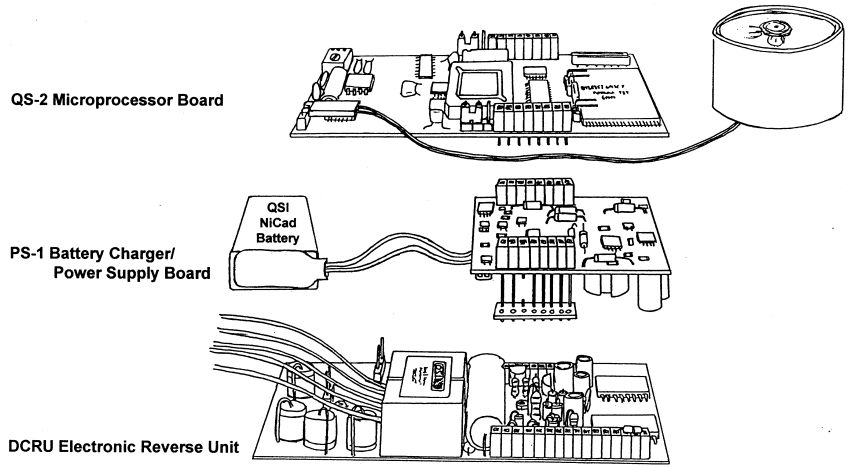
RESET Position/Feature	Choice
0 Temp / Road ID# and All Select Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. When you reach the assigned Temp. or Road ID#, the engine will start.	Select Temp/Road #1 Select Temp/Road #2, etc.
1 Engine Select Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. When you reach the assigned Engine ID#, the engine will start.	Select Engine #1 Select Engine #2, etc.
2 Temp ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Temp. ID #, temporarily replacing any assigned Road ID #.	Set Temp. ID #1 Set Temp. ID #2, etc.
3 Temp ID# Clear Press the Horn Button (hear "ring") to remove Temp. ID# and restore original Road ID#.	Clear Temp. ID#
4 Slave Engine Choices may affect cab chatter, diesel warning lights, couplers and PFA.	Normal Slave Mid Slave End Master
5 Start-up Direction	RESET before Forward RESET before Reverse Forward Reverse
6 Motor or Chuff Volume Lower volume by pressing Horn Button.	100% 50% 25% Off
8 Engine Lights See #30 below for Diesel Warning Light choices. Lights 2 & 3 not operational at this time.	Diesel Warning Light On/Off Light 2 Light 3
10 Coupler Enable Selects which coupler will arm in neutral.	Both disabled Both enabled Trailing arm enabled Front only enabled Rear only enabled
11 Automatic Operation After selecting program, interrupt power to start operation. To exit, return to this RESET Feature and choose Normal Operation.	Normal Operation Grade Crossing Display Box Milk Run Sales Demo
15 Road ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Road ID # .	Set Road ID#1 Set Road ID#2, etc.
16 Engine ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Engine ID # .	Set Engine ID#1 Set Engine ID#2, etc.
17 Road/Engine ID Clear Press the horn button (hear "ring") to remove Road ID#. Press again (hear "ring, ring") to remove Road and Engine ID#.	Clear Road ID# Clear Road and Engine ID#

18 Operational Clear Press the Horn Button (hear "ring") to clear RESET choices 4-11. Press again (hear "ring, ring") to clear RESET choices 19-46.	Clear 4,5,6,8,10,11 Clear 19,20,23,25,27, 28,30,32,37,40,44,45,46
19 Transformer Type	Auto select ZW or Dallee Lionel Cab-1 MRC or All Trol RS-I
20 System Type System 1 is Horn Button operation only. System 2 is Horn or Bell Button. Systems 3-6 are not operational at this time, and will prevent Horn and Bell Button operation if selected.	System 1 System 2 System 3 System 4 System 5 System 6
23 Cab Chatter or Steam Neutral Sounds	Off On
25 Horn/Whistle In Neutral with Horn Button	Bell Whistle
27 Chuff/Diesel Motor Threshold	Starts Engine Set Threshold Set Chuff and Review Stops Engine
28 Passenger or Freight Announcement Enable	Disabled Enabled for PFA Enabled for QSM
30 Diesel Warning Light Choices "Always On" or "Always Blinking" means light is on whenever power is applied to track, even if engine is not selected.	On if Engine is Selected Always On Blinking if Engine is Selected Always Blinking
32 Feedback in RESET "Special" eliminates RESET bell, air let-off and delays clinks and clanks. For future use.	Normal Feedback No Air Release Special
35 Factory Test	for QSI use
37 "I Think I Can" for small steam engines	Disabled Enabled
40 Lock-out Engine Enable Set to "Enabled" for lock-out to work.	Disabled Enabled
44 All De-Select Enables Bell Button to shut off all engines in RESET Position #0.	Disabled Enabled
45 Squealing Brakes Enable	Brakes Off Brakes Arm Enabled Brakes Always
46 Flange Sounds Enable	Flanges Off Flanges Arm Enabled Flanges always

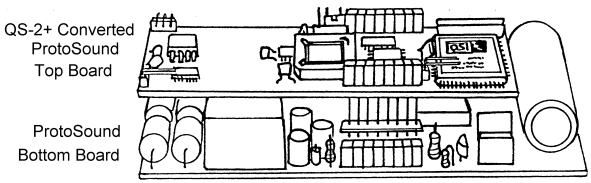
QS-2+ Reference Card version 2

Appendix IV: System Description & Hardware Adjustments

The QS-2+ system consists of three circuit boards that plug into each other as shown below. The bottom board is the QSI reverse unit (either an ACRU or DCRU). The small, middle board, called the PS-1 Board, provides power for the system. The top board, called the QS-2+ 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-like16 bit digital sound as well as computer and train control features.



If you own a ProtoSound system converted to QS-2+, you have a two board system:



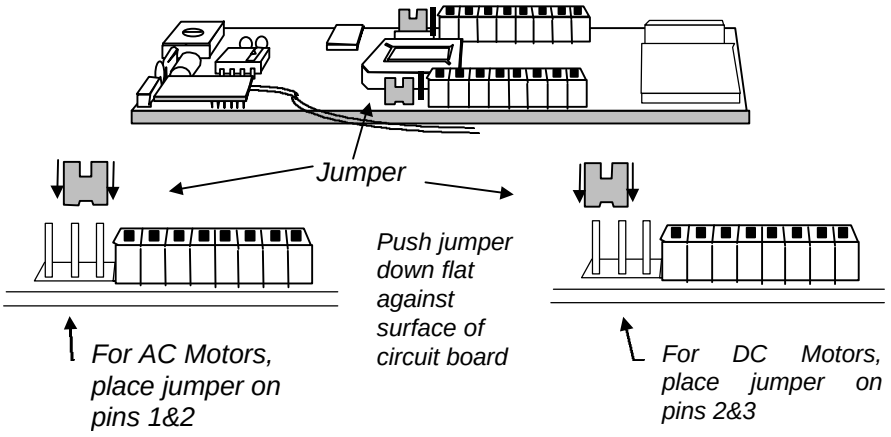
The top board is very similar to the QS-2+ top board, except for a few missing components. Converted ProtoSound systems work like QS-2+, but may not accept all future QSI designed accessories.

The coupler board is included on the ProtoSound Bottom Board.

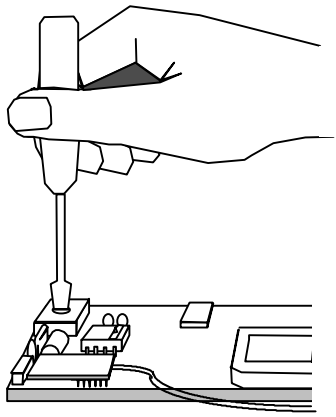
AC Versus DC Motor Operation

QS-2+ has a different way of measuring motor speed for AC Universal motors than for DC Can motors. AC 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). DC 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).

The QS-2+ selection for AC motors is made by moving a jumper on the QS-2+ circuit board as shown below. If you are having trouble setting your chuff rate check to see that the jumper is placed correctly for the type of motor you have in your locomotive.



Adjusting the Volume



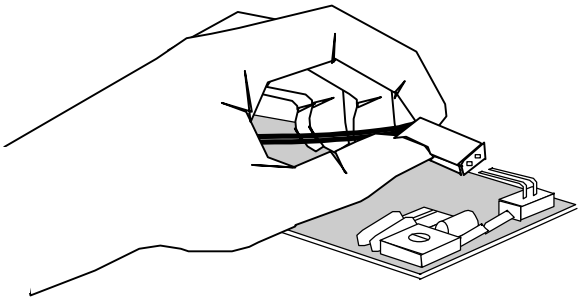
You can change the volume for all QS-2+ sounds as easily as you can adjust the volume of your radio. On the top QS-2+ board there is a small square component with a screw driver slot to adjust the volume. From the angle shown here, turn the slot clockwise to reduce the volume or counter clockwise to increase the volume.

After the volume is adjusted, replace the cab and hold it in place with just two screws. Return the engine to the track and listen again.

The plastic or metal cab will amplify the sound so check to see if the setting is correct with the cab in place. Install the rest of the screws when you are satisfied with the volume.

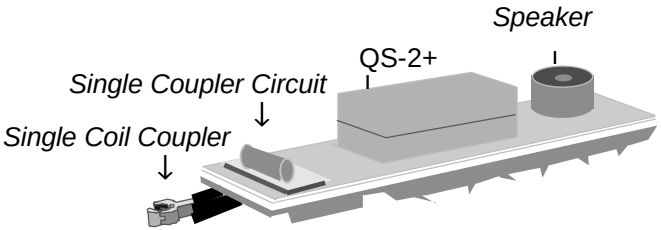
Connecting the Speaker Wires, the Coil Coupler & the Diesel Warning Light

Connections for the speaker are shown below. The speaker wires come with a special two-wire connector that slips onto the two prongs on the circuit board.

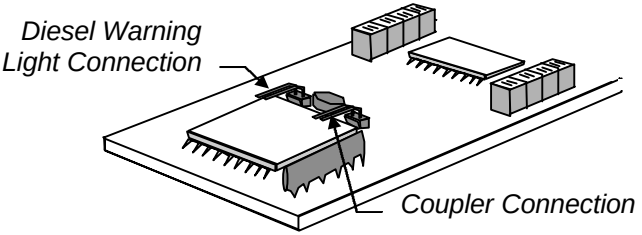


The optional Overhead Blinking Light Kit and QS-2+ Coil Coupler Kit must be installed for these accessories to actually operate. For now, the Overhead Blinking Light Kit is the only kit available for diesel warning lights. Other diesel warning light kit will be available in the future.

If you wish to install a Dual Coil Coupler Kit, the QS-2+ top board needs to be returned to QSI for modification.

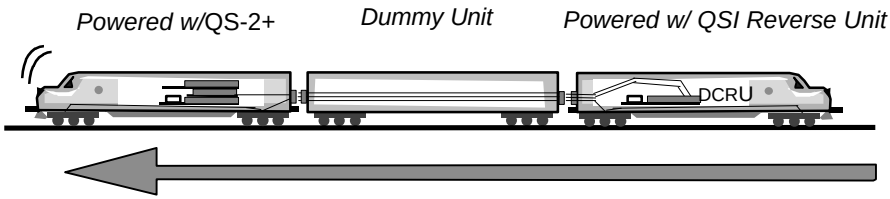


The two pin connectors for the coil coupler and the diesel warning light are shown here. The correct orientation is important with these two plugs; if the coil coupler or warning lights or do not work correctly, try removing the plug, turning it over and plugging it in again.



Using Cables To Connect Powered Diesels

The QS-2+ cable and plug assembly allows you to connect a powered engine equipped with a QS-2+ to another powered engine that has a QSI reverse unit. Cabling from or to ProtoSound equipped engines, even if they are converted to QS-2+, will not work because of hardware differences. Cabling makes it possible to call up (select) both engines as a single two-engine set using only one QS-2+. The plastic plug and socket at the cable ends between engines can be easily disconnected for engine storage or in case you want to run the lead engine separately. If you are using dummy units, you can use the QSI 3-Wire Cable Set to pass the cable directly through the un-powered unit.



The QSI cable assembly is connected to the socket strips on the QS-2+ in the controller engine and to the socket strips on the QSI reverse unit on the engine without QS-2+. The cable assembly will only work if the engine without QS-2+ has a QSI reverse unit. This cable assembly is designed to connect the QS-2+ 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 NiCad battery we use for QS-2+ 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-1 Board (the middle board) with a two wire cable and terminal Snap-On connector. When replacing the battery, simply remove the terminal connector from the old battery and snap the terminal connector onto the new battery.

The battery is often held in place with double sticky foam tape. This tape should be replaced when installing a new battery.

The QS-2+ system recharges the battery whenever power is on. After a few years, the NiCad rechargeable battery may wear out. You may notice that the sound stops suddenly, seems distorted, or is garbled when power is removed for direction changes or a RESET. You may also notice that the sound is distorted at low transformer settings. However, before you replace the battery, try recharging it (see next page).

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, you may not have a worn out battery. You will want to give your battery a full charge by leaving your engine powered up in neutral for not less than 12 hours or more than 24 hours. If the engine is unattended, lock-out your engine in neutral or de-select it so an accidental power interruption will not start your engine running.

You can also remove your battery from the engine and recharge it using a commercial battery charger.

If you do have a bad battery, 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. This will give you a temporary back-up to run your engine while you order another NiCad battery from QSI.

Note: Do not store your engine with an alkaline battery installed since the battery may leak and cause damage to your engine. NiCads are dry batteries and should not leak corrosive chemicals.

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-2+, are not designed to run without a battery.

When the battery is removed from the QS-2+ 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-2+ computer timer. You may notice that you will have to leave the power off a little longer, under some conditions, to get a RESET. You will also notice that the engine sound effects turn off as soon as power is removed and abruptly turn on again when power is re-applied, sometimes with an audible "pop." And the sound may be distorted at low throttle settings.

In addition, there are some features that *do not work* without a battery.

1. There is no three second time-out "ding" to tell 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 your engine. If this happens, see the Troubleshooting guide (Appendix I) to get your engine going.
3. When selecting engines or making Feature choices, your selection will not be made 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 old setting.

Note: If you intend to operate your engine without the battery, cover the battery terminal connector with electrical tape to prevent it from making contact with the chassis or any other part of the engine or electronic components that could damage the QS-2+ system.

Appendix VI: Using the Lionel Cab-1/PowerMaster with QS-2+

QS-2+ responds quickly and accurately to commands from your Lionel® Cab-1 Walk-around Throttle™ and PowerMaster™ set to "conventional."

QS-2+ 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. In contrast, Command Control applies a fixed 18 volts of power to the track and uses digital commands to control speed and send commands. 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 your PowerMaster unit, you will see a switch that says "CMD/CONV," letting you choose between Command (CMD) and Conventional (CONV) track voltage settings. Set the switch to "CONV" when running QS-2+ engines. Your QS-2+ 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 your ZW and the new Lionel PowerHouse™. You 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-2+ you need to know when high or low voltage is being sent to the track, and PowerTrak 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 PowerTrak, 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-2+

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 PowerTrak 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-2+ 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 PowerTrak as you move the Cab-1 throttle knob. When the throttle reaches a low power level, the PowerTrak lights will noticeably dim and you can press the direction button to leave RESET.

Use the direction button to put your QS-2+ 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 PowerTrak 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 PowerTrak 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-2+ brakes 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	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 and QS-2+, but not QS-2.
All Select	A way to turn all your QS-1, QS-2 and QS-2+ engines on. Only engines with assigned ID numbers can be All Selected.
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-1 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. Lionel calls the Bell Button a Sound Activation Button. 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 #25 allows you to turn off these sounds.
Choice	The RESET Feature settings that can be programmed into the QS-2+ computer.
Clear	Resets ID number to "no ID number assigned." An engine with no ID number will always turn on when you use any ID number to select any other engine.
Clinks and Clanks	A special set of sounds telling you which RESET Position you are in. A “clink” equals one up/down movement of the throttle. A “clank” equals five “clinks.”
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 are used with the Coil Coupler Board and the QS-2+ system to control the coupler by remote control anywhere on the layout without using special control tracks.

Computer Restart After the power has been off for 15 seconds or more, the QS-2+ will come up in RESET when the power is re-applied. You will hear two "dings" telling you all systems are up and running. Also called Hard RESET.

DCRU QSI reverse unit used in engines that have DC or "Can" motors.

De-Select Engines are de-selected when you select another engine using ID numbers. A de-selected engine remains silent and motionless while selected engines are running. See All De-Select also.

Direction State Forward, Neutral and Reverse are direction states. RESET is a special state, not a direction state.

Disable To make a feature inoperable.

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 Mechanical reverse unit used by Lionel since the early 1930's and still used today.

Enable To make a feature operable. Another series of commands are needed before the engine actually operates the feature. For instance, when you unlock your house door you Enable it to be opened but you may or may not open it at the same time. Couplers are a good example.

Engine ID One of three ways to assign ID numbers to your locomotive. Engine ID is used to distinguish engines within a group or Road, such as engine #4 in the Union Pacific Road 5.

Engine Plus An easy way to select and operate groups of engines with ID numbers, without using Engine and Road ID Numbers.

Factory Default Settings Your QS-2+ has been pre-set at the factory to sound and operate in a certain way. In Section 6 and on the Quick Reference Card the factory default setting is given for each RESET Position. RESET Position #18 allows you to return QS-2+ to the factory default settings.

Feature Choices You have different choices in each RESET Feature. QS-2+ tells you which choice you are in by the number of "dings" you hear when you first press and release the horn button. Press the horn button until you reach the choice you want. The choice you make is set when you interrupt the power or move to a new RESET Feature with the throttle.

Feedback QS-2+ makes special sounds as you move through the RESET Positions to help you know which RESET Position you have entered. These Feedback sounds include "dings," "clinks" and "clanks," 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-2+ computer. Turning the power off for more than 15 seconds shuts down the electronics in QS-2+ and allows the computer to reset. Also called "Computer Restart."

Hardware An industry name for the physical parts of a computer system. The QS-2+ system hardware consists of three circuit boards: the QS-2+ Microprocessor Board, the PS-1 Power Supply Board and the QSI reverse unit. The QS-2+ Converted ProtoSound hardware consists of two circuit boards: the QS-2+ Converted ProtoSound Top Board and the ProtoSound Bottom Board.

Horn Button Another name for the whistle button found on most Lionel transformers. The horn button puts positive DC on the track to operate the horn or whistle.

ID number An Identification (ID) number given to any QSI locomotive.

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 Memory chips used in the QS-2+ system to store all the sounds and QS-2+ commands and programs. Because they are exchangeable, QS-2+ 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 The type of special, 7-cell, 8.4v rechargeable back-up battery used in the QS-2+ system. NiCad is short for Nickel Cadmium.

Operate After you select a RESET Feature you wish to program, you Operate your choice using the horn button.

Operational Clear A RESET Feature that returns RESET Positions #4-11 and #19-46 to their original factory default settings.

PFA An acronym for Passenger or Freight Announcement. All QS-2+ engines use the same "Northbound Express" announcement. ProtoSound and QS-2+ Converted ProtoSound engines use various passenger station announcements and freight yard sounds.

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-2+ converted ProtoSound systems understand. Works as a visible volt meter. Available from QSI.

ProtoSound The ProtoSound® system was designed by QSI and is supplied factory installed in many MTH® (Mike's Train House) engines. MTH also sold ProtoSound systems to Weaver Models from 1995 through 1996.

ProtoSound systems are not the same as QS-2+ systems.

ProtoDeluxe-2®, Proto-One®, and ProtoPlus® are QSI designed systems sold through MTH for installation in non-sound equipped engines. ProtoDeluxe-2 is equivalent to the QSI QS-2 sound and train control system.

PS-1 Power Supply Board The circuit board that contains the power supply, battery back-up and battery charger circuitry.

QS-1 and QS-2 Earlier QSI sound and train control systems.

QS-2+ Conversion ProtoSound systems can be converted to QS-2+ by sending the ProtoSound top board to QSI. This converted systems have updated sounds and all the train running features of QS-2+.

QS-2+ Micro-processor Board The circuit board that contains the computer chip, the IC memory and the audio amplifier. The microprocessor board produces the sound and controls the entire system.

QSM 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.

RESET The special state your QSI reverse unit or QS-2+ system is in after a three or more second interruption of power. In RESET, your QS-2+ system is ready to access the computer and accept programming commands.

RESET Feature A RESET Feature allows you to choose how your engine will operate.

RESET Position The RESET Position is the number assigned to a RESET Feature.

Road ID One of three ways to assign ID numbers to your engine. Road ID is used to group engines into sets, or Roads.

Select Select has two meanings. In RESET, you Select a RESET Feature to program how your engine will operate.

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.

SideKick II SideKick II is a controller that uses clear, strong signals to run 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 through RESET Positions. Available from QSI.

Software The program that controls QS-2+. The software is stored in the IC memory chip on the QS-2+ Circuit Board.

Start-up Direction Necessary when building consists with nose-to-nose or end-to-end engines. See RESET Position #5.

This RESET Feature was called "Reversal" with QS-1 and QS-2.

System Type QS-2+ has different Systems that determine how your transformer, horn and bell buttons affect the QS-2+ controls. In System 1, the horn and bell button have the same effect. System 2 differentiates between the horn and bell button. See RESET Position #20.

Temporary ID A quick way to give your engine an ID number. Also, Temporary ID takes precedence over Road or Engine ID's so you can choose different engines, couple them together, and operate the entire consist as a whole with a single ID number.

Trailing Coupler On engines with working QSI Dual Couplers, the coupler that works depends on engine direction. See Section 6, RESET Position #10.

Transformer Type QS-2+ supports four different types of transformers. See Section 6, RESET Position #19.

Whistle Button Another name for the horn button. Used to put positive DC on the track to turn on the whistle or horn.

Warranty

QSIndustries, Inc. Warranty for QS-2+

Limited warranty: The QS-2+ 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-2+: a) damaged by accident, misuse, 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.).

Limited Warranty service may be obtained by mailing the product during the warranty period to QSIndustries, Inc., postage prepaid, using the original shipping container or equivalent to prevent damage to the product.

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NOTE: ALWAYS CHECK YOUR QS-2+ 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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No Other Rights

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How To Obtain Upgrades To The Software And New Product Information

If you purchased QS-2+ directly from QSI, you will be informed of any upgrades or new products. If you wish to be added to our mailing list, contact us at the address or phone number given on the next page. Also, your local authorized QS-2+ dealer will help keep you informed about upgrades and other product offerings.

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Quick Reference Card

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 default setting
engines with no ID#'s are always selected (on)

RESET Position/Feature	Choice
0 Temp / Road ID# and All Select Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. When you reach the assigned Temp. or Road ID#, the engine will start.	Select Temp/Road #1 Select Temp/Road #2, etc.
1 Engine Select Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. When you reach the assigned Engine ID#, the engine will start.	Select Engine #1 Select Engine #2, etc.
2 Temp ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Temp. ID #, temporarily replacing any assigned Road ID #.	Set Temp. ID #1 Set Temp. ID #2, etc.
3 Temp ID# Clear Press the Horn Button (hear "ring") to remove Temp. ID# and restore original Road ID#.	Clear Temp. ID#
4 Slave Engine Choices may affect cab chatter, diesel warning lights, couplers and PFA.	Normal Slave Mid Slave End Master
5 Start-up Direction	RESET before Forward RESET before Reverse Forward Reverse
6 Motor or Chuff Volume Lower volume by pressing Horn Button.	100% 50% 25% Off
8 Engine Lights See #30 below for Diesel Warning Light choices. Lights 2 & 3 not operational at this time.	Diesel Warning Light On/Off Light 2 Light 3
10 Coupler Enable Selects which coupler will arm in neutral.	Both disabled Both enabled Trailing arm enabled Front only enabled Rear only enabled
11 Automatic Operation After selecting program, interrupt power to start operation. To exit, return to this RESET Feature and choose Normal Operation.	Normal Operation Grade Crossing Display Box Milk Run Sales Demo
15 Road ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Road ID # .	Set Road ID#1 Set Road ID#2, etc.
16 Engine ID# Set Advance one number (1, 2, 3, 4, etc.) with each press of the Horn Button. The # you stop at is the new Engine ID # .	Set Engine ID#1 Set Engine ID#2, etc.
17 Road/Engine ID Clear Press the horn button (hear "ring") to remove Road ID#. Press again (hear "ring, ring") to remove Road and Engine ID#.	Clear Road ID# Clear Road and Engine ID#

(continued inside)

QSIndustries, Inc.
3800 SW Cedar Hills Blvd. Suite #224
Beaverton, OR 97005
http://www.qsindustries.com
FAX: 503-626-9995
Phone: 503-350-0595

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 default setting
engines with no ID#'s are always selected (on)

18 Operational Clear Press the Horn Button (hear "ring") to clear RESET choices 4-11. Press again (hear "ring, ring") to clear RESET choices 19-46.	Clear 4,5,6,8,10,11 Clear 19,20,23,25,27, 28,30,32,37,40,44,45,46
19 Transformer Type	Auto select ZW or Dallee Lionel Cab-1 MRC or All Trol RS-I
20 System Type System 1 is Horn Button operation only. System 2 is Horn or Bell Button. Systems 3-6 are not operational at this time, and will prevent Horn and Bell Button operation if selected.	System 1 System 2 System 3 System 4 System 5 System 6
23 Cab Chatter or Steam Neutral Sounds	Off On
25 Horn/Whistle In Neutral with Horn Button	Bell Whistle
27 Chuff/Diesel Motor Threshold	Starts Engine Set Threshold Set Chuff and Review Stops Engine
28 Passenger or Freight Announcement Enable	Disabled Enabled for PFA Enabled for QSM
30 Diesel Warning Light Choices "Always On" or "Always Blinking" means light is on whenever power is applied to track, even if engine is not selected.	On if Engine is Selected Always On Blinking if Engine is Selected Always Blinking
32 Feedback in RESET "Special" eliminates RESET bell, air let-off and delays clinks and clanks. For future use.	Normal Feedback No Air Release Special
35 Factory Test	for QSI use
37 "I Think I Can" for small steam engines	Disabled Enabled
40 Lock-out Engine Enable Set to "Enabled" for lock-out to work.	Disabled Enabled
44 All De-Select Enables Bell Button to shut off all engines in RESET Position #0.	Disabled Enabled
45 Squealing Brakes Enable	Brakes Off Brakes Arm Enabled Brakes Always
46 Flange Sounds Enable	Flanges Off Flanges Arm Enabled Flanges always

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QSIndustries, Inc.
3800 SW Cedar Hills Blvd. #224
Beaverton, OR 97005
http://www.qsindustries.com
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Phone: 503-350-0595

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