

Piecing Together the QSI/Proto-Sound Battery Puzzle

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This article is Part One of a two part series on QSI/Proto-Sound systems and batteries.

At a recent monthly RMD meeting several members and I were discussing the problems that some owners have had with QSI and Proto-Sound equipped engines with low or dead batteries. In particular, the conversation focused on two areas – 1) reports of a low battery causing a scrambled memory chip, 2) sources for replacement batteries. If the memory scrambles, the engine will no longer operate properly and the only fix is to have the chip replaced. MTH sells replacement batteries but several members have suggested other sources for replacement batteries.

I own a Rail King Sante Fe Alco PA #64 with Proto-sound and naturally wondered if the memory chip was in danger of becoming scrambled. And, the suggested method for charging the battery on the track seemed a bit primitive. There had to be a better way. So, I decided to do a bit of research to learn more about the battery and scrambled board issues as well as other methods for charging the batteries and measures I could take to protect my engine.



The information that follows was gathered by talking to some Proto-Sound owners and research of Proto-Sound related bulletin board postings. I also spoke with Chuck Sartor of Mizell Trains, Ray Schneringer of Caboose Hobbies, and Mike Clark of Custom Railway Supply, all authorized MTH service professionals. Keep in mind that the information is a summarization of numerous reports and individual cases and may not necessarily apply in all instances.

If you're not interested in the techno-speak, whys, and wherefores of the QSI/Proto-Sound battery issues and simply want to know what to do to protect your engines, skip to that last section titled, *QSI/Proto-Sound care and feeding*.

What engines are affected and what are the symptoms?

The problem appears to be limited to MTH Proto-Sound-1 (PS-1) and early Weaver and 3rd Rail engines equipped with QSI sound. According to Andy Edleman, Vice President of Marketing at MTH, two symptoms have been reported. These are summarized in Table 1. The first symptom can occur in any PS-1 engine. The second symptom has been reported only in PS-1 engines that were produced in 1995 and 1996. In both cases, the problem occurs only when an engine with low or dead battery is powered up on the track. QSI, the maker of the original Proto-Sound system corrected that problem with a software (firmware) change. Most problems have been associated with the engines shown in the suspect list in Table 2. And, of course, there have been exceptions. Some owners have reported the problem in engines that are not on the suspect list and owners of engines on the suspect list have had no problems. One owner reported the scrambled memory problem on two occasions, both with a fully charged battery in the engine.

If you have an engine that starts up and moves in one direction only, or exhibits any other erratic symptoms other than those listed in the Table 1, it may be suffering only from a low battery and not a corrupted memory chip. You can verify the battery's condition by removing the engine shell and temporarily substituting a 9 volt alkaline battery. If the engine runs properly with the substitute battery, the circuitry is fine and the battery needs to be recharged or replaced. If you are still having problems after replacing the battery, try to unlock or reset the engine using the procedures found in the engine's operating instructions.

Since the potential problem exists only when track power is applied to the engine, the QSI/Proto-Sound circuitry should not be damaged by merely sitting on a shelf for long periods of time with a low or dead battery. Furthermore, you can remove the battery to charge it if necessary without affecting the memory chip.

MTH eventually designed its own system, Proto-Sound 2.0, which managed battery charging and memory management more efficiently. In fact, the newer PS-2 engines incorporate a 3 volt system using two rechargeable AA batteries. There are no known issues with low batteries and memory chips associated with Proto-Sound 2.0.

Proto-Sound Battery Issues			
Symptom	Affected Engines	Probable Cause	Fix
#1 – Engine starts up and reports three clank sounds	All PS-1 engines	Occurs when the operator attempts to move the engine by using the direction button or by turning the throttle off and on again in order to reverse direction. The low battery condition causes the memory to become scrambled. The engine reports the problem with three clank sounds.	The memory chip must be re-programmed by MTH or an authorized service center.
#2 – Engine starts up and does not move	- PS-1 engines produced in 1995/1996 - See Table 2 -Suspect Engines	The low battery condition causes the software to de-select the engine and it never leaves the RESET position.	Requires installation of a new memory chip containing a software update which prevents the problem from reoccurring.

Table 1 – QSI/PS-1 Battery Issues

Suspect Engines	
20 th Century Limited (Scale NYC Hudson, Railking Dreyfus) California Zephyr (Railking F3 Western Pacific). RK H8 C&O Allegheny Scale shay Florida Special (RK F3 Florida East Coast) RK PRR K4s Scale FP45 (All Roads) Daylight (RK Gs-4 SP) (Daylight C) Scale Big Boy RK Torpedo RK T&P L3 Mohawk	RK Chessie F3 from construction Set RK SD-60/SD-60M, SD-70MAC Scale F40PH (All Roads) Scale F3, L&N, SF Chief, SF El Capitan RK 0-8-0, second run whistle Scale GP20 (All Roads) RK NYC Hudson w/freight sounds RK Dash 8 (All Roads) Scale GG1 Conrail with FYS Scale GG1 PRR with PFA

Table 2 – QSI/PS-1 Battery Issues Suspect Engines

The Proto-Sound battery and replacements

The Proto-Sound battery (Figure 1) is a re-chargeable NiCd (Nickel-Cadmium) battery. Although it is physically similar to its alkaline 9 volt cousin, the Proto-Sound battery is rated at 8.4 volts. The actual fully charged output is closer to 9 volts since the battery consists of seven cells, each producing about 1.27 volts. The battery is rated at 120 mAh (milliamp hours). In other words, it is capable of powering a device that demands 120 milliamps (.120 amps) of current, and it can do this for one hour before its voltage output drops off below the minimum acceptable value of 6.5 volts.

Replacement Proto-Sound batteries are available from MTH or an authorized service center for about \$10. Other NiCd replacement batteries are difficult to find since most ‘9 volt’ NiCd batteries are 6 cell units producing only 7.8 volts, fully charged. Acceptable replacements are the ‘9 volt’ NiMh (Nickel-Metal-Hydride) batteries shown below. The Radio Shack battery (Figure 2) is catalog number 23-529 and sells for \$12.99. The Rayovac battery (Figure 3) is model number NM1604-1 and sells for \$6.97 at Wal-Mart. Both batteries are 7 cell units producing the required 8.4 volts at 150 mAh.

Energizer makes a 6-cell ‘9 volt’ NiMh battery, but it is rated at only 7.2 volts and is not a recommended replacement since the voltage may drop below the acceptable range sooner than the recommended batteries.



**Figure 1
Proto-Sound Battery**



Figure 2 – Radio Shack 9 volt NiMh Battery

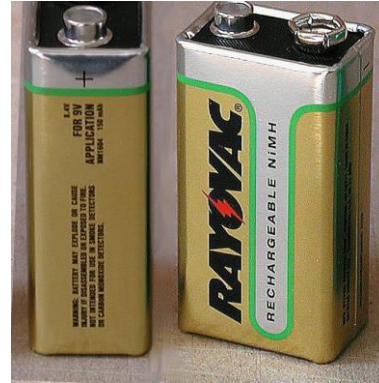


Figure 3 – Rayovac 9 volt NiMh Battery

NiCd and NiMh battery comparison

The comparisons described below may help you in selecting the type of battery you wish to use as a replacement.

Shelf life

Both NiCd and NiMh batteries have a usable ‘shelf life’. That is, they slowly discharge themselves when not in use. Best shelf life estimates seem to be three to five years. MTH recommends the use of NiCd batteries since they have a longer shelf life than NiMh batteries.

Power capacity

NiMh batteries have a higher power rating than NiCd batteries, 150 milliamp-hours vs 120 milliamp- hours. (millamp-hours are explained below under *Testing 9 volt batteries*)

Charge state memory effect

NiCd batteries suffer from a ‘memory’ effect’ if they’re not completely discharged before recharging. The memory effect is evident when the battery will not hold a full charge for an appreciable time when in use. NiMh batteries are not subject to the memory effect and work best when repeatedly charged for a few hours at a time. With either battery type, do not charge it for more than 16 continuous hours.

Maximum Charge cycles

Both battery types are rated at 500 full discharge-charge cycles before requiring replacement. However, most Proto-Sound owners report that they must replace the batteries, especially NiCds, after 150 to 200 cycles. The reported diminished battery life is probably the result of not fully discharging the batteries before recharging them. Remember, each time you operate the engine you are putting it through a discharge-charge cycle, and usually not a full one.

MTH and MTH authorized service centers

For service or batteries, you can contact MTH at 410.381.2580. MTH lists three authorized service centers in the Denver/Colorado Springs area:

Caboose Hobbies, 500 S. Broadway, Denver, 303-777-6766

Mizell Trains, 3051 W 74th Ave, Westminster, 303-429-4811

Custom Railway Supply, 1025 Garden of the Gods Road, Suite D, Colorado Springs, 719-634-4616

Each dealer’s policies and procedures differ regarding repair, replacement, and re-programming of QSI/Proto-Sound parts. Some repairs may be covered under the MTH warranty. Contact the dealers for details. All of them stock replacement Proto-Sound batteries.

QSI/Proto-Sound care and feeding

The best way to protect your QSI/Proto-Sound equipped engine is to test the battery under load before powering the engine up on the track. This is especially true for engines that have been sitting on the shelf for several months or

more. If the battery is low, charge it for 14 hours and test it again. If it won't hold a sufficient charge, replace it with a fully charged battery. Some owners don't care to take the time to charge the old battery and simply replace it. They all agree that a new battery is cheap insurance for a valuable engine. Some of the more conscientious owners charge the batteries in all their QSI/Proto-Sound engines every few months. Bless them!

In the next issue

In our next newsletter, I'll recommended methods for testing and charging Proto-Sound batteries. You'll learn some techniques that will help you protect your QSI/Proto-Sound memory chips from corruption by a low or dead battery.

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