

little flat nimh batteries that I found in a surplus store. All these engines also have a Locolinc receiver on board and they were all brought out under power from the engine house to be lined up for the photo.

Nimh batteries have at least 150% of the capacity of their nicd counterparts and there is no memory effect! These batteries are not cheap (but even as this is written, the prices are coming down quickly) and you can't buy the best ones just anywhere. A high rate 3000 mAh battery retails for about \$9 per cell. A 1700 mAh battery costs about \$5 per cell and the little surplus 600 mAh batteries cost about 60 cents each in packs of eight. One of my previous hobbies was building and flying electric powered airplanes where batteries were stressed beyond belief (nicd sub-C cells, 20 amps operating, 10 amps charging). We don't stress batteries like that in trains but the model airplane counter people sure know about batteries and chargers and that's where to go to buy batteries.

When an engine is modified with batteries and radio the investment can be doubled. I think the operational characteristics warrant the modification but if you collect engines and have 30 of them on the shelf then you may not want to go this route. Perhaps, though, you might want to modify a couple of Šwork horseð engines for every day use. After all, they can run on the same tracks along with track-powered engines.

Now look at the table below showing the energy capacities of various battery types.

Lead Acid gel cell-- about 1.1-1.4 Watt-hours per cubic inch Nickel Cadmium (nicd)-- about 1.9 Watt-hours per cubic inch Nickel metal hydride (nimh)-- about 3.4 Watt-hours per cubic inch Lithium ion polymer (lip)-- about 9.3 Watt-hours per cubic inch (with an anticipated doubling of that in the future). Note that for hobby use, a rating of 4.6 Watt-hours per cubic inch seems to be about the best available on the market at this time.

This table is different from the usual comparison table in that it is computed in terms of volume rather than weight because in the model railway application weight is not a big consideration. You can see that already with nimh batteries we have a capacity of 2-3 times the capacity of gel cell batteries. The lithium ion cells show great promise and are already used in portable applications but their delicate nature in charging and discharging and their disappointing capacity make them a non-contender for hobby use at this time.



Figure 3.

With the nimh batteries and their chargers being readily available it now makes sense to incorporate the batteries directly in the engine rather than a trail car or tender.

Here is what I do to incorporate batteries in an engine: (by the way, I don't do this as a business, so don't ask) 1. The engine is disassembled and any connection to the track is removed. The degree of difficulty varies widely from engine to engine. The easiest modification that I had was with the little LGB rail truck where the connection was made in a toolbox in the bed of the truck and I simply had to melt out two solder bridges on a plug.

2. All engines have some sort of electronics for such things as flashing firebox lights, regulators for constant voltage to the running lights and for circuitry to operate forward and reverse lights. In general, I make a small circuit board with a regulator on it and include plugs for the various lights and to connect to the receiver and battery.

3. The battery circuit has a switch hidden somewhere in the engine for turning off the battery and connecting a charging jack (also hidden). In addition, there is a two pin connector at the back of the engine for use by a trail car in an emergency. The Locolinc receivers have two power inputs that can be used for the two batteries (internal and external) but it is possible to achieve the same thing with any other receiver with a couple of diode bridges.



Figure 4.

As an example of all this, look at my LGB Uintah articulated engine. Figure 3 shows the battery switch and charging jack hidden under the rear most steam dome. Figure 4 shows the external power jack. This jack is disguised by a plug-on toolbox when not in use. Figure 5 shows a typical Strailð car that can be used all the time to double the run time or in an emergency to get the engine back to the roundhouse.

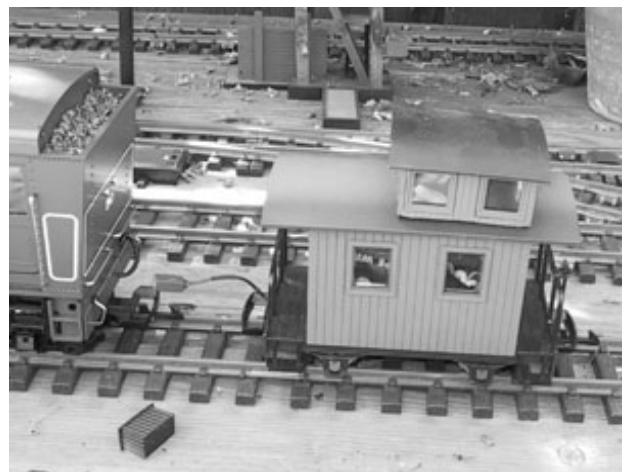


Figure 4.

A note on charging-- batteries under charge get warm at the very least, particularly near the end of their charge cycle. In the confined space of a boiler it can get hot enough to melt the plastic. The expensive Shigh rated batteries are designed to withstand high temperatures but that doesn't help the plastic parts of your engine. Be very careful to charge at a low enough rate that the batteries in the confined space do not get more than warm to the touch.

What do I get for all this? I never clean my rails. There is no power to the rails that run around my swimming pool. Stray leaves and dirt are no problem. I can go out at any time, open up the engine house, switch on an engine and transmitter and run out on the track to start operations. Run time on the larger engines is several hours.

TGRS SCHEDULE DATES

1. Workshop, Fabrication structures from styrofoam: Saturday, February 9th 1:00 PM - Mike and Jane Dorgan
2. TGRS Monthly Mtg. - Saturday, February 16th 1:00PM - Jerry and Joyce Dising
3. Outdoor Layout at the Magic Garden Nursery - March 8, 9, and 10th
4. Workshop, Fabricating structures from jig-stones - Saturday, March 16th 1:00 PM - Alan and Jan Lathrem
5. TGRS Monthly Mtg - Saturday, March 23rd 1:00 PM Garb and Dorothy Mechigan
6. SAHBA Home Show - April 5, 6, and 7th
7. Pima County Fair - April 18th - April 28th
8. TGRS Monthly Mtg - April - none
9. Special Phoenix/Tucson Round-about - Saturday, May 11th - Agenda not finalized
10. TGRS Round-about and Monthly Mtg - Saturday May 18th - Agenda not finalized
11. Queen Mary Train Show - June 5 - 9
12. American Home Show - June 20 - 22



Styrofoam Buildings Workshop at the Dorgan's on Feb 9.

Mike and Jane Dorgan are hosting the workshop on building styrofoam buildings Saturday February 9, 2002 at 1:00 PM. Mike and Jane are located at 5416 N Via Sempre Verde. Phone (520) 529-2430. Anyone who has seen Jane's building knows how good they can look. Now you can learn the simple process used to create these railroad layout gems.

Two Part Jigstones Workshop at the Lathrem's on March 16.

You have an opportunity to learn about the JigStones System as we present a two part clinic on March 16th. You will receive all the materials and guidance you need to construct this lineside building for your own layout. This is a concrete building that will be enjoyed for years

**Come join the fun!
Build this Line side shack!**



Part 1: 10:00 a.m. - Noon - In part one of the clinic you will see how to construct a simple building from the casting of blocks to completion. You will get ideas for a variety of structures which can be built from JigStones, find out what materials work best and hear helpful hints. You will also see how to: use the JigStones mold system to construct retaining walls, construct double sided walls with wall capping, create Santa Fe/stucco style buildings, do resin casting, cast the window surround and arch molds, mold lightweight blocks and be given a variety of other useful techniques. There is no charge for part 1.

Part 2: 1:00 p.m. - 4:00 p.m. - Make & Take Hands On Workshop: Make a building for your layout. In part two of the clinic, learn the techniques of building with JigStones while constructing a lineside building to take

home. You will be provided with all the materials needed to construct a building using the JigStones System and be guided through the construction process. At the end of the workshop you should have a building to take home to paint and place on your layout. Fee: \$22 per participant for TGRS members. Preregistration required. Observers welcome.



The Tucson Garden Railway Society is a non-profit corporation incorporated in Pima County, Arizona. Society members are interested in all areas of garden and modular large scale model railroading. We welcome new members and hope you will consider joining. Members help each other build layouts and learn about railroading and modeling.

The TGRS dues are \$30.00 per year and are due on June 30th of each year. For new members dues are prorated at \$2.50 per month remaining in the year until June 30th plus a \$15.00 initiation fee, the first year. Additional name badges cost \$1.00 for each badge after the first.

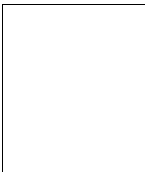
If you are interested in the TGRS please contact one of the officers at the phone number listed in the Calendar section below. If you just **have** to join immediately, send a check and your name, address and telephone number and the names for any additional badges to:

Jan Lathrem,
1750 West Tangerine Rd.
Tucson, AZ 85737

CALENDAR

- FEB. 5 - TGRS Board Meeting - Gary and Peggy Martin's - 7:00 PM**
- FEB. 9 - Workshop - Styrofoam buildings - Jane and Mike Dorgan's - 1:00 PM**
- FEB. 16 - TGRS February Meeting - Jerry and Joyce Diesing's house - 1:00 PM**
- MAR. 8-10 - Magic Garden Nursery Outdoor Layout - Talk to Mike.**
- MAR. 16 - Workshop - Buildings from Jigstones - Jan and Alan Lathrem - 1:00 PM**
- MAR. 23 - TGRS Meeting - Garb and Dorothy Michigan's - 1:00 PM**
- APR. 5-7 - SAHBA Home Show - Talk to Mike.**
- APR. 16-18 - County Fair Setup -**
- APR. 18-28 - County Fair Display and Running**

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