Mark Campling driving David Simonies' Metropolitan.

Paul Konig (with Ben Curtis driving) provided rides with his C19 "Old Glory".

Paul tries downsizing from his C19 to Mitchell's Scamp. After a successful lap of the track his verdict was "these should be banned, you can't see any of the gauges". Maybe Mitchell is just better practiced as a contortionist.

David Elen and his Work's Train.

The Fellow grade (FIMechE) is the highest elected grade of membership within the IMechE, the attainment of which recognises exceptional engineering achievements and contributions to the engineering profession. Fellowship is awarded to members who have demonstrated significant individual responsibility, sustained achievement and exception professionals during their careers.

Given the above, it is perhaps no surprise that to attain this status at the age of thirty is exceptional. Paul is one of only two Members (from a body of over 85,000) to achieve this in the history of the Institution.

Observations on Batteries for Model Locos

Peter Downes has been investigating the use of batteries for electric traction.

I have been building a 5 inch gauge Class 73 EDL for the past year and I am now at the stage of testing on the track. The big question is how much power it will have and how long will the batteries last. I have spent a long time asking people about this (including the various component manufacturers) and I was surprised by how many different answers I got. I am sure that there will be people who will disagree with things in this article, however not being an electronic engineer this is the best that I could do with all the opinions I have obtained.

There are three types of batteries that can be used to power a model locomotive; the car battery, the leisure battery, and the cyclic battery. The only one recommended by the manufacturers for use in a locomotive is the cyclic battery. The other two can be used but they are not designed for the job.
The car battery is designed to give a lot of power to turn over an engine and then be charged all the time the car is running.
The leisure battery is designed to give 10 -15 amps and to be charged when flat. It is designed to be used in a caravan to run the lights, TV and refrigerator.
The cyclic battery is designed to power golf carts and wheel chairs.

If you use a car or leisure battery on a locomotive they will work but their life will be shortened. The designed life of a leisure battery is about 250 charges while the expected life of the new type of cyclic batteries is 500 charges.

My discussions with the manufacturers revealed that if you use a 70Ah leisure battery you will only get 60% of that power (42Ah) before you should recharge it when the battery voltage is down to 12.3v. Some of the very newest leisure batteries can get about 70% of the rated capacity before recharge. If you run leisure batteries down below 12.2v it will damage the battery. It is recommended by the manufacturers that you have two sets so that you don't have to run the batteries flat as this shortens their life. They also recommend that after they have been used they are charged up as soon as possible as leaving a battery discharged will also shorten its life.

Photo Peter Downes

Peter's controller for his Class 73 EDL. The two meters are for the main and auxiliary batteries.

According to Yuasa new cyclic batteries will only give you 60% of capacity until they have been charged a few times.

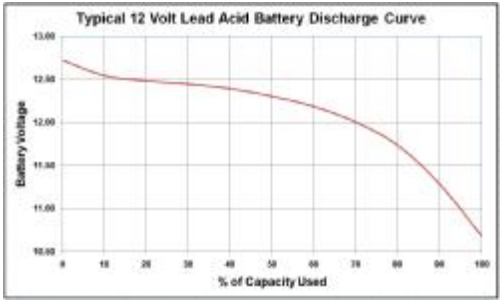
To charge a cyclic battery you must have a modern charger that will monitor the charge and cut out when the battery is fully charged.

Cyclic batteries have a block of power that will drop off very quickly at the end of the discharge. Unlike the other batteries that will run down slowly. This will affect you on a run because this quick drop off will effect the controller. At 11.5v the solenoids will drop out in the controller and it will be like turning off a switch so you could be half way around the track with passengers and the locomotive will stop dead. The good thing is if you let the batteries rest for an hour they will come back up enough for you the run the locomotive light. If you want to check a battery to see if it is charged you can use a volt meter. A car or leisure battery is fully charged at 12.8v, half charged at 12.5v, and flat at 12.2v. A cyclic battery is charged at 12.8v but can go up to 14v but will settle back to 12.8v over night. Unlike the other batteries you can go down to 10.8v before you start to damage it. I have found with my batteries they charge up to 13.8v-14v but when left for 24 hours they drop back

to 12.8v-12.9v. I have been told that you should let a battery stand for 24 hours before checking to see if it is fully charged.

How long will the battery last if you are using 24v motors and two 12v 24 Ah batteries? If you get the battery data sheet it will tell you, it is not as long as you would think.
My 24Ah cyclic batteries should give me about 35-40 minutes at 20 amps according to the date sheet. That is about seven times around the track pulling a full 5ins coach and guard's van with guard.

The next problem is how do you know how much power is in the batteries. The battery meter is the obvious answer but how do you read it. I have one fitted to my hand set and it looks like a petrol gauge. A battery meter is a volt meter set to the safe range of the battery say 13v down to 10.8v and I think they assume that you are using a cyclic battery as a leisure batteries range is 12.8v to 12.2v. The problem is it doesn't go down like a petrol gauge it swings up and down as you use the power. I gave up trying to work this out and rang the supplier, Parkside Electronics. They told me the way to read the gauge is to watch it as you pull away, once the needle swings to the bottom of the yellow as the locomotive takes the load it is time to change the batteries.



Having found all this out I still could not understand how other people managed to get their locomotives to run all day on one battery. The best I could do was 30 minutes until the meter was showing it was time to change the battery. Then the penny dropped they didn't have a meter and carried on until they lost power. They had two 12v batteries and motors that are 12v -24v. So as long as the combined power of the two batteries was above 12v they could keep going. That is if the controller still worked at below 24v.
I checked my controller with a variable power supply and forward dropped out at 14v, reverse dropped out at 11v. So this shows that the two batteries could

go down to 7v each and the motors would still run. How much damage this would do to the batteries I do not know but I assume that people run their locomotives like this.

When I used my hand set on the club's Class 20 the battery meter in it showed that the batteries were down below 12v but it still kept going for the rest of the day. If you go by the instructions they should have been changed at 12.2v.

The next question is what to do if you run out of power half way around the track. If you don't have free wheeling on your controller you could damage the controller if you push the locomotive so you should change the batteries. If you have free wheeling you must switch the key switch to **ON** switch for the direction you want to go **Forward** or **Reverse**. Then move the power control forward slightly and listen to the controller, if you hear a whistle from the controller then there is enough power for the free wheel device to work. If there is no sound then the controller has no power and if you push the locomotive you could damage the controller so you will have to change the batteries. (Editor's note: I believe Peter is referring to Parkside controllers here.)

I hope this has been helpful if you are thinking of going electric but in writing it I think it poses more questions than it answers.
If you have any information that might help me or have any questions you can contact me Peter Downes at metalwood@talk21.com

Photo Colin Gross
John and Dianne Keane on a rare outing with his Class 14XX.

Editors Comment

Peter has evidently spent a lot of time and effort in his research into batteries and their use for model locomotive traction, and at first sight the results don't look too promising.

However I've been operating my own battery powered loco for three years and have watched how Ian Shank's Class 20 performed during four passenger seasons of use at Pinewood, which leads me to believe that compromise is the answer to Peter's issues. If you follow the manufacturer's recommendations you will get reduced track time and a battery life closer to what the manufacturer intended. However, even in a busy year our locos are unlikely to be used more than twenty times with the result that the battery will probably fail from old age before it reaches its designed number of recharge cycles. The motor industry and battery manufacturers all know how difficult it is to get electric traction into everyday use, but thankfully we only require very occasional use. When you visit other tracks for their Electric / Diesel days you quickly see that there are a large number of electrically powered locomotives currently operating satisfactorily, and as Peter says "they are worked all day". I think there are two simple answers to any perceived problem. First, always fit the biggest batteries you can get into the loco. Their weight improves traction, and their capacity is directly proportional to your running time. My 5 inch gauge Hercules shunter uses two 63 Ah batteries rated for 110 minutes load time at 25 amps and it has satisfactorily run more than 25 miles (engine plus driver, no passengers) in a day on a single charge while still not dropping below 11.4 volts per battery under full power acceleration. Secondly, from experience it appears that most batteries can take the abuse we give them while still providing a satisfactory working life.

Finally, if it comes to the worst and the loco stops out on the track then most 5 inch locos can be lifted onto a passenger carriage by a couple of people to return them to the steaming bays. Admittedly the problem is worse for 7 inch gauge (you may need to remove the batteries); but having driven Ian's Class 20 on passenger duty close to the battery limit you could feel the need to use more throttle than normal for a couple of laps which gave plenty of time to get safely off the track.

WORK IN PROGRESS

The Smokebox for Fair Rosamund (Derek Tulley)

I always think that when you build the smokebox for a locomotive that you reach a turning point. Most of the mechanisms are complete and the locomotive gets a face and character of its own.

The smokebox in this case comprised end plates in ¼ inch mild steel with a 16 gauge wrapper and a decorative brass collar where it attaches to the boiler. The two pieces of 4 inch square plate were bored out on the lathe and then transferred to the turntable on the mill to machine the outer profile. The wrapper was machined to its developed dimensions and all the rivet holes predrilled together with lightly countersunk 8BA holes for screws to attach it to the end plates. The wrapper was clamped to the end plate using toolmakers clamps and the first 8BA holes drilled and tapped and the first screws fitted; the wrapper was then pulled into contact with the next section of end plate and the clamps moved, the next hole drilled and so on to the base. The countersunk screws were then filed flush with the wrapper to remove the screwdriver slots.

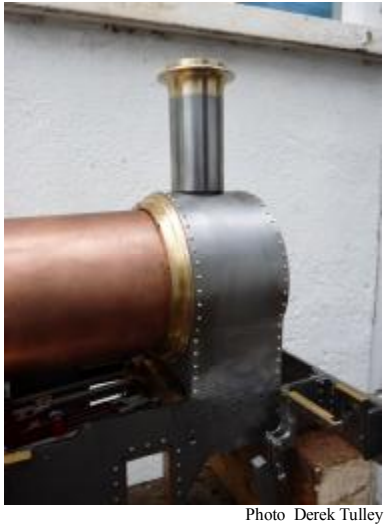


Photo Derek Tulley

The assembled Smokebox.

The assembly was now mounted horizontally on a dividing head and all the rivet holes drilled into the edge of the end plates using the predrilled holes for guidance. Drive rivets were used, similar to those used to attach name plates to motors etc and it was a quick job to tap them all in place. They are of course purely decorative.

The brass collar was made in two parts, the radiused front section and the plain rear section. The front section was machined from a square blank of ¼ thick brass. The rear section, in order to save money, was bent up from a length of ¼ square brass with the joint silver soldered. The ring was then bored and turned to the finished dimensions. The two pieces are joined using countersunk screws and similarly attached to the smokebox body.

The chimney was made from a length of cast iron and externally was a straight forward turning job. The bore was however a little more interesting as it is 0.9" diameter and has a 2 degree taper along its full length of 4 inches. My Myford lathe has only a 1 ¼ inch of travel on the top slide so I did this in several bites from either end. The chimney top was turned from a large chunk of brass most of which ended in the swarf tray. All that remains now is the awkward job of making the chimney base – that is work still in progress.

A 7¼" Narrow Gauge Driving Trolley (Colin Gross)

With my decision to change from owning my 4" scale Tasker A2 Traction Engine to a 7¼" narrow gauge style steam engine came the need for a new

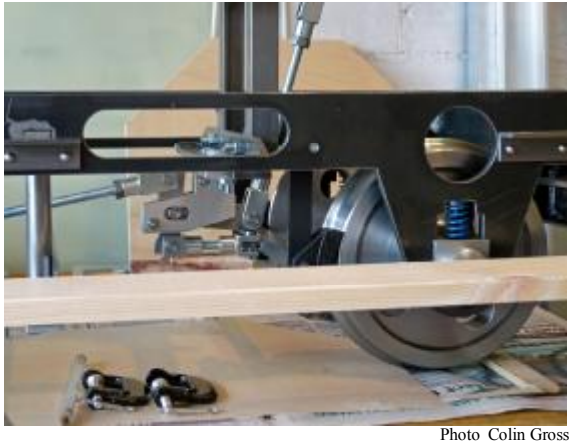


Photo Colin Gross

The trolley and its handbrake equalisation linkage.

driving trolley. The trolley is to my own design with laser cut side frames, but uses PNP wheels as my lathe is too small to machine such monsters. All of the other components which could not be manufactured using the lathe have been made using hand tools. The suspension springs were obtained from Associated Springs (SPEC) whose website provides the largest selection of springs I have ever found.

The intention is to finish the trolley and to get at least one days steaming on our track before this season ends.

PUBLIC RUNNING DUTY ROSTER

Date	Officer in Charge	Assistant
September 19th	Ray Grace	Tim Taylor
October 17th	Tim Caswell	John Keane
December 5th & 12th	Santa Runs	

Please note: If you are unable to make the date on the roster could you please let Keith Briault know as early as possible.

DIARY DATES 2010

External events are in **bold** text. Please check dates before travelling.

DATE		EVENT
SEPTEMBER	Saturday 4th	Polly Rally at Pinewood Railway
	Sunday 5th	Members' Running, 10.00-16.00
	Sunday 11th	**North Wilts MES GWR 175th Anniversary Rally (Swindon)**
	Sunday 19th	Birthday Party, 11.00-13.00 Public Running, 13.30-16.00
	Friday 24th – Monday 27th	**7¼" Society AGM (Echills Wood Railway, Sutton Coldfield, B76 0DY)**
OCTOBER	Sunday 3rd	Members' Running, 10.00-16.00
	Friday 15th - Tuesday 19th	**Midlands Model Engineering Exhibition (Warwickshire Exhibition Centre)**
	Sunday 17th	Birthday Party, 11.00-13.00 Public Running, 13.30-16.00
DECEMBER	Sunday 5th &12th	Santa Specials (provisional dates)
JANUARY 2011	**Friday 21st - Sunday 23rd**	**London Model Engineering Exhibition (Alexandra Palace)**