LIGHTING THE WAY

PAUL CHETTER turns to some practical modelling after spending time in front of the computer. This month he shows how to prepare and fit working headlamps and use DCC to get a flickering firebox glow accompanied by coal shovelling sounds.

Working head and tail lamps can make a massive difference to the appearance of a model locomotive. This real headlamp is located on the front footplating of the North Norfolk Railway's 'WD' 2-10-0 and with DCC Concepts products a similar effect can be achieved with 'OO' gauge steam models. Mike Wild.

THE PURPOSE of lamps on trains in the steam era was less to provide visibility for the engine crews than to help identify the train and - in the case of tail lamps - ensure the formation was intact. By a combination of number and position of lamps fitted to the forward facing end of a locomotive, it was possible to signal to distant observers the nature of the working.

Headcodes were common to all BR regions, although they underwent a number of changes. The Southern, however, used its own headcodes based on train route rather than type to reflect its intensively worked passenger services. A detailed listing is beyond the scope of this article for the Southern, but here is a link to a very comprehensive list: *www.semgonline.com/headcodes/sheadcodes.htm*

Before fitting any lamps, it will pay to do some research to get it right for your intended region and formation.

Lamp selection

Working model locomotive lamps have been around for a long time, and many modellers have produced their own. I came across some ready-made lamps from Richard Johnson's Australian company, DCC Concepts. These lamps are just about as true to 4mm: 1ft scale as you can get and use economical, long-lasting and cool running Light Emitting Diodes (LEDs). The first type available was modelled on the Midland Region type in the correct colour of black. They are easily painted white, but as Richard pleads, not too white please!

They are sold in packs of six and include a good selection of resistors. They are available in red (tail lamps) and white light output and the latter now include a yellow tint so you can achieve the warm glow of an oil lamp, or the whiter light of electric conversions from the same unit. If you purchase a set that does not have the tint included, contact DCC Concepts and they will send you some.

Preparation

DCC enables easy control of these lamps, but it's perfectly possible to use AC or DC power too. As I was preparing this article, a new range of London and North Eastern Railway (LNER)/ British Railways Eastern Region pattern lamps was released ready painted prototypical white. I fitted a pair of these to a DC controlled 'A4' 4-6-2 and the preparation is similar in each case. For full details see: *www.dccconcepts.com/PDF_Downloads/loco_lamp_instructions.pdf*

As supplied the MR/BR lamps are unpainted black, but there is a small amount of light 'bleed' from the base. To cure this, you can use a dab of black paint. However, if your paint is too thin, it may run inside the lamp and partially block the front lens. I found that allowing the paint to thicken by air drying for a short time before applying solved this potential problem.

At the rear of the lamp is a moulding to represent the mounting bracket. This will not be a problem in most cases, but where they are mounted well forward, as on streamlined 'Princess Coronation' class, they can project the lamp into possible contact with the buffers. In such circumstances, this moulding can be removed by gentle filing without damaging the functionality.

Apply paint by spray or brush over the entire lamp. Keep your coats thin. The handle is scale thickness and it would be a pity to spoil that with too much paint.

When dry, apply any weathering required and then gently file off the very front of the lens with a fine warding file or wet and dry paper. Clear gloss lacquer will restore the smooth finish to the lens, and you'll have a nice crisp edge to the paint.

Fitting

You will need to remove the locomotive body from the chassis for the next part.

The Hornby '4MT' 4-6-0 comes with six lamp irons which allow for arrays suitable for all BR Regions. I have decided to model it as a light engine working, with one central lower lamp front and back.

The only additional work prior to fitting is to drill a very small hole immediately in front of the lamp iron through the front footplate of the locomotive to accommodate the wires.

On the tender, I made the hole below the lamp iron. HM29 described how to use a pin vice. This would be an entirely appropriate tool to use for this; your drill size should be 0.5mm if you can find one that small! It should be obscured from most viewing angles by the lamp when it's in place anyway.

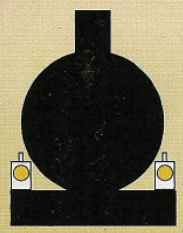
In some applications, it is not possible to route the wires so that they are completely hidden. If you can't, don't worry as they are so fine that neat installation and colour matched paint are enough to ensure they are hidden in plain sight.

Feed the wires through the hole and use a small amount of glue to fit the lamp to the lamp iron. Admire your work from a distance until the glue is set.

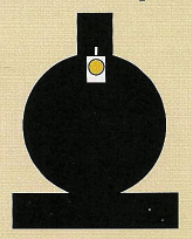
The wires are thin and springy, but you need to route them along the inside of the body »

FIGURE 1 **BR STEAM LOCOMOTIVE LAMP HEADCODES**

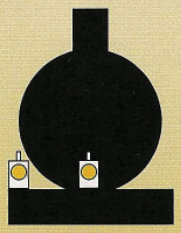
Lamp headcodes used by on all BR Regions except Southern. These were also used on early BR and pre-nationalisation diesels.



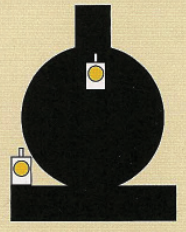
Express passenger train, newspaper train or breakdown train going to clear the line. Light locomotive to assist disabled train. Officer's special train.



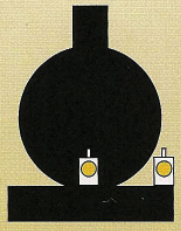
Ordinary passenger train or breakdown train not going to clear a line.



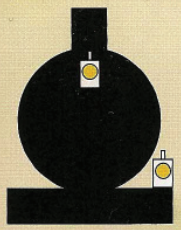
Parcels or perishables conveyed in vehicles conforming to coaching stock standards or empty coaching stock.



Express freight train operating with automatic brake on at least 50% of vehicles.

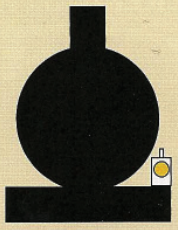


Express freight train operating with automatic brake on at least 20% of vehicles.

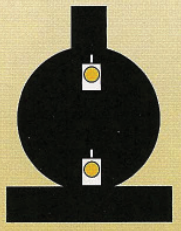


Express freight train not fitted with automatic brake

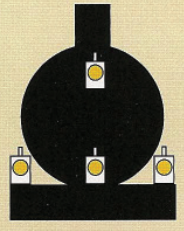
Light engine movement.



Freight train stopping at intermediate stations. Freight, ballast or officer's train requiring to stop in section.

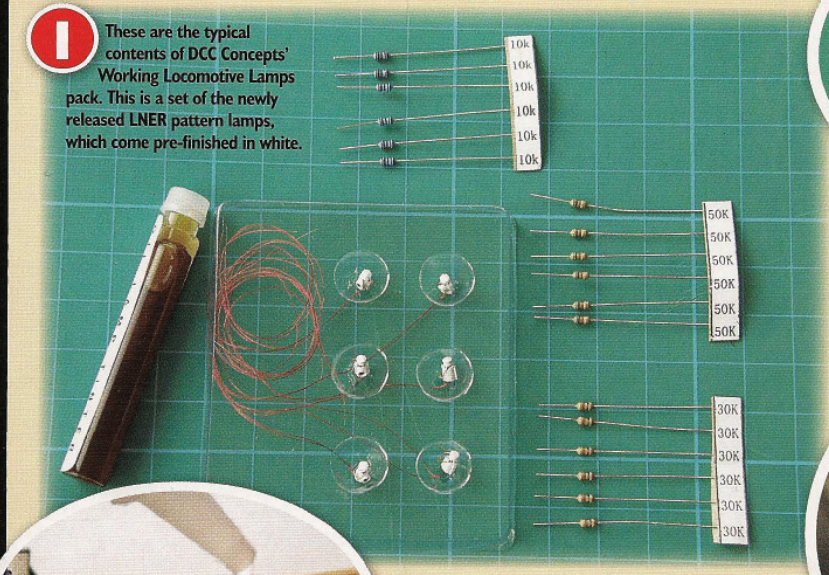


Through freight not fitted with automatic brake.

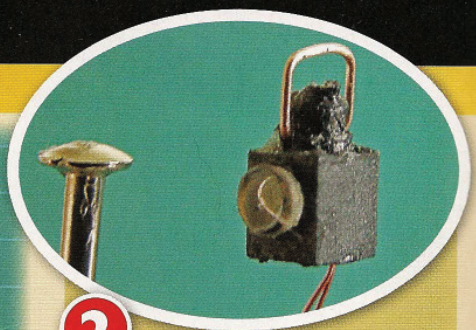


The Royal Train.

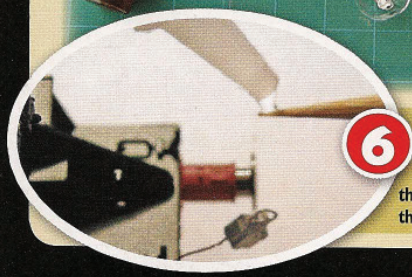
STEP BY STEP ADDING WORKING HEADLAMPS



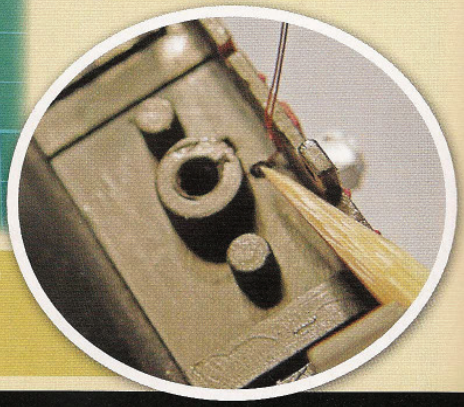
1 These are the typical contents of DCC Concepts' Working Locomotive Lamps pack. This is a set of the newly released LNER pattern lamps, which come pre-finished in white.



2 A MR/BR pattern lamp, as supplied by DCC Concepts, shown here with the head of a normal dressmaker's pin to illustrate scale. These lamps were painted white for this project.



6 A small spot of glue applied with a cocktail stick is enough to hold the lamp in place against the iron.



7 Apply a little glue where the wires emerge on the underside to give added support.

to the point where they will connect to the locomotive wiring, making sure they will not rub against any other components. If this is not possible, you may need to create some space using a fine file.

I prefer to fix the wires in place for their whole length, although this is not strictly necessary. To do this, I hold them in place (using forceps if needed) and run a little superglue along them.

Completing the circuit

If you connect these lamps - indeed almost any LED - direct to normal track voltages, they will be destroyed. A resistor must be connected in series with one wire, normally the positive, in all circumstances to protect them. Out of this necessity comes an advantage; higher resistance gives dimmer light. This is particularly useful for AC or DC layouts.

DCC offers even greater control. The Zimo MX640 decoder I've used in this '4MT' allows the output voltage to be varied. This means that the brightness can be fine tuned *in situ* just by changing CVs.

The wires have a lacquer coat insulation, so the +ve (positive) can only be identified by its longer length. This is not so critical with coloured LEDs as long as a resistor is in circuit, you will not damage the lamp by connecting it up the wrong way; it will simply not work. Swap contacts over and all will be well.

White LEDs, however, are more prone to damage by reverse spikes caused by electrical interference or even 'sparking'. DCC decoders have inbuilt protection, but AC or DC will need a modified circuit which essentially puts two diodes back to back. This could be easily achieved in practice by reverse wiring a pair of LEDs.

The '4MT' has a complicating factor – it is a tender locomotive and in this model, the decoder is in the tender, so power to the front lamp(s) has to bridge the gap.

The wires need to be more resistant to damage than the single fine strands of those supplied on the lamps to withstand making the connection between locomotive and tender. Those supplied are not long enough anyway. I got around this by joining the lamp wires with 0.53mm seven strand wires which I then routed to the decoder via the break-out plate.

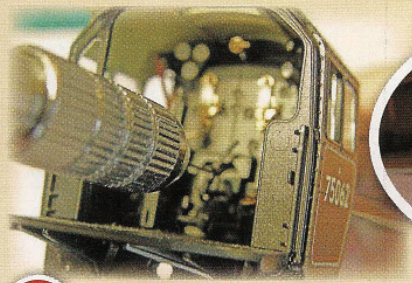
With the wiring completed, we need to allocate the Function Outputs on the decoder and set the CVs as required. The advantage in being able to set things up using CVs is that you can change them at any time without needing to dismantle the model again. See the CV List for more details.

DCC allows you to switch Functions on or off whilst the locomotive is on the track, even when in motion. A Function can be a physical entity like a lamp or, if it's a sound decoder, it can trigger a sound to be played.

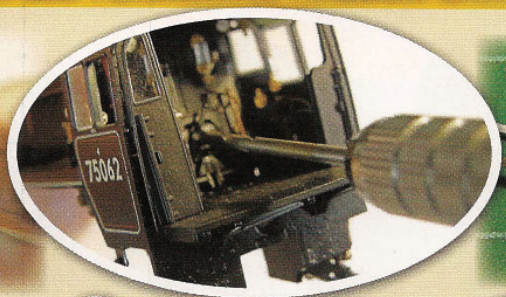
So, if you have a non-sound decoder, you can fit a firebox lamp and still have manual on/off control. Provided your decoder allows it, you may also be able to get the flicker effect.

The MX640 allows physical and sound functions to be allocated to the same control button for synchronous manual control. This is done using CVs (See CV List).

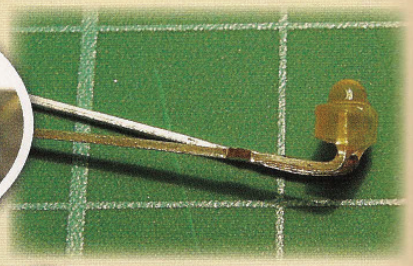
STEP BY STEP ADDING AN LED FLICKERING FIREBOX LIGHT



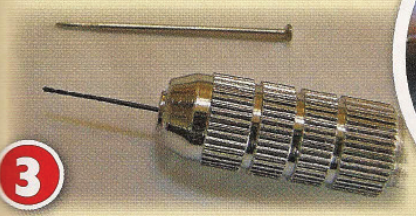
A Use a 0.5mm drill bit in a pin vice to make a pilot hole for the firebox LED.



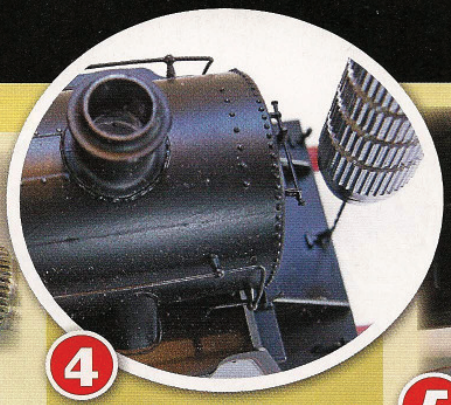
B Using the pilot hole as a guide the hole can then be opened out to the correct size with a 2mm bit in a pin vice.



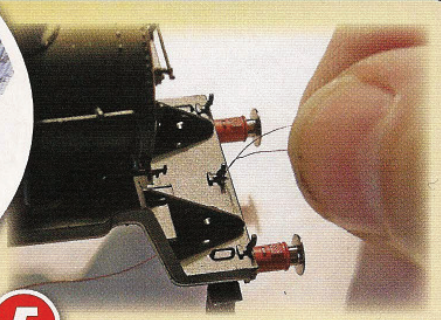
C This is the 2mm amber LED with the connectors bent through 90 degrees ready to place in position.



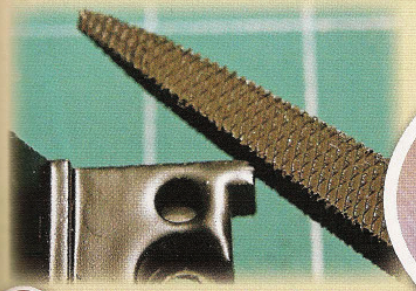
3 A 0.5mm drill bit in a pin vice is the right tool for making the small hole through the bufferbeam for the wires from the headlamp. The straight pin provides scale comparison.



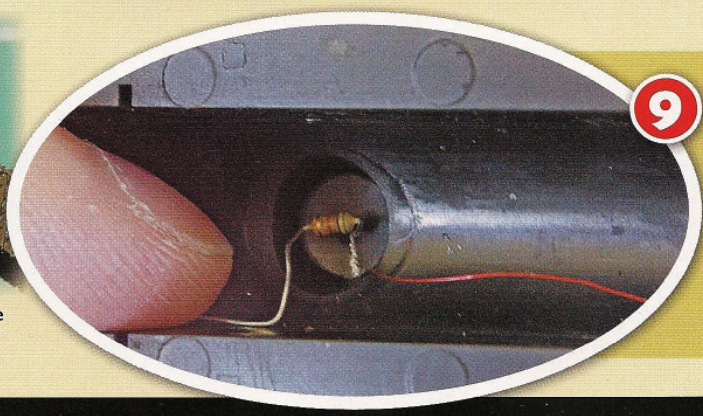
4 Drill through the front footplate as close to the base of the lamp iron as possible.



5 Insert the two lamp wires through the hole. There's plenty of room, but you need a steady hand.



8 Check the wire routing. If there is likely to be any chaffing of the LED wires, make a bit of clearance on the chassis with a warding file.



9 The inside of the dome on the BR '4MT' makes a good clear space to locate the necessary resistor. This will be insulated before final re-fitting.

Boxing clever

Fitting an LED inside a firebox is another job that requires the locomotive body to be removed.

Use a 2mm or 3mm LED, the type with a shoulder at the 'wires' end are easier to fix in place. You can use either a red or yellow LED, but in either case you must fit a suitable resistor. All these items cost just a few pence each, so this is a very cost effective modification.

Drill a hole in the firebox door just large enough to allow the narrower part of the LED to fit. In choosing the place to drill, check that there will be no obstruction when you reassemble the model. Motors or gearboxes are usually the items to watch out for. Also check that there will be sufficient clearance all round to avoid electrical shorting. To be sure, you should also insulate the exposed wires after installation.

The LED's connecting wires are usually solid and can be permanently bent to suit the location. Be gentle, plan the routing and make your bends only once each time. It's simpler to do this before finally fitting the LED.

Fix the LED into the hole created using suitable glue; for a removable solution, blu tak or sticky tape will do as LEDs run cool compared to conventional bulbs.

Connect the +ve side (with the longer wire) via a resistor to the common, usually blue, output from the decoder and the other to the Function Output you have chosen.

After reassembling the locomotive, put it on your track and set the CVs to achieve the desired effect.

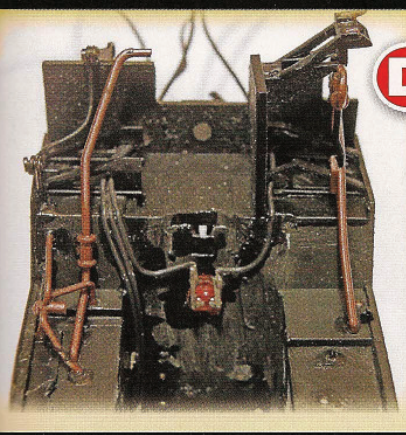
The CV list gives the values that I've used in this project, but you can adjust them to suit your installation. Of course, these can only be guaranteed to work for Zimo MX640 sound decoders, so if you use another type you will need to check your manual.

● In the next issue we'll show how to fit and operate a smoke generator as we near the conclusion of this series. RMM

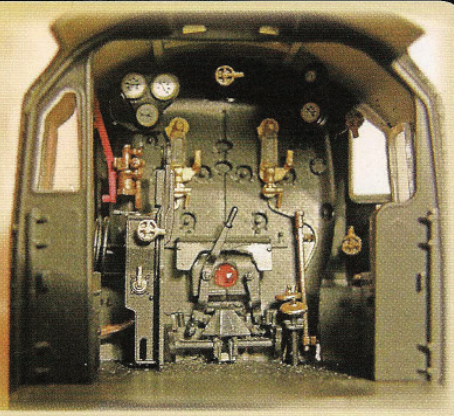
CV LIST

Set the following CVs to the value shown. This will allow the locomotive lamps to switch on/off manually, map Function Output 1 (FO1) to function key 6 (F6) and cause the firebox LED to flicker. The sound of coal shovelling is also set to F6 (in the sound file) so, by pressing key 6 on your DCC controller you will switch on/off the firebox flicker and the shovelling sounds at the same time.

CV Number	35	38	40	41	61	125	126	127
CV Value	0	0	4	0	97	0	0	8



D A red LED installed into the firebox hole. You can just make out the black insulated wires from the front locomotive lamp in addition to those I soldered to the LED. They are routed away from possible contact with chassis and glued in place.



E This is the view inside the cab of the LED in position. When set up with the decoder it emits a flickering light which gently illuminates the cab interior as the if firebox doors had been opened.