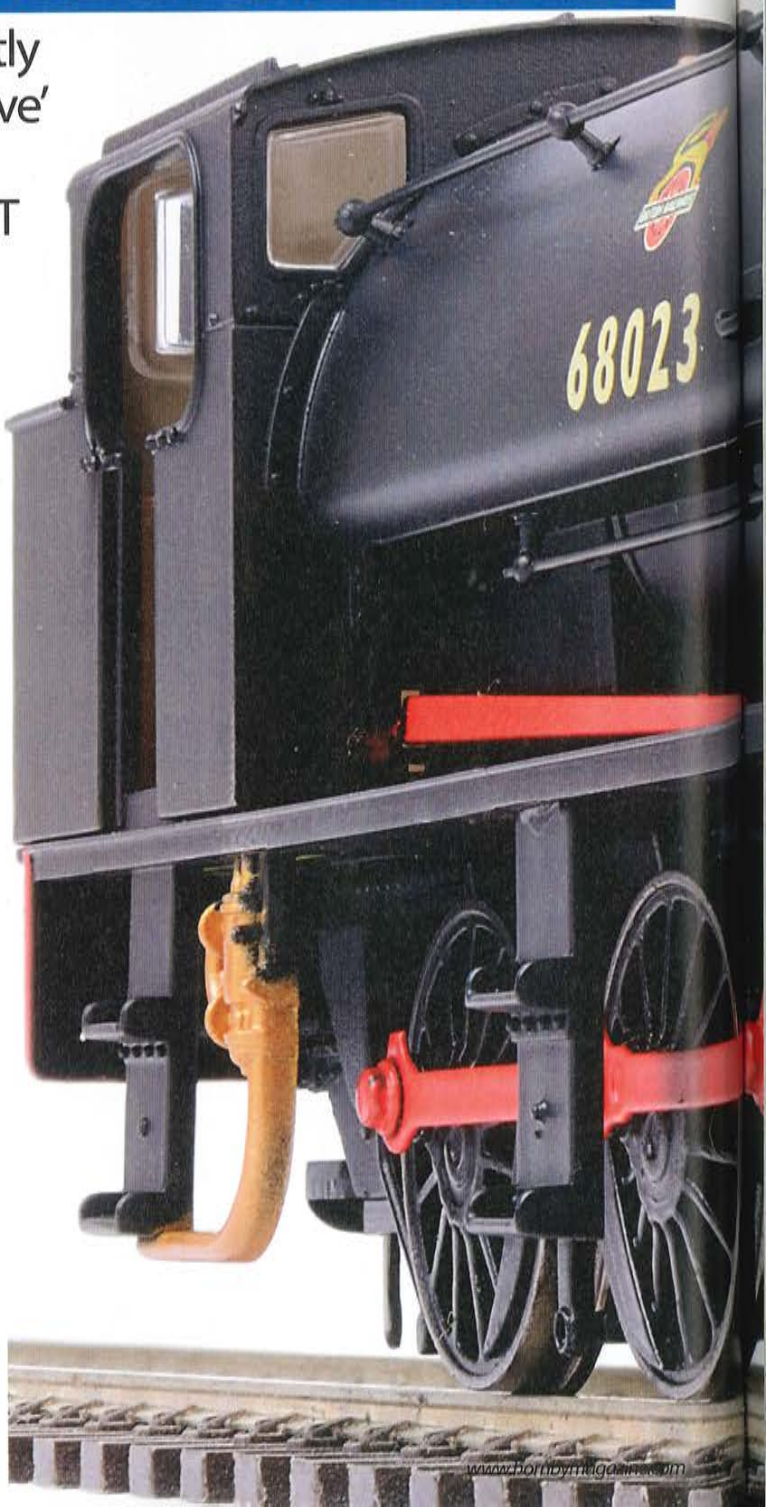
Sound AND stay alive FOR DJ MODELS' 'J94'

Small locomotives can benefit greatly from sound and especially a 'stay alive' pack. **JEREMY FAIRLIE-SMITH** strips down a DJ Models 'J94' 0-6-0ST to make it sound like the real thing.



THE DJ MODELS 'OO' gauge Hunslet 'J94' 0-6-0ST made its debut in September 2016 (HM112) and has been made available in a wide range of standard liveries as well as in exclusive colour schemes for retailer commissions. Consequently many London North Eastern Railway (LNER), British Railways and industrial versions have found homes on our layouts and are giving good service.

They have proved to be a simple and reliable. It is a modern Digital Command Control (DCC) ready model with an easily accessed 6-pin socket. It has a very small quiet motor and a split chassis of advanced design, eliminating the need for wiper pick-ups, and three axles geared together within the chassis, rather than relying on the coupling rods. These features give the two essential qualities that small locomotives really need for standout performance on any layout: good pick-up and a smooth mechanism.

The 'Austerity' 0-6-0ST dates back to 1942 when the War Department (WD) identified a need for a simple 0-6-0 shunting engine. Robert Riddles was given the task of designing a locomotive which called for cost effective and simple construction as well as easy maintenance and operation. The WD 'J94s' were closely based on a 1941 Hunslet design.

Production started at various locomotive workshops throughout Great Britain and engines were pressed into service with the WD while others were sent to Holland and France to assist with the war effort. After the end of hostilities the LNER bought 75 and they became classified as the 'J94s', the 'J' being the LNER's designation for 0-6-0 locomotives. WD orders finished in 1947, but construction of this useful design continued for the National Coal Board (NCB) in 1948. Many WD engines were subsequently rebuilt and sold on to industry, whilst production of new examples continued until 1964, again for the NCB.

ACTIVEDRIVE

There are several survivors in preservation from which to take genuine sound recordings. The sound scheme we're using here, created for Zimo decoders by Paul Chetter, uses his own recordings taken from a working locomotive. This is one of his Activedrive projects which has several advanced but easily used features.

Activedrive is a system developed to allow you to change the way that the locomotive and its sounds respond to your driving style or needs. This avoids the need for reprogramming and all the additional costs that would imply. As supplied, the decoder will work in a 'heavy train' configuration, but it can be switched between heavy »

WHAT WE USED		
PRODUCT	**SUPPLIER**	**CAT NO.**
10mm x 15mm cube speaker	*www.digitrains.co.uk*	LS10x15S
Zimo MX649R sound decoder	*www.digitrains.co.uk*	MX649R
Lais 'stay alive' pack	*www.digitrains.co.uk*	860009
'J94' 0-6-0ST sound file	*www.digitrains.co.uk*	ZS004A

TOOLS

- A small crosshead jeweller's screwdriver
- Standard flux cored electrical solder
- Black tack or similar blue sticky stuff
- Small diameter heatshrink, 1.6mm is ideal
- A soldering iron with a small tip
- Small sharp craft knife
- Small end cutters

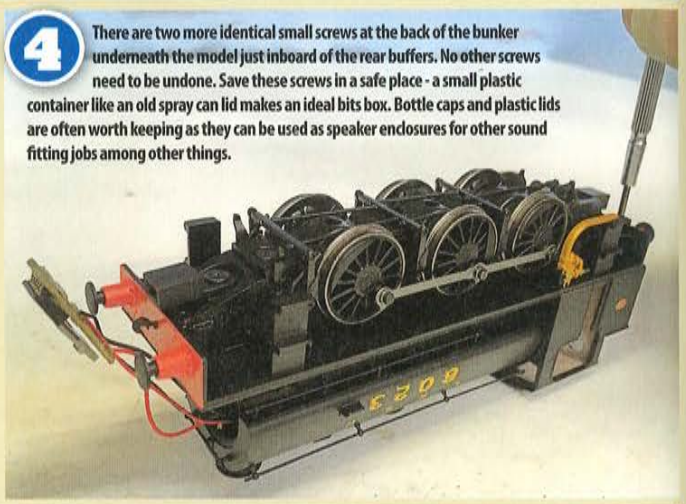
DJ Models' 'J94' 0-6-0ST debuted in September 2016 (HM112) and has been released in LNER and BR liveries as well as numerous industrial schemes. This is 'J94' 68023, one of the original batch from 2016.

INSTALLING SOUND AND STAY ALIVE IN A DJ MODELS 'J94' 0-6-0ST

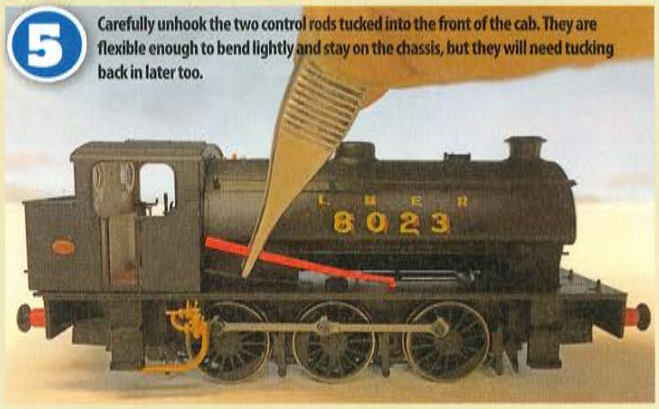
1 The new locomotive ready for testing on DC before getting busy with the screwdrivers. Don't forget this obvious but often overlooked step. You need to get to know how your model performs and whether it's going to be a good one. This is why the manufacturer recommends you run it in.

2 As designed the model opens easily without tools to allow a conventional decoder to be plugged straight in. The smokebox door is retained by a pair of small magnets.

3 This shows the locomotive with the decoder socket pulled out on its harness and visible but for our needs the screwdriver is positioned to undo the single fixing for the saddle tank moulding.



4 There are two more identical small screws at the back of the bunker underneath the model just inboard of the rear buffers. No other screws need to be undone. Save these screws in a safe place - a small plastic container like an old spray can lid makes an ideal bits box. Bottle caps and plastic lids are often worth keeping as they can be used as speaker enclosures for other sound fitting jobs among other things.



5 Carefully unhook the two control rods tucked into the front of the cab. They are flexible enough to bend lightly and stay on the chassis, but they will need tucking back in later too.

6 The rear of the cab was freed by removing the screws but the front of the cab clips in place around the back of the boiler. Using a thin but blunt tool, prise the cab sides to open them outwards a little and slide the whole cab upwards and off.

and light modes using Function 5 on a DCC handset. In addition, in any of the driving sound sets, increasing the speed step by one or more will produce an acceleration sound for a few seconds. If you wish continuous acceleration, ease the throttle setting upwards rather than 0-128 in one jump. Similarly, in each sound set, a reduction of one speed step or more will stop the exhaust beats and the locomotive will 'coast' (or drift) for a few seconds before resuming exhaust beats. Continuous drifting can be simulated by easing the throttle settings down.

Another useful feature of this sound profile is Zimo's brake key. F2, a non-latching function, will give the sound of brake applications. F2 can be 'dabbed' or held for varying durations. The sound will respond accordingly. If the throttle is reduced in advance, as a real driver would do, before operating the brake key, a braking force will be applied which will continue to increase the longer F2 is held. Short dabs will provide speed trimming, holding down continuously will result in a controlled 'Emergency Stop'.

BEST PRACTICE

Back to the model. The very first thing to do before anything else, especially if you've got a new example, is to test it to make sure it runs properly. Fitting sound to an untested model can reward you with a finished item that has a fault and finding it at the end of the job is always worse than not starting work on a model that isn't going to perform correctly. You never know if it's the decoder, the locomotive or something you've done on the way.

The fitting of a simple 6-pin decoder is very straightforward, but the locomotive with its small motor and temptingly big boiler water tank space is asking for some proper 'J94' sound and it is possible to fit a Zimo MX649N 6-pin direct fit sound decoder and a Zimo 10mm x 15mm cube speaker by plugging it straight in and poking

Intermediate
Beginner SKILL LEVEL Advanced

7

Then lift off the water tank/boiler top moulding. This reveals a huge space that we'll utilise shortly. Unsolder the pick-up wires to the socket harness from their solder tabs on the chassis halves, visible either side of the motor's worm gear. Cut off the wires from the socket to the motor leaving enough to attach your decoder wires to later. Don't assume the red one is for the orange decoder wire and the black for the grey wire - in this case it's the black that's the motor positive and red is motor negative. Bare and tin no more than 3mm from these wires ready for soldering later.

TIP

- A bare decoder is much more likely to suffer a short and fail than get too hot in its jacket. Insulation is always vital to successful decoder fitting. Don't be reluctant to put a protective cover on a decoder. Most new decoders are well covered from the factory nowadays.

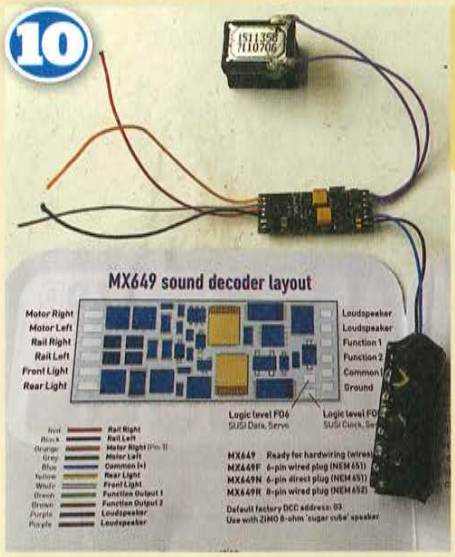
8

Turning our attention to the parts that are going to be fitted to the model we've opted for the wired MX649R version rather than the six pin MX649N. This decoder is pre-prepared with Digitrains 'J94' sound file, code ZS004A.

9

The most challenging part of the whole job is the onerous task of fitting the two wires from your 'stay alive' unit to the solder pads on the decoder. Your retailer may be able to do this for you if you ask when you order your parts. The Zimo decoder leaflet shows where to look for the common positive and the earth terminals. With a sharp knife, carefully trim away a little of the decoder's protective sheath to access these pads on the decoder. Unsolder the decoder's own blue wire from the common positive solder pad and exchange it for the blue stay alive wire then attach the 'stay alive's' black wire to the previously unused earth solder pad. Then tape over it again when done.

10



Trim the two purple speaker wires and the black, grey, red and orange decoder wires to a sensible length - 45mm is plenty. Again, prepare them by stripping and tinning only the minimum length needed to make a secure soldered connection. The remaining function wires that we're not using can then be trimmed and secured away out of use. Solder the speaker wires tidily to the corner terminals of the cube speaker. I always insulate these connections with a blob of hot glue or a thin strip of tape to protect the speaker output from short circuits when powered up. You'll end up with a decoder with its speaker and 'stay alive' both now connected and ready to go into the prepared chassis. There'll be the four free wires ready to attach to the chassis pick-ups and the motor wires.

11

Clip out the plastic lugs from the inside of the saddle tank just to make it easier to reassemble later.

the decoder and speaker in through the front access hole. The big drawback of this installation is the fact that as soon as you fit sound to a short wheelbase model you find that, as good as it's pick-up is, it will stall on the odd point and the sound stops and it needs that little push to get going again.

Sound decoders are so much more sensitive to power outages than motor only decoders and seem to falter more often. All this adds up to a shunter that sounds great on the main line but hates shunting in your yard, just where it should be at its most impressive. Enter the high power 'stay alive' to save the day. The advent of the tiny supercapacitor has given small locomotives the boost they need. These generally are rated at 2.7V so you can't use them on their own. DCC track voltages of around 13 to 16V are common and some go as high as 22V. So, it is important to know what your track voltage is and it can be measured to within 0.2V or so with a standard cheap digital voltmeter as long as you remember to set it to read AC power.

'Stay alives' using these capacitors can be pre-made items from major decoder manufacturers such as the TCS KA Keep Alive units, Zimo SC68 supercao or the Digitrax Power Extenders. Alternatively, you can buy them on their own and create an array of them in series adding up your 2.7V increments until you're safely above your track voltage reading.

The Zimo small decoder manual outlines the parts needed to add your own home grown 'stay alives' to their decoders. However, the 860009 'stay alive' we're using here is a pre-made array with a tiny on board voltage limiter and charge circuit. It has four one Farad super capacitors protected by this device and is safe up to 16V track power and is very compact being only 28mm x 10mm x 9mm. The problem with using capacitors in series is that you end up dividing »

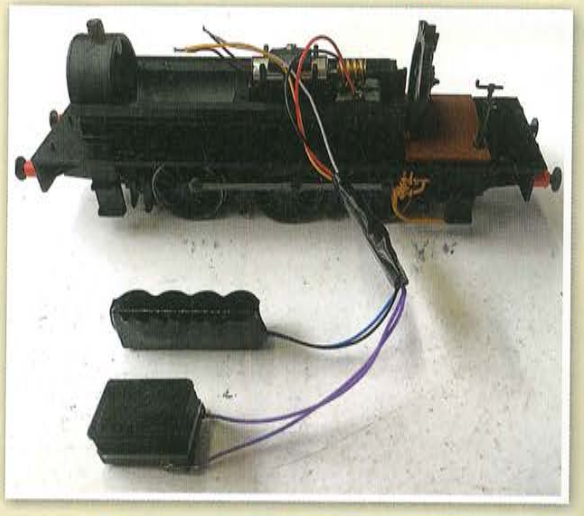
STEP BY STEP

INSTALLING SOUND AND STAY ALIVE IN A DJ MODELS 'J94' 0-6-0ST

Intermediate
Beginner SKILL LEVEL Advanced

FUNCTION LIST	
FUNCTION	**SOUND**
F0	Lights on/off (if fitted)
F1	Sound on/off
F2	Brake key
F3	Whistle
F4	Long whistle
F5	Heavy train/light engine sound selections
F6	Coal shovelling
F7	Live steam injector
F8	Blower
F9	Wheel flange
F10	Safety valves
F11	Handbrake
F12	Tank water filling
F13	Wagon snatch
F14	Buffering up
F15	Cylinder drain cocks
F16	Coupling
F17	Double whistle
F18	Guard's whistle
F19	Fade all sounds
F20	Shunt key
F21	Short whistle
F22	Short and long whistle
F27	Overall volume down
F28	Overall volume up

12 Now for the real fitting bit. Solder your black and red decoder wires to the left and right solder tabs respectively on the chassis either side of the worm gear where the original pick up wires were. Then attach the orange decoder wire to the black motor wire and the grey decoder wire to the red motor wire. I solder these side by side rather than end to end so I can easily slip a tube of heatshrink over them and warm it on using my soldering iron tip as a heat source. The advantage of this is that you can pull off the heatshrink and undo the connection if you ever need to without having to cut your wiring.



13 Below: Arrange and secure the items in the positions shown within the chassis using black tack to secure them in place. The decoder sits at the side of the motor, the 'stay alive' sits at the front lengthways in the bottom of the boiler and the speaker sits on top of the 'stay alive'. Route your cables neatly between the components, well away from the gears and secure them with black tack also. Fit the boiler top and check it all goes on easily without trapping any wires. You can now test your chassis.

TIP

● Most decoders that get damaged do so during the fitting and testing stage. Never be tempted to try a test run without your speaker properly secured and insulation on. This locomotive should now work perfectly on address 3. I recommend checking your decoder's functionality before doing any further programming. If all is well then you can address it to your own number. On this model the chuff rate can be set up pretty accurately starting with a value of 105 in CV267.

14 If all is well then you can finally reassemble the model, refitting the single screw down the chimney. Slide the cab on tucking the reversing rods in as you slide it down rather than just pushing it on and trapping them. Then refit the two bunker screws underneath and you're done.

their power. That still leaves you with a very impressive 250,000 microFarads of charge to keep your locomotive shunting happily. This equates to between five and 20 seconds of power. This variation depends upon how much power your model was actually using when the power interruption occurred. This 'stay alive' gives such impressive results that in this case it's probably necessary to use CV153 on the Zimo decoders that actually limits the 'stay alive' time. A value of ten equates to one second so the maximum value 255 will give to up to 25.5 seconds if you have the power available. Tune this value to suit your needs. Also, don't forget to make sure you've told your locomotive to stop before switching off your controller.

INSTALLATION

'Stay alives' on decoders only work properly under DCC control, but most decoders can also work on DC. As such they are often designed to ignore the 'stay alive' power pack when running on DC as it would conflict with power from the DC controller.

The only problem is that we have now exceeded the amount of items which can fit through the front of the model, but only a few simple steps stand in the way of your 'J94' and enhanced sound performance. Fortunately, the model is actually relatively simple to dismantle and once inside doing the job is not too daunting for anyone who can resurrect their soldering skills for a few minutes.

Everything else is just screwdriver work and joining a few wires.

● The step by step guide contains TIP comments. These are general workshop tips based on years of first-hand experience fitting decoders and working with small electronic components.