

# 7th Heaven

Journal of the Aus7 Modellers Group Inc.  
No 53

\$7.70 inc GST  
Autumn 2017



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**DCC for the Auscision 45**  
**Introducing Mini Micro Connectors**

**Aus7**  
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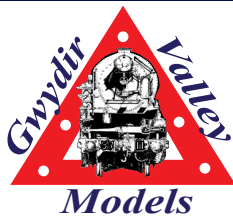
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## Editor's Note

As you can see from the contents section opposite, this issue only has a couple of articles due to their length but it did not seem sensible to spread them over two issues, so they are presented in their entirety. I wouldn't want someone to get half way through fitting the decoder into their 45 and then have to wait three months for the next instalment!

Unusually I do have a few articles to kick start the next issue but still more needed. Some items from new authors would be great.

Finally, I am not a believer in the paranormal but I did find it a bit spooky that on the day Trevor sent me his Straight Down The Line item I was engaged in exactly the sort of magazine culling exercise he advocates. I have now reduced fifty years of AMRM from a dozen plastic tubs to three large binders. There is nothing like the approach of another birthday ending in 0 to make you realise you are never going to build that XYZ wagon you first read about in 1975!



# Straight Down the Line - Opinion

by Trevor Hodges

## Going Digital

The other day a modelling friend and I were sitting in my living room discussing our respective collections of modelling magazines. This discussion was prompted by the fact that we were seated adjacent the bookcases which house my own modelling library, including rows of magazine storage boxes on their shelves groaning with the weight of a portion of the railway magazines I've purchased over the years. My friend said that he'd recently been purchasing the digital editions of magazines he already owned so that these could be loaded onto his computer, thus allowing him to thin out the paper magazines he was required to store. I asked him what he'd been doing with the paper magazines to which he replied that he'd, "tossed them in the bin".

Some of you reading this will probably react with horror at this wanton destruction of such a valuable resource but I must admit that I'd recently been going through a similar process myself. So after years of gradually accumulating literally hundreds of model and prototype magazines what has prompted this recent flurry of divestment? Perhaps the simplest answer is the ready availability of digital copies of these old magazines which can be loaded onto one's computer, thus making retrieval of the needed information relatively quick and convenient.

When I stopped to consider what I'd been doing it occurred to me that, broadly speaking, I've been placing my magazines into three categories, dealing with them in quite distinct ways.

- A number of magazines I used to buy and have kept in the past I no longer purchase regularly and when I do occasionally pick up a copy I tend to toss them out as soon as I've read them.
- These days there are only two magazines I keep every issue of – AMRM and Model Railway Journal. I keep MRJ in paper form because as yet there's no digital version that I'm aware of. My retention of AMRM is somewhat sentimental: I could get most back issues on CD however I retain the paper versions because I have a fondness for the publication.
- For just about every other magazine that is available in digital form that I've got paper versions of I plan to eventually get the CDs and recycle the paper versions.

To be honest a recent house move was a strong motivator in thinning out my collection of magazines – I just didn't feel like lugging all those storage boxes into my new home only to have them sit forlornly on my bookshelves for another decade as they gathered dust and mildew. I would suggest that if you have a large collection of railway magazines and a digital version is available then it might be worth thinning out your own collection. It's not just layouts and rolling stock that are a headache to deal with once the owner has shuffled off this mortal coil.

If you're like me and you hesitated for years before starting to divest yourself of those piles of paper magazines - just in case you ever need that article on how to convert the motor from a microwave oven into a motorized crossing gate - I'd hazard a guess you'll discover that actually tracking down the article you're after is far easier in a digital format than via a paper based magazine. Less time searching for a particular magazine article means more time modelling doesn't it?

Of course I retain and cherish every issue of 7<sup>th</sup> Heaven.

### Aus7 Modellers Group Inc

P.O. Box 3404 Asquith NSW 2077

<https://aus7.org/>

#### President

Trevor Hodges  
trevorhodges@dodo.com.au

#### Secretary

Stephen Reynolds  
spotsreynolds@iprimus.com.au

#### Treasurer

Anthony Furniss  
anthonyfurniss@rocketmail.com

#### Vice President

John Parker  
johnrbp@tpg.com.au

#### 7th Heaven Editor

Paul Chisholm  
paulchisholm@bigpond.com

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#### On The Cover

2002 finally steams into Morpeth. After a thirteen year wait you would expect a larger welcoming crowd!

# 2002 – A Thirteen Year Long Scratch-Build

## Part 1 Trevor Hodges



### Background

There may be members of the Aus7 Modellers Group who haven't heard me give talks or read what I've written about my layouts Queens Wharf and Morpeth, but I'd guess they'd be few in number. However I imagine there are plenty of you who have only heard or read part of the story of how I came to scratch-build my first locomotive for these layouts. So please indulge me because I'd like to record not just the building sequence but also the back-story of 2002 and why it took something like fourteen years to finally finish building this little tank locomotive.

I count my start in O-scale modelling from the Summer of 2000 when I assembled my first rolling stock kit. Since that summer I don't think I've built anything in another scale and my output has been exclusively the NSW prototype. You could say that when I fall in love I fall hard and I stay loyal! At approximately the same time I took the fateful decision to read issue 14 of *Byways of Steam* in which Ian Dunn's article on the Morpeth line appeared. That article has formed the basis of my modelling output to the present day. If you look at photos of the Morpeth line both in that article and beyond they show only two classes of locomotive for the time period I'm interested in modelling; the (C)30 4-6-4T and the (Z)20 2-6-4T classes. While other locomotives (and even a steam tram) ran on the line in earlier times, for the period I'm interested in the photos favour the (Z)20 about 10 to 1 over the (C)30. The line closed in 1953 and there is no evidence I can find that a diesel ever ran on the line. So it was clear from the earliest days of my interest in the line that, if I wanted to model even a loosely prototypical version of it, I would need a model of a (Z)20.

In 2003 I'd firmed up my plans to the point where I'd actually made a start on my first version of a layout called Morpeth and I made the acquaintance of one Keiran Ryan. Keiran was also interested in a (Z)20 in 1:43.5 because of his growing interest in the Camden line, another branch on the periphery of a metropolitan area which had been worked extensively by the (Z)20 class. In the period leading up to 2003 I'd managed to scratch build a model of a 48 class locomotive so I wrote Keiran an email and outlined my plan to scratch-build a 20. Keiran may dispute my recollection of these events but my memory tells me that in that exchange of emails I offered to build him a locomotive in parallel to my own. I was going to build one (Z)20, how much harder was it going to be to build two? Now my memory isn't perfect but at some point in his exchange of emails he wrote words to the effect of, "don't scratch build a Z(20), I'll put out a kit". I'd acquired some parts for the scratch-build project so these went into a box (photo 1) as I wouldn't be needing them in the short term as a kit would be available in a year or so.





Fast forward to March 2014 and my second version of Morpeth made an appearance at the Aus7 ExpO. This event was something like 6 years in the contemplation and over two years in the planning and execution and when it was held I still didn't have a (Z)20 to run on my as yet unfinished layout. After the ExpO was over I remember telling a number of friends, not least of these being our Vice President and the organizer of the ExpO John Parker, that Morpeth would never again appear in public without a (Z)20 to run on it. It was after the ExpO I finally decided that if I was ever going to have a 20 to run on my layout I would need scratch build one. In the second half of 2015 I posted a message on the 7mmAusmodelling Yahoo! group that I was about to build myself a (Z)20 from scratch. My friend Bruce Wood replied with a post that said something like, "why would you want to do that when the kit is about to appear?" I replied to him "I'd be willing to bet I can scratch-build my locomotive faster than you can build one from a kit that still hasn't appeared". Much to my surprise Bruce took me up on the challenge with the purchase of a lunch at an upcoming Forum to the winner. I got my free lunch ☺

## Planning & Acquiring Parts

As mentioned before I'd gathered some parts together in the early years of this project; wheels, side rods, a funnel, dome and a good set of Data Sheet plans in 1:43.5. Greg Edwards of Data Sheets will produce his plans in 7mm if you make the request when you place an order. However I needed parts that weren't available commercially nor from my primary source for parts, the Century Models (Z)19 class kit. It's beyond the scope of this article to go into the history of the conversion of the (Z)19 tender loco into the (Z)20. If you wish to know more there are plenty of articles around and the excellent book "Tender Into Tank" goes into this process in great depth.

I had a ready supply of (Z)19 class parts both from my own earlier kit built 19, of which many parts went unused or were replaced with 3<sup>rd</sup> party products, and from my friend Peter Krause, past proprietor of O-Aust and Century Models. Peter went so far as to offer me essentially a complete set of parts for a 19 class kit which a modeller of his acquaintance had used in an attempt to build a (Z)20 as an experiment: an experiment which failed evidently. While the plan had always been to use as many of the parts from (Z)19 as possible in my own scratch building effort, it transpired that only roughly 20% of the final locomotive that emerged is sourced from the Century (Z)19 kit. As I sit here thinking back over the decisions I made about my (Z)20 during the planning and building sequence and as I attempt to remember why it was that so little of the 19 class kit ended up being used, I believe it came as a result not so much from a drive for prototypical accuracy but rather had much more to do with expediency and practicality. I don't wish to be overly critical of these early Century Models kits, they allowed a lot of modellers to enter the scale and they build up into nice models for those with the skills to build them. Quite a few modellers over the years had said to me "the 19 class kit would give you a good head start into building a 20" but if the modeller who handed the

box of parts back to Peter and my experience is any guide, then I'd suggest this is more wishful thinking than a practical pathway to getting yourself a 20.

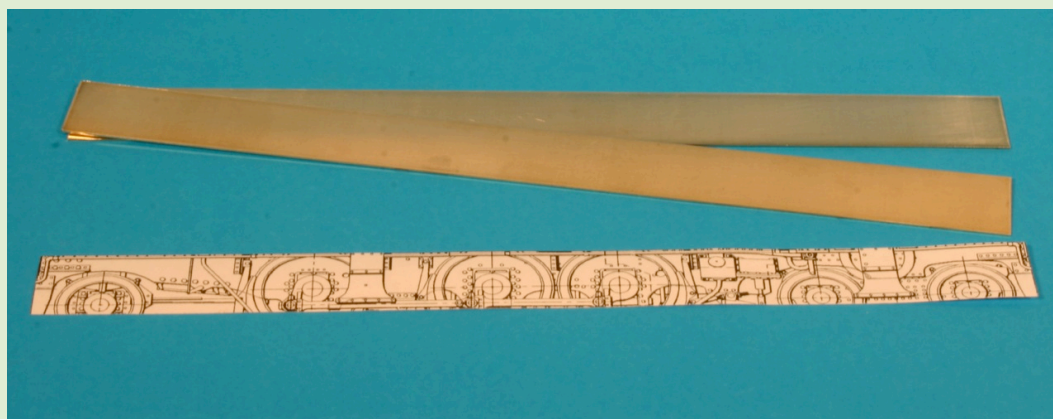
The most critical decision I made in building my model of a (Z)20 was to construct a completely new chassis from raw materials: after even the most cursory study of the kit parts, and a fair bit of contemplation, I came to the conclusion I couldn't use the chassis supplied with the 19 class kit as some sort of "core" around which a 20 could be constructed. This isn't being critical of the kit: they were designed to assemble into a (Z)19, not be used to form the basis of a (Z)20. Because of the differences between the (Z)19 and (Z)20 classes in the end it was easier to scratch build a chassis than try to bodge something up from the (Z)19 class kit. This decision was critical because as I built the (Z)20 chassis to be reasonably close to prototype dimensions there was a knock on effect that significantly reduced the number of parts I could use from the kit. Again, instead of trying to press parts into service from the kit, it was simply easier to make parts from scratch. I'm no masochist however, I used what parts I could and just made what I had to. Having the kit parts available probably saved me close to 15-20 hours precious modelling time. I wanted to win that lunch from Bruce!

## The Chassis

Let me say before I go any further that I made two chassis for this locomotive; the first turned out to be more an accumulation of errors than a working chassis and ended up being scrapped and some of the metal reused in other parts of the locomotive (Photo 2). The second was a vast improvement over this earlier effort and benefitted from the lessons learned from my first abortive attempt. I've had lots of conversations about this model and one universal assumption is that it is made from brass: it is not! The sheet metal you can see in the photos of the chassis and body work for 2002 is nickel silver.

Brass was used in some applications on this project to make parts but about 70% of the locomotive is nickel silver(NS), about 20% urethane castings from the (Z)19 class kit with only about 10% being made from brass. Why use NS rather than brass? Brass has its place in projects such as this but by comparison NS is easier to solder, oxidizes at a slower rate, is less prone to stain and can be rubbed down to a beautiful, silky smooth finish with wet and dry. However for me its greatest advantage over brass is in the area of paint adhesion. There is simply no comparison between the two: in my experience it is extremely difficult to get paint to stick to brass while paint adheres nicely to NS. I get my NS sheet and wire from the UK outlet Eileen's Emporium <https://eileensemposium.com/> as I've found no outlet in Australia that sells NS in the size and range I require. To be more accurate I don't know of any Australian outlet that sells NS, period!

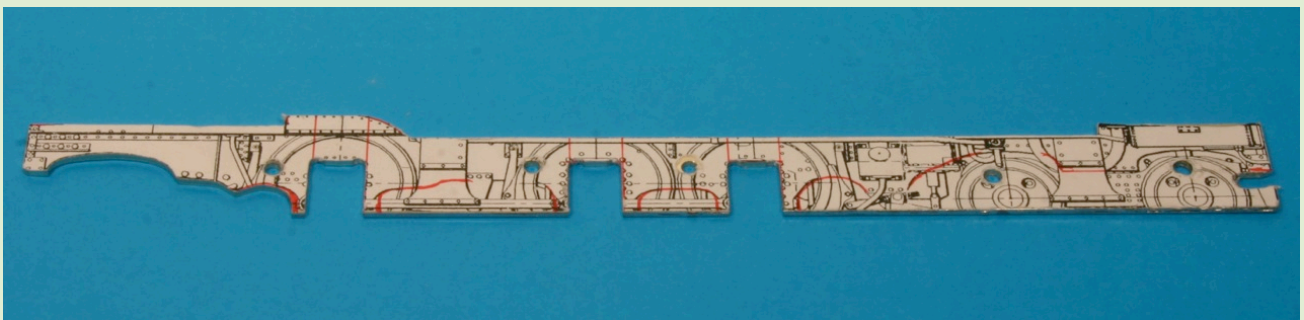
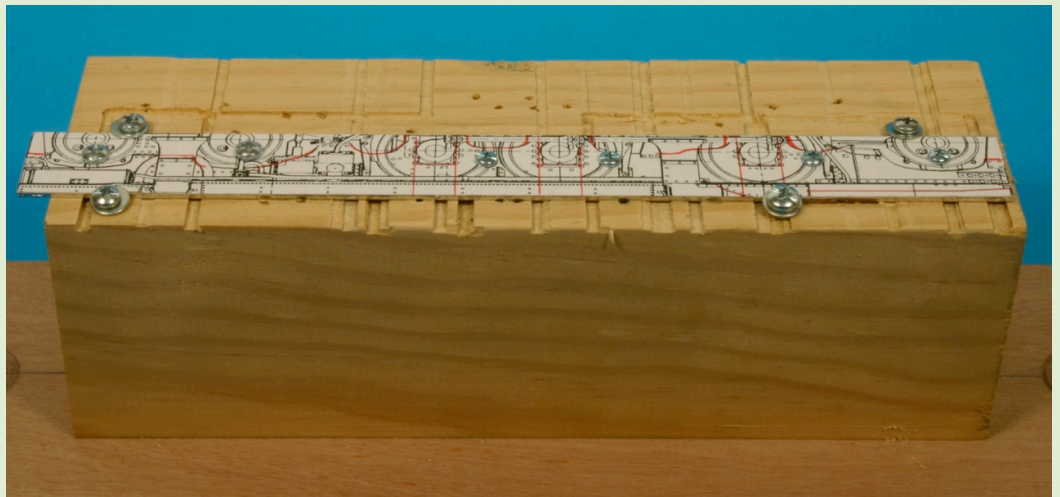
I started by photocopying the plans to gain cutting patterns of the chassis and tack soldered two .7mm thick NS blanks together to form the chassis frames (Photo 3). I then glued the paper cutting patterns to one side of these strips of NS with UHU glue stick. The blanks were not cut to any particularly accurate dimension: they were simply cut to be large enough to cover the chassis frames shown on the plans. After drawing a few extra lines on the cutting patterns with a red Artline pen to make things a bit easier to see, I screwed this assembly to a block of pine (Photo 4), clamped this to the table of my mill and milled out the axle slots as a first step. I've discussed at length in both 7<sup>th</sup> Heaven and AMRM my reasons for moving from the exclusive use of hand tools to metal working



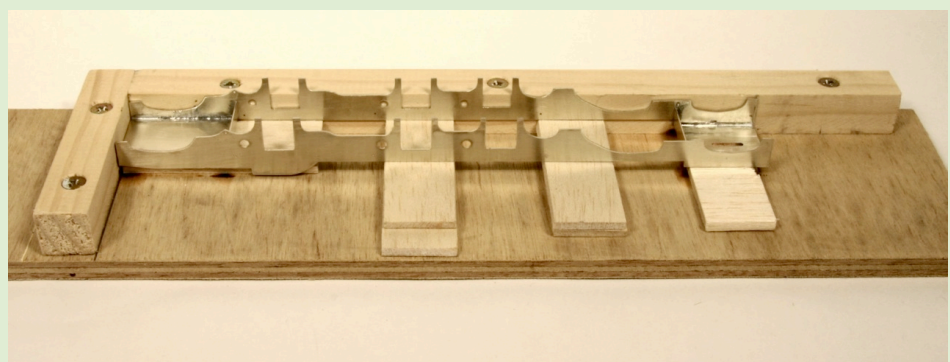
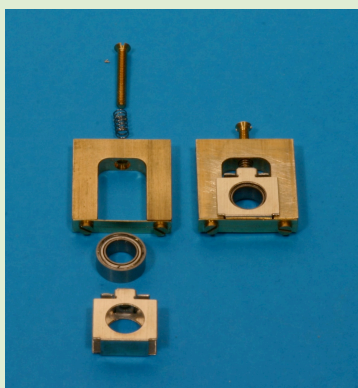
machines and the contortions and contemplations I went through before deciding to purchase a lathe and a mill. Since making these purchases I've discovered their use is not rocket science and I've come to realise that I simply can't match the speed and accuracy I get with

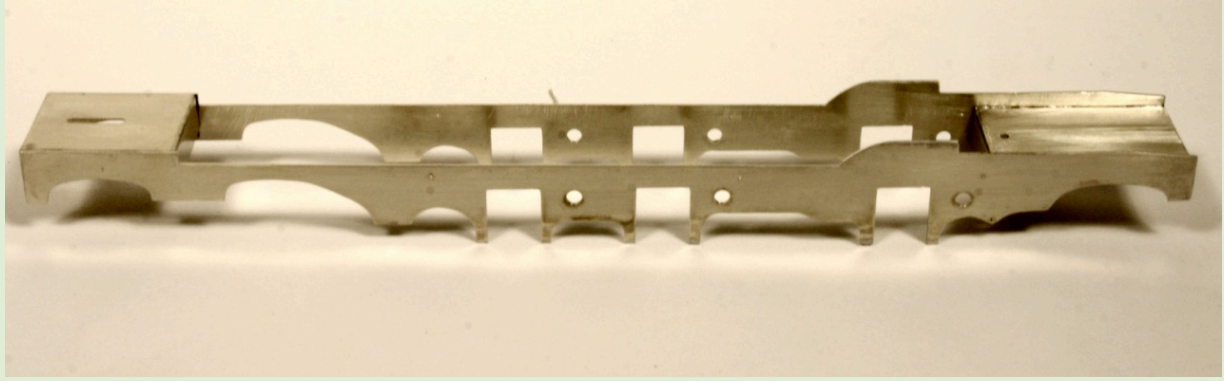


these machines with hand tools. My first aborted attempt at the chassis for this project largely failed because I tried to cut out the axle slots with a piercing saw. I should have saved myself the time, effort and materials and used the mill in the first place. After I had the axle slots cut I cut a series of curved pieces from the NS blanks to represent the shape of the prototype chassis (Photo 5). These curves were cut by hand using a piecing saw.



I was always going to apply springing to this locomotive and I'd wanted to try out a sliding horn block system from the UK firm Hobby Holidays <http://www.hobbyholidays.co.uk/> who produce kits that can be used to allow a locomotive to be sprung on all or some of its axles. There are springing and compensation kits available that use plain brass bearings but these Hobby Holiday's kits incorporate a small ball race in which the axles turn. Being the type of person who is comfortable with being described as a tinkerer, I ordered some of these kits for my project to tinker with. The kits consist of a pair of milled horn-guides, two ball races with an inside diameter that matches a Slaters axle, two NS etches that fold up into a part that captures the ball races and permits them to slide up and down in the horn guide and some other hardware (photo 6). I modified the milled horn-guides by applying a thin brass strip along the bottom edge as a retaining plate but other than this the kits were used unmodified by following the directions supplied. I used three sets of kits in this project and with a bit of fiddling and playing about they worked as described and produced a beautifully free-running mechanism. Once I had satisfied myself that the horn-guide kits would work as intended I moved on to soldering up the chassis in a homemade cradle constructed from 1"x1" pine and a piece of scrap plywood (photo 7). This cradle is nothing more sophisticated than a soldering base with a right angle wall provided by the pine. However it made soldering the chassis up square a breeze as it reduced the need for a third hand. I cut and bent at right angles five cross braces that were soldered between the frames. Everything was held in position on the cradle by a variety of different thicknesses of balsa wood so that it would all turn out square and level. Once this assembly was removed from the cradle and checked for square I cleaned it up with wet and dry, scrubbed it with a toothbrush and some Jif and I had a chassis! (Photo 8)





Possibly the most critical step in achieving smooth running on any sort of steam locomotive construction is getting the axles that carry the driven wheels parallel in all planes. It makes no difference what scale, prototype or whether it is scratch or kit built, if you don't get the axles parallel and level then the locomotive will never run really well. The test is when you first apply power to the newly installed motor with the rods temporarily installed. If your wheels turn but there is one or more tight spots somewhere in the mechanism then there's a very good chance the cause is:

1. That the wheels are not square to their axles.
2. That the axles themselves are not square and parallel with each other.
3. That one of the pins/BA bolts being used as bosses for the rods is not set at 90° to the face of the wheel.

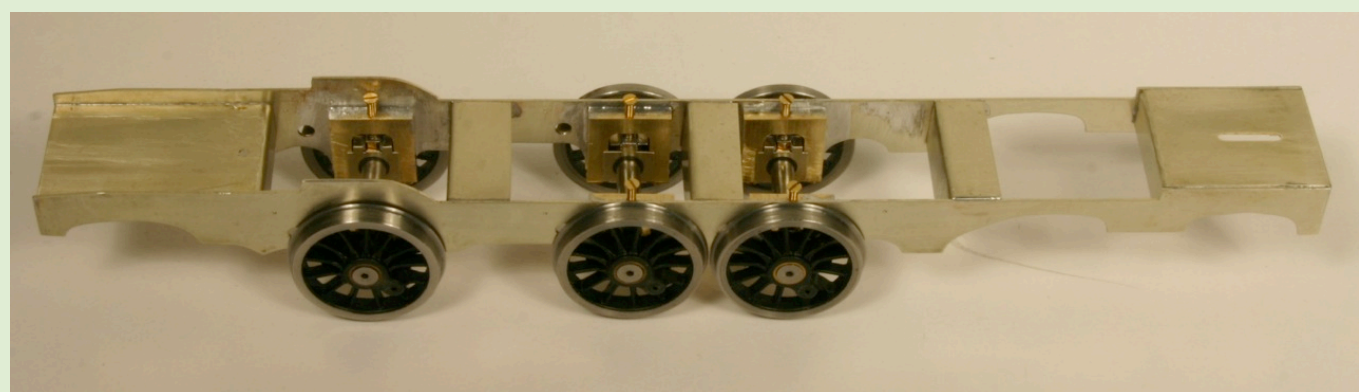
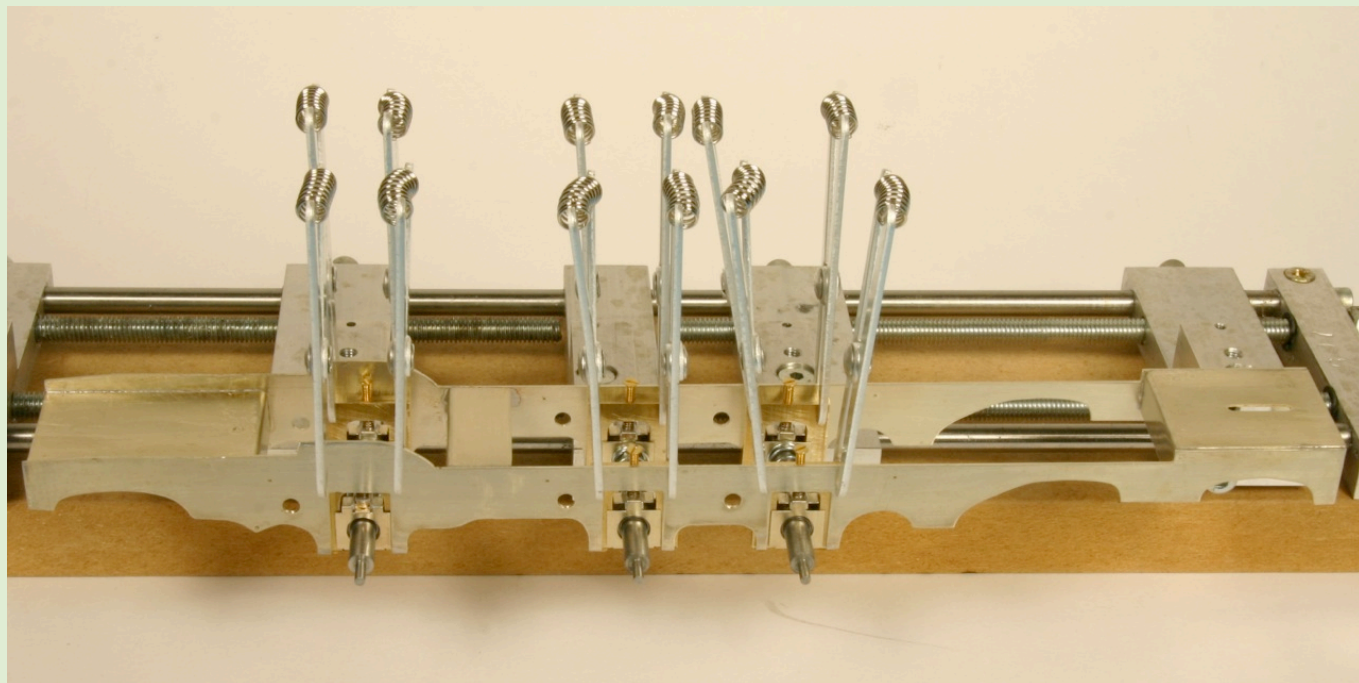
Don't assume that every wheel that comes out of a factory is perfect. I've worked on plenty of locos and I find the failure rate of wheels is something like 15%. By this I mean that about 15% of the wheels I've purchased over the years are cast or put together in such a way that they do not sit square to the axle or the plastic centre of the wheel is miscast so that the wheel tread wobbles when rotated. There is no way of fixing this short of milling and turning up your own set of new wheel centres. They will not improve with age or "run in". Always check the wheels you've purchased before you "trap" them in your locomotive's chassis and if they don't run smooth and wobble free when rotated return them and ask for replacements. Wheels from companies like Slaters cost far too much to accept less than perfect quality. How do you check for wheel wobble? Attach one wheel to an axle and lightly chuck the end of the axle without a wheel into a hand drill. The type of drill is immaterial: electric, battery or hand cranked power will do the job in this application. Apply power to the drill and observe the rotation of the wheel. If it spins with no discernible wobble then place that wheel in a container marked "satisfactory". If the wheel wobbles put it aside ready to be returned to the place of purchase. You can't "fix" a wheel with a miss-cast spoke casting which leads to a tyre that doesn't sit correctly on the spokes. The only solution is to put it in the mail and send it back to the manufacturer.

If all your wheels are wobble free when you tested them any tight spots in your mechanism are probably due to the way you've built your chassis. You can lessen the impact of these tight spots by opening out the holes in the rods but this will tend to lead to sloppy running. Far better to build in parallel axles as you are constructing the loco rather than compensate for them later. That way the amount you have to open out the holes in the rods should be a very minor amount or none at all. Once the horn guides or bearings are soldered into the chassis frames it's too late to fix tight spots in the running quality short of completely dismantling the chassis and starting again from scratch. I've never found getting good running from kit built locomotives any easier to achieve than this scratch built project. Etched chassis frames and manufactured bearings do not in my experience guarantee smooth running. The only thing that will guarantee smooth running is a careful step by step approach that assumes nothing, combined with a few decent tools. If you plan on building a few locomotives these will be well worth the investment.

The tools I consider to be important to getting my 20 class running well were a combination of home built jigs and cradles, some simple hand tools through to some quite expensive equipment. There are several commercial jig systems that can be used to set up a chassis square and parallel but the one I own is from Hobby Holidays, the same firm who sell the ball race horn-block kits mentioned earlier in this article. I wrote about this firm's chassis jig in my 7<sup>th</sup> Heaven articles about building my 19 class locomotive so I won't repeat that information here. The difference between the 20 and the earlier 19 was that this time there was no complicated working inside motion to work around and I was using the Hobby Holiday's horn-guides. The Hobby Holidays Master Chassis uses the locomotive's side rods as a jig to set the wheel spacing so I prepared the set of etched rods I had for my 20. I'd acquired these from David Peterson when he was operating his company DPMS. As this is no longer in operation I doubt these are available now. After setting the wheel spacing in the jig I clamped the horn guides into position with



some small aluminium spring clamps I'd bought from Micro Mark (photo 9) and checked to make sure everything was level then tack soldered the horn-guides in place. I removed the chassis from the Master Chassis, removed the horn-blocks/ball races from the locomotive chassis and then ran a bead of solder round the edges of the horn-guides to make their placement permanent making sure they did not move as I applied heat and more solder to these joins. When everything was permanently soldered up I thoroughly cleaned up the chassis and installed the wheels, rods and motor and gave my first scratch built chassis a test run. There was one minor tight spot but a little adjustment sorted this out quickly (photos 9&10).



## Commercial News

**Trevor Hodges**

### ModelOKits

*ModelOKits*, PO Box 379, Sydney, NSW, 1700, (02) 97073390, 0404935663, <http://www.modelokits.com> & [sales@modelokits.com](mailto:sales@modelokits.com) have passed on the news that the S Wagon is now available. A ten pack is available (one set of instructions, bulk lengths of rod, bulk wheels etc.) for \$800. The D59 pilot is promised for end of April. The kit should be delivered around July, 2017 with RTR's to follow from August in batches of ten. The K, KF and U wagons are back in stock. K wagons to retail for \$95 per kit (down from \$140), U Wagon \$130 (down from \$160) and KF Wagons \$125 (down from \$140).

A new laser cut hotel kit is available (corner building, two storey with ornate balustrade, weatherboard and corrugated iron supplied) priced at \$139.00. Limited number of 1967 F100 Ambulances in stock - \$145.00 each. Extended range of Slaters components and detail items now in stock, including extruded styrene and brass rod.

LHG, FS and BS carriages still in the pipeline for later this year.



## Auscision NSWGR 45 class DCC Conversion

The latest O scale model of a NSW locomotive from Auscision is the Alco 45 class. Back in the real world the NSWGR placed an order for forty of the actual locomotives with A.E. Goodwin Ltd in June 1961. The first locomotive, 4501 entered service on the 5<sup>th</sup> June 1962.

I feel sure that most purchasers will be delighted when they remove the locomotive from its box and place it on the track for the first time. This model really looks the part, clearly considerable thought has been given to getting the detail correct and the paint finish is excellent. My model arrived undamaged in any way although it did suffer from overenthusiastic lubrication resulting in an excess of oil around the gearboxes, this was easily removed with a cloth. The first test run saw some of this oil migrate to the steel tires on the wheels. It has a metal and plastic drive train complete with universals and two brass flywheels mounted on a Pittman 12 volt DC motor. No inappropriate rubber tyres or polypropylene tubes in the drive train this time. It ran well when tested using a DC power-pack with the motor drawing between 400 and 600 milliamps, low speed operation is very smooth and silent. All the obvious lighting features are present as well as some unexpected additions. These are provided by individual Light Emitting Diodes and include directional headlights together with individual red and white marker lights, also directional. The model has illuminated number boards, cab lights, staff token box lights, as well as step lights and even illumination above the coupler

box. These all operate under DC and can be individually switched off if desired using the 6 switches conveniently placed under a removable roof hatch. The sixth switch controls the motor. This unexpected feature would permit a DC modeller to have all the lights on whilst the model was stationary. The cab includes some internal fittings and a crew. Maybe it is just me but the crew appears a little undernourished; perhaps they are 1:50?



Unfortunately no documentation of any sort is provided with the model so it was necessary to open it up to find out what provisions had been made for DCC operation.

I inverted the model in a foam lined cradle to avoid any paint damage

and managed to locate the eleven screws which secure the chassis to the model. One of the screws was slightly different to the others which were all painted black. The odd one out was not painted. Before separating the body from the chassis it is necessary to gently prise the ends of two hand rails from the cab. A couple of small pieces of tape over the released ends will ensure that the body paint is not scratched during the separation process.

Access to the interior unfortunately confirms that despite some earlier indication to the contrary, the provision of any form of DCC compatibility ultimately proved to be too much of a challenge for the manufacturer. There is no indication of plug-in DCC compatibility, nor any provision for mounting speakers, even though a very nicely designed Printed Board Assembly is included as the main termination point of all the individual LEDs.

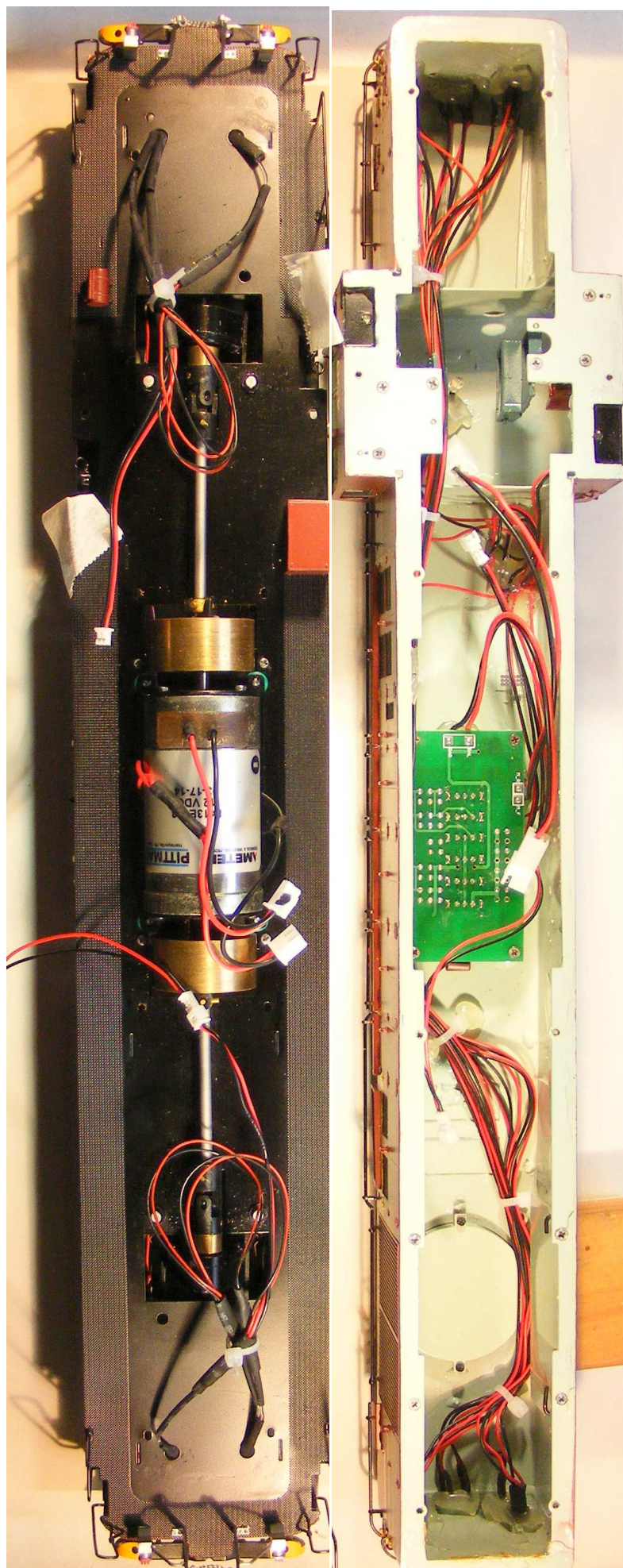
Don't despair; read on, there is a solution!

### ...but I need DCC with sound.

After careful extraction from the packaging a beautifully finished and exceptionally well detailed model is revealed which runs silently with smooth low and moderate speed response from you DC controller. Twenty two separate Light Emitting Diodes provide all the lighting, some such as headlights and marker lights operate automatically with change of direction. Six conveniently located switches give the DC operator the opportunity to turn off the lights not needed and even the motor. What? You wanted DCC and sound together with independent control of the lights? In that case there is a little work to do.

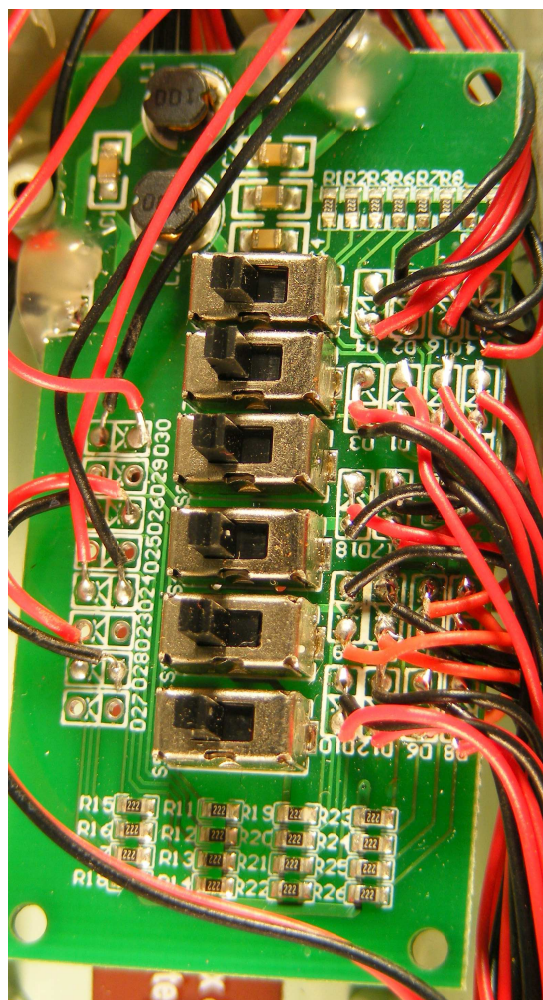
**John R B Parker**





After separating the two major components it will be observed that most of the wiring is in the body, with just four plugs and sockets providing the connections between the chassis and the body. These should be unplugged. The two small plugs and sockets provide the connections for the step lights and the two larger plugs and sockets the connection to the motor and the bogies. There is no need to mark any of these for identification purposes. (The photograph of the interior shows a lead plugged into one of the small sockets. This will not be present in your model).

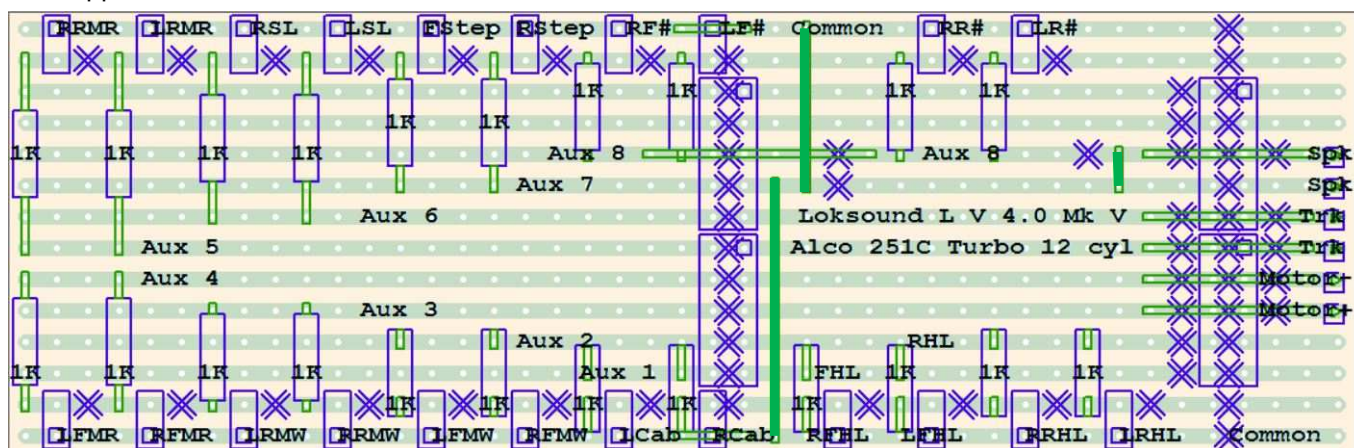
It will be noted at this point that all the wiring is reasonably neat with what appears at first glance to be a consistent use of cable colours. All of the wiring is terminated on the Printed Board Assembly, some of it is visible but most of the connections are on the other side of the board which is currently hidden from view. For those who are interested this is what the other side of the PBA looks like:



This photograph, shown considerably larger than actual size highlights why it was felt that it would be too difficult to attempt to reuse the existing circuitry. Instead it will be replaced by a larger and hopefully more convenient board to which all the various LEDs can be connected. For the time being it is recommended that both the chassis and the body be put aside in safe place until we return later.

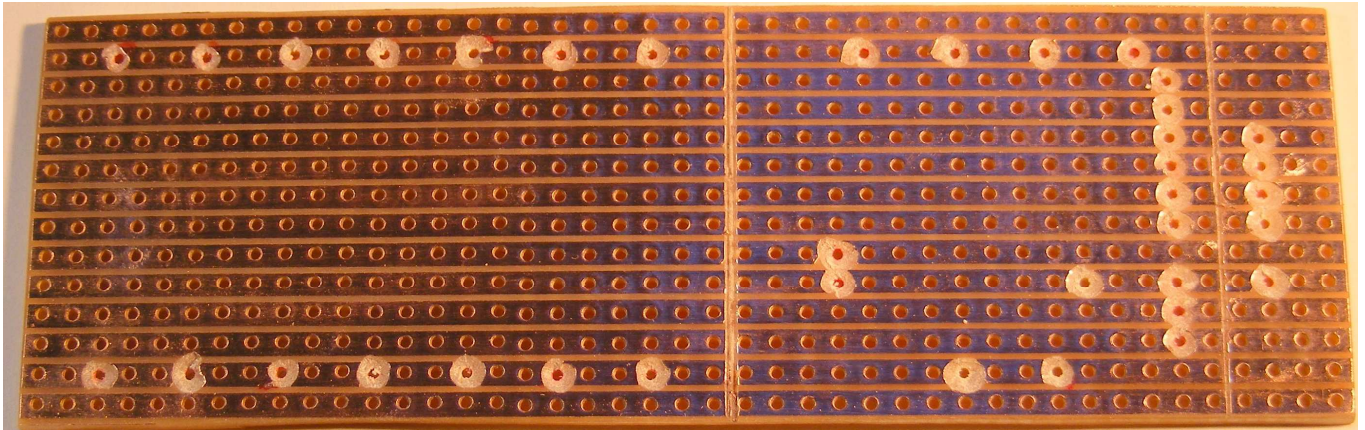


TrkL = Track Left  
Motor += Motor +  
Motor -= Motor -  
LRHL = Left Rear Head Light  
RRHL = Right Rear Head Light  
LFHL = Left Front Head Light  
RFHL = Right Front Head Light  
RCab = Right Cab Light  
LCab = Left Cab Light  
RFMW = Right Front Marker White  
LFMW = Left Front Marker White  
RRMW = Right Rear Marker White  
LRMW = Left Rear Marker White  
RFMR = Right Front Marker Red  
LFMR = Left Front Marker Red

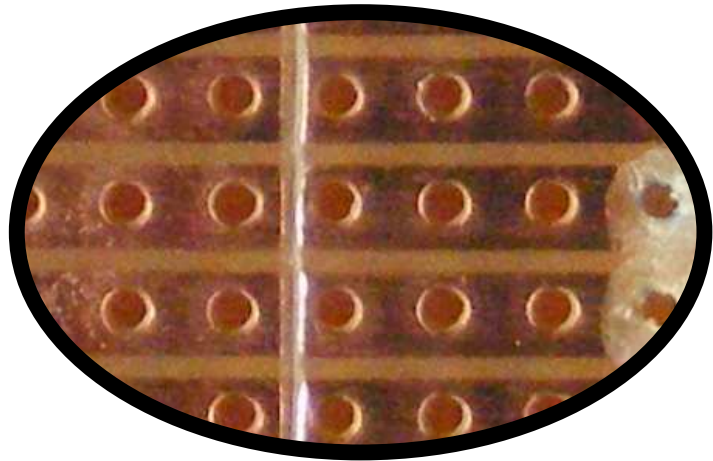


7th Heaven

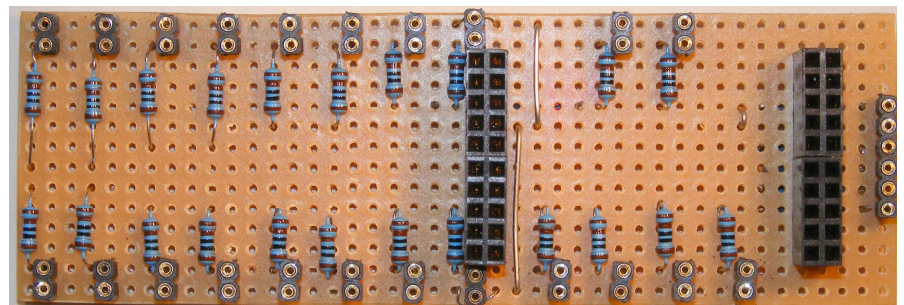




The interface board is 43 holes wide (approx. 110mm) and 14 holes high (approx. 36 mm). It can easily be cut from Jaycar HP9544 Vero Type PC Board<sup>2</sup> using a razor saw or by using multiple knife cuts, just cut along the next row of holes. The above photograph, enlarged for clarity shows exactly where the tracks need to be cut using the spot face cutter or by turning a 3mm drill in the fingers. The 37 cuts that need to be made are all clearly visible above. Close examination of the photograph will show that there is also a need to cut all the horizontal tracks **between** the 23<sup>rd</sup> and 24<sup>th</sup> row of holes as well as **between** the 39<sup>th</sup> and 40<sup>th</sup> row.

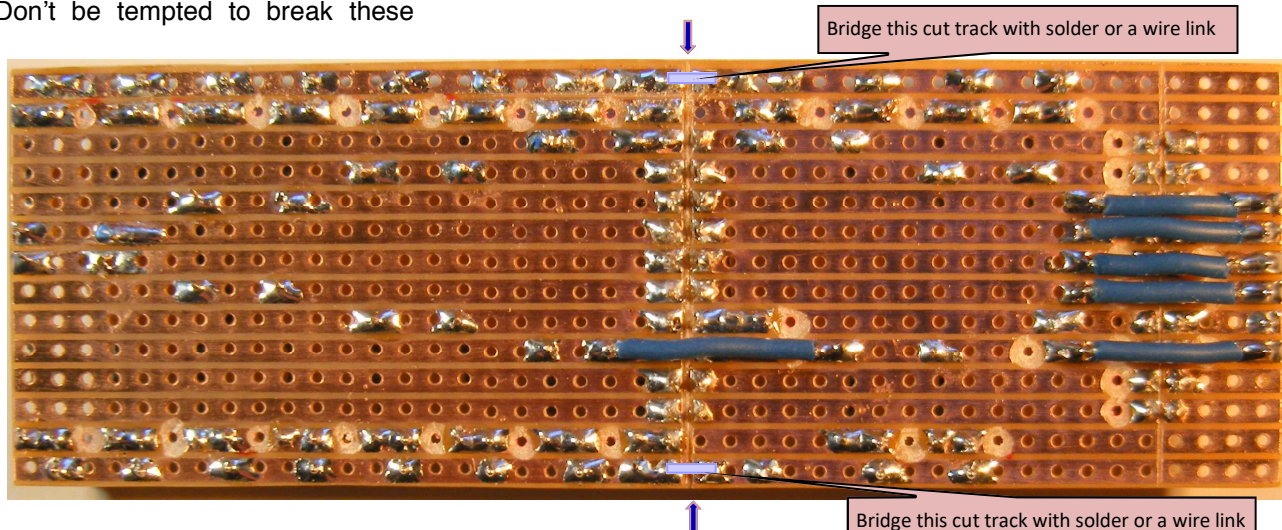


These cuts are best made with a square and sharp knife and finished off with a razor saw. The enlarged section may help to clarify this. It is recommended that the three jumper wires are soldered in first then the 22 1Kohm<sup>4</sup> resistors. See the note on the previous page; some resistors are mounted with a lead pitch smaller than the resistor body. They should be followed by the four 2x5 headers<sup>7</sup> and then the 2 way and finally the 6 way socket. These sockets are all cut from the Jaycar 32 way P16470 I.C. socket strip<sup>3</sup>. (Don't be tempted to break these

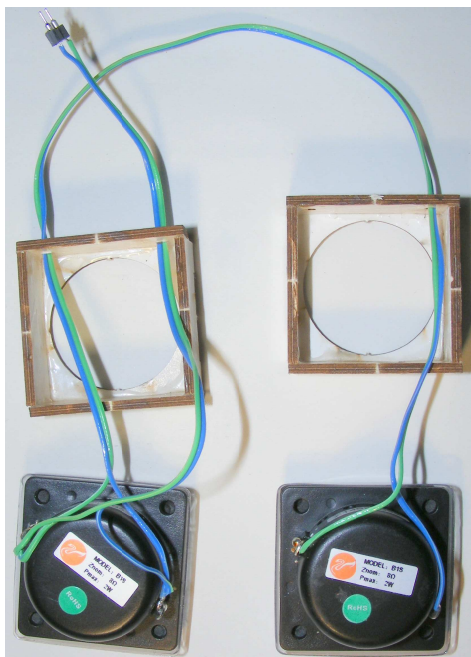
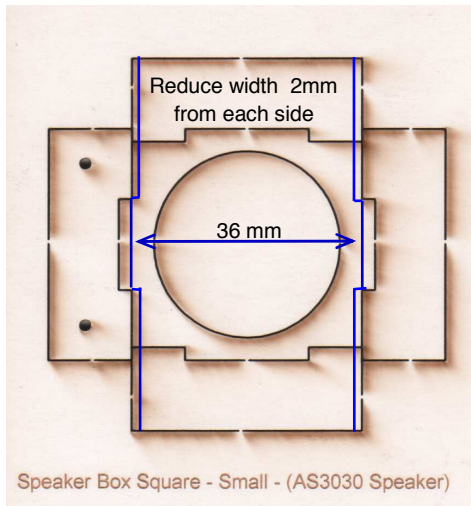


strips to length, use a razor saw.) The horizontal connections, clearly shown on the drawing, on the previous page and below in blue, can now be made on the copper side of the board, it is imperative that insulated wire is used

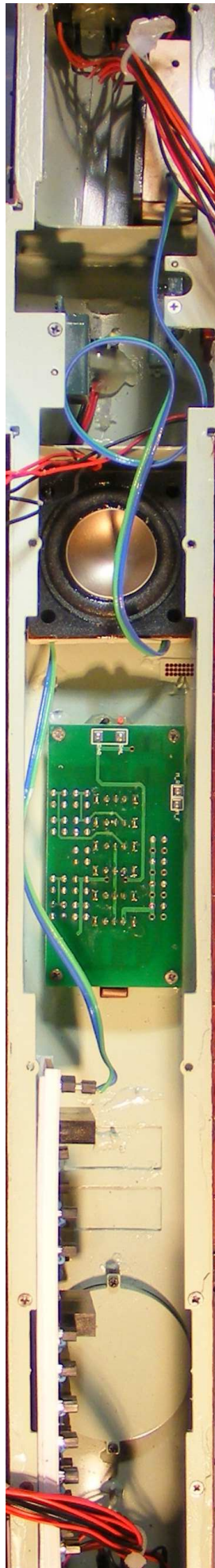
for these six connections. It is also necessary to bridge the cut track where shown on the two outermost tracks which provide the common bus. Tinned copper wire is fine for this.



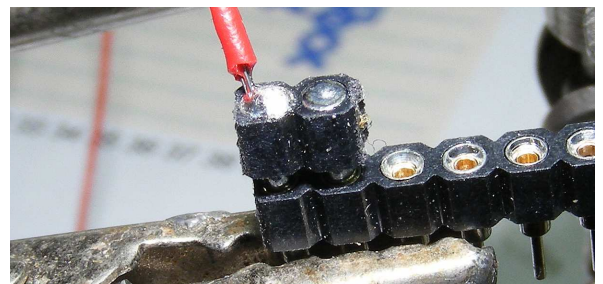




Now the interface board has been completed the next step involves the speakers. The two AS 3030<sup>5</sup> 8 ohm speakers should be connected in parallel to provide the desired 4 ohm impedance. Care should be taken when connecting the speakers to ensure they remain "in phase". The photograph shows the arrangement together with the two pin plug termination cut from PI6470 I.C. Socket Strip<sup>3</sup>. The Model O Kits speaker boxes<sup>5</sup> were designed to provide a sealed enclosure without increasing the overall size of the speaker. If you have the early versions which are slightly over-size, they can be modified as shown to ensure achieve the desired minimum size. The boxes should be assembled with PVA glue prior to the insertion of the speakers which can be fixed in place using acrylic contact cement or similar. The glue should be applied to the front edges of the box and also around the circular opening at the rear with the aim to make the enclosure essentially airtight.



Having completed the essential sub-assemblies we can now return to the modifications required within the body of the model. Remove the 4 small screws which secure the PBA in place so clear access is possible. The next step requires a little confidence. Cut all the wires as close as possible to their termination on the printed board assembly. There is no need to make any notes on which wire is connected to what. Just cut all the connections and move the wiring aside. As access will always be possible under the roof hatch it is recommended that the board, now free of any wiring, be returned to its original position and secured in place. The limited space available above the motor precluded the installation of the new interface board in the same area so the original intention was to install the board along the side as shown. However it soon became obvious that a narrower PBA would be preferable. The final design made it possible to attach the PBA to the roof of the long hood with 3M double sided foam tape. The photograph on the left also shows the final location of the two speakers. Note that in this view all of the original wiring still needs to be terminated with two pin plugs. It may be necessary to gently separate some wiring from the blobs of hot glue which have been used to secure it in place. Locate the four twin cables that are already terminated with JST connectors, two have the familiar small connector and two, which connect to the motor and bogies, slightly larger. They should then be terminated with two pin plugs cut from the PI6470 I.C. Socket Strip<sup>3</sup>. Pre tinning the wire and the socket with solder prior to bringing the two together with the additional application of the soldering iron simplifies this task.

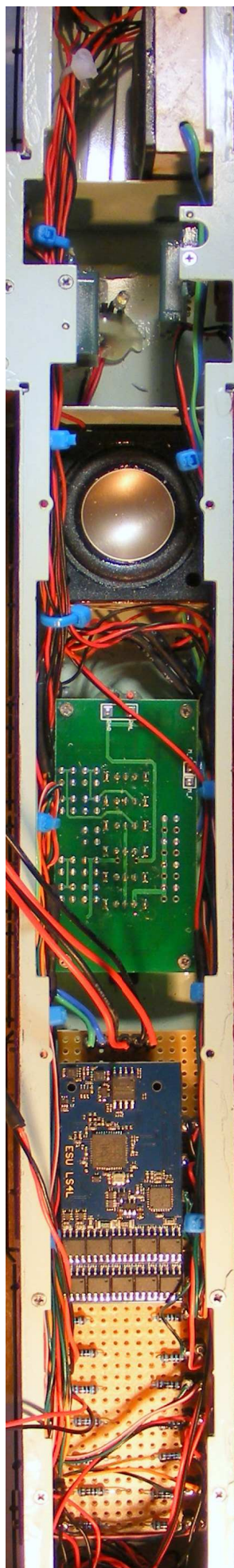


All the other twin red/black cables should now be terminated the same way. A simple LED tester made from a 9 volt battery, a 1 K ohm resistor and a 2 pin socket is useful in determining both polarity and which wire is connected to which LED. **Caution:** I found 4 LEDs with positive **black** wires.

It will be necessary to extend all the wiring from the front of the model so the LEDs can be connected to the correct location on the interface board.







Any suitable hook-up wire can be used for these extensions, just remember that the anode, usually the red lead, must be connected to the outer edge tracks on the interface board. Reference to the wiring diagram on the last page of this article, will ensure that all these connections are correct. Double sided 3M adhesive tape was applied to the copper side of the PBA. Test fitting was achieved by initially leaving the protective paper in place. The obvious area for adhesion is the cover over the fan opening. The paper was removed from the two larger pieces shown in the photograph below and a new piece of tape was placed on top with adhesive side unprotected. Gentle pressure ensured that the PBA was held securely in place. Additional security to ensure that the board cannot move can be achieved with a small amount of hot glue or silicon caulking adhesive.

In this view of the final installation everything can be seen in place with the wiring arranged so that there is no possibility of any entanglement with the motor or drive shaft. Re-attach the body securing it in place with the eleven screws removed earlier. Take care not to damage the paintwork when re-positioning the two hand rails.

I trust that you will be pleased with the results of your handiwork. Please contact me if you would like a copy of the Loksound sound file that I have used on this model.

I think you will find the function allocations used self-explanatory; however you may not be familiar with the new Full Throttle feature which works as follows. Adjust the throttle until the model is running at your desired operational speed, either fast or slow, then press F9. This locks the model to that speed and further movement of the throttle only controls the sound including throttle notches. This permits the simulation of a heavy train under load even when the forward speed is quite low. A second press of F9 will disengage the feature and return the throttle to its usual function.

John R B Parker

## Extra Parts Required

### ESU Loksound

1 x Loksound L 4.0 Decoder<sup>1</sup> (Alco 251C with Full Throttle sound file)

Note that this is **not** a Loksound L **Select** 4.0 decoder.

### Jaycar

1 x HP9544 Vero type PC board<sup>2</sup>

4 x PI6470 32W I.C. Socket strips<sup>3</sup>

3 x RR0572 1K ohms 0.5 Watt resistors<sup>4</sup> (8 per pack)

2 x AS3030 36mm 8 ohm speakers<sup>5</sup>

### Model O Kits

2 x Small Speaker Box (AS3030)<sup>6</sup>

### eBay

10 Pcs 2.54mm 2x5Pin Double Row Female Straight Header Pitch Socket Pin Strip<sup>7</sup>  
(Only 4 pieces are required)

### From the workbench

Tinned Copper wire

Hook up wire

Cable ties

3M double sided adhesive foam tape

Jaycar TD2461 Spot Face Cutter<sup>8</sup>

### YouTube

4501 in action.

<https://www.youtube.com/watch?v=7jTB3cA5c5I&t=2s>



## Function Allocations

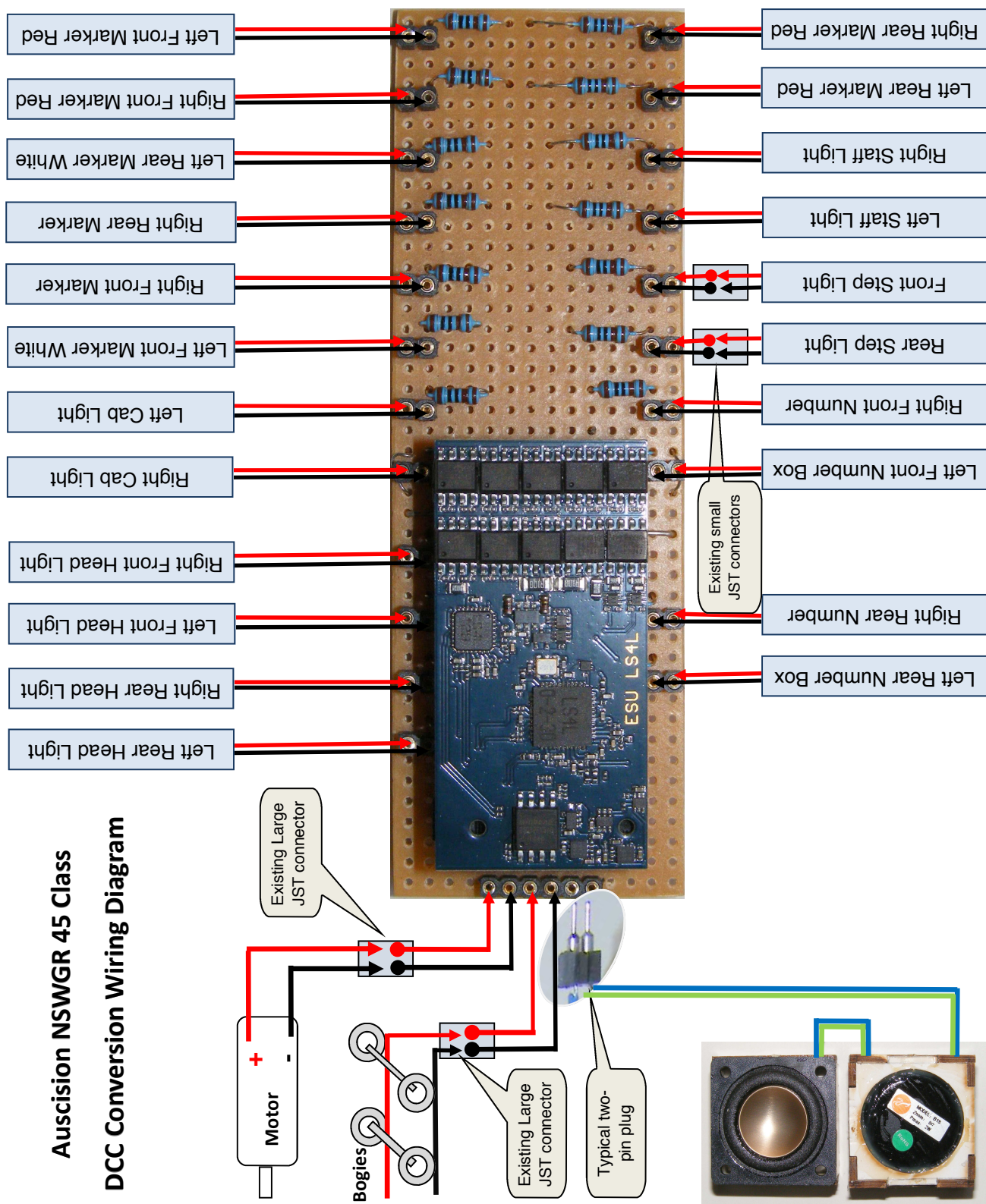
<b>F0</b>	Headlights (directional)
<b>F1</b>	Cab lights
<b>F2</b>	Playable Horn sound
<b>F3</b>	Number lights (all)
<b>F4</b>	White marker lights (directional)
<b>F5</b>	Red marker lights (directional)
<b>F6</b>	Staff Exchange lights
<b>F7</b>	Step & coupler lights
<b>F8</b>	Motor start/stop sound
<b>F9</b>	Lock drive (on/off)
<b>F10</b>	Short Air Let Off sound
<b>F11</b>	Fade sound

Volume CV63 (0-192) set at 100



# Auscision NSWGR 45 Class DCC Conversion Wiring Diagram

RRMR = Right Rear Marker Red  
LRMR = Left Rear Marker Red  
RSL = Right Staff Light  
LSL = Left Staff Light  
FStep = Front Step  
RStep = Rear Step  
RF# = Right Front Number Box  
LF# = Left Front Number Box  
Spk+ = Speaker +  
Spk- = Speaker -  
TrkR = Track Right  
TrkL = Track Left  
Motor + = Motor +  
Motor - = Motor -  
LRHL = Left Rear Head Light  
RRHL = Right Rear Head Light





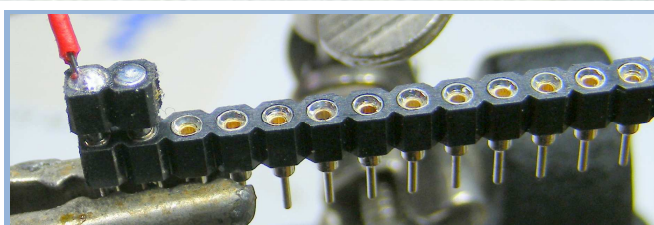


## Introducing the Mini Micro JST PH Connector

For a number of years the DCC conversion articles appearing in 7th Heaven have used the familiar Jaycar I.C. connector strip part # PI-6470 as the source for all the required small connectors. The 32 way connector with its 2.4mm (0.1 inch) pitch was ideal as it was compatible with Vero style matrix boards. There was however one real disadvantage, many found soldering wires to the male plug a challenging exercise. The Mini Micro JST PH pre-terminated connectors which are now available provide another worthwhile option, particularly when only a two pin connector is required.

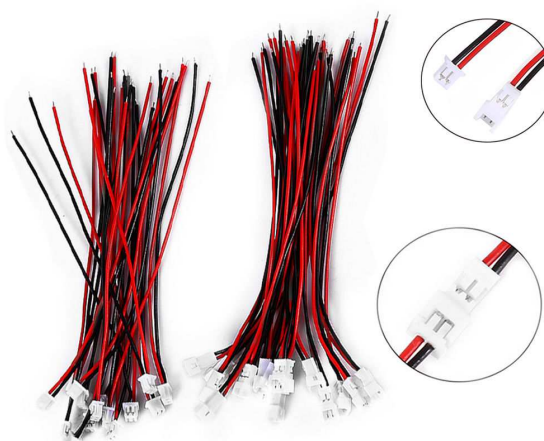
The range of JST connectors are quite difficult to purchase locally, Jaycar does not carry them. The best approach is to use EBay There are a number of suppliers to choose from at very reasonable prices, (all of which include free shipping). The most useful connector is the two pin connector plug with matching socket as shown below but for some applications it makes sense to order the pre-wired plug and sockets. 20 pairs of Mini Micro JST 1.25 2P Male & Female Connector Plug with Wires as shown alongside will set you back a total of \$3.20 at the time of writing.

As a test I decided to redo the Auscision 45 class conversion, included in this issue of 7th Heaven using the JST connector. The socket is not an exact match for the Veroboard as the pitch is 2.0mm rather than 2.4 mm. but it does fit on the redesigned board. The big advantage is the use of the pre-terminated leads which can easily be used to extend the models LEDs.



Do you find soldering the Jaycar connector strips a bit of a chore? Pre-terminated JST PH connectors offer a inexpensive solution which will cater for most, but not all applications.

**John R B Parker**



### 50 SETS Mini Micro JST 2.0 PH 2-Pin Connector plug with Wires Cables 120MM

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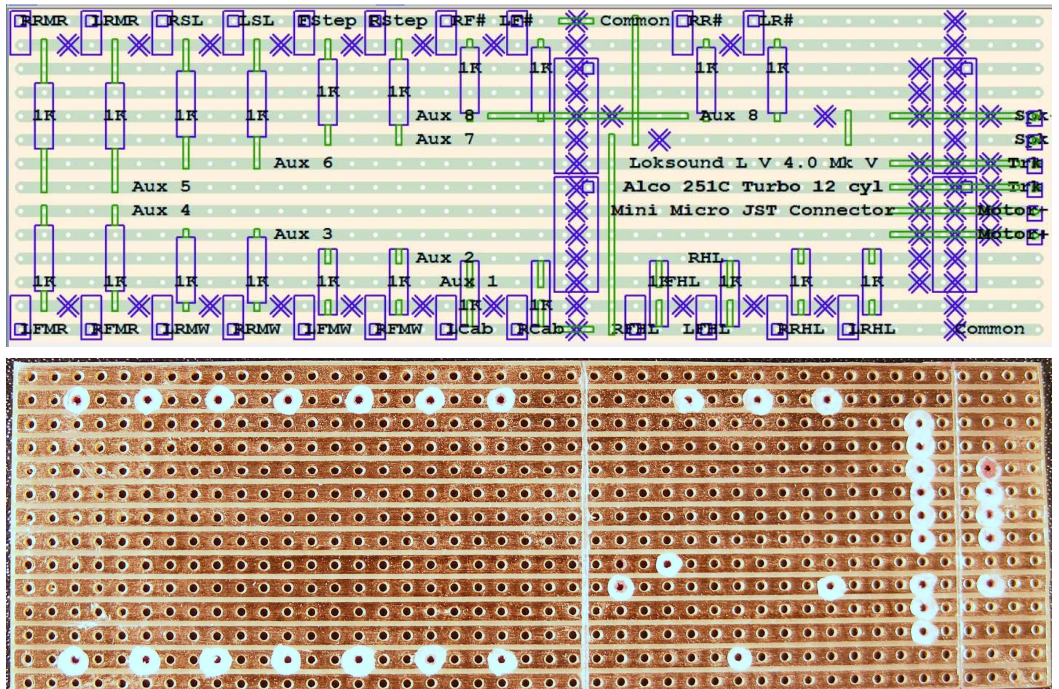
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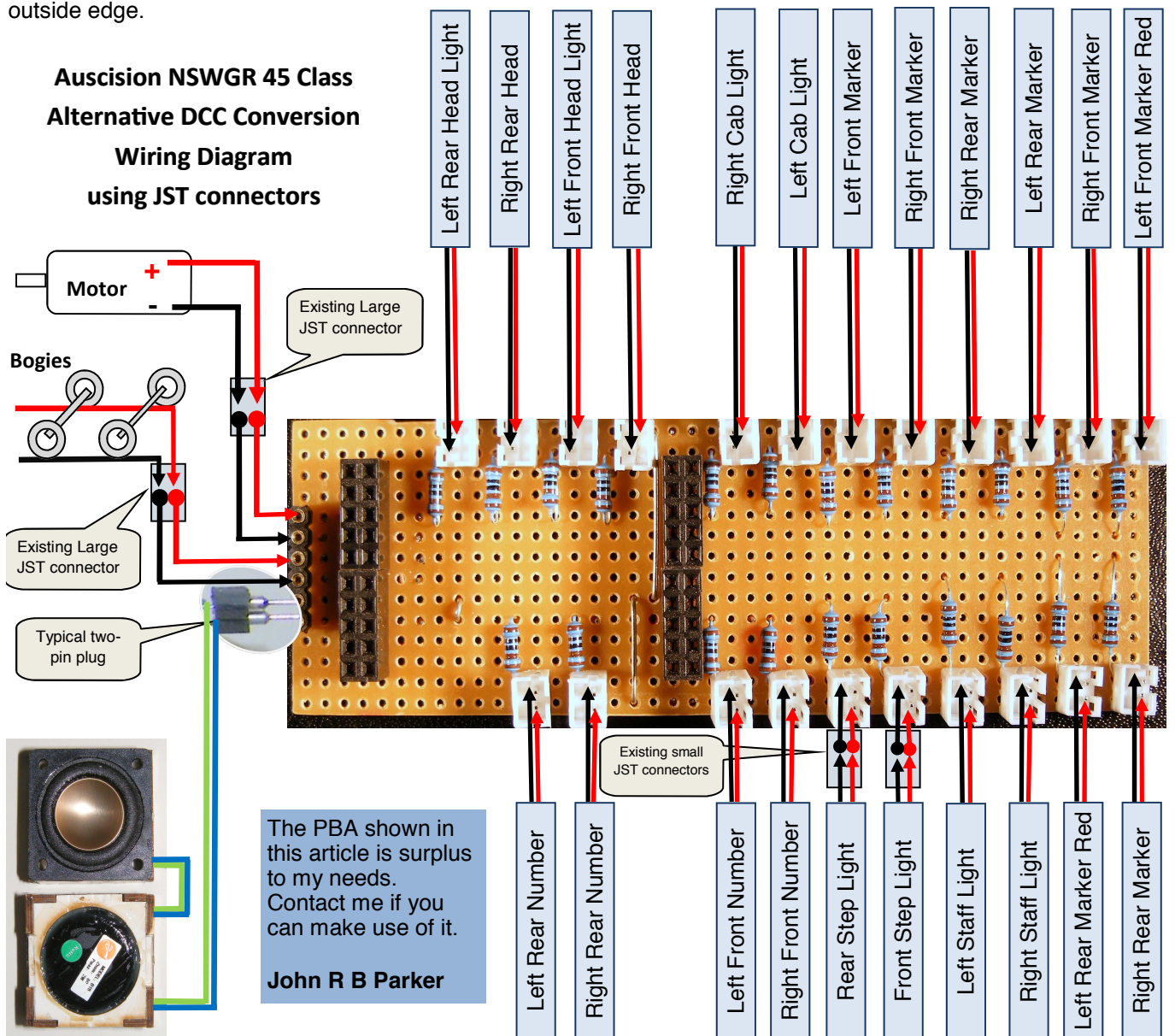
[See other items](#)



If you were intending to convert your Auscision 45 class but have not yet started you might like to build this JST version. The wiring diagram and slightly larger than full size photographs on this page should be read in conjunction with the original article. Please note that the wiring diagram and PCB are **not identical** to the original version. The new PCB is 44 holes wide, (one hole wider), and 14 holes high and the vertical cuts are **between** the 24<sup>th</sup> and 25<sup>th</sup> rows as well as **between** the 40<sup>th</sup> and 41<sup>st</sup> row. Note also that the sockets are polarised. They should be mounted so that when inserted the red lead is inline with the outside edge.



# **Auscision NSWGR 45 Class** **Alternative DCC Conversion** **Wiring Diagram** **using JST connectors**





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SOON**

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- Dual motor
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Photos of pilot model



See website for more photos!



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