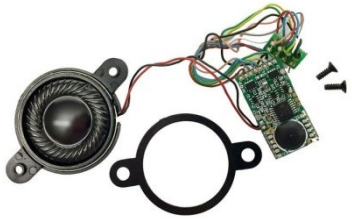
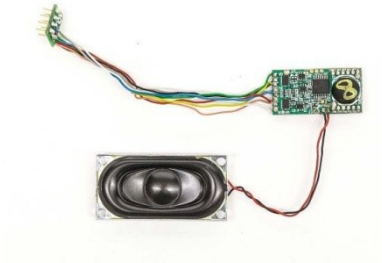
Hornby Twin Track Sound Retro- Kit Installations

(Additional To Basic Installation Guide Provided With TTS Retro-Fit Kits)





This is not an official Hornby document, although the content has been agreed by Hornby as being technically correct.

The author is a member of the Hornby Forums, but is not a Hornby employee.

Neither Hornby nor the author can accept responsibility for any damage caused to any model due to following advice in this guide as they have no way of knowing the skill level of a particular modeller.

Table of Contents

1. Introduction And Warranty

The Hornby Twin Track Sound (TTS) range initially introduced only as factory fitted to locomotives (locos) is now available as retro-fit kits for DIY installation. The available range is expanding as new models are introduced.

This guide expands upon the basic generic instructions provided with these kits and is aimed at the modeller who requires further advice beyond the simple plug-and-play installation possible in some models, which have a decoder socket as well as a dedicated mounting space for the speaker provided in the kit.

It is assumed the modeller has the necessary skills, is willing to dismantle and modify their model as necessary and is competent at soldering.

The following is the very fair no-quibble warranty given by Hornby for TTS decoders...

HORNBY DECODERS - LIMITED WARRANTY

Hornby Decoders are manufactured to a professional standard and if fitted and operated correctly should return years of trouble free use.

However, if within the first year of purchase your decoder fails to function, even if the damage is accidental Hornby will repair or replace the decoder without charge. A cash refund alternative will not generally be offered. In the event of a malfunction the faulty decoder should be reported in the first instance to the Hornby Customer Care Department and arrangements will be made for its return to Hornby minus the product to which it was fitted, however we will require proof of purchase. The customer will be liable for Postage and Packing charges when returned to Hornby

The above does not affect your statutory rights.

2. The Retro-Fit Kits

The kits are marketed with a specific sound set for individual loco types and comprise a TTS sound decoder with an attached 8-pin plug harness, a round or oblong speaker pre-wired to the decoder and possibly a 1 or 2-part plastic speaker enclosure and attachment screws, along with basic instructions for installation. The kits are not bespoke Plug-and-Play for any particular R-numbered model and some adaptive modelling is likely to be required to install them, possibly including soldering.

Tip - If a factory fit TTS loco does not have a speaker enclosure then the equivalent kit will not have one either – refer to the loco service sheet where available.

The basic guide notes regarding installation included with the kits is very broad-brush as it has to cover every different loco type from the Railroad and Main/Detailed ranges, including steam locos with or without tenders and various types of diesel locos. The instructions also briefly take account of:

2.1 Is the loco DCC-Ready
(i.e. it has a decoder socket but still requires a decoder to be fitted)?

2.2 Is it already DCC-Fitted
(i.e. it has a factory fit basic decoder but the modeller wishes to update to TTS)?

2.3 Is it an earlier model that does not have a decoder socket
(i.e. the kit decoder will either have to be hard wired or the modeller may wish to install a suitable decoder socket to facilitate changing decoders in future)?

2.4 Ringfield Motors
A model may have an older ringfield motor, which may be in the tender of a larger steam loco or in the body of a smaller tank engine or diesel loco. Note that some loco drive models may retain a dummy ringfield motor housing in the tender for weight and power pickup purposes.

2.5 Other make locos
Modellers may wish to install TTS into a loco other than Hornby, e.g. Bachmann or Heljan, etc. This guide does not cover converting these other makes.

2.6 Available Space
The TTS decoder (28mm x 14mm x 6mm) is somewhat larger than the Hornby basic R8249 decoder (17mm x 10mm x 5mm) and finding this extra space for the decoder and the standard speaker can be the most challenging part of the installation task, especially in steam locos with a decoder socket in the loco body.

This guide expands upon those basic instructions to provide the average modeller with enough additional information to install the kit to most Hornby models.

3. Assumptions

It is assumed that a modeller has average skills, including soldering where required and is confident and competent at taking their locos apart and modifying them if and where necessary.

This guide does not cover the basic conversion of any specific model to DCC, as that is a wider subject and well documented elsewhere, especially where ringfield motors are involved. It is assumed that if a modeller is fitting TTS beyond the Plug-and-Play level then they can also convert a loco to DCC if required. This is a good site for information about converting many models to DCC and beyond ... http://www.bromsgrovemodels.co.uk/decoderinstallation4mm.htm

The generic term 'chassis' is used in this guide to describe the 'under-frame' carrying the loco running gear, whether the model is steam or diesel. The term 'under-frame' is often seen on service sheets.

It is assumed that the modeller will refer to the associated service sheet(s) for their particular model and that of any factory installed TTS model.

It is assumed the loco motor current draw including any lighting and/or auxiliary functions is within the TTS decoder specification limits - see TTS user manual/leaflet.

4. Preparation

Tip - The first thing to do before starting any installation is to find and download the Hornby Service Sheet (HSS) for your particular model and that of the equivalent TTS equipped model if available.

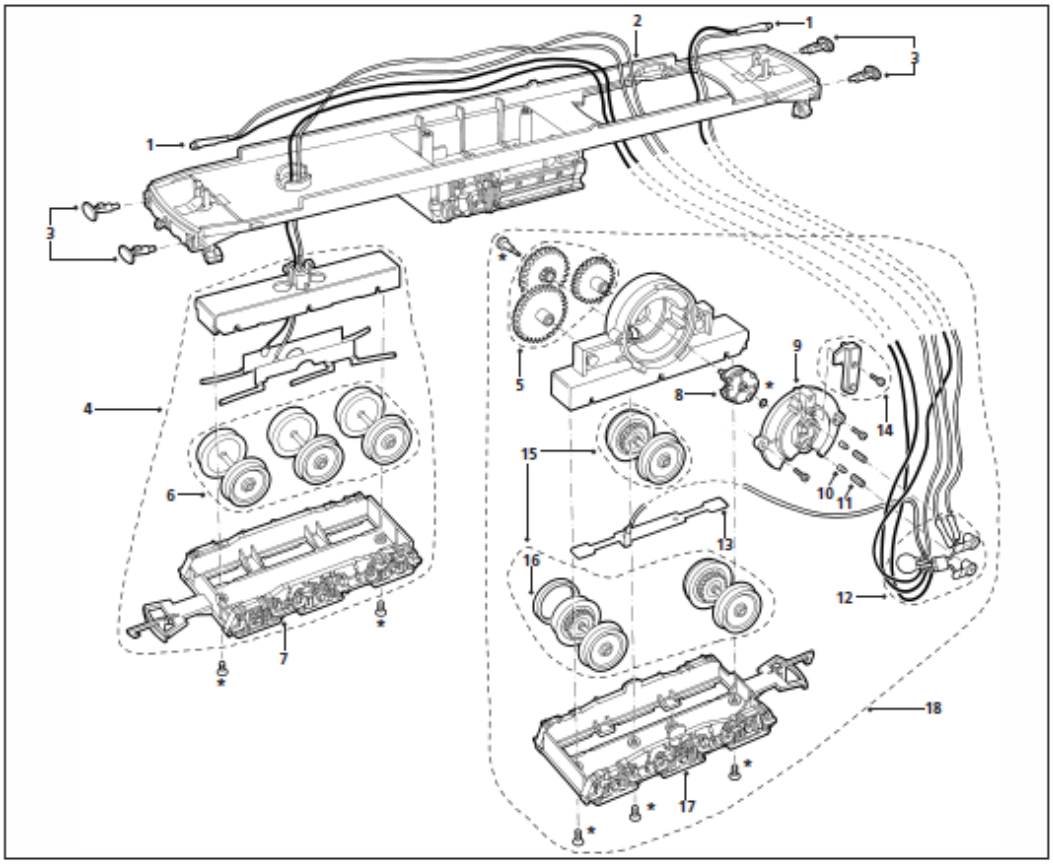
A modeller can download these either from the Hornby web-site (limited to service sheets number HSS200 and above) or the useful Hornby-Guide website, which has mostly earlier service sheets (i.e. prior to number HSS200). This download area on my own web-site may also be of use http://www.halton96th.org.uk/service-sheets.html .

A modeller should check that their particular model catalogue 'R-number' is listed on the sheet and/or that the diagram matches the insides workings of their model. Some service sheets may not have been amended to list all applicable R-numbers, or may not even have been issued yet, in which case modellers should find the closest match possible. If a modeller cannot locate a service sheet for their particular loco they are advised to ask on the Hornby DCC forum and a member will probably be able to help.

Figure 1 illustrates a typical service sheet (although it is more of an illustrated parts catalogue), noting that body parts are not usually covered and some details although illustrated are not given a part number.

HORNBY

CLASS 56 LOCOMOTIVE



LIST OF SPARES

Item No.	Description	Pack	R2074A/B, R2075, R2106A, R2107A/B/C/D, R2235A/B/C/D/E/G, R2288A/B/C/D, R2416A, R2476A/B, R2576	R2253/A R2477A/B
1	Bulbs with Wires	1	X8349	X8349
2	Underframe Assembly without Weights	1	X8350	X8350W
3	Buffers	10	X8443	X8443W
4	Dummy Bogie Assembled with Wires	1	X8570	X8570
5	Plastic Gear Set	1	X8354	X8354
6	Wheel / Axle Assembly Dummy Bogie	3	X8347	X8347W
7	Dummy Bogie Frame	1	X8346	X8346W
8	Armature / Commutator	1	X8353	X8353
9	Motor Cover Plate	1	X8356	X8356
10	Ringfield Brushes	10	X8328	X8328
11	Ringfield Brush Springs	10	X8329	X8329
12	Ringfield Brush Contacts with Capacitor and Bead	1	X8795	X8795
13	Collector Strip and Wire	1	X8358	X8358
14	Retaining Clip and Screw Power Bogie	1	X8355	X8355
15	Wheel / Axle Assembly Power Bogie	3	X8352	X8352W
16	Traction Tyres	10	X8442	X8442
17	Power Bogie Frame	1	X8351	X8351W
18	Power Bogie Complete Assembly	1	X8796	X8796W
*	Small Parts Pack	pack	X8868	X8868

NOTE: all items marked * are contained in small parts pack X8868

HORNBY Hornby Hobbies Ltd, Westwood, Margate, Kent CT9 4JX, England, United Kingdom

Service Sheet No.229F
Issued January, 2006

Printed in England

Figure 1 – Example of a Hornby Service Sheet

Modellers will also need the applicable maintenance sheet that came with their model, which tells how to remove the loco body. If the sheet that came with the loco has been lost, then a new one can usually be downloaded from the Hornby site.

Figure 2 is a typical loco maintenance sheet. Note that where applicable, the sheet will indicate the location and type of decoder socket if installed (e.g. 8 or 21 pin in block 4 below).

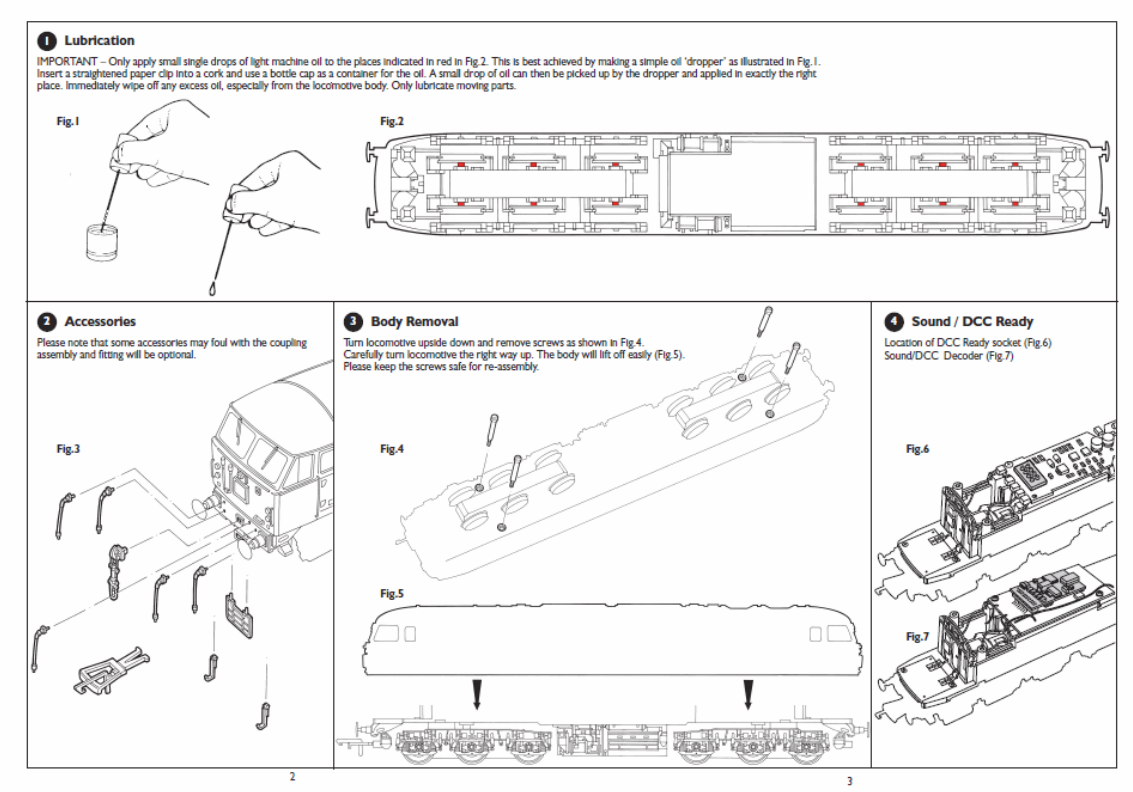


Figure 2 – Example of a Hornby Maintenance Sheet

5. Basic Installation of a Kit

5.1 Plug-and-Play Models

Installation of kits to the most recent models (i.e. virtually any Hornby model introduced after TTS was in the design loop) is usually a simple case of opening the model to access the existing decoder socket, removing any existing decoder or DC blanking plug, then plugging in the TTS decoder and fitting the speaker to a pre-existing mount, so that it ends up looking similar to the ready-to-run Class 47, R3287TTS in Figure 3. After installation test that the new decoder works correctly, program in its new address as required and reinstall the body.

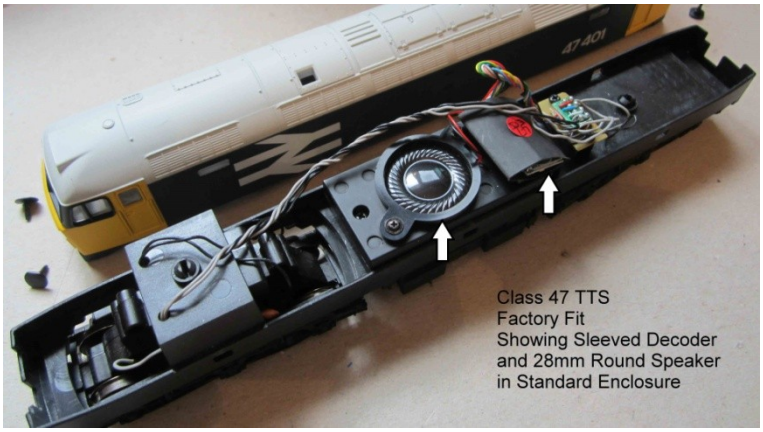


Figure 3 – Factory Fit Class 47 TTS

The rest of this guide is aimed at fitting kits to those model variants which are not quite so easy.

5.2 Decoder Limits

Tip – Do not overload your TTS decoder or it may be damaged beyond recovery. This will invalidate your warranty as the limits are clearly specified in each TTS user manual/leaflet.

Kits can be installed to models other than Hornby, but the modeller should check that the current draw of their model's motor does not exceed the TTS decoder motor maximum continuous limit of 500mA. The motor circuit is self protecting and if overloaded will shut down the decoder until the load is removed. Check the stall current of your model if necessary but do this under DC conditions with a blanking plate fitted. Never load check to motor stall with a decoder fitted.

A current limit also applies to a TTS decoder's function outputs. A modeller may decide to install directional running lights or use the decoder auxiliary function for say cab lights or firebox glow. TTS decoders control directional lights on function F0 with an auxiliary output on function F18 (steam) or F25 (diesel), however each function is limited to 100mA within the overall decoder limit. The function output circuits are **NOT** protected and overloading them could damage the decoder functions output.

A TTS decoder has a motor current overload limit of 1A momentary and a maximum steady draw of 800mA shared between the motor and functions within their individual limits. See TTS decoder specifications for full details.

5.3 Standard Speakers

The speakers supplied in the kits are of 8 Ohm impedance at 1 Watt power and may be 23mm or 26mm or 28mm diameter round, or 40mm x 20mm or 26mm x 20mm oblong according to the model.

Tip - Kits may or may not have a speaker enclosure, again according to the model – check the service sheet.

The round speaker enclosure shown in Figure 3 is in 2-parts, a tub and a securing ring, both with lugs for the 2 x fixing screws. The larger oblong speaker shown in Figure 4 is screwed into a plastic box, which can be secured to the loco using double sided sticky tape/pads or 'tak' substance. The smaller oblong speaker is not supplied with an enclosure.

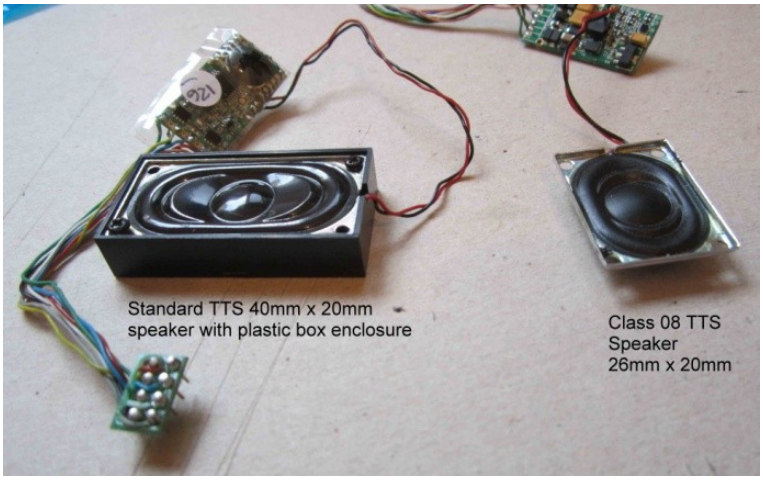


Figure 4 – TTS Oblong Speakers

A modeller can easily make their own custom enclosures by adapting everyday items, e.g. empty Humbrol plastic paint pots with the lid cut off will fit the round speaker, as will the reel from the centre of a small roll of 'Sellotape', or a modeller can use any suitable diameter plastic or card tube. A plasticard box may be assembled for the oblong speakers. A fortunate modeller with a 3-D printer could even make their own custom enclosure designed to fit a model.

Tip - The important thing with any speaker mounting is to isolate the front of the speaker from the back to ensure the best acoustics. This is usually done by carefully gluing the rim of the speaker into its enclosure or using black/white/blue-tak substance as a void sealer – see various Figures following for examples. Care must be taken when gluing or using 'tak' sealer not to foul the speaker cone.

5.4 Alternative Speakers

As noted in the basic installation instructions, a modeller may wish to use their own speaker and in some cases the use of a so-called cube speaker will be necessary due to lack of space for the

standard speaker in a particular loco, or a modeller may wish to install an additional mega-bass speaker for increased depth of sound. The essential thing to note about any replacement speaker(s) is the total impedance, either singly or in combination, must be no less than 8 Ohms at a power of 1 Watt, else you risk overdriving the TTS decoder amplifier and damaging it. Using a speaker with greater impedance e.g. 16 or 100 Ohms will drop the volume level proportionally. Suitable aftermarket speakers are widely available in specialist DCC model shops or from the internet. Mobile phone speakers can also be used, as these are small and may have their own enclosure – again check the impedance and power handling specification.

Hornby cannot endorse any of these alternative speaker products and their use may affect your TTS warranty if out of specification.

Figure 5 illustrates a typical range of cube speakers from Micro to Jumbo sizes.

Tip - The sound quality is generally good, but the author has found the speaker wire attachment clips can be flimsy and are best soldered to for reliability.

Figure 5 – Cube Speakers with Integral Enclosures

Tip - When replacing a speaker or even if just extending the wires on the standard speaker – the magnet in a speaker will attract a soldering iron, likely catching the modeller unawares and possibly damaging the speaker cone with the hot iron. Taping a speaker to the work-bench will prevent any chance of it jumping onto the iron but a modeller should remain aware of the possibility of the iron wandering off towards the speaker.

6. Installations in Various Loco Types

6.1 Diesel Locos

Diesels may either be the simpler Hornby Railroad range with single bogie drive, which include those improved carry over models from previous manufacturers such as Dapol, Airfix, Kitmaster or Lima, with lots of space inside, or they may be from the newer Hornby main range with their bulky, often metal chassis blocks, large printed circuit boards, belt driven fans and central motors with all-wheel drive bogies, which are much tighter on free space.

6.2 Diesel Railroad range and earlier models based on previous manufacturers' ranges, but not DCC-Ready

These models usually have plenty of spare space inside the body and/or on the chassis and may/may not have weights, either in the battery box/fuel tanks and/or on the main chassis bed. These weights may be short and/or long flat steel bars or cast alloy blocks. These models will either need the decoder hard wired in or it is recommended that a decoder socket is installed to make changing a decoder easier in the future should it be necessary.

Tip - The amount of rework and soldering is much the same anyhow. To install a socket is usually just a case of making 2 x posts out of old plastic kit sprue and gluing these to the chassis in a suitable place. The posts are each pilot drilled for a small self tapping screw. Some NEM652 decoder sockets are designed to solder to a harness rather than be hard mounted to the chassis – see Figure 6.

Figure 6 shows a pair of typical Railroad style chassis (the Class 56 Ringfield motor version has been converted to add a free DCC socket; the Class 40 chassis is a DCC-Ready fixed socket).

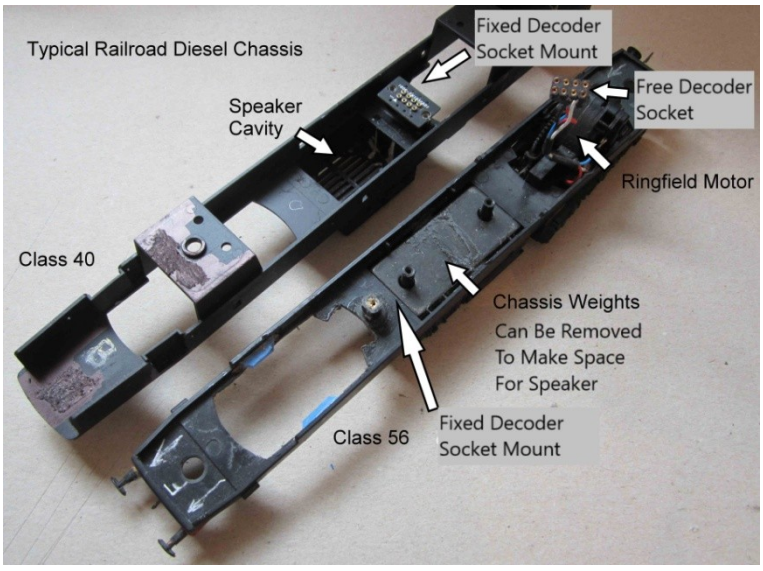


Figure 6 – Decoder Sockets for Railroad Chassis

Figure 7 illustrates a Class 58 Railroad before conversion to DCC and showing speaker space either in the box (item 2) facing down or on the chassis deck facing up as arrowed. If the speaker is mounted in item 2 then holes will be required to allow sound to exit and for speaker wire access.

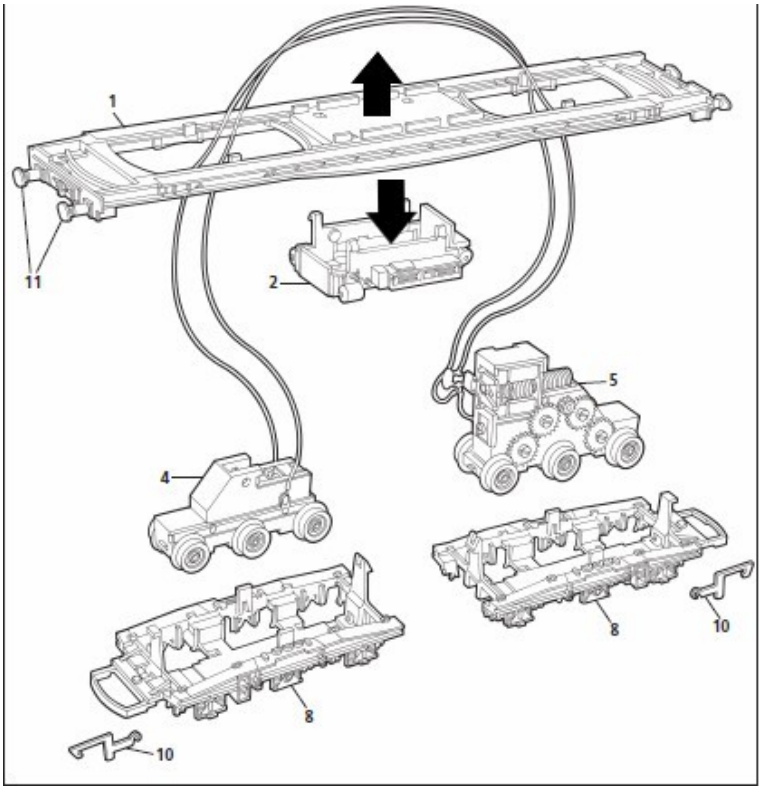


Figure 7 – Class 58 Speaker Options

6.3 Diesel Railroad range DCC-Ready or DCC-Fitted

These models also have a lot of spare space inside the body and on the chassis, but may have weights in the way of the obvious speaker mount. A modeller can either remove the weights from say the battery box area to mount the speaker face down as in Figure 8, shown prior to fitting an enclosure over it or you could just refit some of the displaced weights over the top of the speaker with a suitable insulator.

Figure 8 – Speaker in Battery Box/Fuel Tank

...or the speaker could be mounted in its enclosure on top of the weights, facing up as shown earlier in Figure 3.

Figure 9 is a DCC-Ready Class 37 Railroad showing chassis weights in speaker space. These can either be removed in whole or part and/or the speaker can be mounted facing up on top.

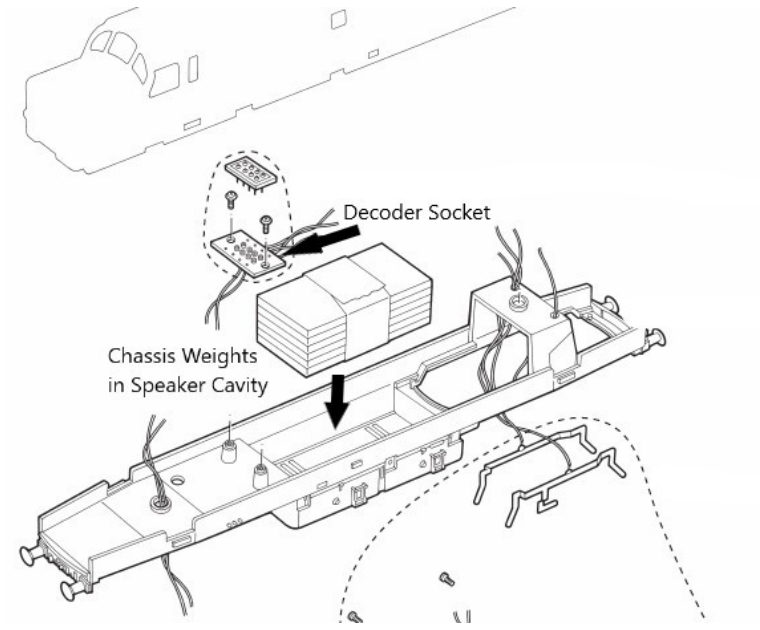


Figure 9 – Class 37 Railroad

Figure 10 is an extract from a Class 87 Railroad maintenance sheet showing speaker space on the chassis deck ahead of the DCC socket facing up or possibly in the battery box amidships facing down.

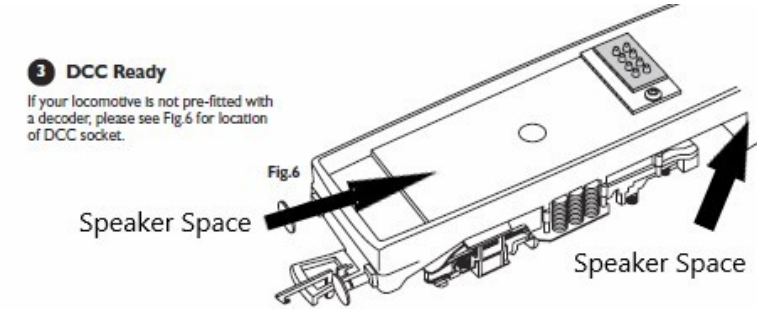


Figure 10 - Class 87 Speaker Options

6.4 Diesel Main range not DCC-Ready

These diesels are typically evolved Railroad style chassis where the old ringfield motor has been replaced by a modern can or frame motor and improved pickups, etc and a more detailed body provided. The more complex all wheel drive and central motor ('heavy') diesels are usually all DCC-Ready. Once a modeller has an understanding of how to convert one of these improved locos to DCC, the added challenge of installing a TTS decoder and speaker is much the same as in the previously described section.

Figure 11 is the service sheet for a Class 395 with an evolved Railroad chassis similar to some HST diesel models.

Tip - Note that Class 395 is an electric loco and TTS is not available for these yet. The Railroad range Blue Rapier Class 395 variant shown requires converting to DCC. Later main range Class 395 variants are DCC-Ready.

Arrows A in Figure 11 show where a decoder socket could be fitted and Arrows B show where a speaker could be mounted facing up. This Class 395 variant has blacked out 'windows' so the speakers would not be on show.

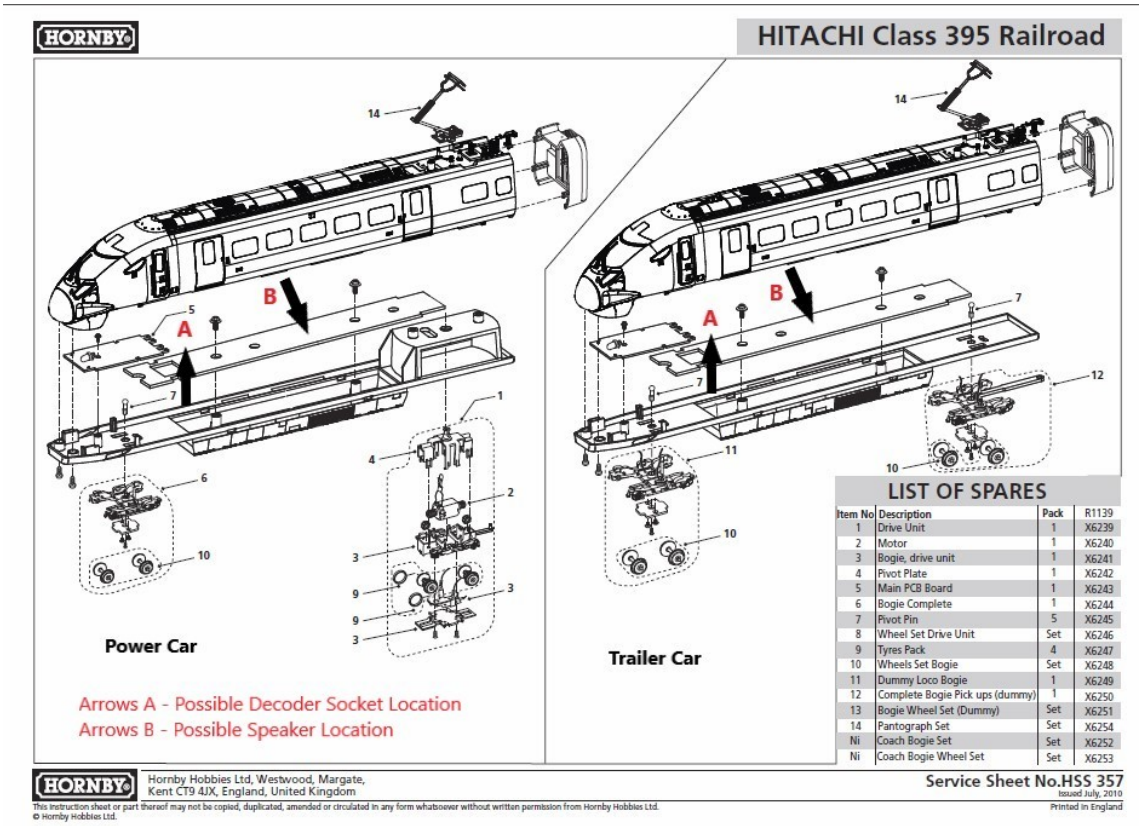


Figure 11 – Evolved Railroad Chassis

6.5 Diesel Main range DCC-Ready or DCC-Fitted

A common problem a modeller will find here is if a particular loco is already restricted on space for a standard R8249 decoder and/or if newer it may have a 4 or 6 pin socket pre-fitted e.g. Sentinel, for which suitable 8-pin adaptors are not readily available. Modellers will either have to revert to hard wiring or replacing the TTS 8-pin plug with a matching one for their loco – see Tip. Refer to the service sheet to establish which decoder socket is fitted to a particular loco. Downsizing on the number of decoder wires may mean losing the TTS ability to fit directional lights or run an Aux function.

A 7-pin socket and decoder is unique to the early DCC-Fitted Pendolino EMU. The DCC-Ready Pendolino has an 8-pin socket. There is no TTS kit for a Pendolino at present.

Tip – The options for a 4, 6 or 7-pin model are either cut off the TTS 8-pin plug and hard wire the TTS decoder wires to the existing socket board, or to cut the wires from the existing decoder plug and splice these into the TTS decoder, following the wiring colours. Tape up any spare wires against shorting, noting that 6 pin wiring takes its common positive from the rails and not as a separately provided blue wire.

Modellers may find a 21-pin socket, but in Hornby locos these would mean a factory sound-fitted model in any case. If however you have a Bachmann loco with a 21-pin socket then you can purchase an adaptor to convert the loco socket into an 8-pin socket. Some adaptors are bulkier than others

and these may make getting the loco body back on a struggle – refer to Hornby DCC Forum discussion for more information.

A modeller may find that attempting to place the speaker in the battery box/fuel tank area of these 'heavy' diesels means having to unsolder the speaker, probably extend the speaker wires and feed them below/past the main chassis parts to say the battery box/fuel tank and reattach the speaker.

Tip - If extending the speaker wires, the modeller should ensure they insulate the joints with heat shrink tube. This also applies to the decoder especially if it is located anywhere near bare metal. A modeller can insulate using loose but bulky heat shrink tube, 'Kapton' insulating tape or 'Sellotape'. A single layer is best for heat dissipation. Normal electrician's tape should be avoided as the adhesive goes sticky after a while.

Figures 12A shows a late model 'heavy' DCC-Ready Class 43 HST with a decoder socket and possible space for a speaker (arrowed) in the battery box/fuel tank or possibly on the rear deck, depending upon if it is the power or dummy car, as the chassis are different. Installation will mean disconnecting the speaker and running extended wires from the decoder plugged in on the top deck past the chassis gear to the speaker location. Some modellers have removed the operating fans (block 3 Fig.7 below) to make space for an even larger speaker, then gluing just the actual fans to the roof of the body.

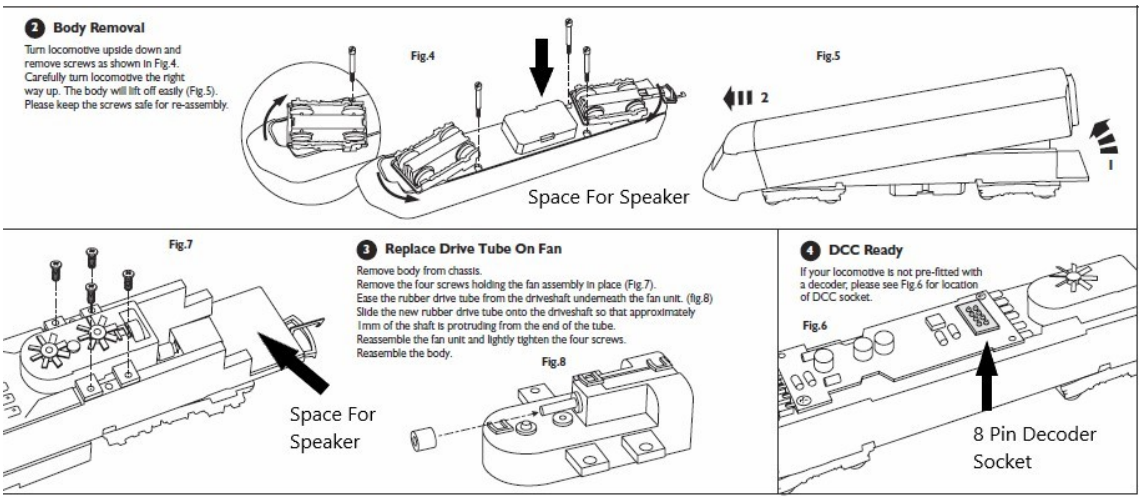


Figure12A – Class 43 HST Heavy Diesel Speaker Options

The newer HST power car has a solid metal chassis block, whereas the dummy car has a spacious plastic chassis and a hollow fuel tank. Figure 12B shows an HST with sound installed.

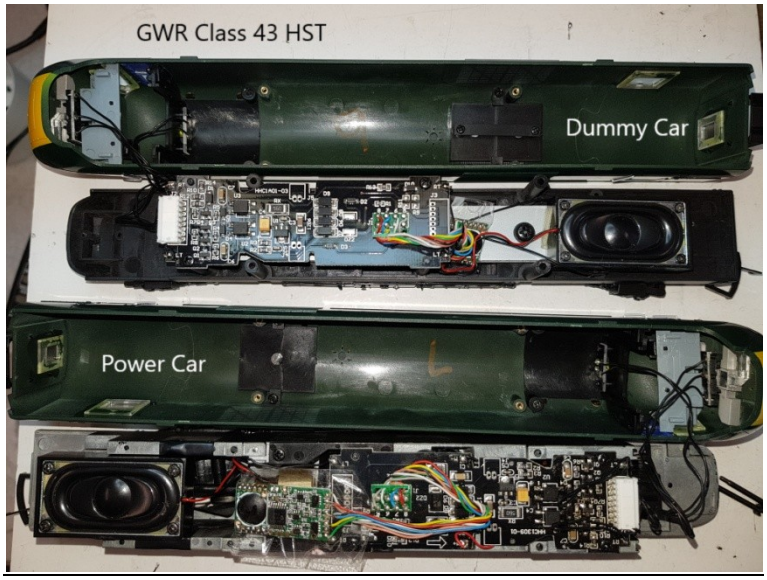


Figure 12C – HST Power and Dummy Cars

Installing TTS into some DCC-Ready or DCC-Fitted diesel locos can be very straightforward, almost Plug-and-Play. Figure 13 shows a DCC-Fitted Class 56, R6245X, which is a typical Hornby main range 'heavy' diesel with the existing decoder replaced by a TTS decoder and the speaker mounted into a handy space above the front bogie tower.

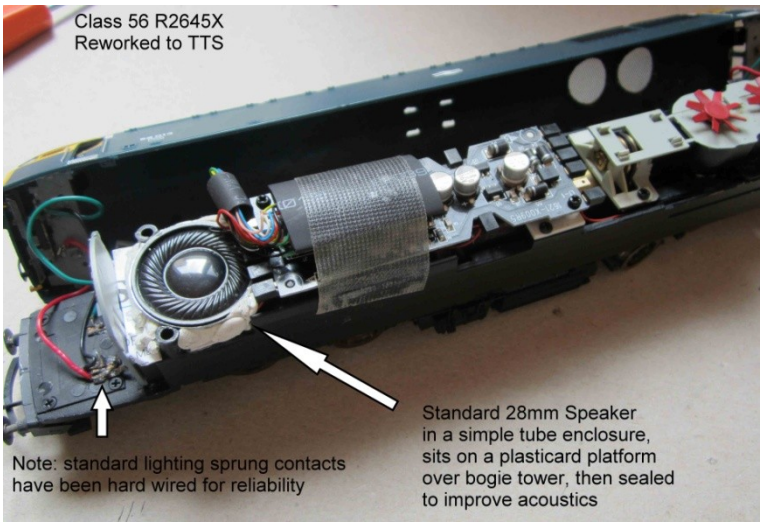


Figure 13 – DCC-Ready/DCC-Fitted Heavy Diesel

6.6 Steam Locos

6.7 Small steam locos without a tender

The main problem here is finding room for a speaker, which likely means replacing the standard speaker with an aftermarket cube speaker, sized to fit the space available. Some recent DCC-Ready models are known to be a difficult fit even for the smaller R8249 decoder.

A modeller may have to remove or modify weight/weights on the chassis or in the loco body to provide enough room for the decoder and a speaker. The author has installed a standard speaker under the drilled out funnel of a Class 2721 GWR Pannier Tank loco, with the decoder relocated into the coal bunker.

The pannier tank weights were cut in half to make space for the speaker mounted on a piece of plastic-card, then sealed in place. The conversion was a hardwired task and required some modification of the loco body to route wiring.

Figure 14 shows Class 2721 with 28mm speaker in a cut down enclosure mounted on a plasticard platform then sealed in.

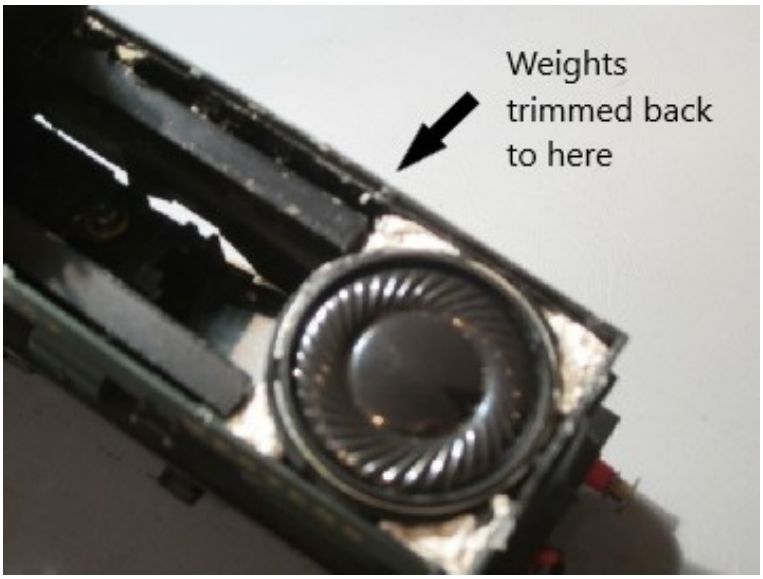


Figure 14 - Class 2721 Speaker Installation

Figure 15 shows Class 2721 with its heat shrink sleeved TTS decoder lodged in the coal bunker. Heat shrink is not recommended due to lack of cooling air over the decoder but this conversion has given no trouble so far.

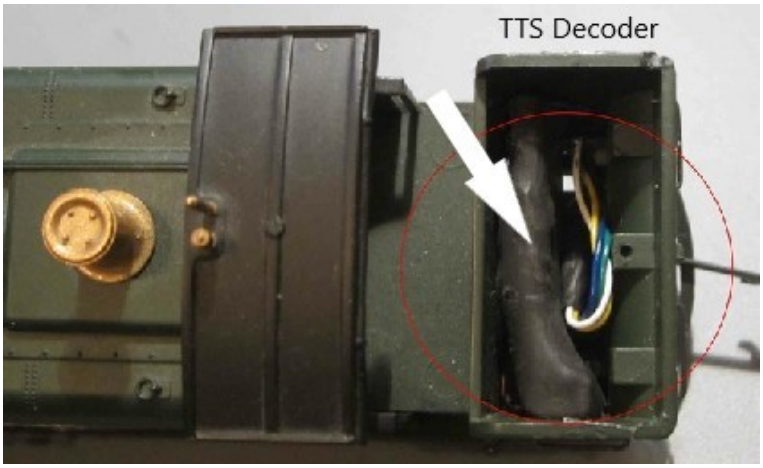


Figure 15 - Class 2721 with TTS Decoder in Coal Bunker

6.8 Small steam locos without a decoder socket

These can be the most difficult to convert to TTS, with the option of hardwiring in the TTS decoder or installing a DCC socket. There may be added problems with these locos in that they may have a split chassis, a chassis common return earth path or other challenges. This guide does not cover how to overcome these particular problems as they are well documented on the various forums and web-sites.

Much will depend upon the modeller's preferred installation choice and/or if there is even room for a socket. The author has fitted a compact NEM652 8-pin socket in his 0-4-0 locos as shown in Figure 16, but has not yet managed to find space for a speaker. This remains an on-going challenge, although modellers have installed sound in the tiny Wickham Trolley and Ruston 48DS models.

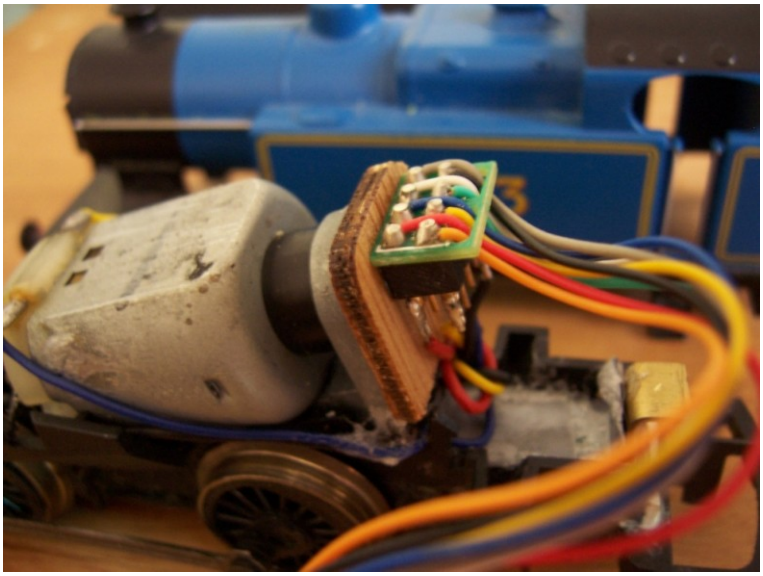


Figure 16 – NEM652 Free Socket in 0-4-0 Loco #1203

6.9 Small steam locos with a decoder socket

The socket in these locos may be 4, 6, 8 or even 21-pin and finding room for a speaker and possibly a pin adaptor will be the biggest challenge.

Figure 17 shows the service sheet for a Hornby Class J50 indicating space may be tight unless one of the side tank or bunker weights can be reworked or removed as arrowed for this guide.

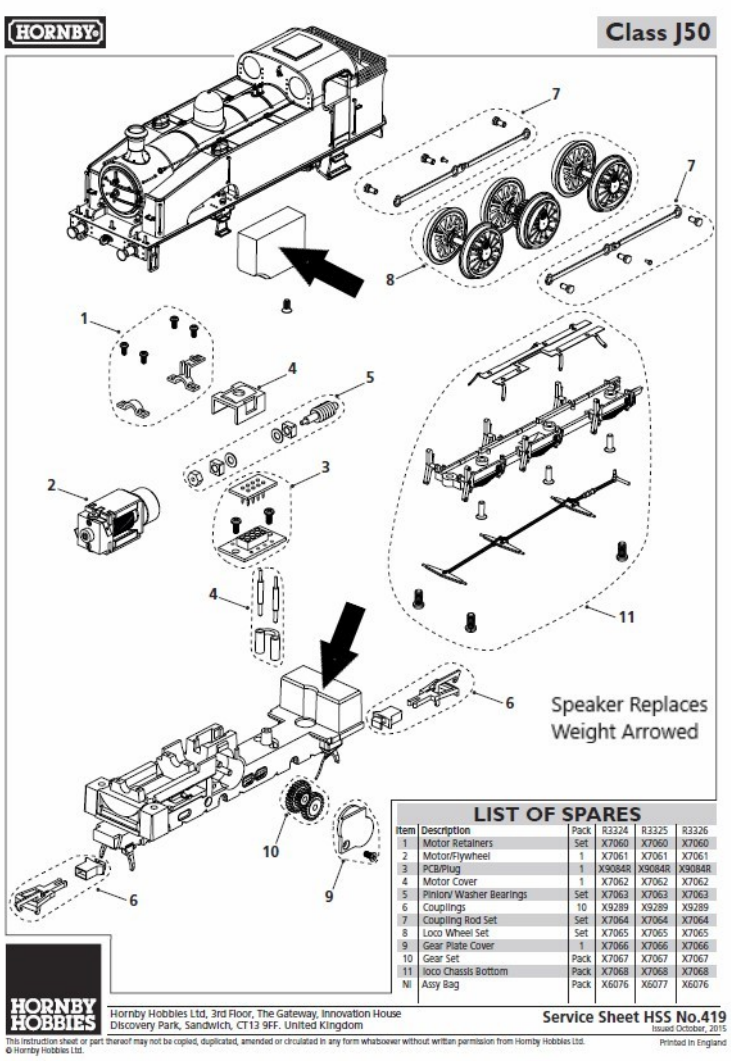


Figure 17 – Hornby J50 Speaker Options

6.10 Larger steam locos with a tender

Post TTS being introduced all new design Hornby tender locos are provided with a socket and speaker mounting in the tender as standard, although this mounting may be under a chassis weight that may/may not require some rework and modellers may not require the speaker enclosure if provided.

Tip - If a TTS loco does not have a speaker enclosure then the retro-fit kit will not have one either.

Older locos are likely to have the socket in the loco and the modeller's choice here is either to extend wires to the tender and mount the speaker there, or to try to find a suitable speaker size that will mount in the loco body. There may or may not be an X6311 style 4-pin plug and socket transferring power between loco and tender. Many locos will not have any socket and many earlier locos may have a Ringfield motor in the tender. Some locos will have a motor in the loco and a dummy Ringfield motor in the tender, making the installation task much more difficult.

6.11 Larger steam locos without a decoder socket

If the modeller plans to install a decoder socket then the tender is probably the obvious place to put it as the speaker can go in there as well. The modeller may have to modify the tender coal load area to make room for the socket and speaker and then either run separate wires to transfer power across from loco to tender or install a 4-pin plug and socket (X6311).

Figure 18 shows a modification where a loco socket (not illustrated) is used to mount the TTS decoder and by way of an X6311 plug and socket passes the speaker feeds across to the tender and similarly passes the tender pickup feeds back to the loco. This also allows a modeller to get rid of the troublesome post and fingers powered drawbar (see item 8 on the Gordon service sheet in Figure 19 - a typical powered drawbar example) in favour of a simple fixed unpowered drawbar shown below.

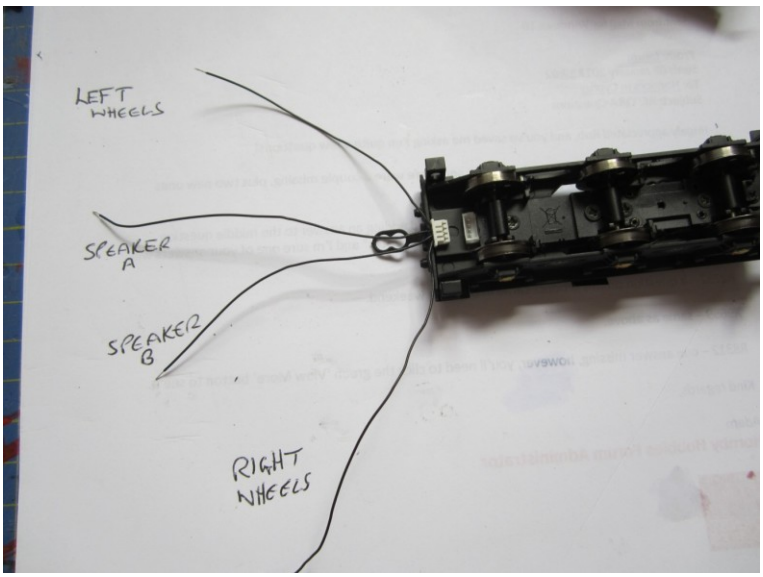


Figure 18 – Passing Power between Loco and Tender

If the loco tender is tender driven then there is likely to be more than adequate space in the loco for the socket and a cube type speaker.

Gordon is a typical tender drive loco and there should be room for a DCC socket and cube speaker to sit on the chassis block as seen in Figure 19.

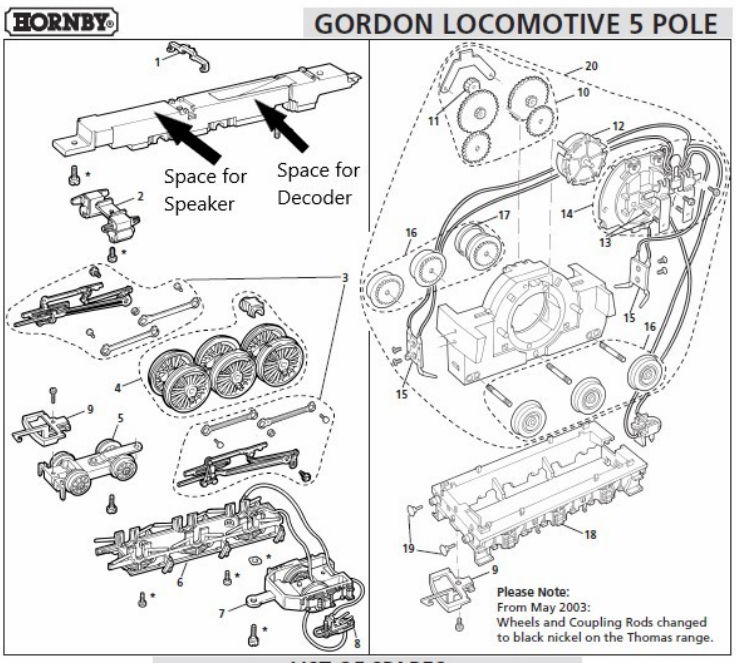


Figure 19 – Tender Driven Gordon

6.12 DCC-Ready steam locos with a decoder socket in the loco

The choice as stated earlier is to find room for a suitable speaker in the loco or run wires to the tender for the speaker.

Figure 20 shows DCC-Ready Merchant Navy, R1038 with a factory socket in the loco and a micro cube speaker installed onto the chassis. It may be necessary to modify the loco body to provide clearance for the speaker, or depending upon the loco body space the speaker may fit in the loco smoke-box area with the decoder located on the 'shelf'.

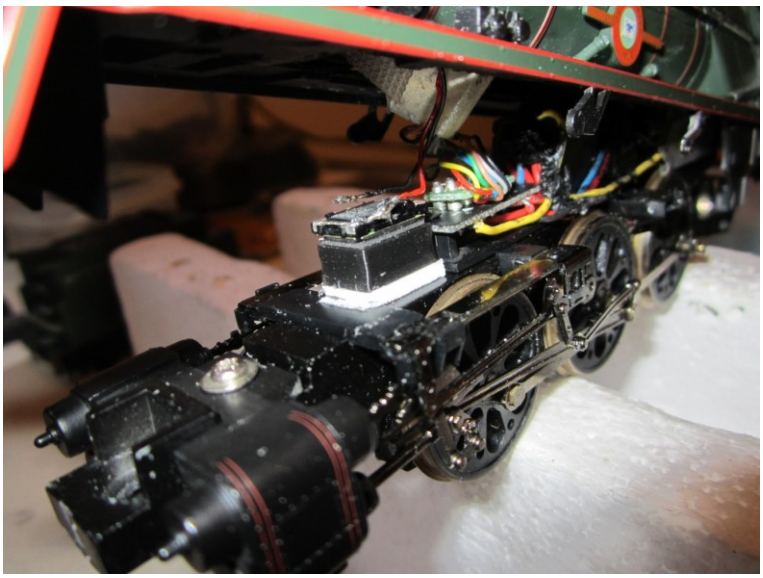


Figure 20 - DCC-Ready Merchant Navy with Cube Speaker

In this case the decoder just fitted into the smoke-box area after slimming down the boiler weight installed there.

Figure 21 shows Mallard with the socket in the loco and the speaker mounted in a plastic tube glued on top of the tender weight.

Tip - Small holes were drilled in the coal load to allow the sound to exit.

The red arrow indicates the standard Hornby X6311 plug and socket installed to carry the extended speaker wires to the tender and the tender wheels pickup feeds back to the loco in lieu of the normal drawbar power transfer method as explained earlier.

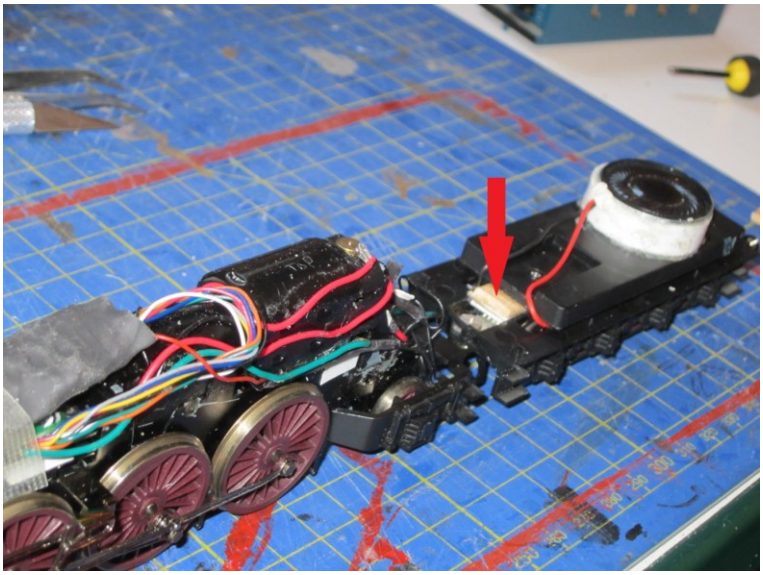


Figure 21 – R2339 Mallard with Speaker in Tender

6.13 DCC-Ready steam locos with a decoder socket in the tender

Most recent locos will have a socket in the tender along with a speaker mount suitable for the standard round speaker. Figure 22 shows a Hornby B1, R3000 tender chassis with the socket and weight removed to show how the standard speaker enclosure plate almost fits. In this case the enclosure lugs were slotted to match the existing screw holes, but in hindsight the enclosure could have simply been glued in place. The weight was modified per the pencilled circle in Figure 22 to accept the enclosure but it could have been left unmodified as shown in Figure 26 and the speaker installed without the enclosure and sealed with 'tak'.

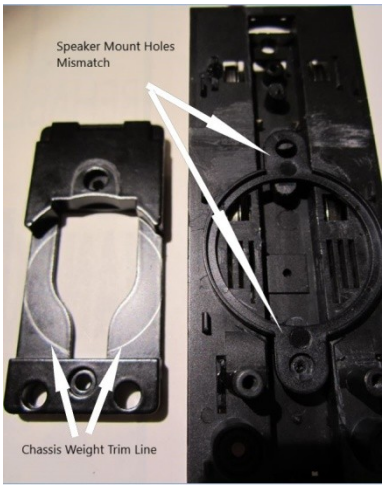


Figure 22 – Class B1 Tender Weight and Speaker Mount

Or the speaker could probably have been mounted in its enclosure facing up simply by gluing it to the tender weights, similar to Figure 3 seen earlier.

Figure 23 shows the Class B1 with the tender weight cut away to provide clearance for the speaker enclosure.

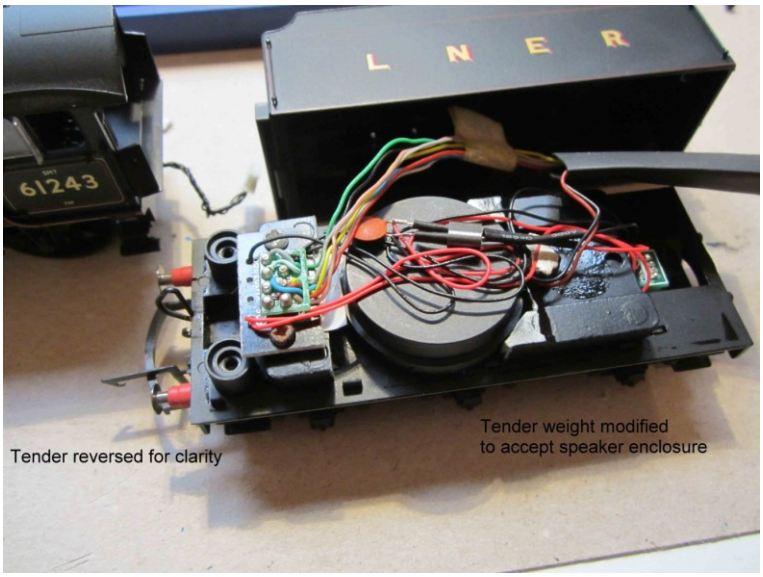


Figure 23 - Hornby Class B1 with Modified Tender Weight to Suit Standard Speaker Enclosure

Figure 24 shows a Schools Class service sheet illustrating arc-shaped speaker mounts in tender. The speaker will be installed without an enclosure and held in place by the chassis weight.

Tip – One of the tender pickup wires may get in the way of mounting the speaker face down, suggesting it could be easier for the modeller to mount the speaker in its enclosure on top of the chassis weight facing up.

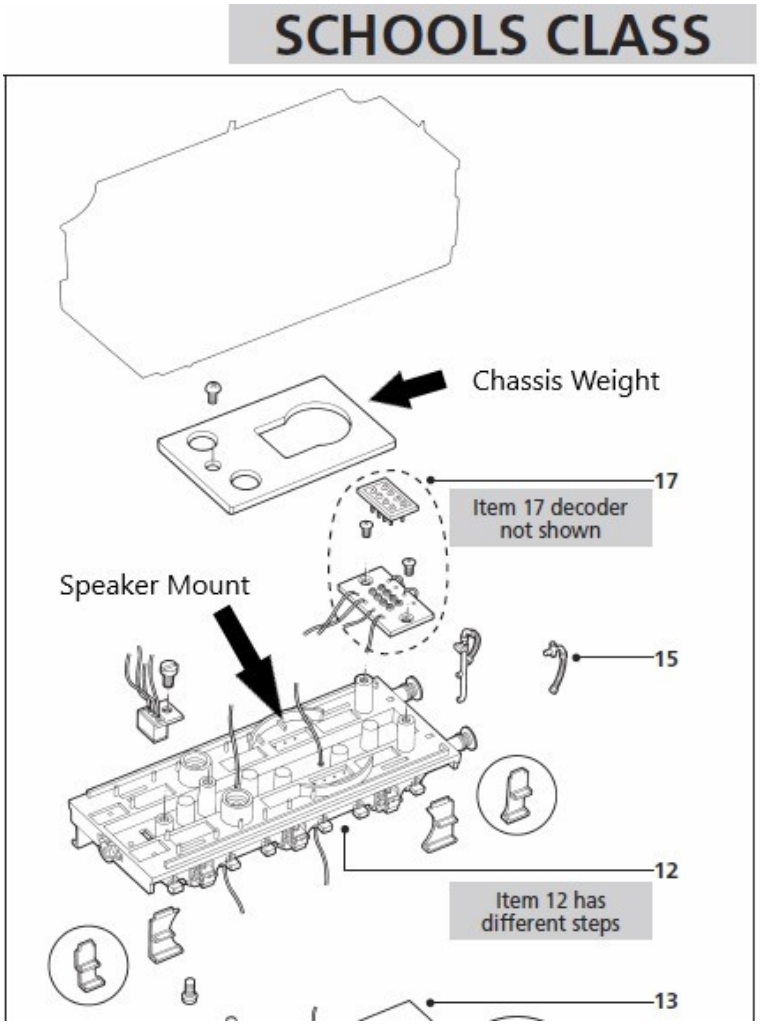


Figure 24 - Schools Class with Speaker Mount

It is worth noting that some tenders with a speaker mount can be at risk of the speaker rim short circuiting across the wheels as seen in Figure 24A below. The use of a suitable insulated packing ring or spacers is recommended.

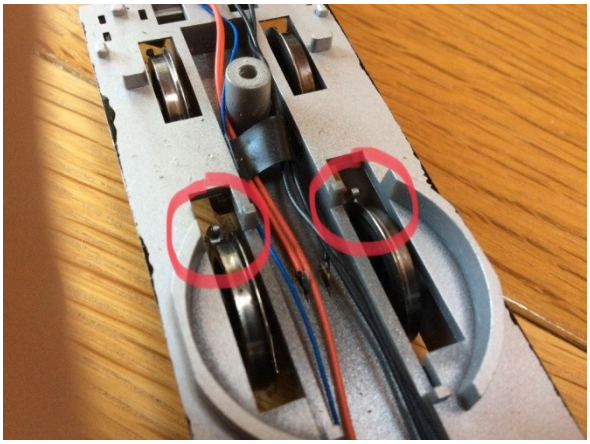


Figure 24A – Chassis Short Risk

7. Taking Inspiration From Factory Fitted Sound Models

Hornby has redesigned many previous models to install factory sound and it makes sense to use these models for guidance when deciding where to fit our speaker and the best shape and size to use.

Tip – Older Hornby Main range sound fitted locos used a 21-pin ESU decoder whereas TTS uses the 8-pin decoder, however these factory fit sound installations may offer the modeller some valuable clues about speaker placement.

Here are some examples from factory sound fitted locos service sheets and actual models.

7.1 Hornby B17 Sound Fitted

Figure 25 shows the B17 21-pin/8-pin (item 15) sound fitted variants (long and short tenders). The speakers (item 13) are mounted without enclosures and could be sealed by the modeller for best performance. Note also that the tender weight cut-out is suitable to mount either a round or oblong speaker. This is now common on all the post TTS design models.

Tip – Item 14 in the Figure is the socket part of the X6311 4-pin plug used to transfer power between the loco and tender.

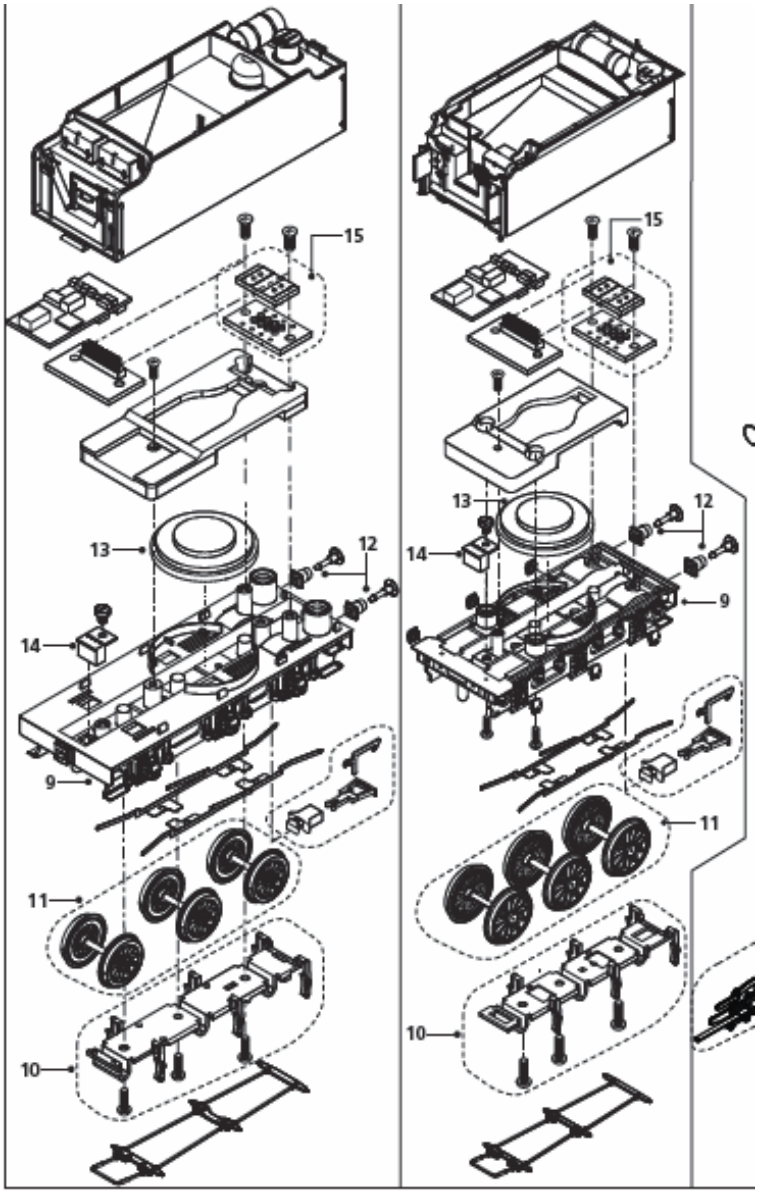


Figure 25 - Hornby Class B17 Long (left) and Short (right) Tenders

7.2 Hornby A1/A3 TTS Fitted

Figure 26 shows the factory fitted A1 / A3 TTS arrangement, which can be used as the basis of a retro-fit kit installation on other similar models. An alternative speaker could be fitted facing up on top of the weight if the tender coal load area is reworked and small holes drilled to allow sound to escape.

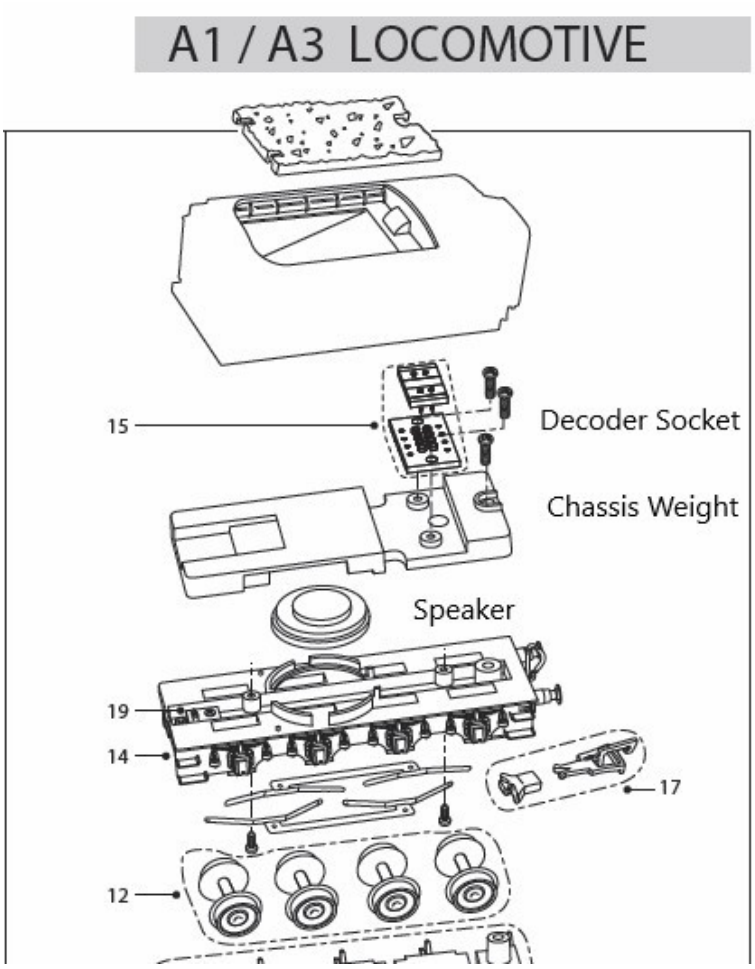


Figure 26 – Hornby A1/A3 TTS Factory Fit

7.3 Hornby Class 31

Figure 27 shows the Class 31 DCC-Ready 8-pin and DCC-Sound 21-Pin Factory Fitted variants. Room is tight here and a cube speaker may just fit on top of the 8-Pin circuit board, or in one of the cabs, or in place of the fan assembly, or maybe in the battery box/fuel tank. If the latter then extensive rework may be required, thus making it one of the more difficult conversions.

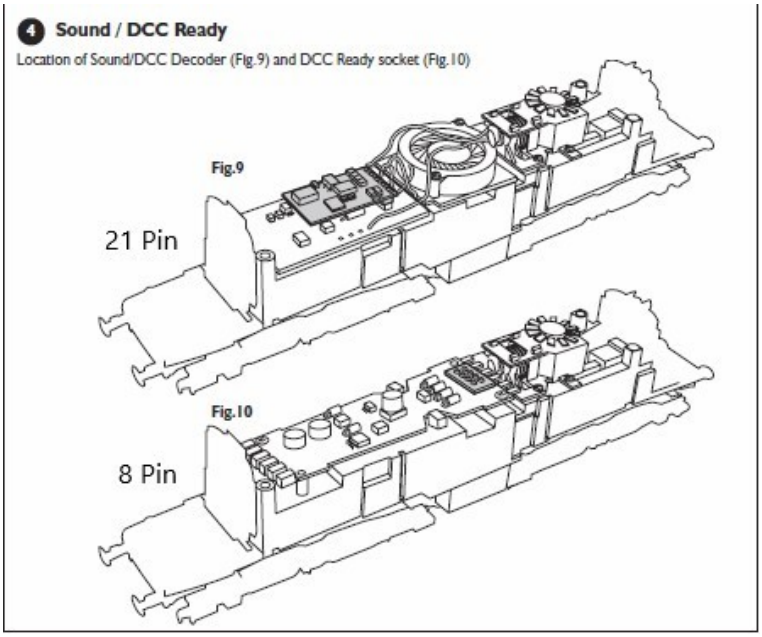


Figure 28 – Hornby Class 31 8 Pin Non-Sound and 21 Pin Sound Variants

Figure 28A shows a Railroad Class 31 with a rectangular speaker and the decoder conveniently mounted down the side of it. This model has an Express Models lighting kit fitted.

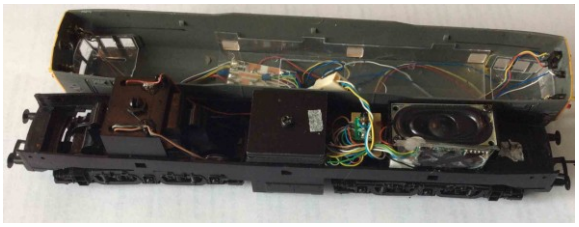


Figure 28A – Class 31 Railroad

Figure 28B shows a Main range Class 31 with twin ESU 4 Ohm speakers wired in series to provide 8 Ohm impedance. In this case the motive fan unit was removed to make space and just the fan glued to the loco body roof. Compare with Figure 28.

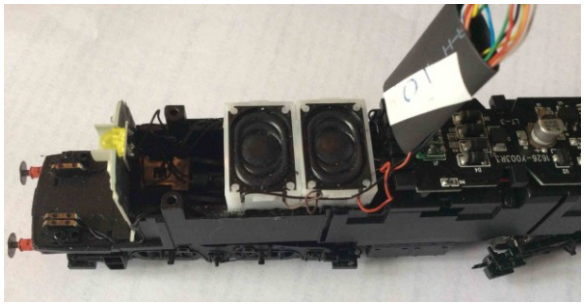


Figure 28B – Class 31 Main Range

7.4 Hornby Class 56 Factory Fitted Sound

Figure 29 shows the Class 56 21-pin Sound Fitted variant using an oblong speaker in a box. See also Figures 13 and 30 for other options.

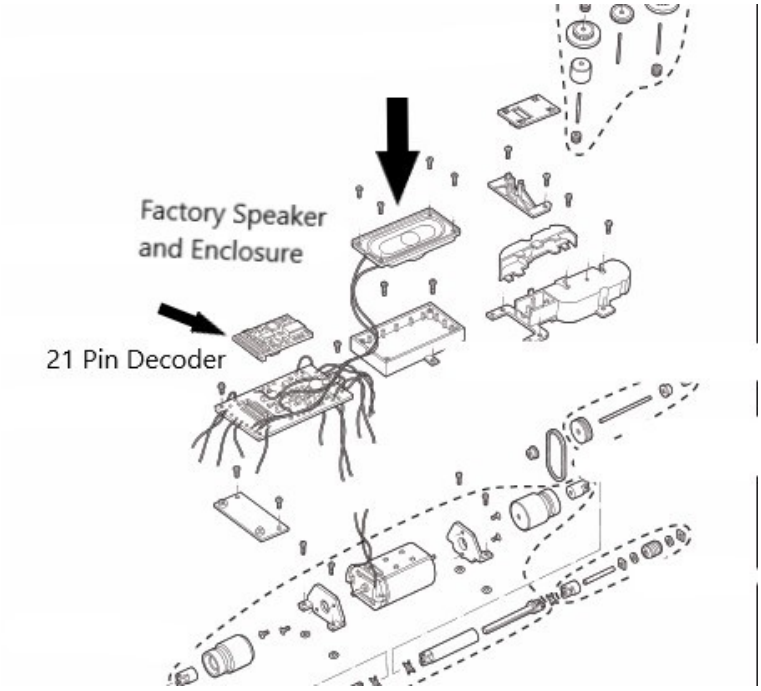


Figure 29 – Hornby Class 56 21-Pin Factory Sound

7.5 Hornby Class 56 Comparison

Figure 30 compares Class 56 DCC-Ready and DCC-Sound Fitted Speaker Space. See Figure 13 for use of this space.

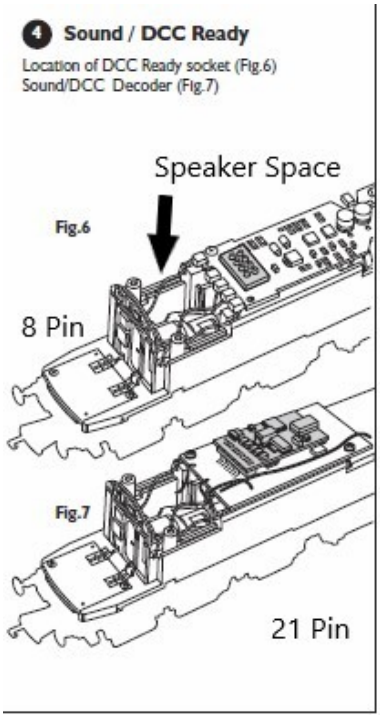


Figure 30 – Hornby Class 56 Speaker Space

7.6 Hornby Class 60

Figure 31 compares Class 60 DCC-Ready with DCC-Sound Factory Fitted. There appears to be adequate space in the DCC-Ready variant for the large oblong speaker and enclosure.

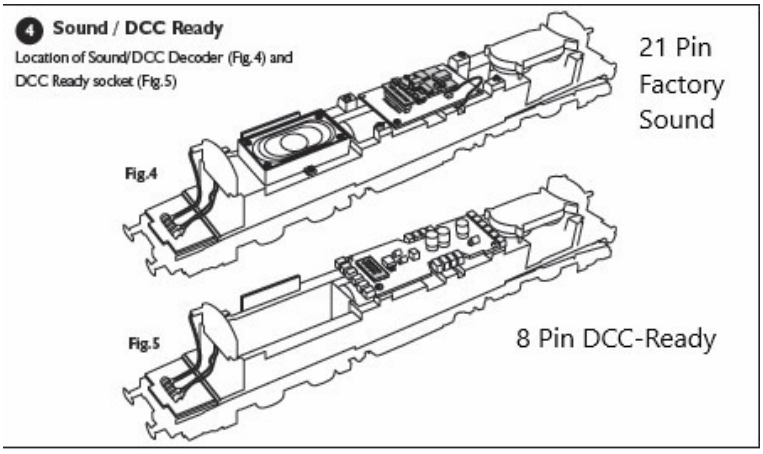


Figure 31 – Hornby Class 60

7.7 Hornby Duchess

Figure 32 shows the Duchess 8-pin DCC-Ready and 21-pin DCC-Sound Factory Fitted variants showing the round speaker and its mounting space under the chassis weight.

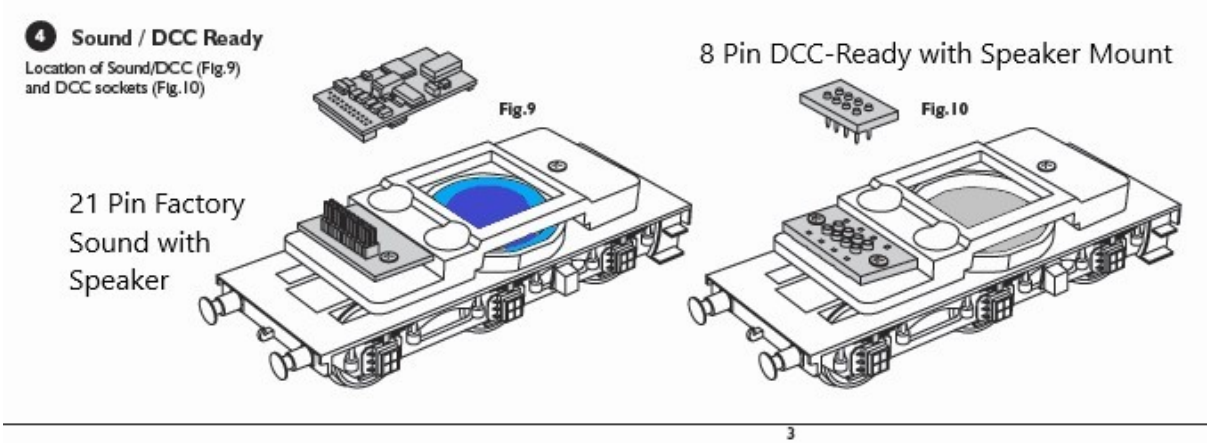


Figure 32 – Hornby Duchess Speaker Mount

7.8 Class 20 TTS

Finally Figure 33 shows the factory fitted TTS in a Class 20. The boxed rectangular speaker is mounted facing down.

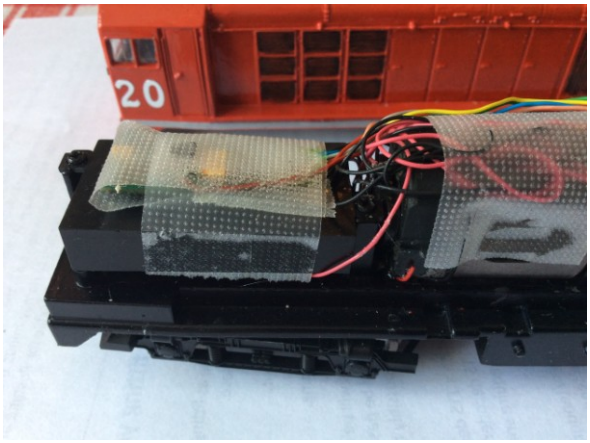


Figure 33 – Class 20 TTS Factory Fit

8. External Information – RM Web Forum

There is a lot of discussion about TTS on RM Web's Hornby and DCC Sound Forums. Contributor Richard Croft has converted many locos to sound including TTS. He has also posted many videos of them in action and has a useful direct comparison video of many speaker types. See his page on RM Web Forum. Modellers may find his installations useful when converting the same models.

(Author's note – Richard has agreed for this link to be posted)

Hornby cannot endorse any advice posted on RM Web Forums as they have no control over the content.