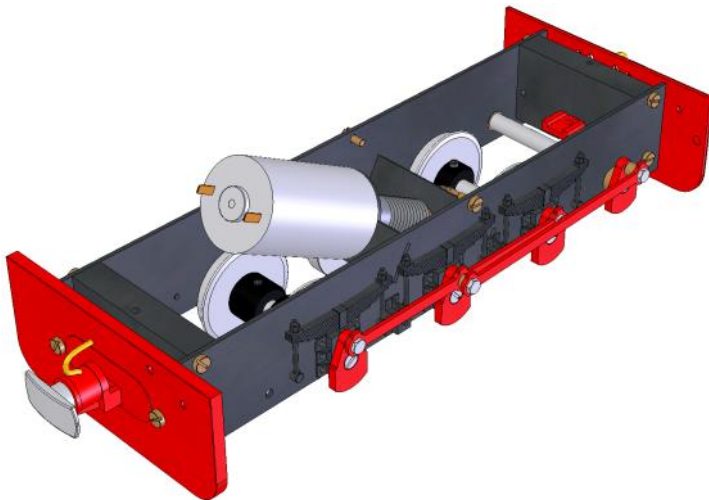




# Modular Locomotive System Instruction Manual *for* HBK-D1 Criccieth Castle Chassis Kit



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# **HBK-D1 Criccieth Castle Chassis Kit**

## **Introduction**

These instructions cover the construction of a 0-6-0 chassis as used in the ROUNDHOUSE Criccieth Castle Diesel locomotive.

No machining is necessary, though certain parts may require the use of hand tools to obtain a good fit.

Not supplied, but available separately are a Battery Pack, Charger, Switch, Electronic Speed Controller and Radio Control Set. We recommend the use of a 2.4 GHz Radio Control Set as this offers benefits over the old type 40 MHz equipment.

In the following pages, we will take you through the construction step by step with the aid of both written instructions and diagrams, just as we build the locomotives in our works. We have made the instructions as clear and concise as possible and have tried to show where and what problems are likely to be encountered and how to overcome them. This is not a 'build it in one evening' kit, however, anyone with a little patience and care can build a working battery chassis to be proud of, using the minimum of hand tools.

Before starting to actually assemble the chassis, check the contents against the check list on the back page and read through these instructions fully so that you identify all parts and understand where each is fitted. Refer to diagrams at all times as these will make it clear which way round certain parts go and what holes are used. From long experience, we have found that with this type of working model, it does not pay to work to 'close fits' in certain areas when assembling. Pay attention to any clearances and slotted holes etc. otherwise you may find that the first time that you run it that it will not run freely.

The more adventurous builders may wish to use this chassis kit as a basis for their own model and, there are many ways in which it can be modified to suit a different design.

Please note: - drawings and pictures in this manual are not to scale.

Thank you for purchasing this chassis kit. The materials and parts have been specifically selected to provide a rugged, powerful and hardwearing chassis, designed to give years of hard work and smooth service.

## **Tools Required**

The following tools will be required during construction:-

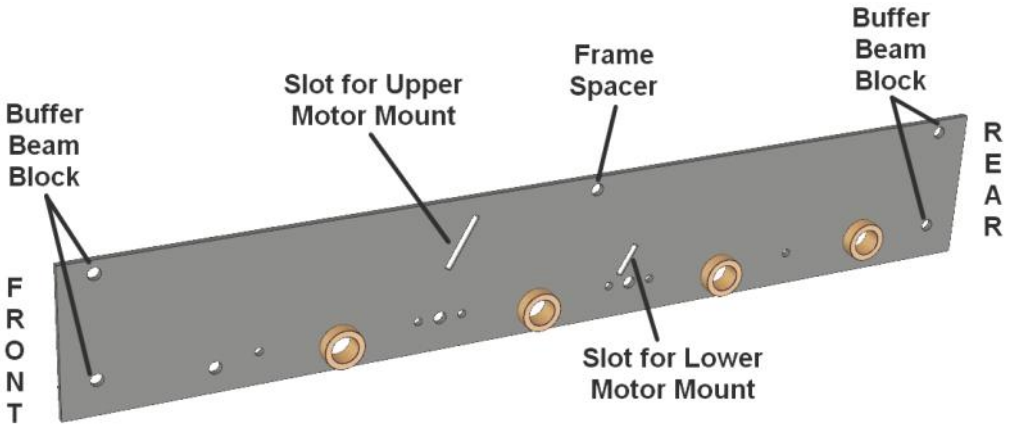
Small and medium sized screwdrivers.

Small (Swiss) files (needle files).

Pair of long nose pliers.

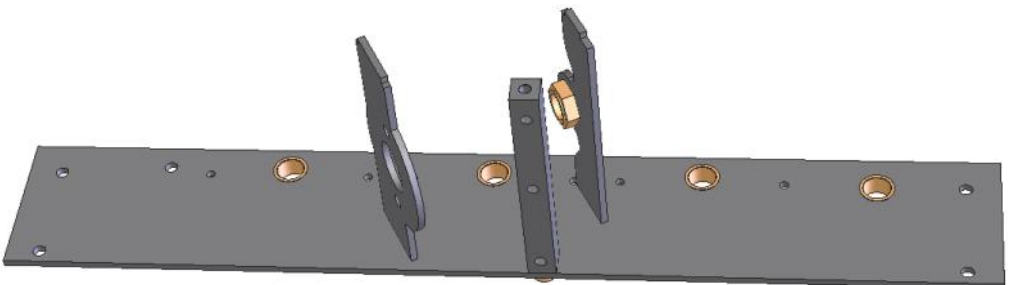
Small clamp (tool makers clamp or similar).

## Construction of the main-frames

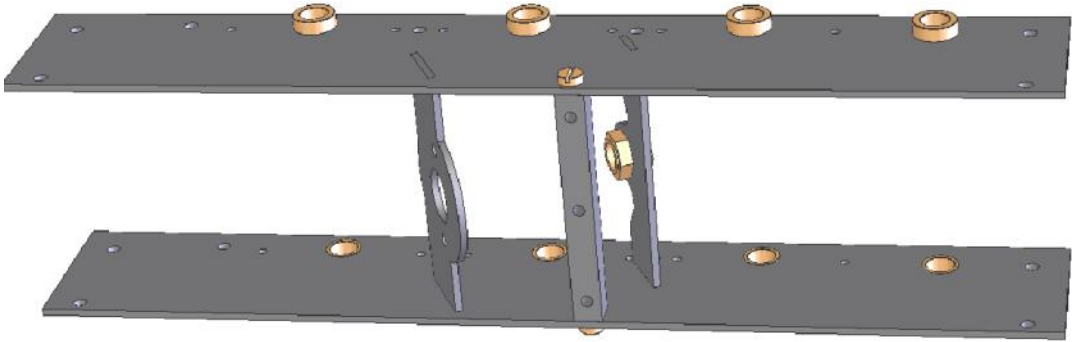


Refer to the diagram above which shows the Left Hand Frame. Note the position of the single frame spacer at the top middle of the frame. Using a M3 screw, fix the frame spacer to the left hand frame only, making sure that the holes are to the top and that the frame spacer is square to the frame. Lay the frame down so that the frame spacer is sticking up.

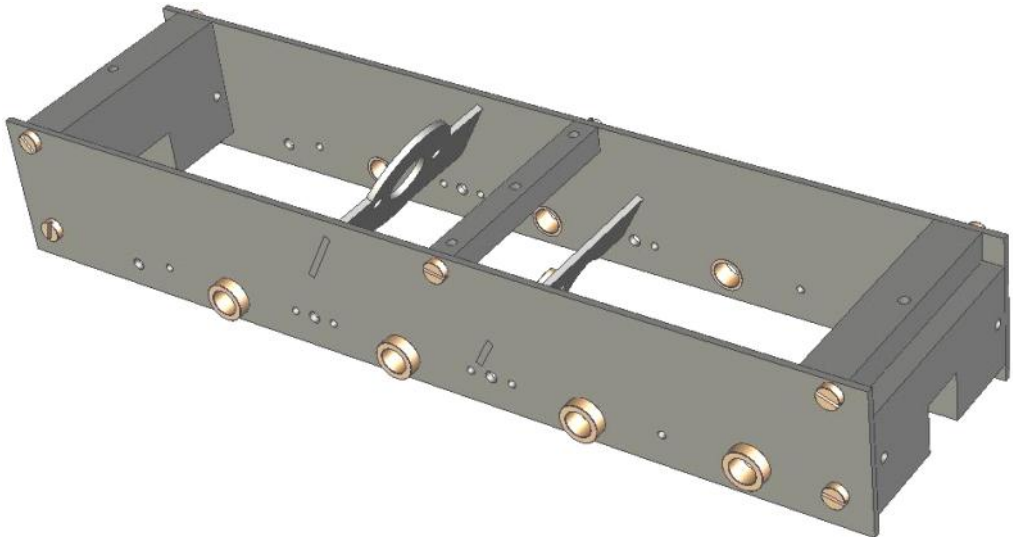
Take both the Upper and Lower Motor Mounting Brackets. First check that they both fit snugly into their respective slots on both chassis frames. The edges of both Motor Mounting Brackets and the slots into which they fit on the frame may need to be de-burred using a small flat needle file to remove any small burrs. Fit both brackets into their respective slots on the frame that has the spacer fitted. Make sure that both brackets are orientated correctly - see drawing below. The Lower Motor Mounting Bracket is fitted with a bush that is locked in place by a nut. Ensure that the nut is to the inside of the chassis - nearest the Upper Motor Mounting Bracket.



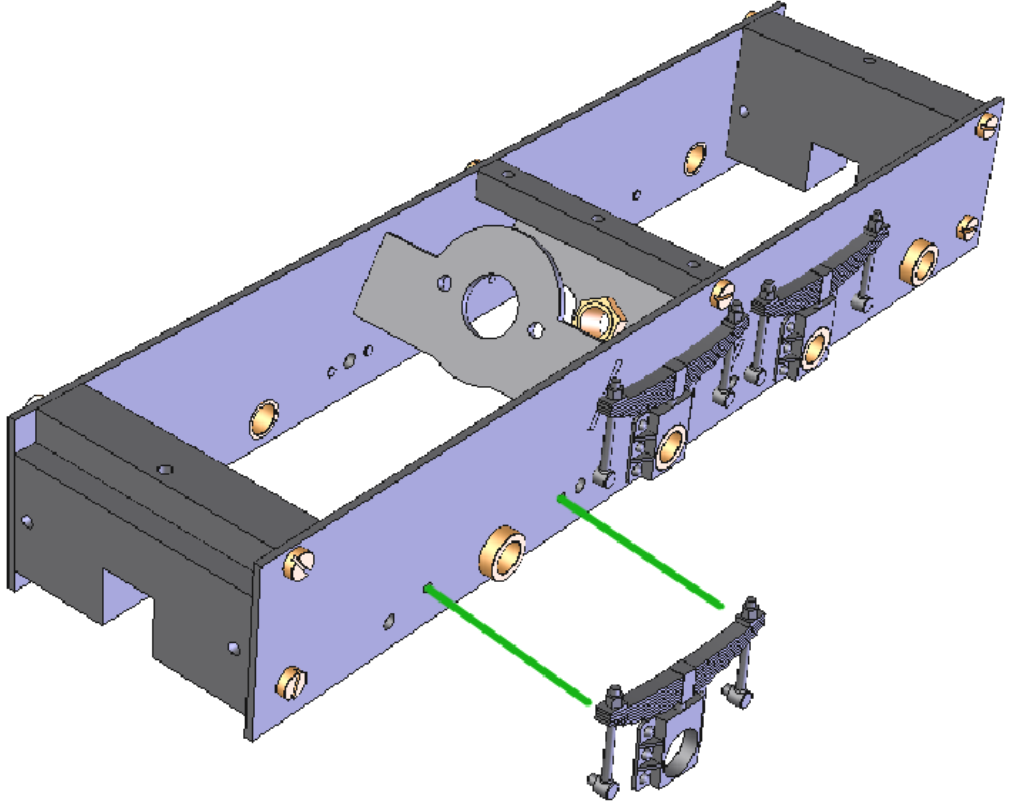
The Right-Hand Frame can now be fitted. Lay it down onto the end of the frame spacer and both motor mounting brackets. Check that both brackets fit neatly into their respective slots and use a M3 screw to fix the frame to the frame spacer.



We can now fit the 2 Frame spacer Blocks. Both the front and rear spacer blocks are identical. Using M3 screws fit the spacer blocks to the frame as shown below. Once again, note the orientation.

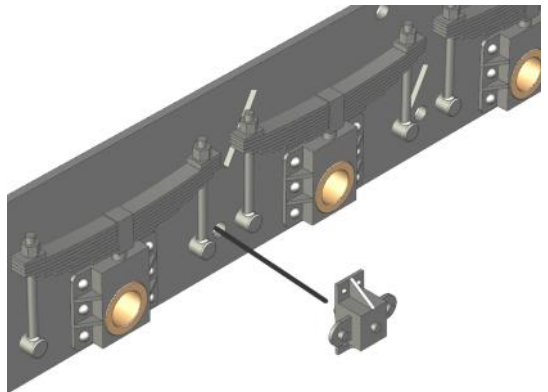


The axle box / spring castings can now be fitted. These fit over the axle bushes and the lugs locate into the small holes in the frame. These are simply glued in place with either Super-Glue or an epoxy resin glue. Make sure that the frame is clean and free from oil so that the glue will work.



When all 6 axle boxes are fitted the dummy spring hangers can be fitted. These are small castings, and once again are glued to the frame. This is a convenient point at which to paint the frames and buffer beams. This may be done with either cellulose or enamel, both of which are readily available in spray cans for a good finish. The metal should be thoroughly cleaned to remove the anti rust oil with which they are coated during manufacture, before being primed and painted with colour

At ROUNDHOUSE, we paint the frames Gloss Black and the Buffer Beams are painted Signal Red. Of course you can paint these parts whatever colour you wish.

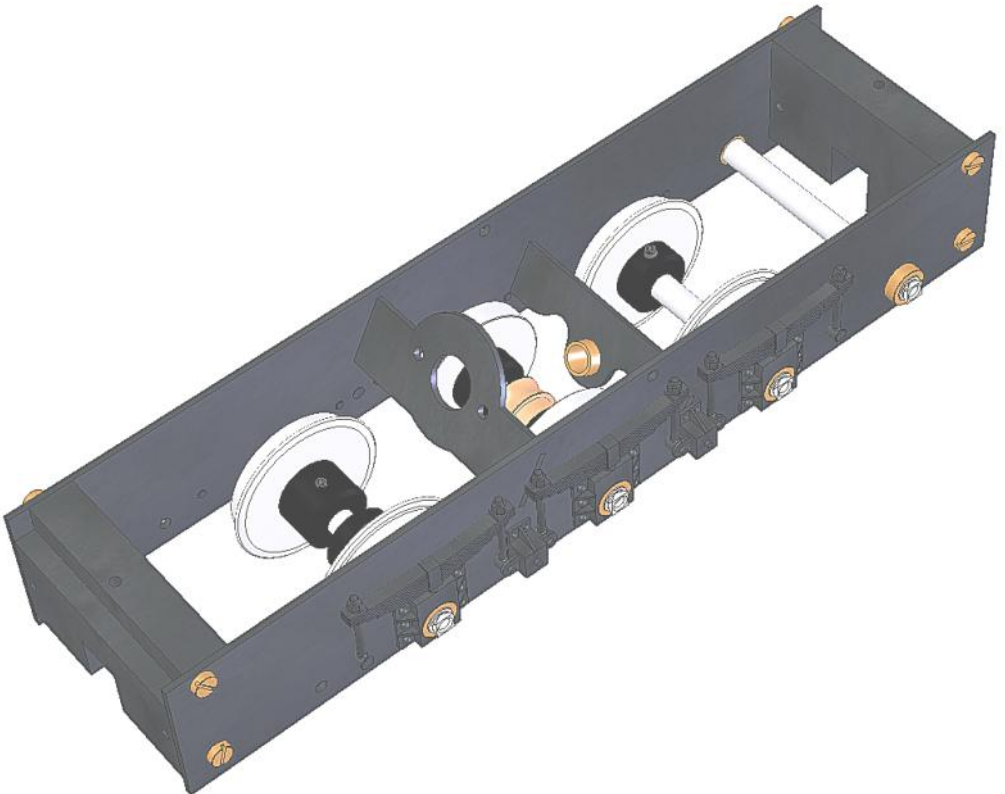


## WHEELS & AXLES

The wheels and axles can now be fitted after first cleaning any paint out of the axle bushes and checking for free running by pushing an axle only, through each pair of bushes.

There are three standard axles. The fourth axle differs from the others in that it has a flat on it, offset to one side. We call this a Drive Axle with locking flat. This axle will have the brass worm wheel fitted between the wheels.

Start with the rear axle first - this is the axle that doesn't have any wheels on it - we call it the Jack Shaft. Push an axle through one side bush and then through the axle bush on the opposite frame. Check that the axle passes freely through both axle bushes and will rotate easily. If it doesn't easily pass through the second axle bush, it will need to be pushed slightly to one side to line the bushes up.



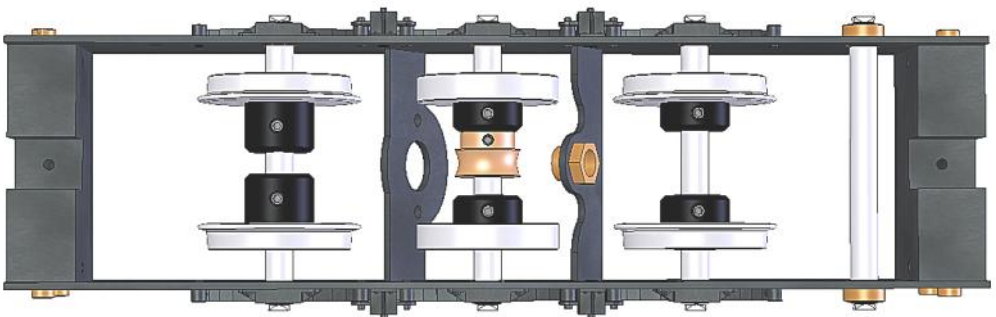
To do this, push the axle through one axle bush until it is just short of going into the second axle bush. If the end of the axle is not in the centre of the second axle bush, gently push the axle over a small amount until it lines up with the second axle bush. Repeat the process by putting the axle through the other bush.

The remaining 3 Axles will each have a pair of wheels fitted to them. The centre Drive Axle with locking flat has the pair of Flangeless wheels and also the brass worm wheel that the motor will drive.



Start with the front axle, slide it through both axle bushes and check that it is free to rotate. Now, slide the axle so that it is partly through one axle bush, slip two wheels on from inside the frame checking that the bosses and grub screws are all towards the inside. Push the axle through the other bush. Do the same for the rear axle - this is the one nearest the Jack Shaft.

The centre axle - the one that has flangeless wheels, also has the brass worm wheel fitted between the wheels. After sliding the first flangeless wheel onto the axle, slide on the brass worm wheel and then the second flangeless wheel. The locking flat on this axle is offset. It doesn't matter which side the flat is at, so long as when the brass worm wheel is fitted the teeth of the worm wheel are positioned to the centre.



Viewed from underneath, your chassis should look like the drawing above. The next step is to fit the outside cranks.

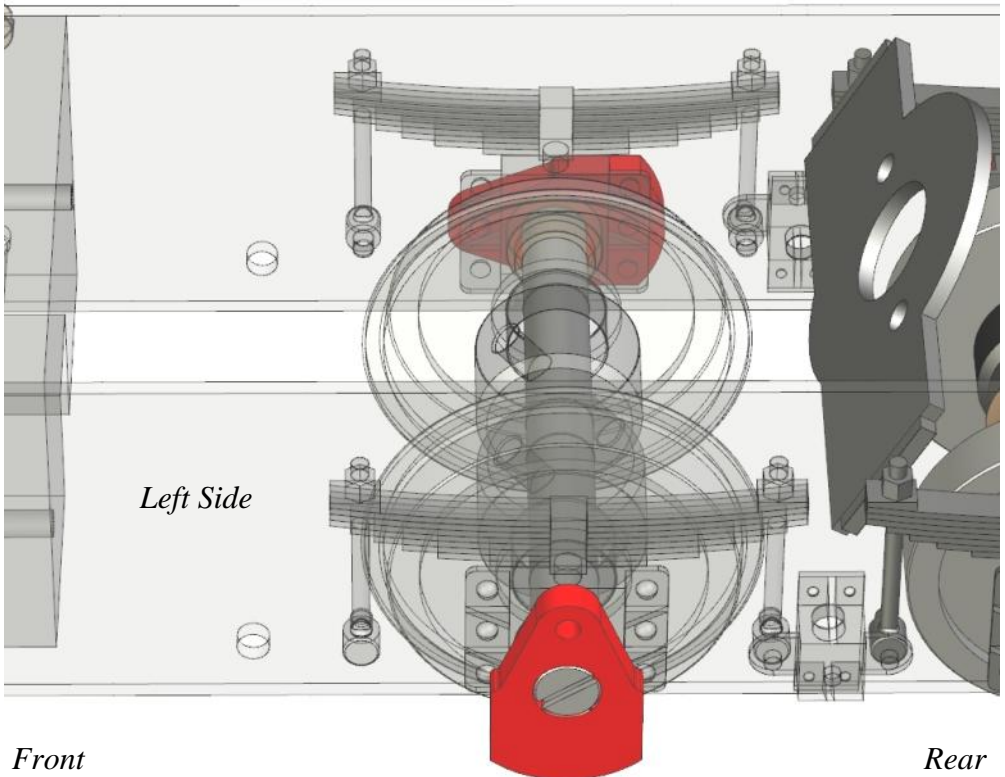
## OUTSIDE CRANKS

The outside cranks have square holes in the centre to ensure the 'quartering' is correct. One side of the centre hole is countersunk, and should be to the outside, so that the fixing screw finishes up flush with the outer face.



Now convention says that the right hand side should lead. All this means is that when the model is running forward, the right hand crank is 90 degrees, or a quarter of a revolution in front of the left; hence the term 'quartering'. We always observe this rule of the right hand side leading, though it would make no difference at all to the running if it were the other way round.

Refer to the drawing below to see quartering of the front axle.





## COUPLING RODS

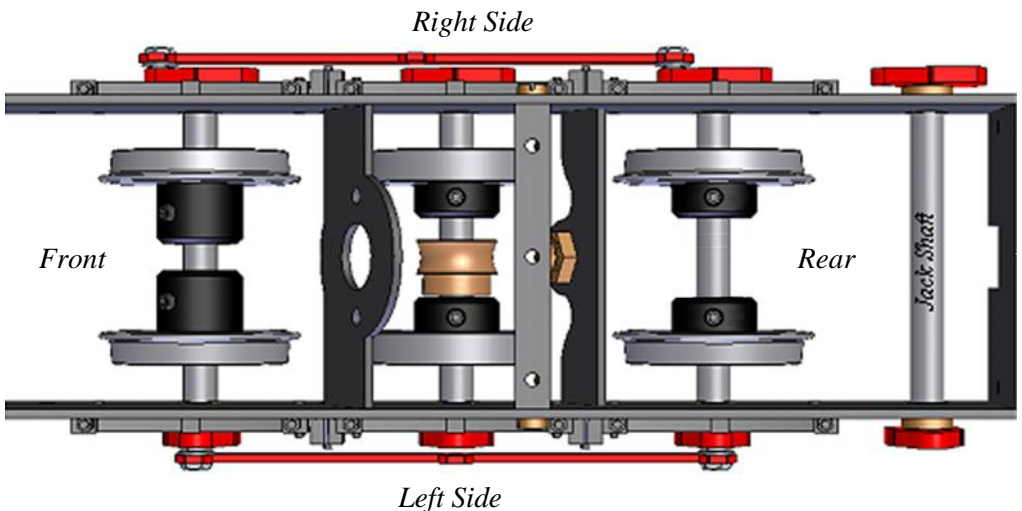


There are two coupling rods. These are the rods that have three holes in them, and their purpose is to link the three pairs of wheels together.

To start with, ignore the centre axle (with the flangeless wheels and the brass worm wheel). Take a Short Crank Pin and a 5BA steel washer and fix a coupling rod to the outside crank on the rear of the three axles with the wheels on it. Check that the lugs on the Coupling rod are pointing to the top. Then connect the front end of the coupling rod to its outside crank using a short crank pin with another 5BA steel washer between the rod and the crank.

Repeat for the opposite side.

Your chassis should look like the drawing below. In this drawing the Right Hand Side of the chassis has the outside cranks pointing towards Front Dead Centre.



Starting with the front axle fit an outside crank to each end of the axle. The countersunk hole in the outside crank should be to the outside so that the 4BA countersunk screws will fit neatly. Ensure that the cranks are pushed well onto the squared ends of the axle. It may help to lightly press the cranks on by gripping between the jaws of a vice or 'G' clamp. Fix the outside cranks onto the axle using the 4BA CSK steel screws.

Check the end float in the axle by sliding it from one side to the other. If this movement is excessive, fit one of the 1/4" bore brass shims onto the axle between the outside crank and the axle bush on the right hand side only. As a general rule, with the axle held firmly over to one side, if a shim can be easily slipped into the gap between outside crank and axle bush and still leave a little space for side movement, then it should be fitted. Check the end float in the axle once again. If it is still excessive a further shim should be added between the outside crank and the axle bush on the left hand side. Check the end float again and make sure that the axles can rotate freely.

Repeat the above procedure so that the end float in all four axles is acceptable. Most of the Criccieth Castle chassis that we build at Roundhouse don't require shims to be fitted.

The driving wheels are moveable on their axles and are locked in place by a small grub screw. They should be adjusted so that the brass Back to Back gauge supplied will just slip between their inner faces. Ensure that the wheels are evenly spaced relative to each side frame. Do not over tighten the grub-screws. Note that the wheel gauge can be used for either 32mm gauge (SM32) or 45mm gauge ('G' scale) depending on which end is used. Make sure that all three axles and the Jack Shaft rotate freely.

We will now fit the Coupling Rods.

Slowly rotate both front and rear wheels together and feel for any tight spots. If it sticks at all, look which side has its outside cranks at or near front or rear dead centre (that is pointing to the front or rear of the chassis). On that side remove the front crank pin and check to see how the hole in the coupling rod aligns with the hole in the outside crank. You may find that, with the cranks in the position where you felt the tight spot, the hole in the coupling rod is offset to the front or rear of the hole in the crank. Slightly elongate the coupling rod hole in this direction with a small round file to stop the coupling rod binding on the short crank pin. Remove only a very small amount at a time and keep trying it until the wheels rotate freely without any tight spots. Don't forget that a 5BA steel washer should be between the rod and the outside crank on all four cranks.

Now, fit a short crank pin and washer to one side only through the centre hole in the coupling rod and into its outside crank. As before, rotate the wheels and check for any tight spots. If there are, then this side centre hole will require slightly elongating as before. When this is running freely, repeat for the centre hole on the other side. In this way, you should end up with all six cranks connected and the wheels running freely. Don't forget that a 5BA steel washer should be between the rod and the outside crank on all six cranks.

We can now fit the Jackshaft Rods.

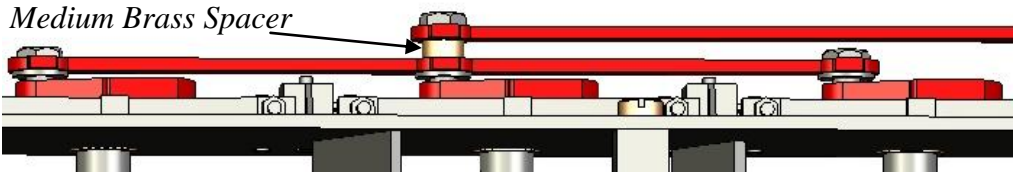
## JACKSHAFT RODS



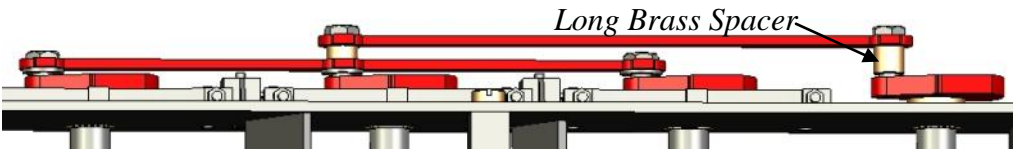
*Jackshaft Rod*

First, remove the short crank pins from the centre of the coupling rods. This is where one end of the Jackshaft rod will be fixed, using a long crank pin. Take a long crank pin and push it through one of the holes in the Jackshaft Rod. Slide one of the Medium Brass Spacers over the protruding end of the long crank pin and screw

this into the centre outside crank, passing through the centre hole of the coupling rod. Make sure that there is a steel 5BA washer between the coupling rod and the outside crank. There are no 5BA steel washers between the Brass Spacers and the rods.

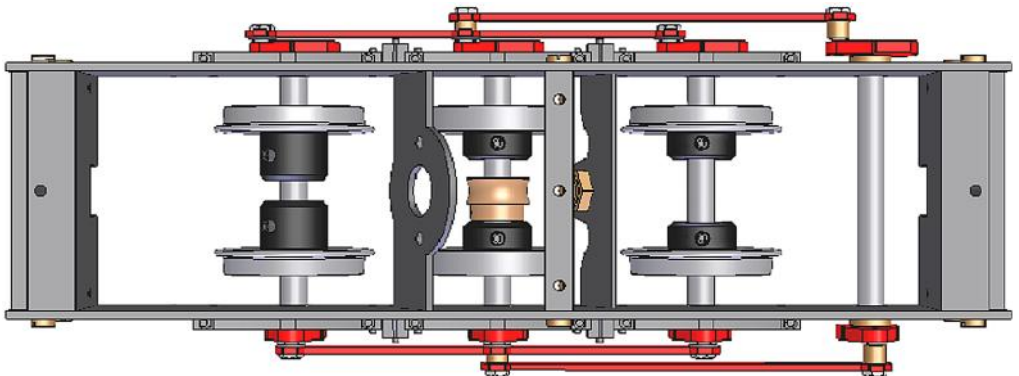


Next, take another long crank pin and push it through the remaining hole in the Jackshaft Rod. Slide a Long Brass Spacer over the end of the long crank pin and screw this into the remaining outside crank at the rear of the chassis. Don't fit any steel washers to either side of this long brass spacer.



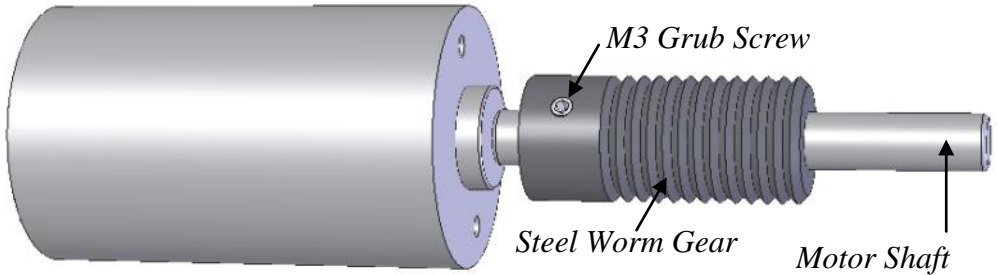
Repeat the above process to fit the Jackshaft Rod to the other side. Check that the wheels rotate freely. If the wheels don't rotate freely, check for tight spots and if necessary gently file the holes in the Jackshaft Rod using the same technique as when fitting the coupling rods.

Your chassis should now look like the drawing below.



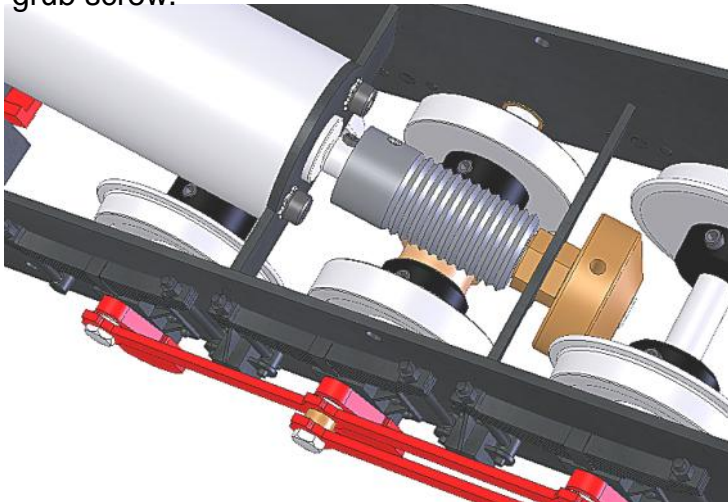
## MOTOR

Take the motor and the steel worm gear. Slide the steel worm gear off of the motor shaft. The steel worm gear is fitted with a M3 grub screw. Check that the steel worm gear slides easily on and off the motor shaft. If not unscrew the grub screw a little in the steel worm gear using the Allen key supplied.



We can now fit the motor to the chassis.

First, remove the centre frame spacer to make access easier. Slide the brass worm wheel on the centre axle to one side. Now take the steel worm gear and place it between the upper and lower motor mount brackets. Ensure that the M3 grub screw in the steel worm gear is nearest the upper motor mount bracket. Slide the motor shaft through the upper motor mount, into the steel worm drive and then into the brass bush in the lower motor mount. Fix the motor loosely to the upper motor mount, using the socket screws and washers. At this stage, fit the brass Fly Wheel to the protruding end of the motor shaft as shown below. Lock in position with the 4BA grub screw.



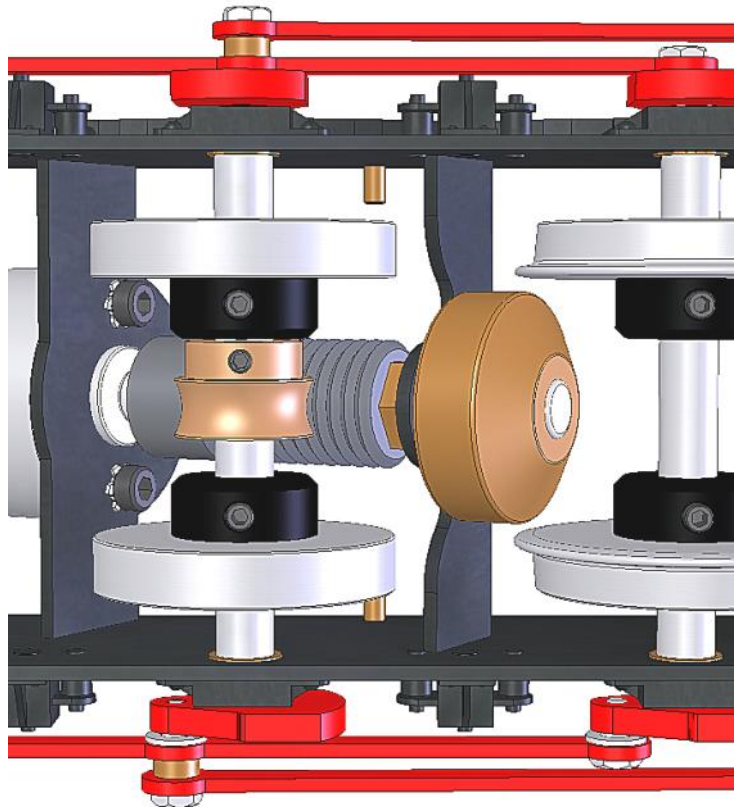
*Motor with steel worm gear and fly wheel fitted.*

*This drawing has the centre frame spacer removed.*

## ALIGNING THE GEARS

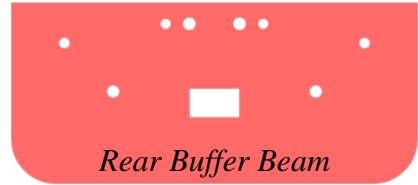
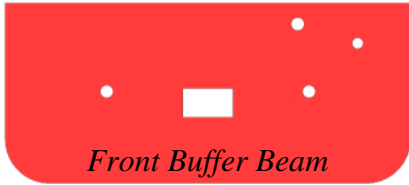
Turn the chassis upside down. Check that the locking flat on the centre axle is visible and then slide the brass worm wheel back to the middle of the axle, making sure that the grub screw lines up above the locking flat. You may have to rotate the steel worm gear slightly so that both the gears mesh. Check that the teeth of the brass worm wheel are in the centre of the steel work gear. Tighten the grub screw in the brass worm wheel onto the locking flat of the axle, and then tighten the grub screw on the steel worm gear to lock it onto the motor shaft.

Use the large Allen key to tighten the socket screws that hold the motor to the upper motor mount bracket. The gears don't want to be too tightly meshed together - a small amount of play is required here so that the motor will turn smoothly. The centre frame spacer can now be fitted back between the frames.



All that remains to do is fit the buffer beams and centre buffers.

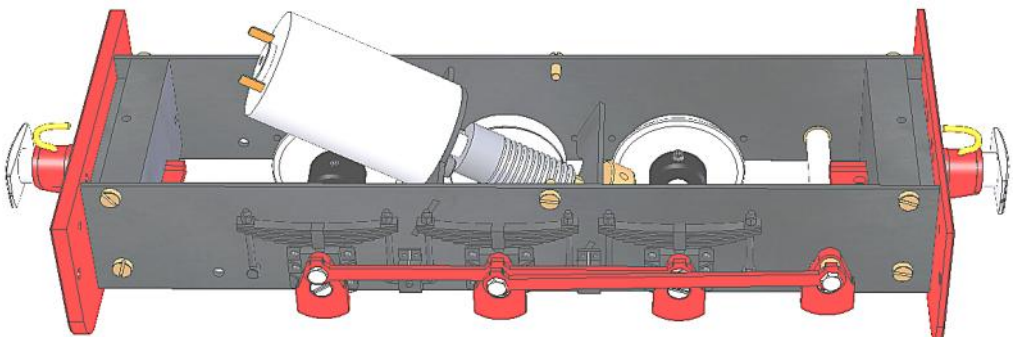
## BUFFER BEAMS AND CENTRE BUFFERS



The front buffer beam has fewer holes and is much thicker than the rear buffer beam. The only holes that we will use are the ones at either side of the square hole. Use two M3 brass screws to attach each buffer beam to its buffer beam block. The extra holes in the buffer beams are not used in this chassis kit - at Roundhouse we use these holes to fit dummy vacuum pipe castings. You can fill these before painting the buffer beams if you wish. Once the buffer beams are in place, simply push the centre buffers through the square holes and secure underneath with another M3 brass screw.

Congratulations! The kit is now finished.

To power the motor simply connect a battery supply of between 6 volts to 14.4 volts and a switch to terminals on the motor. To radio control the chassis, a Radio Control set with Transmitter and Receiver is required, plus an electronic speed controller such as the 'LocoGlyde' speed controller from Roundhouse.



## HBK-D1 CHECKLIST

### Criccieth Castle Chassis Kit

1	Pair mainframes with axle bushes fitted.
1	Pair buffer beams.
1	Motor Spacer Plate.
1	Worm Drive Spacer Plate.
1	Motor with Steel Worm Drive and Fly Wheel.
2	Socket screws and washers.
1	Brass Gear & Drive Axle with locking flat.
2	Allen Keys. 2.5mm & 1.5mm.
1	3 hole Frame spacer.
1	Front Frame spacer Block.
1	Rear Frame spacer Block.
8	Outside cranks.
3	Axles.
8	1/4" Bore Brass Shims.
2	Coupling Rods, 3 holes.
2	Jackshaft Rods, 2 holes.
1	Wheel Back to Back gauge and Allen Key. 2mm.
2	Centre Buffers.
14	M3 x 6 CH Brass screws.
6	Short Crank Pins.
4	Long Crank Pins.
2	Medium Brass Spacers.
2	Long Brass Spacers.
8	4BA Steel CSK Screws.
6	5BA Steel Washers.
6	Axle Box castings.
4	Axle Box Connector Castings.
2	Flanged Driving wheels with Long insulated bush.
2	Flanged Driving wheels with Short insulated bush.
2	Flangeless Driving wheels with Short insulated bush.
	Grub screws fitted to all wheels.

CHECKED