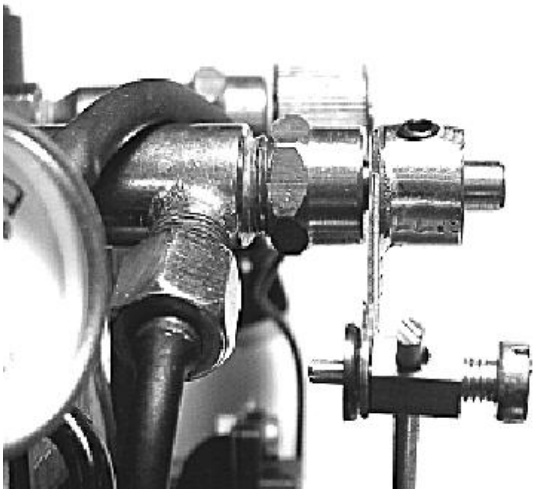
Modular Locomotive System Instruction Manual
for
HBK12 R/CFittings Only Kit For Billy, Katie & George



Roundhouse Engineering Co. Ltd.
Units 6-10 Churchill Business Park.
Churchill Road, Wheatley.
Doncaster. DN1 2TF. England.
Tel. 01302 328035 Fax. 01302 761312
Email. mail@roundhouse-eng.com

www.roundhouse-eng.com

HBK12 R/C Fittings Kit

Introduction

These instructions cover the fitting of radio control to Billy, Katie and George 0-4-0 locomotive kits.

It contains all necessary brackets, fixings etc. to enable the builder to fit his or her own radio equipment.

Roundhouse locomotives are fitted as standard with 2.4GHz radio equipment and all fixings and brackets are designed for this. If using radio equipment from another manufacturer, ensure that it is of similar specification or problems could be encountered.

Modern 2.4GHz radio control equipment should be used as this gives fine control with the minimum of interference.

Before starting assembly, check contents against the list and read through the instructions fully, referring to diagrams where necessary, so that you identify all parts and understand where each is fitted.

List of Contents

1 Etched brass chassis cover plate
1 Etched brass battery box
1 Plastic 4 x AA battery holder
1 Battery connector clip with lead (PP9 type)
1 Reversing rod with Starlock washer (Billy)
1 Reversing rod with Quicklink and lock nut (Katie & George)
2 Reversing servo mounting posts
1 Regulator control rod with Quicklink and lock nut
2 Push rod connector with screw and Starlock washer.
1 Steam regulator (r/c type)
1 Regulator arm
2" (50mm) of small (2.4mm dia.) shrink wrap
4-1/2" (115mm) of large (4.8mm) shrink wrap
8 M3 x 6 CH screws
2 M3 nuts
4 M3 washers
2 8BA x 3/16" CSK. screws
2 8BA nuts
3 Plastic cable ties.

You will need to supply

A 2.4 GHz two channel radio control set complete with transmitter, receiver, switch harness and two micro servos' (Hitec HS81 or equivalent). Standard or mini servos will not fit correctly.

If three or four channel equipment is used, only two channels will be needed for this locomotive.

Construction

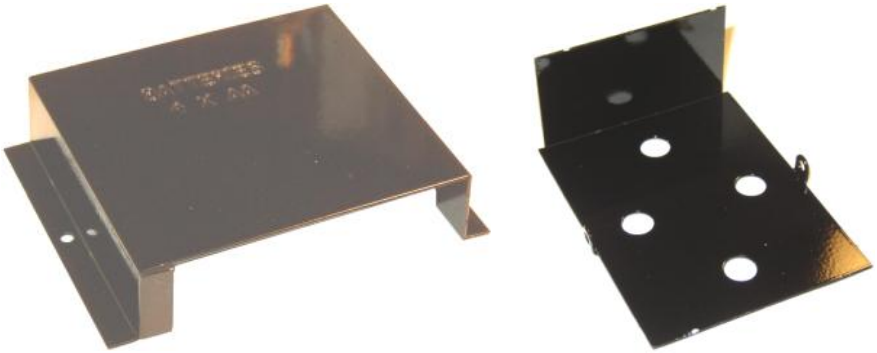


Diagram 1

Folding battery box and chassis cover plate

First of all, fold up the etched brass battery box and chassis cover plate as shown in diagram 1 and paint them as required. Note that all half etched fold lines should be to the inside of the fold.

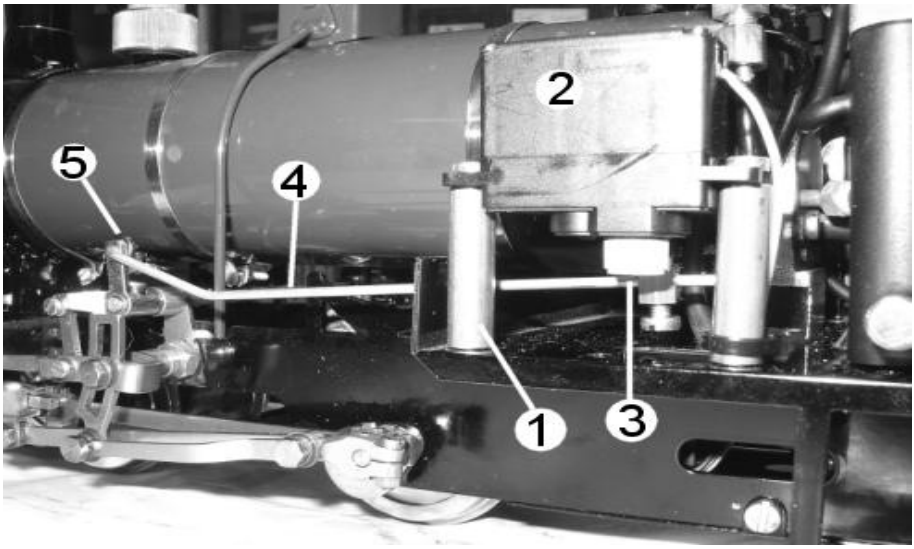


Diagram 2a Reversing Servo (Billy)

1/ Reversing servo mounting posts. 2/ Reversing servo. 3/ Short servo horn. 4/ Reversing rod. 5/ Starlock washer.

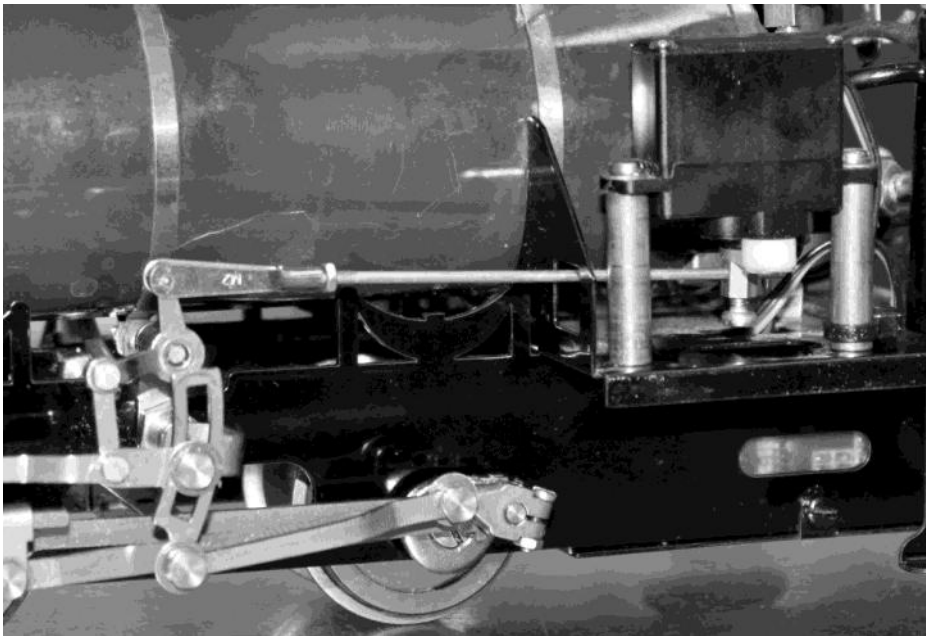


Diagram 2b Reversing Servo (Katie & George)

The reversing servo for operating the Walschaerts valve-gear is fitted first.

The servo mounts on to the left hand side of the foot plate with the three coloured lead to the rear, using the two brass posts, M3 brass screws and washers (on the top screws only) as shown in diagram 2. The lead should be fastened to the rear servo mounting post with a plastic cable tie, and then passed down through the small rectangular hole to the left of the boiler.

Billy has a different reversing rod to Katie & George as shown in the pictures, but do not fit the horn or linkage at this time.

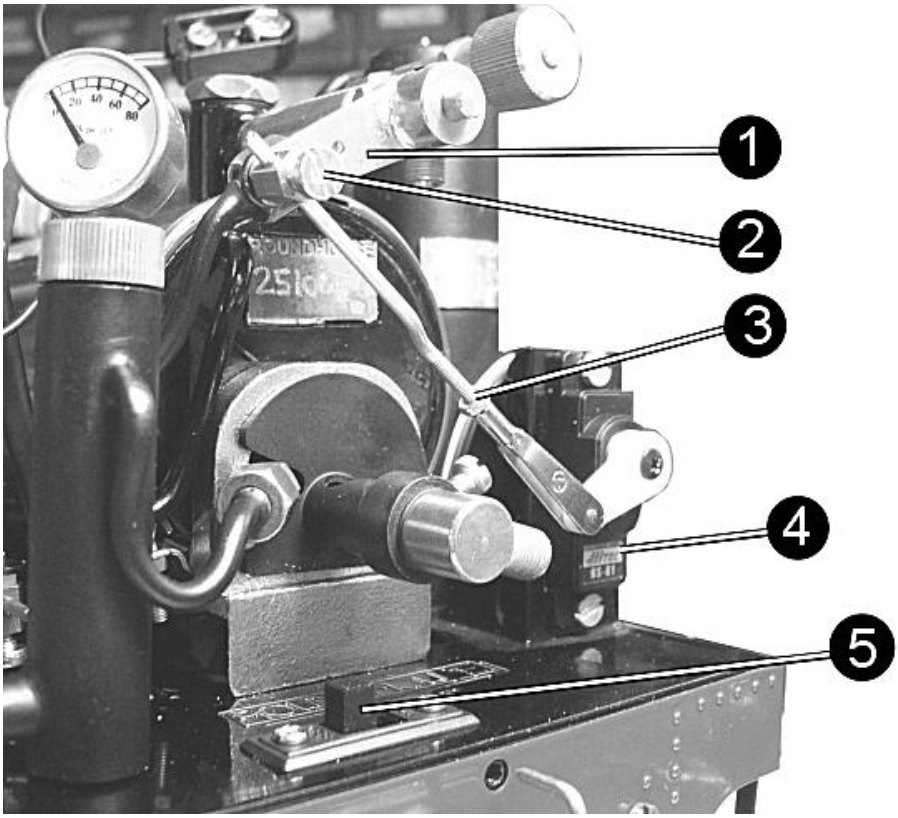


Diagram 3 Regulator Servo

1/ regulator arm. 2/ push rod connector. 3/ regulator control rod with Quicklink and lock nut. 4/ regulator servo. 5/ on/off switch (Billy only).

Fit the regulator servo to the bracket on the right hand side of the foot plate (which you fitted during the body construction). The servo is passed through the rectangular hole in the bracket from the rear with the lead to the top. The lead can then be passed down the front of the servo between it and the gas tank and through the rectangular hole in the foot plate to the left of the servo. Fasten the servo in place with a M3 x 6 Brass screw, washer and nut through the top and bottom mounting flange.

Do not fit the horn or linkage at this time.

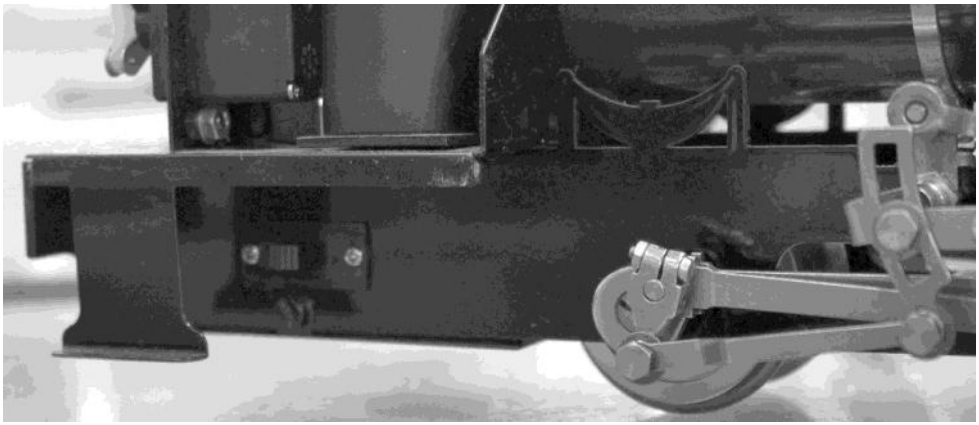


Diagram 4 ON/Off switch (Katie & George)

Fit the on/off switch.
On Billy, it mounts on the rear of the foot plate (diagram 3) using the cut outs provided. The switch body sits on the underside of the foot plate with the slider pointing up for access through the cab rear opening.
On Katie or George, it is fitted to the right hand main frame below the cab footplate (diagram 4).

One of the switch leads (see your r/c equipment instruction book for details) will plug into the receiver, do not alter this. The other lead will go to the battery holder and this must be modified to connect to the new battery holder supplied with this kit.

Switch harnesses from different manufacturers vary in length and the type of plug and socket used to connect their normal battery holder. It is often easier just to cut the plug from the end of this lead and attach the PP9 lead, but check lengths before doing so. The lead must be extended by soldering the PP9 type clip to its end to give an overall length of about 6½" from the floor. Before soldering the wires together, pass the lead up through the left hand footplate cut-out (where the reversing servo lead passes through). Slide the battery lead through the large diameter heat shrink tubing, but do not shrink the tubing yet.

Ensure that both red wires and both black wires are connected together. Two short lengths of the small diameter shrink-wrap about ½" (13mm) long should be cut from the 2” (5 cm) piece supplied, to insulate the soldered joints.

Shrink wrap is a special rubber tube which reduces in diameter when heated. To use it, first slide it over the end of one of the two wires to be joined then, after the wires are soldered together, slide it back to cover the exposed joint and overlap the insulation at little at each side. Finally, rub the hot soldering iron over the shrink wrap and it will close tightly round the joint.

In order to set and adjust the linkages, the r/c equipment must be connected up and batteries fitted.

The short lead from the switch should be plugged into the receiver in the socket typically marked (B) or BATT. The other lead with the PP9 clip then attaches to the battery holder. For now, just lay the battery holder at the side of the loco, it will be fitted to the body later.

The receiver will be housed between the frames under the foot plate area and retained by the chassis cover plate supplied with this kit.

The 2.4 GHz receivers have a short aerial wire. All that is needed is to fold the aerial wire back on itself, and take it down to the back of the receiver.

Plug the regulator servo lead into channel 2 on the receiver and the reversing servo lead into channel 1.

All loose wires, except the long battery wires, can be tidied up using the cable ties supplied. Ensure that none are in contact with hot pipes or fittings and out of the way of any moving parts. Finally, fit the chassis cover plate to protect the switch and receiver. The two small tags which are bent upwards go either side of the chassis and will line up with two tapped holes in the frames for two M3 x 6

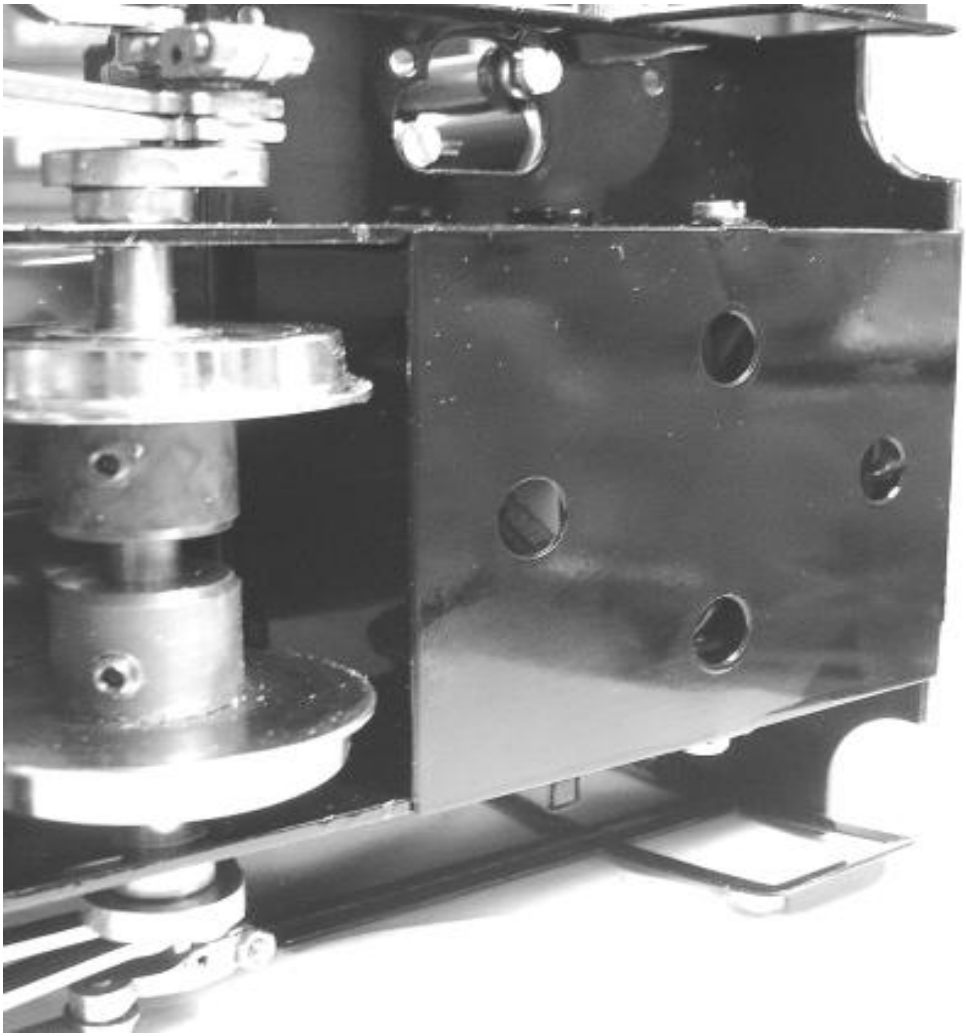


Diagram 4 Chassis Cover Plate

retaining screws. The large flap fits up between the frames behind the rear wheels. When in place this cover boxes in the rear portion of the chassis (diagram 4).

Now that the main items are installed, we can fit and adjust the linkages, first however, the spring which self-centres the left hand (regulator) control arm on the transmitter, needs removing. The right hand control (reverser) can be left sprung loaded to centre as

this gives a convenient mid-gear position.
Refer to the manufacturer's instructions regarding the removal of this spring as details vary on different makes of radio control equipment.

When the transmitter modification is complete, fit the required batteries.

Fit four batteries in the receiver battery clip then connect the battery clip to the end of the battery lead from the switch.
Switch on both transmitter and receiver.
Moving the right hand control lever should now cause the reversing servo to operate and moving the left hand lever should cause the regulator servo to operate. If this is not the case, check all connections and batteries.

Set the reversing servo up first as follows.
Prepare a servo horn so that it has a single arm with a connection hole approx. 8mm from the centre. If none of the arms supplied

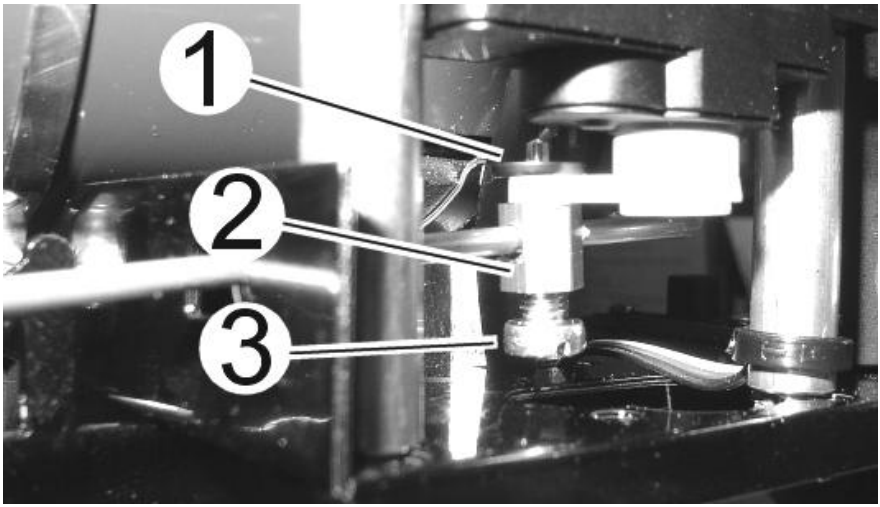


Diagram 5 Reversing Servo Push Rod Connection

1/ Starlock washer. 2/ Pushrod connector. 3/ Lock screw

with your r/c set have a suitably positioned hole, you will have to drill one using a 1/16" or 1.6mm drill. The positioning of this hole is quite critical as it will affect the travel of the radius rod in the expansion link, but as different makes and types of servo have slightly different angles of movement, it is not possible to give an exact measurement - some trial and error is required.

Fit a push rod connector as shown in diagram 5. Push the spigot through the hole from the front and push the Starlock washer over the spigot to lock it on. Fit the screw in the end of the connector loosely.

Trim the plastic servo arm to length.

Ensure that the control lever on the transmitter is in the centre and that the trimmer (small black lever below the main lever) is also in the centre then push the short servo arm up onto the splined servo spindle pointing in towards the boiler at 90 degrees and fix in place with its retaining screw. The shaped cut-out in the footplate below the servo will allow screwdriver access to the horn and push rod connector screws. This has now set the servo horn for mid gear and moving the control lever either way will move the horn accordingly. Set up the transmitter, using the servo reversing switch if necessary, so that moving the lever to the left engages forward gear (moves horn forwards) and to the right engages reverse (moves servo horn to the rear).

Select the correct reversing rod for your model and slide the straight end through the cross hole in the push rod connector.
On Billy, push the short end bent at 90 degrees through the lifting arm from the outside and push the Starlock washer over the end on the inside to retain it. The star lock washer is a tight fit and should be fitted with care, supporting the top of the arm whilst pushing it on.
On Katie or George, spring open the forks of the Quicklink and clip it onto the lifting arm.

The linkage must be adjusted so that when the servo is set to mid

gear, the radius rod is roughly in the centre of the curved slot in the expansion link. Nip up the locking screw in the push rod connector. Now, check for movement to full gear in both directions and make fine adjustments to the linkage by moving the rod in the push rod connector until the radius rod moves an equal amount both up and down the expansion slot.

Note that the radius rod should not travel the full length of the expansion link, but should stop a small distance from either end.

Many modern r/c transmitters have end point adjustment (EPA) facility which will simplify the final adjustment if available.

A replacement r/c type regulator is supplied with this kit. Although externally it looks the same as the manual type supplied with the boiler kit, internally it is quite different. It is designed to operate with a servo where a small amount of movement must give full control from closed to fully open. It also relies on a '0' ring to ensure that it closes fully with the minimum of force.

Although the standard needle valve supplied with the boiler can be used with radio control, its operation, particularly in closing fully, is not always reliable.

Fitting of the r/c type regulator to the boiler is the same as for the manual type and is described fully in the boiler kit instructions.

Prepare the regulator arm by fitting the push rod connector to the fourth hole with the centre boss of the arm and the push rod connector both on the same side. Push the spigot through the hole from the front and push the Starlock washer over the spigot to lock it on. Fit the screw in the end of the connector loosely. See diagram 6.

Set the left hand control lever on the transmitter to the bottom and ensure that the trimmer at the side of it is at the top. This will park the servo in its normally closed position.

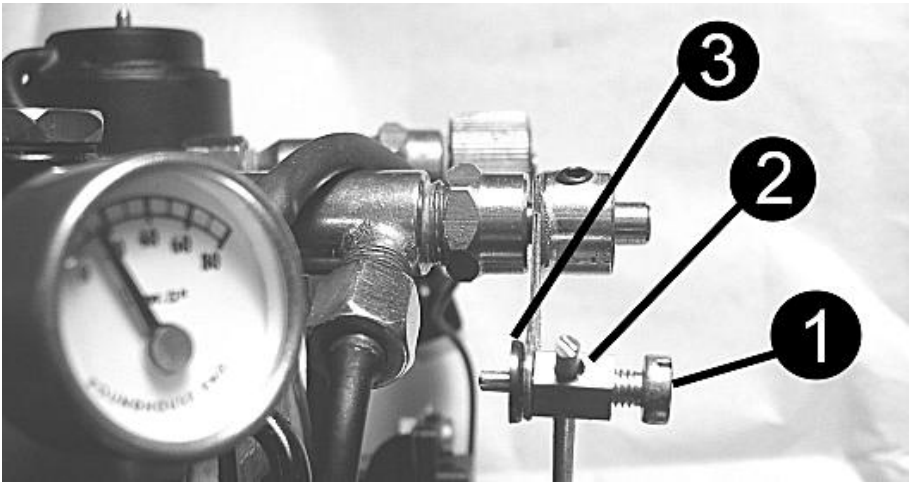


Diagram 6 Regulator Push Rod Connector

1/ Clamp screw 2/ Push rod connector. 3/ Starlock washer

Prepare a servo horn with a single arm and four connection holes. Fit the horn so that it is pointing to roughly half way between 8 and 9 on a clock face and fix it in place with the small screw provided. When the left hand control lever is moved upwards, the servo horn will rotate anticlockwise.

If it travels clockwise, use the servo reverse switch located on the transmitter then reset the horn as above.

Turn the regulator spindle clockwise with your fingers to close it, but do not force it. Fit the regulator arm to the spindle with its centre boss and push rod connector facing the rear, placing it roughly parallel to the servo horn and nip up the grub screw using an Allen key. Using the supplied linkage, Quicklink and lock nut, connect the regulator arm to the servo horn as shown in diagram 3. First pass the plain end of the rod through the push rod connector on the regulator arm, then clip the Quicklink in either the 2nd or 3rd hole on the servo horn. The Quicklink is best fitted by slightly spreading the two sides with a screwdriver as you pass it over the servo arm.

Setting and adjustment of the regulator is best done with the locomotive in steam and with the chassis supported on two wooden blocks under the chassis to raise the wheels off the bench. Ensure that the regulator is closed when raising steam.

With full working pressure raised, switch on both transmitter and receiver and move the locomotive into gear with the right hand lever on the transmitter. Open the regulator by slowly moving the left hand lever upwards and find the position at which the engine starts to run. Move the arm backwards and forwards a few times to establish the position at which it closes and leave it there. If the regulator does not open or fails to close fully, slacken the grub screw holding the regulator arm in place, remove the arm and turn the spindle manually (careful as its hot!) to find the point at which it just closes. Move the control lever on the transmitter to the bottom and replace the regulator arm. Proceed as before to find its closing position and leave it there. Carefully slacken the grub screw and move the control lever to the bottom without moving the spindle. Nip up the grub screw.

You can make fine adjustments to the linkage now until the regulator closes fully with the control lever at the bottom. Because of the '0' ring used in the r/c type regulator, you should aim for the wheels to start moving when you have moved the control lever on the transmitter about half way up. This is because the '0' ring will compress slightly into its seat when fully closed. You may need to adjust the position of the arm on the spindle, the control rod in the push rod connector, or position of the Quicklink on the servo horn to achieve this. When satisfied that all is adjusted correctly, tighten all screws, switch off the gas burner and r/c equipment and disconnect battery clip. Trim off any excess servo horn.

The trimmer at the side of the control arm can be used in the future to compensate for wear and compression of the '0' ring. As time passes, you may find that the regulator does not fully close when the control lever is at the bottom. As this happens, the trimmer can be moved down a little at a time to compensate.

The locomotive body can now be refitted, ensuring that the battery lead passes up inside the left front corner of the cab and is not trapped or fouling any of the fittings.

Using the two 8BA x 3/16” countersunk screws and nuts, fix the etched brass battery box to the underside of the cab roof, using the holes provided. Position it so that when the cab roof is hinged up, the writing on the battery box is the right way up. This will ensure that the small tab at one end of the battery box is nearest the cab front.

Ensure that all links etc. have been tightened and that all wires are safely and securely routed.

Finally, slide the battery clip into the box under the cab roof, with the connections at the front and clip on the PP9 connector. Check position carefully so that the cab roof closes fully without the battery holder, clip or wires fouling anything.

This concludes the fitting and adjustment of the radio control equipment

HBK12 Checklist

1 Etched brass chassis cover plate
1 Etched brass battery box
1 Plastic 4 x AA battery holder with PP9 connector & lead

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1 Reversing rod with Starlock washer (Billy)
1 Reversing rod with Quicklink & lock nut (Katie, George)
1 Regulator control rod with Quicklink & lock nut
2 Push rod connectors with screws & Starlock washers
2 Reversing servo mounting posts
1 Steam regulator (r/c type) with Regulator arm
2" (50mm) of small (2.4mm dia.) shrink wrap
4-1/2 (115mm) of large (4.8mm dia.) shrink wrap.

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8 M3 x 6 CH screws
2 M3 nuts
4 M3 washers
2 8BA x 3/16" CSK. screws
2 8BA nuts
3 Plastic cable ties.

☐ ***Checked***