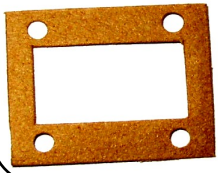
Cylinder Service Kit SKC02

9/16” Bore Cylinder Overhaul Kit
This kit contains parts to overhaul **Older** 9/16" bore cylinders as used on **ROUNDHOUSE** locomotives.



This Service Kit includes Rectangular Paper Gaskets

This Service Kit is for use with older cylinders.

These are distinguished from the outside by having a rectangular valve chest with a brass valve chest cover and a round slide bar screwed directly into the rear cylinder cover.

Paper Gaskets are used to seal between the valve chest joints.

This pack contains the following parts:

4 Cylinder cover gaskets.
(*round, paper gaskets*).

4 Valve chest gaskets.
(*rectangular, paper gaskets*).

2 Piston ‘O’ rings.
(*Silicon 'O' rings - may be either white or red*).

2 Valve spindle gland seals.
(*Silicon 'O' rings - may be either white or red*).

1 Length of graphite yarn.

Parts are included for one pair of cylinders.

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General

Although there are a number of variations of cylinder shape and outward appearance, there are basically three different groups as follows.

1/ Rectangular slide valve.

These are distinguished from the outside by having a rectangular valve chest with a brass valve chest cover and a round slide bar screwed directly into the rear cylinder cover—see diagram 1.

2/ Round slide valve.

These are distinguished from the outside by having a square valve chest with a stainless steel valve chest cover and a square slide bar attached to the rear cylinder cover by the two inside screws—see diagram 2. **Note—** Slide bar not fitted to 'basic series' locomotives.

3/ Piston valves

These are distinguished from the outside by having a 3/4" square valve chest with 3/16" dia. Piston valve entering from the rear—see diagram 3.

On most **ROUNDHOUSE** locomotives, the overhauling of the cylinders is achieved without the need to remove the cylinders from the chassis or any major disassembly. The exceptions to this are the **ROUNDHOUSE - BECK** models, Anna, Helene and Zillertal. We recommend that you contact the works direct for advice with these models.

The standard 9/16" bore cylinders are used on many different engines. Access to the cylinders varies on the different models and some will require the removal of body/footplates and front buffer beams. If in doubt, please contact the works for further advice.

Before you start

Cylinder covers and valve chest joints are sealed by gaskets or '0' rings. Any leaks which develop here, can often be cured by simply tightening the relevant screws. Piston rod and valve spindle gland seals are '0' rings and any steam leak here will normally be cured by simply nipping up the gland nut sufficient to stop the leak. If you only want to cure steam leaks, try this first.

When unscrewing or tightening any of the brass screws on the cylinders, take great care. These are more than adequate for the job but because of their size can easily be damaged or broken if mishandled. Steam oil can seep into the threads and harden with time and heat, making screws stick, particularly the long valve-chest screws. Care should be taken to ease them loose. If the job is undertaken with care and patience, all will be well but never force or over tighten anything and don't rush. Spare screws are included with this kit.

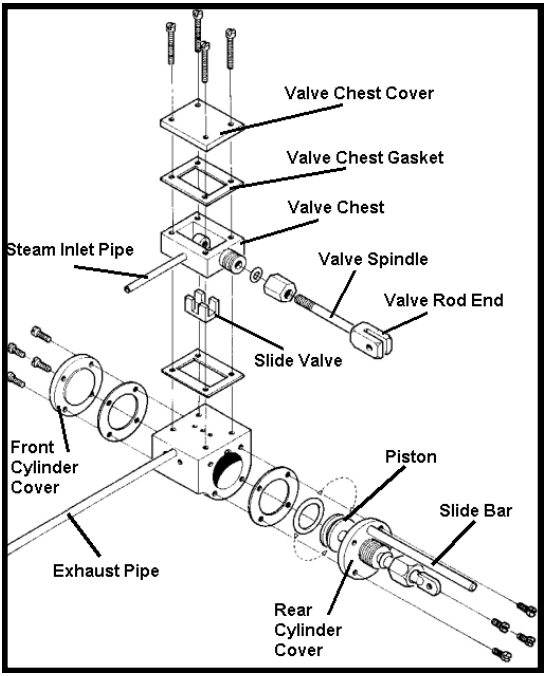
Work on one cylinder at a time.

If you have any problems or are not sure, ask before you act. Help and advice is available from the **ROUNDHOUSE** works.

New gaskets and screws will 'bed in' over time and will require re-tightening after a few hours running.

Diagram 1

Rectangular slide valve cylinder assembly as used on most Roundhouse locomotives up to 2002.



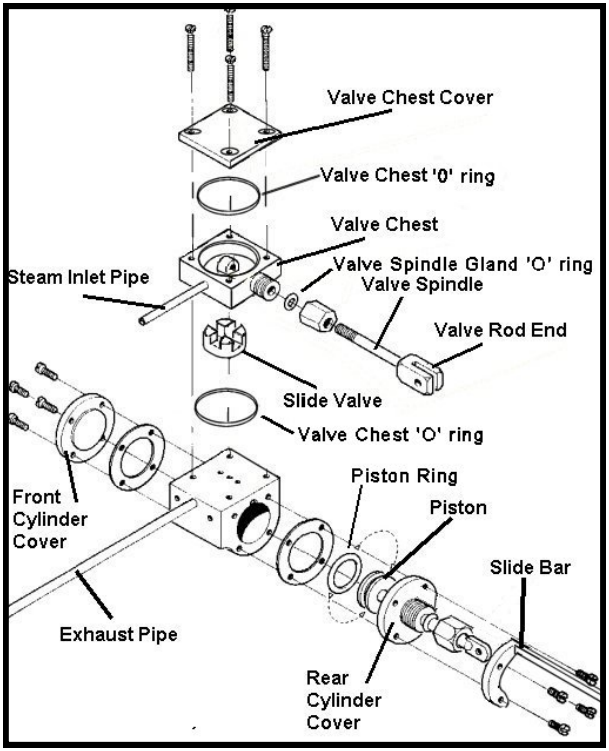
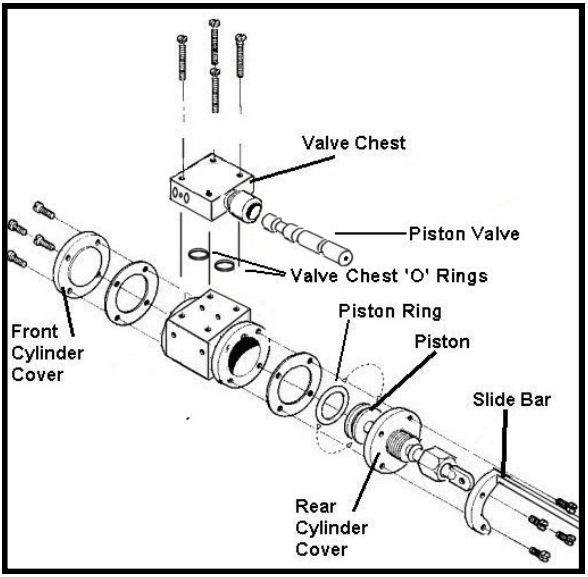


Diagram 2

Round slide valve cylinder assembly. First introduced in 1999 on the ‘basic series’ locomotives but gradually phased in on ‘classic series’ models from 2002. There are several variations of this, some with sloping or smaller 3/4” square valve chests, but all are essentially of similar construction.

Diagram 3



Piston valve cylinder assembly.

Piston seals and cylinder covers gaskets

The front cover is simply held on by four brass screws and removal and replacement are straightforward. Smear a little steam oil on the new gasket to hold it in place as you re-fit the cover and make sure the screw holes in the gasket are in line with those in the cover. Do not over tighten the screws.

The piston and rear cover is one assembly and they are removed together.

Unscrew the hexagon headed screw in the centre of the crosshead to disconnect the connecting rod. If the model has dummy combination levers fitted, these can be left attached to the valve spindle and just swung up out of the way for the moment.

Remove the four cheese head screws from the back cover using a long thin screwdriver. Access to the top inside screw is a little awkward but can be achieved without too much trouble. On later models, the slide bar is attached via the two rear screws and can be lifted away as these are removed. Note that on earlier cylinders these two screws are slightly longer that the rest.

The piston can now be withdrawn complete with rear cover. Remove the old gasket and piston ring. First, fit a new gasket to the cover and hold it in place with a smear of steam oil.

Fit a new piston ring. Take care as you slide the new '0' ring over the piston as rough handling could damage it and smear a little steam oil round it when in place.

Making sure that the screw holes in the gasket are lined up, carefully push the piston back in the cylinder. Make sure the '0' ring enters correctly and push it right in. Slide up the rear cover then replace the four screws ensuring that the slide bar is to the top. Leave the screws a little loose and pull the piston rod out, so that the piston is drawn to the rear of the cylinder, this will help centralise the rear cover. Nip up the screws a little at a time and work on diagonally opposite ones in turn, i.e. inside upper, outside lower, inside lower then outside upper. Tighten down evenly, but do not over tighten these small screws.

The piston rod gland seal should not require replacing unless it is actually damaged. The '0' ring is fitted during manufacture of the assembly and can not be removed without destroying it. If for any reason it is necessary to renew this seal, a length of graphite yarn is supplied for the purpose.

Unscrew the gland nut and slide it back out of the way. The old '0' ring must be cut off and a few turns of graphite yarn wrapped around the piston rod.

Add a little steam oil to the seal, the slide the gland nut back over the yarn and screw on finger tight. Adjustment is done once the loco is back in steam.
Make sure that the piston rod slides in and out without binding.
Re-connect the connecting rod, not forgetting the dummy crosshead.

Valve chest gaskets and seals

On locomotives fitted with piston valves, there are no user serviceable parts in the valve chest, and if there are excessive steam leaks past the valve, the valve chest and piston valve will require replacement as a pair. Contact the factory for further advice on this matter.
On the slide valve cylinders, if the valve spindle gland is OK, there is no need to upset the valve timing in order to replace the valve-chest seals. Carefully remove the four brass screws from the top of the cylinder assembly and lift off the valve chest cover. The top seal will be seen here and can be removed. The seals will be either paper gasket on rectangular valve chests or ‘0’ rings on square valve chests. Whilst fitting new seals it is good practice to clean and, if necessary, re-face the slide-valve.

Because the slide valves are held onto the port faces by steam pressure, it is possible for small particles of dirt, lime scale etc., which are carried through with the steam, to become lodged between the two and thereby break the seal necessary for operation. This would show up as excess amounts of steam being exhausted up the chimney with a continuous hiss coupled with loss of power or failure to run at all.
On the top front edge of the slide valve, carefully put a little scribe line to mark the front. Lift the valve chest just enough to allow the slide valve to be removed from the side by a pair of tweezers, followed by the old gasket or ‘0’ ring. Clean the valve and port face. The valve face can also be 're-made' to remove any score marks etc by carefully rubbing it on a piece of fine emery paper or wet & dry paper placed on a very flat surface. Make sure that you hold the valve perfectly flat down onto the abrasive and remove a very small amount, rubbing in the same direction as the valve travels.
Slide in a new gasket or ‘0’ ring, after giving it a smear of steam oil. Take care not to rotate the valve spindle or nut and replace the slide valve the same way round as it was and there will be no need to reset the valve timing. If you have the ‘0’ ring type seal. ensure that it is sitting correctly in the recess around the bottom of the steam chest cavity. ‘Squirt a little steam oil into the valve chest as you replace the top cover and seal, to help lubricate and seal the valve. Once again, ensure that the ‘0’ ring, if fitted, is sitting correctly in the recess around the top of the steam chest cavity. Note that the valve nut has a flat machined on it, which must be to the bottom when sitting it down into the slide-valve. If it is not, the valve spindle will lock up and may be damaged when the valve chest cover screws are tightened.
Should it be necessary to replace the valve spindle '0' ring, the spindle must be removed and the valve timing re-set after assembly.
The valve spindle will unscrew right out of the chest after disconnecting it from either the radius rod on Walschaerts type locomotives, the eccentric rod on ’basic series’ locomotives or the rocking arm on older models fitted with inside slip-eccentrics. This should be done before the valve chest is replaced so that

the spindle can be re-fitted into the valve nut.
Re-set the valve timing as follows.

Walschaerts type valve-gear

With the valve-gear set in mid gear and the valve chest cover removed, look down into the valve-chest and note the position of the slide valve. There are three steam ports under the valve though you will only ever see two of them, the inlet ports. These are the ports that allow steam to travel to and from the ends of the cylinders. The third port, the exhaust, is always hidden under the centre of the valve and plays no part in the setting.
The slide-valve should be sitting centrally over the steam inlet ports, covering both. If it is not, disconnect the radius rod from the valve spindle fork end and rotate the valve spindle to screw the slide valve in the desired direction. Re-connect the radius rod and re-check position. There may be a small amount of fore and aft free movement of the valve if the spindle is moved with the fingers, which just uncovers the steam ports. If this is the case, adjust the valve position so that the ports are opened an equal amount when moved thus.
Set the gear for forward running then, rotate the wheels by hand in a forward direction and watch the slide valve movement.
The edge of the steam ports should become visible (crack open) as the crank pin on the drive axle is at dead centre. The front steam port should be cracking open at front dead centre and the rear steam port at rear dead centre. If not, the valve can be moved in the desired direction a small amount by once again, disconnecting the radius rod and rotating the valve spindle. When both sides have been done and you are satisfied that the timing is as close as you can get it, the engine can be run to check operation. Slight unevenness in running can normally be overcome by slight adjustments when the locomotive is running under its own steam, see fine tuning.

Slip-eccentric valve-gear

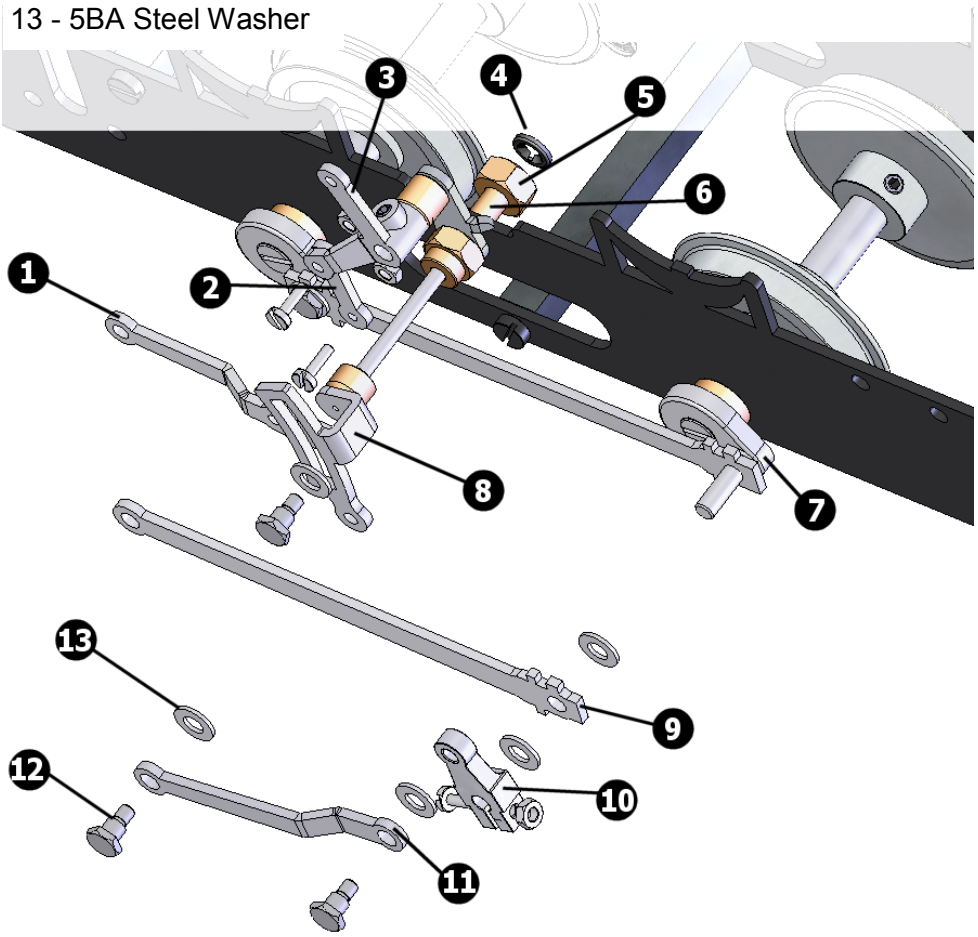
With the valve-chest cover removed, you can look down into the valve chest and see exactly what happens.
Check the position of the slide-valve on the spindle by rotating the wheels and watching the valve movement.
As you rotate the wheels, the valve moves backwards and forwards over the steam ports. There are three steam ports under the valve though you will only ever see two of them, the inlet ports. These are the ports that allow steam to travel to and from the ends of the cylinders. The third port, the exhaust, is always hidden under the centre of the valve and plays no part in the setting.
As the valve moves backwards and forwards, it should uncover both the inlet ports in turn and by the same amount. If it does not, adjust its position in one of the following ways.

Early inside slip-eccentric with rocking arm.

Unscrew the rocker arm pivot screw, lift the rocker arm out of the valve spindle end socket, then screw the valve spindle in or out a little as required. This has the effect of moving the valve along the spindle. For instance, if the front inlet port was opening more than the rear one, then the spindle should be rotated anti-clockwise to move the valve forward along its length. Replace the rocker

Identification of Walschaerts valve gear parts

1 - Radius Rod
2 - Lifting Link
3 - Lifting Arm (Left)
4 - Starlock Washer
5 - 2BA Nut
6 - Expansion Link Bush
7 - Return Crank
8 - Expansion Link
9 - Connecting Rod
10 - Return Crank
11 - Eccentric Rod
12 - Short Crank Pin
13 - 5BA Steel Washer



Please note—the diagrams included in this booklet are provided for information - only the parts listed at the front of this booklet are included in this service kit.

arm and check the valve movement again.

‘Basic series’ locomotives with outside slip-eccentric.
Unscrew the cheese head screw out of the valve spindle fork end and raise or lower the eccentric rod out of the slot in the fork end, then screw the valve spindle in or out a little as required. This has the effect of moving the valve along the spindle. For instance, if the front inlet port was opening more than the rear one, then the spindle should be rotated anti-clockwise to move the valve forward along its length. Replace the eccentric rod and cheese head screw and check the valve movement again.

Both.
Repeat the operation until equal opening is achieved. Note that when they are opening equally, the ports are not necessarily opening fully.
When both sides have been done and you are satisfied that the timing is as close as you can get it, the engine can be run to check operation. Slight un-evenness in running can normally be overcome by slight adjustments when the locomotive is running under its own steam, see fine tuning.

Fine tuning
When the servicing of the cylinders and setting of the valve-gear has been completed, the timing can be fine tuned for best performance.
Please note that it will require a little further running under steam before it reaches its best performance. This is because the new parts have to 'bed in' properly. Initially, a small amount of steam may leak past the slide valves if these have been re-faced but this will soon stop as the two surfaces 'bed in' ' and form a good working seal.

Set the loco off on a reasonably level length of track at a slow speed. If it stalls, note the position of the drive crank pins if either is at front or rear dead centre. Repeat this several times and it will soon show up if there is a 'dead spot' at any particular point of the valve cycle. If, for instance, it keeps stalling with one particular crank pin just after rear dead centre then this would indicate that the slide valve is opening a little late. On Walschaerts locos, disconnect the radius rod and rotate the valve spindle half a turn to move the slide-valve forwards a fraction as detailed in valve timing earlier. On slip-eccentric loco's unscrew the rocker arm pivot screw, move the arm backwards out of the valve spindle end or disconnect the eccentric rod and rotate the valve spindle half a turn to move the slide-valve forwards a fraction as detailed in valve timing earlier. Re-connect the valve-spindle and try the loco again in both directions to check that your adjustment has not simply removed that dead spot only to replace it with a different one. A short time spent running the engine and making any adjustments just half a turn of the valve spindle at a time should soon show its optimum positions.

If all is operating correctly, when running the locomotive slowly, you should hear the separate beats of the exhaust up the chimney as the valve opens and closes.
