

## Humphrey ADE Self-service Instruction sheet (Oct 2005)

**Tools (Fig 1)** For the annual servicing process you will require the ADE spanner set, a normal type screwdriver, a toothbrush for cleaning, paper toweling and some petroleum jelly for re-greasing the cylinder. Standard disinfectant/detergents for washing are recommended. Low flow anaesthesia requires leak proof systems so follow the instructions below carefully.

### ADE block, exhaust and safety valves (Figs 2, 3, 4, 6)

1. Remove tubing from the system; undo the locknuts to separate the ADE block and canister and Place on a flat working surface.
2. Undo the 4 screws that attach the tube storage hanger from the lever-end of the ADE block.
3. Use the larger spanner to remove the exhaust/peep valve with the blue plastic casing. The spanner access slot is just below the screw-cap.
4. Use the smaller spanner to remove the 60cm blow off safety pressure-relief valve sited at the side of the block, parallel to the fresh-gas inlet. The spanner access slot is adjacent to ADE block.

### Put these 2 valves including the RED & BLUE Canister Valves into the box for returning to +Mediquip Ltd

(Address: Unit 15, Dukes Park, Earsham, Bungay, Suffolk NR35 2AQ – remember that if these are not sent back you will be charged for them as these are part of the exchange service)

5. To get at the rotating cylinder inside the main block you will need a screwdriver to remove the lever (**Figs 2 & 5**) which sits inside a sleeve with a small spring that ensures it is held in position. As a small drop of thread sealant may have been applied to the lever spindle, you'll need to apply an initial firm twist to the screwdriver to release the lever. When it is unscrewed, take care that the spring inside the sleeve is not lost. At this point clean off any thread sealant left on the lever spindle.  
The lever can be refitted into the end of the cylinder and is useful as a handle for removing the cylinder from the block (**Fig 6**). The cylinder should be partially rotated as it is gently pulled and eased in (or out) of the block.
6. Use paper toweling to remove any grease, thoroughly clean the cylinder and inside of the main block by washing them with a mild detergent. Removing the hexnut at the opposite end of the block assists cleaning of the cylinder barrel, but remember to replace it afterwards. Be careful not to scratch the cylinder surface. Check that the screw hole for the lever in the cylinder is free from any thread sealant debris. Rinse and dry.
7. Lightly smear the cylinder with a thin layer of petroleum jelly ie. Vaseline, (it should not spill over into the cylinder orifices so do not over-apply the lubricant -) and then ease it back into the block, making sure that the threaded hole for the lever spindle is visible at the top of its rotation slot.
8. Undo the lever from the end of the cylinder and refit into its original position with the sleeve and spring in situ. Ensure that the lever is screwed in firmly. Now check that the cylinder rotates smoothly and that the lever locks into the upper and lower positions. It is recommended that the tightness of the lever is checked from time to time, as the thread sealant will not be added to help secure it.
9. To complete the servicing process, screw the replacement exhaust/peep valve on top and safety pressure-relief valve onto the side of the block and tighten gently with the spanners. Then reattach the tube storage hanger with the 4 screws onto the lever-end of the ADE block.

Finally, check that all the limb fittings are tight onto the block by *lightly* testing with a spanner. These are secured with thread sealant but the **fresh-gas inlet** can become loose due to twisting action when mounted on & off the anaesthetic machine fresh gas outlet.  
(Contact +Mediquip for advice on further repairs).

### Please note

ADE-circle system maintenance diagrams - (May 2003)



Fig 1: Tool kit - vaseline, toothbrush, ADE spanner set, screwdriver



Fig 7: Canister; base lid removed by unscrewing 4 bolts

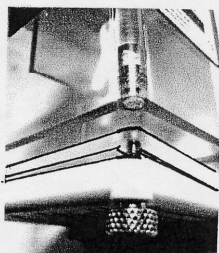


Fig 8: expanded view of canister base showing bolt passing through seal

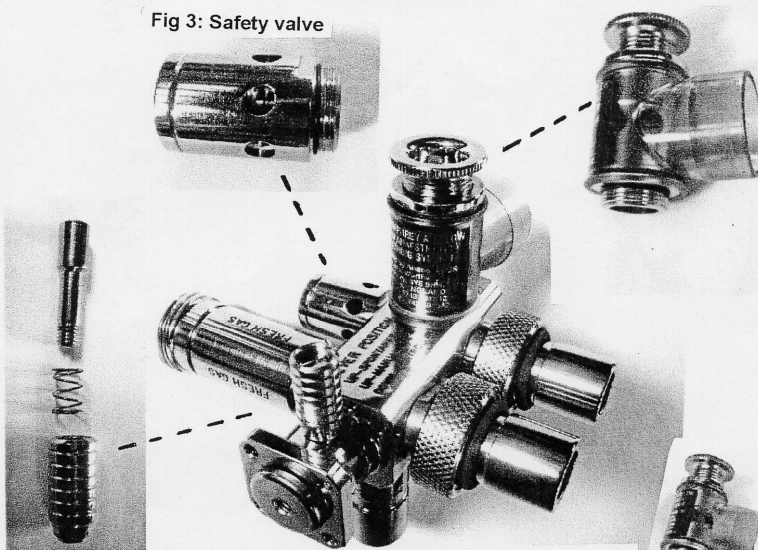


Fig 3: Safety valve

Fig 4: Exhaust valve

Fig 5: Lever, spring, sleeve

Fig 2: ADE assembled

- COLOURED VALVES MUST ALIGN WITH ENGRAVED INSTRUCTIONS ON CANISTER
- NOTCHED SEAL MUST ALIGN WITH CROSS-TUBE AND CANISTER COUNTERPARTS
- READ INSTRUCTIONS ON BASE LID WHEN REFILLING WITH SODA LIME
- ONCE COMPLETE ALWAYS TEST SYSTEM TO ENSURE THERE ARE NO LEAKS

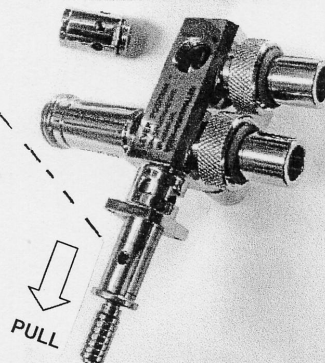


Fig 6: ADE dismantled for servicing. Safety and exhaust valves removed. Lever inserted into end of cylinder to pull it out for cleaning



Fig 9: always replace only one valve at a time

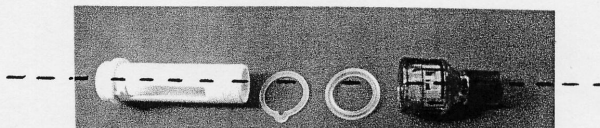


Fig 10: sequence order for components - cross tube, notched seal, round seal, one-way valve

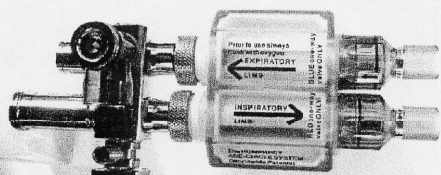


Fig 12: re-align ADE system and canister by attaching canister with lock nuts but with valves loose – once attached secure valves tightly.

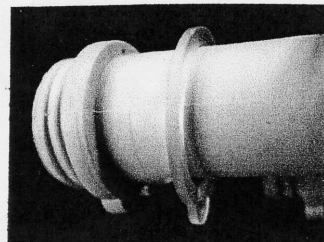


Fig 11: notched seal, cross tube and canister must all line up

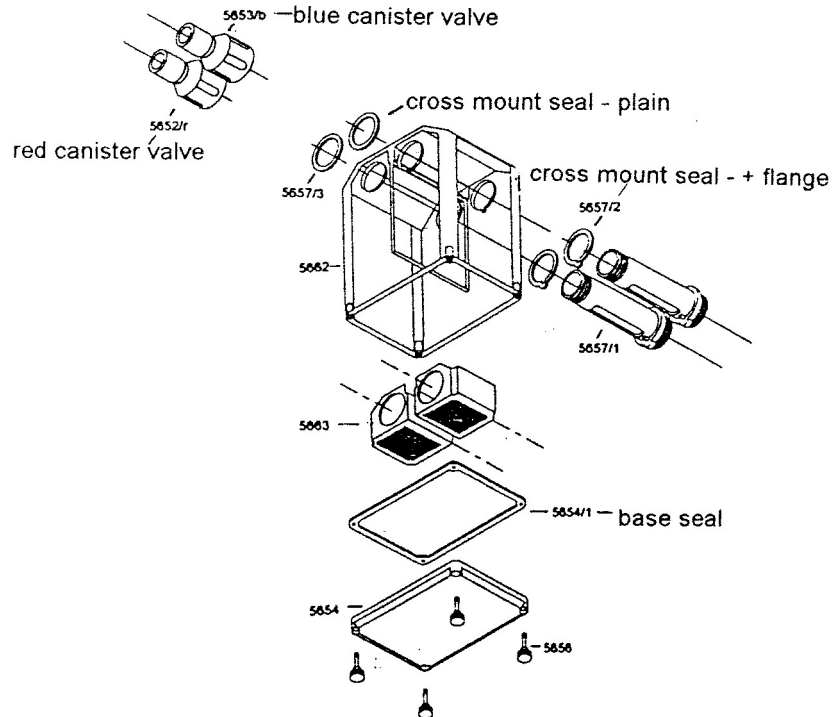
**Please note**

## Canister

A servicing package will contain:-

1 x Base seal and 4 x Cross-mount tube seals set (Combined Part No: 5651 canister seal set)  
1 x Blue expiratory valve ( Pt No 5652/b) 1 x Red inspiratory valve (Pt No: 5652/r)

The recycling process relies on the fact there must be NO LEAKS. This is ensured by effective seals and valve closure, so after the replacement of these items, the ADE-circle system must be checked for leaks.



1. **Base seal:** Carefully undo the screws holding the base (**Fig 7 & 8**) and when loose from all four corner threads, push up the perimeter seal which is located inside a recess around the base plate (**Fig 8**). Remove the seal from the screws which will now easily be removed. (Note that the seal grips the 4 screws tightly so they don't go astray when opening the base just for refilling). Clean the base by washing in a mild detergent solution (a toothbrush is effective) and check for any cracks/chips. Rinse and dry thoroughly & press the new seal into the vacant groove (with the central ridge uppermost and the flat side down). Check the screws are not damaged or bent, and push them back through the corner holes of the canister base and through the holes in the seal. Press the seal down into its recess all the way round the perimeter of the base.
2. **Canister valves & seals:** Each valve is coloured and labelled with direction arrows to ensure that it is fitted on the correct side of the canister. The red valve is fitted to *INSPIRATORY* limb and the blue one fits onto the *EXPIRATORY* limb. (clearly engraved on the canister top), **Only remove ONE valve and cross-tube at a time (Fig 9)**, to ensure that the same colour valve is replaced on the correct side. Swapping the valves will reduce the canister efficiency and make it more difficult to breathe through.
3. As the valve is undone, it will allow access to the white cross-tube and the two seals at each side of the canister. Note the position of these seals and peel off the seal adjacent to the valve (**Fig 10**). Pull the cross-tube back through the canister and remove the flanged seal. **Note at this time the alignment of the seal with the small flange on the cross mount and the notched location into the canister box (Fig 11).**

### **Please note**

4. Clean the cross-tube by washing in a mild detergent solution (a toothbrush is effective), and also the canister with two white "baskets" (which act as sieves) still fitted inside - some baskets have a looser fitting and will easily drop out. Rinse well, shake off excess water. Dry with fresh paper towelling before reassembling and put the baskets back in place.
5. To re-assemble, first place the new flanged seal onto the cross-tube and ease it along to the threaded end and match it onto the tube flange, then pass it back through the canister baskets (**Fig 10, 11**). Locate the flange of the cross-tube with the notched hole on the canister box – when these all align and fall into place leaks at this point are prevented – so **ensure it is done carefully (Fig 11)**.  
Mount the remaining round seal with the flat edge against the canister (**Fig 9,10**). At this point the two seals should be in place either side of the canister on the cross-tube.
6. Now fit on the new valve, using the colour, labels and arrows to identify the whether it should be an **inspiratory (red)** or **expiratory (blue)** valve. The engraving on the top of the canister clearly identifies where each valve goes. Do not completely tighten the valve at this point.
7. Repeat actions **2 - 6** for replacement of the second canister valve. The canister valve and seal replacement is now almost finished.
8. To ensure a good alignment between the canister and the ADE system, the canister cross-mount tubes can be adjusted by a millimetre or two. Ensuring that both canister valves are slightly loose, push the canister onto the ADE system and tighten the locknuts as usual (**Fig 12**). Secure the canister valves at the opposite end of the cross-tubes and tighten firmly by hand. Now remove the canister from the ADE system to complete the remaining processes
9. Visually check the canister casing has no cracks or surface chips as these will cause leaks. If there is any damage it must be replaced. Also check in the base of the canister that the screw holes in the four corners are clean, removing any debris (use a pin to remove any soda-lime granules that may have got in by mistake). As the canister must be dry prior to filling, a hairdryer can be used if any moisture remains.
10. Completely fill the canister to the brim with soda-lime, (see instructions advice supplied with the ADE system) - wipe off any excess granules and dust from the rim. Replace the base onto the canister and firmly hand-tighten the screws to secure the base plate, screwing each screw in a little in rotation to ensure an even pressure on the seal. Observe that the seal looks evenly sandwiched between the base and the canister sides and that there is no obvious evidence of any soda lime between the seal that could cause leaks.

**BEFORE USE – THE ADE AND CANISTER MUST NOW BE CHECKED FOR CORRECT FUNCTION AND ABSENCE OF GAS LEAKS. Poor assembly is the commonest cause of leaks!**

11. Replace the canister onto the ADE system together with the tubes and the reservoir bag and fix onto the anaesthetic machine. Screw down the exhaust/peep valve on the ADE block. With a thumb, block the patient "Y" connector at the end of the tubing and with the lever up, allow fresh gas to inflate the reservoir bag until it is distended and tense. Turn off the gas and observe the bag for loss of pressure over about 15 seconds. If the bag remains inflated the equipment is sealed and has no leaks. If it goes down this indicates a small leak - if it collapses you are looking for a major leak. To identify whether the source of the leak is from the canister or ADE block, detach the canister and repeat the leak test. The common origin of leaks is from tubing, the reservoir bag, faulty attachment of the canister at the locknuts or a leaking canister base or seal.
12. To check the function of the exhaust/peep valve, fully open the valve by unscrewing the screw-cap on top, fill the reservoir bag with gas, and squeeze the bag several times. The orange stem of the valve seat should rise & fall as the gas escapes in response to the squeezing.
13. Other Preoperative function checks are listed in the instructions booklet. - see Chapter 2 -11.

**+Mediquip Ltd cannot be held responsible for mistakes on valve replacements – an alternative servicing option is available for those who do not wish to carry out this task. If you have any problems please phone for assistance on 01986 892108 (if the office is unattended leave a message on the answerphone with your name, practice details and telephone number and we will get back to you).**

Maintenance October 2005 WD Self-servicing UK instructions

**Please note**

For any equipment parts you should contact + MEDIQUIP LTD Tel: 01986 892108