

19 GDS Helpsheet



*World Leaders in Computer Controlled Testing
Systems for Geotechnical Engineers and Geologists*

Hardware

Standard Controller

Replacement of the 'O' Ring Seal

1. Disassembly

Please refer to the attached diagram with the title "Stages in removal of piston for 200cc/2MPa controller.

1. Using the FILL command run the controller to the back limit. Turn off the mains power and remove the mains lead.
2. Undo the two screws fixing the bellows keeper ring to the output shaft end of the gearbox. This will allow you to push back the bellows covering the ballscrew and hence expose the connection between the ballscrew and the output shaft of the gearbox.
3. With a small punch and a light engineers hammer, drive out the hardened dowel pin connecting the two shafts together. Be careful not to hit the gearbox and damage the paint work. If the angle is wrong and the pin is not aligned nearly vertically, you may briefly power on the controller and operate the FILL or EMPTY functions to achieve the best alignment. Do not forget to power off and disconnect the power lead before resuming the procedure.
4. With the heel of your hand, bump the gearbox along so that the two shafts disengage. The bellows may now be removed. Attach a small self-adhesive label to the end of the screw identifying the top of the dowel pin hole and the serial number of the controller. This is so your ball screw will match up again with the output shaft of the gearbox when you reassemble the controller.
5. Using an Allen key/hexagonal drive, remove the 6 stainless steel cap-headed Allen screws securing the light coloured top plate to the darker coloured lower case.
6. With the help of a colleague, gently raise the front edge of the top plate while making sure it does not slide backwards. Be careful - the pressure cylinder is very heavy!
7. Rotate the top plate until you can see inside the case. Make sure that the internal cables are not tensioned, particularly the shortest one which is transparent and connects the key pad to the printed circuit board (PCB).
8. While your colleague holds the top plate in position, note the orientation of the cable then reach your hand inside the case and gently pull up from the PCB the connector of the transparent ribbon cable.
9. Now disconnect the other cables linking the top plate to the PCB noting their position and orientation. The grey ribbon cable to the display is connected to the PCB via a keyed clipped connector which is released by moving the hinged clips up and outwards. On the right hand edge of the PCB, the pressure transducer, limit switches and motor cables may be pulled off the board by moving them to your right. Note that the limit switch and transducer connectors

have raised "horns" which are uppermost. Note also that the motor and transducer connections have the individual wire colours printed on the PCB. Make sure you note all the positions and orientation of connection before you remove them.

10. The top plate may now be moved and rested on the bench top to the rear of the case. You will find it helpful to have a small solid object about 60mm or 2.5" high to prop under the pressure cylinder end block so that the plate is vertical and resting on edge. You may also find it helpful to remove the earth cable (coloured yellow and green stripe) from the top plate to totally free the top plate from the case.
11. Carefully remove the pressure transducer and adapter using a spanner. The large countersunk screws and alignment pins securing the pressure cylinder end blocks can now be seen. The screws may now be removed. Now rest the pressure cylinder lengthwise on the edge of your bench so that the top plate is vertical and over the edge and nearest you.
12. Making sure that a colleague has a firm grip of the top plate, lightly tap the plate off the alignment pins using a soft nylon faced mallet. The pressure cylinder and ball screw is now free of the top plate.
13. Make sure the pressure outlet is vented to atmosphere.
14. Carefully using two spanners undo the three tie rods that hold the two cylinder ends together. The piston may now be removed from the cylinder.
15. Now check the 'o' ring seal on the piston. If it is damaged it must be replaced.
16. Clean and dry the bore of the cylinder using clean paper towels. Check the bore of the cylinder for damage. If it is damaged the complete ballscrew/piston/cylinder assembly must be returned to GDS.
17. Clean and oil the ball screw and check for easy movement along its complete travel. Do not unscrew completely as the balls may escape. If it is damaged it must be returned to GDS for repair or replacement.

2. Reassembly

1. Lightly smear the piston and o-ring with silicone grease. Offer up the piston to the open end of the pressure cylinder and gently press the piston into the cylinder. Line up the end block with the pressure cylinder flange and fix the cylinder to the block with the cap-headed Allen screws. (The ones removed at A13) Check for easy movement of the piston by rotating the ball screw for the complete piston travel.
2. Now fix the cylinder back onto the top plate. This is done by positioning the cylinder lengthwise on the edge of the bench with the end block alignment pins pointing towards you. With the help of a colleague, offer up the top plate to the cylinder so that the appropriate hole line up with the alignment pins. With a soft nylon-faced mallet, tap the top plate onto the alignment pins. Now insert the large countersunk screws and tighten them home with an Allen key/hex drive. (This is the reverse procedure to A12 and A11 above)
3. Position the top plate and the case alongside each other lengthwise on the bench with the plate to the rear. Reconnect the earth lead (yellow and green stripe) if disconnected. Reconnect the motor lead to the PCB (note the colours and that the connector should have a plain upper surface). Reconnect the display lead to the PCB. The connector is keyed and will only go in the right way. Make sure the grey ribbon cable is not twisted.
4. The top plate may now be fixed back onto the case of the instrument. With the help of a

colleague, lift the top plate onto the case such that the rear most edge of the top plate is resting on the rear most edge of the case. Be careful because the motor and gearbox are still free to move on the ball slide.

5. While your colleague holds the front edge up, reach under the top plate and into the case. (Don't forget that the instrument should be powered off and the power lead disconnected at this time!) Reconnect the limit switches and the transducer cables(note the "horns" on the connectors should be uppermost). Push the display connector back onto the PCB making sure it is not twisted. Gently lower the top plate down being careful to tuck in any cabling that may get trapped.
6. Fix the top plate to the case using the cap-headed Allen screws. (The ones removed at A5) Do not over tighten.
7. Now the ballscrew and gearbox can be reconnected. First, fit the bellows over the ball screw making sure to get it the right way round with the keeper-ring end towards the end of the ballscrew. Now push the gearbox up to the ballscrew. By hand, turn the ballscrew so that the top of the dowel pin hole corresponds to the position of the hole in the gearbox output shaft. Push the two shafts together and line the holes up. You may need to separate the shafts and try again if they do not line up first time. Drive in the hardened dowel pin.
8. Fit the bellows keeper-ring to the face of the gear box.
9. Power on the controller and using the TEST function key, invoke the diagnostic procedures and check out all the main hardware functions. In particular, use the FILL and EMPTY functions to check that the repositioned limits are correct. Re-adjust if necessary. Note that the forward limit switch position can be checked by observing both the piston position through the pressure outlet hole and the ball slide position with respect to the forward end stop. Note also that the rear limit switch position can be checked by both listening for the stepper motor slipping (indicating the piston has reached the end of the cylinder-immediately press RESET and EMPTY if this occurs-don't worry, the system is failsafe and you cannot hurt it!) and observing the ball slide position with respect to the rear end stop.
10. Using the FILL and EMPTY functions, fill the cylinder with de-aerated water.
11. If there are any problems, contact GDS.