

RIG FLOOR REMOVAL OF CANISTER FROM A BOTTOM LOADING UPPER TOP DRIVE VALVE

M & M International's Bottom Loading Valve System allows for the replacement of the internal valve components of the upper top drive valve without removing the upper valve from the top drive system. This feature allows the rig to be back in full operation in about one hour. The following instructions apply to the removal of a canister from a bottom loading upper valve that is made up with the top drive system.

First, the upper and lower valves (hereinafter referred to as "upper valve" and "lower valve") must be cycled a few times to release any pressure on the canisters. Then the upper valve and lower valve must be broken apart. Make sure the canisters are in the open position prior to beginning the breakout procedures. The valves may then be broken-out. To break the valves, existing rig procedures for breakout and removal should be used. The lower valve pin nose is configured to lock in place the upper valve's canister. Therefore, moderate precaution should be taken when handling the lower valve.

Once the lower valve has been removed, the canister may be removed from the upper valve. This will require the use of an M & M positioning tool. The positioning tool is used to engage and retrieve canisters from bottom loading upper valves. Make sure the canister is in the open position prior to beginning the removal procedures. The canister is accessible through the internal box connection of the upper valve. Lower the upper valve and pipe handler to within 4 to 6 feet of the rig floor. With the lower valve removed from the upper valve, the pipe handler can be pulled to the back using a tugger line. This allows access to the bottom of the upper valve without having to go through the bell guide and breakout dies. This allows the positioning tool to be shorter. However, if this is not possible, a longer positioning tool can be supplied to work through the aforementioned equipment.

To remove the canister from the upper valve, these steps must be followed:

1. Unscrew the insertion cap from the positioning tool.



2. With the male threads of the positioning tool exposed, insert the positioning tool into the upper valve through the internal box connection.



3. Thread the positioning tool into the canister. This connection does not need to be made up tightly.

4. Actuate the upper valve to the closed position.



5. Using the slide handle on the positioning tool, hammer in a downward direction to remove the canister from the upper valve. The positioning tool handler should be prepared for the canister to disengage from the valve and remain attached to the top of the positioning tool. Further, care should be taken, as the canister will fall from the upper valve body if not fully engaged with the positioning tool upon removal.





At this point, the operating stem assemblies can be removed for redress if so desired. The crank-arms would need to be removed if redressing the stems. With the canister removed, the operating stem assemblies can be removed. The stem assembly consists of the stem, stem o'rings, and two thrust washers with a thrust bearing between them. It is imperative that all these parts are retrieved from the valve and are accounted for. To remove the operating stem assembly, this step must be followed:

6. Push the stems toward the inside diameter of the valve body.



After cleaning, inspecting and replacing any worn parts, the upper valve can be reassembled.

RIG FLOOR INSTALLATION OF A CANISTER INTO A BOTTOM LOADING UPPER TOP DRIVE VALVE

First, gather all of the components necessary to assemble the upper top drive valve (hereinafter referred to as "upper valve"). To make sure all of the proper parts for assembly have been acquired, check the parts list for the specific valve type being assembled. To do this, go to www.mmvalve.com and enter the serial number of the valve being assembled into the product search feature. By doing this you should be provided with an option to view the parts list for that valve. The following is a general list of all of the components needed:

1. Upper Valve Body
2. Complete Canister
3. Operating Stems
4. Thrust bearings
5. Thrust washers
6. Upper Seat O'Ring
7. Upper Seat Back-up Ring
8. Operating Stem O'Rings
9. Operating Stem Back-up Rings
10. Hex Wrench



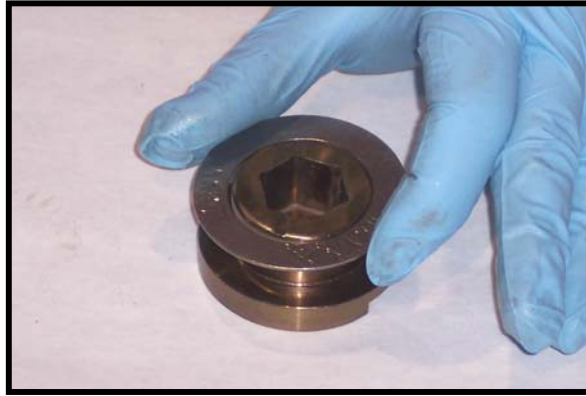


Once all of the components necessary to assemble the valve have been compiled, the following steps must be followed:

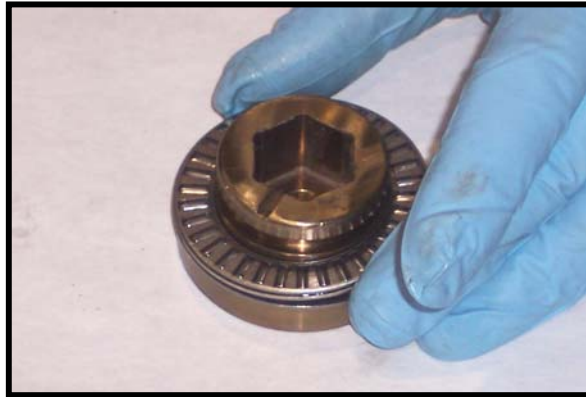
1. **Inspect and lubricate all components, ensuring to replace any worn or damaged component(s). All o’rings should be replaced regardless of wear or damage. In the course of replacing o’rings, visually ensure that none of the removed parts or replacement parts are damaged or defective.**
2. **Add the thrust bearing assemblies to the operating stems by:**



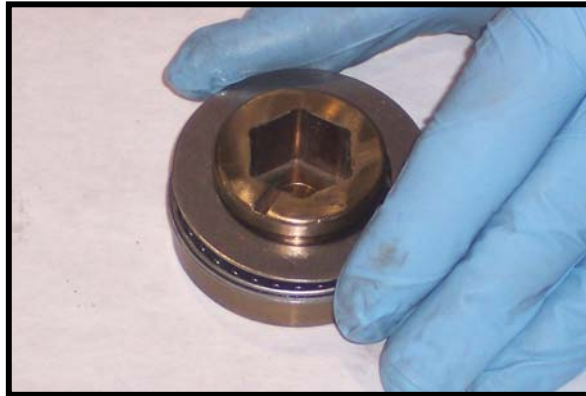
(1) placing one of the thrust washers on the stem;



(2) placing the thrust bearing on the stem;



and (3) placing the second thrust washer on the stem.



3. Add the operating stem o'ring(s) to the operating stem(s).



4. Add the operating stem back-up rings to the operating stems. **Note:** The operating stem back-up ring should be located above the operating stem o'ring in the same groove. **Note:** Ensure that the concave side of the operating stem back-up ring rests on top of/facing the top of the operating stem o'ring.





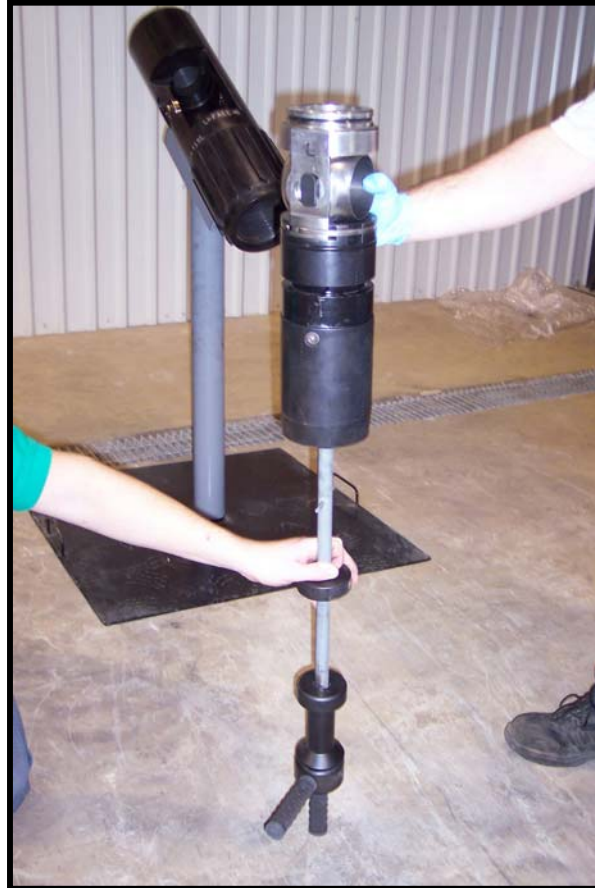
5. Replace the stems in the stem holes located in the valve body. Position the stems to the closed position. This is established via alignment of the stem indicator with the closed position mark on the body.



6. Insertion of the closed canister into the upper valve body will require the use of an M & M positioning tool. The positioning tool is used to engage and retrieve canisters from bottom loading upper valves.
7. Thread the insertion cap onto the positioning tool.



8. With the positioning tool in the vertical position, set the closed canister over the cap and rotate until the canister sits down on the two positioning pins located on the insertion cap. This places the canister stem links, which engage the stems, in line with the indicator handle at the bottom of the positioning tool.



9. Lift the canister into the valve body with the positioning tool. Be sure to keep the right hand side of the canister in line with the right hand stem in the valve. The purpose of the indicator handle is to track this position. If the actuator shell and crank arms are in place, the same should be held up in the area of the closed position. Align the canister's stem links with the stems in the body. Make sure that the canister is in the closed position. **Note:** Canisters with dual stem-links have a right and left side. The canister is marked on the canister leg with an "R" on the canister's right side and the left side is marked with an "L". Older versions of the canister have "M&M" on the right side and no marks on the left side. This will assure proper rotational direction of stem positions. In the case of dual operating stems, the stems and body will also have right and left designations and the canister should be inserted accordingly. When the installer is facing the side of the valve body that is marked with the word "face", the markings designating left and right correlate with the installer's left and right hands.



10. Use the slide handle to tap the canister into the upper top drive body seal bore.



11. When the canister is all of the way in place the indicator pin will be flush with the internal box connection shoulder.
12. When that position is established, the positioning tool can be pulled from the valve body leaving the canister in place. Note: There is no difficult disengagement procedure.
13. Manually actuate the upper valve and look up into the valve body to see that the valve has fully opened.



14. Reposition the pipe handler. **Note:** Guide the actuator roller arms back into the actuator shell's grooves.
15. The lower valve must then be threaded and made-up with the upper valve as per standard rig procedure. **Note:** Handle the internal pin connection of the lower valve body with caution and make sure it is clean. Any foreign solids between the pin nose and the canister during make-up can damage the canister during torque-up of the connection.





The valve assembly is now ready to be pressure tested. It is recommended that, with the lower valve fully open, the upper valve be cycled open and closed. Then, with the upper valve fully open, visually inspect the internal diameter of the valves with a flashlight to confirm that the balls of both the upper and lower valves are in the fully open position.

MAINTENANCE

M&M Canister Guard™ Valves are designed to require minimal maintenance. Like any tool joint, the connections should be protected and handled as per common industry practices. The most important exercise in maintenance of the valves is to operate frequently even if in storage. Secondly, when being stored after use, even for short durations, it is best to rinse the valve externally with water, flush clean internally with water, blow out any remaining water with air, and store in the closed position. Thirdly, the operating wrench should be kept for its intended purpose and replaced if damaged. Be sure the wrench is inserted into the operating stem's recess to its full depth. This will prevent damage to the wrench and stem. The valve should be disassembled and inspected approximately every nine to twelve months. Even if there is no detectable damage, all seals should be replaced during assembly.