Form No. 3327–812

# Shock Valve Kit

## 100 and 200 Series Z Masters

**Part No. 106–2053**

**Installation Instructions**

This service kit is designed for the replacement or the addition of the Hydro–Gear® **Shock Valve** relief valve cartridges in the hydro pumps on Toro 100 and 200 Series Z Master units.

**Note:** This kit contains the parts required for one pump. Two kits are needed when updating both pumps on a machine.

## Loose Parts

**Note:** Use the chart below to identify parts for assembly.

| DESCRIPTION | QTY. | USE |
|---|---|---|
| Shock valve, .024 in. orifice | 1 | Installing the shock valves |
| Shock valve, no orifice | 1 | |
| Spring | 2 | |
| Valve cap | 2 | |

**Note:** Determine the left and right sides of the machine from the normal operating position.

## Before Installing this Kit

**Important** Use extreme care to ensure the hydraulic system is not contaminated.

Particles as small as lint, dust, or human hair have the potential to cause failure of the hydraulic system.

Take care removing and installing these components to protect the integrity of the system.

1. Thoroughly clean the area around both hydraulic pumps.

**Note:** Up to 4 fl. oz. of hydraulic oil can be lost per pump while installing this kit.

2. Place a pan under each hydraulic pump.

**Important** Wear protective equipment while installing this kit. Avoid any contact of the hydraulic oil with eyes or continuous contact with skin.

**Warning**

**Incorrect battery cable routing could damage the machine and cables causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.**

- **Always *Disconnect* the negative (black) battery cable before disconnecting the positive (red) cable.**
- **Always *Reconnect* the positive (red) battery cable before reconnecting the negative (black) cable .**


8111 Lyndale Avenue South
Bloomington, MN 55420-1196

## Warning

**Hydraulic fluid escaping under pressure can penetrate skin and cause injury.**

- **If hydraulic fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result if this is not done.**
- **Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.**
- **Use cardboard or paper to find hydraulic leaks.**
- **Safely relieve all pressure in the hydraulic system before performing any work on the hydraulic system.**
- **Make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.**

# Using the Correct Shock Valve

There are two types of shock valves for this installation.

- One has no orifice or hole and text markings of 200 and 000 (Fig. 1).
- One has a very small .024 in. hole or orifice and text markings of 200 and 024 (Fig. 1).

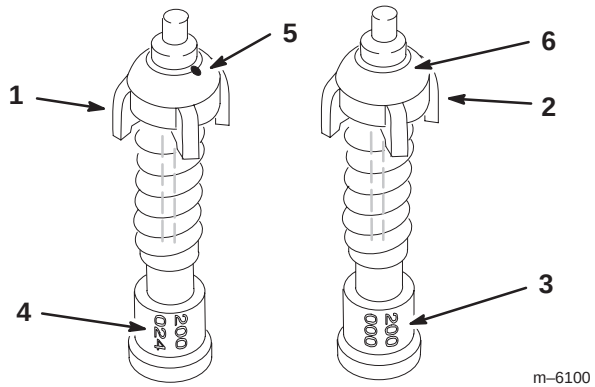


**Figure 1**

1. Shock valve with an orifice
2. Shock valve with no orifice
3. 200 and 000 markings
4. 200 and 024 markings
5. .024 in. orifice
6. No orifice

# Finding the Correct Machine and Pump in the following Table

This instruction sheet provides separate instructions for the installation of the shock valves in Z Masters listed in the following table.

1. Determine if you have a 100 or 200 series Z Master.
2. Identify the serial number on the Z Master.
3. Identify the the pump model number.
4. Identify the serial number on the pumps. See Identifying the Pumps on page 3.
5. If needed, identify the date code in the pump serial number. See Identifying the Pumps on page 3.
6. Refer to the appropriate instruction page, as listed in the table section, for your machine and pump.

| | **Hydro–Gear® Pumps** | | | |
|---|---|---|---|---|
| | BDP–10L–121P | BDP–10A–414 | BDP–10A–433 | BDP–10A–427 |
| **100 Series Z Master** | Z Master Serial Number 210999999 and Lower<br><br>**See page 4 for instructions.** | Z Master Serial number 220000001 and Up with Hydro–Gear pump date code 1275 and Up[1]<br><br>**See page 6 for instructions.** | N/A | N/A |
| **200 Series Z Master** | Z Master Serial Number 210999999 and Lower<br><br>**See page 8 for instructions.** | N/A | Z Master Serial number 210000001 –22000XXXX and Lower with Hydro–Gear pump date code 1275 and Up[1]<br><br>**See page 10 for correct models and serial numbers.** | Z Master Serial number 22000XXXX and Up<br><br>**See page 12 for correct models and serial numbers.** |

[1] only BDP–10A pumps with a date code 1275 and greater are compatible with Shock Valves. The date code is the first four digits of the four–part number in the lower left corner of the Hydro–Gear label. Ex) 0 131 P1 476 – the date code of this pump would be 0131.

# Indentifying the Pumps

The following is an example of the Hydro–Gear® label. The information on this label is needed for determining which pump you have on your machine (Fig. 2).

The date code is the first four digits of the four–part number in the lower left corner of the Hydro–Gear label. An example is 0 131 P1 476. The date code of this pump would be 0131 (Fig. 2).

1. Locate this label on one of the pumps in your machine.

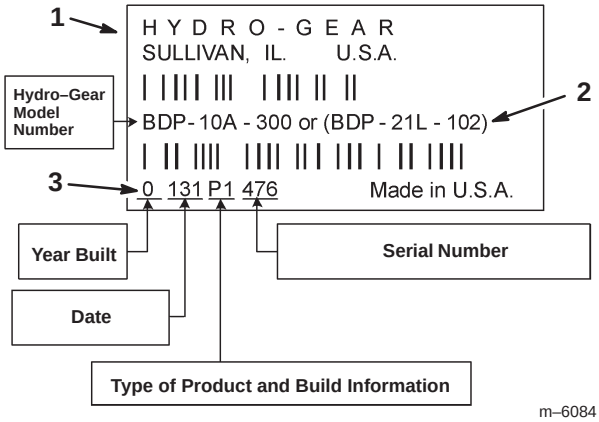


**Figure 2**

1. Label
2. Model Number
3. Date code—first four digits

# Installing the Shock Valves on a 100 Series Z Master with Serial Number 210999999 and Lower

These machines are equipped with the Hydro–Gear BDP–10L–121P pumps. This model number can be found on the label on the side of the pump (Fig. 2).

## Installing the Shock Valve on the Control Arm Side

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the seat and locate the battery.
4. Disconnect the negative battery cable.

**Danger**

**Mechanical or hydraulic jacks may fail to support machine and cause a serious injury.**

- **Use jack stands when supporting machine.**
- **Do not use hydraulic jacks.**

5. For the left–hand pump only, remove the left rear tire.

**Note:** An extension on an Allen wrench socket may be needed to gain access to the system check plug on the left pump.

6. Remove the system check plug from the control arm–side of the pump (Fig. 3).
7. Use a magnetic screwdriver to remove the spring and ball (Fig. 3).
8. Insert the blank shock valve (no orifice) (Figures 1 and 3).
9. Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.
10. Install the left rear tire. Torque lugnuts to 95 ft.–lb. (128 N•M).

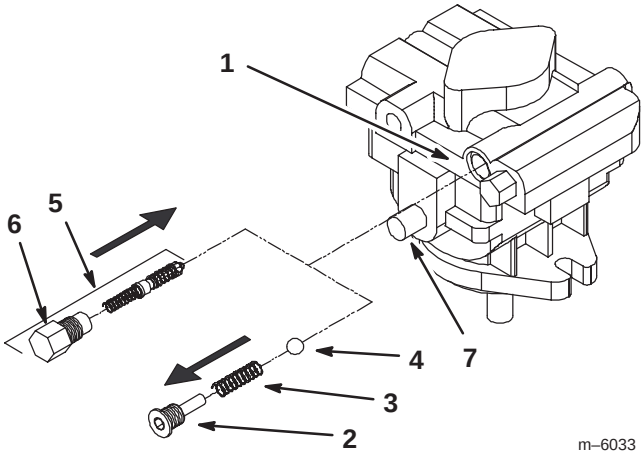


**Figure 3**

1. Left **side** of pump
2. Check plug
3. Spring
4. Ball
5. Blank shock valve—no orifice
6. Valve cap
7. Control arm

## Installing the Shock Valve on the Side Opposite the Control Arm

1. Remove the system check plug in the pump, on the side opposite of the control arm (Fig. 4).

**Note:** This assembly will contain a spring and poppet rather than a spring and ball.

2. Use a magnetic screwdriver to remove the spring and poppet (Fig. 4).
3. Insert the shock valve with the 0.024 in. orifice (Figures 1 and 4).
4. Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.
5. Fill the hydraulic reservoir with Mobil® 1 15W–50, or equivalent oil, to the top of the baffle in the tank.
6. Connect the negative battery cable, lower the seat, start the engine, and drive the unit for 5 to 10 minutes to purge the air out of the hydraulic system.
7. Shut the machine off and allow system to cool for 15 minutes.
8. Check the hydraulic oil level and add hydraulic oil if necessary.

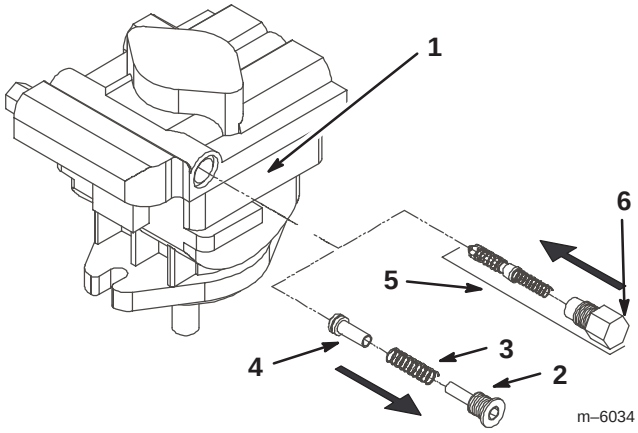


**Figure 4**

1. Pump—non–control arm side
2. Check plug
3. Spring
4. Poppet
5. Shock valve—.024 in. orifice
6. Valve cap

# Installing the Shock Valves on a 100 Series Z Master with Serial Number 220000001 and Up

These units are equipped with the Hydro–Gear BDP–10A–414 pumps. This model number can be found on the label on the side of the pump (Fig. 2).

**Important** Pumps with a date code of 1274 and lower **are not** compatible with this Shock Valve kit. **Do not** install this kit into these pumps.

**Important** Only pumps with a date code of 1275 or higher **are** compatible with this Shock Valve kit.

## Installing the Shock Valve on the Control Arm Side

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the seat and locate the battery.
4. Disconnect the negative battery cable.
5. For the right pump only, loosen the hose clamp on the case drain hose and slide the clamp down the hose about 2–1/2 in. (Fig. 5).
6. For the right pump only, pull the hose off of the beaded tube adapter (Fig. 5).
7. For the right pump only, place a clean bolt in the end of the hose and elevate this end as high as possible to slow leaking fluid.

**Note:** Take note of the adapter's angular position. This is the correct position when installed again.

8. For the right pump only, loosen the jam nut on the adapter, and rotate the adapter counterclockwise until the beaded tube end is pointing upward.
9. Remove the system check plug (Fig. 5).
10. Using a magnetic screwdriver, remove the spring and poppet (Fig. 5).
11. Insert the blank shock valve (no orifice) (Figures 1 and 5).
12. Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.
13. For the right pump only, rotate the adapter clockwise to its original position and then tighten and torque the jam nut to 15–17 ft.–lb.
14. For the right pump only, remove the bolt from the end of the case drain hose and slide the hose onto the beaded tube of the adapter (Fig. 5).
15. Install the hose clamp (Fig. 5).

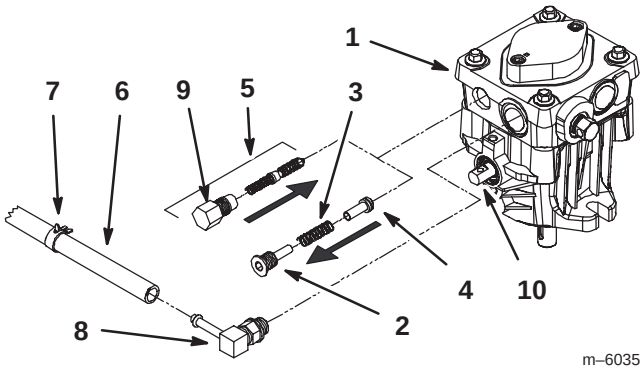


**Figure 5**

1. Right **side** of pump
2. Check plug
3. Spring
4. Poppet
5. Blank shock valve—no orifice
6. Hose—right pump only
7. Hose clamp—right pump only
8. Beaded tube adapter—right pump only
9. Valve cap
10. Control arm

## Installing the Shock Valve on the Side Opposite the Control Arm

**Danger**

**Mechanical or hydraulic jacks may fail to support machine and cause a serious injury.**

- **Use jack stands when supporting machine.**
- **Do not use hydraulic jacks.**

1. For the left pump only, remove the left rear tire.

**Note:** An extension on an Allen wrench socket may be needed to gain access to the system check plug on the left pump.

1. Remove the system check plug in the pump, on the side opposite of the control arm (Fig. 6).
2. Use a magnetic screwdriver to remove the spring and poppet (Fig. 6).
3. Insert the shock valve with the 0.024 in. orifice (Fig. 6).
4. Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.
5. For the left pump only, install the left rear tire.

6. Fill the hydraulic reservoir with Mobil® 1 15W–50, or equivalent oil, to the step marked **Cold** on the baffle in the tank.

7. Connect the negative battery cable, lower the seat, start the engine, and drive the unit for 5 to 10 minutes to purge the air out of the hydraulic system.

8. Shut the machine off and allow system to cool for 15 minutes.

9. Check the hydraulic oil level and add hydraulic oil if necessary.

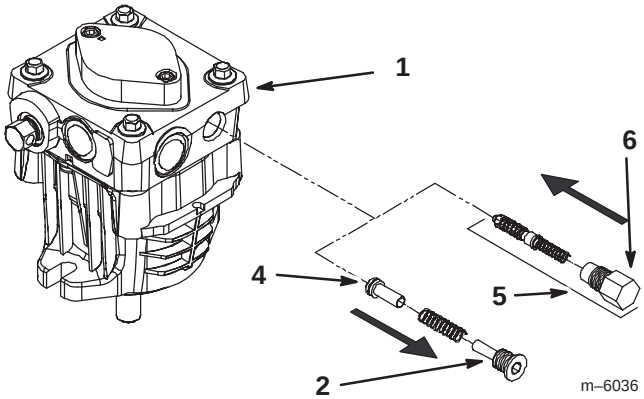


**Figure 6**

1. Pump—non–control arm side
2. Check plug
3. Spring
4. Poppet
5. Shock valve—.024 in. orifice
6. Valve cap

# Installing the Shock Valves on a 200 Series Z Master with Serial Number 210999999 and lower

These units are equipped with the Hydro–Gear BDP–10L–121P pumps. This model number can be found on the label on the side of the pump (Fig. 2).

## Installing the Shock Valve on the Control Arm Side

**1.** Disengage the PTO and set the parking brake.

**2.** Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

**3.** Raise the seat and locate the battery.

**4.** Disconnect the negative battery cable.

**5.** Remove the nut, washer and bolt from the ball joint and linkage and the pump control arm (Fig. 7). This will allow access to the system check plug on the control arm–side of the pump.

**6.** Remove the high–pressure hose on the control arm–side of the pump (Fig. 7). This will prevent the check ball from falling down into the hose while it is being removed.

**Note:** An extension on an Allen wrench socket may be needed to gain access to the system check plug on the left pump.

**7.** For the left pump only, remove the left rear tire.

**8.** Remove the system check plug from the control arm–side of the pump (Fig. 7).

**9.** Use a magnetic screwdriver to remove the spring and ball (Fig. 7).

**10.** Insert the blank shock valve (no orifice) (Figures 1 and 7).

**11.** Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.

**12.** For the left pump only, install the left rear tire.

**13.** Connect the high–pressure hose to the pump. Torque it to 21–24 ft.–lb.

**14.** Reconnect the ball joint and linkage to the pump control arm (Fig. 7).

**15.** For the left pump only, install the left rear tire. Torque lugnuts to 95 ft–lb (128 N•M).

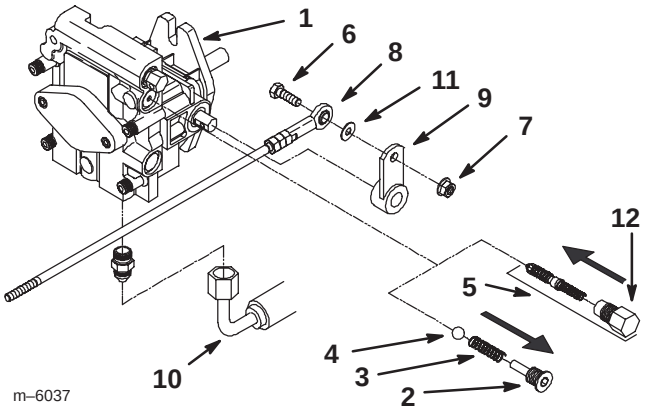


**Figure 7**

1. Pump—control arm side
2. Check plug
3. Spring
4. Ball
5. Blank shock valve—no orifice
6. Bolt
7. Nut
8. Ball joint and linkage
9. Pump control arm
10. High–pressure hose
11. Washer
12. Valve cap

## Installing the Shock Valve on the Side Opposite the Control Arm

**Note:** For the left pump, the hydraulic reservoir may need to be moved to gain access to the system check valve.

**Danger**

**Mechanical or hydraulic jacks may fail to support machine and cause a serious injury.**

- **Use jack stands when supporting machine.**
- **Do not use hydraulic jacks.**

**1.** For the right pump only, remove the right rear tire.

**Note:** An extension on an Allen wrench may be needed to gain access to the system check plug on the right pump.

**2.** Remove the system check plug in the pump, on side opposite the control arm (Fig. 8).

**3.** Use a magnetic screwdriver to remove the spring and poppet (Fig. 8).

**4.** Insert the shock valve with the 0.024 in. orifice (Fig. 8).

**5.** Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.

**6.** For the right pump only, install the right rear tire. Torque lugnuts to 95 ft–lb (128 N•M).

**7.** Fill the hydraulic reservoir with Mobil® 1 15W–50, or equivalent oil, to the top of the baffle in the tank.

**8.** Connect the negative battery cable, lower the seat, start the engine, and drive the unit for 5 to 10 minutes to purge the air out of the hydraulic system.

**9.** Shut the machine off and allow system to cool for 15 minutes.

**10.** Check the hydraulic oil level and add hydraulic oil if necessary.

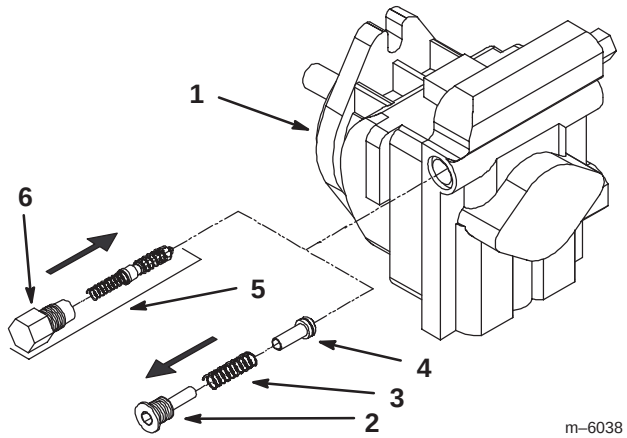


**Figure 8**

1. Pump—non–control arm side
2. Check plug
3. Spring
4. Poppet
5. Shock valve—.024 in. orifice
6. Valve cap

# Installing the Shock Valves on a 200 Series Z Master with Serial Number 220000001–22000XXXX and Lower

These units are equipped with the Hydro–Gear BDP–10A–433 pumps. This model number can be found on the label on the side of the pump (Fig. 2).

The following 200 Series Z Masters use these instructions.

- Model No. 74213—Serial No. 220000606 and Lower
- Model No. 74214—Serial No. 220000338 and Lower
- Model No. 74225—Serial No. 220001151 and Lower
- Model No. 74226—Serial No. 220001025 and Lower
- Model No. 74227—Serial No. 220000150 and Lower
- Model No. 74228—Serial No. 220000250 and Lower
- Model No. 74233—Serial No. 220000254 and Lower
- Model No. 74234—Serial No. 220000312 and Lower
- Model No. 74235—Serial No. 220000174 and Lower
- Model No. 74236—Serial No. 220000200 and Lower
- Model No. 74240—Serial No. 220000282 and Lower
- Model No. 74241—Serial No. 220000193 and Lower

**Important** Pumps with a date code of 1274 or lower **are not** compatible with this Shock Valve kit. **Do not** install this kit into these pumps.

**Important** Pumps with a date code of 1275 or higher **are** compatible with this Shock Valve kit.

If the date code is 1275 or higher, install only the **0.024 orifice shock valve into the side opposite the control arm.**

## Checking for the System Check Relief (SCR) Valve

The SCR valve can not be replaced with a shock valve.

**1.** Check the valve cap on the control arm side of the pump.

If the valve cap uses a 7/8 inch wrench, it contains a SCR Valve (Fig. 9).

**Important** Do not remove the SCR Valve. **Do not** replace it with a shock valve.

If the valve cap uses an 11/16 inch wrench, it contains a shock valve; refer to instructions starting on page 12 (Fig. 9).

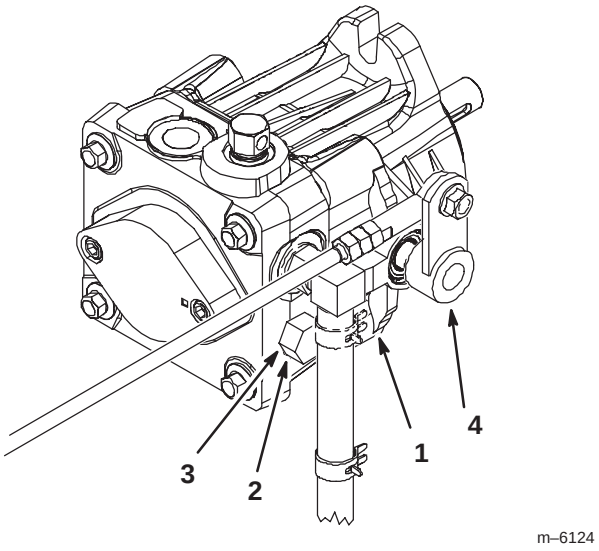


**Figure 9**

1. Pump—control arm side
2. Valve cap
3. SCR Valve—do not remove
4. Control arm

## Installing the Shock Valve on the Side Opposite the Control Arm

Install the 0.024 orifice shock valve only into the **side opposite the control arm.**

**1.** Disengage the PTO and set the parking brake.

**2.** Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

**3.** Raise the seat and locate the battery.

**4.** Disconnect the negative battery cable.

**5.** Remove the pump drive belt.

**6.** For the right pump only, loosen, but do not remove, the nuts on the two pump mounting bolts (Fig. 10). This will allow access and clearance over the right frame rail.

**7.** For the right pump only, tip the pump upward.

**8.** Remove the system check plug in the pump (Fig. 10).

**9.** Use a magnetic screwdriver to remove the spring and poppet (Fig. 10).

**10.** Insert the shock valve with the 0.024 in. orifice (Fig. 10).

**11.** Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.

**12.** For the right pump only, tighten the nuts on the two pump mounting bolts (Fig. 10).

**13.** Install the pump drive belt.

**14.** Fill the hydraulic reservoir with Mobil® 1 15W–50, or equivalent oil, to the step marked **Cold** on the baffle in the tank.

**15.** Connect the negative battery cable, lower the seat, start the engine, and drive the unit for 5 to 10 minutes to purge the air out of the hydraulic system.

**16.** Shut the machine off and allow system to cool for 15 minutes.

**17.** Check the hydraulic oil level and add hydraulic oil if necessary.

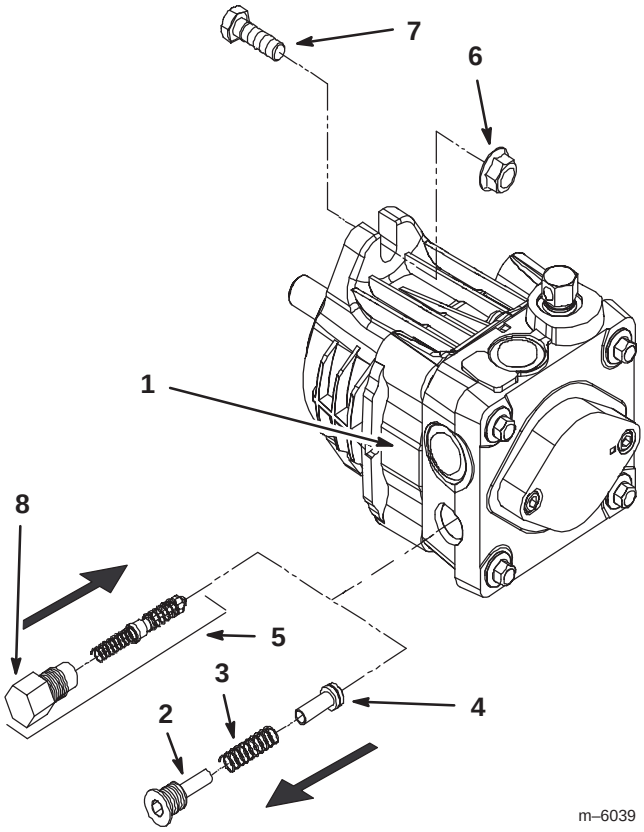


**Figure 10**

1. Pump—non–control arm side
2. Check plug
3. Spring
4. Poppet
5. Shock valve—.024 in. orifice
6. Nut
7. Bolt
8. Valve cap

# Installing the Shock Valves on a 200 Series Z Master with Serial Number 22000XXXX and Up

The following 200 Series Z Masters use these instructions.

- Model No. 74213—Serial No. 220000607 and Up
- Model No. 74214—Serial No. 220000339 and Up
- Model No. 74225—Serial No. 220001152 and Up
- Model No. 74226—Serial No. 220001026 and Up
- Model No. 74227—Serial No. 220000151 and Up
- Model No. 74228—Serial No. 220000251 and Up
- Model No. 74233—Serial No. 220000255 and Up
- Model No. 74234—Serial No. 220000313 and Up
- Model No. 74235—Serial No. 220000175 and Up
- Model No. 74236—Serial No. 220000201 and Up
- Model No. 74240—Serial No. 220000283 and Up
- Model No. 74241—Serial No. 220000194 and Up

These units are equipped with the Hydro–Gear BDP–10A–427 pumps. This model number can be found on the label on the side of the pump (Fig. 2).

These pumps are equipped with shock valves in both system check ports at the factory. Replace the shock valves if a malfunction is observed.

## Installing the Shock Valve on the Control Arm Side

**Important** It is recommended to access the pumps from underneath the machine. This will eliminate steps 5 through 9 and 14 through 17.

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Raise the seat and locate the battery.
4. Disconnect the negative battery cable.

**Note:** Steps 5 through 9 can be eliminated if machine is accessed from underneath.

5. For pumps being accessed from overhead, remove the nut from the bolt connecting the ball joint and linkage to the pump control arm (Fig. 11).
6. For pumps being accessed from overhead, loosen the hose clamp on the case drain hose and slide the clamp down the hose about 2–1/2 in. (Fig. 11).
7. For pumps being accessed from overhead, pull the hose off of the beaded tube adapter (Fig. 11).
8. For pumps being accessed from overhead, place a clean bolt (1/4 in.) in the end of the hose and elevate this end as high as possible to slow leaking fluid.

**Note:** Take note of the adapter's angular position. This is the correct position when installed again.

9. For pumps being accessed from overhead, loosen the jam nut on the adapter and rotate the adapter counterclockwise until the beaded tube end is pointing upward.
10. Remove the valve cap.
11. Using a magnetic screwdriver, remove the valve assembly.
12. Insert the blank shock valve (no orifice) (Fig. 11).
13. Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.

**Note:** Steps 14 through 17 can be eliminated if machine is accessed from underneath.

14. For pumps being accessed from overhead, rotate the adapter clockwise to its original position and then tighten and torque the jam nut to 15–17 ft.–lb.
15. For pumps being accessed from overhead, remove the bolt from the end of the case drain hose and slide the hose onto the beaded tube of the adapter (Fig. 11).
16. For pumps being accessed from overhead, install the hose clamp (Fig. 11).
17. For pumps being accessed from overhead, connect the motion control linkage to the motion control arm on the pump.

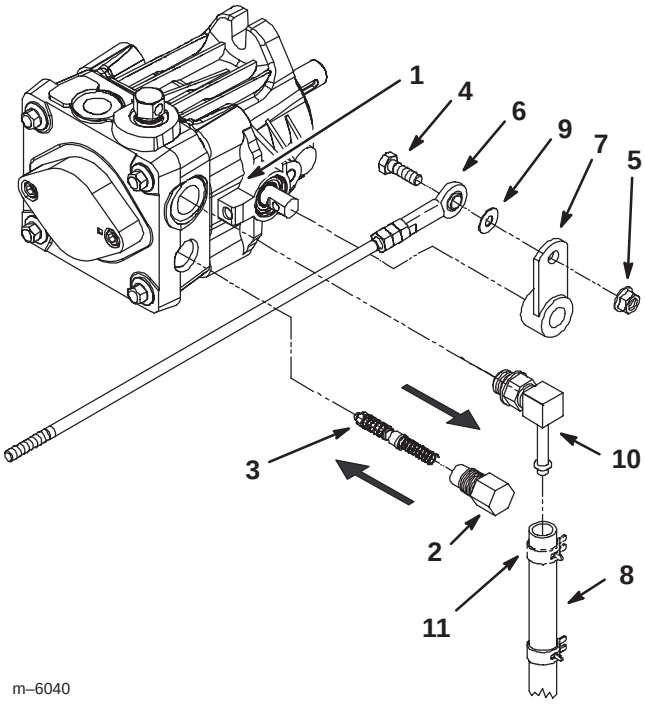


**Figure 11**

1. Pump—control arm side
2. Valve cap
3. Blank shock valve—no orifice
4. Bolt
5. Nut
6. Ball joint and linkage
7. Pump control arm
8. High–pressure hose
9. Washer
10. Beaded tube adapter
11. Hose clamp

## Installing the Shock Valve on the Side Opposite the Control Arm

**1.** Remove the pump drive belt.

**2.** For the right pump only, loosen, but do not remove, the nuts on the two pump mounting bolts (Fig. 12). This will allow access and clearance over the right frame rail.

**3.** For the right pump only, tip the pump upward.

**4.** Remove the valve cap.

**5.** Using a magnetic screwdriver, remove the valve assembly.

**6.** Insert the shock valve with the 0.024 in. orifice (Fig. 12).

**7.** Tighten and torque the valve cap for the shock valve assembly to 15–20 ft.–lb.

**8.** For the right pump only, tighten the nuts on the two pump mounting bolts (Fig. 12).

**9.** Install the pump drive belt.

**10.** Fill the hydraulic reservoir with Mobil® 1 15W–50, or equivalent oil, to the step marked **Cold** on the baffle in the tank.

**11.** Connect the negative battery cable, lower the seat, start the engine, and drive the unit for 5 to 10 minutes to purge the air out of the hydraulic system.

**12.** Shut the machine off and allow system to cool for 15 minutes.

**13.** Check the hydraulic oil level and add hydraulic oil if necessary.

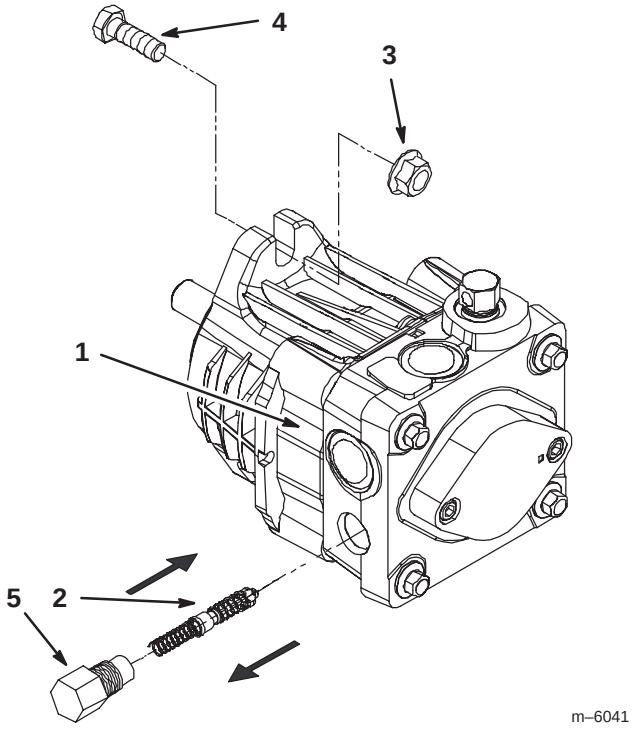


**Figure 12**

1. Pump—non–control arm side
2. Shock valve—.024 in. orifice
3. Nut
4. Bolt
5. Valve cap


TORO®