



# Superior Energizer Maintenance Guide

## DRESSING AREA MAINTENANCE

After prolonged field service the Logan Superior Energizer should be disassembled, cleaned, inspected, and redressed.

## EQUIPMENT REQUIRED

The following is a list of equipment that will be required to dress the Logan Superior Energizer.

1. A suitable vise and tong or equivalent device of suitable size.
2. Overhead crane, with 1,000 lb. minimum capacity.
3. Pipe wrenches of suitable sizes for outside diameters of body parts and for all internal parts.
4. Chain wrenches of suitable sizes for all threaded parts.
5. A suitable belt pulley assembly that can be suspended from a hoist for rotating threaded parts during make up or break out.
6. Suitable nylon lift straps for lifting heavy parts during disassembly or assembly.
7. A suitable jar tester for tool diameter and length.
8. Logan Superior Energizer Service Kit.
9. The required packing assembly sleeves for the size tool being dressed.
10. Required spare parts, packing sets, and o-rings for the size of tool being dressed.

**CAUTION:** The Energizer could contain residual well pressure. Care should be taken when draining silicone oil from the tool so bodily injury does not occur.

**NOTE:** The Energizer should always be in the CLOSED position prior to disassembly.

## DISASSEMBLY

1. Position the Energizer in a floor vise with the Connector Body centered in the vise. Support the mandrel end of the Energizer with a support stand.
2. Loosen the Pressure Body and back off the connection, place an oil catch bucket below the connection, to catch the oil in the pressure chamber. Exercise care at this point of disassembly since residual well pressure could be trapped inside. Allow the silicone oil to drain from the Pressure Body.
3. Remove the Pressure Body and Washpipe Body as an assembly and lay aside for later disassembly. Remember to use the pulley belt assembly to support the parts as they are being removed. **Not supporting the parts properly can cause thread galling or other damages.**
4. Unscrew and remove the Washpipe and lay it on a pallet.
5. Remove the Piston Assembly and lay it on the workbench.
6. Reposition the Energizer in the vise and clamp it in the vise on the Spline Body. Support the Energizer at the Balance Body with a support stand.
7. Remove the Connector Body and place it on a pallet.
8. Remove the Mandrel Extension and lay it on a pallet.
9. Remove the Impact Sleeve, if so equipped, and lay it on a pallet.
10. Remove the Mandrel from the Spline Body and lay it on a pallet.
11. Remove the Spline Body from the vise.
12. Now position the Pressure Body, and Washpipe Body in the vise, clamping on the Washpipe Body.

13. Remove the Pressure Body, taking care to catch any oil that might have migrated into the Washpipe Body when the assembly was removed, and lay it on a pallet.

## INSPECTION OF PARTS

**NOTE:** All parts should be cleaned prior to inspection. If steam cleaning or high-pressure washing is available, this is the best type of cleaning to be applied to the parts.

**NOTE:** Inspect all seals as they are removed for unusual wear patterns. Noting seal wear can help identify other areas of wear that could cause premature seal failure.

**CAUTION:** Magnetic particle inspection of all parts is strongly recommended for locating fatigue cracks that could lead to catastrophic failure downhole. Inspect all parts for signs of wear on seal surfaces, splines, bores, bearing faces at each connection, 15° shoulders at each connection, and impact surfaces. Inspect all outside body parts for rotational wear, especially if the tools have been used for heavy milling jobs.

### Pressure Body

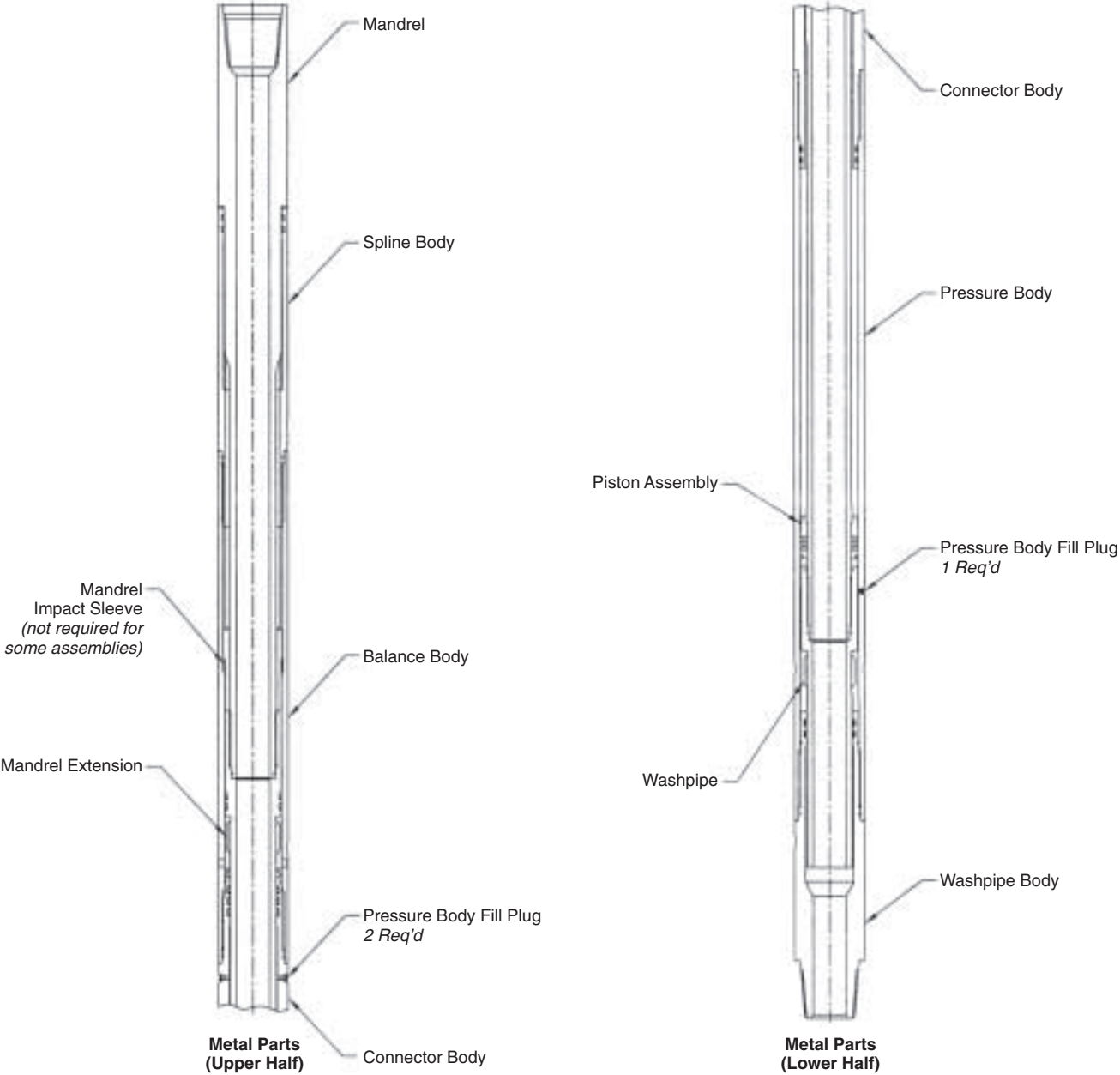
Examine the pull bore of the pressure body for galling or pitting. If severe damage is noted, the parts will have to be replaced or reworked. This procedure cannot be done in the oil field facility. Return the part to the manufacturing facility for repair.

### Impact Surfaces

The impact loads are taken on the male end of the Spline Body and the Impact sleeve large O.D. end face, if equipped. These areas should be inspected for upsets due to high impact loads. Any upsets can be removed with a file or hand held die grinder and the proper cutting bit. Also inspect for visual signs of cracking or damage.



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**CAUTION:** Care should be taken when using power tools: Always wear protective eyewear and gloves to prevent metal particles from getting in your eyes and hands.

## Splines

Inspect the splines in the Spline Body and the splines on the Mandrel for any type of unusual damage such as heavy spline wear on the sides of the splines from heavy milling jobs. Look for burrs on the edges of the splines from normal use. Remove burrs with a file or hand held grinder.

## ASSEMBLY Preparation

Make sure all parts have been cleaned and inspected. Prior to assembly, install all seals in their proper location by observing their location and direction. Some seals have special non-extrusion devices and care should be taken to assure their proper assembly. All seals should be lubricated with silicone oil prior to assembly.

1. Place the Spline Body in the vise and clamp it down. Apply a good anti-galling grease to the inside of the splines and inside the top end of the spline body past the mandrel seals.
2. Install the Mandrel through the Spline Body. Take care to insure the splines on the Mandrel are lined up with the splines in the Spline Body. Grease the splines on the Mandrel before assembly.
3. Install the Mandrel Extension onto the end of the Mandrel and torque it to the specified torque found in the strength data chart. Some Energizers require an impact sleeve. If the Energizer you are working on requires the sleeve, install it before

the Mandrel Extension is screwed onto the Mandrel. When installing the impact sleeve, install it with the larger O.D. end going on first. Make sure the threads are coated with Kopr-Kote® or equivalent thread compound. Keep the thread compound confined between the o-ring seal on the connection to avoid contamination of the silicone oil.

4. Install the Balance Body onto the Spline Body with balance holes pointed away from Spline Body. Coat the threads with thread compound.
5. Install seal installation rings on the Mandrel Extension shoulder.
6. Install the Connector Body onto the Mandrel Extension with the I.D. wiper end pointed toward Balance Body. Make sure the entire length of the Mandrel Extension is lubricated with silicone oil to ease assembly. Screw threaded end into the Balance Body and tighten.
7. Remove the assembly sleeve from the Mandrel Extension.
8. Install the Piston Assembly on the Mandrel Extension.
9. Install the Washpipe. Make sure to apply thread compound to the threads of the Mandrel Extension.
10. Install the Pressure Body.

**NOTE:** The Pressure Body is stenciled with "Connector Body End" and "Washpipe Body End" Please make note and assemble in the proper direction. Make sure the threads on the Connector Body are coated with thread compound.

11. Install the Washpipe Body. Make sure the threads are coated with thread compound.
12. Tighten all outside body joints to the recommended tightening torque specified on the torque data chart.

## TESTING

**NOTE:** Prior to testing the Energizer make sure you have all the necessary technical data. Test loads required to make a pull.

1. Install the proper Energizer tester subs onto the Energizer and lift it into the Jar Tester using an appropriate hoist.
2. Set the Jar Tester at the proper loads for the tool being tested.

## FILLING AND TESTING

The Energizer is to be filled only with Energizer Fluid (silicone fluid).

1. Stroke the Mandrel so the measured gap is in the fill position. (See figure and chart on page 4).
2. With the tool horizontal, rotate the tool so the Fill Plug holes in the Connector Body (two holes at 180 degrees) are pointing straight up and down (perpendicular to the floor).
3. Tilt the tool 15 to 20 degrees from horizontal with the Mandrel end higher.
4. Fill the fluid chamber with Energizer Fluid (silicone fluid) using the Fill Plug holes in the Connector Body until all the air is removed. Pump the fluid in the Fill Plug hole on the under side of the tool. Let the air and oil escape from the Fill Plug hole on the topside of the tool and return to the fill pump reservoir. When air is removed, install both Fill Plugs.



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5. Set the Jar Tester to the Test Pull Load per above chart. Place the tool in the Jar Tester and pull to the Test Pull Load.

**NOTE:** If the pull load needs adjusting, make the adjustment and then relax the pull load and re-pull the tools to insure accurate Pull Load/Tester pressure reading and stroke length.

6. With Test Pull Load applied, measure the Pull Stroke Length. (See figure and chart above).

7. If the Pull Stroke Length is not correct, the pull load should be applied, held for a short period of time, and then relaxed. Repeat several times to properly set the packing before adjusting the fluid volume.

8. If the Pull Stroke Length is short, the tool has too much fluid and some will need to be removed.

**WARNING:** The fluid in the tool may still be pressurized. Before removing the Fill Plug, use the Jar Tester to push the tool closed all the way. Use caution when removing the Fill Plug.

Only the top Fill Plug needs to be removed to drain some fluid. It is recommended that only a very small amount be removed and the tool retested. Repeat this process as required to get proper Test Pull Load and Stroke.

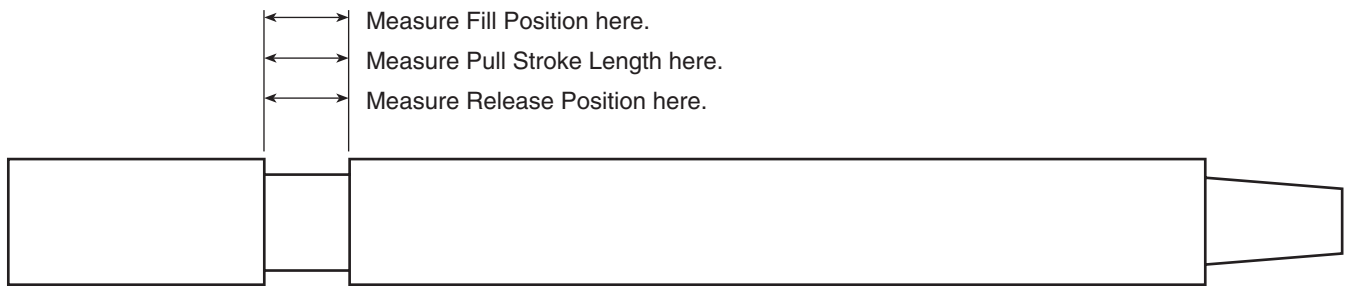
9. If the Pull Stroke Length is long, the tool has too little fluid and some will need to be added.

Only the top Fill Plug needs to be removed to add fluid. Add a small amount of fluid and retest the tool.

**WARNING:** The fluid in the tool may still be pressurized. Before removing the Fill Plug, use the Jar Tester to push the tool closed all the way. Use caution when removing the Fill Plug.

10. The Energizer is properly filled when the Test Pull Load is attained just as the tool reaches the Test Pull Stroke plus or minus 1/8 inch.

11. Relax the jar tester allowing the tool to retract as far as it will without pushing it with the jar tester. Measure the Release Position and compare to data in chart. It should be within about 1/4 inch.



Tool Size (OD x ID)	Connection	Fill Position	Test Pull Load	Test Pull Stroke	Release Position	Total Stroke	Torque (ft-lbs)
3-1/6" x 1-1/2"	2-3/8 EUE	2-1/2"	30,500	5-7/8"	3-11/16"	6"	2,400
3-1/8" x 1"	2-3/8 REG	2"	43,692	5-7/8"	4"	6"	2,700
3-1/8" x 1-1/2"	2-7/8 PAC	2-1/2"	28,450	5-3/4"	3-1/2"	6"	2,600
3-3/4" x 1-1/4"	2-7/8 REG	2-1/2"	56,900	6-3/8"	3-7/8"	6-5/8"	3,500
3-3/4" x 1-1/2"	2-3/8 IF	2-1/2"	56,900	6-3/8"	3-3/8"	6-5/8"	3,500
4-1/4" x 2"	2-7/8 IF	2-1/4"	40,600	5-11/16"	4"	6-3/16"	5,000
4-3/4" x 2-1/4"	3-1/2 IF	3-1/4"	81,300	6-5/8"	4-1/8"	7"	9,000
6-1/4" x 2-1/4"	4-1/2 IF	3-1/2"	121,900	7-11/16"	4-9/16"	8-3/16"	20,000

Additional sizes are available upon request.