



Z Type Energizer



Contents

Z Type Energizer

- Overview 2
- Use 2
- Construction 2
- Illustration 3
- Operation 4
 - Fishing Operations 4
 - Shallow or Deviated Holes 5
 - Jarring Procedure 5
- Assembly 5
 - Seal Ring Assembly 5, 8 – 10
 - Filling the Energizer 7
 - Testing the Energizer 11
- Maintenance
 - Rig Down and Rig Floor Maintenance 11
 - Dressing Area Maintenance 12
 - Complete Disassembly 12
- Logan Jar Tester 14
- Complete Assemblies and Parts Lists 15 – 24
- Recommended Test Loads 25
- Strength Data 26
- Recommended Tightening Torques 27 – 28
- Service Kit 29 – 30



Z Type Energizer

OVERVIEW

The Logan Z Type Energizer is run in conjunction with a Logan Z Type Hydraulic Fishing Jar of the same size. Each size of Logan Z Type Energizer is designed to match a corresponding size of Logan Z Type Hydraulic Fishing Jar.

The Logan Z Type Energizer is essentially a fluid spring that stores energy when strain is applied by pulling on the fishing string. Its function is to increase the impact energy delivered to the stuck fish by the Logan Z Type Hydraulic Fishing Jar and the drill collars used to supply the impact energy.

When the strain is removed by the free stroke of the fishing jar, the stored energy is released and the drill collars are accelerated upward until a blow of high impact is struck. The hydraulic fluid contained in the tool cushions much of the jarring shock from the rebounding string after each stroke to protect tools and string from damage.

Variable load is controlled by applying a lighter or heavier pull on the working string. A light pull will create light impact and a heavy pull will create hard impact at the strike point.

USE

The Logan Z Type Energizer is always used with a Logan Z Type Hydraulic Fishing Jar of corresponding size. The Logan Z Type Energizer is installed in the string when maximum jarring impact and impulse are needed, particularly in shallow, deviated, or directional holes.

In conventional jarring operations (using either hydraulic or mechanical jars), the intensity of a blow is a function of, and is proportional to, the accelerated movement of the entire running string above the fishing jar. At shallow depths, running strings lack stretch, and acceleration and effectiveness of the jarring assembly are diminished due to the

small amount of available stretch. In deviated or directional holes, friction between the running string and the wall of the hole will often diminish accelerated movement and much of the energy will be lost.

Sometimes drill collars are used to achieve mass — a practice that should be avoided because it often damages tools and the running string. This is especially true when operating in shallow depths where sometimes too many drill collars are used to replace available stretch in the string with mass. In these cases, the Logan Z Type Energizer provides a means to store the required energy immediately above the drill collars and fishing jar to offset the loss of stretch or drag on the running string. Use of the Logan Z Type Energizer allows the use of fewer drill collars than would otherwise be possible.

CONSTRUCTION

The Logan Z Type Energizer is composed of a mandrel (and/or top sub), a mandrel body insert, a mandrel body, a middle body, a washpipe body, knocker, a piston assembly, washpipe, fill plugs, seals, and seal ring assemblies.

Mandrel

The shoulder-type, splined mandrel fits into the mating splines of the mandrel body. The splines are always engaged to provide a continuous source of torque transmission in either direction at all times. The mandrel freely moves up and down while transmitting torque to the mandrel body. There is a polished seal section between the splines and top end. A suitable knocker and washpipe are made up on the lower end of the mandrel.

Mandrel Body Insert

The mandrel body insert closes the upper end of the middle body (the washpipe body closes the lower end) to form the oil chamber for the lubricating oil for the working parts of the tool. Two seal assemblies (each consisting of a non-extrusion ring, seal protector ring, and an o-ring), seal the fluid in the upper end of the mandrel body insert. A fill plug located at the upper end of the mandrel body insert, similar to the fill plug on the lower end of the middle body, allows the Energizer to be filled with energizer fluid. (See page 7 for a detailed description of the filling process under the subheading "Filling the Energizer".)

Mandrel Body

The mandrel body slides flat-end up over the mandrel and mandrel body insert. The inside of the mandrel body is designed with a series of straight splines near the lower end. These splines engage the corresponding splines of the mandrel to transmit torque conveyed by the running string through the middle body, washpipe body, and attached tool.

Piston Assembly

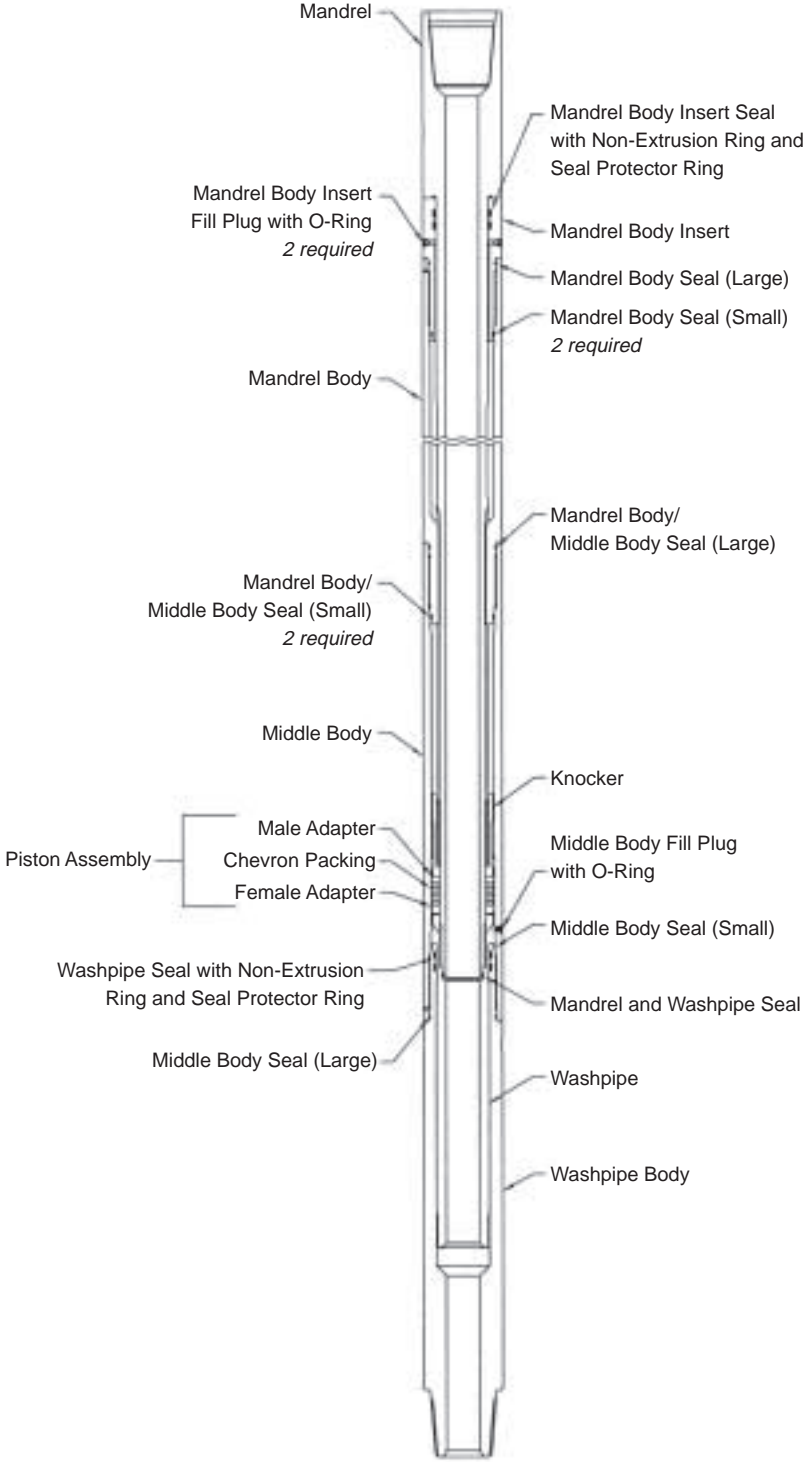
The piston assembly is assembled on the lower end of the mandrel between the knocker and the washpipe. It consists of an upper male adapter, chevron packing (usually five packing rings per set), and a lower female adapter. The inner diameter of the piston assembly presses against the mandrel while the outer diameter presses against the middle body to form an exceptionally reliable, leak-proof sliding seal.

Middle Body

With the mandrel body insert at the upper end and the washpipe body at the lower end, the middle body forms a chamber for the energizer fluid. The inside diameter of the middle body is closely fitted to the outside diameter of the knocker and the upper end of the



Z Type Energizer



Logan Z Type Energizer



Z Type Energizer

washpipe. This interior surface is highly polished to reduce frictional wear. The middle body fill plug and seal are located at the lower end of the middle body.

Knocker

The knocker strikes a heavy impact blow to the lower end of the mandrel body. The knocker material is specially selected for use in impact loading. It is closely fitted to restrict high frequency lateral vibration, or chatter, that can shorten the life of the tool.

Washpipe

The upper end of the washpipe is designed with stabilizing features similar to the knocker. The lower end is hardfaced and ground to a high polish to reduce frictional wear in the sealed upper end of the washpipe body.

Washpipe Body

The lowermost part of the tool is the washpipe body. Its primary purposes are to close the lower end of the middle body (oil chamber) and to transmit torque. Two (2) washpipe seal assemblies (each consisting of a non-extrusion ring, seal protector ring, and an o-ring) are located on the upper end of the washpipe body.

Critical Seals

Seal assemblies (consisting of o-ring seals, seal protector rings, and non-extrusion rings) are placed in tandem in areas where a seal point is subjected to high pressure in both directions. These areas of high differential pressure are located on the upper end of the mandrel body insert and upper end of the washpipe body. As hydraulic pressure is applied from either direction, the seal ring assemblies reduce normal diametric clearance at the seal points to nearly zero. Non-extrusion rings prevent the o-rings from being pushed out or rolled out of position.

OPERATION

The Logan Z Type Energizer is always used in conjunction with a Logan Z Type Hydraulic Fishing Jar of corresponding size. The Logan Z Type Energizer is simple to use and requires only a straight pull at a speed determined by the job. It is completely safe to assemble since no high-pressure pre-loading is required.

Carefully examine the Logan Z Type Energizer prior to use. Ensure that it is properly assembled, in good working condition, filled with energizer fluid, and there is no leakage. Test the Energizer in a Logan Jar Tester (*see page 14*) or equivalent test fixture to verify performance.

The Logan Z Type Energizer is shipped from the factory in the closed position. All internal and external threaded connections are tightened to the recommended torque at the Logan manufacturing facilities prior to shipment. Refer to the Recommended Tightening Torques on pages 27 and 28.

CAUTION: If tightening is necessary, tong at least four inches from the tool joint — not on the threads. Doing so will damage the tool.

To achieve maximum effect from jarring action, the Logan Z Type Energizer should be installed in the running string (tubing or drill pipe) immediately above the drill collars and just above the fishing tools. The sequence from the fish upward should be: fishing tool, Logan Z Type Hydraulic Fishing Jar, drill collars, Logan Z Type Energizer, and running string.

Except when flexibility is required for bending, there should be no change in weight per foot in the first 1,000 feet in the working string directly above the Logan Z Type Energizer.

It is recommended that no less than two joints of drill collars or no less than four joints of heavyweight drill pipe be installed between the Logan Z Type Hydraulic Fishing Jar and the Logan Z Type Energizer. The number of drill collars used will depend upon the type of operation.

Fishing Operations

For maximum effectiveness, a Logan Z Type Energizer should be installed in the fishing string immediately below the drill collars. Refer to the Strength Data on page 26 for recommended weight of drill collars.

Fishing operations are run in the conventional manner. After the fish is engaged, strain caused by pulling the fishing string will force the Energizer to stroke six (6) to thirteen (13) inches depending on its size, compressing the energizer fluid. The compressed energizer fluid creates stored energy in the Energizer that causes the jar to operate. When the jar trips, the Energizer imparts the stored energy through the drill collars and to the jar's mandrel. The sudden release of energy accelerates the drill collars upward at tremendous velocity that in turn causes the jar to strike a heavy blow directly to the fish. Movement is primarily confined to the drill collars and does not rely on the movement of the entire running string. This independent action confines the impact of the jar and drill collars where it is most effective and least damaging, regardless of the depth. The jarring procedure can be repeated as many times as needed to free the stuck fish.



Z Type Energizer

Shallow or Deviated Holes

For maximum effectiveness in shallow, very deep, or crooked holes, a Logan Z Type Energizer is recommended for use with the Logan Z Type Hydraulic Fishing Jar. Use of the Logan Z Type Energizer allows the use of fewer drill collars than would otherwise be possible. This is especially true when operating in shallow depths where too many drill collars are used to replace available stretch in the string with mass. Using drill collars to achieve mass should be avoided as this practice often damages tools and the running string.

The Energizer should be placed in the string immediately above the drill collars. Refer to the Strength Data on page 26 for recommended weight of drill collars.

Avoid running the tools at a highly deviated point or in the curve of a directional hole. The Logan Z Type Hydraulic Fishing Jar and Logan Z Type Energizer should be isolated from stiffer sections of the string with flexible joints to protect the tools from excessive bending loads. However, except when flexibility is required for bending, there should be no change in weight per foot in the first 1,000 feet in the working string directly above the Logan Z Type Energizer.

Jarring Procedure

Raise the string to stretch it sufficiently to produce the desired impact. Set the brake and wait for the Jar to strike. The initial blow is affected by many variables and timing may range from a few seconds to several minutes. Variables include the depth of operation, down-hole temperature, condition of the hole, and amount of stretch in the string.

Do not exceed the recommended pull load at any time during operation, including the first pull. Additional load will not increase speed. Refer to the Strength Data, "Torque @ Yield" line, on pages 31 – 32 of the Z Type Hydraulic Fishing

Jar instruction manual to determine the safe working load for the Jar. Velocity and relative impact load is controlled by the weight of the drill collars installed above the Jar and the amount of stretch in the running string. A crooked hole will prevent the string from stretching uniformly, so the same amount of pull can not be exerted as if the hole was straight.

After a stroke, the Jar is open and the string is stretched. The intensity of jarring impact — from very light to very heavy — can be easily controlled by the operator. A rapid series of jarring blows, at any desired intensity, can be delivered when needed. The speed is limited only by the time it takes the operator to raise and lower the fishing string for each stroke.

WARNING: When closed, the Jar should not be left suspended from the elevator, especially with any appreciable weight suspended below it. When in this position, the Jar could fire and cause damage to the rig floor or bodily injury.

ASSEMBLY

Parts should be thoroughly cleaned and wiped dry with a clean, soft cloth. Inspect all parts for defects, including the piston, middle body bore, tool joint threads, and especially any polished surfaces for pits or scratches. Minor abrasions, nicks, galls, or burrs may be removed with fine emery cloth or a small hand file. Parts with polished surfaces (mandrel, washpipe, and middle body bore) that have become deeply pitted or gouged must be replaced with new parts prior to reassembly. Lubricate all parts with a thin coating of a good grade of clean, lightweight oil.

CAUTION: Defects on the polished surfaces will damage the o-ring seals, resulting in fluid loss during operation. Replace any defective parts prior to reassembly.

Install all seals in the mandrel body insert, mandrel body, and washpipe body. Refer to the illustration on page 3 and seal/ring installation photos on pages 8 – 10 for their proper location and direction. Care should be taken to ensure the proper assembly of non-extrusion rings. All seals should be lubricated with light oil prior to assembly.

Proceed with assembly as follows:

Seal/Ring Assembly:

1. Referring to the photos on pages 8 – 10, install the non-extrusion seal assemblies in the mandrel body insert and washpipe body:
 - a. Carefully examine each non-extrusion ring and remove any burrs or rough edges with a hand file.
 - b. Holding the non-extrusion ring between thumbs and forefingers, overlap the ends until the diameter fits inside the body.
 - c. Place the edge opposite the split into the lower groove and spread the ring towards the ends. Be sure the beveled side of the ring matches the beveled groove.
 - d. Spread the ring from the center out towards the ends. Press the non-extrusion ring into the groove with the thumbs until the ends meet and the ring is firmly seated in the groove. Press into place as best as possible by hand.
 - e. Repeat the sequence for all non-extrusion rings.
2. Install the seal protector rings:
 - a. Bend the seal protector ring until it is small enough to fit into the bore.
 - b. Insert one edge of the seal protector ring into the groove. Insert the opposite edge and press down until entire ring is in place.



Z Type Energizer

- c. Straighten and flatten the ring by pressing against it with the bent-tip installation tool (Logan Part No. J1073) from the Service Kit.
 - e. Repeat the sequence for all seal protector rings.
3. With both seal assemblies pressed into place as best as possible by hand with the aid of the installation tool, properly seat the seals with the setting tool. Tap around the edge of the setting tool to seat the rings if necessary.

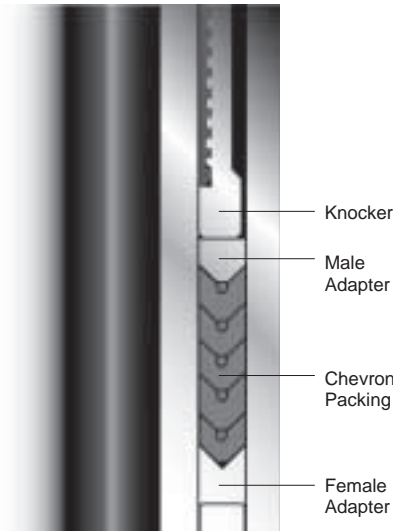
4. Remove the setting tool and continue with o-rings installation. Make sure the seal protector rings are straight and flat. Press against them with the bent-tip installation tool (Logan Part No. J1073) from the Service Kit if necessary. O-rings will be inserted in each groove between the seal protector rings.

- a. Grasp the o-ring between the thumbs and forefingers. Bend the o-ring until it is small enough to fit into the bore.
- b. Insert one edge of the o-ring into the groove between the seal protector rings. Insert the opposite edge and press down until the entire o-ring is in place.
- c. Repeat the sequence for all o-rings.

5. After the seal ring assemblies have been installed on the mandrel body insert, secure the mandrel horizontally in a vise. Clamp on the joint end.

CAUTION: Use only enough gripping action in the vise to secure the body. Avoid making heavy tool marks.

6. Thoroughly coat the polished mandrel surface with a good grade of clean, lightweight oil. Slide the mandrel body insert (seal end first) onto the mandrel.



Detail of Piston Assembly

7. Install the two mandrel body seals, one (1) large and two (2) small, in the grooves on the lower end of the mandrel body insert.
8. Carefully slide the mandrel body (female end first) over the mandrel. Prevent damage to the seals and seal assemblies as the threads and splines are engaged. Do not force the mandrel body as damage to the seal surface may result. If resistance is encountered, remove the mandrel. Reset the seal assemblies and remove any foreign matter. Screw the mandrel body onto the mandrel body insert and tighten.
9. Install the mandrel body/middle body seals, one (1) large and two (2) small, on the outside diameter at the lower end of the mandrel body.
10. Lubricate and install the knocker on the lower end of the mandrel. Tighten, using the wrench flats.

CAUTION: Prevent loose burrs or steel slivers produced by wrenching from entering the Energizer. Clean and lubricate.

11. Install the piston on the lower end of the mandrel. Assemble the upper male adapter onto the mandrel with the flat face against the knocker. Then install the chevron packing with the lips facing towards the male adapter. Install the lower female adapter with its lips against the chevron packing.

NOTE: The Energizer will not function or close if the piston assembly is installed upside-down.

12. Install the mandrel/washpipe seal onto the lower end of the mandrel. Screw the washpipe onto the mandrel. Tighten, exercising the same care as described for the knocker installation. Do not wrench on the chromed or plated areas.

CAUTION: If they are inadvertently upset or otherwise damaged, remove the upset or burr with fine emery cloth or a hand file. Prevent loose burrs or steel slivers produced by wrenching from entering the tool as foreign matter may damage the Energizer. Clean and lubricate.

13. Install the middle body seals, one (1) large and one (1) small, on the inside diameter at the lower end of the middle body.

14. Thoroughly coat the piston assembly and inside of the middle body with light oil. Slide the middle body onto the washpipe and over the lower end of the mandrel body. Be sure the larger inner diameter is at the top and the fill plug end down. Tighten connection.

CAUTION: Excessive torque on the washpipe, especially on smaller size Energizers, can distort the piston.



Z Type Energizer

- 15. Reclamp the assembly at the middle body. Install the two (2) washpipe seal assemblies into the washpipe body. Lubricate the washpipe and washpipe seal assemblies with light oil. Slide the washpipe body over the washpipe and screw it onto the lower end of the middle body. Tighten, exercising the same care as described for the mandrel installation.
- 16. Check and tighten all joint connections before running the tool in the hole. Connections should be as tight as the other tool joints in the string. Refer to the Maximum Recommended Tightening Torques tables on pages 27 – 28.
- 17. Fill the Energizer with energizer fluid as outlined in column at right under "Filling the Energizer."
- 18. Test the Energizer for proper operation as outlined on page 11 under "Testing the Energizer."
- 19. Paint or lubricate exterior surfaces to prevent corrosion.

NOTE: If the tool will be stored for a prolonged period, paint or lubricate the exterior surfaces to prevent corrosion. Do not paint or lubricate the seals. Paint, sunlight, solvents, and most lubricants are harmful to rubber products.

With assembly, filling, and testing completed, the Energizer is now ready for service.

If the tool will be stored for future service, apply a good grade of thread dope to the tool joints and install thread protectors. Also coat the box and pin threads with anti-gall grease. This will help prevent corrosion and aid make-up for next use. If the tool will be stored outside, the exterior of the tool should be cleaned and painted, or coated with a heavy application of grease. Thoroughly grease the bore if the climate is very humid or corrosive (salty). Push the

Energizer into closed position and store it with the mandrel end up or horizontally on a suitable rack.

Filling the Energizer

All parts should be cleaned and inspected. Pay special attention to the seals. Replace any that show signs of wear, damage, or have become permanently set. Assemble all parts except the mandrel body insert fill plugs and middle body fill plug. These three ports will be used during the filling process. The Logan Z Type Energizer should be filled only with Logan Energizer Fluid (Logan Part No. 50529) or equivalent hydraulic fluid. Because it is relatively expensive, energizer fluid should be kept clean and free of contamination.

The introduction of small amounts of lubricating oil from oiling other parts of the tool are not harmful but should be kept to a minimum. Drained energizer fluid may be reused provided it is clean. Filter it through several layers of clean, small-mesh cheese cloth, filter paper, or oil filter prior to reuse.

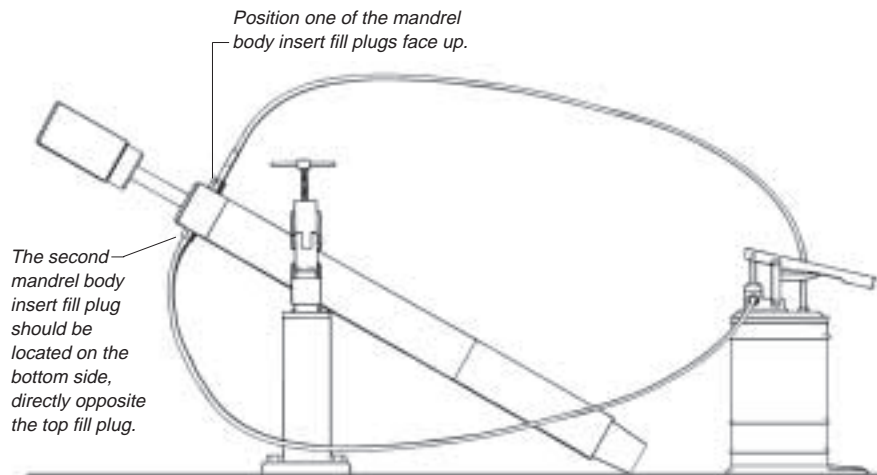
NOTE: During service, energizer fluid may become discolored with traces of brown or amber. These stains are caused by seals bleeding under high

pressure and thread dope used on connections. Discolorations are not detrimental to the fluid or the tool unless the concentration is heavy and includes solid particles such as pieces of rubber.

Proceed with the filling process as follows:

1. Clamp the Energizer horizontally in an anchored vise. Tilt the mandrel body end upward at a 30° angle, positioning one of the mandrel body insert fill plugs face up on the upper end. The second mandrel body insert fill plug should be located directly opposite (on the bottom). The two mandrel body insert fill plugs will be oriented vertically to each other. (Refer to the illustration below for proper positioning.)
2. Connect the volume pump hose to the mandrel body insert fill plug hole (bottom position). Attach the exhaust hose to the mandrel body insert fill plug (top position).
3. Pump energizer fluid into the tool at moderate speed. Continue pumping until the flow out through the exhaust hose is bubble-free.

Continued on page 11.



Filling the Energizer: Tilt the mandrel body end upward at a 30° angle, positioning the two mandrel body insert fill plugs at the upper end. Connect the volume pump hose to the mandrel body fill plug hole (bottom position). Attach the opposite end of the hose to the volume pump. Connect the clear exhaust hose to the mandrel body insert fill plug hole (top position). Place the free end into the opening of the volume pump.



Z Type Energizer

SEAL/RING ASSEMBLY INSTALLATION



Before installation, examine each non-extrusion ring and remove any burrs or rough edges with a small file.



Install the non-extrusion ring in the mandrel body. Hold the non-extrusion ring between the thumbs and forefingers.



Overlap the ends of the ring until the diameter fits inside the body.



Place the edge of the ring opposite the split into the lower groove. Be sure the beveled side of the ring matches the beveled side of the groove.



Spread the ring from the center out towards the ends. Press the ring into the groove with the thumbs until the ends meet and the ring is firmly seated in the groove.



Seal protector ring before it is bent. It will look like this after it is properly installed in the groove.

Press the non-extrusion ring into place as best as possible by hand.



Bend the seal protector ring until it is small enough to fit into the bore.



Insert one edge of the seal protector ring into the groove. Insert the opposite edge and press down until entire ring is in place.



Straighten and flatten the seal protector ring by pressing against it with the bent-tip installation tool (Logan Part No. J1073) from the Service Kit (refer to pages 29 – 30).



Z Type Energizer

SEAL/RING ASSEMBLY INSTALLATION (CONTINUED)



Repeat the installation sequence for the seal protector ring.



Bend the seal protector ring until it is small enough to fit into the bore.



Insert one edge of the seal protector ring into the groove. Insert the opposite edge and press down until entire ring is in place.



Straighten and flatten the seal protector ring by pressing against it with the bent-tip installation tool (Logan Part No. J1073) from the Service Kit.



Grasp the non-extrusion ring between the thumbs and forefingers.



Overlap the ends of the ring until the diameter fits inside the body. Place the edge of the ring opposite the split into the lower groove. Be sure the beveled side of the ring matches the beveled side of the groove.



Spread the ring from the center out towards the ends. Press the ring into the groove with the thumbs until the ends meet and the ring is firmly seated in the groove.

Thoroughly coat the surfaces of the seals with a good grade of clean, lightweight oil. Do not apply lubricant to the seals if the tool is going to be stored.



Place the setting tool in a sling and position it over the top of the mandrel body/washpipe body.

Coat the polished surface of the setting tool with a good grade of clean, lightweight oil.

Lower the setting tool into position and remove the sling.



Insert a bar or rod through the top of the setting tool to make handles to hold the tool.



Z Type Energizer

SEAL/RING ASSEMBLY INSTALLATION (CONTINUED)



Properly seat the seals with the aid of the setting tool, tapping around the entire top edge of the setting tool to seat the rings if necessary. (Setting tools are not included in the Service Kit and must be ordered separately. Refer to Parts Lists on pages 15 – 24 for part numbers.)



Remove the setting tool and continue with seal assembly installation.



Make sure the seal protector rings are straight and flat. Press against them with the bent-tip installation tool (Logan Part No. J1073) from the Service Kit if necessary. The o-rings will be inserted in the grooves between the seal protector rings.



Grasp the o-ring between the thumbs and forefingers.

Bend the o-ring until it is small enough to fit into the bore.



Insert one edge of the o-ring into the groove between the seal protector rings. Insert the opposite edge and press down until entire o-ring is in place.



O-rings are inserted in each groove between the seal protector rings.



Repeat the installation sequence for the second o-ring.



Completed seal assemblies.



Z Type Energizer

Filling the Energizer

Continued from page 7.

4. Detach the exhaust hose and insert a mandrel body insert fill plug. Then detach the volume pump hose and install the second mandrel body insert fill plug.
5. Tighten the two mandrel body insert fill plugs and test the tool in an appropriate test fixture.

Testing the Energizer

After the Logan Z Type Energizer has been completely assembled and filled with Logan Energizer Fluid (Logan Part No. 50529) or equivalent silicone fluid, it should be tested in a Logan Jar Tester or other suitable test fixture with a read-out gauge for applied pull load.

Prior to testing, have all the necessary technical data, including pull loads, readily available. Use the Recommended Pull Loads tables on page 25 as a guide.

WARNING: Do not stand beside the tool during testing. Metal body failure caused by extremely high pressures could cause bodily injury.

Proceed with testing as follows:

1. Install the proper test subs onto the Energizer and lift it into the jar tester using an appropriate hoist.
2. Set the jar tester at the proper Test Pull Load according to the table on page 25. Place the Energizer in the jar tester and pull it open to its full stroke. The pull load required to open the tool should be within $\pm 2,000$ lbs. of the load value listed for the specific Energizer.

NOTE: If the pull load needs adjusting, make the adjustment and then relax the pull load and re-pull the Energizer to insure accurate pull load tester pressure reading and stroke length.

3. Release the test load. The tool should close within 1-1/2" (measured where the mandrel meets the mandrel body) of complete closure.
4. If the tool does not close within 1-1/2", residual air may have been trapped in the tool and created an undesirable air cushion.

In such cases, repeat the filling procedure. First, back out the mandrel body insert one full turn so the tool will accept an excess volume of fluid. The mandrel body insert should be re-made and tightened after refilling. This will slightly compress the fluid to help overcome the effects of entrapped air and pre-compression of the seal assemblies.

The tool will not be harmed if it remains slightly open in the shop or during use. The only effect will be a slight loss of stroke. This is not a cause for concern, unless the distance is greater than one (1) inch.

5. Inspect the tool carefully, especially around the mandrel body seals and the mandrel body insert seal assemblies and fill plug, for leaks during the test pulls.

If the tool will be stored for future service, apply a good grade of thread dope to the tool joints and install thread protectors. Also coat the box and pin threads with anti-gall grease. This will help prevent corrosion and aid make-up for next use. If the tool will be stored outside, the exterior of the tool should be cleaned and painted, or coated with a heavy application of grease. Thoroughly grease the bore if the climate is very humid or corrosive (salty). Push the Energizer into closed position and store it with the mandrel end up or horizontally on a suitable rack.

RIG DOWN AND RIG FLOOR MAINTENANCE

The Logan Z Type Energizer requires minimal maintenance. In most cases, after moderate use on a short job, minor maintenance may be performed on the rig floor. After inspecting the rig floor for oil leaks, lay the Logan Z Type Energizer on the derrick floor. It is recommended that the Energizer should not remain suspended in the elevator for extended periods.

CAUTION: The fishing jar will usually come out of the hole in the open position. If the fishing jar comes out of the hole in the closed (cocked) position, do not allow the fishing jar to hang from the elevators, especially with any significant amount of weight suspended below the tool. If the jar opens and falls the length of its free stroke, bodily harm or rig damage could result.

Immediately remove the Logan Z Type Energizer from the fishing string and flush all mud from the bore, especially from inside the washpipe. Clean the mandrel seal surface and apply grease to prevent corrosion. Also coat the box and pin threads with anti-gall grease. This will help prevent corrosion and aid make-up for next use. Push the Energizer into closed position and cover the threads with protectors. Store the Energizer with the mandrel end up or horizontally on a suitable rack.

No specific action is required for rig down.



Z Type Energizer

DRESSING AREA MAINTENANCE

The Energizer should be taken to an adequate dressing area to be completely disassembled, cleaned, inspected, repaired as required, and reassembled.

Equipment Required

The following is a list of equipment that will be needed to dress the Energizer.

1. A suitable vise and tong or equivalent device of suitable size.
2. An overhead crane with 2,000 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 that can be suspended from a hoist for rotating threaded parts during make up or break out.
6. Nylon lift straps suitable for lifting heavy parts during disassembly or assembly.
7. A suitable jar tester for tool diameter and length.
8. A Service Kit complete with mandrel body seal setting tools. (Refer to pages 29 – 30.)
9. All required seals, rings, o-rings, and packing sets for the tool size being dressed.

Complete Disassembly

The Logan Z Type Energizer should be in the closed position for disassembly.

Place a bucket or pan under the tool to catch energizer fluid that will drain out of the washpipe body, middle body, and mandrel body as each connection is broken.

CAUTION: Care should be taken when draining energizer fluid from the tool as residual pressure may be trapped within the tool. Avoid possible injury or damage by firmly securing the tool and removing the fill plugs only after the tool is completely disassembled.

Refer to the illustration on page 3 and proceed with disassembly as follows:

1. Center and secure the middle body horizontally in a suitable vise.

CAUTION: Use only enough gripping action in the vise to break the connections. Avoid making heavy tool marks.

2. Position a clean, open-mouthed receptacle under the washpipe body joint to catch draining energizer fluid.
3. Break the connections between the washpipe body and middle body.
4. Firmly secure the washpipe body. Unscrew the washpipe body until the energizer fluid drains from the tool into the open receptacle. Remove the washpipe body and lay it aside.

CAUTION: Do not scratch or dent the washpipe seal surface.

5. Reposition the Energizer in the vise and reclamp on the mandrel body. Do not clamp over the mandrel body insert fill plug hole.
6. Remove the middle body from the mandrel body, catching any fluid that drains as it is removed.
7. Remove the washpipe from the mandrel and lay it aside.
8. Examine the middle body and washpipe body seals, seal protector rings, and non-extrusion rings for wear and/or damage. Replace seals and rings that show signs of wear and/or damage.

9. Carefully remove the piston assembly. Loosen the piston, if necessary, by driving a thin-blade screwdriver between the upper end of the piston and the knocker or mandrel shoulder. Take care not to mar the parts.

10. Carefully examine the piston assembly. Use a small hand file or emery cloth to polish off any abrasions, nicks, or burrs on the piston seal surface. Any damage to the piston packing seating surface will render the piston unuseable. Replace the chevron packing if it is worn or damaged.

11. Remove the knocker from the mandrel using the wrench flats.

CAUTION: Do not wrench between the wrench flats or gouge them with the sides of the wrench jaws. If they are inadvertently upset or otherwise damaged, remove the upset or burr with fine emery cloth or a hand file. Clean and lubricate.

13. Re-clamp on the tool joint end of the mandrel. Slide the mandrel body/mandrel body insert off the mandrel and lay it aside.
14. Remove the mandrel/washpipe seal from the washpipe end of the mandrel.
15. Unclamp the mandrel from the vise. Support the weight of the mandrel with a soft line or wire rope sling as it is removed. Handle carefully to prevent marring or denting the mandrel seal surface. Lay the mandrel aside.
16. Place the mandrel body/mandrel body insert back in the vise and remove the mandrel body insert.



Z Type Energizer

17. Inspect the splines on the bottom of the mandrel and in the mandrel body for upset. Grind off upsets with a small hand file or grinder. Polish with emery cloth.
18. Remove the large and small seals from the outer diameters of the mandrel body and washpipe body.
19. Remove the two (2) seal assemblies from the mandrel body insert.
 - a. Carefully insert the tip of either the bent-tip installation tool (Logan Part No. J1073) or o-ring installation tool (Logan Part No. J1074) from the Service Kit between the o-ring and the seal protector ring. Carefully lift out the o-ring, taking care not to damage the seal protector ring or non-extrusion ring.

CAUTION: Do not run the installation tool around the groove under the rings. This will scratch and damage the grooves.

20. Check the similar two washpipe seal assemblies in the washpipe body.
21. Visually and manually examine the mandrel body insert seals, mandrel body seals, mandrel/middle body seals, mandrel/washpipe seals, all seal protector rings, non-extrusion rings, and o-rings for wear and/or damage. Use the forefinger to feel for burrs or other damage. Replace seals and rings that show signs of wear and/or damage.
22. Remove the fill plugs from the mandrel body insert and middle body. Install new o-rings on the fill plugs.
23. Examine all parts for defects, including the piston, middle body bore, tool joint threads, and especially any polished surfaces for pits or scratches. Minor abrasions, nicks, galls, or burrs may be removed with fine emery cloth or a small hand file.

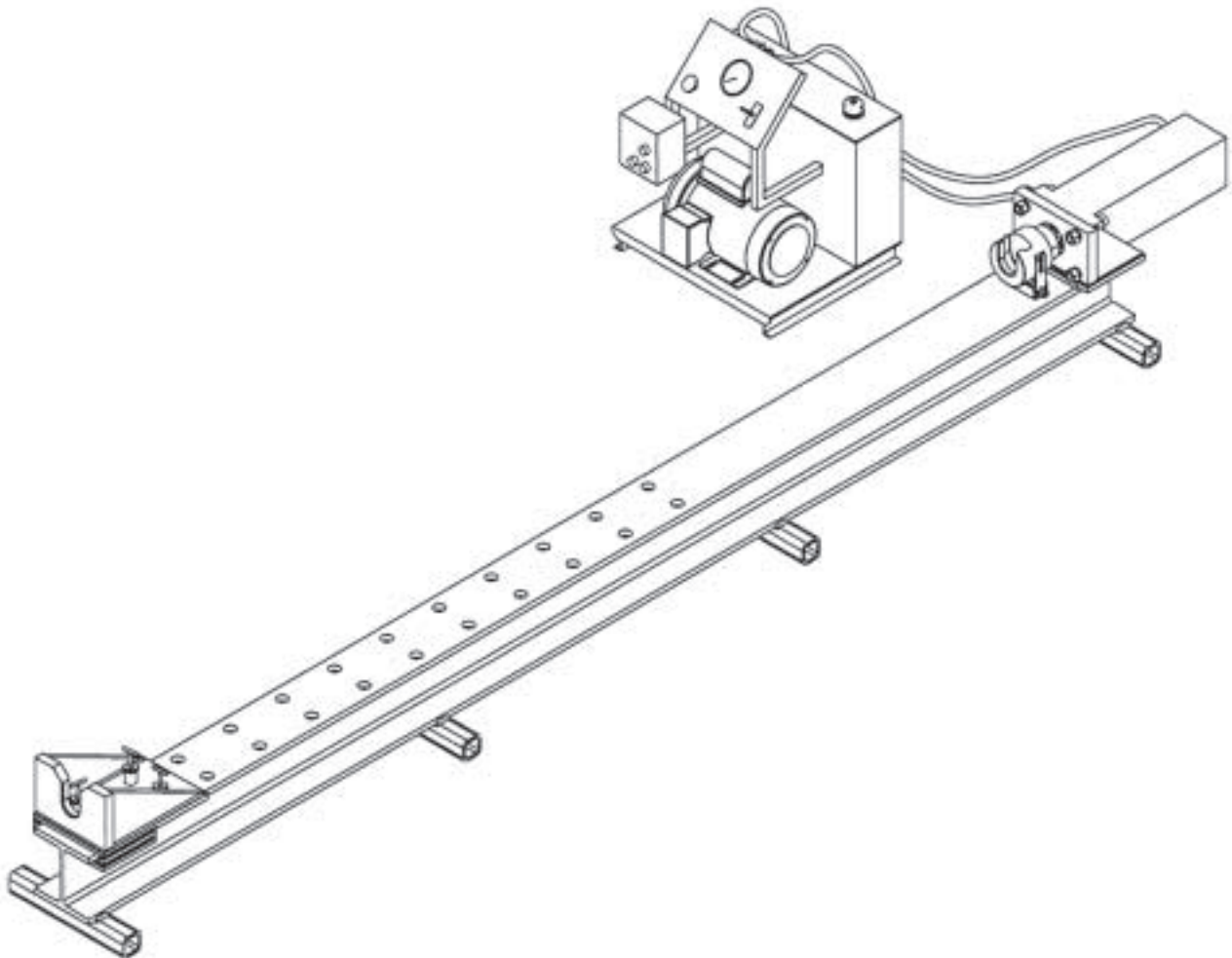
Parts with polished surfaces (mandrel, washpipe, and middle body bore) that have become deeply pitted or gouged must be replaced with new parts prior to reassembly.

CAUTION: Defects on the polished surfaces of the mandrel and/or mandrel will damage the o-ring seals, resulting in fluid loss during operation. Replace any defective parts prior to reassembly.
24. Thoroughly clean all disassembled parts in cleaning solution and wipe dry with a clean, soft cloth. Lubricate all parts with a thin coating of a good grade of clean, lightweight oil.

Disassembly is now complete.



Jar Tester



OVERVIEW

The Logan Jar Tester is a versatile machine for setting, checking, or testing pull loads of a variety of tools with outer diameters up to 11 inches. The Jar Tester is capable of exerting tension or compression loads in a controlled manner. The Logan Jar Tester provides an effective and accurate means for shop testing hydraulic jars; setting and checking pull loads of mechanical rotary jars, safety joints, bumper subs, and other similar tools; and testing formation tools. It is especially useful when many such tools must be maintained on a recurring basis.

CONSTRUCTION

The Logan Jar Tester is composed of two basic components: a frame and a prime mover. A pull plate and crosshead cradle the tool to be tested. The crosshead is attached to a hydraulic cylinder that supplies the tensile or compressive load. The prime mover, which is also referred to as the power-pak, is an electric, motor-driven hydraulic power supply. It is composed of a hydraulic pump, an electric motor, a hydraulic reservoir, a start/stop switch, a pressure gauge, a filter, and appropriate valve fittings to properly operate and maintain the system.

All components of the Logan Jar Tester are manufactured from high-grade materials. All main load bearing members are made from selected heat-treated alloy steel for maximum strength and durability.

All Logan Jar Testers are completely assembled and tested before shipment. The unit requires very little maintenance. However, usual wear parts must be occasionally replaced.

When ordering, please specify:
Complete Assembly part number:
900-003



Z Type Energizer

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API Reg	2-3/8 PH6 5.9# HYD	2-3/8 API Reg	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	70822	74723	54020	68010	52504	52528	52497	
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No.	606-000	606-001	606-002	606-003	606-004	606-005	606-006
	Bowen No.	70957	64460	50640	...	55867	55747	50660
TOP SUB	Logan Part No.	AG3000	AG3001	...	AG3003	...	AG3007	AG3008
	Bowen No.	70823	21156	...	...	...	37412	20156
MANDREL	Logan Part No.	AH3000	AH3001	AH3002	AH3017-001	AH3004	AH3005	AH3006
	Bowen No.	70959	64461	50641	...	55869	55749	50661
PISTON ASSEMBLY	Logan Part No.	...	27000-018	27000-019	27000-020	27000-021	27000-022	27000-023
	Bowen No.	...	64455	64317	...	64234	64211	64330
MANDREL BODY INSERT	Logan Part No.	AH4000	AH4001	AH4002	AH4003 *	AH4004	AH4005	AH4005
	Bowen No.	71254	50634	50642	...	50650	50283	50283
MANDREL BODY EXTENSION	Logan Part No.	...	...	...	AH5017-001 *	...	...	...
	Bowen No.	...	...	...	...	...	...	...
MANDREL BODY	Logan Part No.	AH6000	AH6001	AH6002	AH7017-001 **	AH6004	AH6006	AH6006
	Bowen No.	70958	50635	50643	...	50651	50284	50284
MIDDLE BODY	Logan Part No.	AH7000	AH7001	AH7002	AH7003	AH7004	AH7005	AH7005
	Bowen No.	70960	50636	50644	...	55870	55748	55748
WASHPIPE BODY	Logan Part No.	AG7000	AG7001	AG7002	AG7003	AG7005	AG7007	AG7008
	Bowen No.	70829	21151	18776	...	38064	37407	20151
KNOCKER	Logan Part No.	...	...	AG8002	...	AG8005	...	...
	Bowen No.	...	...	18781	...	38060	...	...
WASHPIPE	Logan Part No.	AG9000	AG9001	AG9002	AG9003	AG9005	AG9007	AG9008
	Bowen No.	70828	21154	18779	...	42738	37410	20154
MANDREL BODY INSERT	Logan Part No.	AG10000	AG10000	AG10002	AG10000	AG10002	AG10002	AG10002
FILL PLUG	Bowen No.	617	617	329	617	329	329	329
	No. Req'd	2	2	2	2	2	2	2
MIDDLE BODY FILL PLUG	Logan Part No.	AG10004	AG10004	AG10000	AG10004	AG10000	AG10000	AG10000
	Bowen No.	10641	10641	617	...	617	617	617

Logan Oil Tools reserves the right to change or discontinue designs without notice.

* Left-hand threads

** Left-hand threads on upper connection

Special Notes:

- (1) Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.
- (2) Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API Reg	2-3/8 PH6 5.9# HYD	2-3/8 API Reg	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	70822	74723	54020	68010	52504	52528	52497	
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No.	606-000	606-001	606-002	606-003	606-004	606-005	606-006
	Bowen No.	70957	64460	50640	68262	55867	55747	50660
MANDREL BODY INSERT	Logan Part No.	L8-024	...	L56542	...	...	...	...
NON-EXTRUSION RING	Bowen No.	8-024	...	56542	...	...	...	...
MIDDLE BODY INSERT	Logan Part No.	568-024	L8-027	L227-27.25	...	...	...	...
SEAL RING	Bowen No.	568-024	8-027	227-27.25	...	...	...	...
	No. Req'd	2	2	2	...	...	...	...
MANDREL & WASHPIPE	Logan Part No.	L365-16	L365-17	L365-24	L365-30.5	L365-32	L365-36	L365-36
NON-EXTRUSION RING	Bowen No.	365-16	365-17	365-24	365-30.5	365-32	365-36	365-36
	No. Req'd	8	8	8	8	8	8	8
MANDREL & WASHPIPE	Logan Part No.	L375-16	L375-17	L375-24	L375-30.5	L375-32	L375-36	L375-36
SEAL PROTECTOR RING	Bowen No.	375-16	375-17	375-24	375-30.5	375-32	375-36	375-36
	No. Req'd	8	8	8	8	8	8	8

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API Reg	2-3/8 PH6 5.9# HYD	2-3/8 API Reg	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	70822	74723	54020	68010	52504	52528	52497	
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No.	606-000	606-001	606-002	606-003	606-004	606-005	606-006
	Bowen No.	70957	64460	50640	68262	55867	55747	50660

OPTIONAL

MANDREL BODY	Logan Part No.	AG1000-16	AG1000-17	AG1000-24	AG1000-30.5	AG1000-32	AG1000-36	AG1000-36
SETTING TOOL	Bowen No.	22709-16	22709-17	22709-24	22709-30.5	22709-32	22709-36	22709-36
PISTON ASSEMBLY	Logan Part No.	...	27000-018	27000-019	27000-020	27000-021	27000-022	27000-023
<i>Consists of:</i>	Bowen No.	...	64455	64317	68268	64234	64211	64330
UPPER ADAPTER	Logan Part No.	...	AH12001	AH12002	AH12003	AH12004	AH12005	AH12006
	Bowen No.	...	64456	64318	68270	64236	64213	64331
PACKING	Logan Part No.	...	AH13001	AH13002	AH13003	AH13004	AH13005	AH13006
	Bowen No.	...	64458	64320	68271	64237	64214	64333
LOWER ADAPTER	Logan Part No.	...	AH14001	AH14002	AH14003	AH14004	AH14005	AH14006
	Bowen No.	...	64457	64319	68269	64235	64212	64332
CONE	Logan Part No.	AH15000	...	...	...	...	...	...
	Bowen No.	77514	...	...	...	...	...	...
BY-PASS BODY	Logan Part No.	AH16000	...	...	...	...	...	...
	Bowen No.	77513	...	...	...	...	...	...
SEAL BODY	Logan Part No.	AH17000	...	...	...	...	...	...
	Bowen No.	77515	...	...	...	...	...	...
O-RING SEAL	Logan Part No.	L2-019	...	...	...	...	...	...
	Bowen No.	2-019	...	...	...	...	...	...

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API Reg	2-3/8 PH6 5.9# HYD	2-3/8 API Reg	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	70822	74723	54020	68010	52504	52528	52497	
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No.	606-000	606-001	606-002	606-003	606-004	606-005	606-006
	Bowen No.	70957	64460	50640	68262	55867	55747	50660
O-RING PACKING SET	Logan Part No.	27000-034	27000-035	27000-036	27000-037	27000-038	27000-039	27000-040
<i>Consists of:</i>	Bowen No.	70961	50638	50835	68272	55873	55816	55497
WASHPIPE SEAL	Logan Part No.	568-211	568-115	568-210	568-224	568-220	568-224	568-227
	Bowen No.	568211	568115	568210	568224	568220	568224	568227
MANDREL & WASHPIPE SEAL	Logan Part No.	568-015	568-212	568-219	568-328	568-329	568-333	568-333
	Bowen No.	568015	568212	568219	568328	568329	568333	568333
	No. Req'd	1	2	4	5	4	4	3
MANDREL BODY & MIDDLE BODY SEAL – LARGE	Logan Part No.	568-016	568-219	568-224	568-036	568-231	568-235	568-235
	Bowen No.	568016	568219	568224	568036	568231	568235	568235
	No. Req'd	3	3	3	4	3	3	3
MANDREL BODY & MIDDLE BODY SEAL – SMALL	Logan Part No.	568-214	568-027	568-222	568-035	568-228	568-233	568-233
	Bowen No.	568214	568027	568222	568035	568228	568233	568233
	No. Req'd	3	3	3	8	5	5	5
MANDREL BODY INSERT FILL PLUG SEAL	Logan Part No.	568-001	...	568-006	568-005	568-006	568-006	568-006
	Bowen No.	568001	...	568006	568005	568006	568006	568006
	No. Req'd	2	...	2	2	2	2	2
MIDDLE BODY FILL PLUG SEAL	Logan Part No.	...	568-005	568-005	...	568-005	568-005	568-005
	Bowen No.	...	568005	568005	...	568005	568005	568005
SERVICE KIT	Logan Part No.	26000-054	26000-055	26000-055	26000-055	26000-055	26000-055	26000-055
	Bowen No.	21279	55403	55403	55403	55403	55403	55403

ENERGIZER FLUID	Logan Part No.	50529-A	50529-B	50529-C	50529-D	50529-E		
	Bowen No.	50529-A	50529-B	50529-C	50529-D	50529		
		1 Gallon	2 Gallons	5 Gallons	30 Gallons	55 Gallons		

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF
OUTSIDE DIAMETER (INCHES)		3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2
INSIDE DIAMETER (INCHES)		1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4
JARS USED WITH		52506	52502	52653	52530	52500	52498	52544
TOTAL STROKE TO SOLID (INCHES)		8-1/4	8-5/8	10-3/8	8-7/8	10-1/8	8-5/8	13
COMPLETE ASSEMBLY	Logan Part No.	606-007	606-008	606-009	606-010	606-011	606-012	606-013
	Bowen No.	55895	55664	50708	50700	55812	55860	55905
TOP SUB	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...
MANDREL	Logan Part No.	AH3007	AH3008	AH3009	AH3010	AH3011	AH3012	AH3013
	Bowen No.	55897	55769	50709	50701	55817	55862	55908
PISTON ASSEMBLY	Part No.	27000-024	27000-025	27000-026	27000-027	27000-028	27000-029	27000-030
	Bowen No.	64248	64206	64340	64995	64264	64268	64272
MANDREL BODY INSERT	Logan Part No.	AH4008	AH4009	AH4010	AH4011	AH4012	AH4013	AH4014
	Bowen No.	50591	49412	50710	50702	49394	49635	50598
MANDREL BODY EXTENSION	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...
MANDREL BODY	Logan Part No.	AH6007	AH6008	AH6009	AH6010	AH6011	AH6012	AH6013
	Bowen No.	50589	50371	50711	50703	50374	49634	50597
MIDDLE BODY	Logan Part No.	AH7007	AH7008	AH7009	AH7010	AH7011	AH7012	AH7013
	Bowen No.	55898	55660	50712	50704	55814	55863	55920
WASHPIPE BODY	Logan Part No.	AG7006	AG7009	AG7010	AG7011	AG7012	AG7013	AG7014
	Bowen No.	38045	44487	35854	25961	38111	14711	12371
KNOCKER	Logan Part No.	AG8006	AH9008	AG8010	AG8011	AG8012	AG8013	AG8014
	Bowen No.	38049	51185	35857	25966	38116	14717	12377
WASHPIPE	Logan Part No.	AG9006	AG9009	AH10009	AG9011	AG9012	AG9013	AH10013
	Bowen No.	38046	44488	64344	25964	38114	14714	55907
MANDREL BODY INSERT FILL PLUG	Logan Part No.	AG10002	AG10002	AG10002	AG10002	AG10002	AG10003	AG10003
	Bowen No.	329	329	329	329	329	508	508
	No. Req'd	2	2	2	2	2	2	2
MIDDLE BODY FILL PLUG	Logan Part No.	AG10000	AG10000	AG10000	AG10002	AG10000	AG10002	AG10002
	Bowen No.	617	617	617	329	617	329	329

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF
OUTSIDE DIAMETER (INCHES)		3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2
INSIDE DIAMETER (INCHES)		1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4
JARS USED WITH		52506	52502	52653	52530	52500	52498	52544
TOTAL STROKE TO SOLID (INCHES)		8-1/4	8-5/8	10-3/8	8-7/8	10-1/8	8-5/8	13
COMPLETE ASSEMBLY	Logan Part No.	606-007	606-008	606-009	606-010	606-011	606-012	606-013
	Bowen No.	55895	55664	50708	50700	55812	55860	55905
MANDREL BODY INSERT	Logan Part No.	...	...	...	...	...	...	...
NON-EXTRUSION RING	Bowen No.	...	...	...	...	...	...	...
MIDDLE BODY INSERT	Logan Part No.	...	...	...	...	...	...	...
SEAL RING	Bowen No.	...	...	...	...	...	...	...
	No. Req'd	...	...	...	...	...	...	...
MANDREL & WASHPIPE	Logan Part No.	L365-35	L365-40	L365-42	L365-40	L365-41	L453	L365-48
NON-EXTRUSION RING	Bowen No.	365-35	365-40	365-42	365-40	365-41	453	365-48
	No. Req'd	8	8	8	8	8	8	8
MANDREL & WASHPIPE	Logan Part No.	L375-35	L375-40	L375-42	L375-40	L375-41	L449	L375-48
SEAL PROTECTOR RING	Bowen No.	375-35	375-40	375-42	375-40	375-41	449	375-48
	No. Req'd	8	8	8	8	8	8	8

OPTIONAL

MANDREL BODY	Logan Part No.	AG1000-35	AG1000-40	AG1000-42	AG1000-40	AG1000-41	AG1001	AG1000-48
SETTING TOOL	Bowen No.	22709-35	22709-40	22709-42	22709-40	22709-41	448	22709-48
PISTON ASSEMBLY	Logan Part No.	27000-024	27000-025	27000-026	27000-027	27000-028	27000-029	27000-030
<i>Consists of:</i>	Bowen No.	64248	64206	64340	64995	64264	64268	64272
UPPER ADAPTER	Logan Part No.	AH12007	AH12008	AH12009	AH12010	AH12011	AH12012	AH12013
	Bowen No.	64250	64208	64341	64997	64266	64269	64273
PACKING	Logan Part No.	AH13007	AH13008	AH13009	AH13010	AH13011	AH13012	AH13013
	Bowen No.	64251	64209	64343	64998	64267	64271	64275
LOWER ADAPTER	Part No.	AH14007	AH14008	AH14009	AH14010	AH14011	AH14012	AH14013
	Bowen No.	64249	64207	64342	64996	64265	64270	64274
CONE	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...
BY-PASS BODY	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...
SEAL BODY	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...
O-RING SEAL	Logan Part No.	...	...	...	...	...	...	...
	Bowen No.	...	...	...	...	...	...	...

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.
- (2) Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF
OUTSIDE DIAMETER (INCHES)		3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2
INSIDE DIAMETER (INCHES)		1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4
JARS USED WITH		52506	52502	52653	52530	52500	52498	52544
TOTAL STROKE TO SOLID (INCHES)		8-1/4	8-5/8	10-3/8	8-7/8	10-1/8	8-5/8	13
COMPLETE ASSEMBLY	Logan Part No.	606-007	606-008	606-009	606-010	606-011	606-012	606-013
	Bowen No.	55895	55664	50708	50700	55812	55860	55905
O-RING PACKING SET	Logan Part No.	27000-041	27000-042	27000-043	27000-044	27000-045	27000-046	27000-047
<i>Consists of:</i>	Bowen No.	55902	55666	50840	50841	55815	55866	55919
WASHPIPE SEAL	Logan Part No.	568-222	568-227	568-233	568-228	568-228	568-234	568-232
	Bowen No.	568222	568227	568233	568228	568228	568234	568232
MANDREL & WASHPIPE SEAL	Logan Part No.	568-332	568-327	568339	568-337	568-338	568-344	568-345
	Bowen No.	568332	568327	568339	568337	568338	568344	568345
	No. Req'd	4	4	4	4	4	4	4
MANDREL BODY & MIDDLE BODY SEAL – LARGE	Logan Part No.	568-235	568-239	568-241	568-241	568-241	568-248	568-252
	Bowen No.	568235	568239	568241	568241	568241	568248	568252
	No. Req'd	3	3	3	3	3	3	3
MANDREL BODY & MIDDLE BODY SEAL – SMALL	Logan Part No.	568-233	568-237	568-239	568-239	568-239	568-246	568-250
	Bowen No.	568233	568237	568239	568239	568239	568246	568250
	No. Req'd	5	5	5	5	5	3	5
MANDREL BODY INSERT FILL PLUG SEAL	Logan Part No.	568-006	568-006	568-006	568-006	568-006	568-011	568-011
	Bowen No.	568006	568006	568006	568006	568006	568011	568011
	No. Req'd	2	2	2	2	2	2	2
MIDDLE BODY FILL PLUG SEAL	Logan Part No.	568-005	568-005	568-005	568-006	568-005	568-006	568-006
	Bowen No.	568005	568005	568005	568006	568005	568006	568006
SERVICE KIT	Logan Part No.	26000-055	26000-055	26000-055	26000-055	26000-055	26000-055	26000-055
	Bowen No.	55403	55403	55403	55403	55403	55403	55403

ENERGIZER FLUID	Logan Part No.	50529-A	50529-B	50529-C	50529-D	50529-E		
	Bowen No.	50529-A	50529-B	50529-C	50529-D	50529		
		1 Gallon	2 Gallons	5 Gallons	30 Gallons	55 Gallons		

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		5-1/2 API Reg	6-5/8 API Reg	7-5/8 API Reg				
OUTSIDE DIAMETER (INCHES)		6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)		2-3/8	3-1/16	3-3/4				
JARS USED WITH		52680	52711	66346				
TOTAL STROKE TO SOLID (INCHES)		13	13	13				
COMPLETE ASSEMBLY	Logan Part No.	606-014	606-015	606-016				
	Bowen No.	50720	55910	66372				
TOP SUB	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	
MANDREL	Logan Part No.	AH3014	AH3015	AH3016				
	Bowen No.	50721	50146	66376				
PISTON ASSEMBLY	Logan Part No.	27000-031	27000-032	27000-033				
	Bowen No.	64240	64276	66382				
MANDREL BODY INSERT	Logan Part No.	AH4015	AH4016	AH4017				
	Bowen No.	50722	50149	66380				
MANDREL BODY EXTENSION	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	
MANDREL BODY	Logan Part No.	AH6014	AH6015	AH6016				
	Bowen No.	50723	50147	66377				
MIDDLE BODY	Logan Part No.	AH7014	AH7015	AH7016				
	Bowen No.	50724	55911	66373				
WASHPIPE BODY	Logan Part No.	AG7015	AG7016	AG7017				
	Bowen No.	701	15164	66350				
KNOCKER	Logan Part No.	AG8015	AH9015	AG8017				
	Bowen No.	11134	50150	66348				
WASHPIPE	Logan Part No.	AG9015	AH10015	AG9017				
	Bowen No.	704	55912	66349				
MANDREL BODY INSERT FILL PLUG	Logan Part No.	AG10003	AG10003	AG10003				
	Bowen No.	508	508	508				
	No. Req'd	2	2	2				
MIDDLE BODY FILL PLUG	Logan Part No.	AG10002	AG10002	...				
	Bowen No.	329	329	...				

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		5-1/2 API Reg	6-5/8 API Reg	7-5/8 API Reg				
OUTSIDE DIAMETER (INCHES)		6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)		2-3/8	3-1/16	3-3/4				
JARS USED WITH		52680	52711	66346				
TOTAL STROKE TO SOLID (INCHES)		13	13	13				
COMPLETE ASSEMBLY	Logan Part No.	606-014	606-015	606-016				
	Bowen No.	50720	55910	66372				
MANDREL BODY INSERT	Logan Part No.	...	...	...	
NON-EXTRUSION RING	Bowen No.	...	...	...	
MIDDLE BODY INSERT	Logan Part No.	...	...	...	
SEAL RING	Bowen No.	...	...	...	
	No. Req'd	...	...	...	
MANDREL & WASHPIPE	Logan Part No.	L365-50.75	L365-59	L365-65				
NON-EXTRUSION RING	Bowen No.	708	365-59	365-65				
	No. Req'd	8	8	8				
MANDREL & WASHPIPE	Logan Part No.	L375-50.75	L375-59	L375-65				
SEAL PROTECTOR RING	Bowen No.	709	375-59	375-65				
	No. Req'd	8	8	8				

OPTIONAL

MANDREL BODY	Logan Part No.	AG1000-51	AG1000-59	AG1017				
SETTING TOOL	Bowen No.	22709-51	22709-59	22709-65				
PISTON ASSEMBLY	Logan Part No.	27000-031	27000-032	27000-033				
<i>Consists of:</i>	Bowen No.	64240	64276	66382				
UPPER ADAPTER	Logan Part No.	AH12014	AH12015	AH12016				
	Bowen No.	64242	64277	66378				
PACKING	Logan Part No.	AH13014	AH13015	AH13016				
	Bowen No.	64243	64279	66384				
LOWER ADAPTER	Logan Part No.	AH14014	AH14015	AH14016				
	Bowen No.	64241	64278	66379				
CONE	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	
BY-PASS BODY	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	
SEAL BODY	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	
O-RING SEAL	Logan Part No.	...	...	...	
	Bowen No.	...	...	...	

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.
- (2) Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Z Type Energizer

TOOL JOINT CONNECTION		5-1/2 API Reg	6-5/8 API Reg	7-5/8 API Reg				
OUTSIDE DIAMETER (INCHES)		6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)		2-3/8	3-1/16	3-3/4				
JARS USED WITH		52680	52711	66346				
TOTAL STROKE TO SOLID (INCHES)		13	13	13				
COMPLETE ASSEMBLY	Logan Part No.	606-014	606-015	606-016				
	Bowen No.	50720	55910	66372				
O-RING PACKING SET	Logan Part No.	27000-048	27000-049	27000-050				
<i>Consists of:</i>	Bowen No.	50842	55921	66383				
WASHPIPE SEAL	Logan Part No.	568-235	568-242	568-246				
	Bowen No.	568235	568242	568246				
MANDREL & WASHPIPE SEAL	Logan Part No.	568-348	568-432	568-438				
	Bowen No.	568348	568432	568438				
	No. Req'd	4	4	4				
MANDREL BODY & MIDDLE BODY SEAL – LARGE	Logan Part No.	568-256	568-261	568-265				
	Bowen No.	568256	568261	568265				
	No. Req'd	3	3	3				
	Price	\$6.90	\$7.00	\$8.25				
MANDREL BODY & MIDDLE BODY SEAL – SMALL	Logan Part No.	568-254	568-259	568-263				
	Bowen No.	568254	568259	568263				
	No. Req'd	5	3	1				
MANDREL BODY INSERT FILL PLUG SEAL	Logan Part No.	568-011	568-011	568-441				
	Bowen No.	568011	568011	568441				
	No. Req'd	2	2	2				
MIDDLE BODY FILL PLUG SEAL	Logan Part No.	568-006	568-006	568-011				
	Bowen No.	568006	568006	568011				
SERVICE KIT	Logan Part No.	26000-055	26000-055	26000-055				
	Bowen No.	55403	55403	55403				

ENERGIZER FLUID	Logan Part No.	50529-A	50529-B	50529-C	50529-D	50529-E		
	Bowen No.	50529-A	50529-B	50529-C	50529-D	50529		
		1 Gallon	2 Gallons	5 Gallons	30 Gallons	55 Gallons		

Logan Oil Tools reserves the right to change or discontinue designs without notice.

Special Notes:

- (1) *Packing Sets include all seals necessary to dress the tool. Non-Extrusion Rings and Seal Protector Rings are not included, and must be ordered separately.*
- (2) *Jar Service Kit does not include Seal Setting Tools or Piston Ring Pliers, which must be ordered separately.*

When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard
- (3) Name and number of any desired spares
- (4) Outside diameter, if other than standard



Recommended Test Loads

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API REG	2-3/8 PH6 5.9# HYD	2-3/8 API REG	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	Logan Part No.	605-000	605-001	605-002	605-003	605-005	605-007	605-008
	Bowen No.	70822	74723	54020	68010	52504	52528	52497
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No.	606-000	606-001	606-002	606-003	606-004	606-005	606-006
	Bowen No.	70957	64460	50640	68682	55867	55747	50660
PULL LOAD TO OPEN FULLY (LBS)	14,000	18,100	20,700	37,000	30,000	43,500	43,000	

TOOL JOINT CONNECTION	2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF	
OUTSIDE DIAMETER (INCHES)	3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2	
INSIDE DIAMETER (INCHES)	1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4	
JARS USED WITH	Logan Part No.	605-006	605-009	605-010	605-011	605-012	605-013	605-014
	Bowen No.	52506	52502	52653	52530	52500	52498	52544
TOTAL STROKE TO SOLID (INCHES)	8-1/4	8-5/8	10-3/8	8-7/8	10-1/8	8-5/8	13	
COMPLETE ASSEMBLY	Logan Part No.	606-007	606-008	606-009	606-010	606-011	606-012	606-013
	Bowen No.	55895	55664	50708	50700	55812	55860	55905
PULL LOAD TO OPEN FULLY (LBS)	52,000	43,000	49,000	78,000	63,000	128,500	147,000	

TOOL JOINT CONNECTION	5-1/2 API REG	6-5/8 API REG	7-5/8 API REG				
OUTSIDE DIAMETER (INCHES)	6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)	2-3/8	3-1/16	3-3/4				
JARS USED WITH	Logan Part No.	605-015	605-016	605-017			
	Bowen No.	52680	52711	66346			
TOTAL STROKE TO SOLID (INCHES)	13	13	13				
COMPLETE ASSEMBLY	Logan Part No.	606-014	606-015	606-016			
	Bowen No.	50720	55910	66372			
PULL LOAD TO OPEN FULLY (LBS)	172,900	126,100	200,000				

* Figures are based on a Jar Tester speed of 2-1/2 feet per minute.

Full speed, approximately 6-1/2 feet per minute, is needed to reach maximum allowable load.

WARNING: All jarring and pulling loads listed in this manual assume that force is acting alone along the major axis of the Energizer. Torque and tension, or bending and tension, combine stresses that may lead to failure at less than the rated loads. Combining rotation and bending can lead to fatigue.

CAUTION: Operators should also be aware that milling or drilling operations may cause complex stresses in the Energizer other than the simple torsional and tensile values listed in the Strength Data on page 26. The weight necessary for milling can cause bending forces. When combined with torsional forces, very high stresses may be generated in some areas of the Energizer. Rotating the Energizer in a deviated hole or at a neutral point may have a similar effect. Milling operations are necessary at times and are not discouraged. However, operators should exercise caution and be aware of the possible dangers when rotating under adverse conditions.



Strength Data

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API Reg	2-3/8 PH6 5.9# HYD	2-3/8 API Reg	2-3/8 API IF	2-3/8 EUE
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8
COMPLETE ASSEMBLY Logan Part No. Bowen No.	606-000 70957	606-001 64460	606-002 50640	606-003 68262	606-004 55867	606-005 55747	606-006 50660
DRILL COLLAR	1,100 –	1,360 –	1,560 –	2,200 –	2,400 –	3,400 –	3,500 –
WEIGHT ABOVE JAR (LBS)	1,400	1,800	2,100	3,000	3,300	4,600	4,700
MINIMUM PULL LOAD (LBS)	8,400	10,800	13,800	24,600	21,000	30,000	30,000
TENSILE @ YIELD (LBS) *	43,200 – 46,300	59,400	118,500	194,800	229,200	299,700	179,500
RECOMMENDED TORQUE (FT-LBS)	200	370	1,700	1,600	3,500	3,800	2,500
TORQUE @ YIELD (FT-LBS)	420	640	2,200	5,200	7,600	13,000	8,200

TOOL JOINT CONNECTION	2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF
OUTSIDE DIAMETER (INCHES)	3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2
INSIDE DIAMETER (INCHES)	1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4
COMPLETE ASSEMBLY Logan Part No. Bowen No.	606-007 55895	606-008 55664	606-009 50708	606-010 50700	606-011 55812	606-012 55860	606-013 55905
DRILL COLLAR	4,200 –	3,500 –	3,600 –	6,300 –	5,600 –	10,200 –	11,800 –
WEIGHT ABOVE JAR (LBS)	5,700	4,700	4,900	8,500	7,500	13,800	16,000
MINIMUM PULL LOAD (LBS)	36,000	30,000	32,000	54,000	43,000	77,000	102,000
TENSILE @ YIELD (LBS) *	345,000	430,300	375,000	591,900	468,800	937,000	917,400
RECOMMENDED TORQUE (FT-LBS)	3,800	6,600	4,000	9,500	9,500	17,000	21,000
TORQUE @ YIELD (FT-LBS)	13,500	24,500	25,900	27,600	27,100	52,600	56,900

TOOL JOINT CONNECTION	5-1/2 API Reg	6-5/8 API Reg	7-5/8 API Reg				
OUTSIDE DIAMETER (INCHES)	6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)	2-3/8	3-1/16	3-3/4				
COMPLETE ASSEMBLY Logan Part No. Bowen No.	606-014 50720	606-015 55910	606-016 66372				
DRILL COLLAR	13,000 –	11,000 –	12,000 –				
WEIGHT ABOVE JAR (LBS)	17,500	15,000	16,000				
MINIMUM PULL LOAD (LBS)	102,000	88,000	100,000				
TENSILE @ YIELD (LBS) *	1,013,800	1,587,900	1,621,000				
RECOMMENDED TORQUE (FT-LBS)	24,000	45,000	70,000				
TORQUE @ YIELD (FT-LBS)	74,200	145,300	224,700				

* Tensile strengths listed above are calculated theoretical yield strengths and are considered accurate to $\pm 20\%$. Operating torques are set at 50% of the calculated theoretical yield torque and are the maximum recommended operating torques. These figures do not constitute a guarantee, actual or implied. They are meant to serve as a guide only, and an appropriate safety allowance must be made in use.

WARNING: All jarring and pulling loads listed in above assume that force is acting alone along the major axis of the Jar. Torque and tension, or bending and tension, combine stresses that may lead to failure at less than the rated loads. Combining rotation and bending can lead to fatigue.

CAUTION: Operators should also be aware that milling operations may cause complex stresses in the Jar other than the simple torsional and tensile values listed above. The weight necessary for milling can cause bending forces. When combined with torsional forces, very high stresses may be generated in some areas of the Jar. Rotating the Jar in a deviated hole or at a neutral point may have a similar effect. Milling operations are necessary at times and are not discouraged. However, operators should exercise caution and be aware of the possible dangers when rotating under adverse conditions.



Recommended Tightening Torques

MAXIMUM RECOMMENDED TIGHTENING TORQUES (FT-LBS)

TOOL JOINT CONNECTION	Per Order	1-13/16 WFJ	1-1/4 API REG	2-3/8 PH6 5.9# HYD	2-3/8 API REG	2-3/8 API IF	2-3/8 EUE	
OUTSIDE DIAMETER (INCHES)	1-5/8	1-13/16	2-1/4	2-29/32	3-1/8	3-3/4	3-3/4	
INSIDE DIAMETER (INCHES)	1/4	5/16	3/8	1	1	1-1/2	1-7/8	
JARS USED WITH	Logan Part No. Bowen No.	605-000 70822	605-001 74723	605-002 54020	605-003 68010	605-005 52504	605-007 52528	605-008 52497
TOTAL STROKE TO SOLID (INCHES)	6	6	6	12-3/4	8-3/4	7-7/8	7-5/8	
COMPLETE ASSEMBLY	Logan Part No. Bowen No.	606-000 70957	606-001 64460	606-002 50640	606-003 68262	606-004 55687	606-005 55747	606-006 50660
MANDREL BODY INSERT TO MANDREL BODY	320	...	...	...	...	...	...
TOP SUB TO MANDREL	130	170	...	1,130	...	2,670	1,490	
MANDREL BODY TO MIDDLE BODY	150	350	900	1,950	2,030	3,570	3,570	
KNOCKER TO MANDREL	...	...	30	...	200	...	...
MANDREL TO WASHPIPE	80	100	150	800	690	890	410	
MIDDLE BODY TO WASHPIPE BODY	270	520	1,050	2,070	2,030	3,570	3,570	

MAXIMUM RECOMMENDED TIGHTENING TORQUES (FT-LBS)

TOOL JOINT CONNECTION	2-7/8 API REG	2-7/8 API IF	2-7/8 EUE	3-1/2 API IF	3-1/2 API IF	4-1/2 API FH	4-1/2 API IF	
OUTSIDE DIAMETER (INCHES)	3-3/4	4-1/4	4-1/2	4-3/4	4-3/4	6	6-1/4 & 6-1/2	
INSIDE DIAMETER (INCHES)	1-1/4	1-15/16	2-3/8	1-1/2	2	2	2-1/4	
JARS USED WITH	Logan Part No. Bowen No.	605-006 52506	605-009 52502	605-010 52653	605-001 52530	605-012 52500	605-013 52498	605-014 52544
TOTAL STROKE TO SOLID (INCHES)	8-1/4	8-5/8	10-3/8	8-7/8	10-1/8	8-5/8	13	
COMPLETE ASSEMBLY	Logan Part No. Bowen No.	606-007 55895	606-008 55664	606-009 50708	606-010 50700	606-011 55812	606-012 55860	606-013 55905
MANDREL BODY INSERT TO MANDREL BODY	...	...	...	...	...	...	...
TOP SUB TO MANDREL	...	...	...	...	...	...	...
MANDREL BODY TO MIDDLE BODY	3,820	4,960	5,580	9,770	9,750	17,530	20,340	
KNOCKER TO MANDREL	300	500	500	700	500	2,200	2,000	
MANDREL TO WASHPIPE	1,140	1,880	1,930	2,130	2,010	4,990	5,460	
MIDDLE BODY TO WASHPIPE BODY	3,820	4,960	5,580	9,770	8,600	17,160	20,340	

The makeup torques listed above are the maximum recommended makeup torques for each connection.

Values are set at 50% of the calculated theoretical yield torque. Torques this high are not required for all fishing jobs.

Lower values will result in less thread wear.

The tightening torque values were calculated assuming Itcolube or similar zinc-based grease was applied to all threads and shoulders.



Recommended Tightening Torques

MAXIMUM RECOMMENDED TIGHTENING TORQUES (FT-LBS)

TOOL JOINT CONNECTION		5-1/2 API REG	6-5/8 API REG	7-5/8 API REG				
OUTSIDE DIAMETER (INCHES)		6-3/4	7-3/4 & 8	9				
INSIDE DIAMETER (INCHES)		2-3/8	3-1/16	3-3/4				
JARS USED WITH	Logan Part No.	605-015	605-016	605-017				
	Bowen No.	52680	52711	66346				
TOTAL STROKE TO SOLID (INCHES)		13	13	13				
COMPLETE ASSEMBLY	Logan Part No.	606-014	606-015	606-016				
	Bowen No.	50720	55910	66372				
MANDREL BODY INSERT TO MANDREL BODY		...	...	...	
TOP SUB TO MANDREL		...	...	...	
MANDREL BODY TO MIDDLE BODY		24,330	32,020	57,760				
KNOCKER TO MANDREL		1,900	3,200	6,200				
MANDREL TO WASHPIPE		7,260	11,680	21,540				
MIDDLE BODY TO WASHPIPE BODY		24,330	32,010	46,130				

The makeup torques listed above are the maximum recommended makeup torques for each connection. Values are set at 50% of the calculated theoretical yield torque. Torques this high are not required for all fishing jobs. Lower values will result in less thread wear.

The tightening torque values were calculated assuming Itcolube or similar zinc-based grease was applied to all threads and shoulders.



Service Kit *Note: Photos of parts are not actual size.*



J1045-001
3/8" Fill Plug
Adapter



J1046-001
7/16" Fill Plug
Adapter



J1224-001
5/8" Fill Plug
Adapter



J1086
1/4" Female Couplers



J1374
Hex Bushing



J1373
Box Coupler



J1376
Hose Fitting



J1085
1/4" Male Couplers



J1078
1/4" x 1" Pipe Nipple



J1080
Line Filter

568010-100
O-Ring



568005-100
O-Rings



J1073
Installation Tool



J1074
O-Ring Installation Tool

J1077
Fill Plug Wrench



J1075
Torx Head
Fill Plug Wrench



AG1000-xx *
Mandrel Setting Tool

Setting Tools are not included in the Service Kit and must be ordered separately for each tool size at additional cost.

** Refer to Parts Lists on pages 15 – 24 for complete part numbers.*



Service Kit



Pump Hose



J1072
6 Ft. Exhaust Hose



J1069
Volume Pump



J1070
Metal Box

COMPLETE ASSEMBLY	Logan Part No.	26000-055
<i>Consists of:</i>	Bowen No.	145213
SEAL PROTECTOR RING INSTALLATION TOOL	Logan Part No.	J1073
	Bowen No.	625
O-RING INSTALLATION TOOL	Logan Part No.	J1074
	Bowen No.	626
FILL PLUG WRENCH — T30 TORX HEAD	Logan Part No.	J1075
	Bowen No.	359T
FILL PLUG WRENCH — ALLEN HEAD	Logan Part No.	J1077
	Bowen No.	620A
1/4" x 1" PIPE NIPPLE	Logan Part No.	J1078
	Bowen No.	36953
LINE FILTER	Logan Part No.	J1080
	Bowen No.	56565
1/4" MALE COUPLER	Logan Part No.	J1085
	Bowen No.	656
1/4" FEMALE COUPLER	Logan Part No.	J1086
	Bowen No.	655
3/8" BOX x 1/4" GALVANIZED BOX COUPLER	Logan Part No.	J1373
	Bowen No.	...
1/8" BOX x 1/4" PIN HEX BUSHING	Logan Part No.	J1374
	Bowen No.	...

1/4" 19 NPT PIN HOSE FITTING	Logan Part No.	J1376
	Bowen No.	...
6 FT. EXHAUST HOSE	Logan Part No.	J1072
	Bowen No.	33435
PUMP HOSE	Logan Part No.	...
	Bowen No.	2581
VOLUME PUMP	Logan Part No.	J1069
	Bowen No.	2580
METAL BOX	Logan Part No.	J1070
	Bowen No.	1995
5/8" FILL PLUG ADAPTER	Logan Part No.	J1224-001
	Bowen No.	...
7/16" 20 NF FILL PLUG ADAPTER	Logan Part No.	J1046-001
	Bowen No.	...
3/8" 24 NF FILL PLUG ADAPTER	Logan Part No.	J1045-001
	Bowen No.	...
O-RING	Logan Part No.	568010-100
	Bowen No.	568010
O-RING — 70 DURO NITRILE	Logan Part No.	568005-100
	Bowen No.	568005

Mandrel Setting Tools are not included in the Service Kit and must be ordered separately for each tool size at additional cost. See pages 15 – 24 for complete part numbers.

When ordering, please specify: Name and number of assembly or part

HEADQUARTERS

11006 Lucerne Street
Houston, TX 77016
Tel: (281) 219-6613
Fax: (281) 219-6638

sales@loganoiltools.com

UNITED STATES

Louisiana

103 Bluffwood Drive
Broussard, LA 70518
Tel: (337) 839-2331/2332
Fax: (337) 839-2334

118 Common Court
Houma, LA 70360
Tel: (985) 868-7333
Fax: (985) 868-7007

Mississippi

6 Donald Drive
Laurel, MS 39440
Tel: (601) 649-0636
Fax: (601) 649-6909

Oklahoma

424 South Eagle Lane
Oklahoma City, OK 73128
Tel: (405) 782-0625/0699/0754
Fax: (405) 782-0760

Texas

101 Commerce Street
Alice, TX 78332
Tel: (361) 396-0139/0147
Fax: (361) 396-0112

1305 Energy Drive
Kilgore, TX 75662
Tel: (903) 984-6700
Fax: (903) 984-6755

1617 South Viceroy
Odessa, TX 79763
Tel: (432) 580-7414
Fax: (432) 580-7656

Utah

1369 South 1100 East
Vernal, UT 84078
Tel: (435) 781-2856/2857
Fax: (435) 781-2858

STOCKING DISTRIBUTORS

Canada

Lee Oilfield Fishing Tools Ltd.
4604 Eleniak Road NW
Edmonton, AB T6B2S1
Canada
Tel: (780) 440-6705
Fax: (780) 463-5570

Dubai

Woodhouse International
P.O. Box 23724
Dubai, UAE
Tel: 971-4-347-2300
Fax: 971-4-347-4642

Scotland

Smith Services, HE Group
Howe Moss Avenue
Dyce, Aberdeen
Scotland AB21 OGP
Tel: 44-1224-770707
Fax: 44-1224-724182



www.loganoiltools.com

