



Surface Bumper Jar



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OVERVIEW

The Logan Surface Bumper Jar is installed in the drill string at the surface and is used whenever the downhole drilling, fishing, or washover running string becomes stuck and requires a heavy downward force to release it. It is often used to free keyseated drill pipe and drill collars, and initiate sharp jarring blows down the string to actuate drilling bumper subs, bumper safety joints, and other similar downhole bumping tools. It is also useful for transmitting heavy downward impact to release imbedded grappling tools. Since it is not necessary that the two striking surfaces meet, the tool's 48-inch stroke allows the fish to be hammered down farther than what is possible with conventional jarring tools. By a simple adjustment, the Logan Surface Bumper Jar may be set to deliver very light blows of very high impact. Because it is intermittently used only on the surface to release a stuck fish, this tool has an extended service life when compared to conventional bumper subs.

USE

The Logan Surface Bumper Jar may be used to great advantage in any situation where the downhole running string (drilling, fishing or washover) becomes stuck, and a heavy downward blow is required to release it. The Logan Surface Bumper Jar is often used to free keyseated drill pipe and drill collars.

It is also used to initiate abrupt jarring blows down the string to actuate drilling bumper subs, bumper safety joints and other similar downhole bumping tools.

The Logan Surface Bumper Jar is particularly useful for transmitting very heavy downward blows to effect the release of tools such as overshots or spears, in situations where the grapples or slips have become imbedded in the fish, or become friction locked due to repeated and prolonged downhole jarring.

In many instances, the Logan Surface Bumper Jar has been successfully utilized when all previous methods have failed.

CONSTRUCTION

The Logan Surface Bumper Jar is basically composed of a mandrel assembly that works in conjunction with a bowl assembly. The mandrel assembly is composed of a top sub, mandrel, and friction mandrel. The bowl assembly consists of a bowl, bowl extension, bottom sub, knocker sub, friction slip spacer, control ring, control ring plug, and a washpipe.

The washpipe is connected to the bottom sub and moves inside of the main mandrel. It is sealed from the main mandrel by the packing confining the well fluids within the washpipe and out of the restraining mechanism within the bowl.

The hexagon-shaped main mandrel fits into the correspondingly shaped bore in the knocker sub, where it is capable of transmitting torque, while also free to move up and down over its entire 48-inch stroke.

Control of the Logan Surface Bumper Jar is exercised by the action of the restraining mechanism of the friction mandrel, the friction slip, the friction slip spacer and the control ring. The load, measured in tons, is adjusted by setting the control ring.

Top and bottom subs are furnished with an API connection. The top sub is a box connection and the bottom sub is a pin connection. A lifting sub is provided for the top connection for the purpose of transporting and/or lifting the Surface Bumper Jar.

EXPLANATION OF MECHANISM

Refer to the illustration on page 6.

The friction slip is restricted within the tapered bowl by the control ring. Turning the control ring to the right or to the left moves the friction slip up or down the taper, thereby either increasing or decreasing its ability to expand. There are internal rings (raised areas) within the friction slip which must pass over the external rings (raised areas) of the friction mandrel in order to pull the Jar into its open position and to produce the jarring blow.

When the Surface Bumper Jar is opened or tripped, the friction mandrel pulls the friction slip into a reduced section of the taper in the bowl and against the bottom of the control ring. Depending upon the position of the control ring, only a slight pull or a pull of many tons is required to open the jar.

When the Surface Bumper Jar is installed at the surface and a straight upward pull is exerted against it, the friction slip applies friction to the enclosed friction mandrel and arrests upward movement while the drill pipe is being stretched. When the upward pull reaches the pre-set tripping load, the friction mandrel is pulled through the friction slip. The downward surge of the drill pipe in returning to its normal length causes a sudden separation of the main mandrel and bowl assemblies which are free to move apart for the length of its 48-inch stroke and drive the weight of the free pipe against the point where the fish is stuck.

When the Surface Bumper Jar is closed, the friction mandrel pushes the friction slip into the enlarged section of the taper in the bowl and then slides easily through it.



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The control ring plug has a lug on its inner end which engages a slot in the control ring and prevents it from turning. Removing the control ring plug from the bowl exposes a port through which the control ring may be turned with a large screwdriver.

Turning the control ring to the right moves it up, allowing the friction slip to move into the smaller diameter of the tapered bowl — constricting the rings more and requiring more load to open the jar. The words “Increase Load” are stamped on the right side of the control ring port.

Turning the control ring to the left moves it down, which moves the friction slip into the larger diameter of the tapered bowl — expanding the rings more and requiring less load to open the jar. The words “Decrease Load” are stamped on the left side of the control ring port.

OPERATION

Setting Load (Tons) 0 – 50 *
*100,000 lbs.

In all types of jarring operations, the Logan Surface Bumper Jar is installed in the drilling string or fishing string just above the rotary table or at the joint nearest the table.

Full circulation through the tool can be maintained during operation and full torque may be utilized in either direction. If circulation is desired, connect the kelly to the top of the jar. If circulation is not required, connect a single joint of pipe above the jar. Sufficient weight (300 to 400 lbs.) should be run above the jar to close and re-set it.

The jarring force is set by a simple adjustment. Always begin a jarring operation with a light load, gradually increasing the load as the operation proceeds. Set the restraining mechanism to a light load by adjusting the control ring as indicated by the stencil on the bowl at the control ring plug.

To adjust the control ring, remove the control ring plug. Use a large screwdriver, rotate the control ring to the right to increase the tripping load, or to the left to decrease the tripping load.

Take an upward strain on the Logan Surface Bumper Jar. When the upward strain is equal to the previously set load, the restraining mechanism will release and allow the bowl assembly to fall rapidly for the 48-inch stroke length of the mandrel assembly. This will cause the weight of the stretched pipe to fall downward against the stuck fish.

Freeing a Stuck Drill String

Drill strings frequently stick on the trip out of the hole by pulling into a keyseat. Install the Logan Surface Bumper Jar in the drill string as explained above. Set the Jar for a light load and begin jarring operations, gradually increasing the load as jarring proceeds, until the drill pipe is free.

CAUTION: Do not set the tripping load of the jar higher than the weight between the surface and the point where it is stuck. If the tripping load is set higher than the weight of the amount of free pipe above the stuck point, the pipe will be pulled tighter into the keyseat.

Do not use a load setting that will create a stretch in the drill string that is greater than the stroke of the jar. This could cause an impact within the jar and possibly damage the hook or other rig components.

Be aware that a sudden freeing of a heavy fish will allow the fish to drop and strike a jarring blow with the jar.

This could also damage the rig. A similar procedure is observed in all cases of stuck pipe.

Actuating a Surface Bumper Sub

Many drilling operators employ drilling bumper subs in the drilling string. Also, almost all fishing operators install a bumper sub above the engaging tool in a fishing string. In either case, when the string becomes stuck and the bumper sub is ineffective, install a Logan Surface Bumper Jar in the drill string as explained above.

Set the Surface Bumper Jar for a light load — just enough to open it. Then gradually increase load but observe the precaution cited below. Do not set the tripping load so high that it exceeds the weight of the free pipe above the stuck point. Continue jarring with the Surface Bumper Jar until the stuck drill string is free.

CAUTION: Do not set the tripping load of the Jar higher than the weight between the surface and the point where it is stuck. If the tripping load is set higher than the weight of the amount of free pipe above the stuck point, it will result in the pipe being pulled tighter into the keyseat.

Do not use a load setting that will create a stretch in the drill string that is greater than the stroke of the jar. This could cause an impact within the jar and possibly damage the hook or other rig components.

Be aware that a sudden freeing of a heavy fish will allow the fish to drop and strike a jarring blow with the jar. This could also damage the rig. A similar procedure is observed in all cases of stuck pipe.



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Releasing a Fishing Tool

Occasionally, fishing tools such as overshots or spears cannot be released by the normal procedure of bumping down with the weight of the fishing string. This is usually the result of the grapple or the slips having become locked due to repeated and prolonged bumping and jarring on the fish.

In such cases, install a Logan Surface Bumper Jar in the fishing string as explained above. Set the load at a medium load but do not exceed the weight of the free pipe below the Surface Bumper Jar. If there is a bumper sub in the string, set the load high enough to insure that the Bumper Sub is pulled into its fully open position. Open the Surface Bumper Jar to effect the release of the fishing tool. This will usually require only one or two blows.

PRECAUTIONS

Always begin Surface Bumper Jar operations with the Jar set for light jarring. Gradually increase the load as jarring operations proceed.

Avoid setting the load of the Surface Bumper Jar to exceed the weight of the free pipe between the Jar and the stuck point. This will usually result in defeating the purpose of the Jar and may stick the pipe tighter.

Occasionally, the Logan Surface Bumper Jar may become half-cocked — when the Jar is neither fully opened nor fully closed. This situation results from having set the tripping load so high that there is insufficient pulling power to trip the Jar and the weight of the pipe above the Jar is insufficient to close it.

It is then necessary to break the Jar out of the string. Protect the pin connection thread on the bottom and strike the Jar sharply against some solid object until the Jar is closed. The control ring may then be adjusted for less tripping load and the operation resumed.

ASSEMBLY

Before assembling the Logan Surface Bumper Jar, make sure that all of the parts are thoroughly cleaned, lubricated and inspected. Lubricate parts with good quality grease or heavyweight oil as they are assembled. Replace all damaged or badly worn parts before proceeding.

1. Install the packing set into the seal insert.
2. Install the two o-ring seals in the grooves on the outside diameter of the seal insert. Set the seal insert aside.

NOTE: Apply clean, good quality thread dope to each connection as it is made up.

3. Clamp the bottom sub in a suitable vise.
4. Make the washpipe up to the bottom sub. Support the free end of the washpipe. Do not wrench on the sealing surface of the washpipe.
5. Remove the bottom sub/washpipe subassembly from the vise and lay it aside.
6. Clamp the bowl extension in the vise.
7. Assemble the knocker sub in the bowl extension. Tighten it with a wrench.
8. Insert the threaded end of the main mandrel through the bowl extension and knocker sub.

9. Lubricate the packing set and install it into the seal area of the mandrel. Install the male adapter first followed by the packing, lips facing toward the top sub end. Install the female adapter last.

If the insert must be seated, place a wood block against it and strike the block with a hammer.

10. Make the top sub up to the end of the main mandrel and tighten it.
11. Insert the friction mandrel into the main mandrel. Tighten, wrenching only on the wrench flats provided.
12. Install the control ring inside the bowl in the threads provided. In making the setting, the control ring is turned back to the lowest point; then, the slip setting gauge is used to achieve the proper low tripping load setting. (A slip setting gauge is a rigid tube of the same outside dimensions and appearance as that of the friction slip, except that it does not have the vertical slots cut in it. A rod is provided to screw into the top edge to serve as a handle for inserting the slip setting gauge into the bowl of the tool.) The slip setting gauge is placed in the taper of the bowl, as far into the bowl as possible, and held securely.

The control ring should then be screwed until it moves toward the slip setting gauge. To screw the control ring up until it touches the bottom of the slip setting gauge, the control plug should be removed from the bowl. A screwdriver can be inserted to engage with the adjusting slots in the control ring and easily permit screwing the control ring toward the slip setting gauge.

13. Insert the friction slip inside the bowl.



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14. Insert the friction slip spacer inside the bowl and up against the friction slip.
15. Install the washpipe/bottom sub subassembly that was previously assembled in steps 4 and 5. Grease the washpipe to cut down friction on the packing. Carefully insert the washpipe inside the main mandrel to avoid damaging the packing. Make up the bottom sub to the bowl.
16. Place assembled tool in a jar tester and adjust the control ring to the desired tripping load.
17. Install the control ring plug into the control ring port located on the bowl.

MAINTENANCE

The Logan Surface Bumper Jar normally requires very little maintenance. After each use, it should be thoroughly rinsed out with clear water to remove any drilling fluid that may have been circulated through it. The Jar should be opened so that the surface of the hexagonal main mandrel may be lubricated with a good grade of heavyweight oil or grease. After lubricating the main mandrel, the Jar should be set to a minimum load and then closed. The exterior surface may be painted or lubricated to prevent any rust or deterioration.

Disassembly

Complete disassembly of the Logan Surface Bumper Jar should proceed as follows:

1. Secure the tool in a suitable vise, clamping it at the bowl. Do not clamp on the control ring plug.
2. Loosen the bottom sub in the bowl. Remove the bottom sub and washpipe as a unit and lay them aside. Since the washpipe is tightened into the bottom sub, they will remain attached.
3. Remove the friction slip spacer from the lower end of the bowl.
4. Remove the control ring plug and rotate the control ring to a minimum load position or as far as it will go, if this has not previously been done.
5. Slide the mandrel out far enough to partially open the Jar, releasing the friction mandrel from the friction slip.
6. Remove the friction slip from the inside of the bowl.
7. Re-clamp the tool, clamping on the bowl extension.
8. Break loose and remove the friction mandrel from the main mandrel. Use the wrench flats provided on the lower end of the friction mandrel to remove it.
9. Remove the packing set from the inside, lower end of the main mandrel. A bent-tip screwdriver will aid the operator to reach through the bore of the packing set and pull it out.
10. Break out and remove the top sub.
11. Slide the mandrel down through the knocker sub and bowl extension to remove it. Lay it aside.
12. Remove the knocker sub from the bowl extension and set it aside.
13. Remove the bowl extension from the bowl and set it aside.
14. Remove the control ring from the end of the bowl extension. Turn the control ring counter-clockwise to remove it.
15. Thoroughly clean and examine all the parts. Replace any damaged or badly worn parts.
16. Examine the seals or packing for evidence of damage or appear to be permanently set. Replace them if they are not in good condition.
17. Examine the washpipe in particular for nicks, scratches, or abrasions. Small, superficial scratches and abrasions can be polished out with fine emery cloth. A washpipe with any severe gouges or scratches must be replaced.
 - a. To replace the washpipe, clamp the bottom sub horizontally in a vise. Support the washpipe end farthest from the bottom sub, unscrew and remove the damaged washpipe. Assemble the new washpipe into the bottom sub. Support the free end to avoid bending the washpipe.

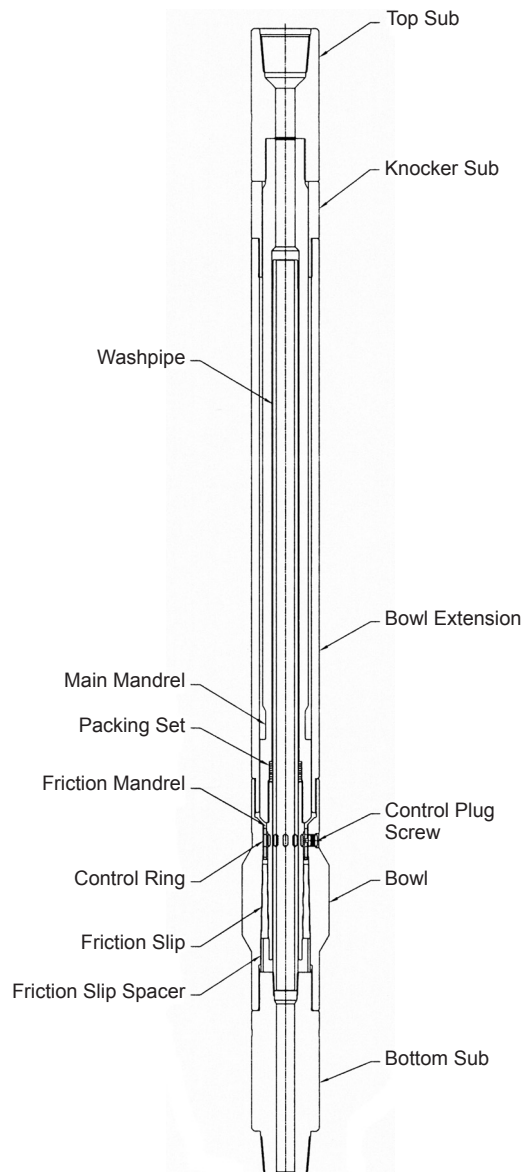
Disassembly is now complete.

CAUTION: Do not apply a wrench to the finished slip surface.



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TOOL JOINT CONNECTION		4-1/2 API IF
OUTSIDE DIAMETER (INCHES)		7
INSIDE DIAMETER (INCHES)		1-7/8
STROKE		48
COMPLETE ASSEMBLY	Logan Part No.	609-001
	Bowen No.	74520
TOP SUB	Logan Part No.	AS1000
	Bowen No.	13587
KNOCKER SUB	Logan Part No.	AS2000
	Bowen No.	74522
BOWL EXTENSION	Logan Part No.	AS3000
	Bowen No.	74523
BOWL	Logan Part No.	AS4000
	Bowen No.	74524
BOTTOM SUB	Logan Part No.	AS5000
	Bowen No.	74525
MAIN MANDREL	Logan Part No.	AS6000
	Bowen No.	78609
WASHPIPE	Logan Part No.	AS7000
	Bowen No.	13588
PACKING SET	Logan Part No.	AS8000
	Bowen No.	66816
FRICTION MANDREL	Logan Part No.	AS9000
	Bowen No.	78610
CONTROL RING	Logan Part No.	AS10000
	Bowen No.	844
FRICTION SLIP	Logan Part No.	AS11000
	Bowen No.	B-236
FRICTION SLIP SPACER	Logan Part No.	AS12000
	Bowen No.	13594
CONTROL RING PLUG	Logan Part No.	AS13000
	Bowen No.	4144
SERVICE EQUIPMENT		
PLUG & CONTROL RING WRENCH	Logan Part No.	AS14000
<i>1 with Each Assembly</i>	Bowen No.	86
MANDREL SOCKET WRENCH	Logan Part No.	AS15000
<i>Sold Separately</i>	Bowen No.	14773
LIFTING SUB	Logan Part No.	AS17000
<i>Sold Separately</i>	Bowen No.	242
FRICTION SLIP LUBE (1 Tube)	Logan Part No.	AS18000
<i>Sold Separately</i>	Bowen No.	74285



When ordering, please specify:

- (1) Name and number of assembly or part
- (2) Connections, if other than standard

Recommended Spare Parts:

- (1) 2 Washpipes
- (2) 1 Friction Mandrel
- (3) 1 Control Ring
- (4) 1 Friction Slip
- (5) 1 Control Ring Plug
- (6) 6 Packing Sets

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



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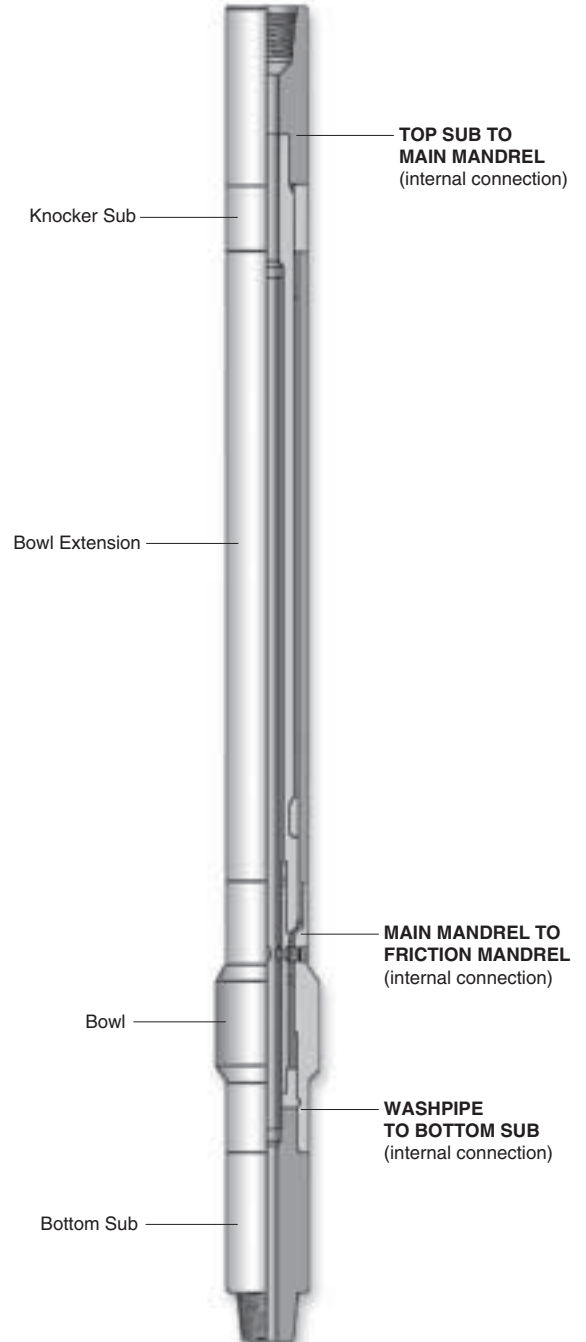
STRENGTH AND TEST DATA

COMPLETE ASSEMBLY	609-001
OUTSIDE DIAMETER (IN)	7
BOWL OUTSIDE DIAMETER (IN)	9
MAX TORQUE @ YIELD (FT-LBS)	33,800
MAX TENSILE LOAD @ YIELD (FT-LBS)	845,000
MAX PUMP PRESSURE (PSI)	8,000
SETTING LOAD (TONS)	0 – 50 *

* 100,000 lbs.

MAX. RECOMMENDED TIGHTENING TORQUES (FT-LBS)

TOP SUB TO MAIN MANDREL	16,900
KNOCKER SUB TO BOWL EXTENSION	16,900
BOWL EXTENSION TO BOWL	17,900
MAIN MANDREL TO FRICTION MANDREL	2,700
WASHPIPE TO BOTTOM SUB	2,700
BOWL TO BOTTOM SUB	17,900





Notes

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