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Internal Pressure Pipe Cutters

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Contents

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OVERVIEW

The Logan Internal Pressure Pipe Cutter utilizes pump pressure to actuate three (3) carbide-coated knives to cut single and multiple strings of pipe from 4 inches O.D. to 36 inches O.D. Each size cutter can be dressed with knives of various lengths to cut different sizes of pipe. Pump pressure is preset by a simple adjustment to extend the knives at the exact desired diameter. Restricted flow across an orifice feeds a piston that forces the knives out. When the knives reach the preset diameter, the operator will see a sudden pressure drop that indicates the pipe has been severed.

USES

The Logan Internal Pressure Pipe Cutter is used to cut tubing, casing, and drill pipe.

CONSTRUCTION

Logan Internal Pressure Pipe Cutter consists of a top sub, a body, three (3) carbide-coated knives with knife pins and retainer screws, and a piston with a pressure relief valve assembly that includes a valve stem, piston bushing, bit jet retainer, stop spider, bit jet, and set screws. All component parts are manufactured from specially selected alloys.

The top sub threads into the body and holds the inner parts in position. It has a suitable connection at its upper end for attaching to the running string.

The body has threaded connections top and bottom to accept the top sub and a drill bit. Knife slots in the lower end of the body incorporate crossholes for the knife pins.

The knives are made from high quality tempered steel for strength and durability. The cutting end of the knives is curved for the most efficient cutting action. A hole on the shank end of each knife accepts the knife pins. Set screws hold the knife pins in the body.

OPERATION

Before use, be sure the Logan Internal Pressure Pipe Cutter is properly assembled. Threaded connections should be tightly made up. The tool should be dressed for the size of pipe to be cut. Refer to the specifications on pages 11 – 12 for the correct assembly number for the size of pipe to be cut.

The Logan Internal Pressure Pipe Cutter is made up on the bottom of tubing or drill pipe. The knives should be wired so they stay in the slots in the cutter body until the desired cutting depth is reached. A stabilizer should be run above the cutter.

Begin rotation of the drill string at approximately 35 to 50 rpm. Start rotation before activating the mud pumps. Engage the mud pumps at about 900 psi pump pressure.

Hold the cutter in one position while making the cut. The mud pressure will force the piston out against the knives, which will in turn, pivot on their pins and be forced into the pipe being cut. Once the knives have reached the predetermined pipe diameter, the piston will separate from the valve stem to allow more mud to flow through the tool. This will cause a rapid drop in pump pressure and will indicate to the operator that the pipe has been severed.

The piston reacts to the pump pressure with continued downward movement that forces the knives to pivot about the knife pins. When the knives reach the preset diameter, the piston separates from the bit jet retainer stem. This causes increased mud flow through the tool.

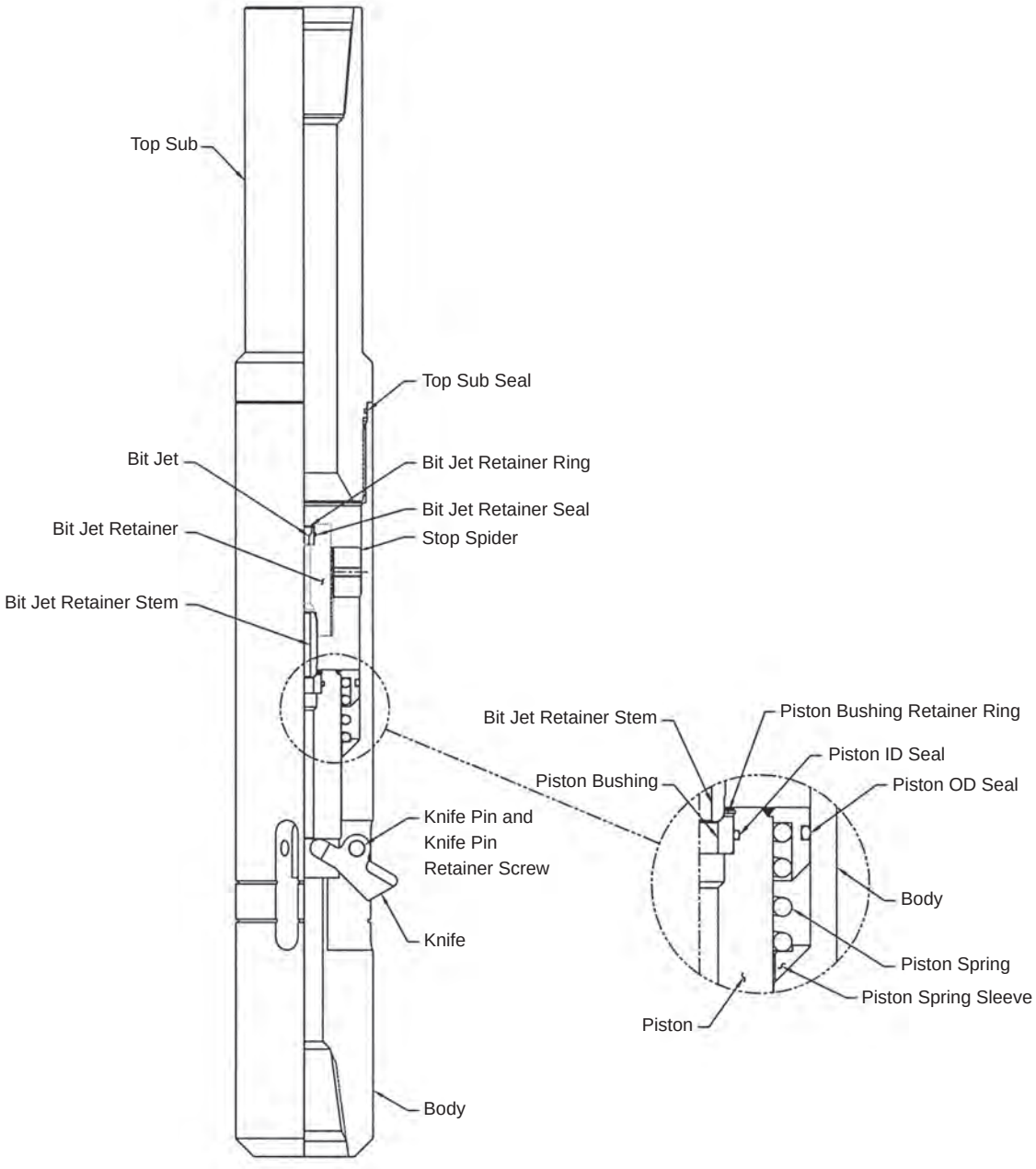
Before making a cut, make sure that the knives are not located opposite a casing coupling. Once the tool is in cutting position, establish the knife locations. Begin the cutting operation by starting the rotary and achieving the recommended rpm. Zero the weight indicator and note the free torque of the cutter string. Start the mud pump and increase pressure as recommended in the tables on pages 6 and 7. Continue cutting until the knives reach the preset diameter. A sharp drop in pump pressure will indicate the cut has been completed. Relieve the pump pressure and raise the string to remove the cutter from the hole.

Single Cut from a Fixed Platform
Refer to the tables on pages 6 and 7 for proper cutting sequence rpm (rotary speed) and mud pump pressure.

To make a successful cut using the Logan Internal Pressure Pipe Cutter, determine the proper knife length for the pipe to be cut and dress the pipe cutter accordingly. (Directions for adjusting the cutting diameter of the knives can be found under the assembly instructions on page 10.) Set the correct rotary table rpm. Select the mud pump pressure necessary for a cut. A drill bit or stabilizer run at the bottom of the cutter and a stabilizer directly above it will help achieve a more efficient and smoother cut. In some extreme cases, a cut cannot be made without a stabilizer.

Single Cut from a Floating Platform
To cut a single stand of pipe from a floating platform, follow the same make-up procedure as that for multiple stands of pipe from a fixed platform.

When working from a floating platform, an underwater swivel with a bumper sub must be added to prevent wave motion from affecting the pipe cutter position. Allow the swivel to seat in the subsea wellhead system at the proper



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distance from the pipe cutter. Lower the string to one half the stroke of the bumper sub. Mark the kelly for possible relocation of the bumper sub. This ensures that the underwater swivel is not disturbed and remains seated on the wellhead or riser.

Start the rotary and achieve the recommended rpm. Zero the weight indicator and note the free torque of the cutting string. Start the mud pump and increase pressure to the recommended setting shown in the tables on pages 6 – 7. Continue cutting until the knives reach the preset diameter. The cut will result in a sharp drop in pump pressure. After the cut is completed, release the pump pressure and raise the string to remove the cutter.

Multiple Cuts from a Fixed Platform

The Logan Internal Pressure Pipe Cutter can efficiently make multiple cuts when the guidelines are observed, and the proper knife length, run sequence, rotary speed, and pump pressure are used. Refer to the table on page 8 for the cutting sequence.

To ensure smooth cuts, a drill bit should be attached to the bottom of the cutter and a stabilizer added directly above it. If casing is pulled after a run, the drill bit may need to be changed and the stabilizer modified to accommodate larger I.D. casing on subsequent trips.

Before making the first cut, be sure that the knives are not positioned by a casing coupling. Lower the cutter and mark the kelly so the knives can be repositioned in the same location for subsequent cuts.

To begin the first cut, start rotation and bring the mud pump up to the recommended pressure, as shown in the table on page 7. Run the cutter until the knives reach the preset diameter. A drop in mud pump pressure will indicate that the cut has been made. Relieve the pump pressure and remove the cutter from the hole.

Dress the cutter with the appropriate length knives needed for the second run. Measure the difference between the lengths of the knives. Raise the kelly to compensate for the difference in length. Be sure the longer knives clear the bottom of the cut. Start the rotary and increase the mud pump pressure to the recommended setting. Continue to cut until the knives reach their preset diameter which is indicated by a drop in pressure. Relieve the pump pressure and trip out of the hole. Follow this procedure until all sizes of pipe have been cut.

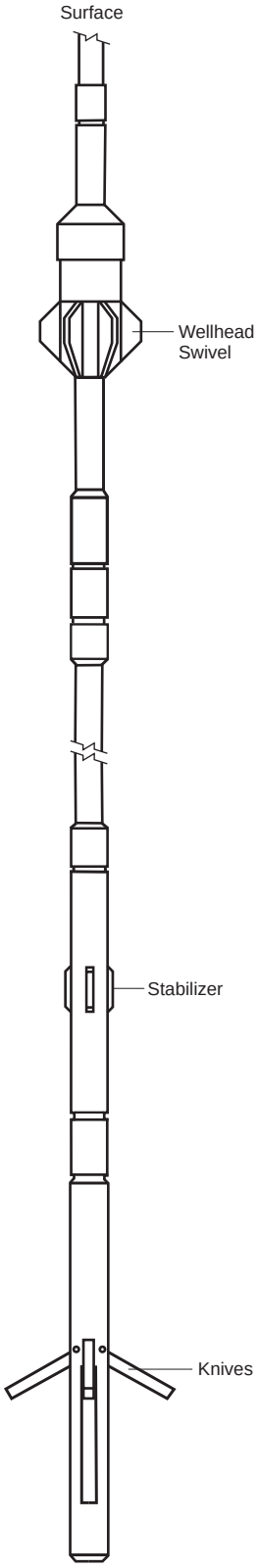
Multiple Cuts from a Floating Platform

Multiple sizes of pipe can be cut from a floating platform by adding an underwater swivel to the cutting string. Refer to the illustration at right for a typical setup from floating platform.

Land the swivel on the subsea wellhead or riser. Use a Logan Bumper Sub to stabilize the pipe cutter and offset wave motion as it cuts through the pipe. Place spacer subs between the swivel and the bumper sub or stabilizer.

Lower the string to half the stroke of the bumper sub. Mark the kelly and start the rotary, noting the free torque. Increase pump pressure to the recommended level. Continue cutting until the knives are fully extended which is normally indicated by a drop in pressure. Relieve the pump pressure and remove the cutter from the hole.

Refer to tables on page 8 for information on additional runs into the hole.



Typical Set Up from a Floating Platform

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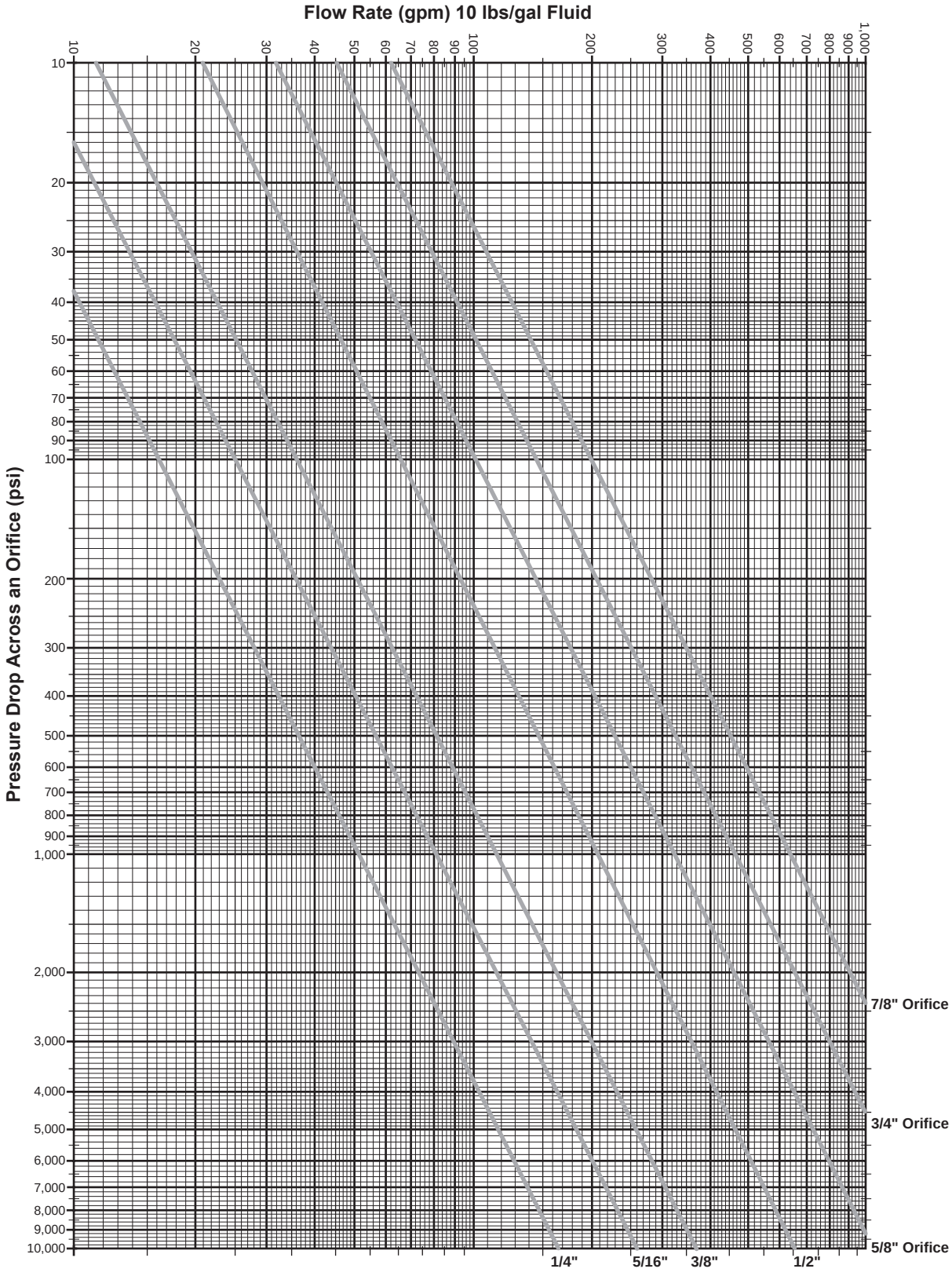
PRESSURE DROP ACROSS AN ORIFICE



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SINGLE CUT RUN CHART

3-1/4" (83 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife											Orifice		
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *		Rotary	Pressure Differential		Orifice
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm	Speed	psi	kg/cm²	Std. I.D.
4	...	**R2000**	150446	.625	16	2-1/4	57	4-1/2	114	5-3/8	136	80	180	13	1/4

3-5/8" (92 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife											Orifice		
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *		Rotary	Pressure Differential		Orifice
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm	Speed	psi	kg/cm²	Std. I.D.
4-1/2	114	**R2001**	80357	9/16	14	2-3/8	60	4-3/4	121	6-1/2	165	80	180	13	1/4
5	127	**R2001**	80357	13/16	21	2-5/8	67	5-1/2	133	6-1/2	165	80	180	13	1/4
5-1/2	140	**R2001**	80357	11/16	27	2-7/8	73	5-3/4	146	6-1/2	165	80	240	17	1/4
6	152	**R2001**	80357	15/16	33	3-1/8	79	6-1/4	159	6-1/2	165	80	240	17	1/4

5-9/16" (141 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife											Orifice		
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *		Rotary	Pressure Differential		Orifice
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm	Speed	psi	kg/cm²	Std. I.D.
6-5/8	168	**R2002**	80717	5/8	17	3-7/16	87	6-7/8	175	8-3/4	222	80	750	53	1/4
7	178	**R2002**	80717	13/16	21	3-5/8	92	7-1/4	184	8-3/4	222	80	750	53	1/4
7-5/8	194	**R2006**	81896	1-1/8	29	3-15/16	100	7-7/8	200	10-1/2	267	70	800	56	1/4
8-5/8	219	**R2006**	81896	1-5/8	42	4-7/16	113	8-7/8	225	10-1/2	267	60	900	63	1/4
9-5/8	244	**R2006**	81896	2-1/8	55	4-15/16	125	9-7/8	251	10-1/2	267	60	900	63	1/4

7-3/8" (187 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife											Orifice		
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *		Rotary	Pressure Differential		Orifice
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm	Speed	psi	kg/cm²	Std. I.D.
8-5/8	219	**R2003**	151023	7/8	22	4-9/16	115	9-1/8	231	10-9/16	268	70	450	32	3/8
9-5/8	244	**R2003**	151023	1-3/8	34	5-9/16	128	10-1/8	257	10-9/16	268	70	450	32	3/8
10-3/4	273	**R2007**	151029	1-15/16	49	5-5/8	142	11-1/4	285	19-1/2	495	60	450	32	3/8
11-3/4	298	**R2007**	151029	2-7/16	61	61/8	155	12-1/4	311	19-1/2	495	60	500	35	3/8
13-3/8	340	**R2007**	151029	3-1/4	82	6-15/16	176	13-1/8	333	19-1/2	495	60	600	42	3/8

8-1/4" (210 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife											Orifice		
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *		Rotary	Pressure Differential		Orifice
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm	Speed	psi	kg/cm²	Std. I.D.
9-5/8	244	**R2004**	147008	7/8	22	5	127	10	254	13-1/2	343	70	450	32	3/8
10-3/4	273	**R2008**	147021	1-1/2	38	5-5/8	143	11-1/4	286	16-1/2	419	70	450	32	3/8
13-3/8	340	**R2011**	147022	2-13/16	71	6-15/16	176	13-7/8	352	23-1/4	591	60	600	42	3/8
16	406	**R2011**	147022	4-1/8	105	8-1/4	210	16-1/2	419	23-1/4	591	60	600	42	3/8
20	508	**R2015**	147023	6-1/8	156	10-1/4	260	20-1/2	521	39-1/2	1003	50	750	53	3/8
24	610	**R2018**	147024	8-1/8	206	12-1/4	311	24-1/2	622	50-1/4	1276	40	850	60	3/8
30	762	**R2018**	147024	11-1/8	283	15-1/4	387	30-1/2	775	50-1/4	1276	30	950	67	3/8
30	762	**R2021**	147025	11-1/8	283	15-1/4	387	30-1/2	775	60	1524	30	950	67	3/8
34	864	**R2021**	147025	13-1/8	333	17-1/4	438	34-1/2	876	60	1524	25	950	67	3/8
34	864	**R2022**	147026	13-1/8	333	17-1/4	438	34-1/2	876	64	1626	25	950	67	3/8
36	914	**R2022**	147026	14-1/8	359	18-1/4	464	36-1/2	927	64	1626	20	950	67	3/8

** Maximum diameter is at 75º. See drawing on page 7.*

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SINGLE CUT RUN CHART (continued)

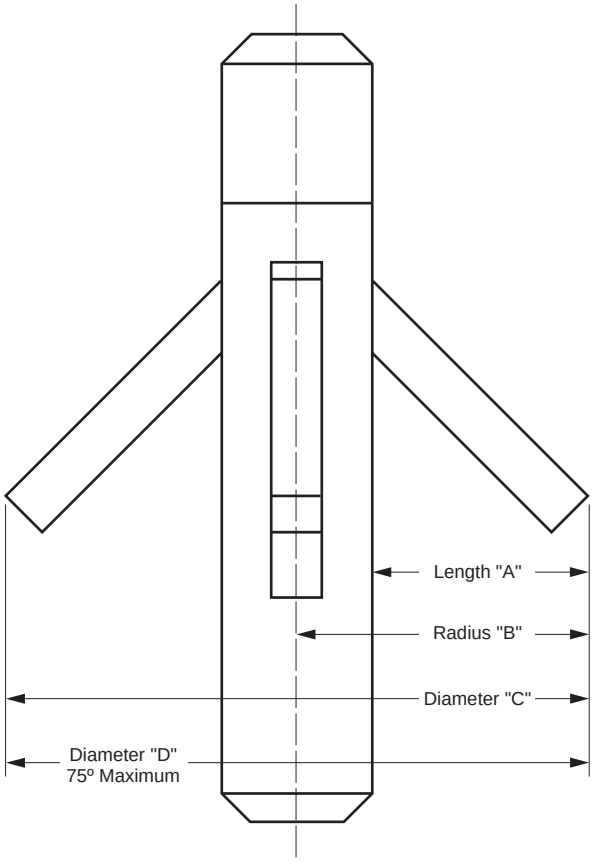
9-1/2" (241 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Information available upon request.

11-3/4" (298 mm) O.D. INTERNAL PRESSURE PIPE CUTTER

Casing or Pipe Size		Knife										Rotary Speed	Orifice Pressure Differential		Orifice Std. I.D.
		Part Number		Length "A"		Radius "B"		Diameter "C"		Max. Diameter "D" *					
in	mm	Logan	Bowen	in	mm	in	mm	in	mm	in	mm		psi	kg/cm²	
13-3/8	340	**R2005**	147357	1-1/16	27	6-15/16	176	13-7/8	352	18-3/4	476	70	150	11	3/8
13-3/4	349	**R2013**	147358	1-1/4	32	7-1/8	181	14-1/4	362	21-1/2	546	60	275	19	3/8
16	406	**R2013**	147358	2-3/8	60	8-1/4	210	16-1/2	419	21-1/2	546	60	275	19	3/8
16	406	**R2014**	147359	2-3/8	60	8-1/4	210	16-1/2	449	29-1/4	743	50	400	28	3/8
18-5/8	473	**R2014**	147359	3-11/16	94	9-9/16	243	19-1/8	486	29-1/4	743	50	400	28	3/8
18-5/8	473	**R2017**	147360	3-11/16	94	9-9/16	243	19-1/8	486	42-3/4	1086	45	400	28	3/8
24	610	**R2017**	147360	6-3/8	162	12-1/4	311	24-1/2	622	42-3/4	1086	40	500	35	3/8
26	660	**R2020**	147361	7-3/8	187	13-1/4	337	26-1/2	673	54	686	35	600	42	3/8
30	762	**R2020**	147361	9-3/8	238	15-1/4	387	30-1/2	775	54	686	30	600	42	3/8
34	864	**R2024**	147362	11-3/8	289	17-1/4	438	34-1/2	876	64-1/2	819	25	800	56	3/8
36	914	**R2024**	147362	12-3/8	314	18-1/4	464	36-1/2	927	64-1/2	819	25	800	56	3/8

** Maximum diameter is at 75º. See drawing below.*



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MULTIPLE CUT RUN CHART

8-1/4" INTERNAL PRESSURE PIPE CUTTER

Run Number	Pipe Size O.D. (inches)	Knife Length (inches)	Spacer Sub Length (inches)	Spacer Sub Length (inches)	Spacer Total Length (inches)	Sub Cutter Tip Raised (inches)
1st	9-5/8	4	40	31	71	0
2nd	10-3/4	5-1/2	40	29	69	1/2
3rd	13-3/8 to 16	9	40	24	64	1-1/2
4th	20	17-1/2	31	24	55	1/2
5th	24 to 30	23	31	15	46	3-1/2
6th	30 to 34	28	0	40	40	1
7th	34 to 36	30	24	11	35	3

11-3/4" INTERNAL PRESSURE PIPE CUTTER

Run Number	Pipe Size O.D. (inches)	Knife Length (inches)	Spacer Sub Length (inches)	Spacer Sub Length (inches)	Spacer Sub Length (inches)	Spacer Total Length (inches)	Sub Cutter Tip Raised (inches)
1st	13-3/8 to 13-3/4	4-1/2	40	31	11	82	0
2nd	13-3/4 to 16	6-1/2	40	24	15	79	1
3rd	16-1/8 to 5/8	10-1/2	40	24	11	75	0
4th	18-5/8 to 24	17-1/2	40	15	11	66	2
5th	26 to 30	23	31	15	11	57	3-1/2
6th	34 to 36	30	0	31	15	46	4

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MAINTENANCE

Good maintenance will ensure the best performance and maximum life of the Logan Internal Pressure Pipe Cutter. The tool should be thoroughly washed and cleaned to remove all drilling mud and other debris. All parts, especially the knives, should be examined for wear or damage and replaced during disassembly/assembly. It is recommended that the tool be completely disassembled, cleaned, lubricated (or painted), and reassembled after each use and before storing.

DISASSEMBLY

All disassembly and repairs should be conducted in a clean, well-equipped shop. Refer to the tool illustration on page 3 for the proper location of the parts.

1. Place the Logan Internal Pressure Pipe Cutter in a suitable vise. Clamp on the body just above the knives.
2. Break the top sub connection and remove the top sub.
3. Using a screwdriver, remove the top sub seal.
4. Reach inside the body and remove the pressure relief valve assembly. The pressure relief valve assembly consists of the bit jet, bit jet retainer, bit jet retainer stem, bit jet retainer ring, bit jet retainer seal, and stop spider. Lay the pressure relief valve assembly on a clean shop table.
5. Using retainer ring pliers, remove the bit jet retainer ring from the bit jet retainer.
6. Remove the bit jet from the bit jet retainer stem by inserting a rod through the bit jet retainer stem and tapping out the bit jet.
7. Remove the bit jet retainer seal from the bit jet retainer.
8. Remove the three (3) set screws from the stop spider.
9. Remove the bit jet retainer stem from the bit jet retainer.
10. Remove the bit jet retainer from the stop spider.
11. Remove the three (3) knife pin retaining screws from the head of each knife.
12. Using a screwdriver or metal punch, remove the three (3) knife pins.
13. Extract the three (3) knives from the body.
14. Insert a pipe or brass bar into one of the knife grooves on the body and tap out the piston.
15. Remove the piston spring from the body. Lay the piston on a clean shop table. On 3-5/8", 5-9/16", and 8-1/4" cutters, remove the piston spring sleeve.
16. Remove the piston bushing retainer ring with a retainer ring pliers.
17. With a screwdriver, remove the piston bushing and the piston I.D. seal from inside the piston bushing bore.
18. Secure the piston with soft brass or copper jaws in a small bench vise. Be careful not score or mark any outer diameter surface of the piston. With a screwdriver, remove the outer diameter seal retainer ring, plate, and outer diameter seal. (On 3-5/8" and 5-9/16" O.D. tools, the piston O.D. seal is an O-ring.)
19. Carefully clean and inspect all parts for wear and damage. Replace all worn or damaged parts.

Disassembly of the Logan Internal Pressure Pipe Cutter is now complete.

ASSEMBLY

The Logan Internal Pressure Pipe Cutter is easily assembled using standard shop tools. No special tools are required. Refer to the tool illustration on page 3 for the proper location of parts.

Make sure all parts have been thoroughly cleaned, inspected, and lubricated prior to assembly. Replace any chipped or worn knives.

1. Secure the Internal Pressure Pipe Cutter body in a suitable vise. Clamp on the body just above the knife slots.
2. Insert the knives into the three (3) knife slots with the cutting edges facing outward. Align the holes in the knives with the holes in the body.
3. Insert the knife pins into each of the holes on the body. Install the three (3) knife pin retaining screws. The knives should pivot freely.
4. Secure the piston in a small bench vise with soft brass or copper jaws. Be careful not score or mark any outer diameter surface of the pis ton. Fit the piston O.D. seal. Then install the bushing and piston bushing retainer ring. (On 3-5/8" and 5-9/16" O.D. tools, the piston O.D. seal is an O-ring.)
5. Install the piston I.D. seal inside the piston bushing with retainer ring pliers.
6. Insert the piston bushing until it rests on the shoulder of the piston.
7. Insert the piston bushing retainer ring into the groove. Lock the piston bushing into the I.D. of the piston.

CAUTION: ***Do not install the piston spring at this time.***

8. Insert the piston assembly into the body. Slide it inside the body until it touches the knives.
9. Screw and securely tighten the bit jet retainer stem onto the bit jet retainer.
10. Install the bit jet retainer seal inside the bit jet retainer. Then install the bit jet and then the bit jet retainer ring.
11. Thread the stop spider onto the bit jet retainer. Insert the three (3) set screws into the stop spider.
12. Preset the knives' cutting diameters before continuing with assembly. Refer to the tables on pages 6 – 7 to select the correct length of knives for the pipe O.D. to be cut.

Knife Cutting Diameter Adjustment:

13. Extend one (1) of the knives to the desired diameter. Measure the distance from the tip of the knife to the center of the tool. With the knife held in this position, insert the valve assembly into the body and push down on the piston until it touches the top of the extended knife. Adjust the stop spider so it rests on the shoulder at the upper end of the body. At the same time, the ground surface of the bit jet retainer stem should rest on the ground seat of the piston bushing.
14. Remove the pressure relief valve assembly from the body.
15. Align the set screw holes on the stop spider with the three (3) flats on the bit jet retainer. Install the three (3) set screws and tighten securely.
16. Remove the piston assembly from the body and install the piston spring. On 3-5/8", 5-9/16", and 8-1/4" cutters, install the piston spring sleeve.
17. Reinstall the piston assembly in the body until it comes to rest on the piston spring.
18. Install the pressure relief valve assembly inside the body.
19. Fit the top sub with the top sub seal and thread the top sub onto the body.
20. Wrap wire around the body in the grooves over the knife slots to help keep the knives in the closed position while the tool is lowered into the hole.

The Logan Internal Pressure Pipe Cutter is now ready for use.

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INTERNAL PRESSURE PIPE CUTTERS

PIPE SIZE TO CUT		4	4-1/2 to 6-1/8	6-5/8 to 7-5/8	8-5/8 to 11-3/4	9-5/8 to 36	10-3/4 to 36	13-3/8 to 36
CUTTER O.D.		3-1/4	3-5/8	5-9/16	7-3/8	8-1/4	9-1/2	11-3/4
CONNECTION SIZE (BOX UP)		2-3/8 Reg	2-3/8 IF	3-1/2 IF	Blank	Blank	Blank	Blank
CONNECTION SIZE (BOX DOWN)		2-3/8 Reg	2-3/8 Reg	3-1/2 Reg	Blank	Blank	Blank	Blank
COMPLETE ASSEMBLY	**Logan Part No.**	**412-325**	**412-363**	**412-556**	**412-738**	**412-825**	**412-950**	**412-1175**
	Bowen No.	150444	147483	147489	150959	147495	147343	147369
BODY	**Logan Part No.**	**R1000**	**R1001**	**R1002**	**R1003**	**R1004**	**R1005**	**R1006**
	Bowen No.	150445	147484	147490	151022	147496	147344	147370
KNIFE (UNDRESSED)	**Logan Part No.**	**R2000**	**R2001**	**R2002**	**R2003**	**R2004**	**R2025**	**R2005**
	Bowen No.	150446	80357	80717	151023	147008	…	147357
	No. Req'd	3	3	3	3	3	3	3
KNIFE PIN	**Logan Part No.**	**R3000**	**R3000**	**R3002**	**R3003**	**R3004**	**R3004**	**R3005**
	Bowen No.	80359	80359	80719	151024	147009	147009	147371
	No. Req'd	3	3	3	3	3	3	3
KNIFE PIN RETAINER	**Logan Part No.**	**AK9004**	**AK9004**	**R4002**	**R4003**	**R4003**	**R4003**	**R4004**
SCREW	Bowen No.	23508	23508	13847	148526	148526	148256	148256
	No. Req'd	3	3	3	3	3	3	3
SPRING SLEEVE	**Logan Part No.**	**…**	**R5001**	**R5002**	**…**	**R5003**	**…**	**…**
	Bowen No.	…	147487	147493	…	147499	…	…
SPRING	**Logan Part No.**	**R6000**	**R6001**	**R6002**	**R6003**	**R6003**	**R6004**	**R6004**
	Bowen No.	150449	147488	147494	147500	147500	147384	147384
PISTON	**Logan Part No.**	**R7000**	**R7001**	**R7002**	**R7003**	**R7004**	**R7005**	**R7005**
	Bowen No.	150450	147485	147491	151025	147497	147373	147373
PISTON O.D. SEAL	**Logan Part No.**	**568-330**	**568-333**	**568-346**	**R8003**	**R8004**	**R8005**	**R8005**
	Bowen No.	27-33	27-36	27-49	151026	147012	147374	147374
PISTON I.D. SEAL	**Logan Part No.**	**568-220**	**568-220**	**568-220**	**568-228**	**568-331**	**568-331**	**568-331**
	Bowen No.	27-25	27-25	27-25	568228	27-34	27-34	27-34
PISTON BUSHING	**Logan Part No.**	**R10000**	**R10000**	**R10000**	**R10002**	**R10002**	**R10002**	**R10002**
	Bowen No.	80356	80356	80356	147013	147013	147013	147013
PISTON BUSHING	**Logan Part No.**	**R11000**	**R11000**	**R11000**	**R11001**	**R11001**	**R11001**	**R11001**
RETAINER RING	Bowen No.	21116	21116	21116	147014	147014	147014	147014
BIT JET RETAINER	**Logan Part No.**	**R12000**	**R12000**	**R12001**	**R12002**	**R12002**	**R12003**	**R12003**
	Bowen No.	80352	80352	80714	147015	147015	147377	147377

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Special Note:
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LOGAN
OIL TOOLS

INTERNAL PRESSURE PIPE CUTTERS

PIPE SIZE TO CUT		4	4-1/2 to 6-1/8	6-5/8 to 7-5/8	8-5/8 to 11-3/4	9-5/8 to 36	10-3/4 to 36	13-3/8 to 36
CUTTER O.D.		3-1/4	3-5/8	5-9/16	7-3/8	8-1/4	9-1/2	11-3/4
CONNECTION SIZE (BOX UP)		2-3/8 Reg	2-3/8 IF	3-1/2 IF	Blank	Blank	Blank	Blank
CONNECTION SIZE (BOX DOWN)		2-3/8 Reg	2-3/8 Reg	3-1/2 Reg	Blank	Blank	Blank	Blank
COMPLETE ASSEMBLY	**Logan Part No.**	**412-325**	**412-363**	**412-556**	**412-738**	**412-825**	**412-950**	**412-1175**
	Bowen No.	150444	147483	147489	150959	147495	147343	147369
BIT JET RETAINER SEAL	**Logan Part No.**	**568-117**	**568-117**	**568-117**	**568-219**	**568-219**	**568-219**	**568-219**
	Bowen No.	568117	568117	568117	27-24	27-24	27-24	27-24
BIT JET RETAINER STEM	**Logan Part No.**	**R16000**	**R16000**	**R16000**	**R16001**	**R16001**	**R16001**	**R16001**
	Bowen No.	80354	80354	80354	147017	147017	147017	147017
STOP SPIDER	**Logan Part No.**	**R17000**	**R17001**	**R17002**	**R17003**	**R17004**	**R17005**	**R17006**
	Bowen No.	150451	80353	80715	151027	145168	147354	147381
STOP SPIDER SET SCREW	**Logan Part No.**	**P12008**	**R18001**	**R18002**	**AX10002**	**AX10002**	**AX10002**	**R18004**
	Bowen No.	23705	23706	23709	145165	145165	145165	23384
	No. Req'd	3	3	3	3	3	3	3
BIT JET	**Logan Part No.**	**R14000**	**R14001**	**R14001**	**R14002**	**R14002**	**R14002**	**R14002**
	Bowen No.	150682	80453	80453	147016	147016	147016	147016
BIT JET RETAINER RING	**Logan Part No.**	**R15000**	**R15000**	**R15000**	**R15002**	**R15002**	**R15002**	**R15002**
	Bowen No.	54131	54131	54131	33788	33788	33788	33788
TOP SUB	**Logan Part No.**	**R19000**	**R19001**	**R19002**	**R19003**	**R19004**	**R19005**	**R19006**
	Bowen No.	150452	80351	80713	151028	147018	147356	147383
TOP SUB SEAL	**Logan Part No.**	**568-231**	**568-234**	**568-249**	**568-359**	**568-438**	**568-443**	**568-447**
	Bowen No.	30-9	30-12	30-27	568359	27-65	568440	27-74
TOP SUB SEAL	**Logan Part No.**	**…**	**…**	**…**	**…**	**568-437**	**…**	**…**
	Bowen No.	…	…	…	…	27-64	…	…

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LOGAN
OIL TOOLS

CENTRALIZING TOP SUBS

5" O.D.	**Logan Part No.**	**…**	**R2100**	**…**	**…**	**…**	**…**	**…**
	Bowen No.	…	80566	…	…	…	…	…
5-1/2" O.D.	**Logan Part No.**	**…**	**R2101**	**…**	**…**	**…**	**…**	**…**
	Bowen No.	…	80567	…	…	…	…	…
7" O.D.	**Logan Part No.**	**…**	**…**	**R2102**	**…**	**…**	**…**	**…**
	Bowen No.	…	…	80720	…	…	…	…
7-5/8" O.D.	**Logan Part No.**	**…**	**…**	**R2103**	**…**	**…**	**…**	**…**
	Bowen No.	…	…	80721	…	…	…	…

KNIVES (UNDRESSED)

7-5/8" to 9-5/8" O.D.	**Logan Part No.**	**…**	**…**	**R2006**	**…**	**…**	**…**	**…**
	Bowen No.	…	…	81896	…	…	…	…
10-3/4" O.D.	**Logan Part No.**	**…**	**…**	**…**	**R2007**	**R2008**	**…**	**…**
	Bowen No.	…	…	…	151029	147021	…	…
11-3/4" to 13-3/8" O.D.	**Logan Part No.**	**…**	**…**	**…**	**R2007**	**…**	**R2026**	**…**
	Bowen No.	…	…	…	151029	…	…	…
13-3/8" to 16" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**R2011**	**R2026**	**R2010**
	Bowen No.	…	…	…	…	147022	…	147358
16" to 18-5/8" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**…**	**…**	**R2012**
	Bowen No.	…	…	…	…	…	…	147359
18" to 20" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**R2015**	**…**	**…**
	Bowen No.	…	…	…	…	147023	…	…
18-5/8 to 24" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**…**	**R2027**	**R2017**
	Bowen No.	…	…	…	…	…	…	147360
24" to 30" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**R2018**	**…**	**…**
	Bowen No.	…	…	…	…	147024	…	…
26" to 30" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**…**	**R2028**	**R2020**
	Bowen No.	…	…	…	…	…	…	147361
30" to 34" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**R2021**	**…**	**…**
	Bowen No.	…	…	…	…	147025	…	…
34" to 36" O.D.	**Logan Part No.**	**…**	**…**	**…**	**…**	**R2022**	**R2028**	**R2024**
	Bowen No.	…	…	…	…	147026	147362	147362

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