A) DESCRIPTION

The D&L ASI-X Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. The ASI-X Packer is suited for treating, testing, injecting, pumping wells, and flowing wells, deep or shallow. The ASI-X Packer can be left in tension or compression, depending on well conditions and the required application. A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set and opens prior to releasing the upper slips when retrieving to allow pressure equalization. The J-slot design allows easy setting and releasing; 1/4 turn right-hand set, right-hand release.

B) SPECIFICATION GUIDE

CASING		RECOMMENDED HOLE SIZE (INCHES)	TOOL OD (INCHES)	TOOL ID (INCHES)	THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)					
20	133.0 – 169.0#	18.376 – 18.730	18.000	5.00	7” LTC	60320

NOTE$_1$: Tool listed is right-hand set / right-hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
3,000 PSI	420,000 LBS

C) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION$_2$: D&L ships tool connections made-up hand-tight—labeled with hand-tight tape on the tool—unless stated otherwise. Properly tighten connections before operating tool (Fig. 1).

STUB ACME/ACME THREADS	INTERNAL TAPERED TUBING THREADS		PREMIUM THREADS
	UP TO 2-3/8”	GREATER THAN 2-3/8”	
600 – 800 FT-LBS	600 – 800 FT-LBS	800 – 1,200 FT-LBS	Consult thread manufacturer’s recommendations.

Fig. 1 – General Thread Connection Torque Recommendations

Before first use, D&L recommends disassembly and inspection of the tool unless stated otherwise. Ensure parts have not been damaged during shipping. Replace damaged parts with D&L replacement parts. Contact D&L sales for replacement part information.

Re-assemble the tool after inspection. Install parts in the correct order and orientation. Properly tighten connections (Fig. 1).

Before re-using the tool, D&L recommends disassembly and inspection of the tool. Clean parts and ensure parts are in good working condition. Replace worn or damaged parts with D&L replacement parts.

When redressing the tool, D&L recommends replacement of all seals, elements, o-rings, shear screws, etc. Contact D&L sales for redress kit and/or other replacement part information.

D) SETTING PROCEDURES

CAUTION$_2$: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

D-1) COMPRESSION SET

Run the packer to setting depth. Pick up the tubing to allow for setting stroke (14”) plus desired tubing load. Rotate the tubing 1/4 right-hand turn at the packer, and then lower the tubing while releasing torque. Slack off on the tubing sufficient weight to set the packer (40,000 lbs). Pull tension to assure that the upper slips are set. The tubing can then be left in tension, compression or neutral. If insufficient weight is available to set the packer with compression, tension can be applied after slack-off to pack off the elements.

D-2) TENSION SET

Run to setting depth, pick up on the tubing and rotate 1/4 turn to the right at the packer then lower the tubing slacking off available weight to set the packer lower slips. Pull tension to set upper slips and pack off elements (40,000 lbs). After setting the packer, the tubing can be left in compression, tension or neutral.

E) RELEASING PROCEDURES

The releasing procedures are the same whether the packer has been tension or compression set. Set down weight on the packer to unseat the J-pin from the tension shoulder of the J-slot. Refer to the Pressure Affected Area Guide to determine necessary set down weight on the packer. Rotate the tubing 1/4 right-hand turn at the packer and pick up while holding right hand torque. Weight in addition to pipe weight may be required to pick up on packer – refer to Pressure Affected Area Guide. The internal by-pass will open, allowing pressure to equalize. After pressure is equalized, continue to pick up to release the upper slips, relax the elements and release the lower slips thus allowing the packer to be re-set or removed from the well.

In the event, the packer will not release in the normal manner, hard right-hand torque can be applied (800-1,000 Ft-lbs) which will break the tack weld on the J-pin ring. Continued rotation of approximately 15 turns will release the J-pin ring and allow the packer to be pulled. When released in this manner, the packer will reset when moved down the hole.

CAUTION$_1$: High differential pressure below the ASI-X Packer may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

F) STORAGE PROCEDURES

When preparing the tool for storage, follow the Pre-Installation Inspection Procedures. Re-assemble the tool with connections hand-tight only and in running position if applicable. Elastomers should be in a relaxed state—free from tension, compression or other deformation.

Store the tool, if possible, in an enclosed, temperature and humidity controlled environment. Avoid excessively high temperatures over long periods of time. Shield elastomeric parts from ultraviolet light sources. Keep tool dry and protected from condensation. Do not store in contact with or near volatile or corrosive chemicals. Do not store near ozone generating equipment or operations such as welding.

G) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	TUBING SIZE (INCHES)	PRESSURE (IN^2)	
		ABOVE	BELOW
20” X 7”	6.625	8.247 DOWN	13.980 UP
	7.000	4.234 DOWN	9.146 UP
	7.625	2.945 UP	3.958 UP

Example: Consider a 20” X 7” ASI-X Packer set on 7” tubing with a differential pressure of 3,000 PSI in the annulus around the tubing above the packer. How much force is acting on the seal area of the mandrel?

To calculate the force (lbs) acting on the seal area of the mandrel, refer to the pressure affected area guide for a 20” X 7” ASI-X Packer run on 7” tubing. In this example, the differential pressure from above the packer acts down on the seal area of the mandrel area across a pressure affected area of 4.24 in^2. Multiplying the differential pressure (3,000 PSI) by the pressure affected area (4.24 in^2) results in a downward force of 12,720 lbs. 12,720 lbs is the force which needs to be neutralized when releasing the packer.

H) ELEMENT SELECTION GUIDE

NITRILE (STD)			
TEMPERATURE RANGE (F°)	DUROMETER		
	END	MIDDLE	END
70° - 125°	80	70	80
125° - 250°	90	70	90
250° - 300°	90	80	90
300° +	Contact D&L Sales		

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	70° - 300°F
HSN (HNBR)	70° - 325°F
VITON	100° - 350°F
AFLAS	200° - 400°F

I) RECOMMENDED TOOLS

I-1) HAND TOOLS

- VISE
- GLOVES
- ALLEN WRENCHES
- TAPE MEASURE
- O-RING PICK
- BAR
  - 1/2-INCH
  - 3/4-INCH
- PAINT BRUSH, 2-INCH
- PIPE WRENCH, 3-FT (2 EA)
- “CHEATER” PIPE, 4-FT LONG
- ADJUSTABLE WRENCH, 12-INCH
- CORDLESS DRILL, 18V
- SNAP RING SPREADER PLIERS
- ALIGNING PUNCH
- SCREWDRIVER SET, FLAT-TIPPED
- SOCKET SETS
  - 3/8-INCH DRIVE
  - 1/2-INCH DRIVE
- HAMMERS
  - SLEDGE
  - BALL PEEN
  - DEAD BLOW
- JACK STAND

I-2) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT018110

J) DISASSEMBLY

NOTE$_2$: Ensure vise is capable of handling weight of tool.

NOTE$_3$: Support tool during disassembly and assembly with jack stands as necessary.

J-1) Clamp top sub (1) in vise.

J-1.1) Unscrew and remove set screws (38) from J-pin bottom sub (23). Move J-body (20) as needed to access set screws (38).

J-1.2) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE$_4$: Drag block body assembly must be free to rotate.

J-1.2.1) Remove o-ring (41) from J-pin bottom sub (23).

J-1.3) Unscrew and remove set screws (38) from drag block body support (28).

J-1.4) Unscrew and remove J-body (20) from drag block body support (28) (**NOTE$_5$**: Left-hand threads).

J-1.5) Compress drag blocks (22) using drag block body assembly tool (T1). Unscrew and remove drag block retainer (21) from drag block body support (28).

J-1.6) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

J-1.7) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE$_6$: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

J-1.8) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:

J-1.8.1) Unscrew and remove set screws (38) from drag block body (18).

J-1.8.2) Unscrew and remove drag block body support (28) from drag block body (18) (**NOTE$_5$**: Left-hand threads).

NOTE$_7$: Insert rod in drag block body support (28) if needed.

J-1.8.3) Unscrew and remove socket cap screws (37) from drag block body (18).

J-1.8.4) Remove lower slip support (32) from drag block body (18).

J-1.8.5) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

J-1.9) Unscrew and remove lower cone support (31) from lower cone (16).

J-1.10) Unscrew and remove lower cone (16) from rubber retainer (15).

J-1.11) Unscrew rubber mandrel (11) from center coupling (10).

J-1.12) Remove rubber mandrel assembly and disassemble:

J-1.12.1) Remove elements (13, 14), rubber spacers (12) and rubber retainer (15) from rubber mandrel sleeve (34).

J-1.12.2) Remove rubber mandrel sleeve (34) from rubber mandrel (11).

J-1.12.3) Remove o-ring (40) from rubber mandrel (11).

J-1.13) Unscrew and remove gage ring (29) from center coupling (10).

J-1.14) Unscrew and remove center coupling (10) from upper cone (9).

J-1.14.1) Remove bonded seal (24) and o-rings (39) from center coupling (10).

J-1.15) Remove upper cone (9) and bearing bushing (30) from inner mandrel (2).

J-2) Unclamp and remove top sub (1) from vise. Clamp lower part of inner mandrel (2) in vise.

CAUTION$_4$: Do NOT wrench or clamp on seal surface.

J-2.1) Unscrew and remove spring cage cap (27) from spring cage (5).

CAUTION$_2$: Compression spring (4) is compressed with spring tension against upper slip body assembly.

J-2.2) Unscrew and remove set screws (38) from top sub (1).

J) DISASSEMBLY (cont’d)

J-2.3) Unscrew and remove top sub (1) from inner mandrel (2).

J-2.3.1) Remove o-ring (42) from top sub (1).

J-2.4) Remove compression spring (4) from inner mandrel (2).

J-2.5) Unscrew and remove spring cage (5) from upper slip support (33).

J-2.6) Remove upper slip body assembly and disassemble:

J-2.6.1) Remove spring retaining ring (35) from upper slip support (33).

J-2.6.2) Wedge releasing slip (7) and upper slips (8) outward. Unscrew and remove upper slip body support (36) from upper slip support (33).

J-2.6.3) Unscrew and remove upper slip support (33) from upper slip body (6).

J-2.6.4) Remove wedges. Remove releasing slip (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

J-3) Unclamp and remove inner mandrel (2) from vise.

K) ASSEMBLY

NOTE$_8$: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order and orientation.

NOTE$_2$: Ensure vise is capable of handling weight of tool.

NOTE$_3$: Support tool during disassembly and assembly with jack stands as necessary.

K-1) Clamp inner mandrel (2) in vise.

CAUTION$_4$: Do NOT wrench or clamp on seal surface.

K-1.1) Assemble upper slip body assembly and install:

K-1.1.1) Screw upper slip support (33) into upper slip body support (36).

K-1.1.2) Install upper slips (8), releasing slip (7) and upper slip springs (26) into upper slip body (6).

NOTE$_9$: Install two (2ea) springs per slip (Fig. 2).

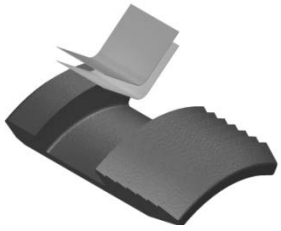


Fig. 2

K-1.1.3) Wedge releasing slip (7) and upper slips (8) outwards. Screw upper slip body support (36) into upper slip body (6). Remove wedges.

K-1.1.4) Install spring retaining ring (35) into place in upper slip support (33).

K-1.1.5) Install upper slip body assembly onto inner mandrel (2).

K-1.2) Screw spring cage (5) into upper slip support (33).

K-1.3) Install compression spring (4) onto inner mandrel (2).

K-1.4) Install o-ring (42) in groove in top sub (1).

K-1.5) Screw top sub (1) onto inner mandrel (2).

CAUTION$_3$: Do not rip or tear o-ring during installation.

K-1.6) Screw set screws (38) into top sub (1).

K-1.7) Screw spring cage cap (27) onto spring cage (5).

CAUTION$_2$: Compression spring (4) is compressed with spring tension against upper slip body assembly.

K-2) Unclamp and remove inner mandrel (2) from vise. Clamp top sub (1) in vise.

K-2.1) Install upper cone (9) and bearing bushing (30) onto inner mandrel (2).

K-2.2) Install o-rings (39) in grooves in center coupling (10).

K-2.3) Install bonded seal (24) into center coupling (10).

CAUTION$_3$: Do not rip or tear o-rings during installation.

K) ASSEMBLY (cont’d)

K-2.4) Screw center coupling (10) onto upper cone (9).

K-2.5) Screw gage ring (29) onto center coupling (10).

K-2.6) Assemble rubber mandrel assembly and install:

K-2.6.1) Install o-ring (40) in groove in rubber mandrel (11).

K-2.6.2) Install rubber mandrel sleeve (34) onto rubber mandrel (11).

CAUTION$_3$: Do not rip or tear o-ring during installation.

K-2.6.3) Install rubber retainer (15), elements (13, 14) and rubber spacers (12) onto rubber mandrel sleeve (34).

K-2.6.4) Install rubber mandrel assembly onto inner mandrel (2); Screw rubber mandrel (11) into center coupling (10).

CAUTION$_3$: Do not rip or tear o-ring during installation.

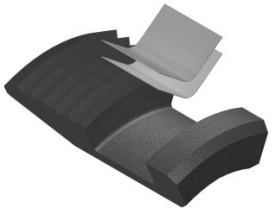


Fig. 3

K-2.7) Screw lower cone (16) into rubber retainer (15).

K-2.8) Screw lower cone support (31) into lower cone (16).

K-2.9) Assemble drag block body assembly and install:

K-2.9.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE$_9$: Install two (2ea) springs per slip (Fig. 3).

K-2.9.2) Install lower slip support (32) into drag block body (18).

K-2.9.3) Align threaded holes in lower slip support (32) with holes in drag block body (18). Screw socket cap screws (37) into drag block body (18). Remove wedges.

K-2.9.4) Screw drag block body support (28) into drag block body (18). (**NOTE$_5$**: Left-hand threads).

K-2.9.5) Screw set screws (38) into drag block body (18).

K-2.9.6) Install drag block body assembly onto rubber mandrel (11).

Fig. 4

K-2.10) Screw rubber mandrel cap (19) onto rubber mandrel (11).

K-2.11) Install drag blocks (22) and drag block springs (3). Compress drag blocks (22) using drag block body assembly tool (T1).

NOTE$_{10}$: Install six (6ea) springs per block (Fig. 4).

K-2.12) Screw drag block retainer (21) onto drag block body support (28) capturing Release drag blocks (22).

K-2.13) Screw J-body (20) into drag block body support (28) (**NOTE$_5$**: Left-hand threads).

K-2.14) Screw set screws (38) into drag block body support (28).

K-2.15) Install o-ring (41) in groove in J-pin bottom sub (23).

K-2.16) Screw J-pin bottom sub (23) onto inner mandrel (2).

NOTE$_4$: Drag block body assembly must be free to rotate.

CAUTION$_3$: Do not rip or tear o-ring during installation.

K-2.17) Screw set screws (38) into J-pin bottom sub (23). Move J-body (20) as needed to access threaded holes in J-pin bottom sub (23).

K-3) Unclamp top sub (1) from vise and remove assembled tool.

L) PARTS LIST

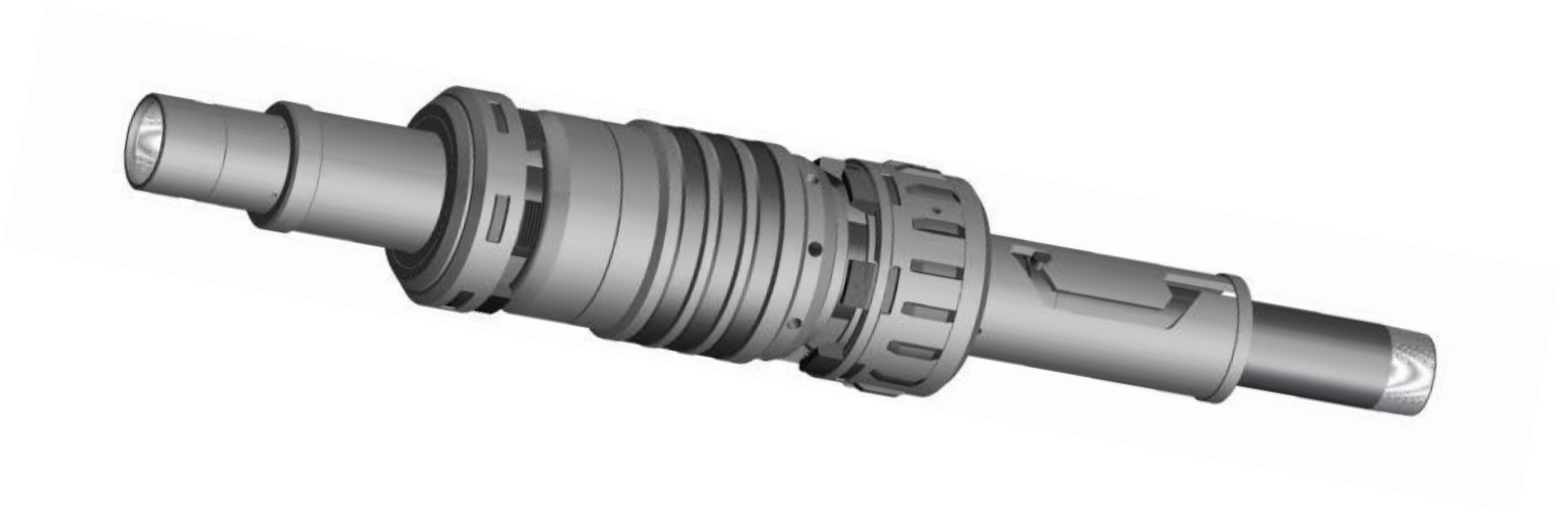
ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60320 (133.0 – 169.0#)
1	1	TOP SUB	1026	60316610
2	1	INNER MANDREL	L-80	60316210
3	96	DRAG BLOCK SPRING	INCONEL	9101900
4	1	COMPRESSION SPRING	CHROME VANADIUM	60316920
5	1	SPRING CAGE	1026	60316310
6	1	UPPER SLIP BODY	1026	60320320
7	2	RELEASING SLIP	P-110	60020125
8	4	UPPER SLIP	1026	60020115
9	1	UPPER CONE	1026	60318410
10	1	CENTER COUPLING	1026	60318620
11	1	RUBBER MANDREL	P-110	60316220
12	2	RUBBER SPACER	1026	60220840
13	1	ELEMENT	80 DURO NITRILE	60220512
14	2	ELEMENT	90 DURO NITRILE	60220513
15	1	RUBBER RETAINER	P-110	61320850
16	1	LOWER CONE	P-110	61318420
17	6	LOWER SLIP	1026	60020135
18	1	DRAG BLOCK BODY	P-110	60320335
19	1	RUBBER MANDREL CAP	P-110	60316230
20	1	J-BODY	1026	60316340
21	1	DRAG BLOCK RETAINER	P-110	60020910
22	16	DRAG BLOCK	8620	9080900
23	1	J-PIN BOTTOM SUB	L-80	60316650
24	1	BONDED SEAL	90 DURO NITRILE	60016520
25	12	LOWER SLIP SPRING	INCONEL	7116901
26	12	UPPER SLIP SPRING	INCONEL	7116902
27	1	SPRING CAGE CAP	1026	60316810

L) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60320 (133.0 – 169.0#)
28	1	DRAG BLOCK BODY SUPPORT	P-110	60318330
29	1	GAGE RING	P-110	60220830
30	1	BEARING BUSHING	1026	60318224
31	1	LOWER CONE SUPPORT	P-110	61318421
32	1	LOWER SLIP SUPPORT	P-110	60318912
33	1	UPPER SLIP SUPPORT	1026	60318880
34	1	RUBBER MANDREL SLEEVE	P-110	60318225
35	1	SPRING RETAINING RING	1026	60316820
36	1	UPPER SLIP BODY SUPPORT	1026	60318885
37	2	SOCKET CAP SCREW 1/2-13 UNC X 1-1/2	STEEL	SCS050C150
38	14	SET SCREW 3/8-16 UNC X 1/2	STEEL	SSS037C050
39	2	171 O-RING	90 DURO NITRILE	90171
40	1	265 O-RING	90 DURO NITRILE	90265
41	1	362 O-RING	90 DURO NITRILE	90362
42	1	363 O-RING	90 DURO NITRILE	90363

REDRESS KIT (RDK)		60320050
ASSEMBLED WEIGHT		2,256 LBS

M) TECHNICAL ILLUSTRATION



N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
03/12/14	D	Revised releasing procedures, assembled weight was 2,259 lbs; Added max. tensile load, pre-installation inspection and storage procedures, recommended hand tools, revision history	J.Anderson	K.Riggs