



#20 MODEL “H” HYDRAULIC SETTING TOOL w/ 2-7/8” (7.9#) HYDRIL PH-6, VITON

Manual No:
DL-391-20-634

Revision: **B**

Revision Date:
03/31/2017

Authored by: J.Anderson

Approved by: K.Plunkett

A) DESCRIPTION

The Model “H” Hydraulic Setting Assembly (HST) is a hydraulic setting tool designed for setting packers and plugs without pipe manipulations in deep, high-temperature wells. It is used to set packers and plugs that are normally set with a Model “E-4” Wireline Pressure Setting Assembly (or similar wireline setting equipment). The same adapter kit that is used on wireline can be used with the Model “H” HST.

The Model “H” HST and packer (or plug) is run in on the tubing to the desired setting depth and a ball is dropped to the HST. Pressure is applied to close the fill ports, which also opens the setting pistons to pressure. As pressure is applied, force is transmitted to the packer (or plug) to set. Tubing tension can also be applied to supplement the setting force generated by the pressure applied.

The standard setting tool comes with three pistons, but additional pistons can be added to reduce setting pressure.

Features include:

- The primary feature of the D&L Model "H" Hydraulic Setting Assembly is that it permits setting on tubing equipment, which could previously be set only with wireline setting tools. This is particularly advantageous in high angle or deviated wells where wireline setting is extremely difficult.
- Premature setting is prevented by means of a shear screw in the cross link sleeve.
- The tubing fills automatically as it is run in the hole through a ported top sub in the setting assembly. These ports also permit circulation through the setting assembly at any time.

B) RELATED TOOLS (sold separately)

B-1) Wireline adapter kits (WLAK) (PN varies)—refer to applicable technical manual.

B-2) Wireline set tools (PN varies)—refer to applicable technical manual.

C) SPECIFICATION GUIDE

SIZE	TOOL OD (INCHES)	EFFECTIVE PISTON AREA (IN ² / PISTON)	CONNECTION		PART NUMBER
			TOP	BOTTOM (BAKER E-4)	
#20	3.812	20.97	2-7/8 (7.9#) HYDRIL PH-6	SIZE #20	39120V-3-XGNBA

DIFFERENTIAL PRESSURE (MAX)	TENSION THRU TOOL (MAX)
10,000 PSI	100,000 LBS

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-3504 www.dloilttools.com



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D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION₁: D&L ships tool connections made-up **HAND TIGHT**—labeled with hand-tight tape on the tool (Fig. 1)—unless stated otherwise. Tighten/torque all connections properly before operating tool.



Fig. 1

GENERAL THREAD CONNECTION TORQUE RECOMMENDATIONS			
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.

GENERAL SCREW TORQUE RECOMMENDATIONS									
SCREW SIZE (INCHES)	#6	#8	#10	1/4	5/16	3/8	7/16	1/2	5/8 and larger
TORQUE RANGE (INCH-POUNDS)	5 – 8	10 – 15	18 – 25	25 – 40	50 – 80	90 – 135	160 – 210	250 – 330	450 - 650

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.

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 o-rings, shear screws, etc. Contact D&L sales for redress kit and/or other replacement part information.

E) OPERATION

CAUTION₃: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

The Model "H" Hydraulic Setting Assembly uses the same wireline adapter kit (WLAK) used with the Baker wireline pressure setting assembly. To set packer or plug with the hydraulic setting tool, make up the hydraulic setting tool to the WLAK and the packer or plug. Run the pressure setting assembly downhole on tubing to the desired setting depth.

With the pressure setting assembly at the desired setting depth, pump the setting ball down the tubing to its seat in the support sleeve of the hydraulic setting tool. Apply 1,200 psi to shear the shear screws in the support sleeve and close off the top sub ports.

Continue to hold a minimum of 800 psi to force the pistons and cross link sleeve downward. The setting mandrel remains stationary while the cross link sleeve forces the WLAK and the packer or plug body downward. The resulting squeeze action applied to the packer or plug forces the slips to set and the elements to pack off. Apply tension and/or pump pressure to complete setting of the packer or plug and releasing of the pressure setting assembly.

Pick up on the work string to remove the hydraulic setting assembly from the well. As the pistons move downwards, cylinder ports open to allow the fluid in the tubing to unload.



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F) APPLIED FORCE WITH PRESURE

NOTE₁: Piston Area = 6.990 in² / piston

PRESSURE (PSI)	FORCE (LBS)	
	w/2 PISTONS (Total Area = 13.980 in ²)	w/3 PISTONS (Total Area = 20.970 in ²)
1,000	13,980	20,970
2,000	27,960	41,940
3,000	41,940	62,910
4,000	55,920	83,880
5,000	69,900	-
6,000	83,880	-

CAUTION₄: Some packers may not be energized by mechanical pull after slips are set. It is your responsibility to identify these packers and set with pressure only.

G) STORAGE RECOMMENDATIONS

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.

H) ELASTOMER TRIM TEMPERATURE GUIDE

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	40° - 250°F
HSN (HNBR)	70° - 300°F
VITON	100° - 350°F

I) DISASSEMBLY

I-1) Clamp bottom cylinder (4) in vise.

- I-1.1) Unscrew and remove top sub assembly from top cylinder (4).
 - I-1.1.1) Remove o-ring (22) from top sub (1).
 - I-1.1.2) Unscrew and remove piston stop (2) from top sub (1).
 - I-1.1.3) Unscrew and remove shear screws (15) from top sub (1).
 - I-1.1.4) Remove support sleeve (3) from top sub (1).
 - I-1.1.4.1) Remove o-rings (19, 20) from support sleeve (3).
- I-1.2) Unscrew and remove top cylinder (4) from cylinder connector (14).
- I-1.3) Unscrew and remove piston cap (12) from piston rod (13).
 - I-1.3.1) Remove o-rings (18, 22) from piston cap (12).
- I-1.4) Remove piston rod (13) from cylinder connector (14).



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I) DISASSEMBLY (cont'd)

- I-1.5) Unscrew and remove middle cylinder connector (14) from middle cylinder (4).
 - I-1.5.1) Remove o-rings (21, 22) from cylinder connector (14).
- I-1.6) Unscrew and remove middle cylinder (4) from bottom cylinder connector (14):
- I-1.7) Unscrew and remove piston cap (12) from piston rod (13).
 - I-1.7.1) Remove o-rings (18, 22) from piston cap (12).
- I-1.8) Unscrew and remove bottom cylinder connector (14) from bottom cylinder (4).
 - I-1.8.1) Remove o-rings (21, 22) from cylinder connector (14).
- I-2) Unclamp bottom cylinder (4) from vise. Clamp cylinder head (5) in vise.
 - I-2.1) Unscrew and remove bottom cylinder (4) from cylinder head (5).
 - I-2.2) Remove lower piston (7) from piston rod (8).
 - I-2.2.1) Remove o-ring (22) from lower piston (7).
 - I-2.3) Unscrew and remove shear screw (15) and socket head cap screw (16) from cross link sleeve (6).
 - I-2.4) Remove cross link (10) from slots in cross link sleeve (6), piston rod (8), and setting mandrel (9).
 - I-2.5) Remove cross link sleeve (6) and cross ring (11) from setting mandrel (9) and separate.
 - I-2.6) Pull piston rod (8) out of setting mandrel (9).
 - I-2.7) Unscrew setting mandrel (9) from cylinder head (5).
- I-3) Unclamp and remove cylinder head (5) from vise.

J) ASSEMBLY

NOTE₂: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION₅: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

- J-1) Clamp cylinder head (5) in vise.
 - J-1.1) Screw setting mandrel (9) into cylinder head (5).
 - J-1.2) Install piston rod (8) into setting mandrel (9). Align cross link slot in piston rod (8) with lower end of cross link slot in setting mandrel (9).
 - J-1.3) Install cross ring (11) onto cross link sleeve (6).
 - J-1.4) Install cross link sleeve (6) and cross ring (11) onto setting mandrel (9). Align cross link slot of cross link sleeve (6) with lower end of cross link slot in setting mandrel (9).
 - J-1.5) Install cross link (10) into cross link sleeve (6), piston rod (8), and setting mandrel (9) through aligned slots.
 - J-1.6) Screw socket head cap screw (16) into cross link sleeve (6). Rotate cross ring (11) as needed to align holes in cross ring (11) with threaded holes in cross link sleeve (6).
 - J-1.7) Move cross link sleeve (6) as needed to align threaded hole in cross link sleeve (6) with pocket hole in setting mandrel (9).
 - J-1.8) **TEMPORARILY** screw a long 1/4-20 UNC steel bolt into cross link sleeve (6) to allow further assembly without damaging shear screw.
 - J-1.9) Screw bottom cylinder (4) onto cylinder head (5).
 - J-1.10) Install o-ring (22) in groove in lower piston (7).

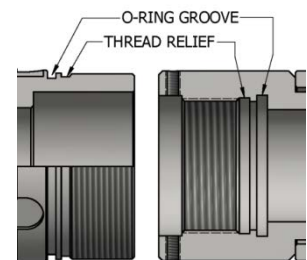


Fig. 2



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J) ASSEMBLY (cont'd)

J-1.11) Install lower piston (7) into bottom cylinder (4). Push lower piston (7) into bottom cylinder until it fits onto piston rod (8)

NOTE₃: Ensure lower piston (7) has been installed onto piston rod (8).

CAUTION₂: Do not rip or tear o-ring during installation.

J-1.12) Install o-rings (21, 22) in grooves in bottom cylinder connector (14).

J-1.13) Screw bottom cylinder connector (14) into bottom cylinder (4).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2) Unclamp cylinder head (5) from vise. Clamp bottom cylinder (4) in vise.

J-2.1) Screw middle cylinder (4) onto bottom cylinder connector (14.)

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.2) Install o-rings (18, 22) in grooves in piston cap (12).

J-2.3) Screw piston rod (13) into piston cap (12).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.4) Install piston cap (12) and piston rod (13) into middle cylinder (4) and bottom cylinder connector (14). Tap on end of the piston cap (12) until assembly contacts top of lower piston (7).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.5) Install o-rings (21, 22) in grooves in top cylinder connector (14).

J-2.6) Screw top cylinder connector (14) into middle cylinder (4).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.7) Screw top cylinder (4) onto top cylinder connector (14.)

J-2.8) Install o-rings (18, 22) in grooves in piston cap (12).

J-2.9) Screw piston rod (13) into piston cap (12).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.10) Install piston cap (12) and piston rod (13) into top cylinder (4) and top cylinder connector (14). Tap on end of the piston cap (12) until assembly contacts top of piston cap (12).

CAUTION₂: Do not rip or tear o-ring during installation.

J-2.11) Assemble top sub assembly and install:

J-2.11.1) Install o-rings (19, 20) in grooves in support sleeve (3).

J-2.11.2) Install support sleeve (3) into top sub (1). Align groove at upper end of support sleeve (3) with threaded hole in top sub (1).

J-2.11.3) Screw shear screws (15) into top sub (1). Tighten until shear screws (15) make contact with support sleeve (3). Back shear screws (15) out 1/4 turn.

J-2.11.4) Screw piston stop (2) into lower end of top sub (1).

J-2.11.5) Install o-ring (22) in groove in top sub (1).

J-2.11.6) Screw top sub (1) into top cylinder (4.)

J-2.11.7) Moving to lower end of tool, unscrew and remove temporary long 1/4-20 UNC steel bolt from cross link sleeve (6).

CAUTION₆: Failure to remove temporary steel bolt will cause the tool to malfunction.

J-2.11.8) Screw shear screw (15) into cross link sleeve (6). Tighten until shear screw (15) make contact with setting mandrel (9). Back shear screw (15) out 1/4 turn.

J-3) Unclamp cylinder (4) from vise and remove assembled tool.

J-4) Tool is ready to use with the correct size setting steel ball (17).



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K) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 39120V-3-XGNBA
1	1	TOP SUB	P-110	39120101-YGNBA
2	1	PISTON STOP-BIG I.D.	DLMS60	39120102-BIG ID
3	1	SUPPORT SLEEVE	DLMS110	39120103-BIG ID
4	3	CYLINDER	DLMS110	39120104
5	1	CYLINDER HEAD	DLMS110	39120106
6	1	CROSS LINK SLEEVE	DLMS110	39120108
7	1	LOWER PISTON	DLMS110	39120113
8	1	PISTON ROD	DLMS110	39120112
9	1	SETTING MANDREL	DLMS110	39120109
10	1	CROSS LINK	DLMS110	39120111
11	1	CROSS RING	DLMS110	39120110
12	2	PISTON CAP	DLMS110	39120115A
13	2	PISTON ROD	DLMS110	39120115B
14	2	CYLINDER CONNECTOR	DLMS110	39120107
15	3	SHEAR SCREW (1200#) 1/4-20 UNC X 3/4	DLM360BRS	BSSSLT025C075
16	1	SOCKET CAP SCREW 1/4-20 UNC X 1/4	STEEL	SCS025C025
17	1	STEEL BALL 1.00"	STEEL	SB100
		OPTIONAL: STEEL BALL 1.25	STEEL	SB125
18	2	121 O-RING	90 DURO VITON	90121V
19	1	219 O-RING	90 DURO VITON	90219V
20	2	220 O-RING	90 DURO VITON	90220V
21	2	321 O-RING	90 DURO VITON	90321V
22	6	336 O-RING	90 DURO VITON	90336V

REDRESS KIT (RDK)	391203050V-3
ASSEMBLED WEIGHT	164 LBS



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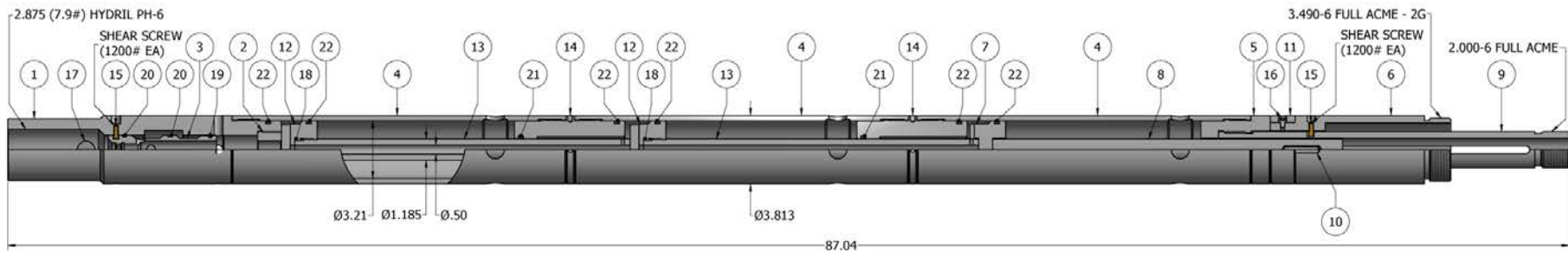
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L) TECHNICAL ILLUSTRATION



M) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
03/31/2017	B	Revised max. tension 100,000 lbs was 138,000 lbs, entire manual	J.Anderson	N.Banker
11/07/13	A	Created new manual	-	-