



HYDROSET II
w/FLAT TOP
9-5/8" X 3-1/2" X 2-7/8"

| |
|--------------------------------------|
| Manual No: DL-905-9625-160 |
| Revision: A |
| Revision Date: 06/29/2009 |

Written by: Bruce Mathis

Approved by: Fred Johnson

DESCRIPTION

The D&L Hydroset II is a hydraulic set, mechanically held dual string production packer, normally run above a single string hydraulic set or wireline set seal bore packer. The short length of the Hydroset II makes it ideally suited for deviated wells or doglegs. Since there is no tubing manipulation required to set the packer, the well head can be installed and flanged up before setting the packer. The Hydroset II is available with short or long string setting capabilities and a variety of tubing connections. The packer is also adaptable for submersible pump applications. The Hydroset II has a sequential upper slip releasing system that is designed so that each slip is released individually to reduce the pull required to release the packer. The angles on the upper slips and upper slip cage result in the slips releasing smoothly from the casing.

SPECIFICATION GUIDE

| CASING | | RECOMMENDED HOLE SIZE | TOOL OD (INCHES) | THREAD CONNECTION BOX UP/PIN DOWN | | MANDREL ID (INCHES) | | PRODUCT NUMBER |
|---------------|-----------------|-----------------------|------------------|-----------------------------------|--------------|---------------------|--------------|----------------|
| SIZE (INCHES) | WEIGHT (LBS/FT) | | | LONG STRING | SHORT STRING | LONG STRING | SHORT STRING | |
| 9-5/8 | 47-53.5 | 8.535 – 8.681 | 8.312 | 3-1/2 EUE | 2-7/8 EUE | 3.00 | 2.50 | 90596-BAE-BAC |

SETTING PROCEDURES

Run the packer in the well slowly (**60 Ft. stand in 30 seconds is recommended**). If both strings are run simultaneously, allow at least 30 minutes for the packer to equalize thermally before setting. Run the secondary string, if it was not run with the primary string, and latch into the packer seal bore. Temporarily plug the long string below the packer and apply a minimum of 2,000 PSI differential in the tubing at the packer and hold it for minimum of 15 minutes (**CAUTION: Do NOT exceed 5,000 PSI**). The packer should now be fully set and can be pressure tested if desired.

RELEASING PROCEDURES

The Hydroset II packer is released by a straight pick up on the long string. The shear release value is adjustable from 5,000 lbs to 40,000 lbs (in 5,000 lb increments - *See illustration*).

OPERATION

When tubing pressure is applied to the packer, the inlet port allows pressure differential to be present in the setting chamber. This differential forces the setting mandrel to separate from the setting chamber, shearing the setting shear screws. The setting chamber is forced down, which shears the lower slip cage shear screws and sets the lower slips. The setting mandrel is forced up, which shears the upper slip cage shear screws, and sets the upper slips and packs off the elements. Any relative motion between the setting chamber and the setting mandrel is held in place by the locking nut, which will ratchet in only one direction. With a pressure differential from above, the force is transferred through the outer components of the packer and is supported by the lower slips. This packer is rated for 6,000 lbs. With the pressure differential from below, the force transfers through the outer components of the packer and is supported by the upper slips.

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



HYDROSET II
w/FLAT TOP
9-5/8" X 3-1/2" X 2-7/8"

| |
|-------------------------------------|
| Manual No: |
| DL-905-9625-160 |
| Revision: A |
| Revision Date: 06/29/2009 |

Written by: Bruce Mathis

Approved by: Fred Johnson

DISASSEMBLY

- 1) Clamp flat top (1) in vise.
 - 1.1) Unscrew and remove coupling (25) from pup joint (32), then unscrew and remove pup joint (32).
 - 1.2) Unscrew and remove changeover (24) and crossover (23), then unscrew and remove pup joint (9).
 - 1.3) Unscrew and remove shear screws (22).
 - 1.4) Unscrew and remove shear sleeve (20) from lower slip body cap (19).
 - 1.5) Unscrew and remove socket cap (torque) screws (7) and shear screws (6) from lower slip body (15).
 - 1.6) Slide lower slip body assembly off of lower cone (16), long string mandrel (2) and short string mandrel (3).
 - 1.7) Disassemble lower slip body assembly:
 - 1.7.1) Unscrew and remove lower slip body cap (19) from lower slip body (15).
 - 1.7.1.1) Remove o-ring (30) from lower slip body cap (19).
 - 1.7.2) Remove alignment mandrel (26) from lower slip body cap (19).
 - 1.7.3) Remove lower slips (21) and slip springs (28) from lower slip body (15).
 - 1.8) Remove pick up ring (18) from long string mandrel (2)
 - 1.9) Unscrew and remove long string mandrel (2) from flat top (1).
 - NOTE: Do NOT wrench or clamp on seal surface.
 - 1.10) Pull long string mandrel (2) out through lower cone (16).
 - 1.11) Remove setting mandrel assembly from short string mandrel (3) and disassemble:
 - 1.11.1) Unscrew and remove lower cone (16) from setting chamber (14).
 - 1.11.1.1) Remove o-rings (27, 29, 30) from lower cone (16).
 - 1.11.2) Unscrew and remove shear screws (6) from setting cylinder (14).
 - 1.11.3) Rotate setting mandrel (13) to remove it from locking ring (17) and out of setting chamber (14).
 - 1.11.3.1) Remove o-ring (27) from setting mandrel (13).
 - 1.11.4) Unscrew and remove locking ring (17) from setting cylinder (14).
 - 1.11.5) Remove o-rings (30, 31) from setting cylinder (14).
 - 1.12) Remove elements (10, 11) and rubber spacers (12) from short string mandrel (3).
 - 1.13) Remove short string mandrel (3) from flat top (1).
 - NOTE: Do NOT wrench or clamp on seal surface.
 - 1.14) Unscrew and remove upper slip body assembly from flat top (1) and disassemble:
 - 1.14.1) Remove shear screws (6) and socket cap (torque) screws (7) from upper slip body (4).
 - 1.14.2) Slide upper cone (5) out of upper slip body (4).
 - 1.14.2.1) Remove o-rings (27, 30) from upper cone (5) .
 - 1.14.3) Remove upper slips (8) and slip springs (28) from upper slip body (4).
 - 2) Unclamp and remove flat top (1) from vise.



HYDROSET II

w/FLAT TOP

9-5/8" X 3-1/2" X 2-7/8"

| |
|------------------------------|
| Manual No: |
| DL-905-9625-160 |
| Revision: A |
| Revision Date: 06/29/2009 |

Written by: Bruce Mathis

Approved by: Fred Johnson

ASSEMBLY

- 1) Clamp flat top (1) in vise.
 - 1.1) Assemble upper body assembly:
 - 1.1.1) Install slip springs (28) to upper slips (8) and install upper slip assemblies into upper slip body (4).
 - 1.1.2) Install o-rings (27, 30) into upper cone (5), then slide upper cone (5) into upper slip body (4).

CAUTION: Do NOT rip or tear o-rings on threads while installing into upper slip body.
 - 1.1.3) Install shear screws (6) and socket cap (torque) screws (7) to secure upper cone (5) to upper slip body (4).
 - 1.2) Screw upper slip body assembly into flat top (1).
 - 1.3) Screw short string mandrel (3) into flat top (1).
 - 1.4) Slide elements and rubber spacers (10, 11, 12) onto short string mandrel (3),
 - 1.5) Assemble setting mandrel assembly:
 - 1.5.1) Install o-rings (27, 30) into setting mandrel (13).
 - 1.5.2) Install o-ring (31) into setting cylinder (14).
 - 1.5.3) With setting mandrel (13) on bench with threads facing up, CAREFULLY slide setting chamber (14) onto setting mandrel (13).
 - 1.5.4) With holes aligned, screw a shear screw (6) through setting chamber (14) and into setting mandrel (13).

NOTE: Install one shear screw to assist and hold parts together temporarily.

- 1.5.5) Insert locking ring (17) into setting cylinder (14) and screw it onto setting mandrel (13) until locking ring (17) is flush with lower end of setting mandrel (13).

- 1.5.6) Install o-rings (27, 29, 30) into grooves in lower cone (16).

- 1.5.7) CAREFULLY start the lower cone (16) into the setting chamber (14).

CAUTION: Do NOT rip or tear the o-rings on the threads while installing into the setting chamber.

- 1.5.8) Screw lower cone (16) into setting chamber (14) until they shoulder.

- 1.5.9) Remove shear screw (6) from setting chamber (14).

- 1.5.10) Rotate setting chamber (14) and lower cone (16) in unison about setting mandrel (13) until holes for strings align.



- 1.5.11) Align set screw holes in setting chamber (14) with setting mandrel (13). Looking from lower end of lower cone (16), rotate setting chamber (14) and lower cone (16) clockwise until shear screw holes align with pockets in setting mandrel (13).

NOTE: This should NOT take more than 45° rotation (or 1/8 of a revolution).

- 1.5.12) Install shear screws (6) into setting cylinder (14). Tighten and back off 1/4 turn.

- 1.5.13) Backing up on setting chamber (14), back off lower cone (16) just enough to allow holes for short & long strings (2, 3) to align again.



HYDROSET II
w/FLAT TOP
9-5/8" X 3-1/2" X 2-7/8"

| |
|-------------------------------------|
| Manual No: |
| DL-905-9625-160 |
| Revision: A |
| Revision Date: 06/29/2009 |

Written by: Bruce Mathis

Approved by: Fred Johnson

ASSEMBLY (cont'd)

- 1.6) Slide the setting mandrel assembly onto the short string mandrel (3).

CAUTION: Do NOT rip or tear the o-rings on the threads while installing.

- 1.7) Screw long string mandrel (2) into flat top (1).

- 1.8) Install pick up ring (18) onto long string mandrel (2).

- 1.9) Assemble lower slip body assembly:

- 1.9.1) Install slip springs (28) to lower slips (21).

- 1.9.1.1) Install lower slip assemblies into lower slip body (15).

- 1.9.2) Install o-ring (30) into the lower slip body cap (19).

- 1.9.3) Screw alignment mandrel (26) into lower slip body cap (19).

- 1.9.4) Screw lower slip body cap (19) into lower slip body (15).

- 1.10) Slide lower slip body assembly onto lower cone (16). Install shear screws (6) and socket cap (torque) screws (7). Tighten shear screws and back off 1/4 turn.

NOTE: Back off lower slip body cap (19) as needed to align short and long string mandrels (2, 3).

- 1.11) Screw shear sleeve (20) into lower slip body cap (19) until shouldered.

- 1.12) Back off shear sleeve (20) just enough to install shear screws (22).

NOTE: Install quantity of shear screws (22) needed to achieve desired shear value.



- 1.13) Screw in pup joints (9, 32).

- 1.14) Screw on changeover (24), coupling (25) and crossover (23).

- 2) Unclamp and remove flat top (1) from vise.



HYDROSET II
w/FLAT TOP
9-5/8" X 3-1/2" X 2-7/8"

| |
|--------------------------------------|
| Manual No: DL-905-9625-160 |
| Revision: A |
| Revision Date: 06/29/2009 |

Written by: Bruce Mathis

Approved by: Fred Johnson

PARTS LIST

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 90596-BAE-BAC (47-53.5#) |
|------|-----|--|-----------------|---------------------------------|
| 1 | 1 | FLAT TOP | L-80 | 90596612 |
| 2 | 1 | LONG STRING MANDREL | L-80 | 90596210 |
| 3 | 1 | SHORT STRING MANDREL | L-80 | 90596211 |
| 4 | 1 | UPPER SLIP BODY | L-80 | 90596320 |
| 5 | 1 | UPPER CONE | L-80 | 90596411 |
| 6 | 20 | SHEAR SCREW (2375#) | BRASS | 60100990 |
| 7 | 4 | SOCKET CAP SCREW 3/8-16 X 5/8 | STEEL | SCS037C063 |
| 8 | 4 | UPPER SLIP | 1018 | 90595115 |
| 9 | 1 | PUP JOINT - 24" | L-80 | PJ2875N-24-L80 |
| 10 | 2 | ELEMENT (OUTER) | 90 DURO NITRILE | 90596523 |
| 11 | 1 | ELEMENT (CENTER) | 70 DURO NITRILE | 90596521 |
| 12 | 2 | RUBBER SPACER | 1018 | 90596841 |
| 13 | 1 | SETTING MANDREL | L-80 | 90596751 |
| 14 | 1 | SETTING CYLINDER | L-80 | 90596755 |
| 15 | 1 | LOWER SLIP BODY | L-80 | 90596316 |
| 16 | 1 | LOWER CONE | L-80 | 90596421 |
| 17 | 1 | LOCKING RING | 1018 | 90596720 |
| 18 | 1 | PICK UP RING | 1018 | 90595915 |
| 19 | 1 | LOWER SLIP BODY CAP | L-80 | 90596338 |
| 20 | 1 | SHEAR SLEEVE | L-80 | 90596741 |
| 21 | 4 | LOWER SLIP | 1018 | 90595131 |
| 22 | 8 | SHEAR SCREW 1/2-13 w/.418 DOG POINT (5000#) | BRASS | 65050902 |
| 23 | 1 | CROSSOVER | 1018 | CH3500N3500E |
| 24 | 1 | CHANGE OVER | 1018-1020 | CH2875N2875E |
| 25 | 1 | COUPLING | 1018 | CP3500E3500N |
| 26 | 1 | ALIGNMENT MANDREL | 1018 | 90596215 |
| 27 | 3 | 341-90 O-RING | | 90341 |
| 28 | 24 | SLIP SPRING | | DL94829 |
| 29 | 1 | 364-90 O-RING | | 90364 |
| 30 | 4 | 336-90 O-RING | | 90336 |
| 31 | 1 | 367-90 O-RING | | 90367 |
| 32 | 1 | PUP JOINT - 72" | L-80 | PJ3500N3500N-72 |



HYDROSET II

w/FLAT TOP

9-5/8" X 3-1/2" X 2-7/8"

Manual No:
DL-905-9625-160

Revision: A

Revision Date:
06/29/2009

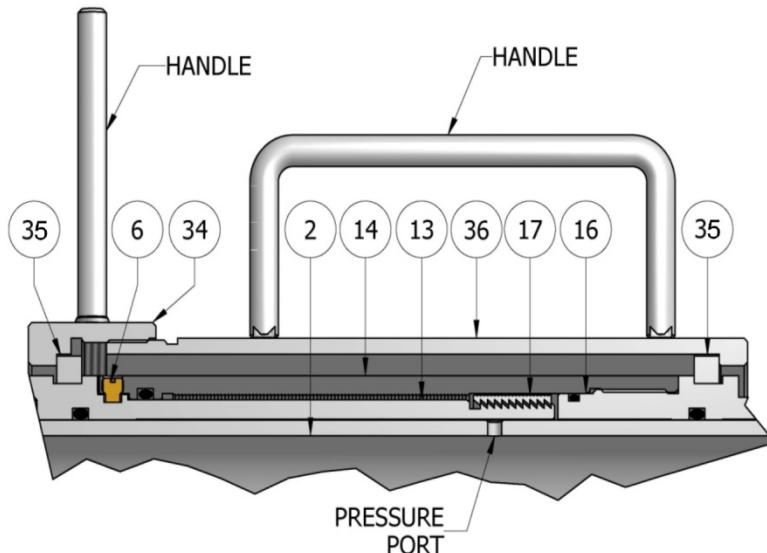
Written by: Bruce Mathis

Approved by: Fred Johnson

PRESSURE TEST

ASSEMBLY

NOTE: Prior to testing, all o-rings must be properly installed and in good condition (no rips, tears, cuts, etc).



- 1) Remove all but one of setting shear screws (6) from setting chamber (14).
- 2) Slide sleeve cap (34) onto lower end of packer with threads facing toward lower end.
- 3) Install split ring (35) into pressure test groove on lower cone (16).
- 4) Slide test sleeve (36) onto lower end of packer (with threads facing upper end) over split ring (35).
- 5) Install split ring (35) into pressure test groove on setting mandrel (13).
- 6) Screw sleeve cap (34) onto test sleeve (36) and tighten using handles.
- 7) Plug off top and bottom of long string mandrel.
- 8) Fill mandrel with hydraulic oil or inhibited water.
- 9) Apply pressure. Hold and observe for leaks.

WARNING: Do NOT exceed 1,500 PSI.

- 10) Release pressure, remove test fixtures and plugs, and re-install setting shear screws (6) in setting chamber (14).

PARTS LIST

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 90595PTF |
|------|-----|-------------|-------------------|--------------|
| 34 | 1 | SLEEVE CAP | WELDED STEEL MILD | 90595PTF006 |
| 35 | 2 | SPLIT RING | P-110 | 90595PTF008 |
| 36 | 1 | TEST SLEEVE | WELDED STEEL MILD | 90595PTF007 |



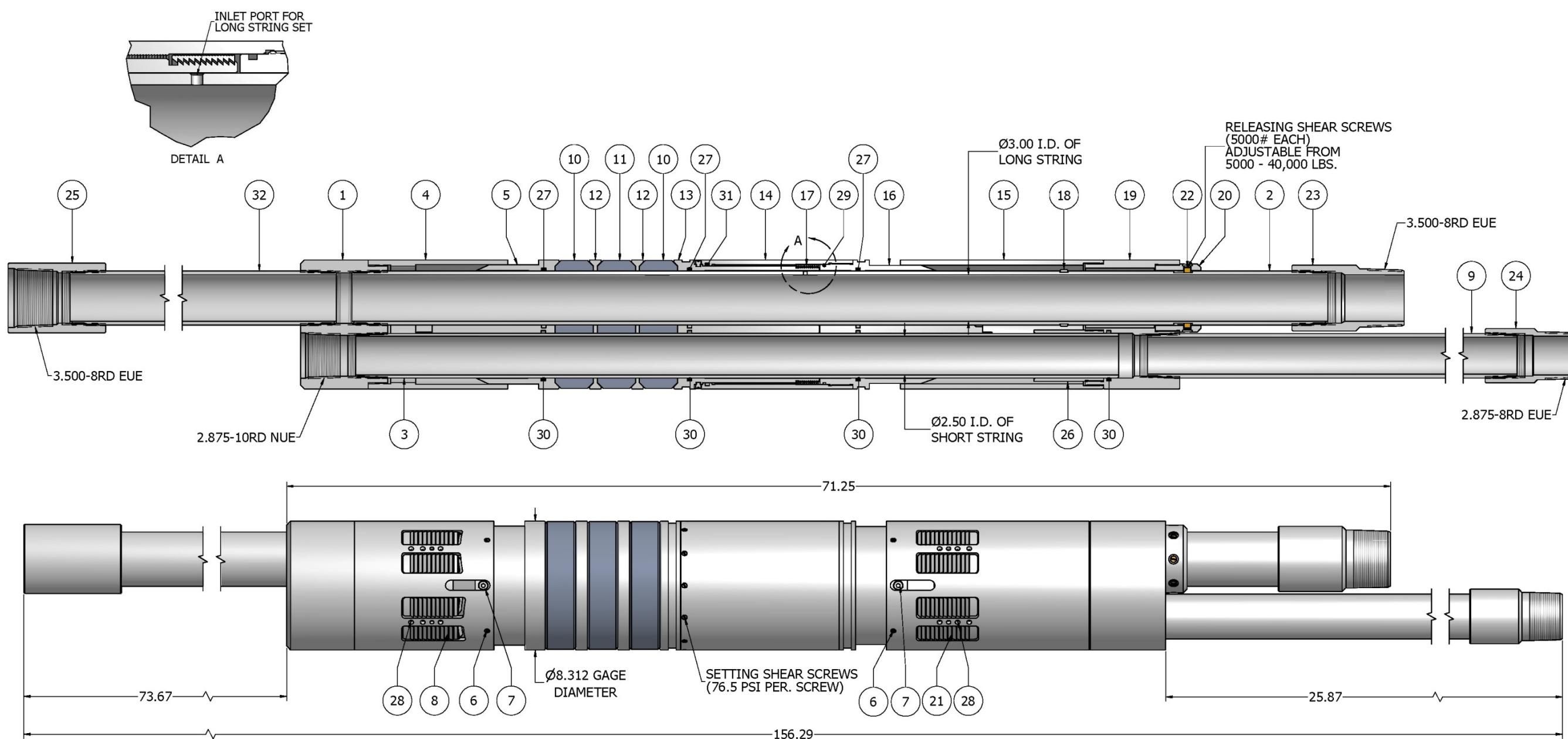
HYDROSET II w/FLAT TOP

9-5/8" X 3-1/2" X 2-7/8"

Manual No:
DL-905-9625-160
Revision: A
Revision Date:
06/29/2009

Written by: Bruce Mathis

Approved by: Fred Johnson



| P/N | CASING WEIGHT | ASSEMBLED WEIGHT |
|---------------|---------------|------------------|
| 90596-BAE-BAC | 47-53.5# | 596 LBS |

