Manual Number:_____

IMPACT SELECTOR

XCALIBUR 1-9/16" E-LINE

REDUCE THE RISK

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INTRODUCTION

Impact Selector, Inc. (“ISI”) manufactures, rents, and leases a comprehensive line of technologically advanced mechanical impact tools for open-hole and cased-hole wireline operations. These jars allow for more efficient and safer operations in even the harshest environments by virtually eliminating the risk of a stuck string and the staggering costs associated with stripovers, fishing, and rig downtime.

All ISI wireline jars employ patented or patent-pending technology which utilizes stored energy to maximize impact ratios. When line tension surpasses a preset load-limit (indicating a stuck condition), the tool activates and releases stored energy to deliver the initial impact. Usually, this impact – intensified by the multiplying effect of the jar's Weight Forward™ design, and assisted by the elasticity of the wireline cable – frees the tool string. If not, the operator simply decreases line tension to re-latch the tool instantly under its own weight. An Impact Selector tool can be repeatedly reset in seconds for an unlimited number of activation cycles until the stuck string is freed.

Features

- All-mechanical design – Not affected by downhole temperature or pressure.
- HP/HT Rating – Available 500 deg F and 25,000 psi ratings.
- Safety First – No build up of pressures when the tool is brought back to the surface.
- Use of stored energy – Uses kinetic energy in conjunction with wireline stretch to achieve a “superior” impact ratio.
- Designed for maximum moving mass at top of impact tool to apply superior forces to stuck tools.
- Variable Overpull Setting – Multiple release adjustments for tool string, wireline, and borehole conditions for optimum performance.
- Fully adjustable on the surface, and even while in the tool string.
- Resets downhole under its own weight for unlimited activation cycles.

E-LINE XCALIBUR SPECIFICATIONS

	E-Line Xcalibur-GO	E-Line Xcalibur-SLB 1-11/16”
Diameter	1.562 inches	1.562 inches
Length, Retracted	75-3/4 inches	77-3/16 inches
Length, Extended	81-7/8 inches	83-5/16 inches
Approximate Weight	30 lbs	31 lbs
Temperature Rating	400 degrees F[1]	400 degrees F[1]
Pressure Rating	25,000 psi	25,000 psi
Field Adjustability	300 to 1,400 lbs[2]	300 to 1,400 lbs[2]
Total Stroke	6-3/16 inches	6-3/16 inches
Power Stroke	5-11/16 inches	5-11/16 inches

1 - Available 500 degrees F available by special request
2 - Higher pre-sets available by special request

SCOPE OF XCALIBUR MANUAL

- All references made to jars or components are considered to be with the jar oriented so that the top of the jar is on the left and the bottom of the jar on the right.
- All components take their location in relation to the jar in this position.
- The jar contains GO-type or Schlumberger 1-11/16”-type connections. The top of the jar is referred to as the box end. The bottom of the jar is the pin end.

SETTING CONSIDERATIONS

Factors to Consider:

- Max safe pulling weight of the cable
- Weight of the cable in the well-bore at target depth
- Pull-out tension or “weak point” at the cable head
  (A good rule of thumb is a preset of half of this figure unless well conditions indicate a lower preset release tension)
- Remember that E-Line jars are typically run at the uppermost position with the bulk of the weight below the jar

Example:

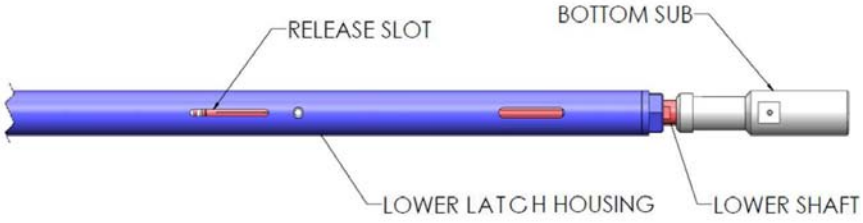
Preset to a release tension of 350 lbs
Tool string weight below the jar is 450 lbs

The jar will not close while hanging in open air, but if fluid viscosity is sufficient it may close during the run in the hole and operate at a lower preset than that required to hold the jar closed on the surface. Slacking off weight allows the jar to relatch.

XCALIBUR MANUAL RELEASE – LATCH TEST

Warning!! Do not place your hand or fingers along the shaft when re-engaging; **to do so might cause injury!** This is a potential pinch point.

Caution!! Do not perform this operation with the jar hanging in the tool string with tool string weight below it. To do so may cause a sudden jolt against the cable-head or rope-socket resulting in a possible separation of the tool string and wireline.



1. Locate the release slot; the upper most slot in the Lower Latch Housing.

2. Insert a tool (screwdriver, punch, etc.) in the slot and engage the Outer Latch.

3. With an upward movement, hold the Outer Latch, grasp the Bottom Sub and pull downward; this will release the latch mechanism.

4. To re-engage the latch, push upward on the Bottom Sub. You will not be able to pull the Lower Shaft out again unless you first repeat steps 1, 2 & 3.

ELECTRICAL TEST

Using a 1,000V meg-meter, connect leads to upper and lower conductors to check for continuity. The typical reading ranges from 4 to 8 OHM. To check for leaks beyond the maximum allowed, take one lead off and touch it to the body, or any bare metal surface.

DISASSEMBLY PROCEDURE

1. Remove the 1/8” NPT Mod Plug (IS408) from the Adjustment Sleeve Cover (IS405).

2. Rotate Adjustment Sleeve Cover to remove the Adjustment Sleeve Insert (IS406).

3. Remove the (5) 10-24 X .19 set screws from the external housings.

4. Remove the 1/4”-20 X .25 set screw located on the Bottom Sub (IS401).

5. Place Bottom Sub in vise and break connection between Bottom E-Line Connector (IS148-1) and Bottom Sub.

6. Remove Bottom E-Line Connector and cut wire.

7. Place Top Sub Coil Housing (IS391) in vise and break connection between Top E-Line Connector (IS147) and Top Sub Coil Housing.

8. Remove Top E-Line Connector, and pull Coiled Wire (IS149) from jar.

9. Cut Coiled Wire near Top E-Line Connector, remove Boot Retaining Sleeves (Kemlon 16-A-19240-00) from top and bottom Air-to-Fluids (Kemlon 16-B-01848-00). Discard Boot Assemblies (16-B-01381-82) and Coiled Wire.

10. Break connection between Center Connector (IS392) and Top Sub Coil Housing.

11. Place Upper Spring Housing (IS393) in vise and break connection between Center Connector and Upper Spring Housing. Remove Center Connector and Top Sub Coil Housing. ***Note: Do not clamp Adjustment Sleeve Cover in vise.***

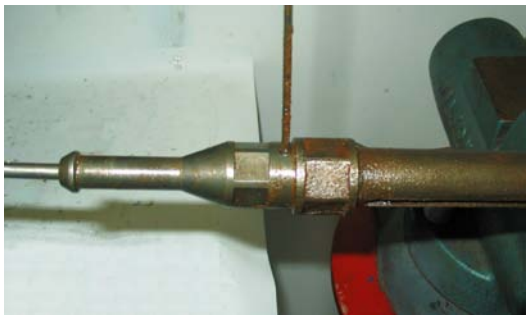
12. Break connection between Adjustment Center Connector (IS399) and Upper Spring Housing.

13. Place Lower Latch Housing (IS404) in vise. Break connection between Adjustment Center Connector and Lower Latch Housing. Remove Upper Spring Housing and Adjustment Center Connector Assembly. Set assembly aside for further disassembly.

14. Break connection between Bottom Stop (IS400) and Lower Latch Housing.

15. Remove Bottom Stop Assembly. Remove (2) Keys (IS397) from Bottom Stop.

16. Place Bottom Stop Assembly in vise. Remove (2) 10-24 X .16 Set Screws from Inner Latch (IS377).



17. Break connection between Inner Latch and Lower Shaft (IS402). Remove the Inner Latch from the Lower Shaft.

18. Break connection between Bottom Sub and Lower Shaft. Remove the Bottom Sub from the Lower Shaft.

19. Remove the Stainless Tube (IS150) from the lower end of the Lower Shaft, and remove Lower Shaft from Bottom Stop.

20. Place Adjustment Center Connector in vise. Remove (2) 1/4”-20 X .25 Set Screws from Latch Connector (IS403).

21. Using a 1/4” Allen key remove Outer Latch Connector (IS376) from Latch Connector. Remove Outer Latch Connector and Coil Spring (IS068C) from Outer Latch (IS375).

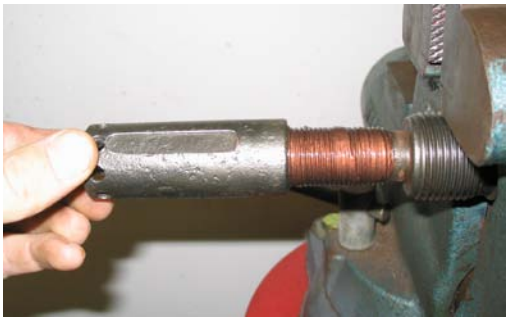
22. Break connection between Latch Connector and Spring Shaft (IS394). Remove Latch Connector from Spring Shaft.

23. Remove Spring Shaft Assembly, from Adjustment Center Connector. Measure length of Disc Spring stack. Record stack length and quantity of Disc Springs as you will need to reference this information during assembly. Remove Die Spring (IS419), Spring Cage (IS384), Spring Cage Washer (IS388) and Disk Springs (IS421) from Spring Shaft.

24. Remove Adjusting Sleeve (IS398) from Adjustment Center Connector.

ASSEMBLY PROCEDURE

1. Place Adjustment Center Connector (IS399) in vise, apply anti-seize to small threads and thread Adjusting Sleeve (IS398) completely onto Adjustment Center Connector. Verify that it is the correct lead (this is a double lead thread), by temporarily installing the Upper Spring Housing (IS393) onto the Adjustment Center Connector and verify that the long slot on the Adjusting Sleeve is visible in the adjustment window.



2. Place Spring Shaft (IS394) in vise, apply a light coat of high temp grease (minimum rating of 400° F) to shaft and install Disc Springs (IS421), in alternating direction, onto spring shaft. Number of Disc Springs and length of Disc Spring stack should be consistent with information recorded during disassembly (ref. pg. 10, step 23). Apply high temp grease to Disc Springs.

3. Install Spring Cage Washer (IS388) followed by Die Spring (IS419) and Spring Cage (IS384) onto Spring Shaft. Apply high temp grease.

4. Install previously assembled Adjusting Sleeve and Adjustment Center Connector onto Spring Shaft.

5. Clean threads of Spring Shaft and apply Loctite 246. Make-up Latch Connector (IS403) to Spring Shaft and torque to 60 ft-lbs.

6. Lightly grease Outer Latch Connector (IS376) and install into Outer Latch (IS375).

7. Clean and Apply Loctite 246 to threads of Outer Latch Connector. Install Coil Spring (IS068C) on to Outer Latch Connector and make-up Outer Latch Connector to Latch Connector using a 1/4" Allen key.

8. Apply Loctite 246 to (2) ¼-20 X .25 set screws and install into Latch Connector.

9. Place Upper Spring Housing in vise. Apply a light coat of high temp grease to Upper Spring Housing where Adjustment Sleeve Cover (IS405) will sit. Install Adjustment Sleeve Cover to Upper Spring Housing.

10. Install Spring shaft assembly into Upper Spring Housing. Apply high temp grease to Latch Connector, Coil Spring and Outer Latch. Apply anti-seize to both threads of Adjustment Center Connector. Make up and torque Adjustment Center Connector to Upper Spring Housing to 300 ft-lbs.

11. Install Lower Latch Housing (IS404) onto Adjustment Center Connector. The single slot should be nearest the Adjustment Center Connector.

12. Place Bottom Stop (IS400) in vise. Slide Lower Shaft (IS402) into Bottom Stop. Install Stainless Tube (IS150) into Lower Shaft.

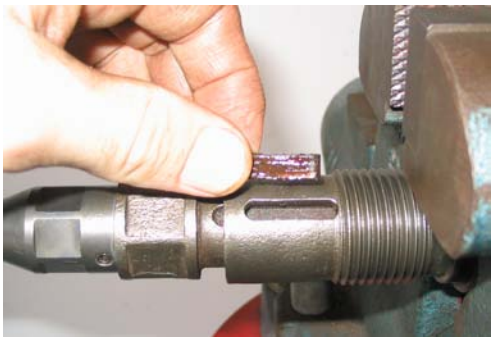
13. Apply Loctite 246 to Lower Shaft threads. Make-up and torque Inner Latch (IS377) to Lower Shaft to 60 ft-lbs.

14. Apply Loctite 246 to (2) 10-24 X .16 set screws and install into the Inner Latch. ***Note: Be sure the set screws sit flush or below the surface of the Inner Latch.***

15. Apply Loctite 246 to threads of Lower Shaft. Make-up and torque E-Line Bottom Sub (IS401) to Lower Shaft to 115 ft-lbs.

16. Apply Loctite 246 to 1/4-20 X .25 set screw and install into E-Line Bottom Sub. Torque to 65 in-lbs

17. Apply high temp grease to (2) Keys (IS397) and install into Bottom Stop. Apply high temp grease to Lower Shaft and Inner Latch.



18. Place Lower Latch Housing in vise. Apply anti-seize to threads of Bottom Stop. Make-up and torque Bottom Stop to Lower Latch Housing to 300 ft-lbs.

19. Torque Adjustment Center Connector to Lower Latch Housing to 300 ft-lbs.

20. Jar is now ready for Calibration. Install Pull Subs and see following page for Calibration Procedures

XCALIBUR 1-9/16" E-LINE CALIBRATION PROCEDURES

Name:_____ Date:_____Tool Serial Number:_____

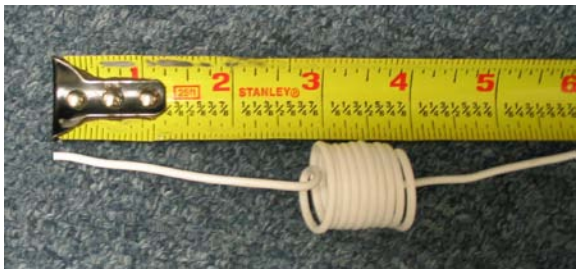
You must initial each step in the space provided to the right as each step is completed.

Initials

1. Install the jar into a test bench. _____
2. Open the Adjustment Sleeve Window. _____
3. Test pull the jar at the highest setting (between 1,350lbs and 1,700lbs). For new Belleville stacks – activate the jar (25) times at the high setting. For used Belleville stacks – activate the jar (2) times at the high setting. *The purpose of this step is to prepare the jar for the calibration and to ensure an accurate calibration.* _____
4. Set the jar to the low setting, "zero" turns. _____
5. Pull Test the jar (2) times, if the setting is below 200lbs or above 300lbs, Bellevilles will need to be added or removed to adjust the setting. *Each Belleville added increases the setting approximately 125lbs. Each Belleville removed decreases the setting approximately 25lbs.* _____
6. Repeat step 4 and 5 until the low setting is between 200lbs and 300lbs and record results in the "Calibration Test #1" column of the Xcalibur EL Calibration Report (SRD-005). _____
7. Rotate the Adjustment Sleeve one-half turn, pull test, and record results in the "Calibration Test #1" column of the Xcalibur EL Calibration Report (SRD-005). _____
8. Repeat step 7 until the highest setting is reached (between 1,350lbs and 1,700lbs). _____
9. Once the high setting has been reached, set the jar back to the "zero" setting. Pull test and record results in the "Calibration Test #2" column of the Xcalibur EL Calibration Report (SRD-005). _____
10. Rotate the Adjustment Sleeve one-half turn, pull test, and record results in the "Calibration Test #2" column of the Xcalibur EL Calibration Report (SRD-005). _____
11. Repeat step 10 until the highest setting is reached (between 1,350lbs and 1,700lbs). _____
12. Once the highest setting is reached, the calibration is complete. If the high setting takes more than (8) full turns, a new Belleville stack will be necessary and calibration will need to be repeated. _____
13. Compare "Calibration Test #1" results to "Calibration Test #2" results. If at any given number of turns there is a variance of more than 200 lbs between the two tests, a new Belleville stack will be necessary and calibration will need to be repeated. _____

WIRING PROCEDURE

1. Cut the short section of Coiled Wire (IS149) to 2-3/4”.

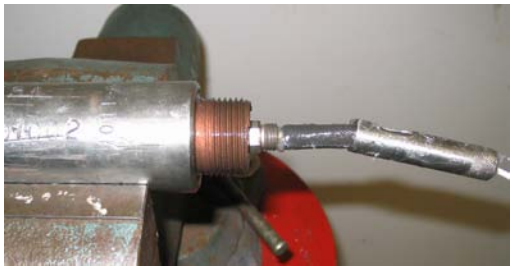


2. Install Boot Retaining Sleeve (Kemlon 12-A-19240-00), Boot, and Insulator (Boot-Insulator-Pin Assembly Kemlon 16-B-01381-82) onto wire.

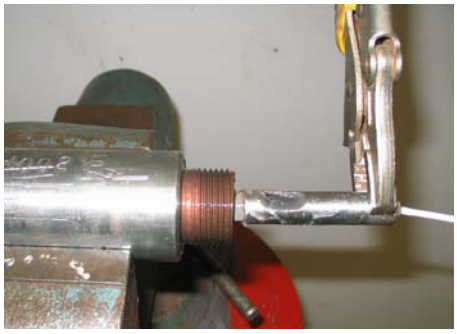
3. Strip 1/4” of the Teflon insulation off of the wire. Install Micro Pin and crimp to wire.

4. Apply non-conductive grease to inside of boot and pull boot and insulator over micro pin.

5. Apply non-conductive grease to inside of boot. Push the boot onto the Top E-Line Connector (IS147) Air-to-Fluid Terminal (Kemlon 16-B-01848-00).

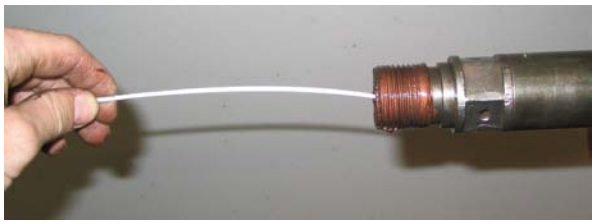


6. Apply non-conductive grease to inside of Boot Retaining Sleeve and thread the Boot Retaining Sleeve onto the Air-to-Fluid Terminal.



7. Place assembled jar in vise at the Upper Spring Housing. Apply anti-seize to both threads of Center Connector (IS392). Make-up and torque Center Connector to Upper Spring Housing to 300 ft-lbs.

8. Feed long end of the wire thru upper side of Top Sub Coil Housing (IS391), Center Connector and assembled jar. The wire will extend out the E-Line Bottom Sub. *Note: Top Sub Coil Housing should be assembled such that the threaded set screw hole is next to the Center Connector.*



9. Place Top Sub Coil Housing in vise. Apply non-conductive grease around Boot Retaining Sleeve. Apply anti-seize to threads of Upper E-Line Connector. Make-up and torque Upper E-Line Connector to Top Sub Coil Housing to 300 ft-lbs.

10. Torque Center Connector to Top Sub Coil Housing to 300 ft-lbs.

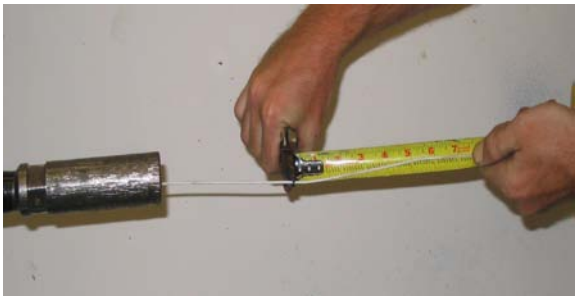
11. Pull wire from E-Line Bottom Sub to ensure all slack has been removed.

12. From the relaxed position, trim wire leaving 6” exposed from end of wire to edge of E-Line Bottom Sub.

13. Install Boot Retaining Sleeve, Boot, and Insulator onto wire. Push into E-Line Bottom Sub.

14. Pull wire to expose an additional 4”. Push Boot Retaining Sleeve, Boot and Insulator into E-Line Bottom Sub. The friction of Boot on the wire will hold the wire in place.

15. Trim 7-3/4” from end of wire. Strip 1/4” of the Teflon insulation off of wire. Install Micro Pin and crimp to wire.



16. Apply non-conductive grease to inside of boot and pull Boot and Insulator over Micro Pin.

17. Apply non-conductive grease to inside of boot and push the rubber boot onto the Bottom E-Line Connector (IS148-1) Air-to-Fluid Terminal.

18. Apply non-conductive grease to inside of Boot Retaining Sleeve and thread the Boot Retaining Sleeve onto the Air-to-Fluid Terminal.

19. Perform Electrical Test (Ref. Pg. 6).

20. Apply non-conductive grease around boot retaining sleeve. Apply anti-seize to Bottom E-Line Connector threads. Spin the Bottom E-Line Connector 6 revolutions counterclockwise. Make-up and torque Bottom E-Line Connector to Bottom E-Line Sub to 300 ft-lbs.

21. Install new O-rings: (2) 214 Viton 95 onto bottom SLB 1-11/16 connection or (2) 211 Viton 95 onto bottom GO connection. Apply high temp grease to O-Rings.

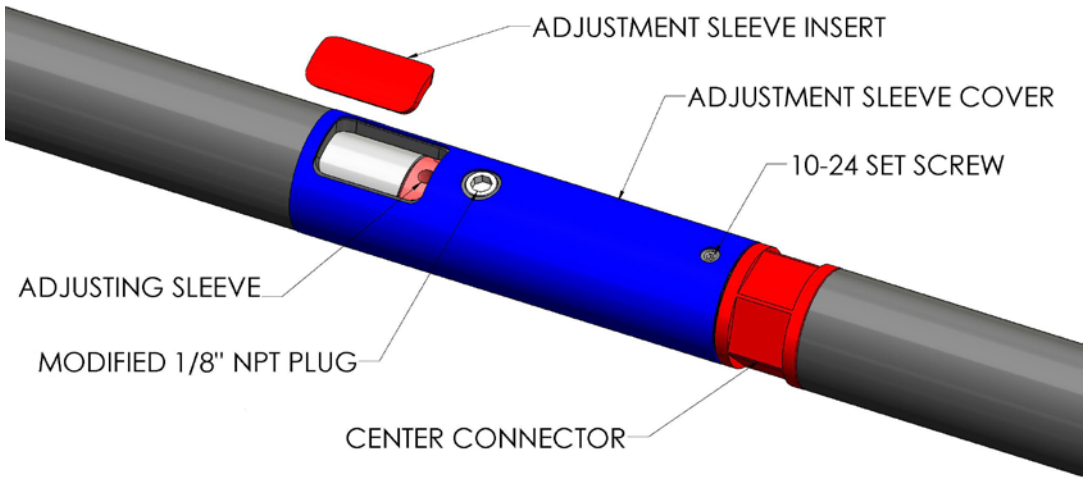
22. Install thread protectors on each end.

23. Apply Loctite 246 to (5) 10-24 X.19 set screws and install into the external housings.

24. Install Adjustment Sleeve Insert (IS406). Rotate Adjustment Sleeve Cover and install the 1/8” NPT Mod Plug (IS408).

SETTING PROCEDURE

The XCALIBUR may be preset prior to load out for added convenience. It may also be preset and/or adjusted in the field as necessary.

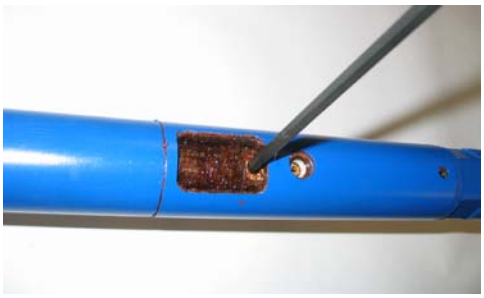


1. Locate Adjustment Sleeve Cover just above the Center Connector (about the middle of the jar).

2. Locate the Modified 1/8” NPT Plug.

3. Remove Modified 1/8” NPT Plug and rotate Adjustment Sleeve Cover until adjustment window is fully opened. Remove Adjustment Sleeve Insert.

4. Using a 3/16” punch or Allen wrench rotate the Adjuster Sleeve (IS207) to the right to increase the tension or to the left to decrease the tension. Each slot represents a half turn. If unsure of the current setting, rotate the Adjuster Sleeve to the left (down in these pictures) until bottomed out. When rotated to the right, the first slot reached on the Adjuster Sleeve is the zero turn setting. Refer to the supplied calibration sheet to obtain the correct number of turns and jar setting.



5. Replace Adjustment Sleeve Insert. Rotate the Adjustment Sleeve Cover until the holes are aligned.



6. Replace and tighten the Modified 1/8" NPT Plug *. It should be flush with tool outside diameter.

Note:
Moderate torque is sufficient when tightening the lock-screw; too much torque may make future removal very difficult or impossible.

7. After setting the jar, a latch test can be performed prior to installing the jar in the tool string. Please refer to the XCALIBUR MANUAL RELEASE – LATCH TEST (Ref. Pg.5) to perform the test. This test will ensure that the latch is functioning properly, but will not verify the actual tool setting.

Caution:
If performing this operation with the jar in the tool string and hanging be sure not to lower the preset below the tool string weight or the jar will open and cause a sudden jolt against the cable-head/rope-socket.

RUNNING THE XCALIBUR

Between runs the jar should be visually inspected to insure that:

A. All set screws are still in place and tight
B. All connections are tight

DEVIATED WELLS

When running in highly deviated wells or heavy mud weights the following minimum weights should be above the jar for optimum performance.

Deviation	Minimum Weight
0°- 20°	10 – 20 lbs
21° - 40°	21 – 30 lbs
41°- 60°	31 – 65 lbs

For perforating operations, a weight bar should be ran below the jar in order to help separate the jar from a possible debris field.

AVERAGE WIRELINE CABLE WEIGHT PER 1,000 FEET

	7/32”	**1/4”**	**9/32”**	**5/16”**
Camesa	94-100 lbs	120-127 lbs	153-167 lbs	188-206 lbs
Rochester	92-96 lbs	N/A	153-158 lbs	183-193 lbs
Vector	100-109 lbs	118-123 lbs	N/A	195-203 lbs

SINKER BAR WEIGHT REQUIREMENTS

$$W_t = \frac{\pi \times D_i^2 \times P_{wh}}{4B_f} - T_w$$

Given:

W_t = Weight required at balance point. Additional weight is needed to overcome friction and to obtain downward motion.

D_i = Cable diameter

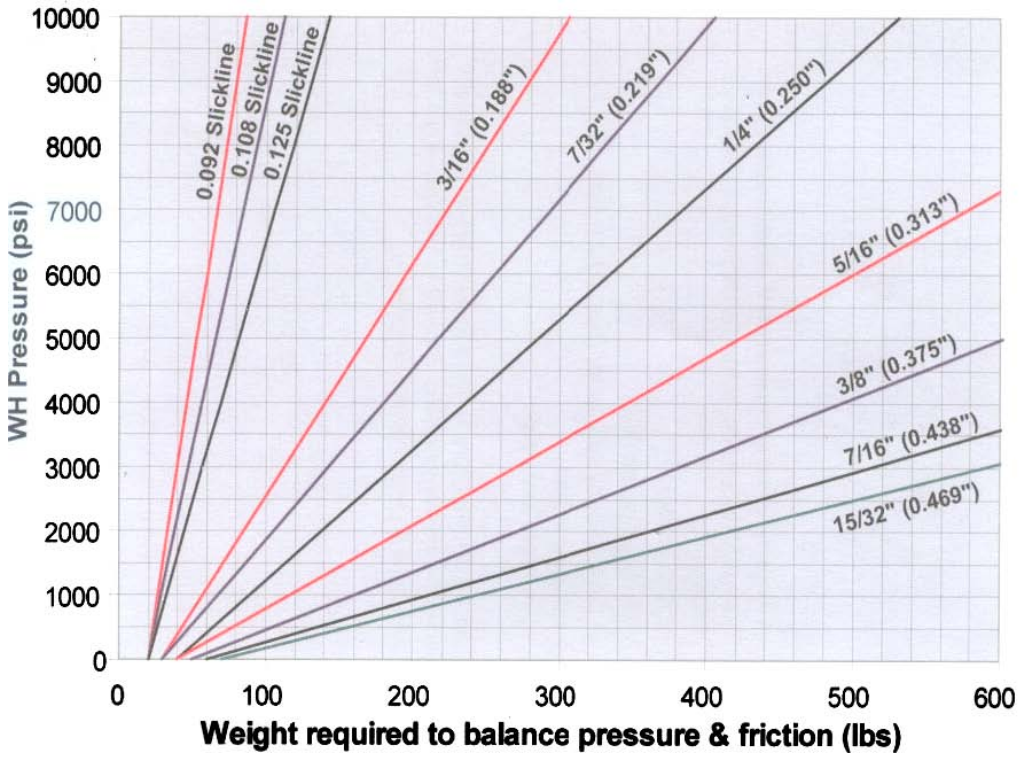
P_{wh} = Wellhead pressure

B_f = Well fluid buoyancy factor (from fluid weight, pressure & buoyancy chart)

T_w = Downhole tool weight

In some cases, all the factors to determine the sinker bar weight required may not be readily available. Therefore, the following charts can be used to determine an approximate amount.

Sinker Bar Weight vs. WHP



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NOTES