Manual Number: 25

IMPACT SELECTOR

XCALIBUR 2-3/4" E-LINE

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REDUCE THE RISK

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.

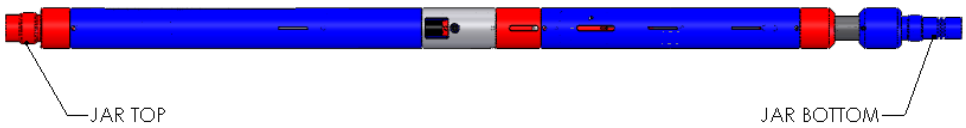
2-3/4" E-LINE XCALIBUR SPECIFICATIONS

Diameter	2-3/4 inches
Length, Retracted	64 inches
Length, Extended	70-3/8 inches
Approximate Weight	65 lbs
Temperature Rating	400 degrees F[1]
Pressure Rating	25,000 psi
Field Adjustability	400 to 1,700 lbs[2]
Total Stroke	6-3/8 inches
Power Stroke	4-13/16 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 Cal-G or GO-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 400 lbs
Tool string weight below the jar is 500 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 in the Center Connector.
2. Insert a tool (screwdriver, punch, etc.) in the slot and engage the Inner Latch.

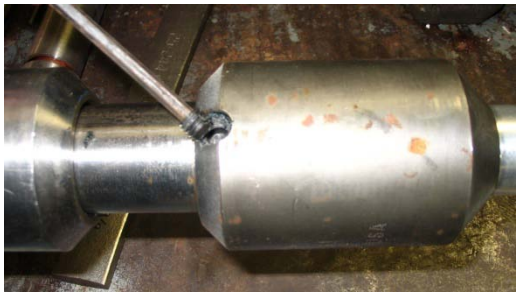
3. With an upward movement, hold the Inner Latch up, grasp the Bottom Connection and pull downward; this will release the latch mechanism.
4. To re-engage the latch, push upward on the Bottom Connection. You will not be able to pull the Lower Shaft out again unless you first repeat steps 1,2 & 3.

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 Ω to 8 Ω. To check for leaks, take one lead off and touch it to the body, or any bare metal surface. The meter should display a reading of “OL” indicating that the circuit is open.

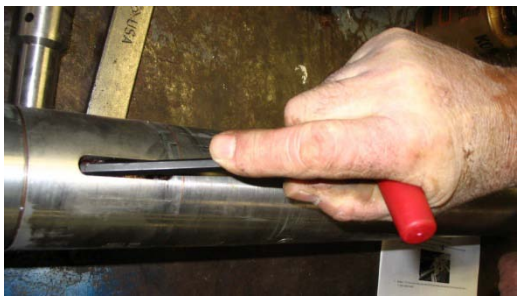
DISASSEMBLY PROCEDURE

1. Remove (5) 5/16-24 external set screws.

2. Remove the Adjustment Screw (IS335, 1/2-13).

3. Unlatch the jar. A shoulder of the Inner Latch (IS317) is accessible through a slot in the Center Connector (IS324). Push the Inner Latch upward while pulling quickly on the Bottom Connection.



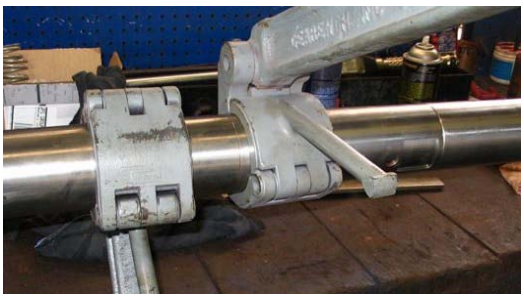
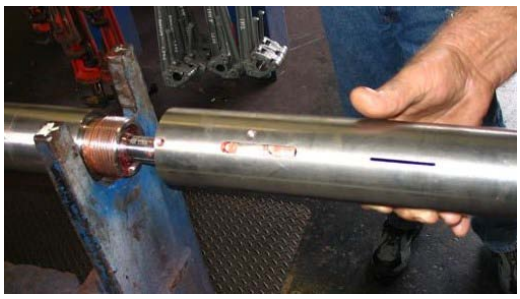
4. While unlatched, hold the Lower Shaft (IS216) with the 1-5/8” Gearench tong.

5. Remove Bottom Connection (IS295) with 2-3/4” Gearench tong.
6. Unthread the Boot Retaining Sleeve (Kemlon 16-A-19240-00) and slip the Boot Assembly (16-B-01381-82) off of the Air-to-Fluid (Kemlon 16-B-01848-00). ***Note: Be careful when removing Boot Retaining Sleeve as Air-to-Fluid may come out with the Boot Retaining Sleeve.***

7. Remove Bottom Stop (IS215) and Lower Shaft using 2-3/4” Gearench tongs on the Bottom Stop and Lower Latch Housing (IS322). Watch for Keys (IS289) to fall out.

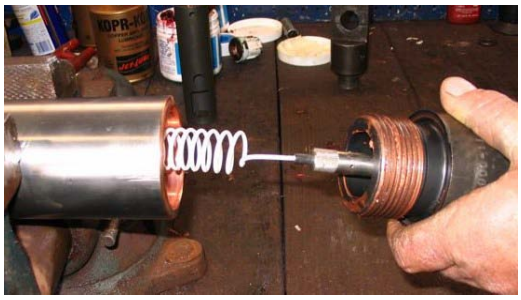
8. Remove 5/16-24 set screw from Outer Latch (IS318) and remove the Outer Latch from the Lower Shaft with a 1-1/2" closed ended wrench.


9. Remove Lower Latch Housing from Center Connector using 2-3/4" Gearench tongs on each.

10. Remove the Micro-Adjustment Sleeve (IS320) by hand from the top end of the bottom housing. If difficult, a flat tipped screwdriver can be used to rotate the sleeve through a slot in the bottom housing.

11. Remove Top Connection (IS294) and Coiled Wire Assembly (IS351).

12. Remove Spring Housing (IS202) from Center Connector using 2-3/4" Gearench tongs on each. Do not use tongs on Adjustment Sleeve Cover (IS203). Slide the Adjustment Sleeve Cover off after the spring housing is removed.


13. Place Center Connector in Gearench vise or regular vise with padding.
14. Remove (2) 5/16-24 set screws from Spring Cap (IS210).

15. Place 7/8" closed end wrench on flats on lower end of the Spring Shaft (IS316). Use a 1-1/2" closed end wrench to remove the Spring Cap.


16. Remove the Disc Spring Stack (IS206) onto a rod. Record number of Disc Springs (46 Disc Springs stacked in sets of 2).

17. Remove the Spring Shaft Assembly from the lower end of the Center Connector.

18. Slide Coil Spring (IS296) off of Spring Shaft.
19. Remove and discard Retaining Ring (IS240) from Inner Latch with .07” pliers. Remove Split Inner Latch from Spring Shaft.

20. Remove Adjustment Sleeve (IS207) from Center Connector by hand.

21. Remove the reusable Boot Retaining Sleeves from each end of the wire. Discard the boots, Teflon inserts, contacts, and wire. Clean and degrease all parts.

ASSEMBLY PROCEDURE

1. Place Split Inner Latch (IS317) onto Spring Shaft (IS316). Coat the Inside Diameter and Outside Diameter of the Inner Latch with high temperature grease (minimum 400 degrees F).

2. Install Retaining Ring (IS240) onto Inner Latch.

3. Slide Coil Spring (IS296) onto top end of Spring Shaft. Grease the Coil Spring and the entire Spring Shaft with high temperature grease.

4. Place Center Connector (IS324) into Gearench vise or regular vise with padding.

5. Apply anti-seize to adjustment thread of the Center Connector. Install Adjusting Sleeve (IS207) onto top of Center Connector. Hand tighten only.

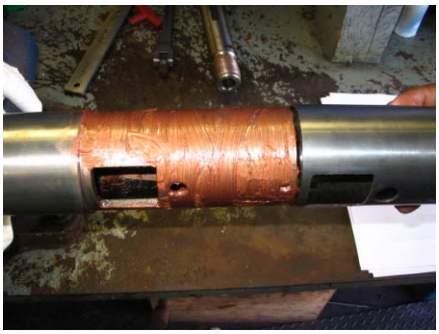
6. Insert Spring Shaft Assembly into lower end of Center Connector.

7. Install the Disc Spring Stack (IS206) onto Spring Shaft. Verify that number of Disc Springs is equal to the number noted during disassembly. Grease both sides of all the Belleville springs with high temperature grease.

8. Clean threads on Springs Shaft and apply Loctite 246. Place 7/8” closed end wrench on flats on lower end of the Spring Shaft. Use a 1-1/2” closed end wrench to install the Spring Cap (IS210). Torque to 150-200 ft-lb.

9. Apply Loctite 246 to (2) 5/16-24 set screws and install into the Spring Cap Outside Diameter. Torque to 10 ft-lb.

10. Coat lower end of Spring Housing (IS202) with high temperature grease. Slide the Adjustment Sleeve Cover (IS203) onto the Spring Housing.



11. Apply anti-seize to upper threads of Center Connector. Install Spring Housing onto Center Connector using 2-3/4" Gearench tongs or vise on each. Do not use tongs or vise on Adjustment Sleeve Cover. Torque to 500-700 ft-lb with the 2 ¾" Gearench tong. Install 5/16-24 x 1/4 set screw with 10 ft-lb torque and Loctite 246.

12. Align the window in the Adjustment Sleeve Cover opposite the Spring Housing window. Install the adjustment screw (IS335) into the housing and hand tighten. It will be removed and replaced during calibration.

13. Apply anti-seize to the top thread of the Lower Latch Housing (IS322). Coat the Micro-Adjustment Sleeve (IS320) with high temperature grease. Install the Micro-Adjustment Sleeve into the thread by hand until bottomed out.

14. Apply anti-seize to lower thread of Center Connector. Install Lower Latch Housing onto Center Connector using 2-3/4" Gearench tongs or vise on each. Torque to 500-700 ft-lb. Apply Loctite 246 to 5/16-24 set screw and install with 10 ft-lb torque.

15. Grease the Outside Diameter of the Lower Shaft (IS216) with high temperature grease and install into the Bottom Stop (IS215).

16. Coat the keys (IS289) with high temperature grease and insert into Bottom Stop.

17. Clean the upper threads of the Lower Shaft and apply Loctite 246. Install the Outer Latch (IS318) with a 1-1/2" open ended wrench. Apply Loctite 246 to 5/16-24 set screw and install with 10 ft-lb torque. Apply high temperature grease to the latch collet end.

18. Apply anti-seize to the Bottom Stop thread and install into the Lower Latch Housing using the 2-3/4" Gearench tong with 500-700 ft-lb torque. Apply Loctite 246 to 5/16-24 set screw and install into Lower Latch Housing with 10 ft-lb torque.

19. Jar is now ready for Calibration. See following page for Calibration Procedures.

XCALIBUR 2-3/4" 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. Increase the jar setting in half turn increments and test pull the jar until the jar reaches the highest setting (between 1,500lbs and 1,800lbs). 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 350lbs or above 450lbs, the Micro Adjustment Sleeve must be adjusted. If below 350lbs, rotate the Micro Adjustment sleeve counterclockwise to increase the setting, if above 450lbs rotate the Micro Adjustment sleeve clockwise to decrease the setting. _____
6. Repeat step 4 and 5 until the low setting is between 350lbs and 450lbs 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 1,500lbs and 1,800lbs).
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 1,500lbs and 1,800lbs). _____
12. Once the highest setting is reached, the calibration is complete. If the high setting takes more than (9) 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. _____

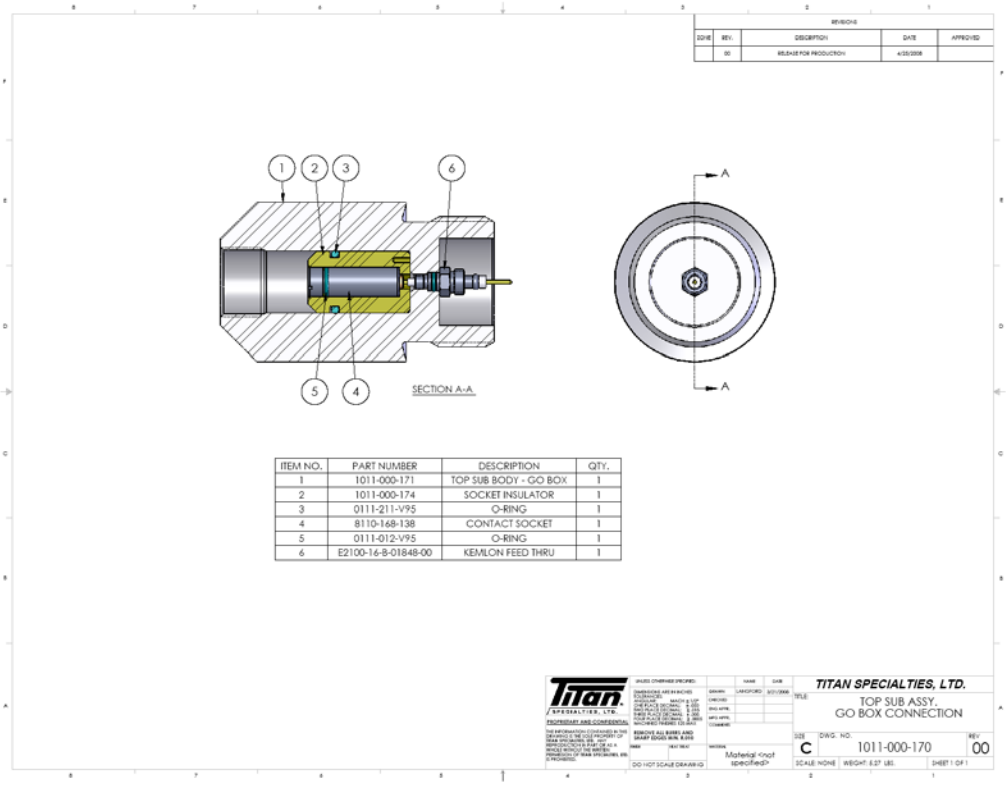
WIRING PROCEDURE

Note: Do not repair damaged or compromised wiring.

1. Install the insulators, Air-to-Fluids, and conductive components into the Top and Bottom Connections. Reference these drawings below:

Connection	Titan Drawing #
Cal-G Top	1011-000-260
Cal-G Bottom	1011-000-270
GO Top	1011-000-170
GO Bottom	1011-000-180

The drawings on this page are the property of Titan Specialties, LTD. Impact Selector, Inc. has been granted permission to reference them in this manual.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1011-000-171	TOP SUB BODY - GO BOX	1
2	1011-000-174	SOCKET INSULATOR	1
3	0111-211-V95	O-RING	1
4	8110-168-138	CONTACT SOCKET	1
5	0111-012-V95	O-RING	1
6	E2100-16-8-01848-00	KEMLON FEED THRU	1

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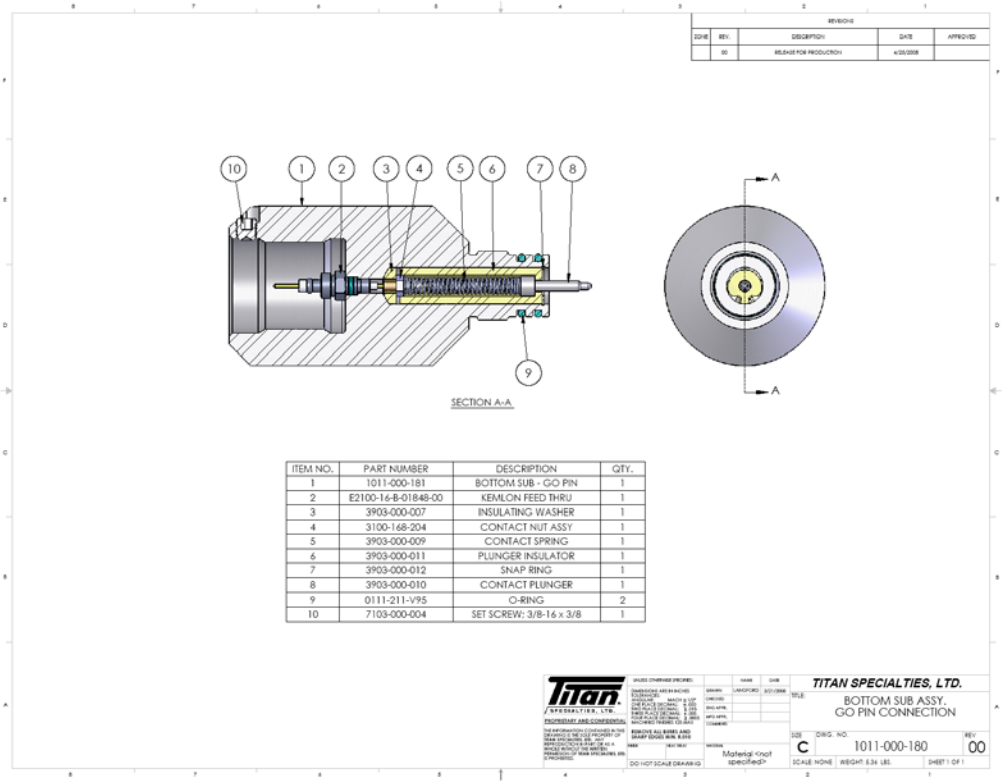
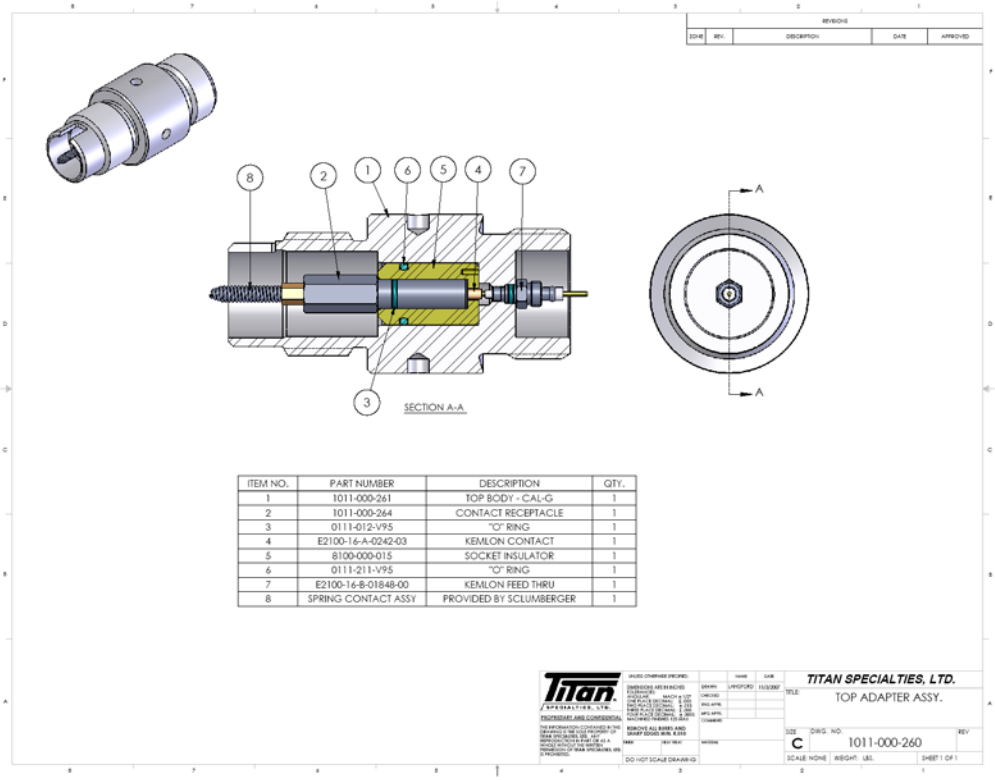


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1011-000-181	BOTTOM SUB - GO PIN	1
2	E2100-16-B-01848-00	KEMLON FEED THRU	1
3	3903-000-007	INSULATING WASHER	1
4	3100-168-204	CONTACT NUT ASSY	1
5	3903-000-009	CONTACT SPRING	1
6	3903-000-011	PLUNGER INSULATOR	1
7	3903-000-012	SNAP RING	1
8	3903-000-010	CONTACT PLUNGER	1
9	0111-211-V95	O-RING	2
10	7103-000-004	SET SCREW: 3/8-16 x 3/8	1

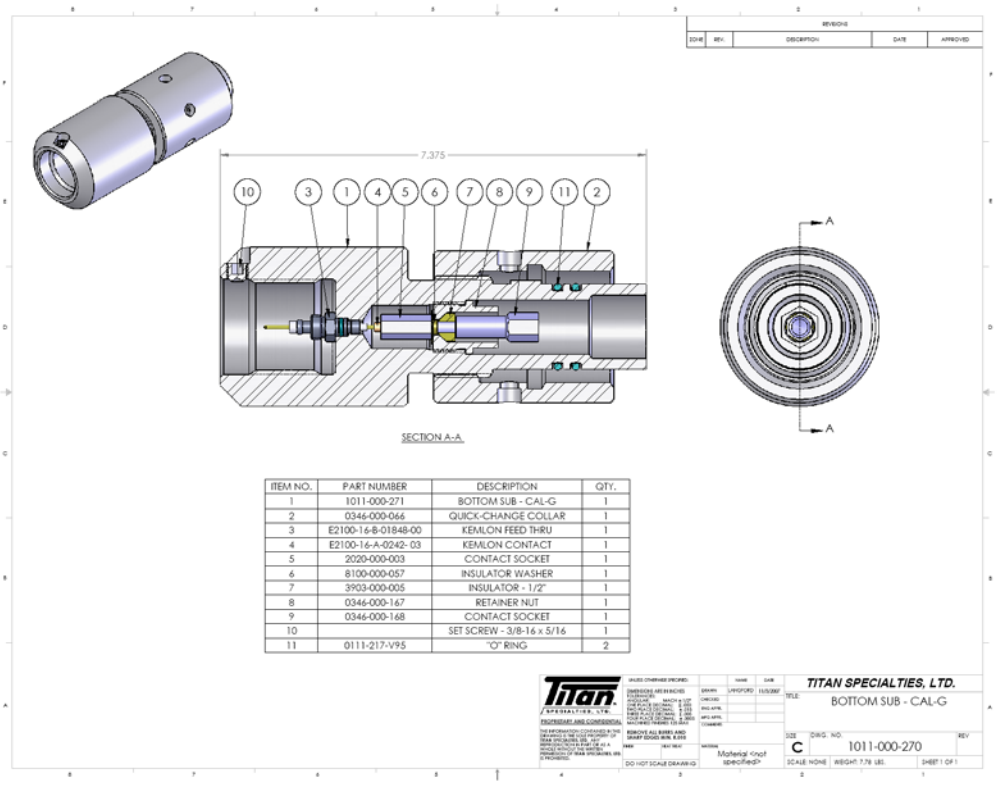
TITAN SPECIALTIES, LTD.
BOTTOM SUB ASSY.
GO PIN CONNECTION
C 1011-000-180 00



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1011-000-261	TOP BODY - CAL-G	1
2	1011-000-264	CONTACT RECEPTACLE	1
3	0111-012-V95	"O" RING	1
4	E2100-16-A-0242-03	KEMLON CONTACT	1
5	8100-000-015	SOCKET INSULATOR	1
6	0111-211-V95	"O" RING	1
7	E2100-16-B-01848-00	KEMLON FEED THRU	1
8	SPRING CONTACT ASSY	PROVIDED BY SCLUMBERGER	1

TITAN SPECIALTIES, LTD.
TOP ADAPTER ASSY.
C 1011-000-260

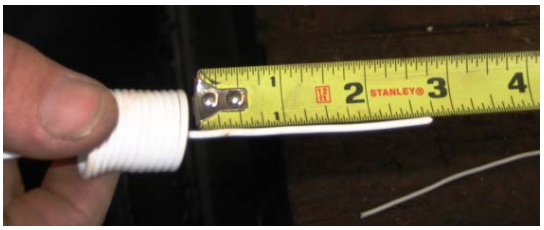
The drawings on this page are the property of Titan Specialties, LTD. Impact Selector, Inc. has been granted permission to reference them in this manual.



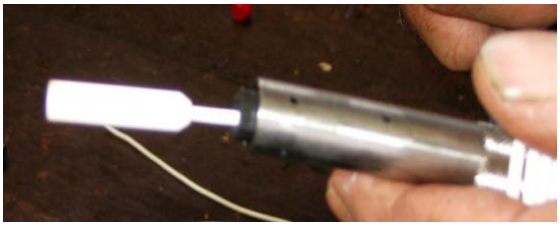
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1011-000-271	BOTTOM SUB - CAL-G	1
2	0346-000-066	QUICK-CHANGE COLLAR	1
3	E2100-16-B-01848-00	KEMLON FEED THRU	1
4	E2100-16-A-0242- 03	KEMLON CONTACT	1
5	2020-000-003	CONTACT SOCKET	1
6	8100-000-057	INSULATOR WASHER	1
7	3903-000-005	INSULATOR - 1/2"	1
8	0346-000-167	RETAINER NUT	1
9	0346-000-168	CONTACT SOCKET	1
10		SET SCREW - 3/8-16 x 5/16	1
11	0111-217-V95	"O" RING	2

TITAN SPECIALTIES, LTD.
BOTTOM SUB - CAL-G
C 1011-000-270

2. Begin preparing the Wire Assembly (IS351) by cutting the short section of the wire (IS149) to 2-3/4”

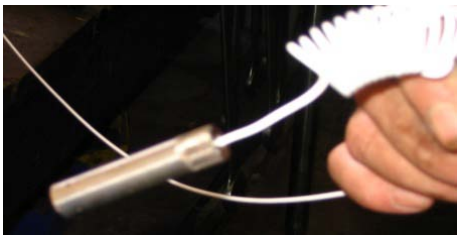


3. Measure the overall length of the wire and trim to 51”.
4. Install Boot Retaining Sleeve, Boot, and Insulator onto wire.



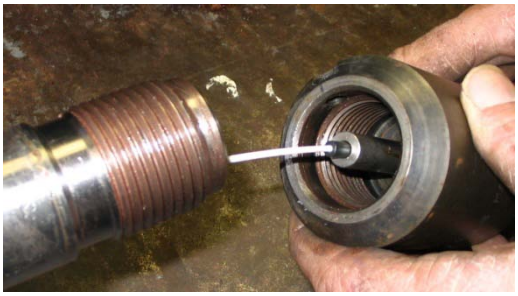
5. Strip 1/4” of the Teflon insulation off of the wire. Install Micro Pin and crimp to wire.

6. Pull Boot and Insulator over Micro Pin.

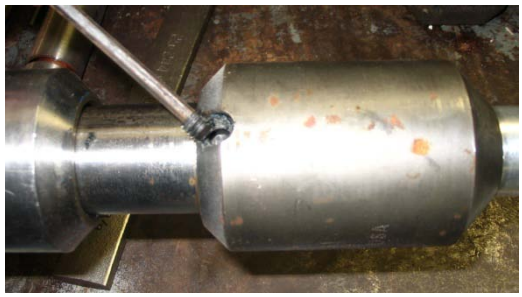


7. Repeat steps 4-6 to opposite end of wire to complete Wire Assembly.
8. Place the jar vertical and lower the non-coiled end of the Wire Assembly into the jar. The Lower Boot and Boot Retaining Sleeve need to pass through the jar. Return the jar to a horizontal position and retrieve the wire assembly from the Lower Shaft.
9. Apply DC-111 grease to inside of Boot. Push the Boot onto the Bottom Connection Air-to-Fluid.

10. Apply DC-111 grease to inside of boot retaining sleeve. Thread the Boot Retaining Sleeve onto the bottom Air-to-Fluid. Pack area around Boot Retaining Sleeve with DC-111 grease.



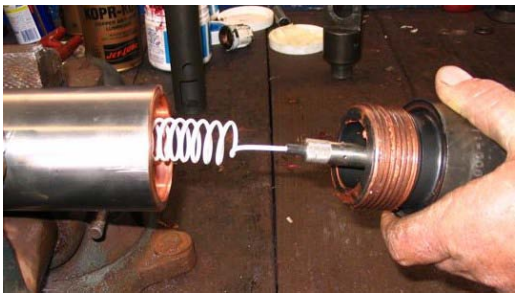
11. Apply anti-seize to the threads of the Lower Shaft. Install the Bottom Connection to the Lower Shaft with 500-700 ft-lb torque, be careful not to pinch or nick the wire. Use 2-3/4" and 1-5/8" Gearench tongs. Apply Loctite 246 to a 5/16-24 set screw and install into Bottom Connection with 10 ft-lb torque.



12. Retrieve the top of Wire Assembly from the inside of the Spring Housing. Apply DC-111 grease to inside of boot and push onto the top Air-to-Fluid. Apply DC-111 grease to inside of Boot Retaining Sleeve. Thread the Boot Retaining Sleeve onto the top Air-to-Fluid as well. Pack area around Boot Retaining Sleeve with DC-111 grease.

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

14. Spin the top connection 8 revolutions counterclockwise. Apply anti-seize to the threads of the Top Connection and install into the Spring Housing with Gearench tongs or vise. Use 500-700 ft-lb torque. Install the 5/16-24 set screw with 10 ft-lb and Loctite 246.



15. Install new O-rings: (2) size 217 Viton 95 onto bottom Cal-G connection or (2) size 211 Viton 95 onto bottom GO connection. Grease the O-rings.

16. Install thread protectors onto each end.

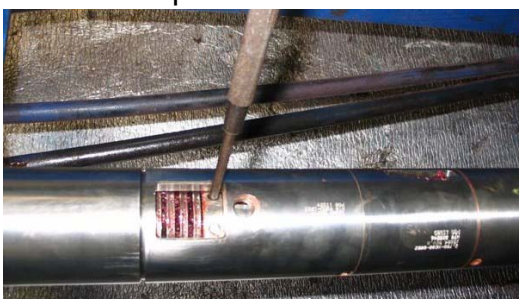
SETTING PROCEDURE

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. Remove the adjustment screw.

2. If necessary, rotate the adjustment cover (IS203) 180° to align the adjustment windows.

3. If unsure of the current setting, rotate the adjustment sleeve (IS207) to the left (down in these pictures) until bottomed out. When rotated to the right, the first slot reached on the adjustment sleeve is the zero turn setting.
4. Reference the supplied calibration sheet for the preferred setting and corresponding number of turns.
5. Rotate the adjustment sleeve to the right to increase the number of turns. Each slot represents a half turn.



6. Once the desired setting is reached, rotate the adjustment cover 180° back to cover the adjustment window.

7. Replace the adjustment screw. It should be flush with the tool Outside Diameter.

8. 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.

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

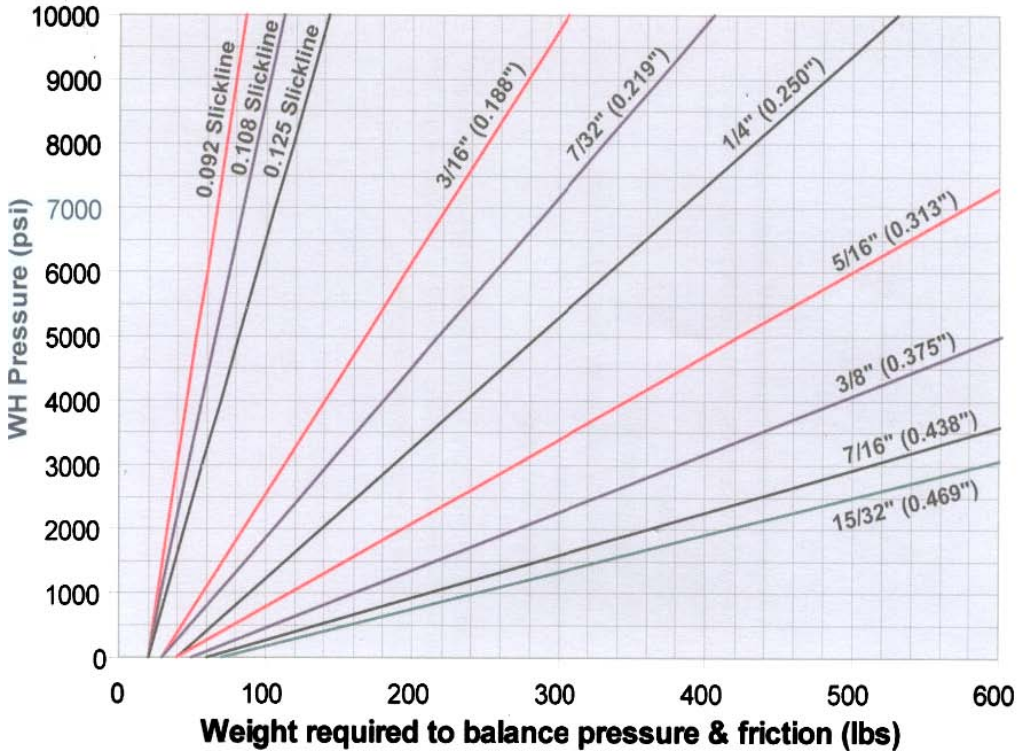
P_{wh} = Wellhead pressure

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