



SEA-BIRD ELECTRONICS, INC.

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SBE P/N 801483

DATE	RE V	REVISION RECORD	AUTH	DR	CHK
05/04	B	Warning that must use Electro Chem	DHB		
01/27	C	Added Tab Schematics, Figure, Tools	JJB		
2/7/05	D	Modified for new plates	JJB		
2/16/05	E	Removed items from supplies	JJB		

9D (10.8V / 42 AH) Lithium Battery Pack Kit

KIT CONTENTS

SBE P/N	Description	Primary SBE Application	QTY
41309A	PCB, Lithium battery pack top plate assembly	Battery pack top plate	1
233101	Lithium battery pack bottom battery plate	Battery pack bottom plate	1
233100	Lithium battery pack middle battery plate	Battery pack intermediate plates	2
801489	Rod, 6-32, full threaded, plated, 20 cm (7.84 inches) long	Secures battery pack	3
30362	Nut, 6-32 nylon stop (thin), SS	For 801489 rods	6

Warnings

1. Lithium batteries can explode under extreme heat and/or pressure. Use extreme caution when soldering wires on the battery tabs.
2. DO NOT touch any part of the soldering iron to the battery.
3. The use of lithium cells other than the specified Electrochem or Saft* cells may cause mechanical or electrical incompatibility with instruments for which this battery pack was designed. Sea-Bird will bear no responsibility for substitution of non-specified cells. *Although this kit has been modified to fit Saft cells it has not been electrically tested for compatibility.

Supplies and Equipment Required

Lithium D Cell Batteries (9) – Electrochem BCX85D/3B75-ST or (9) – Saft LSH 20
(see drawings 41400, 41398 for solder-tab orientations)

Wire cutters, strippers	Solder station
Rosin Core Solder	Dow Corning RTV 734 (flowable, self-leveling silicone sealant) or equivalent
#24 Stranded Wire	Needle-nose pliers
Permanent Marker	5/16" nut driver or 5/16" combination wrench
Q-tips	Multimeter
Disposable syringe	

Parent Part Number: 801483

SBE Drawings:

40668E Lithium Battery Pack 9D Cells 10.8V/42AH
 32589C Lithium Battery Pack Schematic 9D, 10.8V 42AH
 41398A Lithium D/DD Cell With Tab Orientation
 41400 Lithium D-Cell Button Top Solder Tab Orientation

Sea-Bird Electronics Procedure

PROCEDURE NUMBER: 67143

TITLE: **9D (10.8V / 42 AH) Lithium Battery Pack Kit**

REVISION: **E**

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Battery Pack Assembly

The battery pack consists of a top and bottom plate sandwiching three layers of three batteries each stacked with a middle plate between each layer (see figure 1). The rods and nuts hold the whole assembly together.

A. Prep Wires and Batteries

1. Cut wire lengths:
 - a. 3 long wires, each approximately 30 cm (11.84 inches) long.
 - b. 3 medium wires, each approximately 3.8 cm (1.5 inches) long.
 - c. 6 short wires, each approximately 2.5 cm (1 inch) long.
2. Strip ¼" of insulation off the ends of each wire.
3. Solder wires to the batteries (see battery pack drawing and schematic 32589):
 - **3 first (bottom) layer batteries:** Solder **long** wires [30 cm (11.84 inches)] to **lower (- neg.)** tabs on batteries. Solder **short** wires [2.5 cm (1 inch)] to **upper (+ pos.)** tabs on batteries.
 - **3 second (middle) layer batteries:** Solder **short** wires [2.5 cm (1 inch)] to **upper (+ pos.)** tabs on batteries.
 - **3 third (top) layer batteries:** Solder **medium** wires [3.8 cm (1.5 inches)] to **upper (+ pos.)** tabs on batteries.

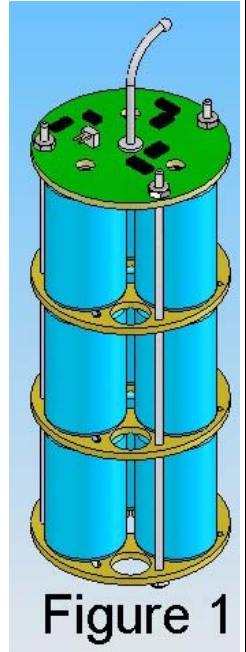


Figure 1

B. Prep plates

1. Place one of the middle plates against the flat side of the top battery plate (PN 41309A).
2. Line up the notch in the middle plate with the mark/notch on the top plate.
 - a. Make sure the rod holes all line up and that the silver contact points on the top plate fall inside the large holes in the middle plate- if they don't then flip the middle plate over and line up the notches again.
3. Mark the bottom of the middle plate before you remove it.
 - a. The bottom side of the plate is the side not touching the top plate.
 - b. Use a permanent marker – any line, design, letter, etc. can be used, this is strictly for reference purposes.
 - c. DO NOT use anything that will gouge the surface of the plate – sharp blade, knife, screwdriver, soldering iron, etc. to make the mark
4. Repeat for the other middle plate and bottom plate.

C. Installation

1. Install 1 nut (PN 30362) on the end of each rod (PN 801489), with the nylon side of the nut facing away from the rod.
 - a. Screw the nut onto the rod so that one thread of the rod comes through the nylon side.

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- b. If the nut is difficult to screw on, you can grip the threaded rod with the pliers but do so in the middle section only because the pliers will flatten the threads. If the rod is gripped at the other end other nut will not go on and your assembly will not stay together.
2. Install each rod through the rod holes from the bottom side of the bottom battery plate (PN 233101).
 - a. Slide the plate down the rods until it rests against the nuts.
 - b. The bottom side of the plate is the one marked earlier under 'Prep Plates'.
3. Install the first layer of batteries.
 - a. *The first layer of batteries are the ones with the long wires soldered to lower tabs and short wires soldered to upper tabs.*
 - b. Thread the long wires through the holes directly below the batteries in the bottom plate.
 - c. Settle the batteries on the plate. (see figure 1)
4. Install the middle battery plate (PN 233100) on top of the first layer of batteries.
 - a. Line up the mark on the edge of the plate with the one on the edge of the bottom plate.
 - b. Thread the rods through the bottom of the plate.
5. Feed the short wires from batteries upper tabs through the middle plate.
 - a. This is easiest to do after the plate is installed on the threaded rods but before it is settled on top of the batteries.
6. Solder the short wire from one of the installed batteries to the bottom tab on one of the second layer batteries.
 - a. These are the ones with the short wire to soldered to the upper tab of the battery.
 - b. Solder the wire directly to the contact.
7. Place the second layer batteries on the middle plate, aligning them above the first layer battery they are soldered to.
8. Thread the rods through the second middle battery plate until it sits on top of the second layer of batteries.
 - a. Follow the same procedure as for the first middle plate, threading the wires through before setting the plate on the batteries.
9. Solder the short wire from one of the second layer batteries to the bottom tab on one of the third layer batteries.
 - a. Solder the wire directly to the contact
10. Place the third layer batteries on the middle plate, aligning them with battery in the second layer that they are soldered to.
11. Install the top battery plate (PN 41309A).
 - a. Match up the notch on the middle plate with the mark/notch on the top plate.
 - b. Thread the rods through the top battery plate (component side face up).
 - c. Feed the wires from the third layer battery's upper tabs through the top plate.
 - d. Adjust the plate so that the battery tabs are centered in the large holes.
 - e. Thread on one nut per rod, with the nylon side of the nut facing away from the board.
 - f. Use the nut driver to tighten the nuts, pliers to grip the rod, until the nuts securely hold the batteries and boards together.
12. Solder the wires from the top batteries onto the top battery plate. *see drawing 40668E for the visual locations & more information*
 - a. Wire in H1 goes to BT1+
 - b. Wire in H2 goes to BT2+

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- c. Wire in H3 goes to BT3+
- d. Solder the wire directly to the contact.
13. Solder the long wires from the bottom of the battery pack to the top plate. . *see drawing 40068E for the visual locations & more information*
 - a. Thread the long wires from the bottom batteries (the ones that are threaded through the bottom plate) through the grooves in the bottom plate and up through the slot located closest to the batteries under H1
 - b. Continue threading the wires through the corresponding slots in the middle boards.
 - c. **DO NOT go through the large round holes in the boards – this will prevent you from installing the battery pack in your sensor.**
 - d. Trim the wires to about 1” above the height of the top board.
 - *you will trim different amount of each wire off.*
 - e. Strip about ¼” from the end of each wire.
 - f. Twist the thin pieces of wire together and insert them through their corresponding hole from the bottom of the board – **do not have them go into the holes from the top as this will prevent the battery pack from being installed.**
 - *The wire from the stack under H1 goes to P3.*
 - *The wire from the stack under H2 goes to P4.*
 - *The wire from the stack under H3 goes to P5.*
 - *You may find it easier for you if you thread one wire at a time from the bottom board to the top board, then trim and solder it, this is okay.*
 - g. Solder the wires directly to the contacts.
14. Test the fit of the battery pack in the housing:
 - a. Slide the pack into the housing to ensure it will seat fully down in the housing without any difficulty.
 - b. If it will not seat, check the alignment into the housing, then the alignment of the batteries, plates, and rods, and rebuild the pack as needed.

D. Test Electrical Output of Battery Pack

1. Check the electrical output using a multimeter (ensure that the multimeter is not in the *current* position when making voltage measurements):
2. Measure and record the overall voltage of the battery pack, which should be approximately 11.76 volts.
3. Measure and record the voltage of each *leg* (vertical stack of 3 batteries wired in series) by measuring between battery pack – and the anode of each diode. Each *leg* should independently have the same voltage as the total of the battery pack (from previous step)
 - a. Repeat, but this time with a 1k load resistor in parallel with the multimeter test leads. The results should be approximately the same as in the previous step (± 0.2 volts).
Remove the 1k resistor when done with these measurements.
 - b. Connect the multimeter across the current limiting resistor (3 ohm) of one *leg*. Measure and record the voltage while connecting a 100 ohm $\geq 3W$ resistor across the battery pack total.
 - c. Repeat for the remaining *legs*. Calculate the current for each *leg* by dividing each voltage by the value of the current limiting resistor ($I = V / R = V / 3$ ohms). The current for each *leg* should be approximately 36 mA; the total current (adding up all three legs) should be approximately 108 mA.

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E. Secure the battery pack with Dow Corning RTV 734 (flowable, self-leveling sealant) or equivalent:

4. Fill a disposable syringe with RTV 734.
5. Place a very thin bead of RTV as far around the bottom of each battery as you can, securing the batteries to the bottom and middle plates.
6. Fill the open area where the battery wires come through the top plate with RTV. Wait approximately 5 minutes for the RTV to flow into the place, and fill again. Let this set for 15 to 30 minutes.
7. Turn the battery pack over. Repeat Step 5 & 6, securing the batteries to the top and middle plates and filling the holes on the bottom plate. Let this set for 15 to 30 minutes.

NOTE: The RTV requires approximately 24 hours to completely dry. Do not place the battery pack in the housing until the RTV is completely dry.

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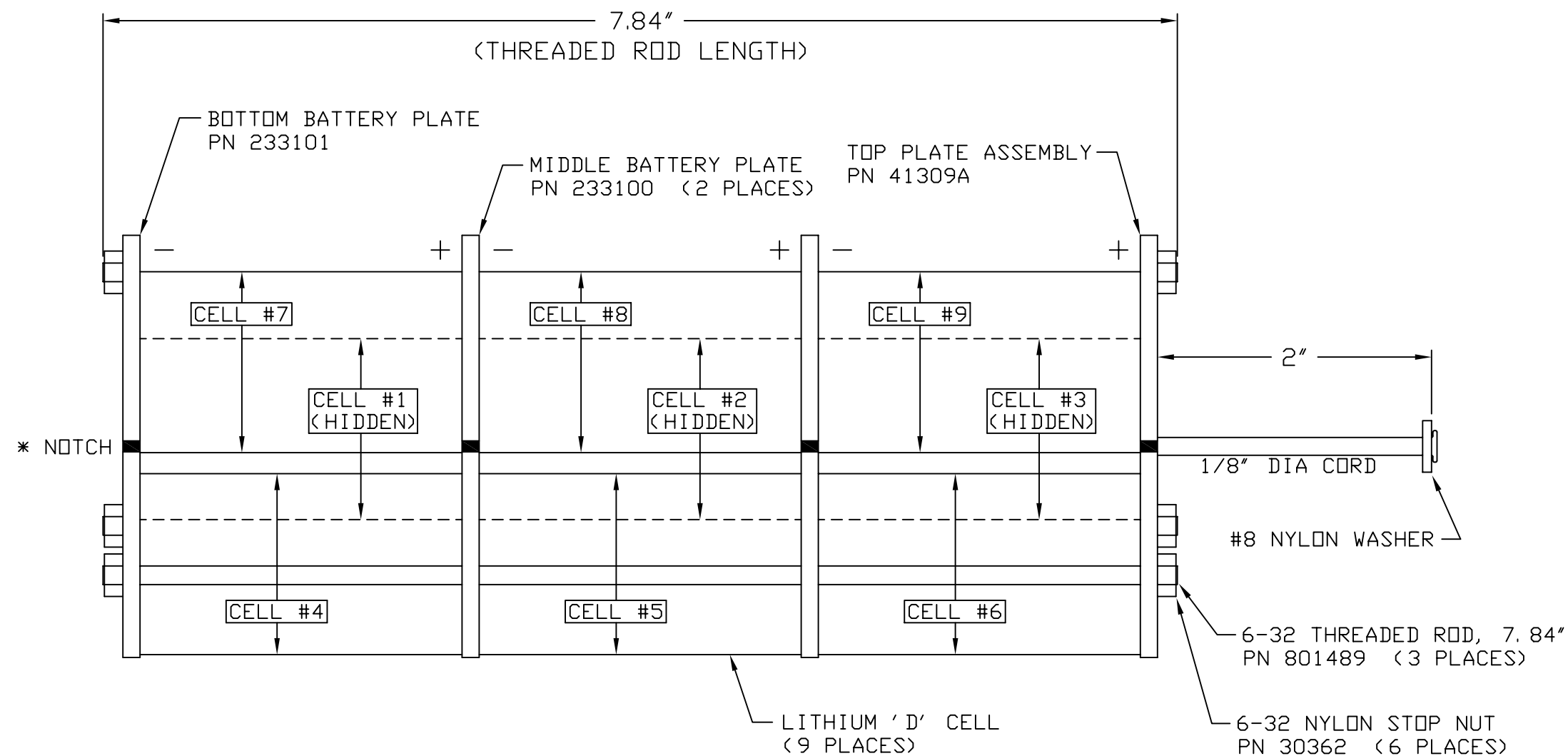
REVISION: **E**

EFFECTIVE DATE: **2/16/05**

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DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
4/6/99	A	ECN623: NEW BOTTOM PLATE		DG	
9/12/01	B	ECN704: 10125A, REDRAWN		DG	
3/16/04	C	ECN778: BATTERY PN, JP1	CB	DG	
1/31/05	D	MID PLT WAS 23357, ADD NOTCHES		DG	
2/3/05	E	ECN821: 10125B, 233101		DG	



USE #24 STRANDED WIRE WITH BLUE TEFLON INSULATION ON ALL BATTERY CONNECTIONS

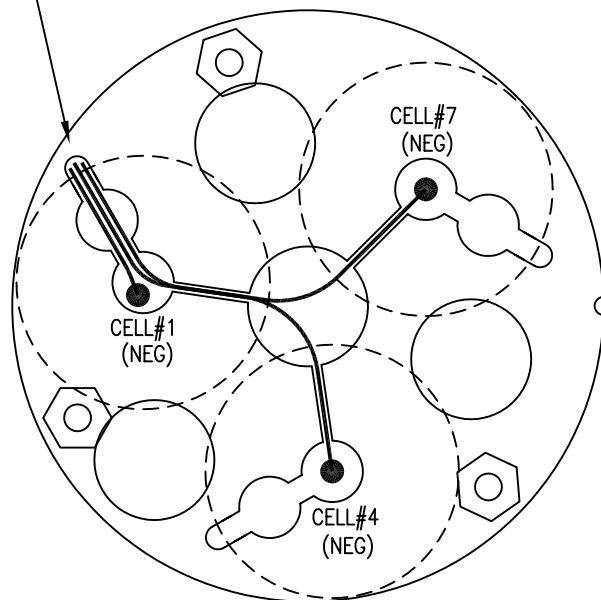
* LINE UP NOTCH ON ALL BOARDS AS SHOWN.

PART #	DESCRIPTION
80547	ASSEMBLED
801483	PARTS KIT

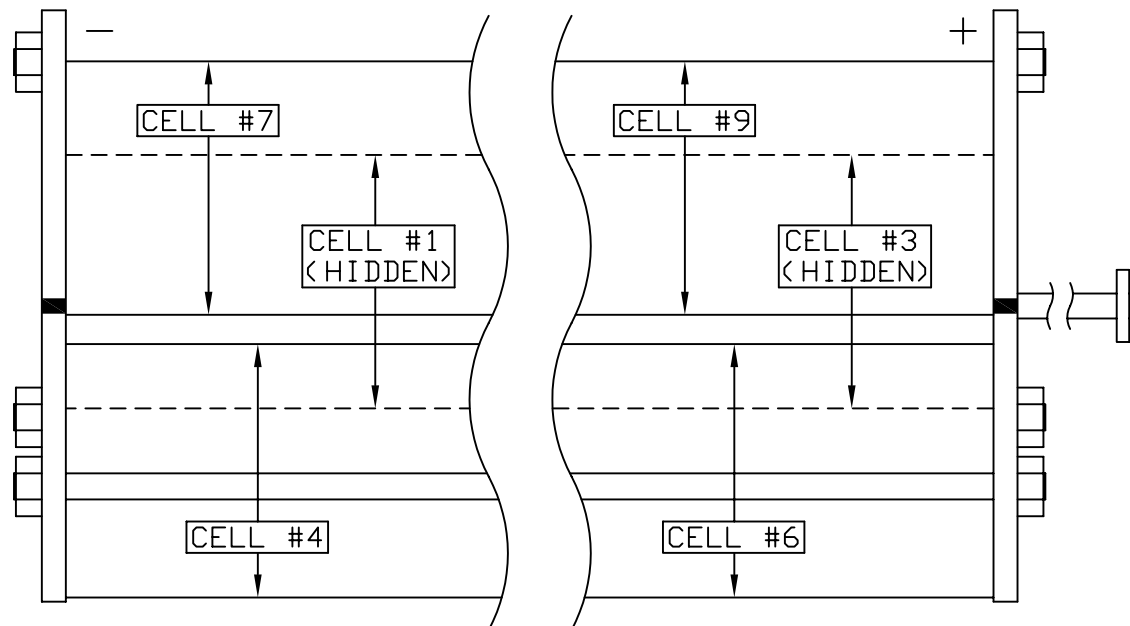
SEA-BIRD ELECTRONICS, INC

PART NO.	SEE TABLE	BD SCALE	1.00	DRWN BY	BMc/DG
SCHEM	32589C	PL SCALE	1.20	APPR BY	
TITLE	LITHIUM BATTERY PACK 9 D CELLS, 10.8V / 42AH				
DATE	9/13/93	DWG NO.	SH 1 OF 2	40668	REV E

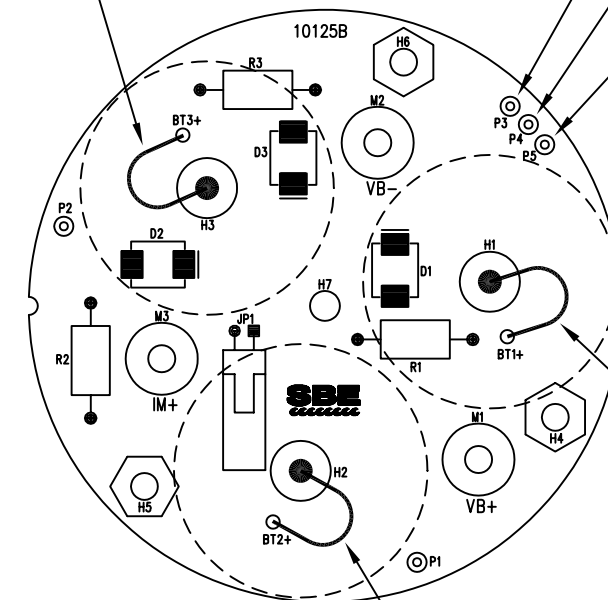
CONNECT CELL#1 NEG, CELL#4 NEG, CELL#7 NEG TO P3,P4,P5 ON COVER PLATE



USE #24 STRANDED WIRE WITH BLUE TEFLON INSULATION ON ALL BATTERY CONNECTIONS



CONNECT CELL#9 (POS) TO 'BT3+' PAD



CONNECT 'P3' PAD TO CELL#1 (NEG)
CONNECT 'P4' PAD TO CELL#4 (NEG)
CONNECT 'P5' PAD TO CELL#7 (NEG)

CONNECT CELL#3 (POS) TO 'BT1+' PAD

CONNECT CELL#6 (POS) TO 'BT2+' PAD

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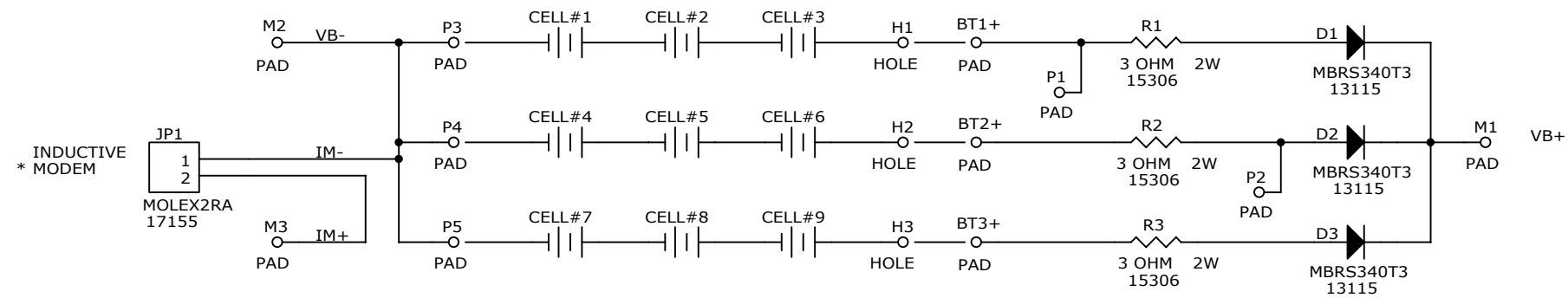
PART. NUMBER.	DESCRIPTION	QPA.	REF DESIG.
80547	D LITHIUM BATT PK, 9-CELL, 10.8V/42AH /40668E		
22089	BATTERY, LITHIUM D CELL, BCX85D/3B75-ST	9.0000	
233100	MIDDLE BATTERY PLATE, LITHIUM PACK	2.0000	
233101	BOTTOM BATTERY PLATE, LITHIUM PACK	1.0000	
30362	NUT, 6-32 NYLON STOP (THIN), SS	6.0000	H4 H5 H6
41309A	ASSY, LITH PK TOP PLATE, 9D CELL, 10.8V/42AH	1.0000	
801489	ROD, FULL THREAD 6-32, 7.84" LENGTH	3.0000	H4 H5 H6

SLB PRINTED ON 14:33:16 03 FEB 2005

PART. NUMBER.	DESCRIPTION	QPA.	REF DESIG.
801483	9-CELL, 10.8V/42AH, D LITH BATT KIT /40668E		
233100	MIDDLE BATTERY PLATE, LITHIUM PACK	2.0000	
233101	BOTTOM BATTERY PLATE, LITHIUM PACK	1.0000	
30362	NUT, 6-32 NYLON STOP (THIN), SS	6.0000	H4 H5 H6
41309A	ASSY, LITH PK TOP PLATE, 9D CELL, 10.8V/42AH	1.0000	
67143C	SBE17PLUS SEARAM SUPPORT KIT DOCUMENT	1.0000	
801489	ROD, FULL THREAD 6-32, 7.84" LENGTH	3.0000	H4 H5 H6

NOTE: KIT ASSEMBLY INSTRUCTIONS MAY BE MORE CURRENT THAN THIS LIST INDICATES.

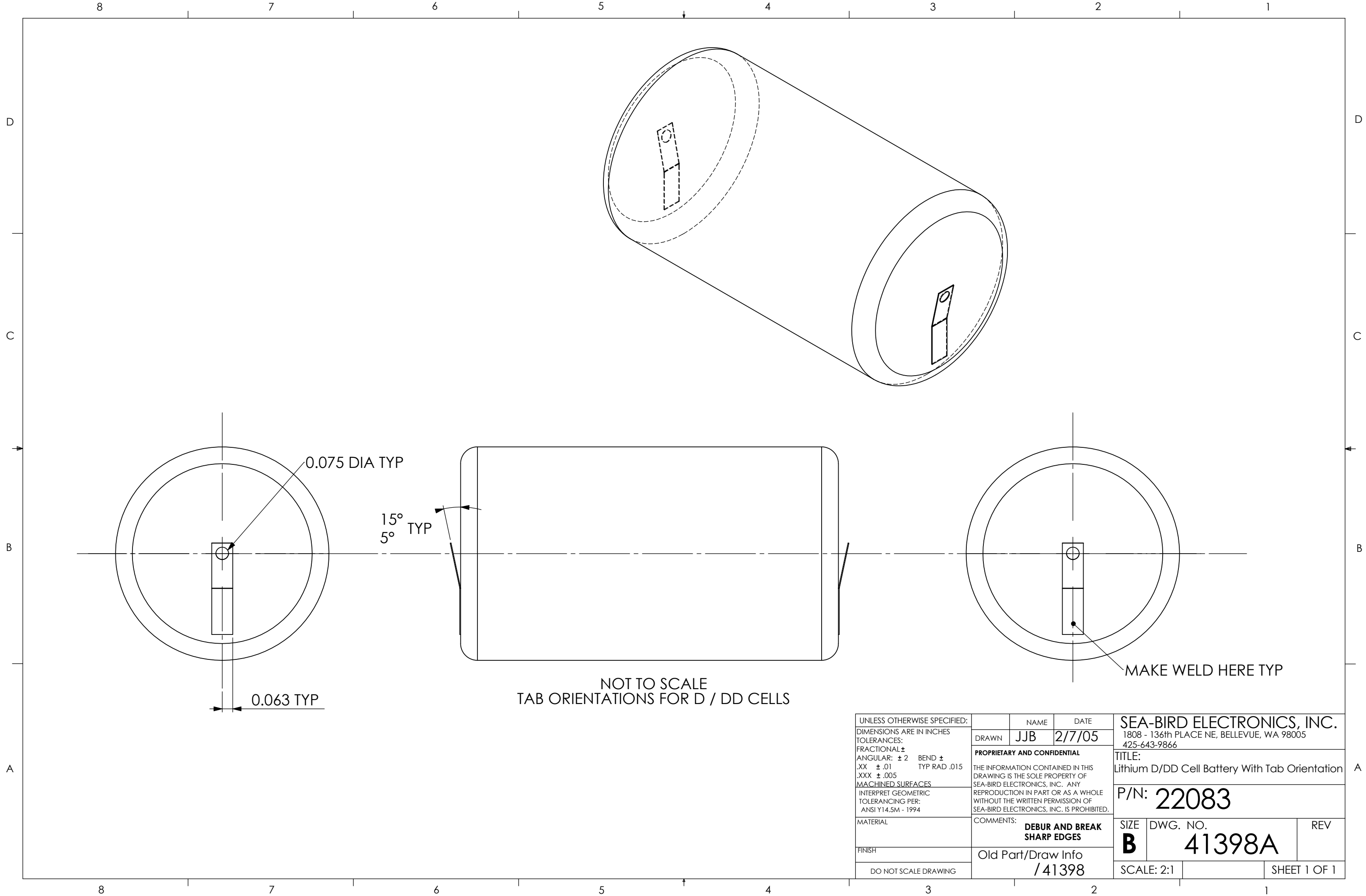
DATE	SYM	REVISION RECORD	AUTH	DR	CK
03/12/04	A	ECN778: BATTERY PN, JP1	CB	DG	
01/28/05	B	ASSY REV D, DEL LITHIUM CELL PN		DG	
02/01/05	C	ECN821: PCB REV B		DG	



9 D CELLS, 10.8V / 42AH

* REQUIRES OPTIONAL ELECTRONICS FOR IM FUNCTIONALITY.

SEA-BIRD ELECTRONICS, INC.		
ASSY: 40668E PN: 80547/801483		
Title		
LITHIUM BATTERY PACK: 9D, 10.8V 42AH		
Size	Document Number	Rev
B	32589	C
Date:	Tuesday, February 01, 2005	Sheet 1 of 1



0.075 DIA TYP

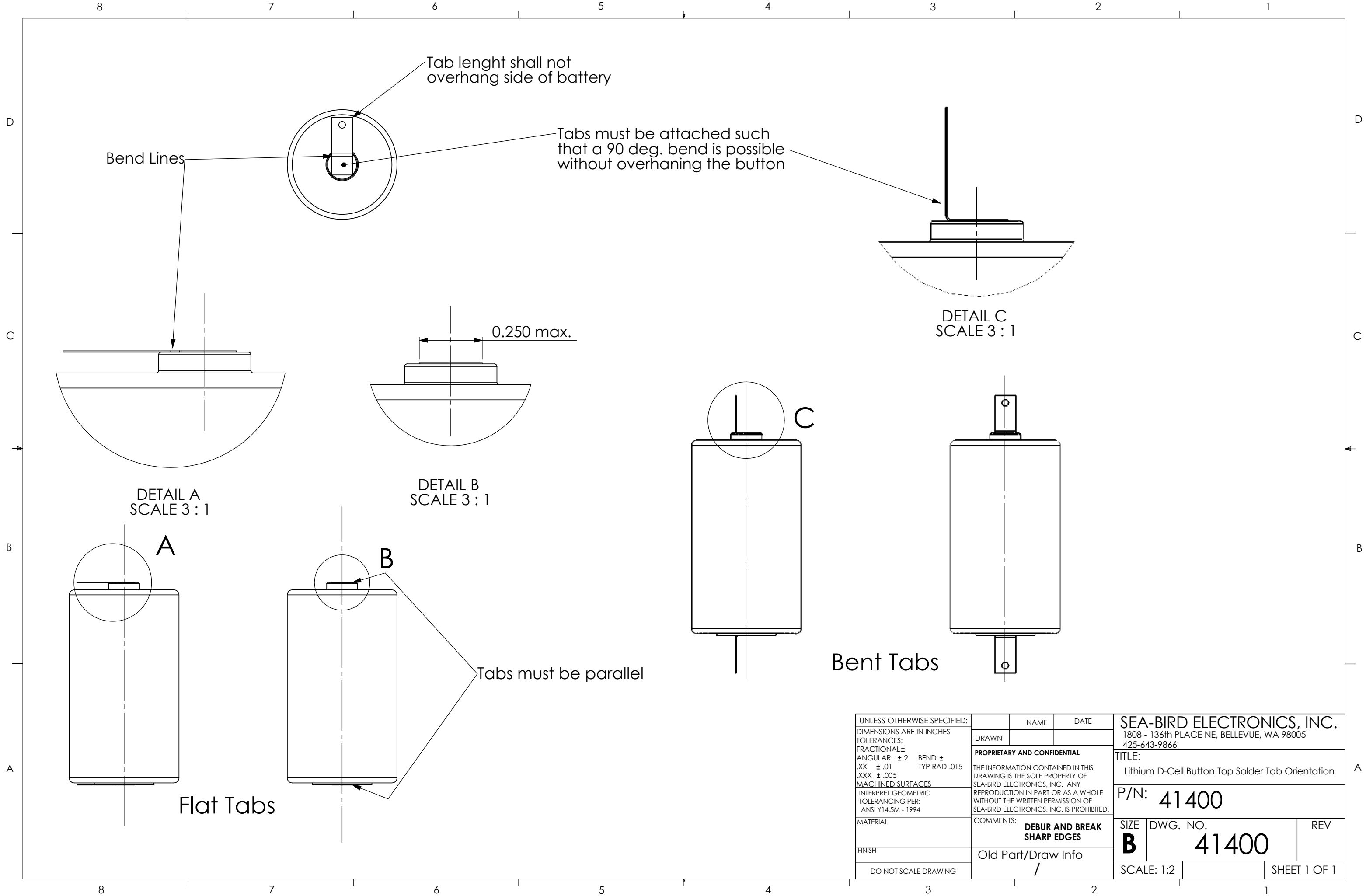
15° TYP
5° TYP

0.063 TYP

NOT TO SCALE
TAB ORIENTATIONS FOR D / DD CELLS

MAKE WELD HERE TYP

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	SEA-BIRD ELECTRONICS, INC.	
DIMENSIONS ARE IN INCHES		DRAWN	JJB	2/7/05	1808 - 136th PLACE NE, BELLEVUE, WA 98005
TOLERANCES:		PROPRIETARY AND CONFIDENTIAL		425-643-9866	
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ANGULAR: ± 2		BEND ±		Lithium D/DD Cell Battery With Tab Orientation	
.XX ± .01		TYP RAD .015		P/N: 22083	
.XXX ± .005		MACHINED SURFACES		SIZE	
INTERPRET GEOMETRIC TOLERANCING PER: ANSI Y14.5M - 1994		COMMENTS:		DWG. NO.	
MATERIAL		DEBUR AND BREAK SHARP EDGES		REV	
FINISH		Old Part/Draw Info /41398		B 41398A	
DO NOT SCALE DRAWING				SCALE: 2:1	
				SHEET 1 OF 1	



Tab length shall not overhang side of battery

Tabs must be attached such that a 90 deg. bend is possible without overhanging the button

Bend Lines

0.250 max.

DETAIL C
SCALE 3:1

DETAIL A
SCALE 3:1

DETAIL B
SCALE 3:1

Bent Tabs

Flat Tabs

Tabs must be parallel

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ANGULAR: ± 2 BEND ±		TITLE:		
.XX ± .01 TYP RAD .015		Lithium D-Cell Button Top Solder Tab Orientation		
.XXX ± .005		P/N: 41400		
MACHINED SURFACES		SIZE DWG. NO. REV		
INTERPRET GEOMETRIC TOLERANCING PER: ANSI Y14.5M - 1994		B 41400		
MATERIAL		COMMENTS: DEBUR AND BREAK SHARP EDGES		
FINISH		Old Part/Draw Info /		
DO NOT SCALE DRAWING		SCALE: 1:2		SHEET 1 OF 1