Sea-Bird Electronics, Inc.
13431 NE 20th Street
Bellevue, WA 98005
USA

Phone: (425) 643-9866
Fax: (425) 643-9954
E-mail: seabird@seabird.com
Web: www.seabird.com

APPLICATION NOTE NO. 40 **Revised September 2011**

SBE 5T and 5P PUMP SPEED ADJUSTMENT

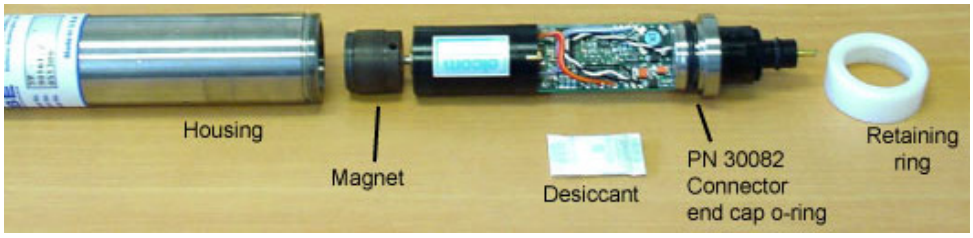
Equipment: DC power supply
Frequency counter

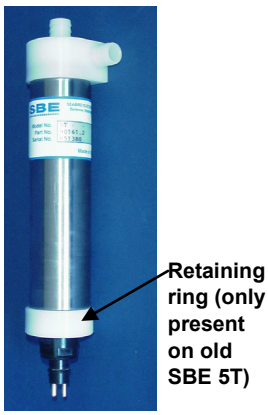
Drawings: 31441B (schematic)
41250A (assembly)

The pump housing must be disassembled to adjust the pump speed. SBE 5P and 5T electronics are the same, but separate instructions for removing / reinstalling the electronics are provided for each pump, because of differences in mechanical details.

Note: **In September 2011, Sea-Bird changed the SBE 5T mechanical design**; the new design is easily differentiated from the old design because the new design does not have a retaining ring (see photo below). The old SBE 5T is opened from the end with the retaining ring and bulkhead connector; the new SBE 5T is opened from the end with the pump head. Instructions for disassembly/reassembly of the new SBE 5T pump are identical to those for the SBE 5P pump.

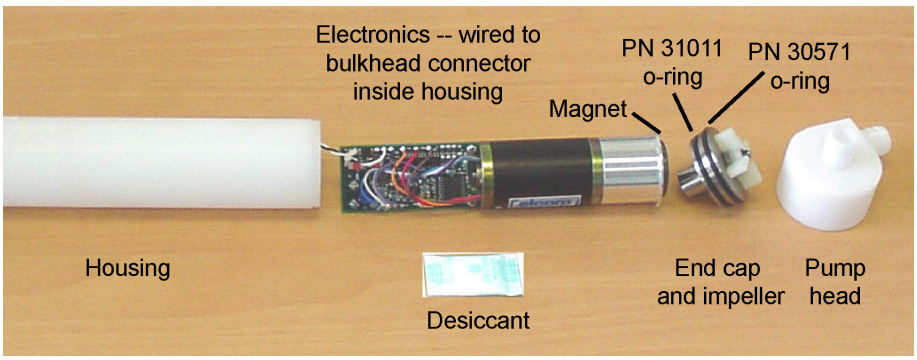
1. Remove the electronics from the housing:
   - **SBE 5T Titanium Pump with retaining ring (old design, discontinued September 2011)** –
     A. Unscrew the white plastic end cap retainer ring.
     B. Install a 2-pin dummy plug with locking sleeve over the bulkhead connector to provide a good grip and protect the connector pins. Rotate the end cap back and forth while carefully pulling the end cap away from the housing. Pull the end cap and attached electronics out of the housing.





SBE 5T (old design, discontinued September 2011

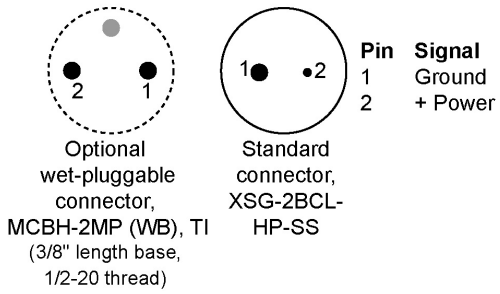
   - **SBE 5P Plastic Pump** and
     SBE 5T Titanium Pump without retaining ring (new design, September 2011) -
     A. Unscrew the pump head from the housing.
     B. Pull out the end cap from the housing.
     C. Pull out the electronics from the housing. Note that the electronics are wired to the bulkhead connector inside the housing.



SBE 5T (new design, September 2011) **SBE 5P**

2. Connect the positive lead of your frequency counter to the yellow test post (T1) (drawing 41250A). Connect the frequency counter ground (negative) to the power supply ground (negative).

3. Supply power:
   - **Low voltage pump** (pump with **LV** in the serial number) - Supply 6 volts DC power to the bulkhead connector or directly to the PCB (P8 is positive, P19 or P18 is common, drawing 41250A).
   - **Normal voltage pump** - Supply 12 volts to the bulkhead connector or directly to the PCB (P8 is positive, P19 or P18 is common, drawing 41250A).



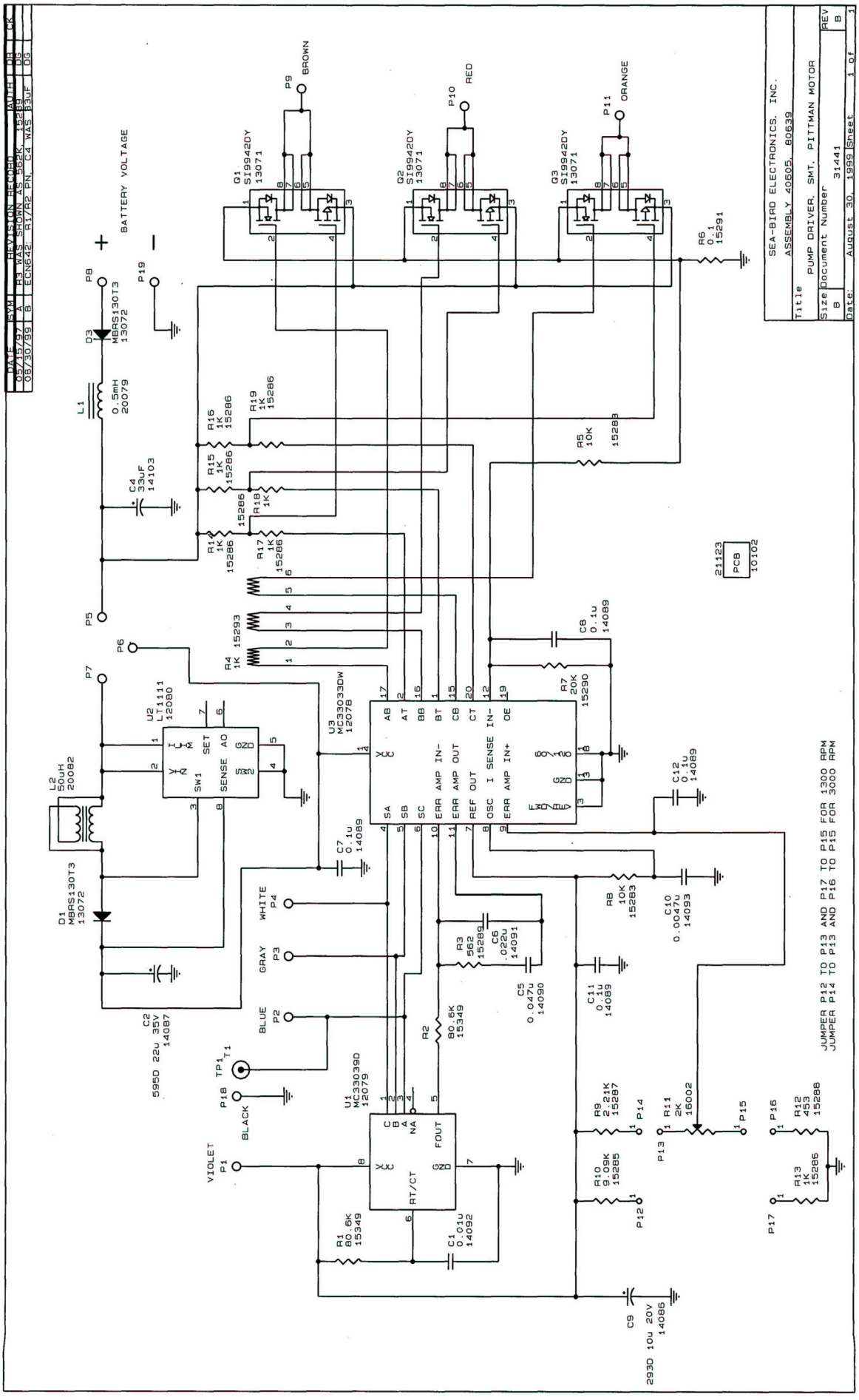
4. A 2K ohm potentiometer (R11, drawing 41250A) is located on the back side of the board. Adjust the potentiometer to obtain the frequency corresponding to the desired speed (Frequency * 30 = rpm):
   - Pittman **18.2Ω motor** (P/N 3711B113-R1) - Set jumper position P15 to P17 (1300 rpm) and P12 to P13 (1300 rpm), and adjust the speed as desired, up to the nominal maximum of 2000 rpm.
   - Pittman **7.4Ω motor** (P/N 3711B112-R1) - Set jumper position P15 to P16 (3000 rpm) and P14 to P13 (3000 rpm), and adjust the speed as desired, up to the nominal maximum of 4500 rpm.
     To adjust speed below approximately 2200 rpm, set jumper position P15 to P17 (1300 rpm) and P12 to P13 (1300 rpm), and adjust speed using the potentiometer.
   - Pittman **3.55Ω motor** (P/N 3711B112-R2) - Set jumper position P15 to P16 (3000 rpm) and P14 to P13 (3000 rpm), and adjust the speed as desired, up to the nominal maximum of 4500 rpm.
     To adjust speed below approximately 2200 rpm, set jumper position P15 to P17 (1300 rpm) and P12 to P13 (1300 rpm), and adjust speed using the potentiometer.

5. Disconnect the frequency counter and the power supply.

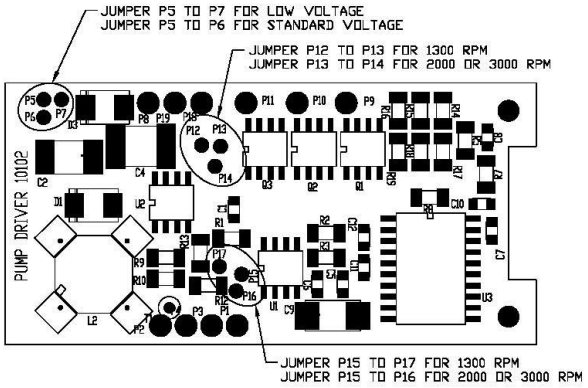
6. Reinstall the electronics in the housing:

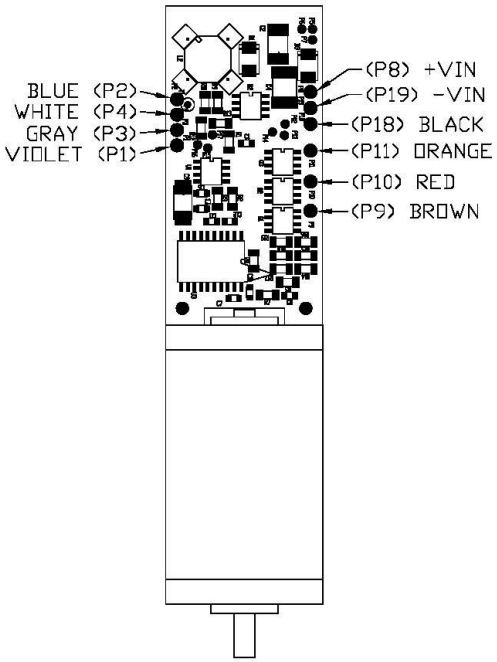
   - **SBE 5T Titanium Pump with retaining ring (old design, discontinued September 2011)** –
     A. Inspect the connector end cap o-ring and the mating surface in the housing for dirt, nicks, and cuts. Clean as necessary. If the o-ring or mating surface is damaged, return the pump to Sea-Bird for repairs.
     Note: Sea-Bird recommends that connector end cap o-ring replacement be performed at the factory, because the pump's physical configuration makes customer-replacement of this o-ring difficult to perform without special tools.
     B. Apply a light coat of o-ring lubricant (Parker Super O Lube) to the o-ring and mating surfaces. Gently place a **new desiccant bag** (PN 30558 – 1 gram) on the electronics (see Application Note 71 for desiccant use and regeneration). Reinstall the electronics in the housing, until the o-ring has fully seated. Reinstall the retaining ring on the connector end cap.

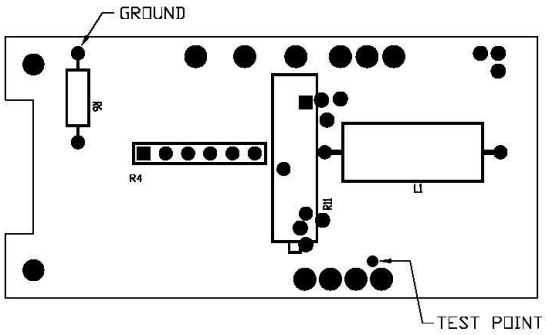
   - **SBE 5P Plastic Pump** and
     SBE 5T Titanium Pump without retaining ring (new design, September 2011) -
     A. Inspect the connector end cap o-ring and the mating surface in the housing for dirt, nicks, and cuts. Clean and/or replace o-rings as necessary.
     B. Apply a light coat of o-ring lubricant (Parker Super O Lube) to the o-ring and mating surfaces. Gently place a **new desiccant bag** (PN 30558 – 1 gram) on the electronics (see *Application Note 71* for desiccant use and regeneration). Reinstall the electronics in the housing. Reinstall the end cap in the housing, carefully aligning the end cap with the housing and pushing hard on the end cap to seat the first o-ring in the housing (only 1 o-ring should now be visible). **CAUTION: If you are not careful, you may pinch the o-ring which may allow water to enter the housing, damaging the electronics.**
     C. Reinstall the pump head on the end cap.


REVISION RECORD
DATE SYM REVISION AUTH CK
05/15/97 A R3 WAS SHOWN AS 562K 15289 DG
08/30/99 B ECN642: R17&R2 PN, C4 WAS 33uF DG
SEA-BIRD ELECTRONICS, INC.
ASSEMBLY 40605, 80639
Title PUMP DRIVER, SMT, PITTMAN MOTOR
Size B Document Number 31441 REV B
Date: August 30, 1999 Sheet 1 of 1
BATTERY VOLTAGE
JUMPER P12 TO P13 AND P17 TO P15 FOR 1300 RPM
JUMPER P14 TO P13 AND P16 TO P15 FOR 3000 RPM
Q1 SI9942DY 13071
Q2 SI9942DY 13071
Q3 SI9942DY 13071
U1 MC33039D 12079
U2 LT1111 12080
U3 MC33033DW 12078
D1 MBRS130T3 13072
D3 MBRS130T3 13072
L1 0.5mH 20079
L2 50uH 20082
BROWN
RED
ORANGE
WHITE
GRAY
BLUE
BLACK
VIOLET

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
4/05	A	ADD 801572.* ASSY	CB	CB	







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PART NUMBER.....	DESCRIPTION.....	QPA
80675	SBE 5T #3WDG MOTOR/DRIVER, 7.4 OHM /41250	
20081	MOTOR, PUMP, 7.4 OHM PITTMAN 3711B112-R1	1.0000
23595	SBE5T PUMP PCB MOUNT BLOCK /DWG 20624B	1.0000
30235	WASHER, WN-2, #2 NYLON WASHER	2.0000
30357	MACH SCREW, 2-56 X 1/4 PH, SS	2.0000
30560	MACH SCREW, 2-56 X 9/16 FH, PHILIPS, SS	2.0000
80639	PUMP DRIVER, SURFACE MOUNT /DWG 40605C	1.0000

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PART NUMBER.....	DESCRIPTION.....	QPA
80676	SBE 5T #5WDG MOTOR/DRIVER, 18.02 OHM /41250	
20080	MOTOR, PUMP, 18 OHM PITTMAN 3711B113-R1	1.0000
23595	SBE5T PUMP PCB MOUNT BLOCK /DWG 20624B	1.0000
30235	WASHER, WN-2, #2 NYLON WASHER	2.0000
30357	MACH SCREW, 2-56 X 1/4 PH, SS	2.0000
30560	MACH SCREW, 2-56 X 9/16 FH, PHILIPS, SS	2.0000
80639	PUMP DRIVER, SURFACE MOUNT /DWG 40605C	1.0000

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PART NUMBER.....	DESCRIPTION.....	QPA
801572	SBE 5T #3WDG MOTOR/DRIVER, 3.55 OHM /41250	
20176	MOTOR, PUMP, 3.55 OHM PITTMAN 3711B112-R2	1.0000
23595	SBE5T PUMP PCB MOUNT BLOCK /DWG 20624B	1.0000
30235	WASHER, WN-2, #2 NYLON WASHER	2.0000
30357	MACH SCREW, 2-56 X 1/4 PH, SS	2.0000
30560	MACH SCREW, 2-56 X 9/16 FH, PHILIPS, SS	2.0000
80639	PUMP DRIVER, SURFACE MOUNT /DWG 40605C	1.0000

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FINISH GENERIC ASSEMBLY TO SPECIFIC ASSEMBLY BY INSTALLING VOLTAGE AND SPEED JUMPERS AS SHOWN ON THE CHART

SBE PN	DESCRIPTION	VOLTAGE	SPEED	SPEED
80675.2	#3 WINDING (7.4 OHM), STANDARD VOLTAGE, 2000 RPM	P5-P6	P13-P14	P15-P16
80675.2LV	#3 WINDING (7.4 OHM), LOW VOLTAGE, 2000 RPM	P5-P7	P13-P14	P15-P16
80675.3	#3 WINDING (7.4 OHM), STANDARD VOLTAGE, 3000 RPM	P5-P6	P13-P14	P15-P16
80676.1	#5 WINDING (18.02 OHM), STANDARD VOLTAGE, 1300 RPM	P5-P6	P12-P13	P15-P17
80676.1LV	#5 WINDING (18.02 OHM), LOW VOLTAGE, 1300 RPM	P5-P7	P12-P13	P15-P17
80676.2	#5 WINDING (18.02 OHM), STANDARD VOLTAGE, 2000 RPM	P5-P6	P13-P14	P15-P16
80676.2LV	#5 WINDING (18.02 OHM), LOW VOLTAGE, 2000 RPM	P5-P7	P13-P14	P15-P16
801572.2	#3 WINDING (3.55 OHM), STANDARD VOLTAGE, 2000 RPM	P5-P6	P13-P14	P15-P16
801572.2LV	#3 WINDING (3.55 OHM), LOW VOLTAGE, 2000 RPM	P5-P7	P13-P14	P15-P16
801572.3	#3 WINDING (3.55 OHM), STANDARD VOLTAGE, 3000 RPM	P5-P6	P13-P14	P15-P16

SEA-BIRD ELECTRONICS, INC			
PART NO. VARIOUS	BD SCALE –	DRWN BY	DG
SCHEM 31441B	PL SCALE 0.90	APPR BY	
TITLE: SBE 5T MOTOR/DRIVER ASSEMBLY			
DATE 2/13/03	DWG NO. 41250	REV A	

Application Note Revision History

Date	Description
April 1999	Initial release
November 2002	Add information about jumper P12 to P13 (1300 rpm) and P14 to P13 (3000 rpm)
May 2005	New drawing numbers and motor
June 2007	Update to include instructions for 5P as well as 5T Add photos to clarify instructions Add standard and wet-pluggable connector diagram to clarify pinouts
September 2011	Add information on new mechanical design for SBE 5T