



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. 13-5

Revised May 2007

MODIFYING THE SBE 13 OXYGEN SENSOR FOR 5 VOLT OUTPUT

The original SBE 13 Dissolved Oxygen Sensor produces two output signals: an oxygen-dependent output in the range of 0 to + 5 volts, and a temperature-dependent output in the range of -5 to + 5 volts. For the **SBE 911plus** CTD as well as other applications requiring that both signals be in the 0 to +5 volt range, the sensor electronics may be easily modified as follows:

1. Disassemble the sensor by unthreading the end cap.
2. Disconnect the yellow and orange (anode and cathode) wires from PC Board 10044 (this is the board with the orange capacitor and green transformer; see drawing 40117).
3. Remove the 3 screws holding PCB 10044 to the aluminum interboard spacers.
4. Separate PCB 10044 from the other PCB (it will be *hinged* by 4 yellow wires).
5. Referring to annotated drawing 40115, remove R22b from PCB 10045 and connect a jumper wire in its place.
6. Remove R27b from PCB 10045 and connect a jumper wire in its place.
7. Change PCB 10045 resistor R22a to 976K 1%.
8. Change PCB 10045 resistor R27a to 442K 1%.
9. Reassemble the boards and reconnect the anode and cathode wires.
10. Run SEASOFT and enter the new values for K and C (9.0 and -6.7 respectively) in the CTD configuration (.con) file.

Note: Edit the CTD configuration (.con) file using the Configure Inputs menu in SEASAVE V7 (real-time data acquisition software) or SBE Data Processing (data processing software) in our SEASOFT suite of programs. Select *Oxygen, Oxygen, Beckman/YSI, Oxygen Current* and *Oxygen, Oxygen, Beckman/YSI, Oxygen Temperature* as voltage sensors when editing the .con file.

The new resistors can be standard 1% types, which should be available from any reasonably well-stocked electronics supplier. Sea-Bird can supply these resistors if necessary.

The calibration values shown are nominal, but should give sufficient accuracy for the intended purpose of temperature compensating the membrane current. The coefficients can be more exactly defined if desired by comparing the DO temperature readout with the temperature of a controlled bath (be sure to let the sensor fully equilibrate thermally). Calculate the adjusted coefficients as follows:

$$K = (T_{hi} - T_{lo}) / (V_{hi} - V_{lo})$$

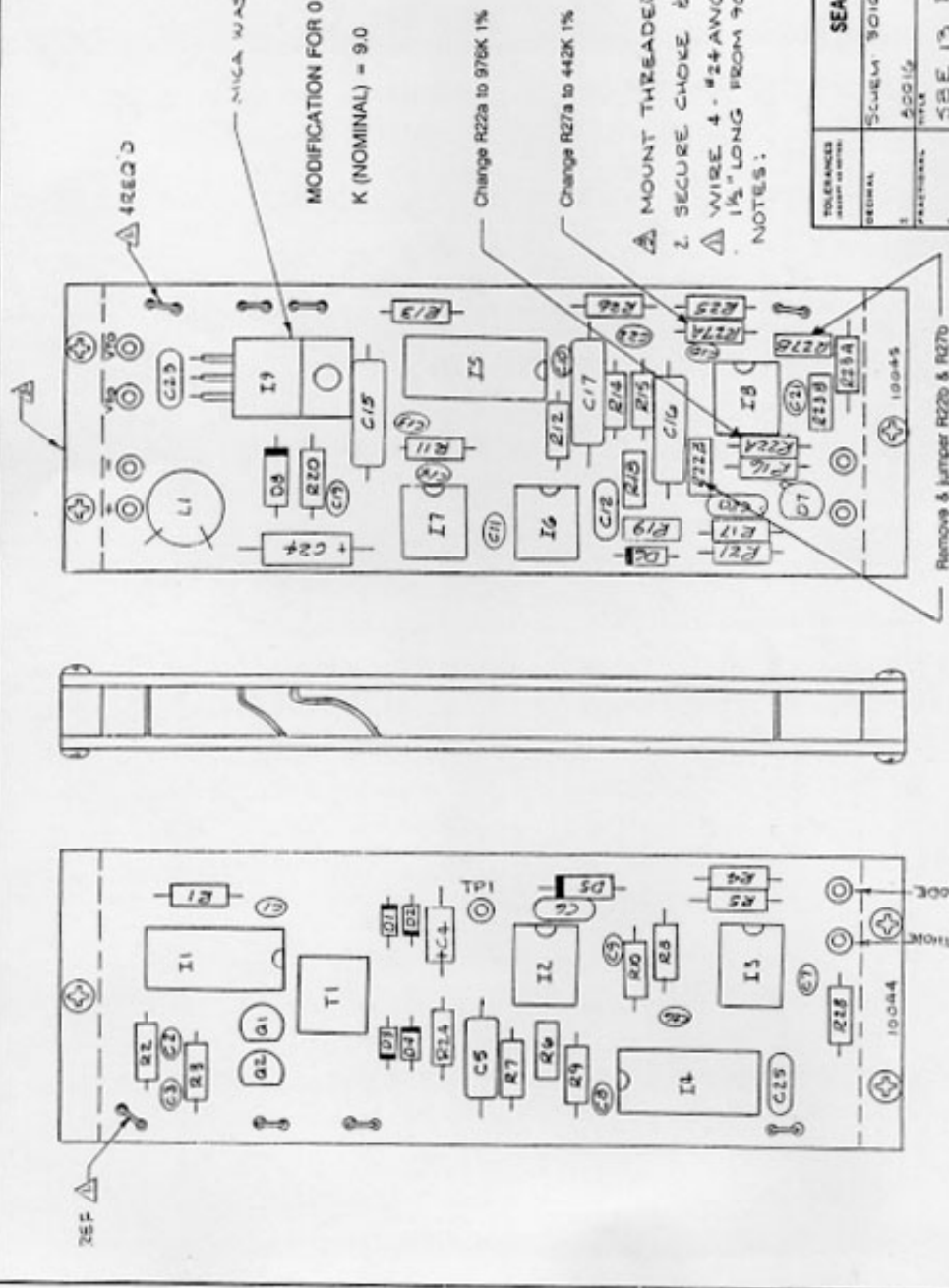
$$C = T_{hi} - KV_{hi}$$

REV	DATE	REVISION	BY	CHK
1	12-21-65	INITIAL	JA	JA
2	1-12-66	REVISED	JA	JA
3	2-12-66	REVISED	JA	JA
4	3-12-66	REVISED	JA	JA
5	4-12-66	REVISED	JA	JA
6	5-12-66	REVISED	JA	JA
7	6-12-66	REVISED	JA	JA
8	7-12-66	REVISED	JA	JA
9	8-12-66	REVISED	JA	JA
10	9-12-66	REVISED	JA	JA
11	10-12-66	REVISED	JA	JA
12	11-12-66	REVISED	JA	JA
13	12-12-66	REVISED	JA	JA
14	1-12-67	REVISED	JA	JA
15	2-12-67	REVISED	JA	JA

NICA WASHER (30089) UNDER I9

MODIFICATION FOR 0 TO 5 VOLT TEMPERATURE

K (NOMINAL) = 9.0 C (NOMINAL) = -8.7



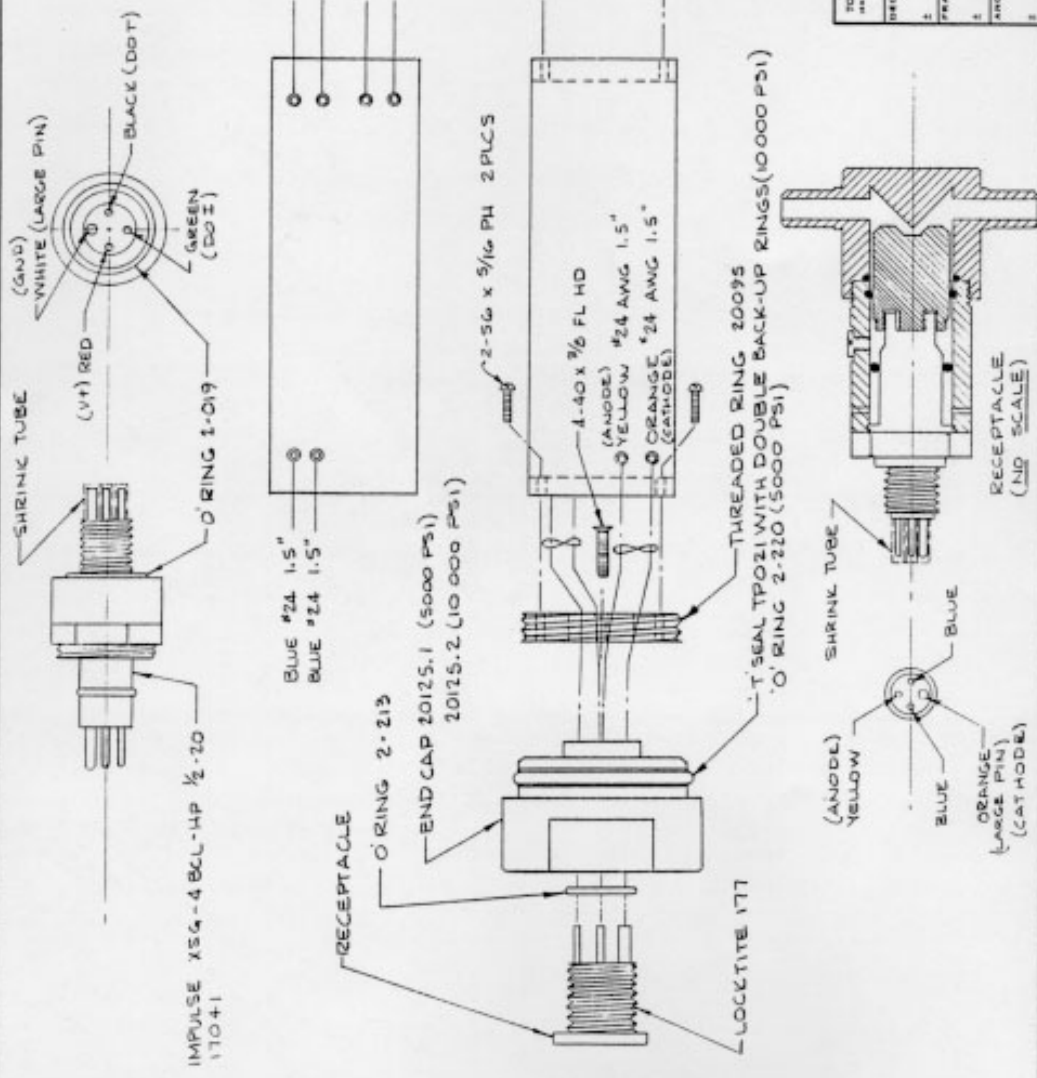
TOLERANCES UNLESS OTHERWISE SPECIFIED	
RESISTORS	±1%
CAPACITORS	±5%
MEASUREMENTS	±0.1%
ANGLE	±0.1°
DATE	7-25-68
ISSUE	011 OF 2
REV	J

SEA-BIRD ELECTRONICS, INC.

SCHEMATIC 50124
 TITLE 20016
 DESIGNED BY
 CHECKED BY
 DATE 7-25-68
 ISSUE 011 OF 2
 REV J

DATE	REVISED	BY	CHK
1964	A	ECL	327

NOTE 3:
 1. USE TEFLON STRANDED WIRE
 2. SOLDER WIRES TO CONN. PLUG FIRST, THEN TWIST
 3. COVER WIRE TO PLUG JOINTS WITH SHRINK TUBING



- RED #24 ANG 9"
- WHITE #24 ANG 9"
- GREEN #24 ANG 9"
- BLACK #24 ANG 9"

TOLERANCES UNLESS NOTED		SEA BIRD ELECTRONICS, INC.	
1	DECIMAL	NOTE: LOCKTITE ALL HARDWARE	SCALE DRAWN BY EJM
2	FRACTIONAL	APPROVED BY	
3	ANGULAR	TITLE	SBE 13 (BECKMAN) FINAL ASSY
4		DATE	7/26/50
5		DRAWING NUMBER	40117
		REV.	A

K-E CONTAINERS & SUPPLY EQUIPMENT STANDARD FORM

MADE IN U.S.A.