APPLICATION NOTE NO. 13-5   **September 2001**

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 911*plus*** 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: The CTD configuration (.con) file is edited using the Configure menu (in SEASAVE or SBE Data Processing in our SEASOFT-Win32 suite of programs) or SEACON (in SEASOFT-DOS).

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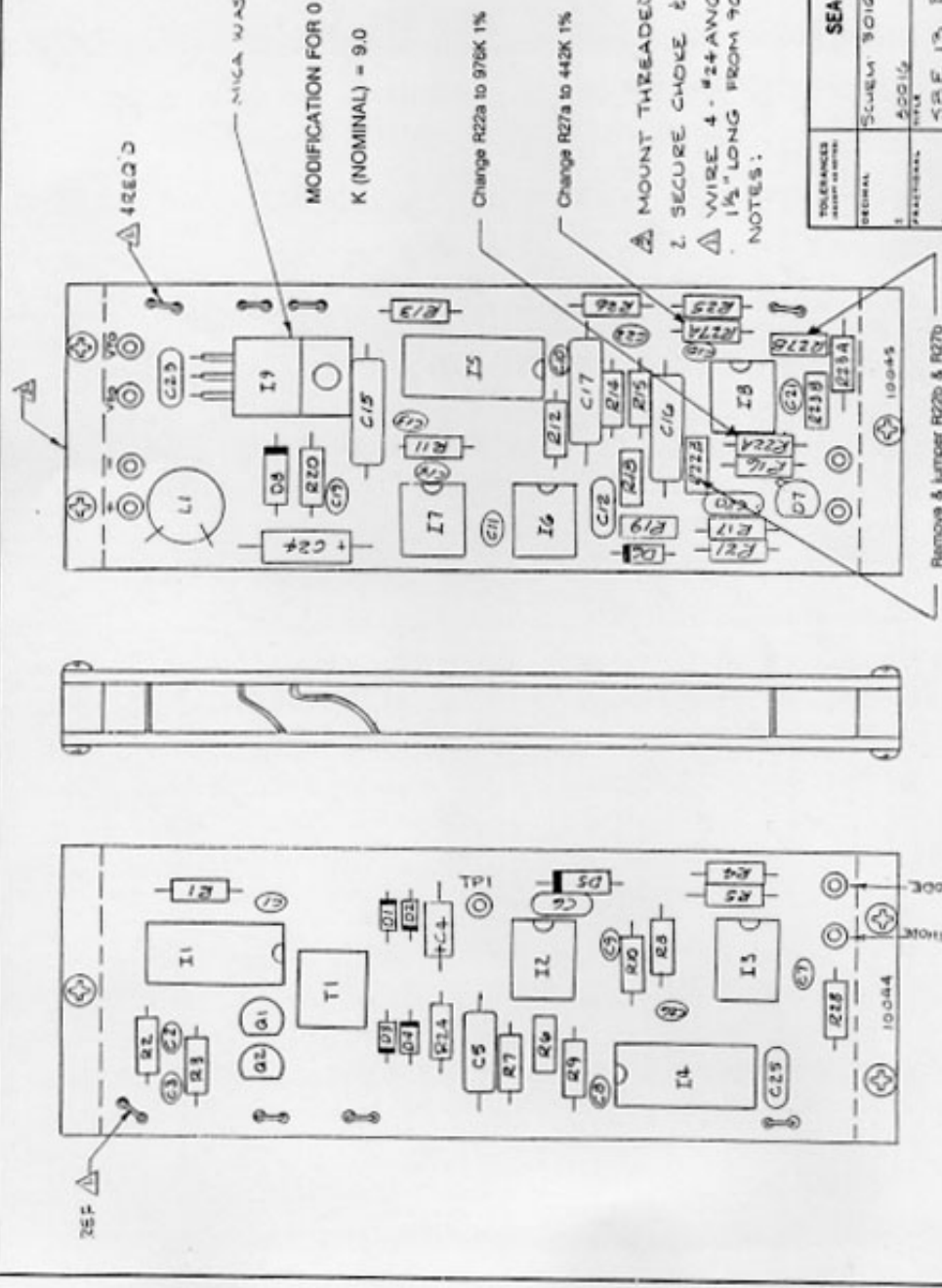
$$K = (T_{hi} - T_{lo})/(V_{hi} - V_{lo})$$

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

MODIFICATION FOR 0 TO 5 VOLT TEMPERATURE

K (NOMINAL) = 9.0   C (NOMINAL) = -6.7

MICA WASHER (30039) UNDER I9

Change R22a to 976K 1%

Change R27a to 442K 1%

4 REQ'D

REF
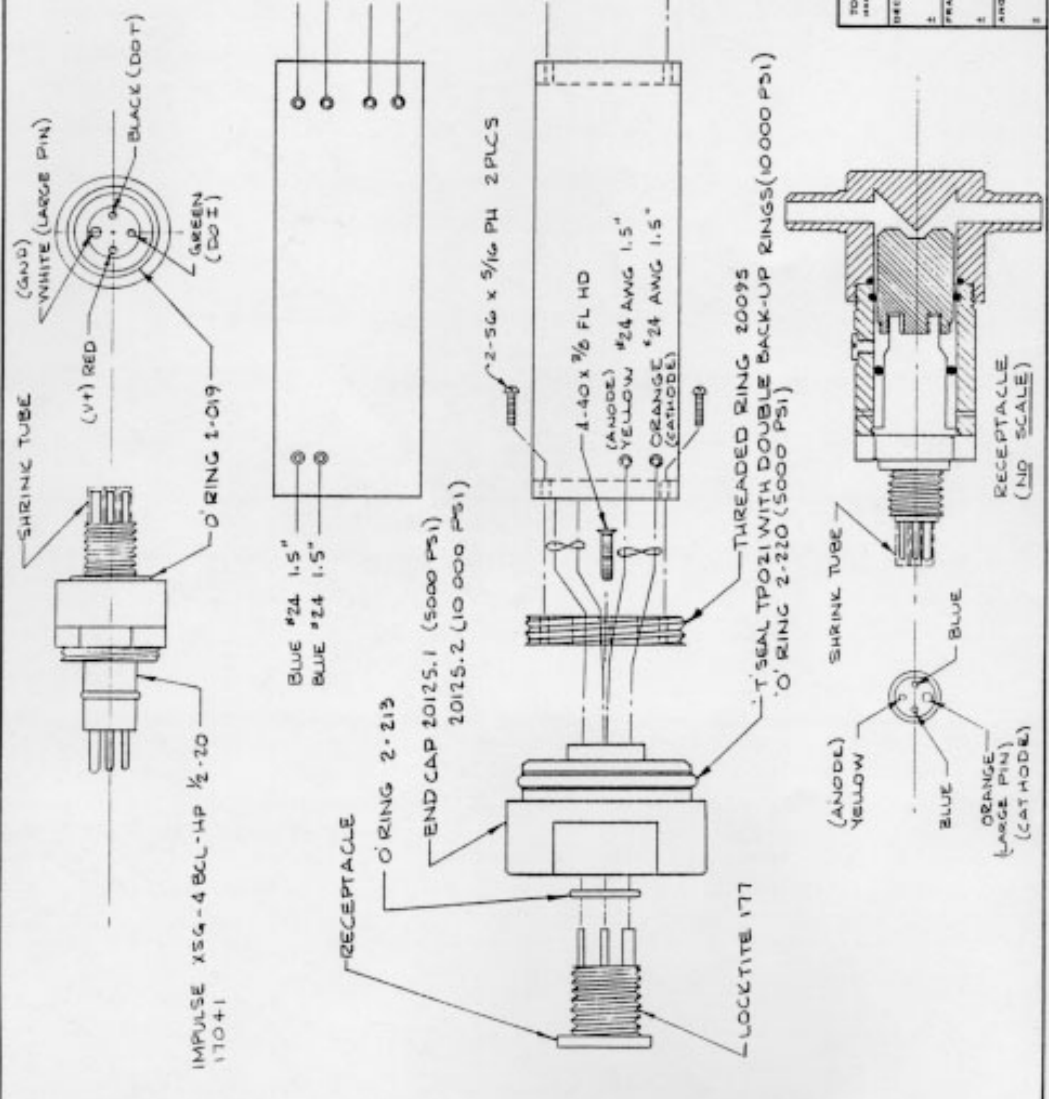
1. MOUNT THREADED END OF SPACER CARS
2. SECURE CHOKE & I9 WITH RTV
3. WIRE 4 - #24 AWG YELLOW WIRES APPROX 1½" LONG FROM 9009-21002 TO 9001-21001

NOTES:

Remove & jumper R22b & R27b

TP1

TO ANODE

TO CATHODE

NOTES:
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 AWG 9"
WHITE #24 AWG 9"
GREEN #24 AWG 9"
BLACK #24 AWG 9"

SHRINK TUBE
(GND) WHITE (LARGE PIN)
BLACK (DOT)
GREEN (DOT)
(V+) RED
O'RING 1-019

IMPULSE XSG-4 BCL-HP ½-20
17041

RECEPTACLE
O'RING 2-213

BLUE #24 1.5"
BLUE #24 1.5"

END CAP 20125.1 (5000 PSI)
20125.2 (10,000 PSI)

2-56 x 5/16 PH 2 PLCS

4-40 x 3/8 FL HD

(ANODE) YELLOW #24 AWG 1.5"
ORANGE #24 AWG 1.5" (CATHODE)

THREADED RING 20095

'T' SEAL TPO21 WITH DOUBLE BACK-UP RINGS (10,000 PSI)
O'RING 2-220 (5000 PSI)

LOCKTITE 177

2-56 x ¼ FL HD

END RING 20110

SHRINK TUBE
BLUE
(ANODE) YELLOW
BLUE
ORANGE (LARGE PIN) (CATHODE)

RECEPTACLE (NO SCALE)

REVISION RECORD

K+E CRYSTALENE 8-11877
ENGINEERS STANDARD FORM
MADE IN U.S.A.