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SBE *9plus* CTD Retrofit for Use with Alkaline-Powered SEARAM

Equipment Affected

All SBE *9plus* CTDs that meet **both** of the following criteria are affected:

- SBE *9plus* was shipped between September 1997 and April 2004, **and**
- SBE *9plus* is used with an SBE *17plus* SEARAM (any version).

Description of Problem

In September 1997, a modification to the *9plus* CTD changed how the negative supply is generated for the card file and telemetry. The original design used a Computer Products DC/DC converter with a clamped input for over-voltage protection. This change removed the DC/DC converter circuitry and placed a charge pump circuit on the CSAD board that could supply the -13.2 volts necessary for the CTD. This circuit used an LT1054, which is only rated for 16 volt operation.

Alkaline batteries in the SEARAM (1.5 volts/battery * 12 batteries = 18 volts) produce a voltage greater than the acceptable operation range of the LT1054 and will damage the *9plus*. A *9plus* built between September 1997 and April 2004 should not be used with a *17plus* SEARAM that is powered by alkaline batteries, without first modifying the *9plus*.

- Symptom of damage: If you previously deployed an affected *9plus* with an alkaline-powered SEARAM, a symptom of the resulting damage is pressure sensor temperature output that remains constant at 0 counts. To check, view pressure sensor temperature in SEASAVE or output pressure sensor temperature in SBE Data Processing's Data Conversion module. If the pressure temperature output is 0 counts, the resulting output in °C is equal to AD590B (Digiquartz calibration coefficient found in the instrument .con file). For example, if AD590B = -9.8, the pressure sensor temperature output will remain constant at -9.8 °C.

The use of Ni-Cad or NiMH batteries in the SEARAM is still acceptable, as the maximum voltage of these battery packs is only 14.4 volts (= 1.2 volts/battery * 12 batteries).

NOTE: All SEARAMs sold during the period in question were shipped with Ni-Cad batteries installed. Damage to the *9plus* will occur only if the Ni-Cad batteries are replaced with alkaline batteries.

In April 2004, the LT1054 on the *9plus* CSAD board was replaced with an LTC1144, which has an operational voltage of 18 volts with 20 volt transient suppression. These CTDs are not affected by the problem described above.

Solution

Before proceeding, contact Sea-Bird, providing your *9plus*' serial number, to determine if your *9plus* requires a retrofit.

For customers using a *9plus* with CSAD board PN 801042 (Rev. 40904 or 40904A) with a SEARAM:

- For customers who have the proper facilities and feel comfortable opening the *9plus* electronics chamber – Sea-Bird will supply and ship a new CSAD PN 801042 (Rev. 40904B) at no charge.
- For customers who do not want to open the *9plus* – After consulting with Sea-Bird on schedule and shipping requirements, return the *9plus* main housing to Sea-Bird for modification. Sea-Bird will perform the modification at no charge.

For customers using a *9plus* with CSAD board PN 801042 (Rev. 40904 or 40904A) with the *11plus* Deck Unit:

The *9plus* used in this system configuration is **not** affected by the over-voltage problem, and does not need the modified CSAD board. However, when your *9plus* is returned to Sea-Bird for calibration and/or repair, we will modify the *9plus* to the current CSAD assembly at no charge to make the *9plus* compatible with an alkaline-powered SEARAM in the future.