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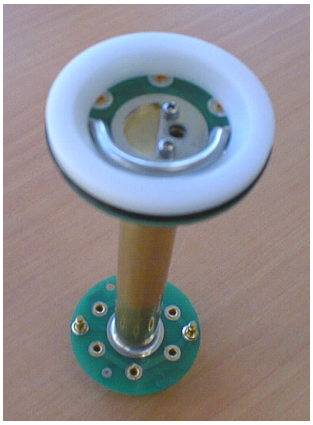
# MicroCAT Change Notice – 25 April 2008
## (revised October 2010)

Two important design changes were implemented in SBE 37 MicroCATs in 2008, bringing significant benefits and some minor changes without increasing the prices for new MicroCATs. The original MicroCAT battery pack was replaced with a new retrofit battery pack, and the electronics were redesigned in new SBE 37 SM/SMP and SI/SIP MicroCATs (firmware version 3.0 and higher). The details of these changes follow

**1. Original MicroCAT Batteries** (used in SBE 37-IM/IMP, SM/SMP, and SBE 44 Underwater Inductive Modems) **were discontinued (2008).** The custom-built 9-volt battery made from three Panasonic BR-2/3A lithium cells were not available after approximately August-September 2008. Six of these batteries, sold as a set (part number 50243.1), were installed in a battery holder forming a battery pack as shown in the photos below.



*Old MicroCAT battery holder*

*PN 50243 6-battery set in holder*

Because the 9-volt batteries are obsolete, the old battery holder is also obsolete and must be replaced. **We have designed a new retrofit battery holder that uses 12 individual AA lithium cells.** AA lithium cells eliminate the need for a custom battery, are available commercially world-wide, and deliver **75 percent more useable capacity** than the old battery pack. Customers are no longer dependent on Sea-Bird as the sole source of a custom battery, and 12 AA lithium cells are less expensive than the six-battery set (50243.1). **The new replacement battery holder became available in July 2008.** All new MicroCATs are shipped with the new battery holder and cells.

***Note:***
The new replacement battery holder does not fit in the very earliest MicroCATs, manufactured in 1996 and 1997 (corresponding *approximately* to serial numbers less than 150). Contact Sea-Bird if you own one of these instruments and need new batteries.

**Details of New battery design and procurement:**

The retrofit battery pack for SBE 37 MicroCATs and SBE 44 Underwater Inductive Modems consists of a battery holder that is a plug-in replacement for the old battery holder, and twelve (12) 3.6 volt AA lithium cells (a list of recommended and alternate cells follows).

*Retrofit MicroCAT battery holder*

*12 AA lithium cells*

The retrofit holder (PN 801797) connects two cells in series and each series string in parallel forming a 7.2 volt battery having a "Sea-Bird factory rating" of 10.6 Amp Hours (Ah) using SAFT LS 14500 cells. This is lower than the SAFT factory capacity rating (2.45 Ah x 6 = 14.7 Ah) because the new holder includes voltage up-conversion circuitry necessary to provide an operating voltage of 8.5 volts. The voltage up-conversion consumes some battery capacity.

In addition, accounting for the MicroCAT's current consumption patterns and for environmental conditions affecting battery performance, the usable capacity is less than 10.6 Ah. Our conservative estimate of the nominal usable capacity is 8.8 Ah. Pumped MicroCATs (37-SMP and IMP) will extract a little less, SBE 44 Inductive Modems will extract a little more.

Based on original discharge tests we performed on the old Panasonic battery pack (unpumped MicroCAT), the usable capacity is reduced from the Panasonic factory specification of 7.2 Ah (1.2 Ah x 6 in parallel) to 5 Ah. Comparing the usable capacities of both battery packs, the new one (with SAFT LS 14500 cells) delivers 75% more usable capacity than the old battery pack.

The retrofit battery holder is also easier to use. The design uses only one captured screw to fasten the battery pack into the instrument battery compartment (no more small loose screws to remove and replace).

Sea-Bird is helping to absorb some of the cost for the retrofit battery holder by providing a one-time reduced price on the purchase of the holder and the first set of 12 cells. Even though replacing the old battery holder itself will require a one-time purchase of a retrofit holder, the savings on future battery purchases plus shipping costs from Sea-Bird, and the convenience of local supply of standard AA lithium cells will offset the cost of the retrofit holder after 2 sets of AA cells have been purchased.

The SAFT LS 14500 cells are available from Sea-Bird's stock. They are packaged to comply with shipping regulations under PN 50441 as a set of 12 cells. The price for this set of 12 is substantially lower than the price of the old pack. Additionally, customers are likely to find lower prices locally for SAFT LS 14500 cells (or alternates) and save money on shipping costs compared to purchasing batteries from Sea-Bird.

Only "AA" **lithium** batteries can be used. Alkaline, Ni-Cad and other batteries will not work. Sea-Bird will stock and supply "AA" Lithium batteries, but customers are encouraged to obtain these batteries from other commercial vendors when and where practical.

**Sea-Bird Recommends**: SAFT LS 14500, 3.6 V per cell, 2.45 Ah (nominal SAFT specification at 1 ma).

Alternative cells can be substituted:

Tadiran, TL-5903, 3.6V per cell, 2.4 Ah

Electrochem PN 3B64/BCX85 (AA) 3.9 V per cell, 2.0 Ah (lower factory rating but usable estimated capacity is equivalent to others).

The following web sites will direct you to sources for these cells world-wide:

http://www.saftbatteries.com

http://www.tadiran.com

http://www.electrochemsolutions.com/find/partnerslist.htm

**2. Details of 37-SI, SIP, SM, SMP, IM, IMP Electronics Re-design (2008):**

Semiconductor parts obsolescence forced a redesign necessary to continue production of new MicroCATs and support of older versions. New microprocessor and memory chips increase power efficiency and include 8 MB of memory (vs 2MB previously). The new memory holds three times as many samples as the old 2 MB memory because data are stored with more bytes per sample. MicroCAT deployment durations have always been limited by battery capacity, not memory capacity. Though this is still true, the new battery pack provides enough capacity for more samples than was previously possible. Filling the entire memory requires external power.

Sampling current and measurement acquisition time were both reduced. For SBE 37-SMP and 37-IMP (pumped) MicroCATs, that energy savings made it possible to pump longer per sample (1 second vs 0.5) without reducing the possible deployment duration, and thereby produce more accurate salinity data.

SM and SMP versions both now include external power capability, and a 4-pin data I/O connector is standard instead of the previous 3-pin standard. 3-pin bulkhead connectors (or 3-pin to 4-pin adapters) can be special-ordered if necessary for backward compatibility reasons.

SI and SIP versions now use exactly the same board set as the SM/SMP, and therefore include 8MB memory. Older SI/SIP models had no memory.

Some new commands invoke new formats for displaying instrument status and configuration data and support XML output formats. These are used by the new terminal program, SeatermV2. Old DS and DC commands are retained for compatibility with Seaterm.

The new board sets can be installed in all 37-SI, SIP, SM, SMP, IM, and IMP MicroCATs built to date.