

MISO Facility: High Temperature Loggers

D. Fornari at WHOI helped to initially develop (with M. Olsson at DeepSea Power & Light-DSPL) high-T 'Hobo' fluid temperature loggers (~152°C - 417°C) over a decade ago, and DSPL provided them for many users in the oceanographic community for the past 10 years. These self recording loggers are rated to 6000m operating depth and have been pressure certified for use on Alvin. They have been used extensively and successfully at hydrothermal vents in the Pacific and Atlantic Oceans by numerous investigators over the years and the results have been published in numerous journal articles including: Fornari et al., [1996, 1998, 2003, 2004]; Fornari and Shank, [1999]; Langmuir et al., [1996]; Shank et al., [1998, 2001]; Sohn et al., [1998, 1999, 2005, in press]; Scheirer et al., [2006]). These types of loggers are currently in use at the East Pacific Rise 9° 50'N and the Juan de Fuca Ridge - Main Endeavour Field ISSs, and will be deployed in the Lau Basin in Fall, 2006 (C. Fisher, Penn State. U.).

Over the past two years, since DSPL stopped manufacturing these loggers and turned over to WHOI-MISO the drawings and related assembly and supplier information, I have provided refurbishment and supply services to various users. Two styles of loggers exist, as shown in Figures 1 and 2. The most recent (spherical housing) style has two Onsetundefined™undefined 32k recording chips, and a pressure barrier between the housing and the tip, that provides shipboard capability for refurbishment and redeployment as long as adequate supplies are on hand. The older style, cylindrical housings have been modified so that they now, too accommodate two Onsetundefined™undefined 32k recording chips. The main difference is that the old style cannot be refurbished at sea while the new ones can. The old style can be refurbished back at WHOI.

These loggers remain the only readily available, and relatively inexpensive self-recording high-T vent fluid temperature loggers, and they have provided important time-series information to R2K investigators working at various ISS sites. Most recently these loggers captured the 2005-2006 EPR eruption at 9° 50'N (K. Von Damm, pers. commun., unpubl. data, 2006).

Housings, end-caps and tubing tips are all made from Grade 2 Titanium. Welding of tubing tips to housing is done in an oxygen-free environment. All seal surfaces have been machined to tolerance and the entire housing is rated to 6000 m depth and certified for Alvin operation.

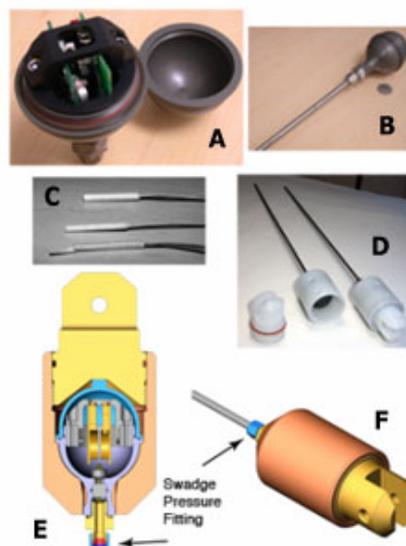
The logging chips are made by Onset Computer Corp. They are 8-bit, 32k StowAway Temperature logger models with an external platinum RTD sensor that has a range of ~152°C to 417°C (http://www.onsetcomp.com/Products/Product_Pages/older_data_loggers.html).

The platinum RTD sensor is specifically manufactured to measure temperatures in the ~152°C to 417°C range. Two RTDs are encased in high-temperature ceramic for each logger, to prevent damage to the fine wires that connect them to the Onset™ chips.

Batteries supplied with the logger are Lithium/thionyl chloride made by Tadiran Batteries Ltd. They are user replaceable and can be ordered from: <http://www.tadiranbat.com>

Care should be taken to properly dispose of the battery when normally discharged. Special instructions are provided below in Section 2.7 when the casing is flooded at depth as hydrogen and oxygen can be generated by electrolysis. MSDS sheets for these batteries are available at the following link at: <http://www.tadiranbat.com/primary.php>.

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[Enlarge Image](#)

New style (spherical housing) high-T logger. A) shows interior of spherical housing with 2 Onset computer chips (green wafers) visible. B) shows probe tip and housing (quarter for scale reference). C) RTD elements shown, lower one is raw RTD and upper two are encased in ceramic plug. D) loggers shown with polyethylene covers which also serve to attach syntactic foam for floatation. E-F) drawings of internal and external views of spherical high-T loggers showing location of Swage pressure fitting that seals tubing from the housing where the computer chips are stored. This configuration provides the ability to service the loggers at sea and replace tips that may have had to be broken off in chimney walls. In this case, the Ti tubing tips are replaced, as are the RTD elements and connector, and the unit can be placed back into service on the same cruise.



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Cylindrical (old style) high-T fluid temperature loggers currently manufactured and serviced by the MISO Facility. These loggers have been modified to accommodate two (2)- 32k Onset logging chips. When/if the tips are broken on recovery they must be returned to the facility for machining, re-welding and re-certification and installation of new logging chips.



[Enlarge Image](#)

New style logger (red arrow) imaged by TowCam on the R/V New Horizon cruise in M vent, EPR at 9° 50.6'N in May 2006. Data from this logger (recovered by Alvin in June 06) provide the first direct measurements of the impact of a volcanic eruption on hydrothermal vent fluid temperature (K. Von Damm, unpubl. data, 2006) and the correlation with microseismicity [Tolstoy et al., submitted]. (right) An old style logger being extracted from a vent with Jason2's manipulator.

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