

# Data Recovery Report

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During the second German Antarctic expedition with RV POLARSIRKEL in 1980/81 CTD profiles were measured by G. Wegner and W. Schönfeld; see Kohnen (1982), [hdl:10013/epic.10001](http://hdl:10013/epic.10001), page 39-43, data: [doi:10.1594/PANGAEA.785904](https://doi.org/10.1594/PANGAEA.785904)

After the cruise, the data were processed and transferred from punched paper tape to magnetic tape. The responsible oceanographer during the cruise was Gerd Wegner working since 1976 at the Bundesforschungsanstalt für Fischerei which became in 2008 part of the Johann Heinrich von Thünen-Institut, Hamburg. When he prepared his retirement during 2011 he became aware that the magnetic tapes were not readable anymore. Fortunately the raw-data still exist on paper tapes and processed data on line prints. G. Wegner transferred the complete material to the Alfred-Wegener-Institut where Eberhard Fahrbach and Gerd Rohardt recognizing the value of these very first data measured by a German expedition in front of the Filchner Shelf Ice and in Atka Bay took care of the transfer of the data to PANGAEA. However, it became obvious that it was almost impossible to get access to an operational punched paper tape reader. Therefore by help of H. Grobe and PANGAEA the line prints were typed in by hand. The processing of regenerated data occurred in the context of practical training of students, Linda Baldewein (Jacobs University, Bremen) and Patricia Handmann (Institut für Technologie, Karlsruhe) in June/July 2012.

This report describes the procedure to recover CTD profiles from line prints which are now saved in PANGAEA data base. It consisted in the following steps:

## 1. Transfer from line print to data file

Michael Seebeck (AWI) typewrote the huge pile of line prints which results in 65524 lines in an Excel file. The typed variables were depth (one decimal place), temperature and salinity (both with 2 decimal places). They were transferred into the Excel list. The line prints contained further derived parameters which were not typed since they can be recalculated if needed.

## 2. Validate the names and meanings of variables

The header line in the line print indicated the variable "Tiefe (depth)" but "Druck (pressure)" was not listed. Because "Tiefe (depth)" was given without dimension ("Tiefe" instead of "Tiefe [m]"), it was not absolutely clear whether pressure in dbar or depth in m was printed. The expedition report and the protocols could not resolve this question. For this reason the potential temperature was computed for two cases. A: Assuming "Tiefe" means the depth given in meters; than pressure has to be recomputed. B: Assuming "Tiefe" means pressure in decibar. The comparison of the re-computed potential temperature with the number in the line print concludes that "Tiefe" was most likely the depth in meters. In 1980/81 temperature was recorded as T68. Therefore it was converted to T90.

## 3. Identify station data

Station data consisting of station number, position, water depth, date and time was typewritten by M. Seebeck in a separate Excel sheet. No information was found in the protocols whether the indicated water depth was corrected to the true water depth. Most likely the given depth is the echo sounder reading based on 1500 m/s

sound velocity. The indicated latitude and longitude can be erroneous in some cases because the radio station was interacting with the position log. Errors related to this effect could not be clearly identified.

#### 4. Quality control

The typewritten Excel sheet was read and split into single files for each profile. The station data were added which were read from the station data Excel sheet.

Temperature- and salinity profiles were plotted to be checked for spikes resulting from typewriting errors. These spikes were interpolated applying a standard deviation filter. Errors in the station data were checked and corrected manually. In total about 8% of values were interpolated.

#### 5. Accuracy

The cruise report and folders with handwritten notes from G. Wegner did not mention whether temperature or salinity corrections were applied. Because of the reduced resolution due to the format in line prints (2 decimal places) we can assume that the accuracy given by the manufacturer is better than the resolution of the indicated data. The technical data of the "Multisonde" according to manufacturer's declaration in the user manual was taken from Sy (1883):

|              |                     |                                 |
|--------------|---------------------|---------------------------------|
| Pressure     | Principle           | Strain-Gauge Pressure Cell      |
|              | Range               | 0 – 6000 dbar                   |
|              | Resolution          | 16 bit := 0.2 dbar              |
|              | Accuracy            | 0.35% of range                  |
| Temperature  | Principle           | Platinum Resistance             |
|              | Range               | -2 to 35 °C                     |
|              | Time lag            | 60 ms without protecting sheath |
|              | Resolution          | 16 bit := 1 mK                  |
|              | Long Term Stability | ± 5 mK/0.5 y                    |
| Accuracy     | ± 5 mK              |                                 |
| Conductivity | Principle           | Symmetric Electrode Cell        |
|              | Range               | 5 to 55 mS/cm                   |
|              | Resolution          | 16 bit := 1 µS/cm               |
|              | Long Term Stability | ± 10 µS/cm/0.5 y                |
|              | Accuracy            | ± 5 µS/cm                       |

Still, since we do not know the calibration status of the CTD, we have to take into account that the accuracy is somewhat below the manufacturer's indication.

#### 6. Regular pressure levels

The profiles were linearly interpolated to 1 dbar pressure intervals so that data are consistent with other data sets in the PANGAEA data base. Afterwards derived parameters were computed from pressure, temperature and salinity.

#### References:

Sy, Alexander (1983) "Warmwassersphäre Handling and Processing of Hydrographic Data; Nr 111 Technical Report". Berichte aus dem Institut für Meereskunde Kiel