

CSIRO Division of Oceanography/RV Franklin CTD format guide

=====

The output format for our CTD data has changed in some ways. The basic format of the data files has remained unchanged, but now many files are concatenated into one. Normally, all stations for one cruise will be in one file, but, if data has been extracted for a specified area and range of dates, regardless of specific cruises, stations from many cruises will be in the same file.

The format of each file is such that it is easy to unpack the data into separate files for each station at the destination site.

There may or may not be some cruise header records. These header records will not be present when data from a number of cruises has been put into one file (such as when all stations within a time or lat/long range have been extracted from the archive). They can only be present when data has been extracted into one file per cruise, and may not be present then if they have not been requested.

Overall file structure

=====

If the header records are present, the first record includes the count of the total number of header records. To skip the header records, either read this number and skip as appropriate, or read through the file until the first record consisting of 80 x 'S' characters is found.

The data for each station is preceded by a record consisting of 80 x 'S', then a record with an 'S', one blank space, the 9 character name that we used for the file on our system, then the total number of header and data records for the station.

Header format

=====

If the header is present, the first record consists of the character 'H', the cruise id, the number of stations in the cruise, the cruise start and end dates, the number of 'quantity descriptor records', the number of comment records, the number of records in the station list and the total number of header records (including this record). They are written using the FORTRAN format (see example) :

('H ',a7,i5,2(x,a11),4i6)

A set of 'quantity descriptor records'. These records list all quantities present for this cruise and their units. (see example). Note that some quantities may not be present for all stations. These records all begin with a 'Q', and are preceded and followed by records consisting of 80 x 'Q' (these two records are included in the count in the first record).

A number of comment records. These records all begin with a 'C', and are

preceded and followed by records consisting of 80 x 'C' (these two records are included in the count in the first record).

A station list. For each station number within the cruise, the station id, latitude, longitude, date (UTC), start time (UTC), bottom depth, maximum sample pressure and number of samples. If a station doesn't exist, the record is left blank. The information is written using the FORTRAN format

```
('L ',a9,2x,a9,2x,a10,2x,a11,2x,i4,'Z',4i6)
```

The station list is preceded and followed by records containing 80 x 'L' (these two records are included in the count in the first record).

A typical sequence of FORTRAN statements to skip over the header records (if present) would be:

```
read(inunit,'(a80)')charbuf
if(cbuf(1:1).eq.'S')then
  rewind(inunit)
else
  read(charbuf(57:62),'(i6)')nhead
  do i=1,nhead-1
    read(inunit,'(a80)')charbuf
  end do
end if
```

(the next record in either case will be the 'SSSSSS....' record preceding the first station).

Station format
=====

A typical sequence of FORTRAN statements to unpack a station would be:

```
1000 read(inunit,1000)file,nrecs
      format(/,2x,a9,i8)
      if(nrecs.eq.-1)goto (finished)

      open(outunit,name=file//'.ave',form='formatted',status='unknown')

      do i=1,nrecs
        read(inunit,'(a)')charbuf
        write(outunit,'(a)')charbuf
      end do

      close(outunit)

(finished) close(inunit)
```

The last station in a file is followed by a record of 'E's, then, in the next record, an 'E', a blank where the file name would have been, and -1 for the number of records.

Note that charbuf must be at least 79 characters long for cruises where the

16-channel digitiser was not in use, and at least (79 + ndig X 13) characters long for cruises where the 16-channel digitiser was in use. 'ndig' here is the number of digitiser channels in use. Any digitiser channels which were used can, of course, be ignored at this stage.

See example.

Station data format

=====

For each station there are a total of 15 header records. These are followed by as many data records as are needed. Some header fields may be blank. Positions are determined from (in order of preference) 1. Gps, 2. back-calculated SATNAV data, 3. any other source. Note also that the maximum cast pressure is in decibars, and that the bottom depth is in metres, so for some deep stations the maximum cast pressure may be numerically greater than the bottom depth.

The header records are always in the same order, and all headers are always present, even if the information for some of the header records is not available.

The temperature scale for the temperature data is recorded in the 15th header record. This is always t68 (IPTS-68) for data up to the end of 1989, and t90 (ITS-90) from 01-JAN-1990 onwards. The conversion between the two temperature scales in the 'Oceanographic' range is :

$$\begin{aligned} t68 &= 1.00024 \times t90 \quad \text{or} \\ t90 &= 0.99976 \times t68 \end{aligned}$$

Care should be used when using temperature to calculate any derived quantities such as theta or sigma-theta, as most existing equation of state routines expect temperatures in t68!

Where the 16 channel digitiser was used, the digitiser channel labels are in columns 81-92, 94-105, etc of header record number 14.

Each data record consists of the averages for 2 decibar bins centred on even integers. Missing data is indicated by blanks. The data records contain the fields :

Cols	Quantity
====	=====
1- 6	Pressure (centre of interval) (decibars)
7-13	Temperature (t68 or t90 as above)
14-20	Salinity (psu)
21-27	Sigma-t
28-34	Anomaly of Specific Volume X 1.e+8
35-41	Geopotential anomaly (J/Kg)
44-49	Dissolved oxygen (micromoles/cubic decimetre)
62-67	Number of good samples in 2 decibar interval
68-73	Standard deviation of good temperature samples in the interval
74-79	Standard deviation of good conductivity samples in the interval

