



Wildlife Computers

Minimum-Maximum-Mean (3M)

This program takes a hexadecimal file generated by a single- or multi-channel Wildlife Computers Time-Depth Recorder, and generates a formatted ASCII file. A time interval must be specified over which the TDR data will be analyzed for minima, maxima and means. If you specify a time interval equal to the original sampling interval, the 3M program will behave as a simple hexadecimal to decimal conversion utility.

3M requires an IBM-PC, IBM-AT, 386 or compatible computer operating under DOS.

Step-by-Step Instructions

- 1) You are first asked for the hexadecimal file to analyze.

Enter HEX data file to analyze:

Enter a full path and filename. If the file cannot be found, you will be prompted to try again. The hexadecimal file must contain a hexadecimal listing (as generated by the TDR's L2 or L3 command). The listing need not be at the start of the file (*i.e.*, the file may contain "header information" from the TDR's B command prior to the L2 listing).

- 2) You are next shown the sampling protocols used by the recorder and asked for the time period over which the sample, minimum, maximum, and mean values will be produced.

Enter period for calculations which must be a multiple of *nnn* seconds.

This period can be suffixed with M, H, or D for minute, hour, or day:

This time period must be a multiple of the fundamental sampling period used by the recorder (*nnn*). The default time unit is seconds. You can enter the time period in minutes, hours, or days by using the suffix M, H, or D respectively.

The choice of units also affects the synchronization of the averages: H (hours) will force the output to synchronize on the first hour change, D (days) will force the output to synchronize on the first day change.

This should be made clear by the following examples:

Unit starts recording at 08:25:30 on 22 Dec with a sampling interval of every 15 seconds. The following time periods will generate the following data:

<u>Time Period</u>	<u>Result</u>
1M or 60	The first average (line of output) will be from 08:25:30 to 08:26:15 inclusive, the next will be from 08:26:30 to 08:27:15, and so on...
10M or 600	The first average (line of output) will be from 08:25:30 to 08:35:15 inclusive, the next will be from 08:35:30 to 08:45:15, and so on...
1H	The first average (line of output) will be from 08:25:30 to 08:59:45 inclusive, the next will be from 09:00:00 to 09:59:45, and so on...
1D	The first average (line of output) will be from 08:25:30 to 23:59:45 inclusive, the next will be from 00:00:00 to 23:59:45, and so on...
360M	The first average (line of output) will be from 08:25:30 to 02:25:15 inclusive, the next will be from 02:25:30 to 08:25:15 and so on...
6H	The first average (line of output) will be from 08:25:30 to 08:59:45 inclusive, the next will be from 09:00:00 to 02:59:45, and so on...
0.25D	The first average (line of output) will be from 08:25:30 to 11:59:45 inclusive, the next will be from 12:00:00 to 17:59:45, and so on...

Note that 360M, 6H, and 0.25D will all average over 6 hours but behave slightly differently: 0.25D will synchronize onto the quarter day (00:00:00, 06:00:00, 12:00:00, 18:00:00), 6H will synchronize onto the hour, and 360M will not synchronize at all.

- 3) If the TDR has both a Depth and Aux Depth channel, and data were sampled on both, you will be prompted with:

Data were sampled on both the Depth and Aux Depth channels.

Do you wish to merge the Aux Depth channel data with the Depth data? [Y|N]:

If you press **Y**, 3M will process the Aux Depth channel readings as primary depth channel data (thus all Aux depth channel output, if selected, will be "blank") for the calculations.

For example: A sampling protocol was used with the primary depth channel for depths less than 400 meters, and the aux depth channel for depths greater than 400 meters. If you select "yes" for the merge then both the primary and aux depth readings will be used to calculate the minimum, maximum, and mean values; and the sample, minimum, maximum, and mean values for the aux depth channel will be "blank".

NOTE: If the TDR's sampling protocol reads both the primary and aux depth channels at the same rate (*e.g.*, sampled depth every 10 seconds and sampled aux depth every 10 seconds), 3M will use either the primary or aux depth reading, never both. The primary depth is used preferentially, unless the value has "pegged out", in which case the aux depth is used.

If you press **N**, 3M will treat the primary and aux depth channels separately, and calculate the output parameters for each.

- 4) You are next asked:

Do you wish to split your output into a separate file for each day of data? [y|n]:

3M can generate very large files; if you are averaging the output over a relatively short time period or have many days of data, the resulting output file may be too large for many editors and word processors.

3M gives you the option of creating a separate output file for each day of output data. Press **Y** if you wish your output to be split into separate files, **N** if not (note that if your time period is 1 day or greater, it does not make sense to split your files!)

If you press **Y**, you will be prompted:

3M will split each day's data into a separate file. These filenames will be suffixed with the day of year (e.g. '.001'). Enter the base for the output filename:

Enter a 1 to 8 character filename. 3M will create an output file for each day's output data named *xxxxxxx.nnn*, where *xxxxxxx* is the base that you enter, and *nnn* is the day of the year of the output data. If the file already exists, the new output data will be appended.

If you press **N**, you will be prompted:

Enter filename for output (SCRN:) for screen output:

Enter **SCRN:** (to direct the output to the screen), **LPT1:** (to direct the output to the printer connected to your computer's LPT1 port), or a valid DOS filename to get a disk file.

- 5) You are next presented with a list of output parameters and options for the output file: parameters are **what** get written to the output file, options define **how** they are written.

A>> Start date of min/max/mean/sample

The date of the beginning of the time period for which the output line is calculated. If you select this parameter, you will be asked to choose a format. Press the number preceding the format you want.

B>> Start time of min/max/mean/sample

The time of the beginning of the time period for which the output line is calculated. If you select this parameter, you will be asked to choose a format. Press the number preceding the format you want.

C>> Blank value designator

The option that defines the value for missing output. For example, if the TDR sampled depth every 10 seconds and temperature every 5 minutes, and you specified the time period to be every 1 minute, there would be no temperature data for output for minute 1-4. The value you specify here will appear as the "blank" or "missing" temperature designator for those lines.

You may specify "nothing" (e.g., pressing RETURN without entering any value) for this option.

D>> Haulout value

The option that defines the value to be output in the depth channel when the animal "hailed out" (the dry periods when a "wet, dry timed" protocol was used).

1>> Channel 1's name

n>> Channel n's name

The channels defined for the TDR are displayed. For each channel, you can specify the sample, minimum, maximum, and/or mean value to be written to the output. Press **1 - n** to select the channel; you are then prompted to press **1 - 4** to toggle sample, minimum, maximum, and mean between "yes" (written to the output) or "no" (not written to the output).

NOTE: The "sampled data" parameter produces an output parameter which contains the first data value for that channel in the time period.

The "mean" is calculated by summing the data values for the time period, then dividing the sum by the number of data readings encountered. This value could be skewed if the sampling period changed during the time period (*i.e.*, if the TDR sampled depth every second between 0-30 meters, then every 10 seconds at depths greater than 30 meters, the mean would be skewed towards shallow depths).

Press the **END** key when you are finished with your selections.

NOTE: 3M "remembers" these settings in a small file called "3M.CNF", and will pre-select them for you in subsequent runs of the program.

6) Once you press the **END** key, you are asked:

Do you wish to enter a from-to range to extract? [y|n]:

If you press Y, you will be prompted:

Press [M] to enter date range as month-day, or [D] as day of year. [M|D]:

If you press **M**, you are asked to enter the month, day, and hour for which you wish the output to start and end. If you press **D**, you are asked to enter the day of the year (where 1 is for January 1st, and 365 is December 31st) and hour. Data will be output through the specified times, inclusive. You may enter a start date and hour, then type the word **end** when prompted for the end month if you want the data to be processed from a certain start point to the end of the HEX file.

If you press **N**, the entire HEX file will be processed.

- 7) 3M now generates the output file. The day of the year and hour of the data readings being processed appear on the bottom of your screen. Press the **ESC** key if you wish to abort the process.

The output file(s) contains one line of data for each averaging period. Each line contains the data for each output parameter selected in the same order as in the option menu. Parameters are separated by commas.

3M also creates a file called "3M.RPT", which reports the files, parameters, and options you chose.