Decoding a Pathfinder Ensemble

Use the following information to help write software.

Rules for the BroadBand Data Format PD0

1. All data types (i.e. fixed leader, variable leader, velocity, echo intensity, correlation, percent good, etc.) will be given a specific and unique ID number. The table below shows some of the most common IDs.

Table 52:   Common Data Format IDs

ID	Description
0x7F7F	Header
0x0000	Fixed Leader
0x0080	Variable Leader
0x0100	Velocity Profile Data
0x0200	Correlation Profile Data
0x0300	Echo Intensity Profile Data
0x0400	Percent Good Profile Data
0x0500	Status Profile Data
0x0600	Bottom Track Data

2. Once a data type has been given an ID number and the format of that data has been published we consider the format for each field has being fixed. Fixed refers to units used for a given field, the number of bytes in a given field, and the order in which the fields appear within the data type. Fixed does not refer to the total number of bytes in the data type - see Rule 3.

3. Data may be added to an existing data type only by adding the bytes to the end of the data format. As an example, the variable leader data contains information on ensemble number, time, heading, pitch, roll, temperature, pressure, etc. The format for the bytes 1-53 are now specified by changes added in support to the Pathfinder. If additional sensor data is to be added to the variable leader data then it must be added to the end of the data string (bytes 54-x as an example).

4. The order of data types in an ensemble is not fixed. That is there is no guarantee that velocity data will always be output before correlation data.

5. The header data will include the number of data types in the files and the offset to each ID number for each data type.

6. The total number of the bytes in an ensemble minus the 2-byte checksum will be included in the header.

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Decoding Sequence for PD0 Data

1. Locate the header data by locating the header ID number (in the case of `PD0` profile data that will be 7F7F).

2. Confirm the correct header ID by:

   a. Locate the checksum offset (located in the header data). This is the offset to the checksum word in the current ensemble. The size of the ensemble is this offset plus 2 bytes (to account for the checksum word), which is also the offset to the next ensemble.

   b. Calculate the checksum of total number of bytes in the ensemble excluding the checksum. The checksum is calculated by adding the value of each byte. The 2-byte least significant digits calculated will be the checksum.

   c. Read the 2-byte checksum word at the end of the ensemble, located by using the checksum offset in the header (determined in step 2-a) and compare this checksum word to the value calculated in step 2-b.

   d. If the checksums match then this is a valid ensemble. If the checksums do not match then it is not a valid ensemble and should go back to step 1 and search for the next header ID number occurrence.

3. Locate the number of data types (located in the header data).

4. Locate the offset to each data type (located in the header data).

5. Locate the data ID type to decode by using the offset to each data type and confirm the data ID number at that offset matches the ID type looking for.

6. Once the proper ID type has been located, use the Pathfinder Technical Manual to understand what each byte represents in that particular data type.