

## **Wideband Systems, Inc. Recorder Archiving and Data Products**

Wideband Systems, Inc manufactures a family of telemetry recorders enjoying widespread use at the national ranges. These recorders are used to support both pre-detect and post-detect requirements and are typically configured with 16 analog and 16 digital channels. The recorders are disk-based and include a built-in multiplexer providing high bandwidth (upto 1600Mbps), multi-channel, robust and reliable recording. Excellent timing is provided with relative timing less than 1usec (ch-to-ch skew) and absolute timing less than 10usecs (using IRIG-B).

To complement the high-performance recorders, PC-based utility software and optional peripheral devices are available to provide data archiving and data product generation. Both of these functions involve the transfer of data from the recorder to low-cost, removable media (CD, DVD, AIT tape, disk, etc.). Most facilities have the requirement for both archiving and data product generation which is described in more detail below:

**Archiving** -- Each selected recording file (Record Sequence Number - RSN) is saved as an image copy similar to a computer backup. These files are aggregate multiplexed files which include all channels and all embedded timing information. This is an internal data format optimized for the real-time recorder and varies depending on channel configuration. This is the best and most efficient way to preserve mission data specifically with the intent of restoring the data back onto a recorder. If the local users and/or the end users need to reconstruct the original signals (i.e. playback the analog and digital PCM streams on a Wideband recorder) then archiving is the recommended procedure. Typically archive files are large with tape (AIT-3) or transportable disks the preferred media.

**Data Products** -- Each selected recording file (Record Sequence Number - RSN) is de-multiplexed into individual channel files. The user has the option to limit the time span and select specific channels to save. The data files are created in a simple, analysis ready format to promote easy file exchange and use. The two primary telemetry file types are analog and digital (PCM) which are described in more detail below. The data products are typically used to provide end users with their data in a form suitable for computer processing and typically are delivered on CD, DVD or transportable disks.

### **Data Products Output File Formats**

The data products output files are named as follows, where *filename* is the user-specified file name prefix and *n* is the data channel number. Output files are generated only for active channels.

Timing calibration file : *filename-IRIG.txt*  
Analog data files : *filename-An.dat*  
Digital (PCM) data files : *filename-Dn.dat*

The timing calibration file is generated only if the IRIG signal was available at the start of the recording. The output consists of comment lines that start with a semicolon, followed by two-column time series data. The first column is elapsed time in seconds from the beginning of data file. The second column is the relative drift between the IRIG time and the local time, measured in microseconds. A negative number indicates that the local clock is slower than the IRIG time.

The Analog data files are binary and stored in Little-Endian format. Each output file starts with a 16-word (64-byte) header followed by four 8-bit samples per word as shown below.

32-bit Word #	Description			
0	Recording Sequence Number (RSN)			
1	Year			
2	Julian Day			
3	Local reference time (seconds of the day)			
4	Local reference time (subseconds in microseconds)			
5	Channel number			
6	Sample rate (MHz, analog output file only)			
7	Reserved			
8-15	Reserved			
16	Sample1	Sample2	Sample3	Sample4
17	Sample5	Sample6	Sample7	Sample8
...	...	...	...	...
EOF	SampleN-3	SampleN-2	SampleN-1	SampleN

Separate time tags are not provided for the analog data since timing can be inferred by sample count, the sample rate (header word#6) and the reference time (header word#3&4).

The Digital (PCM) data files are binary and stored in Little-Endian format. Each output file starts with a 16-word (64-byte) header followed by an explicit timetag for each 32-bits of PCM data as shown below.

<b>32-bit Word#</b>	<b>Description</b>
0	Recording Sequence Number (RSN)
1	Year
2	Julian Day
3	Local reference time (seconds of the day)
4	Local reference time (subseconds in microseconds)
5	Channel number
6	Sample rate (MHz, analog output file only)
7	Reserved
8-15	Reserved
16	Timetag for the MSB of 1 <sup>st</sup> 32-bit word measured in usecs from reference time (header word#3&4)
17	1 <sup>st</sup> 32-bit PCM data word with earliest bit in MSB
...	...
...	...
EOF-1	Timetag for the MSB of N <sup>th</sup> 32-bit word measured in usecs from reference time (header word#3&4)
EOF	Nth 32-bit PCM data word with earliest bit in MSB

The timetags will not be at fixed intervals since the data is packed into 32-bit words without gaps. The timetag will roll over every  $2^{32}$  usecs (~71 minutes).