

## How To Configure the Gamma Parameters of the XXT DIM

It's important to realize that Gamma Logging, Gamma ("Gama") Updating and Gamma ("Gama") Telemetry are distinct activities and can be largely independent of each other.

Gamma values represent a "rate" of Gamma counts per second (CPS) which is calculated as the total number of Gamma Counts detected since the prior Gamma acquisition, divided by the time in seconds since the prior Gamma acquisition.

The following two parameters affect how Gamma values are represented:

1) The **GaHL** Parameter (located in the xxMWDconfig "Telemetry" group)

One of the first things to consider is the maximum Gamma value that you want to telemeter. This is selectable via the GaHL parameter as either 127, 255, 511 or 1023 CPS. The default GaHL value is 255. Set the GaHL parameter accordingly, then set a corresponding appropriate value for the GaLogb parameter.

2) The **GaLogb** Parameter (located in the xxMWDconfig "Gamma" group)

While Non-Packed Gamma values are logged as complete 32-bit floating point numbers, Packed Gamma values are logged as 16-bit numbers, and the GaLogb parameter indicates how many of these bits are to be used as "fraction" bits, with the remainder being used as "integer" bits. For example, if GaHL was set to 1023, then you'll need at least 10 "integer" bits in the logged Gamma value to accommodate a value of 1023. So if you set GaLogb to 6, this means the 6 LSBs of the Gamma value will be fraction bits and the 10 MSBs will be integer bits. The default value of GaHL is 255 for backwards system compatibility. For a value of 255, only 8 integer bits are required, so GaLogb = 8 will allocate 8 fraction bits and 8 integer bits, which is the default value for GaLogb. Regardless of the value of GaHL, a GaLogb setting of 6 or less is always safe.

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GaLogb should be 6 or less when GaHL = 1023

GaLogb should be 7 or less when GaHL = 511

GaLogb should be 8 or less when GaHL = 255 or 127 (GaLogb cannot be set > 8)

The following are some of the other key parameters used to configure Gamma Logging and control how and when the “Gama” parameter value gets updated. The following sections explain how these parameters interoperate. These parameters are located in the xxMWDconfig “Gamma” group:

#### 1) **GaLogI (Gamma Log Interval)**

If GaLogI is not 0: A Gamma measurement will be made and logged every GaLogI seconds. This measurement is only for the purpose of creating a Gamma Log entry. This Gamma measurement does not update or affect the “Gama” parameter used for telemetry.

If GaLogI = 0: Gamma Log entries are made whenever the “Gama” telemetry parameter is updated as described in the next paragraph.

#### 2) **GaAA (Gamma Auto-Acquisition) and GUpT (Gamma Update Time)**

If GaAA = “On”: A Gamma measurement will be made every GUpT seconds. This measurement will update the “Gama” telemetry parameter. If GaLogI = 0, then a Gamma Log entry will also be created when “Gama” is updated.

If GaAA = “Off”: The “Gama” parameter will only be updated immediately prior to each telemetry event, as required by the sequence definition string, e.g. TSq1. If GaLogI = 0, then a Gamma Log entry will also be created when the “Gama” telemetry parameter is updated.

3) **Disabling Gamma:** If GaLogI = 0 and either (GaAA = “On” and GUpT = 0) or (GaAA = “Off” and Gmax = 0), then Gamma acquisition and logging are disabled.

4) Some additional Gamma-related parameters to consider are:

- a. **Gmin** (Gamma Sensor Minimum Averaging Time)
- b. **Gmax** (Gamma Sensor Maximum Averaging Time)
- c. **Gsf** (Gamma Scale Factor)

**Gmin & Gmax** specify absolute minimum and maximum averaging times for the Gamma value. These limits take precedence over any other parameters.

**Gsf** is a multiplier on the Gamma measurement. A value of 1.000 (typical) results in Gamma rate values that have units of Hz.

You can read more about these parameters and the other Gamma-related parameters by using the F1 Help available from within xxMWDconfig.

### **IMPORTANT NOTE about using PACKED GAMMA LOGGING**

The “**GaLogb**”, “**GaLogl**”, “**GaAA**” and “**GUpT**” parameters are stored in the Tool and referenced when Logging or Downloading Packed Gamma data. The values of these parameters must be configured prior to logging any Gamma data into the Packed Gamma Log file. These parameters must not be subsequently altered while performing Packed Gamma Logging or before downloading the Packed Gamma Log File using xxMemIO. If these parameters change during logging or are different when downloading than they were while logging, then the data downloaded from the Tool will not be correctly interpreted. After any change to any of these parameters, the Packed Gamma Log file must be reformatted so as to “start fresh” with the data stored in the Tool’s Packed Gamma Log.

### **There are two types of Gamma Log Files**

Before doing any Gamma Logging, the Gamma Log file in the Tool must be formatted. The user must select, and then format, which type of Gamma Logging data storage is going to be used. Within xxMemIO, click on either:

- The “Gamma Log” Folder or
- The “Packed Gamma Log” Folder

Then click the “Format” or “Reformat” button to make this selection and format the memory for the gamma logging data accordingly.

The “Packed Gamma Log” only allocates time tags periodically, and then derives the time tags for subsequent gamma log entries based on the logging interval indicated by either the GaLogl or the GUpT parameter. For this reason, whenever formatting and using a “Packed Gamma Log” file, it is necessary that either:

- GaLogl be non-zero
- Or if GaLogl = 0, then GaAA is set to “On” and GUpT is non-zero

If at least one of these two requirements is not met, then a predictable logging interval cannot be inferred as required by the Packed Gamma “unpacking” process. Conversely, the regular (Non-Packed) Gamma Log inserts a time tag into the Gamma Log file for each and every Gamma Log entry.

- If the “Gamma Log” folder was selected and formatted, then the Gamma Log files will contain the string “gamaLog” in the file name
- If the “Packed Gamma Log” folder was selected and formatted, then the Gamma Log files will contain the string “gam2Log” in the file name

Note that when using the “Packed Gamma” format, xxMemIO will “unpack” the Tool’s Packed Gamma Log file to provide an accurate conversion of its contents, including the generation of the Time Tags and the application of the GaLogb parameter for converting the logged (and packed) 16-bit Gamma values back into their equivalent numerical representations. If you attempt to view a packed “RAW” file directly, it will not appear to be correct, because it has not yet been “unpacked” by xxMemIO.

**IMPORTANT NOTE:** If you will be using the Packed Gamma Log format, then be sure to double-check your settings for **GaLogl, GaAA and GUpT** to make sure that either GaLogl is nonzero and/or GaAA is set to “On” with a non-zero value for GUpT. The existence of a predictable logging interval is required for the successful use of a Packed Gamma Log!

### **Telemetry the Gamma Values**

Make sure that your Toolface/Logging Sequence Strings are composed to telemeter the desired number of bits and that the default (‘o’) telemetry format is used. For example, “Gama:8” (which is the same as “Gama:o8”) or “Gama:10” (same as “Gama:o10”).

It is common to telemeter a Gamma value which has lower resolution than what is being acquired and logged. For example, if GaHL is set to 1023, the user might still want to telemeter Gamma as an 8-bit value. In this case, “Gama:8” will result in telemetering an 8-bit scaled-down representation of the full 10-bit Gamma value, where each bit represents a count of 4 Hz.

## **Gamma Log Capacity and Logging Intervals**

On the XXT DIM, Part# XPN175080-02, the Gamma Log File capacity is as follows:

a) Non-Packed Gamma

- 1 Gamma Value per 8-Byte Record
- 16,352 8-Byte Records Total
- Total Log Capacity is 16,352 Gamma Values

b) Packed Gamma

- 13 Gamma Values per 32-Byte Record
- 4,088 32-Byte Records Total
- Total Log Capacity is up to 53,144 Gamma Values (maximum)

Note that in practice, Packed Gamma Logging will hold less than 53,144 Gamma values as not all of the records will be fully filled (records are always closed at Flow-Off – even if not full). Packed Gamma Logging will typically provide at least 3 times the capacity of Non-Packed Gamma Logging.

If you want to set your Gamma Logging Interval such that you can accumulate logged data for a certain number of hours before filling up your Gamma Log, then you can use the simple calculation below to determine an appropriate logging interval:

- Logging Interval = (Desired Number of Hours \* 3600) / 16,352 (Non-Packed) or
- Logging Interval = (Desired Number of Hours \* 3600) / 53,144 (Packed)

Then set your GaLogI, GaAA and GUpT parameters accordingly to realize the desired number of logging hours.

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