

EggTIMER Telemetry Data Format Specification

The EggTIMER Telemetry data format is very simple, it consists of a number of individual data elements that are sent on an as-needed basis. Data is streamed out by the altimeter at two second intervals. The actual data that is sent out depends on the flight phase; obviously, you can't send out data for apogee if you're still waiting to launch. The Eggfinder LCD receiver updates displayed data based on each individual data element separately; it does not wait for an "end of transmission" or similar indicator. The data stream is all human-readable ASCII, in the following format:

Trigger byte – a single ASCII byte that specifies what kind of data this is

Data – 1 to 8 bytes of ASCII data, depending on the data type

Terminator byte – always an ASCII ">" character

Specifications for the data is listed below.

EggTIMER Telemetry Data Format (5/2021)

Element	Units	Trigger	Format	Data Range	Actual Range	Notes
Flight Time	Secs	#	nnnn	0000 to 9999	0 to 9999	
Altitude/100	Feet	{	nnn	000 to 999	0 to 99,900	
Altitude	Feet	<	nnnnn	00000 to 99999	0 to 99,999	
Velocity	fps	(	-nnnn	-9999 to 9999	-9999 to 9999	After LD Only
Acceleration	G's	\	-nnn	-999 to 999	-99.9 to 99.9	After LD Only
Flight Phase	state	@	n	see below		
Channel Enabled	state	~	nnnnnn	A to F	A to F	
Channel Disabled	state	~	nnnnnn	- for each disabled channel	-	
Channel Fired	state	~	nnnnnn	1-6	1 to 6	
Temperature * 10	C	!	-nnn	-999 to 999	-99.9 to 99.9	
Name/Callsign	text	=	xxxxxxx	blank/x(8)		
Battery Voltage * 10	V	?	nnn	000 - 999	00.0 to 99.9	
Apogee	ft	%	nnnnn	00000 - 99999	0 to 99999	After NO Only
Max Velocity	fps	^	nnnn	0000 - 9999	0 to 9999	After NO Only
Max Acceleration	G's	[	nnn	000-999	0 to 999	After NO Only

Note: All data elements are terminated with >

Flight Phases:	Code	LCD	Notes
Waiting for Launch	1	WT	
Launch Detected	2	LD	
n/a	3		
Low velocity Detected ($|V| < 100$ fps for > 1 sec)	4	LV	
Nose-Over	5	AP	
Drogue Fired	6	DR	(Quark Only)
Main Fired	7	MN	(Quark Only)
Failsafe Triggered	8	FS	(Quantum/Proton)
Landing Detected	9	TD	

Different devices send different types of data, because not every altimeter has the same hardware. For example, only the Proton sends out acceleration data because it's only one with an accelerometer, and the Quark doesn't have much flash memory so its data is necessarily limited. The data sent by device is listed below.

Element	Quark				
	Pre-D3	Quark D3+	ION	Quantum	Proton
Flight Time			X	X	X
Altitude/100		X	X	X	X
Altitude	X				
Velocity			X	X	X
Acceleration * 10					X
Flight Phase		X	X	X	X
Channel Enabled				X	X
Channel Disabled				X	X
Channel Fired		X		X	X
Temperature * 10			X	X	X
Name/Callsign			X	X	X
Battery Voltage * 10			X	X	X
Apogee		X	X	X	X
Max Velocity			X	X	X
Max Acceleration in G's					X

Data Transmission for each flight phase looks like this:

Element	Units	Trigger	Format	Data Range	Actual Range	Notes	Bytes	Initial	Waiting	Launched	Nose-Over	Drogue	FS/Main	Landed
Flight Time	Secs	#	nnnn	0000 to 9999	0 to 9999		6	6	6	6	6	6	6	
Altitude/100	Feet	{	nnn	000 to 999	0 to 99,900		5	5	5	5	5	5	5	
Altitude (Quark Pre-D3)	Feet	<	nnnnn	00000 to 99999	0 to 99,999		7	7	7	7	7	7	7	
Velocity	fps	(	-nnnn	-9999 to 9999	-9999 to 9999	After LD Only	7	7		7	7	7	7	
Acceleration * 10	fps2	\	-nnn	-999 to 999	-99.9 to 99.9	After LD Only	6	6		6	6	6	6	
Flight Phase	state	@	n	1-9	1-9		3	3	3	3	3	3	3	3
Channel Enabled	state	~	a	A-F	A-F	Before LD Only	4 or 8	8	8					
Channel Disabled	state	~	-	-	-	Before LD Only	4 or 8	8	8					
Channel Fired	state	~	n	1 to 6	1 to 6	After Launching	4 or 8			8	8	8	8	
Temperature * 10	C	!	-nnn	-999 to 999	-99.9 to 99.9		6	6	6	6	6	6	6	
Name/Callsign	text	=	xxxxxxx	blank/x(8)			10	10	10	10	10	10	10	10
Battery Voltage * 10	V	?	nnn	000 - 999	00.0 to 99.9		5	5	5	5	5	5	5	5
Apogee	ft	%	nnnnn	00000 - 99999	0 to 99999	After NO Only	7				7	7	7	
Max Velocity	fps	^	nnnn	0000 - 9999	0 to 9999	After NO Only	6				6	6	6	
Max Acceleration	G's	[	nnn	000-999	0 to 999	After NO Only	5				5	5	5	

An important part of the Eggtimer Telemetry format is data retransmission. Some data is real-time and is not repeatable (altitude, velocity, acceleration, time of flight), and some data is repeated every transmission after it happens (channel status, flight phase). Data transmission from rockets can be interrupted for a

number of reasons, and it is likely that “some” data will be lost in transmission. If you just lose a transmission or two, it shouldn’t matter; you should still be able to tell how your rocket is moving, what flight phase it’s in, and the status of the deployment channels. By repeating that status information at each transmission rather than sending it only when it occurs, you’re virtually assured of receiving it.

You may be wondering why we didn’t just use a CSV type data transmission. One reason is so it can’t confuse the Eggfinder receiver’s GPS mode. None of the trigger characters and the “>” terminator character are found in the common NMEA GPS transmissions. If you have an Eggfinder GPS transmitter and an Eggtimer Telmetry Module transmitting on the same frequency/ID, and your Eggfinder LCD receiver is in TX/Mini/TRS mode, the ETM transmission will basically be discarded.

A CSV transmission would also have required a more robust and complex transmission with some kind of data integrity checking, because a missing element could mess up the entire CSV file. That would be beyond the capabilities of the Eggtimer Quark, so in order to provide the widest compatibility with Eggtimer altimeters, we decided to go with a simple data element based format.

An Example Transmission

Here’s an example of a data transmission from an Eggtimer Proton, it has all of the data elements. The transmission is in one continuous stream, there are no CR or LF’s; we’ve added them here for clarity. Note that there are missing packets, and some that are corrupted in transmission. Because of the data element based transmission, the only data that is “missed” are those elements that are either not received at all or are received incompletely. Intact individual data elements are logged and updated by the LCD receiver.

```
{000>@1>#0000>~AB---->?079>! 211>=KM6ZFL>
```

```
{000>@1>#0000>~AB---->?079>! 211>=KM6ZFL>
```

This was repeated a lot.... Pre-launch data

@1 == Waiting for Launch

#000 == Zero altitude AGL

~AB---- == CH1 enabled, CH2 enabled, CH3-CH6 disabled

?079 == 7.9V You shouldn’t see that voltage change very much, if at all, during the flight

!211 == 21.1C You’ll see this change a little bit during flight, however the temperature sensor isn’t highly responsive

=KM6ZFL == Name field (a Ham call sign)

{040>@2>#0010>~AB---->(0213>\-001>?079>! 212>=KM6ZFL>01>?079>! 212>=KM6ZFL>

First launch data... we didn't get the first few seconds of data, but you're probably looking at your rocket anyway...

Depending on a lot of factors, you may get data all the way from launch, or you may lose a few seconds at launch

{040 == 4000'

@2 == Launched

#010 == 10 secs

(0213 == 213 fps

\-001 == -1G acceleration

Data is basically the same from this point for a few seconds... except it's slowing down and going higher

{045>@2>#0014>~AB---->(0072>\-001>?079>! 212>=KM6ZFL>

{046>@4>#0016>~AB---->(0033>\-001>?079>! 212>=KM6ZFL>

{046>@5>#0018>~1B---->(2787>\ 000>%04679>^0660>[025>?079>! 210>=KM6ZFL>

First nose-over data...

~1B---- == CH1 fired

%04679 == Apogee 4679'

^0660 == maximum velocity 660 fps

[025 == max acceleration 25G

Note the velocity of (2787; this is due to the ejection on the baro sensor, it's not all that unusual to see a spike like that. Velocity in the Proton is based on the accelerometer until nose-over; at that point, it's based on the barometer because accelerometer-based velocity doesn't work will on descent under paracutes.

Now you're basically going to be seeing a lot of the same data, except for a drop in altitude an minor changes in velocity...

{045>@5>#0020>~1B---->(-0354>\ 0=KM6ZFL>

{043>@5>#0022>~1B---->(-0029>\ 004>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{043>@5>#0024>~1B---->(-0023>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{042>@5>#0026>~1B---->(-0028>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{042>@5>#0028>~1B---->(-0035>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{041>@5>#0030>~1B---->(-0029>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{040>@5>#0032>~1B---->(-0032>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{040>@5>#0034>~1B---->(-0021>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{039>@5>#0036>~1B---->(-0028>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{038>@5>#0038>~1B---->(-0028>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{038>@5>#0040>~1B---->(-0031>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>

{037>@5>#0042>~1B---->(-0043>\ 000>%04679>^0660>[025>?079>! 208>=KM6ZFL>

{037>@5>#0044>~1B---->(-0040>\ 000>%04679>^0660>[025>?079>! 209>=KM6ZFL>


```
{007>@5>#0120>~1B---->(-0033>\ 000>%04679>^0660>[025>?079>! 203>=KM6ZFL>
{006>@5>#0122>~1B---->(-0030>\ 000>%04679>^0660>[025>?079>! 202>=KM6ZFL>
{006>@5>#0124>~1B---->(-0033>\ 000>%04679>^0660>[025>?079>! 202>=KM6ZFL>
{005>@5>#0126>~1B---->(-0040>\ 000>%04679>^0660>[025>?079>! 202>=KM6ZFL>
{005>@5>#0128>~1B---->(-0034>\ 000>%04679>^0660>[025>?079>! 202>=KM6ZFL>
{004>@5>#0130>~1B---->(-0020>\ 000>%04679>^0660>[025>?079>! 202>=KM6ZFL>
{004>@5>#0132>~1B---->(-0023>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
```

```
{003>@5>#0134>~12---->(-0022>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
~12---- == CH1 fired, CH2 fired (the Main fired, at < 400')
```

Note that the velocity after the Main fires doesn't really change much; that's because the drogue ejection shook the Main payload section shear pins loose, and the Main chute came out near apogee. Time to install bigger shear pins...

```
{002>@5>#0136>~12---->(-0036>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
{002>@5>#0138>~12---->(-0013>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
{001>@5>#0140>~12---->(-0030>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
{001>@5>#0142>~12---->(-0032>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
{000>@5>#0144>~12---->(-0015>\ 000>%04679>^0660>[025>?079>! 201>=KM6ZFL>
```

Last received near-ground packet...

If you get a ground packet, you'll also see @9 ("touchdown", TD status on the LCD receiver), the frequency of the transmission will depend on the altimeter. The Quark, Quantum, and Proton all beep out the apogee after landing, and send the @9 status, so it's typically about 15 seconds between transmissions.