Advanced Telemetry Linked Acquisition System ATLAS 10

Scatterplot Samples

1. Introduction

This document provides guidance for working with Scatterplot Samples in ATLAS 10.

The explains the current functionality so users understand the values that are calculated and displayed in various scenarios.

The intent is to evolve this guide based on user feedback and issues raised through our support channels.

1.1 Structure

Guidance is currently provided for:

- Scatterplot Sampling modes

1.2 Feedback

Please submit errors and suggestions for future releases through the ATLAS 10 Zendesk Portal.

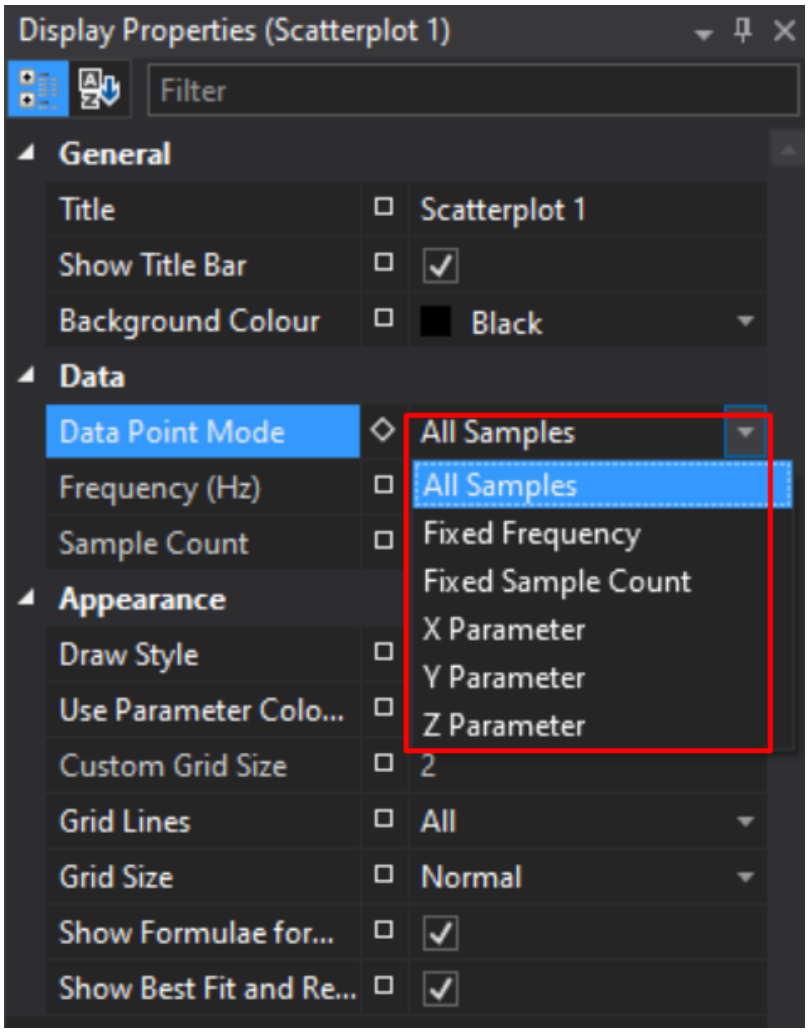
https://mclarenappliedtechnologies.zendesk.com/hc/en-us

2. Scatterplot Sampling modes

2.1 Overview

In the ATLAS 10 Scatterplot, there is a selection of different Data Point Modes. The different Data Point Modes alter the way in which the X, Y (and Z) samples are calculated for plotting co-ordinates on the scatterplot.

These can be accessed via the Display Properties Window for the Scatterplot.



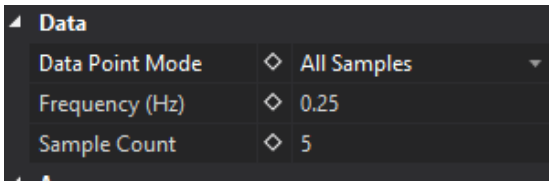
There are 6 different modes

- All Samples
- Fixed Frequency
- Fixed Sample count
- X Parameter
- Y Parameter
- Z Parameter

This section of the document will explain each of the Data Point Modes, with a worked example of which points will be drawn on the scatterplot display

This is set on a DISPLAY level, so any plots within that display inherit these properties

2.2 All Samples Mode



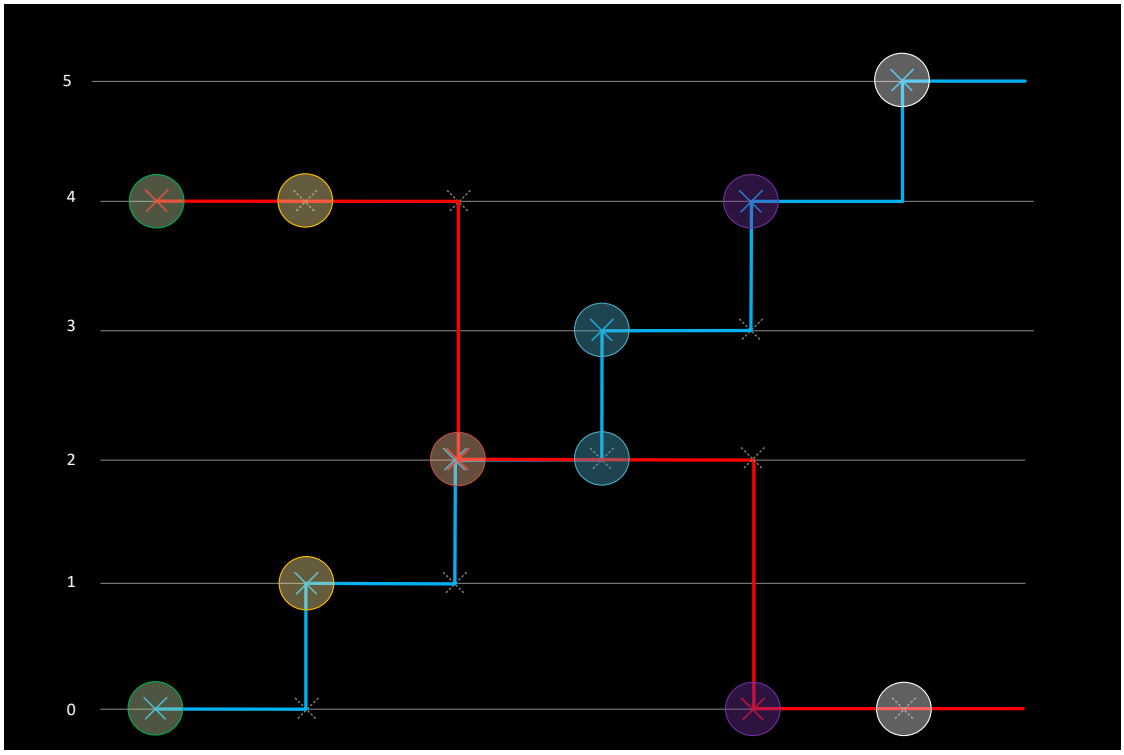
Note, in this mode the Frequency (Hz) and Sample Count fields are ignored and read only.

2.2.1 ATLAS >= 10.4.1 - All Samples Mode

All Samples Mode in ATLAS 10 Versions >= 10.4.1 operates by taking each sample of the Highest rate parameter, and referencing the sample and hold values of the other parameter(s). There is no averaging of samples, and only real values will be plotted.

If the X Parameter is logged at 100Hz, and the Y at 10Hz, the Y parameter will effectively be super-sampled at 100Hz, in order to plot a point for each X parameter sample. If super-sampling is not desired, it is recommended to create a function(s) which down-sample parameters where required such X, Y (and Z) are all at the same rate.

2.2.2 Example – All Samples - ATLAS >=10.4.1



Time	X Parameter Value (Blue) 2Hz	Y Parameter Value (Red) 1Hz	X Co-ordinate plotted	Y Co-ordinate plotted
0.0	0	4	0	4
0.5	1		1	4
1.0	2	2	2	2
1.5	3		3	2
2.0	4	0	4	0
2.5	5		5	0

2.4 ATLAS >=10.4.3 – X, Y, Z Parameter

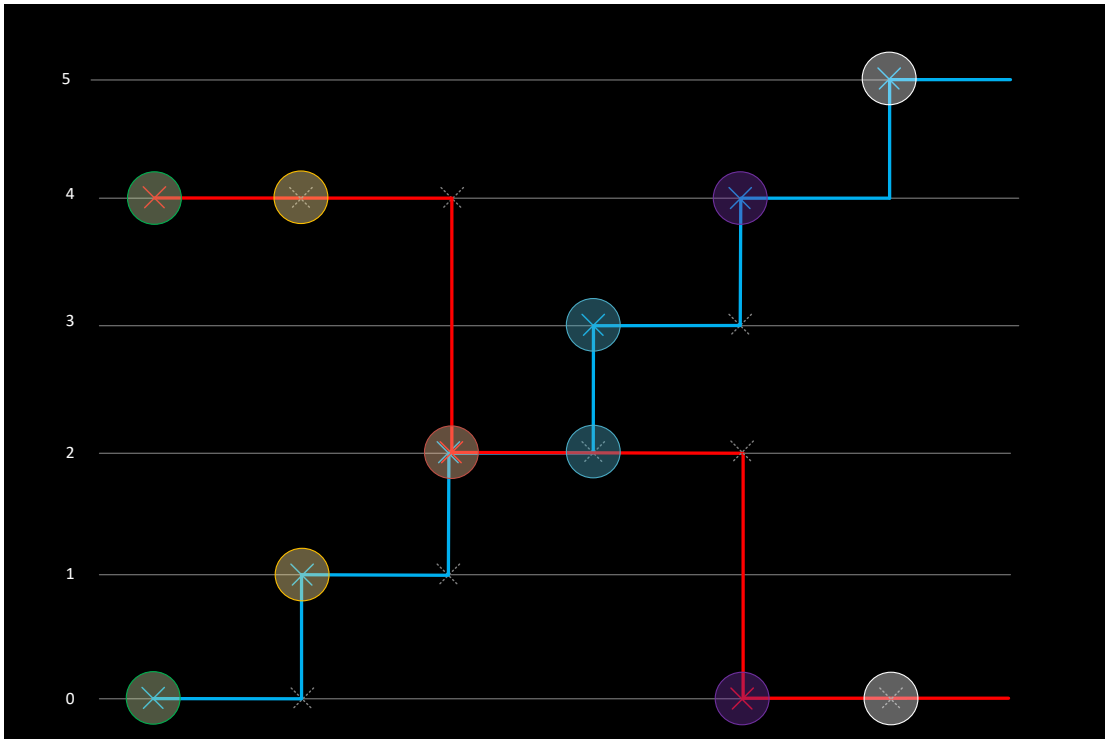
ATLAS 10.4.3 introduced 3 new modes in the scatterplot. X, Y and Z Parameter.

These work in a similar manner to "All Samples" mode, however instead of inferring the Highest rate parameter and using that to look up corresponding values on the other axes, the user can specify explicitly whether the X, Y or Z parameter is used as the "master".

For example, if "X Parameter" is selected, then for every sample of the X Parameter, a corresponding vale of Y (or Z) is referenced regardless of the rate of the these parameters.

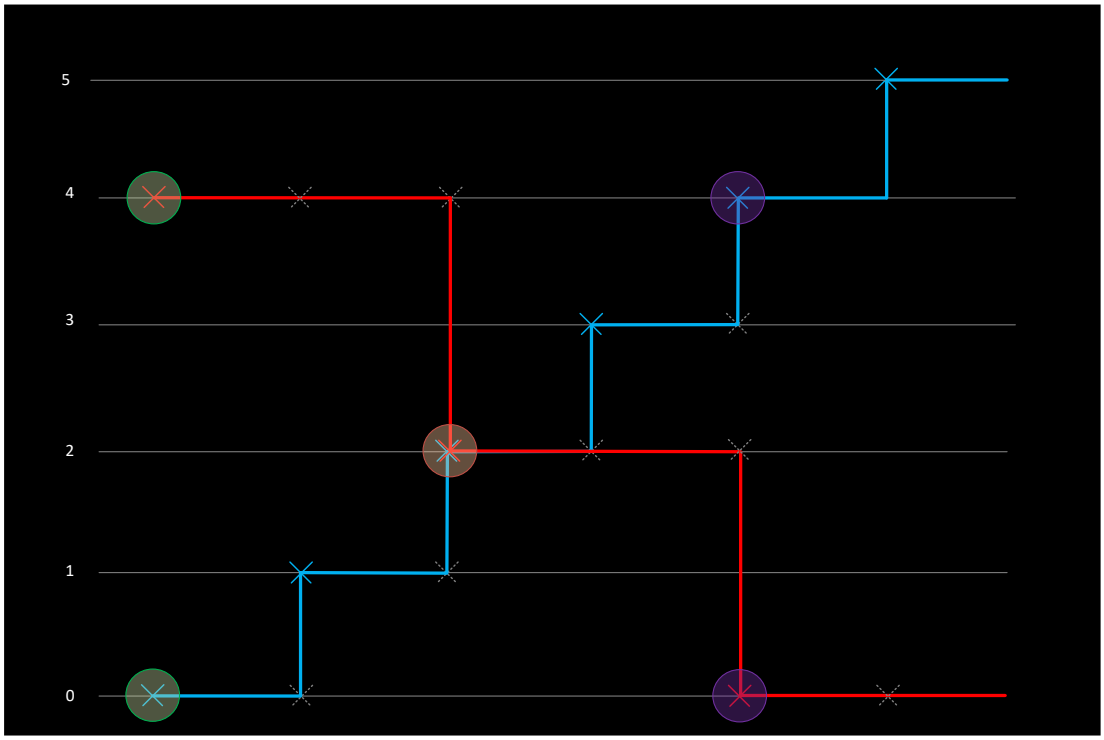
Similarly, if "Y Parameter" is selected then for every sample of Y, corresponding samples of X (or Z) are referenced

2.4.1 Example – X Parameter



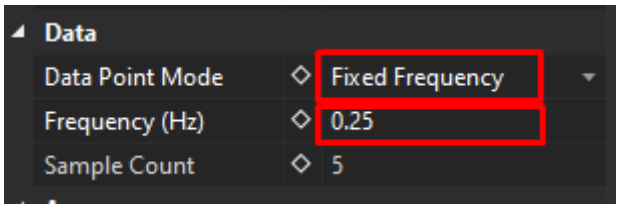
Time	X Parameter Value (Blue) 2Hz	Y Parameter Value (Red) 1Hz	X Co-ordinate plotted	Y Co-ordinate plotted
0.0	0	4	0	4
0.5	1		1	4
1.0	2	2	2	2
1.5	3		3	2
2.0	4	0	4	0
2.5	5		5	0

2.4.2 Example – Y Parameter

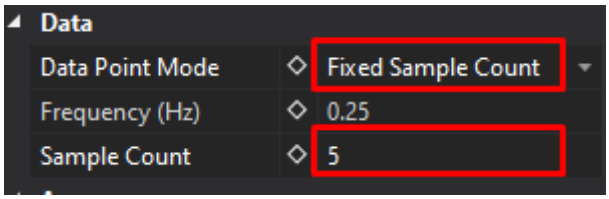


Time	X Parameter Value (Blue) 2Hz	Y Parameter Value (Red) 1Hz	X Co-ordinate plotted	Y Co-ordinate plotted
0.0	0	4	0	4
0.5	1			
1.0	2	2	2	2
1.5	3			
2.0	4	0	4	0
2.5	5			

2.5 Fixed Frequency & Fixed Sample Count Modes



Fixed Frequency mode reads the Frequency (Hz) field. It ignores Sample Count



Fixed Sample Count mode reads the Sample Count field. It ignores Frequency (Hz)

Fixed Frequency & Fixed Sample Count Modes calculate samples to plot in a very similar way, so for the purposes of explanation they will be explained together. Both of these modes calculate a Time Period and then plot **averages** of X, Y or Z parameters over that Period. If a Period only spans a single sample, then the real sample value will be used, however if the Period spans multiple samples, then those samples will be averaged. The only difference between the modes is how the Time Period is calculated.

2.5.1 Fixed Frequency Period Calculation

Fixed Frequency Sample Time Period is set by a frequency.

Time Period = 1/Frequency (Hz)

If the Frequency is set to 0.25Hz, then the Time period will be 4 seconds (1/0.25)

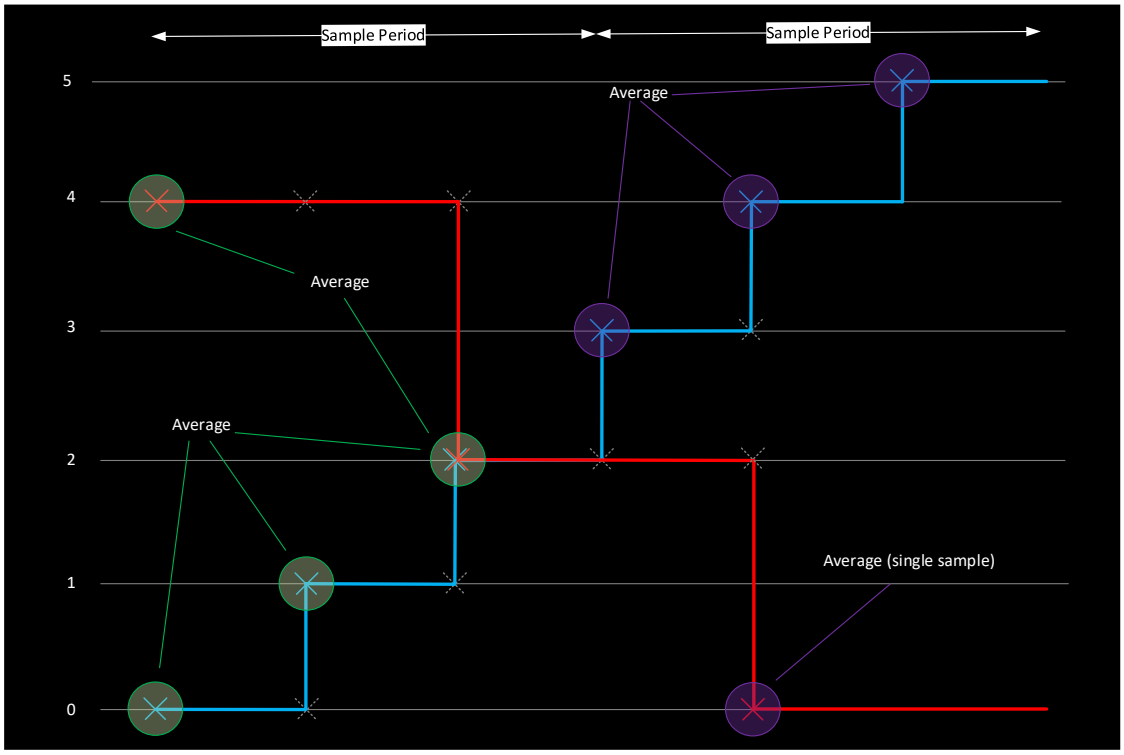
2.5.2 Fixed Sample Count Period Calculation

Fixed Sample Count Time Period is set by splitting up the Display Time range, into a number of samples.

Time Period = Display Time Range / Number of Samples

If the Display Time range is displaying 20 seconds of data (can be changed by Zoom Level), and the Number of Samples is set to 5, then the Time Period will be 4 seconds (20/5)

2.5.3 Example – Fixed Frequency and Fixed Sample Counts Mode - ATLAS 10



Time	X Parameter Value (Blue) 2Hz	Y Parameter Value (Red) 1Hz	X Co-ordinate plotted	Y Co-ordinate plotted
Sample Period 1 0-1.5 Seconds	0	4	(0+1+2) / 2 = 1.5	(4+2) / 2 = 3
	1			
	2	2		
Sample Period 2 1.5-3.0 Seconds	3		(3+4+5) / 2 = 6	0
	4	0		
	5			

In the above example Sample Period of 1.5 seconds could be achieved in both Fixed Frequency, or Fixed Sample Count

Time Period (Fixed Frequency) = 1 / **0.667Hz**

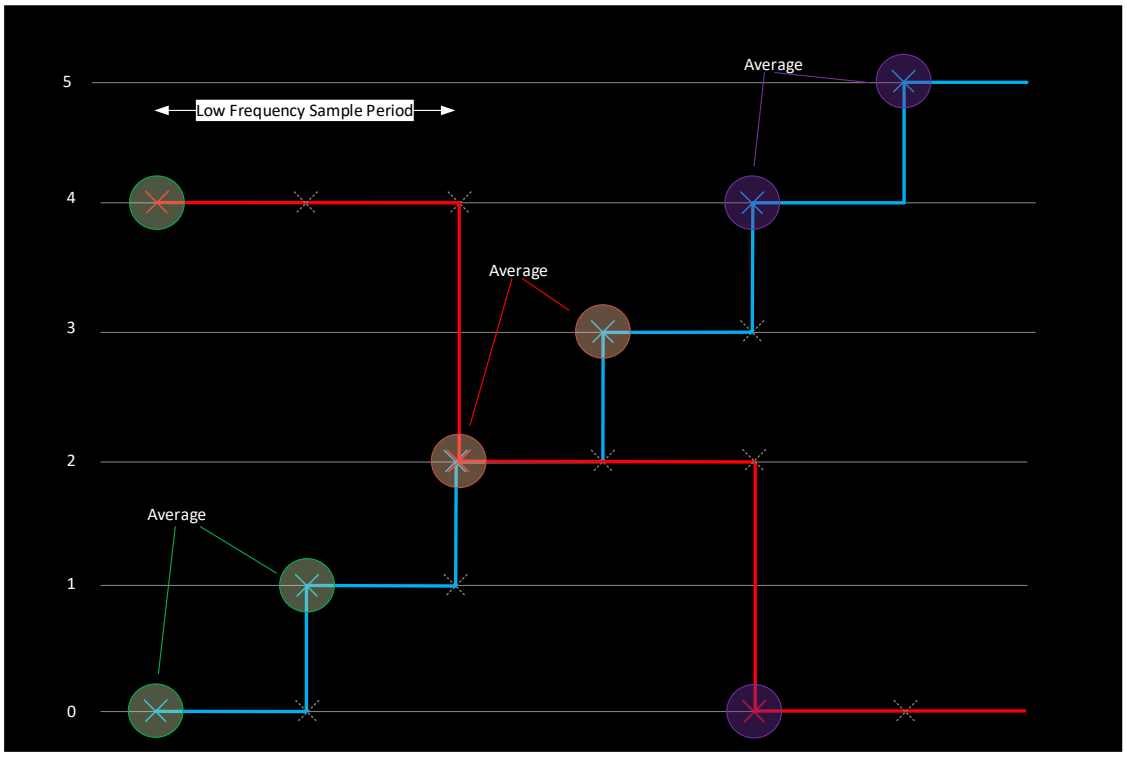
Time Period (Number of Samples) = 6 (seconds on display) / **2 (samples)**

3. Appendix

3.1 ATLAS <10.4.1 - All Samples Mode - OBSOLETE

In ATLAS version <10.4.1, All Samples mode worked slightly differently. Instead of using the Highest Rate parameter, each Sample of the Lowest Rate Parameter is taken, with higher rate parameters being **averaged** over the period between each Low Rate Parameter Sample. This means that the high rate co-ordinates are averages, and not necessarily real sample values.

3.1.1 Example – All Samples - ATLAS <10.4.1



Time	X Parameter Value (Blue) 2Hz	Y Parameter Value (Red) 1Hz	X Co-ordinate plotted	Y Co-ordinate plotted
0.0-0.5	0	4	(0+1) / 2 = 0.5	4
0.5-1.0	1			
1.0-1.5	2	2	(2+3) / 2 = 2.5	2
1.5-2.0	3			
2.0-2.5	4	0	(4+5) / 2 = 4.5	0
2.5-3.0	5			